

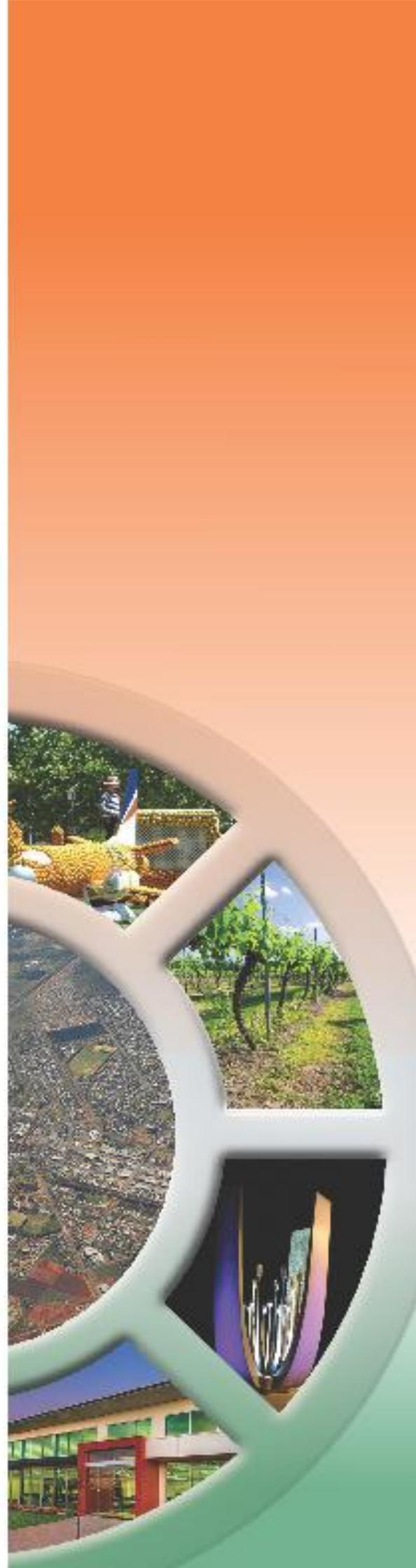


# Ordinary Meeting

**Tuesday, 24 March 2026**

## ATTACHMENTS UNDER SEPARATE COVER

- CL03 Submission from Griffith Tennis Club - Pickleball Facility**
- CL04 Review of Lake Wyangan Flood Study**



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## ATTACHMENTS UNDER SEPARATE COVER

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**EXECUTIVE SUMMARY:**

**Introduction:**

The Griffith Tennis Club has maintained and operated 15 tennis courts and associated facilities at our Noorilla Street location since the 1950s, catering for competition and social tennis for all ages, including the club's annual MIA Open Tennis Championships, Griffith's longest running sporting event.

**What is Pickleball?**

Pickleball is a fun paddle sport blending tennis, badminton, and table tennis, played on a badminton-sized court with a lower net, solid paddles, and a perforated plastic ball, suitable for all ages and skill levels due to its simple rules and social nature. Originating in the USA, Pickleball is now recognised as the fastest growing sport in Australia and across the globe.

**Community Support:**

With the sport's emphasis on social inclusion, the following have offered to supply Letters of Support for funding application purposes for the proposed development:

- Helen Dalton, NSW Member of Parliament for Murray
- Griffith Sports Council
- Griffith Aboriginal Medical Centre
- Murrumbidgee Regional High School – Griffith
- Marian Catholic College

**Development Proposal:**

Construct 2 x concrete-based 'Competition' courts and 1 x wheelchair-accessible court on the greenfield space at the north-west corner of the larger Jubilee Park precinct, situated alongside the tennis club's synthetic grass and clay courts.

The dimensions of the proposed courts are as per Pickleball Australia standardised construction guidelines (see Annexure B).

**Funding Proposal:**

Assuming appropriate approvals are granted, the one quotation received to date indicates a total build cost of approximately [REDACTED]. With the club's ongoing need to fund improvements and upgrades to the existing complex, our preferred funding option is:

- Government Grant [REDACTED] [REDACTED]
- Tennis Club Investment [REDACTED] [REDACTED]

However, with the competitive nature of the grant process, we do recognise that other funding arrangements may be required, such as a combination of:

- Government Grant;
- Tennis Club Investment; and
- Griffith City Council interest-free loan to complete.

**Goods & Services Tax (GST) Liability:**

- Griffith Tennis Club is a Not-for-Profit association and is not registered for GST purposes, and so would be required to pay the full GST cost on the development of approximately [REDACTED].
- This cost may be significantly reduced should the development be administered by Griffith City Council as having the ability to claim back GST imposts as tax credits.

**Griffith City Council Involvement / Support:**

As the land involved is identified as a Council Managed Crown Reserve set aside for sporting purposes, the tennis club committee is seeking the following support from the Council:

- Council applies for and administer applicable Federal and / or State Government grant applications / funds;
- Council compacts and gravel remaining greenfield space as suitable for all-weather public carparking; and
- Council to consider providing an interest-free loan to the tennis club to cover possible funding shortfall.\*\*\*

\*\*\* As a first principle, without a substantive degree of Federal and / or State Government grant funding being approved, this development proposal will not proceed as the tennis club:

- does not have sufficient funds to complete the total build on our own; and
- would struggle to fund our existing overheads, and meet the six-monthly repayments on a Council loan facility of any greater than say [REDACTED] over the maximum 10-year term allowable.

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**SUPPORTING INFORMATION:**

**LAND PARCEL**

The parcel of land identified for the proposed development is located at the north-west corner of the larger Jubilee Park precinct [Lot 7303 DP 1153581].

Per the below image of Jubilee Park, the area of proposed development would be approximately 65 metres long x 25 metres wide; situated alongside the tennis club's synthetic grass and clay courts.



 <p>Griffith City Council PO Box 400 1 Riverina Drive Griffith NSW 2880 Telephone: 08 836 8777 Email: <a href="mailto:griffith@griffithcity.nsw.gov.au">griffith@griffithcity.nsw.gov.au</a></p>	<p><b>Disclaimer:</b> This map is intended for general information purposes only. Griffith City Council does not guarantee its accuracy, completeness or suitability for any particular purpose. Users should exercise their own skill and care in using this map and carefully evaluate the accuracy, currency, completeness and relevance of the map before relying on it. This map is not a substitute for independent professional advice and, to the extent permitted by law, Griffith City Council will not be liable for any loss or damages arising out of any reliance on or use of information contained in this map.</p>		<p>Drawn By: <i>Ashtade</i> Projection: GDA94 / MGA Zone 55 Date: JANUARY 11 11 PM</p>	<p>Map Scale: 1:2932 at A4</p>
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### **NORTH GRIFFITH PRECINCT PARKS – PLAN OF MANAGEMENT**

Per Annexure C, Griffith City Council's 'North Griffith Precinct Parks' Plan of Management document dated July 2021 notes that Jubilee Park is:

- 1      Categorized as a **Sportsground** and defined as an area "where the primary use is for active recreation involving organised sports..."; and
- 2      A **Council Managed Crown Reserve** (R1010108), per Government Gazette dated 26 March 2004 for the purpose of Public Recreation to enable Council to issue user licences for specific areas, such as the Griffith Tennis Club facility.

The intent of the above plan is to:

- 1      establish a clear direction for the future development, planning and resource management by Council of the identified sites;
- 2      ensure that activities on Council Managed Crown Reserves "reflect the intent of the gazetted purpose...";
- 3      develop Jubilee Park to be reflective of community needs; and
- 4      contribute to Council's broader corporate goals as set out in the *Guiding Griffith 2040* Community Strategic Plan:

**Theme 2: Love the Lifestyle** (see page 8, figure 3)

"...building a community which promotes and facilitates and active and healthy lifestyle through provision of sporting and recreational facilities."

According to page 42 (Annexure 2) of the above plan, the construction of facilities, such as courts, at Jubilee Park would not be restricted by Native Title rights, Heritage Significance, or any environmental factors.

### **CURRENT USE OF LAND**

Page 24 of the above plan describes the area of land selected for the new development as "currently utilised as an overfill for informal parking."

It should be noted that the tennis club's property file held in Council's records includes an old plan of the tennis complex with a notation attached indicating the above overfill area was earmarked for future tennis courts (see Annexure D). However, it would appear that the subsequent User Licence issued to the tennis club had used our existing fence-lines to define the boundaries of the licence, i.e., the current licence does not include the overfill area.

The tennis club acknowledges the use of this overfill space for parking by other user groups, such as the local Rugby Union club.

The whole overfill area at the north-west corner of Jubilee Park is approximately 70 metres wide (facing Noorilla Street, to the adjacent tennis club fence-line) by 74 metres long (facing Campbell Street, to the Rugby Union kiosk building).

The tennis club would be seeking an extended user licence to include approximately one-third of this area for the Pickleball development, with the Council rendering the remaining overfill space as suitable for all-weather public carparking for user groups.

### **APPROVAL OF OWNER**

As the Jubilee Park precinct is designated as a Council Managed Crown Reserve and the proposed development aligns with the land's gazetted use it is assumed that, following applicable Development Application and public consultation processes, any approval forthcoming would be issued by the Council.

If approval is given, it is envisaged that the existing User Licence with the tennis club would be redrawn to include the new facility, with all associated rights and responsibilities under that licence extending to the new development.

### **COMMUNITY SUPPORT**

As stated in the Executive Summary, the following have offered to provide Letters of Support for funding application purposes:

- Helen Dalton, NSW Member of Parliament for Murray
- Griffith Sports Council
- Griffith Aboriginal Medical Centre
- Murrumbidgee Regional High School – Griffith
- Marian Catholic College

### **CONSTRUCTION – CONCEPT PLAN**

The Pickleball facility concept plan (see Annexure A) was developed by Griffith-based Architect, Steven Murray. This plan was devised early in discussions as a possible layout for the facility. While certain dimensions have since altered (see below), the concept plan still acts as a clear guide for the overall project.

Notes:

The initial plan allowed for 3 x wheelchair-accessible courts, situated end-on-end, alongside the tennis club's synthetic grass and clay courts.

According to Pickleball Australia guidelines, a wheelchair-accessible court is 22.55m long; three such courts would equal a total length of 67.65m, say 70m.

As indicated in the concept plan, the courts as initially proposed appear to be encroaching on the Rugby Union kiosk building; so, as a means of reducing the overall length of the surface area by near 8m, the plan has since evolved to the following end-on-end layout:

Two x 'Competition' sized courts (19.51m long each) and one x wheelchair-accessible sized court (22.55m long) for a total length of 61.57m, say 62m.

The width of all three courts would be 13.41m in accordance with Pickleball Australia guidelines for a wheelchair-accessible court.

A total surface area of 65m long x 25m wide for the whole development is proposed for ease of access, adequate seating and shading, fencing, and aesthetic appeal.

The proposed layout allows for access to the main tennis clubhouse via the existing corridor between the synthetic grass and the clay tennis courts. Should the proposal proceed, this corridor would be rendered accessible for wheelchair users.

The additional pickleball court included in the concept plan near the tennis clubhouse will not be proceeding at this stage or be forming part of any funding applications.

**CONSTRUCTION QUOTATIONS - BASIS**

Quotations requested were based on:

- Concrete slab 65 metres long x 25 metres wide;
- Construction of 2 x 'Competition' and 1 x wheelchair-accessible sized courts;
- External and Internal Fencing;
- Court lighting.

Other inclusions being considered:

- Adequate viewer seating and shading;
- Bubblers;
- Electronic booking system – suitable for online court hire bookings.

**CONSTRUCTION QUOTATIONS**

The tennis club has received just the one formal quotation to date, and is awaiting replies from other providers. However, for the purposes of this approach to the Council, the below quotation provides a reasonable illustration of the overall cost of the proposed construction (see Annexure E).

- 1 The Sports Court Builders Pty Ltd  
U10/31 Warehouse Circuit  
Yatala QLD



The overall cost proposed has been rounded up to [REDACTED] to include additional costs such as water and power connections.

**GOODS & SERVICES TAX (GST) LIABILITY**

- Griffith Tennis Club is a Not-for-Profit association and is not registered for GST purposes, and so would be required to pay the full GST cost on the development of approximately [REDACTED].
- As stated in the Executive Summary, the GST component of any such development could be significantly reduced should the build be administered by Griffith City Council as having the ability to claim back GST imposts as tax credits.

**FUNDING OPTIONS**

**Option 1:**

The tennis club's preferred funding option is:

- Federal and / or State Government grant [REDACTED] [REDACTED]
- Griffith Tennis Club Investment [REDACTED] [REDACTED] \*\*\*

**Option 2:**

It is recognised that due to the competitive nature of the grant funding process, a mix of the following funding sources may be required:

- Federal and / or State Government grant [REDACTED] [REDACTED]
- Griffith Tennis Club Investment [REDACTED] [REDACTED]
- Griffith City Council Interest-Free Loan [REDACTED] [REDACTED] % \*\*\*

**Option 3:**

Assuming no government funding is approved:

- Griffith Tennis Club Investment      [REDACTED]      [REDACTED]
- Griffith City Council Interest-Free Loan      [REDACTED]      [REDACTED]      +++

+++ As part of the User Licence agreement, the tennis club is responsible for the ongoing maintenance, refurbishment and upgrade of the club's courts and amenities. As such, the committee sets aside sufficient funding annually from our operating income to ensure significant works, such as replacement of synthetic grass courts, are properly resourced as and when needed.

With this requirement in mind, the tennis club can at present commit a maximum investment of [REDACTED] towards the proposed Pickleball development.

^^^ Based on the construction quotation held, for this development to proceed at all, the tennis club would need to receive at least [REDACTED] in government grant monies, meaning the club could require an investment of up to [REDACTED] from other sources to fill funding gaps; the most likely being a Griffith City Council interest-free loan facility repayable over a maximum term of 10 years via six-monthly instalments.

This arrangement is similar to the interest-free facility the tennis club had received from the Council in the 1990s for the construction of our clubhouse.

+++ This option is provided for illustration purposes only as a theoretically possible but financially unworkable scenario. A 10-year interest-free loan of [REDACTED] equals six-monthly repayments of [REDACTED] per annum), and would severely impact on our capacity to meet normal operating costs and to fund future upgrade of deteriorating assets.

**TENNIS CLUB FINANCIAL CAPACITY**

Tennis-related financials (see Annexure F):

	2021	2022	2023	2024
Income:	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Expenditure	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
<b>Net Income:</b>	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

The above financial summary is indicative of the cyclic nature of tennis in Griffith, with the number of participants playing being steadily building over the past two years with the commencement of new competitions, increased social hires, and recovering from the Covid-19 period.

Pickleball-related income (estimate only):

Based on the following competition-based scenario (not including potential social hires):

Three (3) x nights' play per week x 30 weeks per annum;

Three (3) x courts in operation per night;

Eighteen teams of 4 players per week (72 players per week);

█ fee per player per night (█ per week).

█ x 30 weeks:	█	
Less 30% maintenance costs:	█	
Sub-total:	█	
Less <u>Option 2</u> loan repayments:	█	▲▲▲
Net Income for future upgrades:	█	set aside per annum

This scenario takes a relatively conservative approach to the calculation of potential income from Pickleball activities in that it:

- 1 only allows for 3 nights of competition play per week;
- 2 envisages lower maintenance costs in comparison to our tennis courts (concrete pickleball surface versus clay / synthetic tennis surfaces); and
- 3 does not include any social court hires at other times (coded court access via a prepaid online booking system).

While it may take some time for Pickleball to grow into a sizeable presence in Griffith, the committee is confident that the tennis-related activities and potential pickleball income will combine to provide sufficient financial capacity to service a Council interest-free loan facility of up to █ over the maximum term of 10 years, should such a facility be required.

## **SOCIAL BENEFITS OF PICKLEBALL**

### **Pickleball Australia Association**

#### **Embracing Diversity**

Celebrate the diversity of the participants, recognising that each individual brings unique perspectives, skills, and stories to their community.

Embrace diversity in all its forms, including but not limited to race, ethnicity, gender identity, sexual orientation, age, ability, and socio-economic background.

#### **Creating Safe Spaces**

Dedicated to creating safe and supportive spaces where all participants can feel comfortable being their authentic selves. Discrimination, harassment, and bullying of any kind are not tolerated within our community, and we encourage open dialogue and mutual respect among all members.

#### **Accessibility**

Strive to make pickleball accessible to everyone, regardless of physical ability or mobility challenges. Facilities, programs, and events designed to accommodate diverse needs and ensure that all can participate fully and enjoyably in the game.

Everyone deserves the opportunity to enjoy the friendship, competition, and fun of pickleball in a welcoming and vibrant community where all participants can thrive.

### **PCYC NSW**

#### **Key Social Advantages:**

While the following is focused on the benefits to people over 50, Pickleball offers significant social benefits to all age groups by fostering community, combating loneliness, and improving mental well-being through easy-to-learn group play, encouraging laughter, new friendships, and strong support networks across generations, with its welcoming environment and built-in partner rotations making it ideal for meeting people and building connections.

#### **Combats Isolation:**

Its group nature and welcoming culture create belonging, reducing loneliness and feelings of depression, especially for older adults.

**Builds Community:**

Players often form deep friendships, creating support systems and a strong sense of community, with many groups socialising after games.

**Easy Connection:**

The game's simple rules and inclusive atmosphere make it easy for newcomers to jump in, meet diverse people, and find partners quickly.

**Multigenerational Interaction:**

The game naturally brings different age groups together, fostering respect, patience, and mentorship.

**Improved Mood & Stress Relief:**

Physical activity releases endorphins, while shared laughter and strategic play improve mood, lower stress, and boost overall life satisfaction.

**Encourages Communication:**

The proximity of players on the smaller courts promotes constant communication, teamwork, and social interaction.



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 Sydney Office P: 0432 791 577 E: l.murray@stevenmurrayarchitecture.com A: 100 Harris Street, Pyrmont NSW

The Builder shall check all dimensions and levels on site prior to construction. Notify any errors, discrepancies or omissions to the architect. Refer to written dimensions only. Do not scale drawings. Drawings shall not be used for construction purposes until issued for construction. All documents here within are subject to Australian Copyright Laws.

**PROJECT**  
 PROPOSED ALTERATIONS & PICKLEBALL COURT ADDITIONS TO THE GRIFFITH TENNIS CLUB: NOORILLA STREET, GRIFFITH NSW  
**CLIENT:** GRIFFITH TENNIS CLUB  
**JOB No.** **SCALE** 1:500 ON A3 **DATE** NOV. 2025  
**DESIGNED** SM **DRAWN** SM **CHECKED** SM

**CONSULTANTS**

**REVISION NO.** **REVISION DATE** **REVISION DESCRIPTION**

**DRAWING NUMBER**  
 A01- PROPOSED SITE PLAN  
**ISSUE**  
 NO. 2  
 NOT FOR CONSTRUCTION

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*Annex B: Pickleball Aust Guidelines*

**Urbankind**

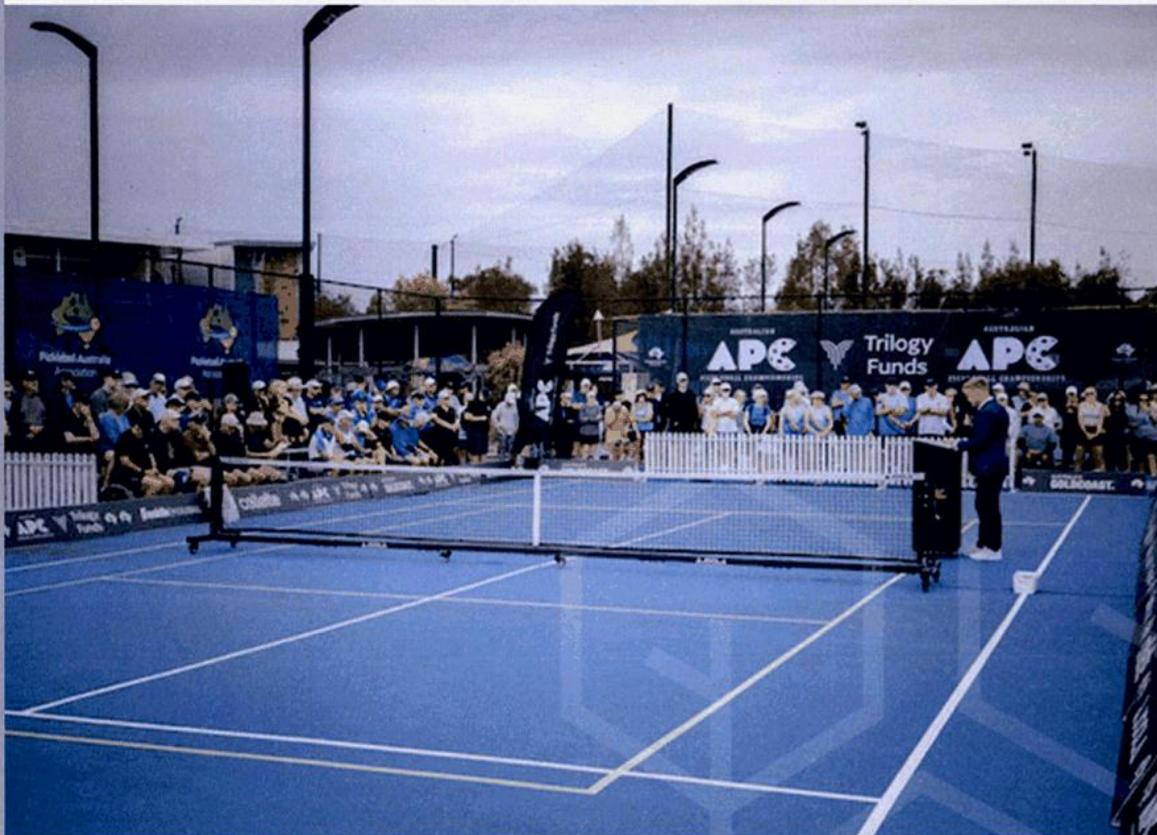


**Pickleball Australia  
Association**

**Prepared by**  
Urbankind

**Prepared for**  
Australia Association

# **Pickleball Australia Facility Guidelines**





Pickleball Australia  
Association

Urbankind



Pickleball Australia Association and Urbankind acknowledge the Traditional Custodians of Country throughout Australia and their continuing connections to land, waters, skies, and communities. We pay our respects to Elders past and present and extend that respect to all Aboriginal and Torres Strait Islander peoples. We recognise their enduring cultural and spiritual relationship with the lands on which we play, gather, and grow the sport of pickleball.



## Disclaimer

The Pickleball Australia Association Facility Development Guidelines ("the Guidelines") are provided for informational purposes only and do not constitute legal or professional advice. Users of these Guidelines do so at their own risk and discretion.

Pickleball Australia Association does not warrant the accuracy, completeness, or currency of the information contained within these Guidelines. The Guidelines are subject to change without notice and may not reflect current standards, regulations, or best practices in facility development.

Users must comply with all applicable federal, state, and territory laws, regulations, and building codes, including but not limited to the Building Code of Australia (BCA), the National Construction Code (NCC), and relevant Australian Standards. The user is responsible for ensuring compliance with all current legal requirements and obtaining appropriate professional advice.

The planning, design, and construction of pickleball facilities should only be undertaken with the guidance of qualified professionals, including architects, engineers, and construction specialists. These professionals should be consulted to ensure that all aspects of facility development adhere to current standards, regulations, and best practices in risk management in your State and Territory.

Pickleball Australia Association expressly disclaims all liability for any loss, damage, or injury arising from the use of or reliance upon these Guidelines. Users are strongly advised to implement comprehensive risk management strategies throughout all stages of facility planning, development, and construction.

By using these Guidelines, you acknowledge and agree that Pickleball Australia Association shall not be held responsible for any errors, omissions, or consequences arising from your use of or reliance upon the information contained herein. Users of the guidelines are advised to verify and consult the most recent standards and legislative updates before commencing any project. Reliance on this document is at your own risk, and no aspect of these Guidelines should be considered a substitute for site and project-specific professional advice.

Users of these Guidelines acknowledge that compliance with the referenced standards and statutory requirements is their sole responsibility. Pickleball Australia, its officers, and affiliates expressly disclaim any liability for direct, indirect, or consequential loss or damage arising from the use or reliance upon the information provided herein.



Pickleball Australia  
Association

Urbankind

## Letter from the EO

Welcome to the Pickleball Australia Facilities Guidelines, a user friendly guide to help shape the future of Pickleball Facilities in Australia.



The unprecedented growth of Pickleball has seen the Pickleball Australia membership skyrocket from just over 4,000 in 2023 to an impressive 17,000 members in February 2025. There is an urgent need for well-planned and strategically located Pickleball facilities across Australia.

The accessibility and inclusive nature of Pickleball has made it a favourite among Australians of all ages and abilities with over 92,000 players nation wide in 2024. From seniors looking to stay active, to young athletes aspiring to compete professionally, Pickleball has something for everyone. This diversity in our player base necessitates a thoughtful approach to facility development that caters to various skill levels and community needs. In 2024 there were over 380 Pickleball facilities across Australia, 62% of those facilities are indoors or undercover and 32% are outdoor. Eighty percent (80%) of facilities have permanent line marking, and 20% of facilities are played on with temporary lined courts with tape, chalk, or drop downs. The most common surface is an indoor timber surface, followed closely by a hard court surface.

The guidelines will assist local governments, sporting organisations, facility operators, and community groups in planning, designing, funding, and implementing Pickleball facilities to meet their specific needs for indoor and outdoor facilities.

As Pickleball Australia look to the future, this resource will:

- guide local governments in their sports infrastructure planning, policy and strategy.
- assist clubs and associations when upgrading existing facilities.
- support funding applications for new Pickleball court developments.
- ensure consistency and quality in Pickleball facilities nationwide.

Let's work together to build a strong foundation for Pickleball in Australia, ensuring we create spaces where players can connect, compete. Together, we're building more than just courts – we're creating communities and changing lives through sport.



Executive Officer - Brendan Lee  
Pickleball Australia



PICKLEBALL AUSTRALIA

# Facility Guidelines

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# 01 Pickleball in the Australian context



Australian Facility Guideline



# 01 Introduction



The pickleball Facility Development Guidelines provide a comprehensive framework for Local Government to facilitate the growth and development of pickleball facilities across Australia. The guidelines will ensure that new and converted facilities meet international standards, promote safety, and support the increasing demand for pickleball.

## PURPOSE OF THE PICKLEBALL FACILITY DEVELOPMENT GUIDELINES

As one of the fastest-growing sports gaining popularity in Australian cities and regional areas, the guidelines will establish a clear and consistent framework of the preferred approach for planning and design of pickleball courts. Ensuring compliance with international regulations and best practices, provide specifications for court dimensions, net heights, and surface materials to ensure uniformity and quality across all facilities.

## CONVERSION OF EXISTING FACILITIES

The guidelines provide advice to efficiently convert existing indoor and outdoor sporting facilities into Pickleball courts, maximising the use of current infrastructure such as existing hard surface courts, and underutilised sporting or public spaces. Guidance for temporary, Pop-Up and permanent conversions helps identify and address common challenges and solutions.

## SAFETY AND ACCESSIBILITY

The importance of safety in design is emphasised, including but not limited to proper court orientation to avoid sun glare, adequate spacing between courts, and the use of appropriate barriers and fencing. This ensures that facilities are accessible to players of all ages and abilities, promoting inclusivity and community engagement.

**NOTE:** This is not a Technical Design manual. This resource is designed to inform planning, design considerations and support funding applications.

Detailed technical elements require site-specific investigations, relating to ground conditions, site constraints, existing infrastructure, user groups needs.

## SUPPORT FOR LOCAL GOVERNMENT

The guidelines provide local governments with the tools and knowledge to support the planning and development of pickleball facilities, including master planning, equipment solutions, partnership models with community stakeholders and grant opportunities. Case studies and international best practices are provided to inspire and guide local efforts.

## SUPPORT THE GROWTH OF PICKLEBALL

The guidelines will encourage the development of recreational and competitive facilities to cater to the diverse needs of the pickleball community.

Support local, regional, and national tournaments, foster a vibrant pickleball culture, and attract tourism. The higher level community and social benefits of pickleball facility investment (including increased activation, usage of public spaces, and revenue from tournaments) improves community health, increase social interaction, and more active lifestyle.

# Need for the guidelines

Welcome to the Pickleball Australia Facility Development Guidelines. The guidelines are designed to assist Local Government, community members, operators, and clubs to effectively plan and develop pickleball facilities across Australia. An outline on how to navigate this guide to ensure a successful development process and identify where to start is provided below.



## TECHNICAL REQUIREMENTS

The first step is to familiarise yourself with the technical requirements for constructing or converting a pickleball facility. By understanding these technical specifications, you can make informed decisions regarding site selection and facility design.

REFER SECTION 02 FOR TECHNICAL RECOMMENDATIONS.



## INFORM YOUR PLANNING & DESIGN

Utilise the guide to inform your planning and design process effectively. A structured approach will help you create a comprehensive plan that addresses community needs while achieving a design outcome that meets desired facility standards for Pickleball in Australia.

REFER SECTION 04 FOR MORE INFO.



## SUPPORT COMMUNITY ENGAGEMENT

Community engagement is key to the success of your facility planning, design, development, and operations. The guidelines foster open communication, build community support and enhance your pickleball facility's success and growth.



## UNDERSTANDING COSTS

Understanding the financial implications of facility development is crucial. The guidelines identify the essential infrastructure requirements to develop initial costs and Indicative budgets to support funding opportunities.

REFER SECTION 02-09 TO ESTABLISH YOUR REQUIREMENTS



## GROWING PICKLEBALL IN YOUR AREA

Promoting the sustainable growth of Pickleball across Australia via a 3-step approach:

- **Develop or Convert Facilities:** Identify unused spaces, green or brownfield sites, suitable for pickleball facilities.
- **Activate Pop-Up Facilities:** Consider temporary installations or pop-up courts in community parks or event spaces to introduce pickleball to new audiences.
- **Host Events and Tournaments:** Organise local tournaments and community events to raise awareness and encourage participation in pickleball.

By implementing these strategies, you can create a thriving pickleball culture that attracts new players and fosters community engagement.



### IMPORTANT - PLEASE READ

Using the Pickleball Facility Development Planning Guide is essential for anyone involved in developing pickleball facilities in Australia. By following and understanding critical requirements, we hope we can inform your planning and support the pickleball community in developing funding proposals and growing the game. By using this guide you will be well-equipped to create successful and sustainable pickleball venues that serve your community for years to come. Happy planning!

# 02 Pickleball Facility Hierarchy



Australian Facility Guideline



There are four (4) categories of pickleball facilities across Australia. This hierarchy is designed to assist Local Government and Operators in planning and designing a facility best suited for their community needs. Helping to plan for growing demand of pickleball facilities and courts across Australia.

### 01 SOCIAL AND COMMUNITY

These facilities cater to casual and recreational players, providing accessible and informal environments for social play. Social and Community Facilities cater to the largest participation in pickleball in Australia.

**Description:**

Typically found in public spaces, community centres, schools and residential areas. They are designed to be easily accessible to the general public.

### 02 CLUBS AND CENTRES

These facilities are for regular Pickleball players who seek a structured environment for practice, training, and social interaction within a club or commercial setting.

**Description:**

Typically found within sports clubs or dedicated pickleball clubs, these facilities offer a higher standard of amenities and may require membership.

### 03 COMPETITION

These facilities are designed to host local and regional tournaments and require higher standards to accommodate competitive play and larger crowds. These are typically found in larger more professionally run clubs or centres.

**Description:**

These are specialised venues that adhere to stringent specifications to support competitive play, including local and regional tournaments, and associated amenities.

### 04 ELITE AND NATIONAL

These top-tier facilities are designed for professional-level events, national and international competitions, and major activations.

**Description:**

These facilities are equipped to host large-scale events, including national championships and international tournaments, and often serve as flagship venues for the sport.

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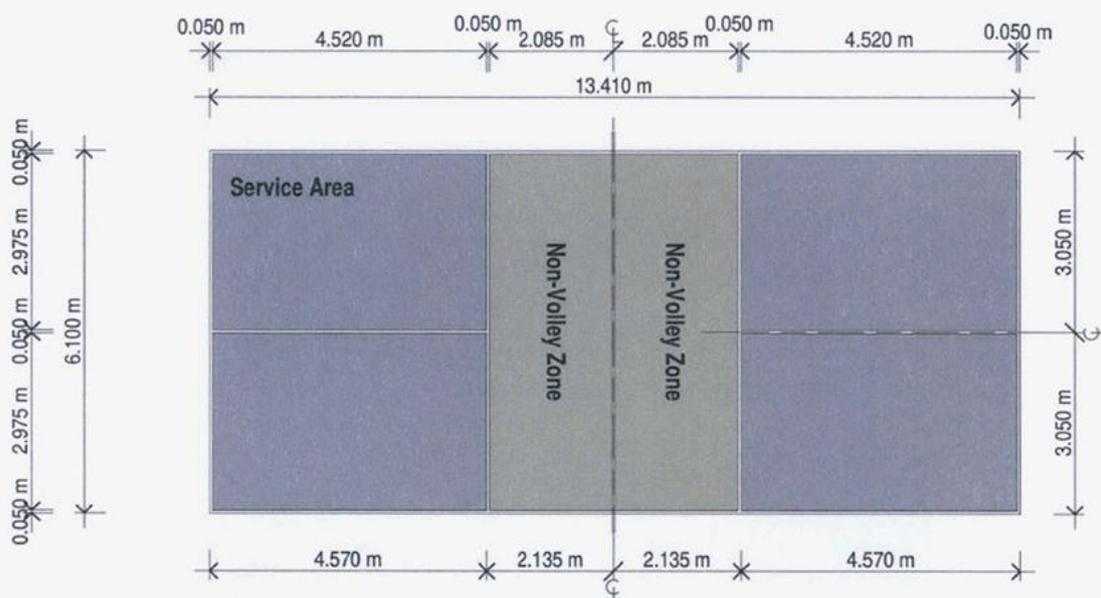
# 03 Pickleball Court Dimensions



Australian Facility Guideline



# 3 Standard Pickleball Court Dimensions



**STANDARD DIMENSIONS OF A PICKLEBALL COURT (REQUIRED LINE MARKINGS AND LENGTH)**

## Description

A standard pickleball Court in Australia is 13.41m by 6.10m.

### KEY FEATURES:

- NET HEIGHT: 91.4 cm at the ends & 86.4 cm at the center.
- LINE WIDTH: All lines should be 5cm wide
- NON- VOLLEY ZONE - on either side of the net of 2.135m and a Service area of 4.570m.
- SERVICE AREA - is divided into two equal areas of 3.050m.

The run off dimensions vary depending on the type of play, context and site, specific considerations

## Standard Pickleball Court Essentials

- Basic court amenities (nets, posts) - pop up court nets are possible and encouraged to minimise the barriers to access to pickleball where budgets don't allow yet for permanent infrastructure.
- Line Markings - multi purpose permanent or temporary lines must be a contrasting colour to the court surface. For multi-purpose courts, use colours in the same family as the court surface.
- Minimal fencing.
- Basic lighting (optional).
- Informal seating areas.

## Specifications for run off areas

### RUN OFF DISTANCES

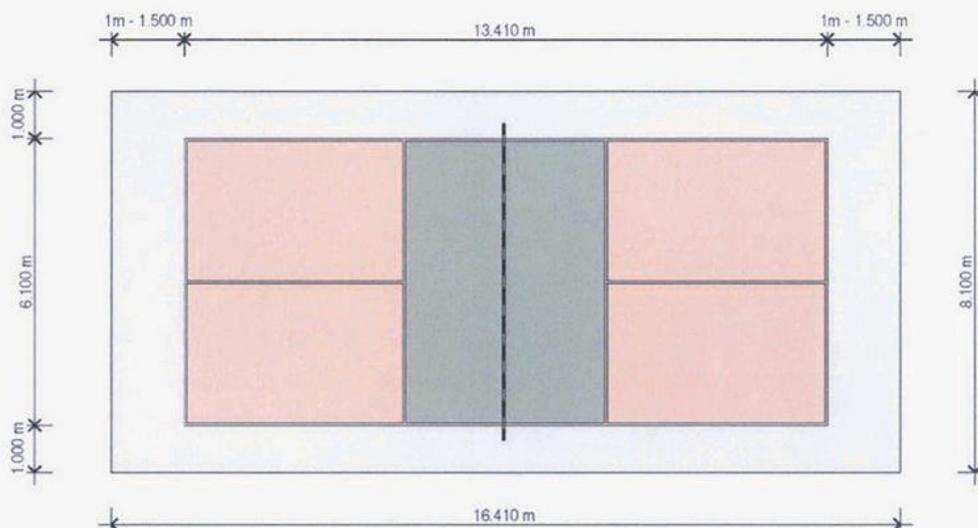
The run off distances will depend on the type of facility you are planning. Social and community courts can work with smaller run off areas safely.

The preferred run off areas and separation between adjacent courts are provided within the guide. Specific recommendations are included for social and community facilities, competition and elite, to ensure player safety.





# Social & Community Facilities



**SUGGESTED TOTAL PLAYING AREA FOR SOCIAL PLAY COURTS: 16.4M X 8.1M**

## Description

These facilities cater to casual and recreational players, providing accessible and informal environments for social play. Social and Community facilities support the largest participation in pickleball in Australia.

### DESCRIPTION:

Typically found in public spaces, community centres, schools, and residential areas, they are designed to be easily accessible to the general public.

## Features

- Basic court amenities (nets, posts)
- Line Markings + multi purpose
- Minimal fencing (refer Section 6 for recommended specifications)
- Basic lighting (refer Section 6 for recommended specifications)
- Informal seating areas
- Typically No dedicated staff or facilities management required
- Predominantly volunteer run integrated with landscaping, play spaces, and other sporting uses
- Equipment and amenity recommendations are provided in Section 7

## Safety

### PROPER FOOTWEAR:

Players should wear court shoes to prevent injuries.

### COURT MAINTENANCE:

Regular inspections and maintenance to ensure the playing surface is free of debris and hazards

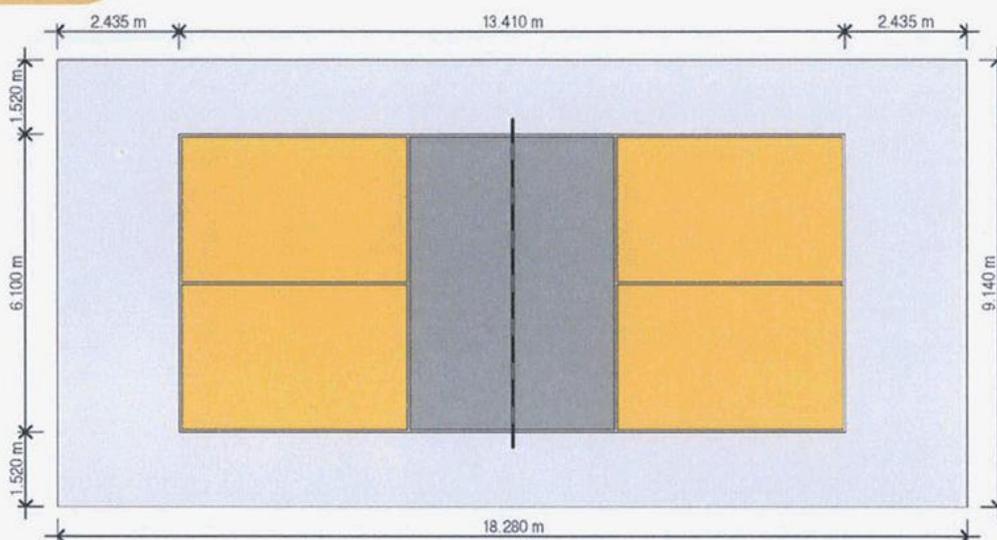
### SHADE AND WATER:

Providing shade and access to water is desirable





## Clubs & Centre Facilities



**SUGGESTED TOTAL PLAYING AREA FOR CLUB & CENTRE COURTS: 18.28M X 9.14M**

### Features

- Multiple courts (indoor or outdoor) with standard dimensions, adaptable for various levels of social to competition play
- May vary in size and court numbers based on metro or regional and population
- Court lighting or in strategic plan
- Clubhouse with amenities (bathrooms, changing rooms, social space, competition management area equipment storage)
- Regular maintenance and management program
- Organised events and leagues and pending size can host tournaments

Australian Facility Guideline

### Specifications

#### DISTANCE BETWEEN COURTS

The distance between adjacent courts should be:

- Where practical 3.05 meters.

#### RUN-OFF AREAS AND SAFETY

Focus is on accessibility and safety. The recommended run-off areas are:

- Side Run-Off: At least 1.52 m
- Rear Run-Off: At least 2.435 m

#### LIGHTING AND FENCING

Refer to Section 6 for lighting and fencing recommendations

#### AMENITY AND EQUIPMENT

Refer to Section 7 for amenity and equipment recommendations

### Safety

#### PROPER FOOTWEAR:

Players should wear court shoes to prevent injuries.

#### COURT MAINTENANCE:

Regular inspections and maintenance to ensure the playing surface is free of debris and hazards.

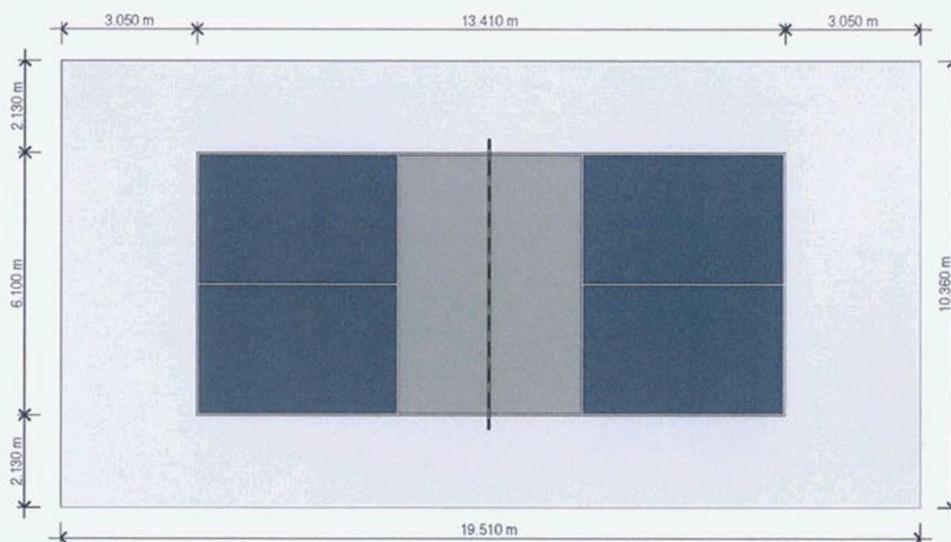
#### SEPARATION FOR CONCURRENT PLAY:

Additional separation or suitable barriers are required if Pickleball is played concurrently on adjoining courts with a different orientation to ensure safety for players





# Competition Facilities



**SUGGESTED TOTAL PLAYING AREA FOR CLUB & CENTRE COURTS: 19.51M X 10.36M**

DESIGNED TO HOST LOCAL AND REGIONAL TOURNAMENT AND REQUIRE HIGHER STANDARDS TO ACCOMMODATE COMPETITIVE PLAY AND LARGER CROWDS. THESE ARE TYPICALLY LARGER MORE PROFESSIONAL RUN CLUBS OR CENTRES.

## Features

- Permanent nets and posts
- Line markings permanent
- Fencing to reduce ball and player conflicts
- Quality lighting
- Informal seating areas
- Dedicated staff or facilities management required
- Predominantly operator run with volunteer club integration
- Player and spectator shade, on and off court

## Specifications

### DISTANCE BETWEEN COURTS

The distance between adjacent courts should be:

- At least 3.05 meters.

### RUN-OFF AREAS AND SAFETY

Focus is on accessibility and safety. The recommended run-off areas are:

- Side Run-Off: At least 2.13m to 3.05 m
- Rear Run-Off: At least 2.54m to 3.05 m

### LIGHTING AND FENCING

Refer to Section 6 for lighting and fencing recommendations

### AMENITY AND EQUIPMENT

Refer to Section 7 for amenity and equipment recommendations

## Safety

### PROPER FOOTWEAR:

Players should wear court shoes to prevent injuries.

### COURT MAINTENANCE:

Regular inspections and maintenance to ensure the playing surface is free of debris and hazards

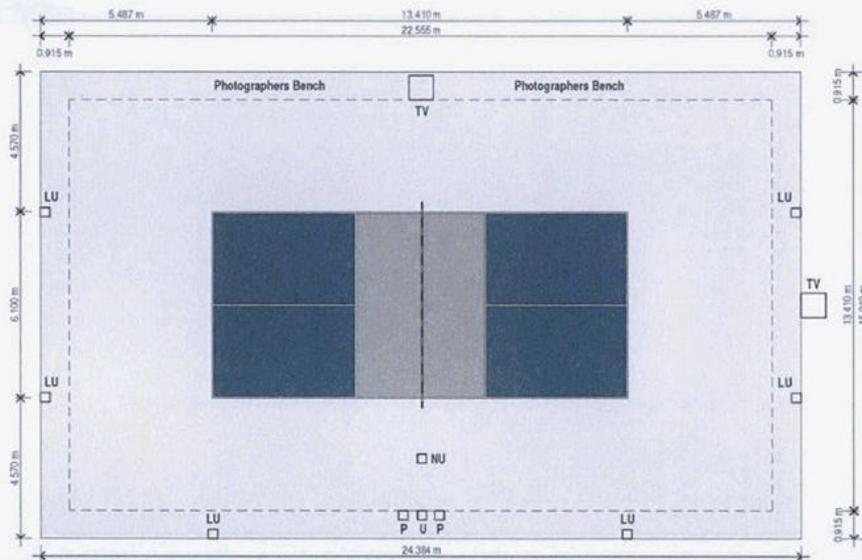


## TIPS

Clubs and Centres may incorporate a mix of social and competition size Pickleball courts into their facilities. Refer to dimensions to ensure suitability



# Elite & National Facilities - Showcourt



**SUGGESTED TOTAL PLAYING AREA FOR ELITE SHOWCOURTS: 15.24M X 24.38 M**

## Features

- Permanent court amenities (nets, post sleeves)
- Line Markings + multi purpose + permanent
- Minimal fencing to provide optimal spectator viewing
- Broadcast to streaming level lighting
- Formal or bump in spectator seating areas
- Ideal for elite and professional level event facilities.

## Specifications

### RUN-OFF AREAS AND SAFETY

Focus is on accessibility and safety. The recommended run-off areas if creating a dedicated show court are:

- Side Run-Off: At least 4.57m
- Rear Run-Off: At least 5.487m

A Show Court is required for elite facilities, designed to support professional-level events, national and international competitions, and major activations.

The overall facility is commonly designed around a standalone showcourt.

## Specifications

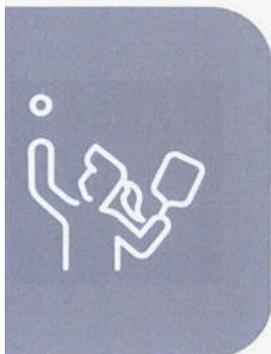
### STANDALONE COURT FEATURES

Showcourts feature a non-slip acrylic surface with UV-resistant coatings to ensure durability and consistent ball bounce.

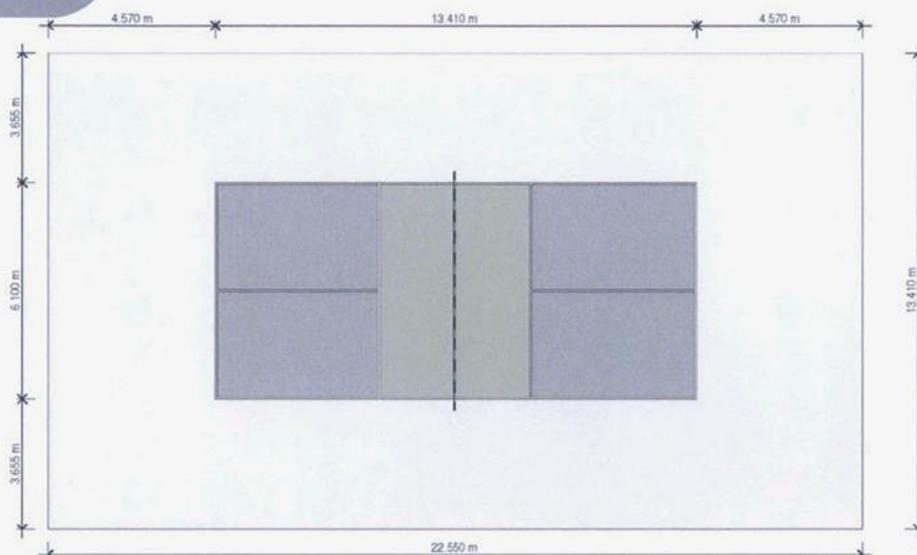
They can be roofed to provide player, and spectator comfort, and provide year round play.

On court amenities such as commentary, courtside viewing, and player rest areas are critical design elements, and are factored in to the suggested run off requirements.





# Accessible Pickleball Facilities



**SUGGESTED TOTAL PLAYING AREA FOR WHEELCHAIR PICKLEBALL COURTS: 22.55M X 13.41 M**

## Features

- Large gate and entry access
- Ample space around the court for wheelchair movement
- Visible signage and wayfinding indicating wheelchair-accessible access to courts
- Wide, unobstructed pathways leading to and around the court
- Accessible planning from the carpark, to the facility entry to the courts, and associated amenities.
- As the popularity of pickleball continues to grow, it is essential to ensure that the sport is accessible to everyone, including those who require support with accessibility.

## Specifications

### COURT DIMENSIONS

Recommended playing surface area: 13.41 m wide by 22.55 m long

Ensure that all entry and exit points to the court are wheelchair accessible, with ramps that have a slope ratio of 1:12 or less.

### RUN-OFF AREAS AND SAFETY

Focus is on accessibility and safety. The recommended run-off areas are:

- Side Run-Off: At least 3.65m
- Rear Run-Off: At least 4.57m

## Safety

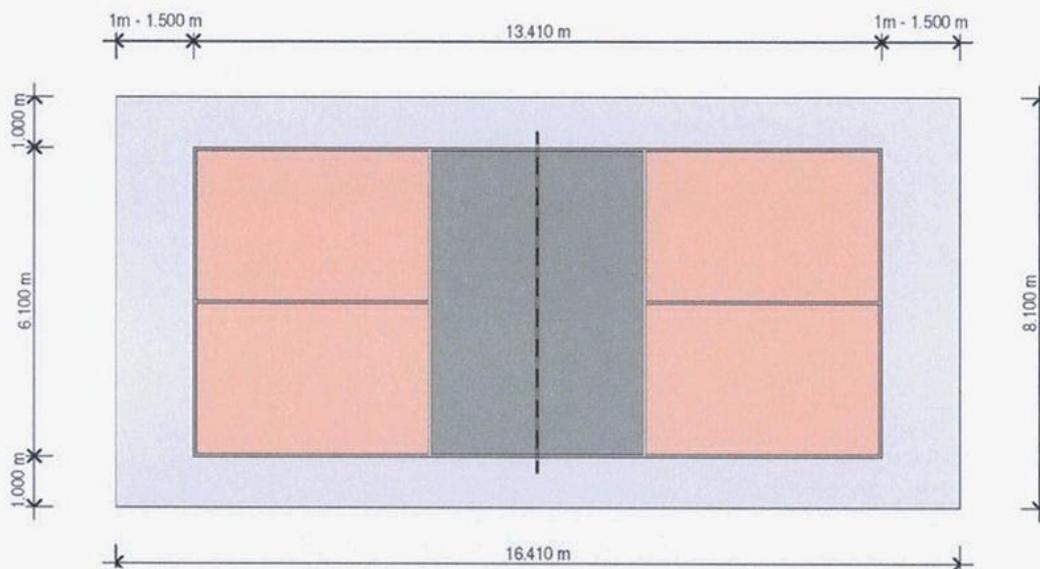
### COURT MAINTENANCE:

- Surface must be smooth, level, and free of debris or obstacles
- Use slip-resistant, stable materials for the court surface
- Install ramps or sloped entrances compliant with guidelines for wheelchair access
- Clear court boundaries with high-contrast markings for visibility
- Ensure wide, unobstructed pathways leading to and around the court





# Pop Up Pickleball Facilities



**SUGGESTED TOTAL PLAYING AREA FOR SOCIAL PLAY COURTS: 16.4 X 8.1M**

### Features

- Basic court amenities such as portable, easy-to-assemble net systems
- Ideal for activations and social play, where permanent courts are not practical, or to align to a site specific event opportunity.
- Line markings + multi purpose + permanent
- Design for versatility across different venues (e.g., conferences, corporate events, businesses)

### Specifications

Standard pickleball court size

Suggested 1m run offs on all sides

**RUN-OFF AREAS AND SAFETY**  
Use temporary marking methods such as

- Floor or surface tape
- Chalk
- Drop down lines
- Washable spray paint
- Removable tape
- Ensure high contrast between court lines and surface for visibility

### Safety

Allow for additional space around the court for player movement and safety

Provide ample space around the court for player movement.

A suggested 1m buffer is outlined, however each facility and operator will conduct their own risk assessment, based on the layout requirements.

Use temporary barriers, sponsor signage or fencing to contain balls



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# 04 Planning and Design Considerations



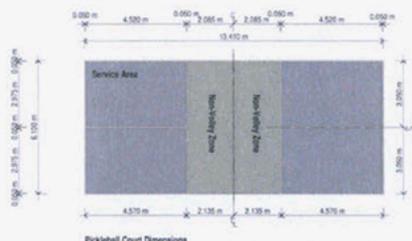
Australian Facility Guideline



# 4 Planning and Design Considerations

There is a universal size for a pickleball Court, the run off dimensions vary depending on the type of play, context, and site specific considerations. The guidelines provide recommendations for optimal design for social and community, club and centre based, competition and elite facilities, and should be considered in the context of the site and operational model.

### STANDARD PICKLEBALL COURT DIMENSIONS.



The official dimensions for a pickleball court are:

**LENGTH 13.41 meters**

**WIDTH: 6.10 meters**

**NET HEIGHT: 91.4 cm at the ends & 86.4 cm at the center.**

**LINE WIDTH: All lines should be 5cm wide**

**LINE MARKING: Lines must be a contrasting colour to the court surface. For multi-purpose courts, use colours in the same family as the court surface**

### FACILITIES MAY HAVE SEVERAL SIZE COURTS

Some larger clubs and centres may integrate several sizes of pickleball courts to optimise the level of play. Social play courts maximise space for community participation. Competition courts require more run off space but support the growth of pickleball and player progression.

The guidelines provide optimal run offs for social, competition, elite, and accessible Pickleball Courts, these are designed to be flexible and can be modified to suit your facility.

Additional separation or suitable barriers may be required if pickleball is to be played concurrently with sports on adjoining courts with a different orientation to ensure safety for players on surrounding courts.

The run off areas are proposed with flexibility in mind. The context of each site will allow some flexibility for minor modifications to the run off areas relative to the level of play expected on the courts, and safety considerations.

**START WITH THE END IN MIND**  
Undertake a thorough site assessment to establish the level of play and operational requirements to ensure suitable space allocation.

**IMPORTANT - PLEASE READ**  
Often people overestimate how many courts can safely be provided at a facility. Consider suitable run off space to ensure safety of players and participants.

# Options to support the growth of pickleball in your community

## Pop up basic set up in public spaces and places

**Encourage line marking on existing infrastructure in public spaces (public open space, car parking, and parks)**



- Pickleball line marking enables participants to turn up and play at any time
- Participants BYO net, paddle and balls
- Very accessible for social and community play
- Publicly accessible and low cost opportunity to increase participation and awareness of Pickleball

## Shared use of existing sport facilities

**Line marking on existing facilities to create shared use/multi sport opportunities (indoor centres, netball and tennis courts)**



- Opportunities to make more efficient use of existing sporting facilities
- Integrate pickleball into complementary existing indoor/outdoor facilities (permanent lines or temporary lines for pop up events and activations)
- Cost effective, with shared infrastructure, management and operating costs
- Greater community connection and engagement

## Purpose built pickleball facilities

**Facilities where pickleball is the predominant sporting use on the site.**



- Multiple courts in one location and purpose-built amenities, these venues can accommodate large numbers of players and visitors.
- Offer the significant advantage of year-round play.
- Dedicated environment for enthusiasts, fostering a sense of community among players.
- Support the growth of pickleball across the region

## Competition ready pickleball facilities

**Competition, elite and tournament pickleball facilities not only elevate the playing experience but also contribute to the growth and professionalisation of the sport**



- Capability enhances the facility's reputation and creates additional revenue streams through tournament, secondary spend, and regional visitation.
- Facilities include a range of amenities designed to support both players and spectators
- The ability to reconfigure court setups to accommodate different tournament formats and player numbers

# 05 Converting facilities for Pickleball



Australian Facility Guideline



# 5.1 Converting Facilities for Pickleball

**As a rapidly growing emerging sport in Australia, stand alone pickleball facilities are often hard to establish. In the short to medium term, converting existing under utilised sport facilities or retrofitting complementary facilities for shared use by pickleball is likely to provide the largest growth in facilities.**

## MAKING THE MOST EFFICIENT USE OF EXISTING SPORT AND RECREATION FACILITIES

Local Government in Australia is the largest provider of sport and recreation facilities. Most council's are under pressure with limited land availability for new sporting precincts and are looking to ensure existing facilities are being used efficiently. Indoor and outdoor multi use facilities will play a large roll in facilitating the growth of pickleball in the short to medium term as the sport matures and demand grows for stand alone facilities.

Pickleball presents a unique opportunity to activate and utilise sporting facilities in complementary times to the peak times of many sports for social play.

Consideration needs to be given to how the shared use arrangements will work from an operational perspective. Some Council Tenure/Lease/User Agreements provide exclusive use terms and others allow council to hire out to other clubs/sports for use outside of peak times.



Alternatively negotiations with individual clubs and operators for shared use of facilities presents a good opportunity to facilitate the growth of pickleball across Australia. This is a great low cost way to build demand for pickleball in your local area.

The intent isn't for pickleball to take over facilities but rather to share facilities in peak times or to grow into underutilised facilities as a pathway to support the growth of pickleball and build the demand for stand alone facilities

These guidelines provide an overview of the key considerations when converting facilities for shared use by pickleball. Guidance is provided on the conversion of the following courts: Netball, Basketball, Tennis, Badminton, and Volleyball, and provide recommendations for optimal court utilisation for player safety and comfort for social play.



### REDLANDS NETBALL/PICKLEBALL

Netball courts in Redlands are used for training and game day play.

Their peak usage is 3-4 nights a week and one day on the weekend. Redlands user agreements allowed them to give Pickleball use of the facility during the day, 3 nights a week and one day on the weekend.

## 5.2 Converting Netball Courts for Pickleball

**Critical Design Elements:** You can fit up to four pickleball courts on one netball court, depending on the layout, circulation spaces and requirements of users at the specific facility. This section provides guidance to support planning and layout based on your individual facility needs

### When designing the layout:

- Position pickleball courts within the netball court to maximise space utilisation.
- Depending on the netball court size, you may be able to fit up to four pickleball courts on one netball court.
- Ensure adequate space between pickleball courts for safe play.
- Maintain appropriate run-off areas for both sports
- Netball requires a minimum run-off area of 3.05 meters on all sides, and has umpires using the outside of the court area officiating from goal to goal.
- Ensure that the run-off areas for both sports are free of obstacles and maintain the same surface type as the court for player safety.
- Install fencing or netting around the perimeter of the netball court to contain balls for both sports.
- Use distinct colors for each sport's lines, which are both typically 5cm to 5.08cm in width.
- Ensure that the run-off areas for both sports are free of obstacles and maintain the same surface type as the court for player safety.

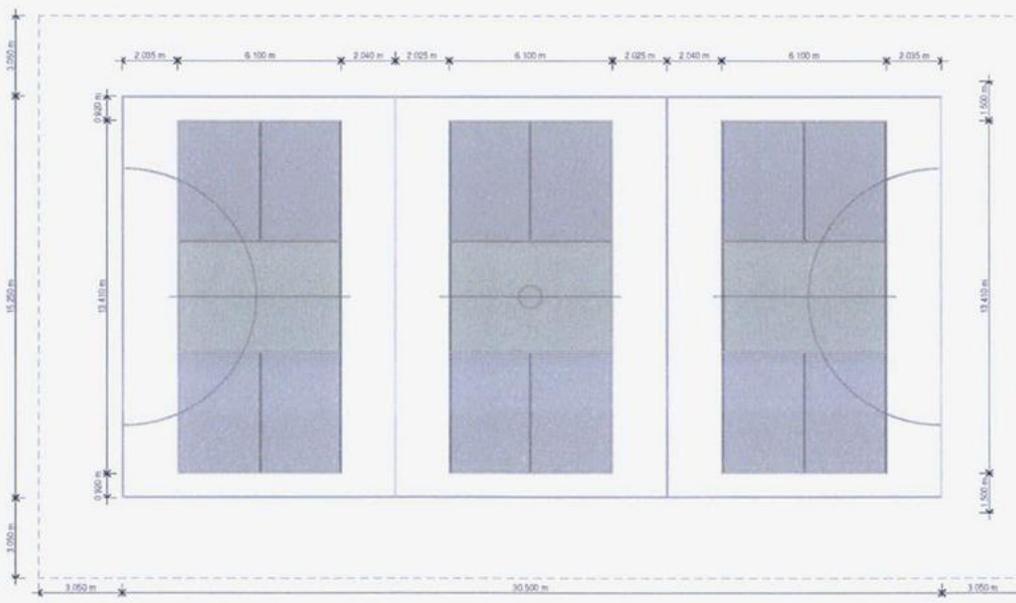
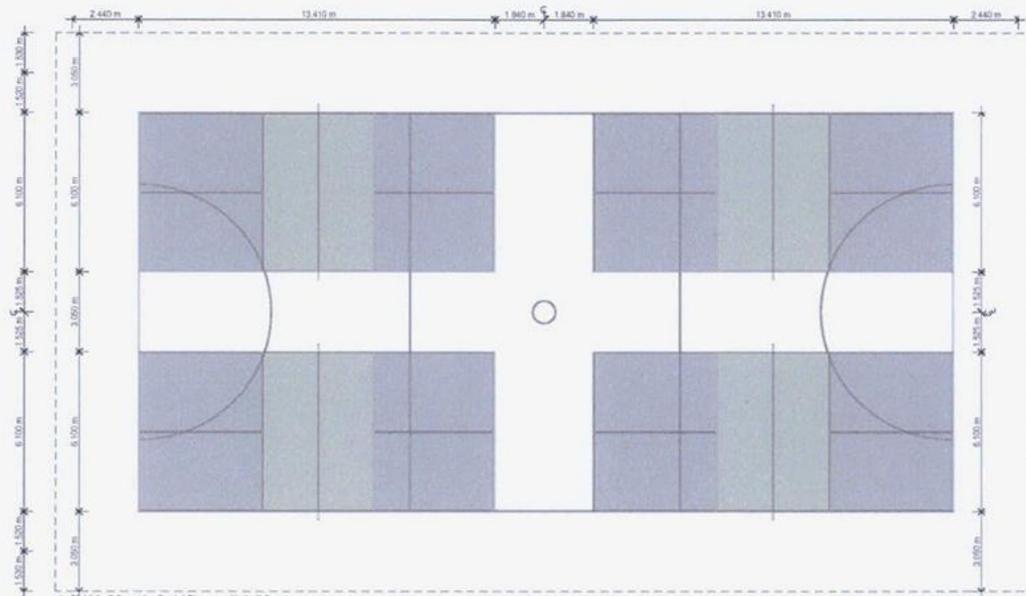
By carefully implementing these strategies, you can create a multi-use facility that effectively accommodates both netball and pickleball, maximising the utility of the space while ensuring a safe and enjoyable experience for players of both sports.

This approach aligns with the growing trend of creating versatile recreational spaces in leisure and sporting facilities



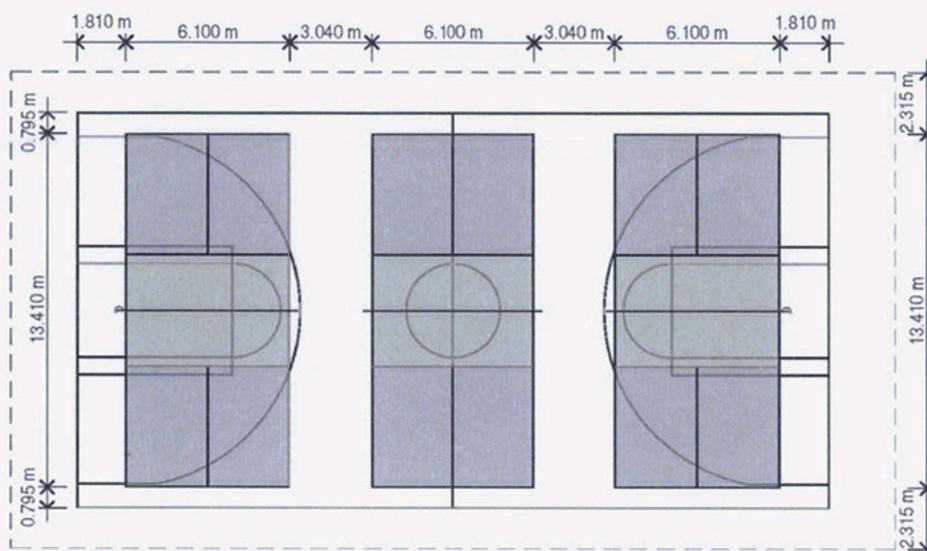


# 5.2 Converting Netball Courts for Pickleball





## 5.3 Converting Basketball Courts for Pickleball



There is a great synergy between basketball and pickleball facilities, similar to netball and other indoor or outdoor court sports

When converting a Basketball court for Pickleball or creating a multi-use court, consider the following:

- Basketball court dimensions: A standard basketball court is 28m x 15m, which can fit up to three pickleball courts (13.41m x 6.1m each).
- Optimal layout: Position pickleball courts within the basketball court to maximize space utilization. Ensure adequate spacing between courts for safe play.
- Run-off areas: Maintain appropriate clearance around the courts. For pickleball, a minimum of 3.040m clearance in between courts and 2.315m run off at the end of courts is recommended.

Line markings are crucial for distinguishing between sports:

COLOUR CODING: Use distinct colours for each sport's lines to minimise confusion for example:

- Basketball: White
- Pickleball: Yellow or blue
- Line width: Maintain consistent line widths for each sport. Pickleball lines are typically 5cm to 5.08cm wide.

LINE HIERARCHY: Consider using solid lines for the primary sport and dashed or thinner lines for secondary sports

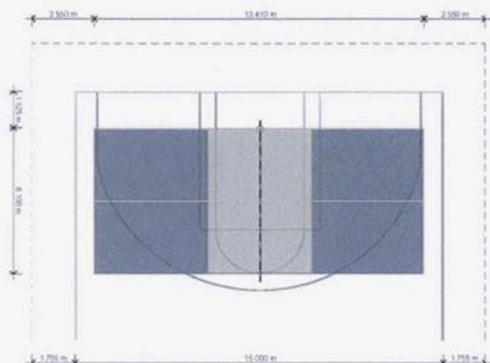
ADAPTABLE EQUIPMENT: is essential for multi-sport courts

REMOVABLE NETS: Install portable pickleball nets that can be easily set up and taken down.

ADJUSTABLE BASKETBALL HOOPS: Consider retractable or removable basketball hoops to accommodate pickleball play when needed.



## 5.3 Basketball Half Courts for Pickleball



Half court basketball courts in public spaces are perfect for line marking for pickleball courts for community play. Participants can bring their own nets and equipment and play in the park. This is a low cost high yield way for Local Governments to support the growth of pickleball in their local areas. Providing an accessible way for communities to play in public spaces.

When converting a half court basketball court to accommodate pickleball consider the following:

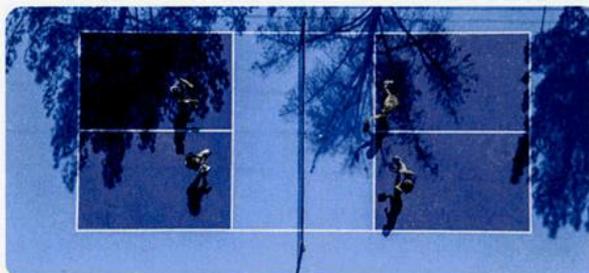
#### HALF COURT BASKETBALL OPTIMAL DIMENSIONS:

There are no standard half court basketball court dimensions they are often designed to the space allocated in parks but can typically fit a single pickleball court (13.41m x 6.1m).

**OPTIMAL LAYOUT FOR EXISTING COURTS:** Position pickleball courts within the half court basketball court to maximise space utilisation. Ensure adequate spacing surrounding courts for safe play.

**OPTIMAL LAYOUT FOR RENEWED HALF COURTS:** For new half court basketball courts to be shared with pickleball consider extending the slab to accommodate a pickleball court at the top of the basketball line marking to enable concurrent play. Specifications will be site specific.

**RUN-OFF AREAS:** Maintain appropriate clearance around the courts. For community play pickleball in this context, a minimum of 1-1.5m clearance on all sides is suggested. A professional court contractor can provide site specific requirements to support playability and safety.



## 5.4 Converting Tennis Courts for Pickleball

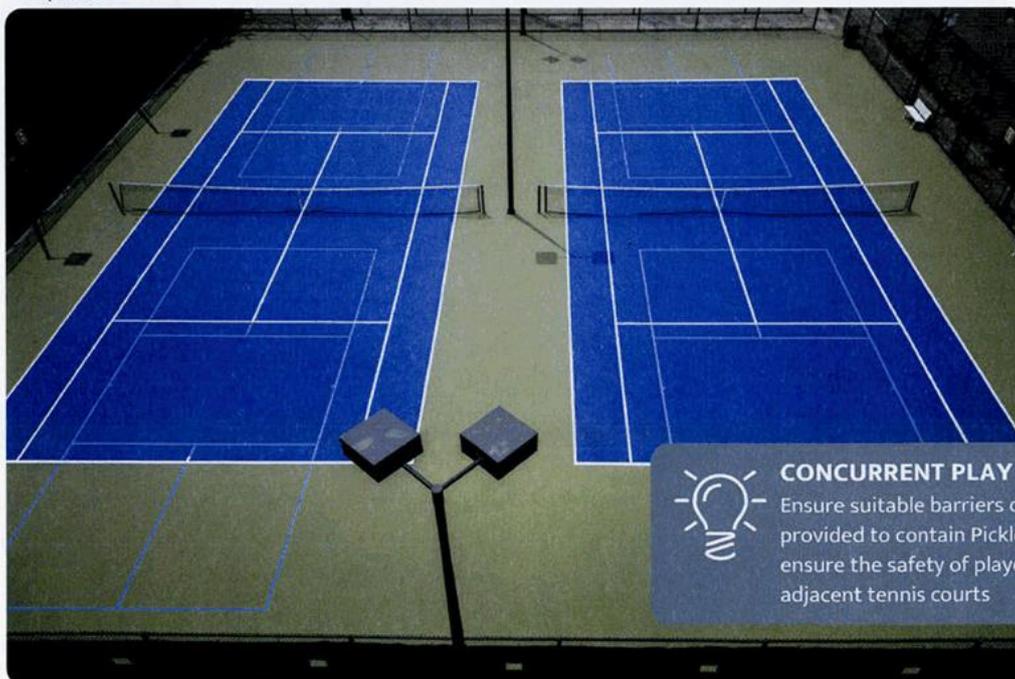
You can typically achieve two to four Pickleball courts on one Tennis court, depending on the layout, circulation spaces, and requirements of users at the facility. This section provides general guidance to support planning and layout based on your individual facility needs.

### When designing the layout:

- Position pickleball courts within the tennis courts to maximise space utilisation.
- Depending on the tennis court size, you may be able to fit up to four pickleball courts on one tennis court.
- Ensure adequate space between pickleball courts for safe play.
- Maintain appropriate run-off areas for both sports.
- Tennis requires a minimum run-off area of 2.44m on the sides and 6.4m at the ends.
- Ensure that the run-off areas for both sports are free of obstacles and maintain the same surface type as the court for player safety.
- Tennis courts typically have perimeter fencing to contain balls for both sports. Depending on the specific site, the establishment of divider fencing may be required.
- Use distinct colors for each sport's lines, which are both typically 5cm (approximately) in width
- Ensure that the run-off areas for both sports are free of obstacles and maintain the same surface type as the court for player safety

By carefully implementing these strategies, you can create a multi-use facility that effectively accommodates both tennis and pickleball, maximising the utility of the space while ensuring a safe and enjoyable experience for players of both sports.

This approach aligns with the growing trend of creating versatile multi use recreational spaces in leisure and sporting facilities to make efficient use of existing facilities.

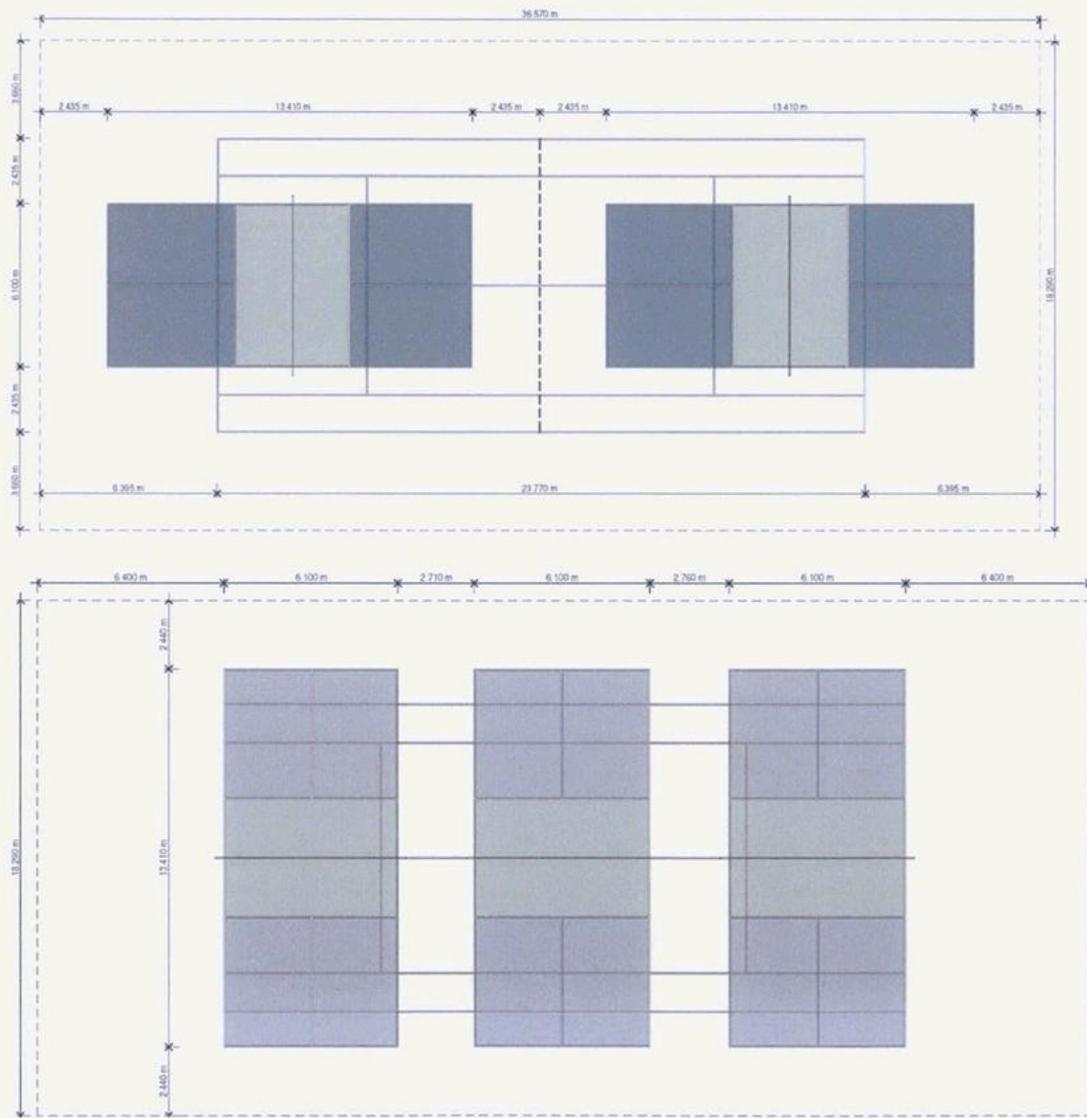


### CONCURRENT PLAY

Ensure suitable barriers or nets are provided to contain Pickleball balls to ensure the safety of players on the adjacent tennis courts

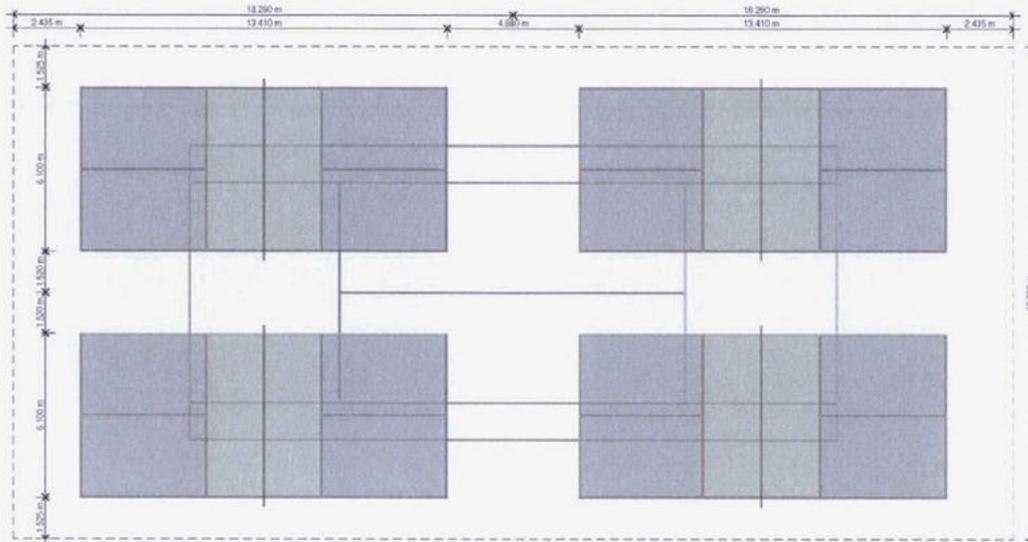


# 5.4 Converting Tennis Courts for Pickleball





# 5.4 Converting Tennis Courts for Pickleball



Tennis and Pickleball can work well as a shared integrated facility.

**Flexibility is key when designing shared use facilities:**

- Tennis and pickleball can coexist as stand alone facilities with shared clubhouse and amenities.
- Or work well as shared courts with pickleball courts line marked within the tennis courts to maximise space utilisation and fluctuations in demand throughout the week.
- Depending on the tennis court size, you may be able to fit up to four pickleball courts on one tennis court.
- Ensure adequate space between pickleball courts for safe play and being mindful of concurrent play on surrounding courts.
- Use distinct colors for each sport's lines, which are both typically 5cm (approximately) in width
- Ensure that the run-off areas for both sports are free of obstacles and maintain the same surface type as the court for player safety

**TRIAL PICKLEBALL**

Pickleball is easy to trial at an existing facility with temporary line marking and pop up nets and barriers. Testing how it might work best at your facility is encouraged before investing in permanent changes.





# 06 Fencing and Lighting Considerations



Australian Facility Guideline

# 6.1 Fencing for outdoor facilities

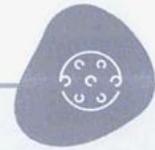


Fencing heights for Pickleball blend the traditional planning of outdoor sports courts, combined with lower fencing requirements of sports such as table tennis or badminton. The goal for pickleball is to provide a fencing height that provides a safe playing environment but encourages high visibility and participant interaction.



## Fencing

The typical height for external fences for existing outdoor sporting facilities in Australia range from 2.44m to 3.66m meters. This considers balancing accessibility, visibility, and operational elements, and urban design considerations to the public interface and subject site.



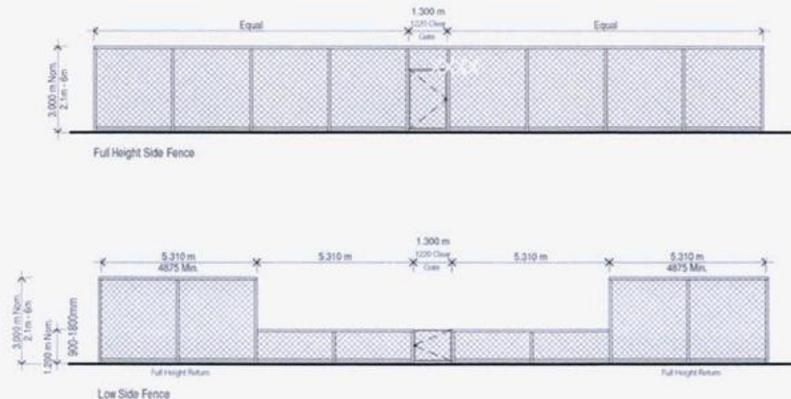
Across the international pickleball industry 1.83m to 3.05m meters is commonly considered the minimum for social or community play, it's may also be acceptable for competition play. Due to low ball bounce fencing heights can respond to site specific needs and layouts. New purpose built facilities should use this range for fencing.

## Divider Fence

When separating courts, the divider fence can be as low as 1.07m or match the height of the baseline fence.

Design is subject to operator requirements and level of play, as it is acknowledged Pickleball facilities may integrate with concurrent sporting uses, particularly with court sports, such as netball, basketball and tennis.

Temporary dividers are also suitable.



# 6.2 Fencing Entry and Backstop Options

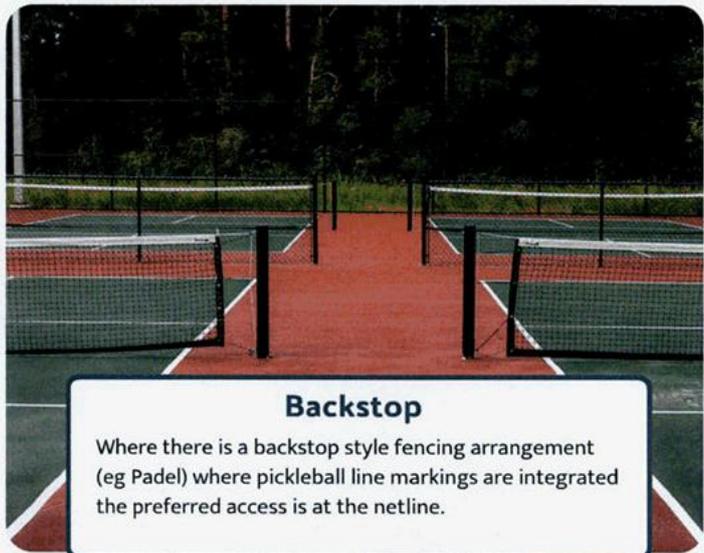


## External Fencing + Entry

Entry to pickleball courts and enclosures can vary significantly from facility to facility.

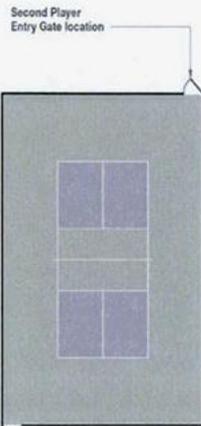
Rear access from the court enclosure is preferred to the side court run off area walkway.

Note: This guidance is to support planning, and fencing design and access will be site and court layout specific.

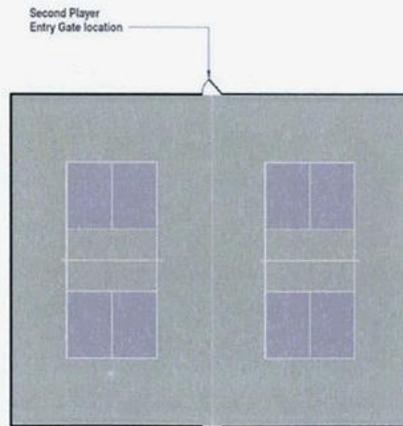


### Backstop

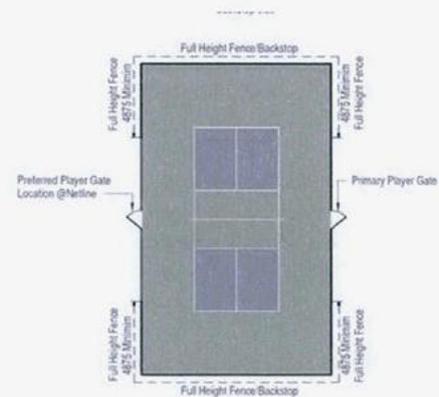
Where there is a backstop style fencing arrangement (eg Padel) where pickleball line markings are integrated the preferred access is at the netline.



**One Court Layout**  
Recommended Player Entry Gate Location if Site Dictates that access is best from backstop side



**Two Court Layout**  
Recommended Player Entry Gate Location if Site Dictates that access is best from backstop centre



## 6.3 Lighting Considerations

When designing lighting for pickleball facilities in Australia, it is essential to adhere to specific lux-level requirements that cater to different levels of play, from community club settings to elite competitions and broadcasts.

A breakdown of the recommended lux levels based on the Australian and international standards for sports lighting is provided below.

In Australia, lighting design for sports facilities must comply with the relevant Australian standards, particularly AS 2560.2, which outlines the requirements for sports lighting.

This standard provides guidance on achieving appropriate illumination levels, uniformity, and glare control, ensuring that all players and spectators have a safe and enjoyable experience.

NOTE: Professional lighting design and guidance is required, specific to each facility, and will be subject to site specific requirements and needs of the operator and the landowner.



### Community

For community club play, the lighting requirements are generally lower, as the focus is on recreational play rather than competitive matches.

The recommended lux levels for this setting are:

- Horizontal Illumination: 200 lux



### Competition

For competition, where matches may be more structured, the lighting requirements increase to enhance visibility and performance.

The recommended lux levels for competition play are:

- Horizontal Illumination: 300 to lux



### Elite + Broadcast

For elite competitions, especially those that may be broadcasted or have a large audience, the lighting requirements are significantly higher.

The recommended lux levels for elite and broadcast pickleball are:

- Horizontal Illumination: 500 lux

PICKLEBALL AUSTRALIA ASSOCIATION

Urbankind

# 07 Court equipment and amenities



Australian Facility Guideline



# 7.1 Court Equipment and Amenities



## Courts Amenities

- Non-slip acrylic court surface coating suitable for outdoor/indoor use
- Line markings: 5.08cm wide in contrasting colour
- Accessibility meeting Australian standards
- Water bubbles
- Shaded viewing and playing spaces



## Nets and Posts

- Regulation pickleball nets: 6.7m wide and 0.914m high at sidelines
- Centre height of 0.864m
- Heavy-duty portable or permanent net posts with a secure anchoring system
- Net tension adjustment mechanisms for proper net height maintenance
- Option for permanent or temporary



## Shade

- Shade for relief during and between play is a critical design consideration for all levels of Pickleball within the facility hierarchy.
- Shade can vary from temporary structures to mature vegetation solutions.



## Seating + Rest Areas

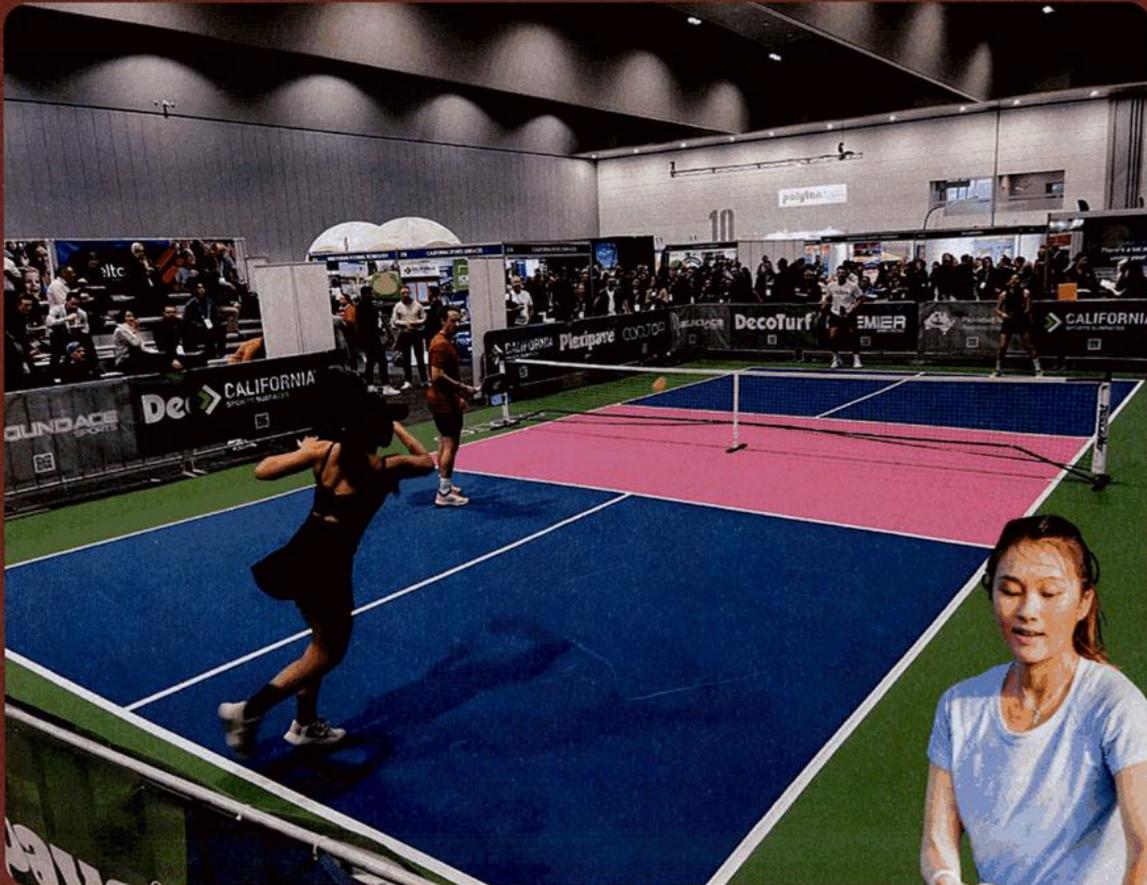
- Player benches between courts (minimum 1.8m length per court)
- Shaded viewing areas for players and spectators
- Score-keeping devices or digital displays per court
- Water stations within easy access of all courts



## Technology

- Court booking system
- Wi-Fi coverage throughout facility
- Sound system for announcements
- Security and access control

# 08 Indoor Pickleball



Australian Facility Guideline



## 8.1 Indoor Commercial Facilities



**Commercial business and warehouse spaces provide an development option for a viable pickleball facility. Based on current industry projects, it is recommended to have at least 4-6 courts and associated secondary spend offerings. This allows for simultaneous play, tournaments, and leagues while maximising space utilisation. Each court requires a minimum playing area including run off space suitable to the safety and business operations needs.**

To create a successful pickleball commercial facility, consideration of space should include the following amenities:

- Floor space for at least 4 courts
- Lockers and change facilities
- Pro shop for equipment sales and rentals
- Spectator seating areas
- Lounge or social area
- Kiosk or small cafe
- Storage space for equipment

Insights from Successful Projects to date:

- **Flexible Space Utilisation:** create multi-use environment that includes courts, social areas, and amenities.
- **Community Integration:** Engage with the local community during the planning phase to ensure the facility meets their needs and expectations.
- **Phased Development:** Consider a phased approach to construction, allowing for initial opening with core facilities while enhancing amenities over time.
- **Natural Light Integration:** Incorporate large windows or skylights to create an open, inviting atmosphere and reduce reliance on artificial lighting.
- **Energy Efficiency:** Utilise energy-efficient lighting, solar, battery and sustainable materials to reduce operational costs and environmental impacts.
- **Versatile Court Design:** Implement court layouts that allow for easy conversion to other uses, such as yoga classes or community events, during off-peak hours.

# 09 Environmental Sustainability



Australian Facility Guideline

## 9 Environment and Sustainability

Pickleball is popular for its accessibility and minimal space requirements. However, as pickleball facilities increase, there is an opportunity to integrate environmentally sustainable practices that align with Australia's climate, social, and economic goals. This guideline provides a comprehensive framework for creating facilities that minimise environmental impact, enhance community engagement, and ensure the long-term sustainability of the sport.

By incorporating sustainable practices into the planning, design, and operation of pickleball facilities, Australia can create resilient, eco-friendly sports spaces that support community health and environmental stewardship. Embracing these practices will ensure that pickleball facilities contribute to Australia's sustainability goals and enhance the overall sport experience for all users.



# Our Top Sustainability Tips

1

## MATERIALS AND CONSTRUCTION

Implement modular or prefabricated structures where possible, allowing for quick, low-impact installation and future adaptability. Prioritise surfaces that reduce urban heat island impacts.

2

## HEAT MITIGATION

Incorporate shaded areas for rest and spectating, and consider cooling measures like misting stations or shaded outdoor seating to enhance player safety and comfort during high temperatures.

3

## WASTE MANAGEMENT

Design waste management facilities for easy recycling and composting access to reduce landfill waste.

Consider partnering with a container exchange program.

4

## ENVIRONMENTAL REPORTING AND IMPROVEMENT

Track and report on sustainability metrics, including water usage, waste generation, energy consumption, and biodiversity efforts, to ensure accountability.

5

## HEAT-RELATED ADAPTATIONS

Offer incentives for players to bring reusable water bottles, reducing plastic waste and supporting hydration best practices in hot climates.

Consider providing chilled water stations across the facility to encourage use of reusable containers.

6

## WATER-SAVING INITIATIVES

Implement drought contingency plans to manage water consumption during water restrictions, such as reducing landscape irrigation or using water-efficient cleaning techniques for courts.

# 10 Case Study



# 10 Pickleball on the Central Coast: A Collaborative Success Story

**Pickleball has been rapidly gaining popularity across the Central Coast of New South Wales. A unique collaboration between the Office of Sport, Central Coast Council, and community stakeholders has led to a significant expansion of the sport in the region**

## Growth and Implementation

The initiative to promote pickleball on the Central Coast has been multifaceted:

**INFRASTRUCTURE DEVELOPMENT:** New pickleball court markings have been implemented at key venues, including Kariong Tennis Centre, Pat Morley Oval, and Blue Haven Netball Courts.

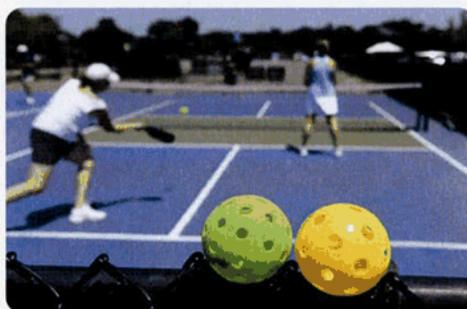
**EQUIPMENT ACCESSIBILITY:** Free pickleball equipment kits are now available for borrowing at several council libraries, including Kincumber, Kariong, and Bateau Bay. These kits contain everything needed to play, including nets, paddles, balls, and instruction guides.

**COMMUNITY PARTNERSHIPS:** Local clubs such as Gosford Pickleball Club, PCYC Bateau Bay, and Central Coast Pickleball Club (Peninsula) have been instrumental in offering social and competitive Pickleball opportunities.

**INCLUSIVE PROGRAMMING:** Special events have been organized to cater to various demographics, including an activation specifically for people with disabilities at Pat Morley Oval Bateau Bay.

## World Pickleball Weekend

A highlight of the collaborative effort was the organization of "World Pickleball Weekend" from October 10-13, 2024. This event featured: Free "Come and Try" sessions across multiple venues Inclusive Pickleball activities for people with disabilities Social Pickleball sessions for players of all skill levels



## Importance of Partnerships

The success of Pickleball's growth on the Central Coast can be attributed to the strong partnerships formed:

**Government Support:** The NSW Government, through the Office of Sport, has provided funding and strategic support for the initiative.

**Local Council Involvement:** Central Coast Council has played a crucial role by integrating pickleball into existing community facilities and library services.

**Community Engagement:** Local pickleball clubs and organisations have been essential in providing expertise, organizing events, and fostering a welcoming community for new players

**Cross-Sector Collaboration:** The involvement of diverse entities such as PCYC, tennis clubs, and community centers has ensured widespread access to the sport.



# Pickleball Australia Association

## CONTACT

[www.pickleballaus.org](http://www.pickleballaus.org)

[info@pickleballaus.org](mailto:info@pickleballaus.org)

PO BOX 233 INDOOROPILLY, QLD 4068

Annex C: Plan of Management



## **NORTH GRIFFITH PRECINCT PARKS**

**CROWN RESERVES 78173, 78175, 85013, 240004 & 1010108**

**AND COUNCIL OWNED COMMUNITY LAND**

## **PLAN OF MANAGEMENT**



Plan of Management Report prepared by



Griffith City Council  
GRIFFITH NSW 2680

July 2021

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GRIFFITH CITY COUNCIL – NORTH GRIFFITH  
PRECINCT PARKS DRAFT POM

1

<b>RESPONSIBLE OFFICER</b>	[REDACTED] Corporate Property Officer			
<b>REVIEWED BY:</b>				
<b>DATE ADOPTED:</b>	28 June 2022			
<b>RESOLUTION NO: (IF RELEVANT)</b>	22/168			
<b>REVIEW DUE DATE:</b>	June 2027			
<b>REVISION NUMBER</b>				
<b>PREVIOUS VERSIONS:</b>	<b>DESCRIPTION OF AMENDMENTS</b>	<b>AUTHOR/ EDITOR</b>	<b>REVIEW/ SIGN OFF</b>	<b>MINUTE NO (IF RELEVANT)</b>

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## 1.0 EXECUTIVE SUMMARY

Griffith Park's PoMs' have been prepared to align with Council's *Playground Strategy (2014)* "Application of Hierarchy" based around Precinct areas within the City of Griffith.

The *North Griffith Precinct Parks Plan of Management* has been prepared by Griffith City Council to reflect the respective features of Playgrounds, Parks and Sportsgrounds within the North Griffith Precinct providing a direction for the use and management of the respective sites. The area covered by the North Griffith Precinct broadly extends west of Boonah Street and is bounded by Ortella and Kooba Streets, Wood Road and north of the Griffith-Hillston railway line to include parks and playgrounds in newer residential developed lands.

This Plan of Management (PoM) comprises both Council Managed Crown Reserves and Council Owned Community Land as a generic PoM incorporating the following Parks: -

### Council Managed Crown Reserves

- Circle Park (R78173)
- French Park (R78175)
- Wood Park (R85013)
- Coates Park (R240004)
- Jubilee Park (R1010108)

### Council Owned Community Land

- Ieraci Park
- Jacka Park
- Kinkead Park
- Noel Hogan Park
- Ryan Park
- Ortella/Gordon Avenue Park

The Parks are more specifically referred to in **Annexure 1** of this PoM (refer pgs. 40-41).

The Plan of Management examines the current character, current use and future needs of the lands and their relationship to the surrounding properties and communities within which they are located. The Plan establishes a clear direction for future development, planning and resource management of the land by Council.

The PoM is required in accordance with Section 3.23 of the *Crown Land Management Act 2016* and Section 36 of the *Local Government Act 1993*.

The Council Managed Crown Reserves and Council Owned Community Lands with the exception of Jubilee Park are all categorised in this PoM, as: -

- **Park**

Jubilee Park is categorised as **Sportsground** in respect of the main sporting precinct area and associated land, however the category of **General Community Use** specifically applies to the area containing the location of the FM Community Radio studio.

The categorisation of the lands is consistent with the Reserves' various purposes of Children's Playground, Public Park, Public Recreation and Community Purposes and all the lands continue

to be used for organised and occasional sporting activities together with passive recreational use; and general community use.

## 2.0 Introduction

Griffith City is a thriving regional capital located in the Murrumbidgee Irrigation Area with a vibrant lifestyle and diverse economy; embracing community, heritage, culture and the environment. The estimated population of Griffith City Council in 2020 was 27,155.

Located in the Riverina, Griffith is 584km from Sydney, 458 km from Melbourne and 358km from Canberra; and is the largest regional centre in the Western Riverina region. Griffith is located in the heart of Wiradjuri Nation – the largest nation of Aboriginal and Torres Strait Islander people in Australia.

Griffith City Council is responsible for the care and control of many parcels of community land. With the introduction of the *CLMA 2016* on 1 July 2018, Council as the appointed Crown Land Manager will generally now manage Crown Reserves under the provisions of the *LGA 1993*.

Figure 1 – Locality diagram



## 2.1 Corporate Objectives

Griffith City Council has a positive future being acknowledged as a predominant major regional centre. Council's Mission Statement is –

1. To respond to the needs of the community and deliver in an economical manner those services which are the responsibility of Local Government.
2. To provide Local Government administration that is dedicated, accountable and committed to the improvement of the quality of life and the economic well-being of the citizens of the City of Griffith.

Figure 2 – Guiding Griffith 2040



GRIFFITH CITY COUNCIL – NORTH GRIFFITH  
PRECINCT PARKS DRAFT POM

7

The Community Strategic Plan '**Guiding Griffith 2040**' adopted in February 2017 identifies the community's priorities and aspirations for the future and provides strategies for achieving these goals. The Community Strategic Plan is made up of four themes. The four key themes are:

**Figure 3 – Community Strategic Plan – Themes**

- 1. Leadership –**
  - a. Developing an engaged and connected community through clear and transparent communication; acknowledging and being responsive to issues; and to be well informed on current issues that impact on the community;
  - b. Working together to achieve goals by engaging actively with State, Federal and non-government agencies to provide local advocacy; partnering and supporting local delivery service providers; sourcing opportunities for funding partnerships, projects and programs to improve quality of life for community members; and develop partnerships with industry and agricultural leaders.
  - c. Planning and leading with good governance within a clear framework of strategic planning, policies and procedures and service standards; and to ensure Council's financial sustainability.
- 2. Love the Lifestyle –**
  - a. Griffith is a great place to live providing accessible diverse housing; a shared responsibility for the safety of its community members; promotion of reconciliation and a celebration of its social and cultural diversity and social inclusion of the varied demographic groups; providing and promoting accessibility to services and facilities; and building a community which promotes and facilitates an active and healthy lifestyle through provision of sporting and recreational facilities.
- 3. Growing our City –**
  - a. Encouraging the local community to grow with establishment of diversified industries; promoting the growth of established businesses and assist new business growth; strategic planning and consideration of land use management to encourage new investment; promotion and support of diverse agricultural industries; and the promotion of Griffith as a desirable visitor and tourism destination.
  - b. Encouraging a skilled workforce with employment opportunities locally; developing partnerships to build quality education and training opportunities; and advocate for safe work practices and employment standards.
  - c. Providing, renewing and maintaining a range of quality infrastructure, assets, services and facilities in a cost effective and sustainable manner; maintain and develop an effective transport network; improving the aesthetic of the City and its villages; and mitigating against natural disasters.
- 4. Valuing our Environment**
  - a. Enhancing the natural and built environment through respectful planning, balanced growth and good design; facilitating community involvement in caring for the natural environment; delivering projects to protect biodiversity; valuing and protecting both natural and built heritage; sustainable land use; and considering climate change issues when decision making.
  - b. Use and manage our resources wisely through management of water resources and water quality; reduction of energy consumption and greenhouse gas emissions; and providing environmentally sustainable waste management services.

## 2.2 Land to Which this Plan Applies

This PoM covers various parcels of land including both Council managed Crown Reserves and Council owned community land as shown in Table 1 below. A more detailed list indicating infrastructure is shown in **Annexure 1** (refer pgs. 40-41).

These lands are predominantly used for passive recreational pursuits although Jubilee Park caters for a variety of formal sporting activities used by various sporting bodies and local schools. Jubilee Park categorised as a 'Sportsground' with the purpose of public recreation, includes infrastructure suited to rugby league / rugby union, cricket, netball, tennis in addition to passive recreational uses. Jubilee Park is also home to the local FM community radio station 95.1.

**Table 1 – Land included in this PoM**

Management Type	Reserve No.	Name	Purpose	Date of Gazette - Trustee	Lot/DP	Area
<b>Crown Reserve</b>	78173	Circle Park, The Circle, Griffith	Children's Playground; Public Park	16/12/1955 - 10/02/1956	1/95/758476	1.38ha
	78175	French Park, Gordon Avenue, Griffith	Children's Playground; Public Park	16/12/1955 - 10/02/1956	1/106/758476	5369m2
	85013	Wood Park, Cnr. Messner and Thompson Streets, Griffith	Public Park; Public Recreation	18/09/1964 - 27/11/1964	1/137/758476	2.425ha
	240004	Coates Park, Gordon Avenue	Public Recreation	03/04/1987 - 3/04/1987	14/56/758476	6987m2
	1010108	Jubilee Park, Groongal Avenue, Griffith	Community Purposes; Public Recreation	26/3/2004 - 02/04/2004	2-3/86/758476 and Lot 7303 DP1153581	10.348ha
<b>Council owned</b>		Ieraci Park, North Grove Drive, Griffith			65/1063408	2504m2
		Jacka Park, Robrick Close, Griffith			83/851401	2029m2
		Kinkead Park, Cnr. North Grove Drive & Robrick Close, Griffith			84/851401	2284m2
		Noel Hogan Park, Nelson Drive, Griffith			60/1008323	2215m2
		Ryan Park, North Grove Drive, Griffith			66/1063408	1288m2
		Ortella/Gordon Avenue Park, Griffith			1/25382	1299m2

The Griffith City Council *Playground Strategy (2014)* describes Wood Park as being a 'Precinct Park' of medium scale and offering several play experiences for children and teenagers, with a reasonable amount of amenity.

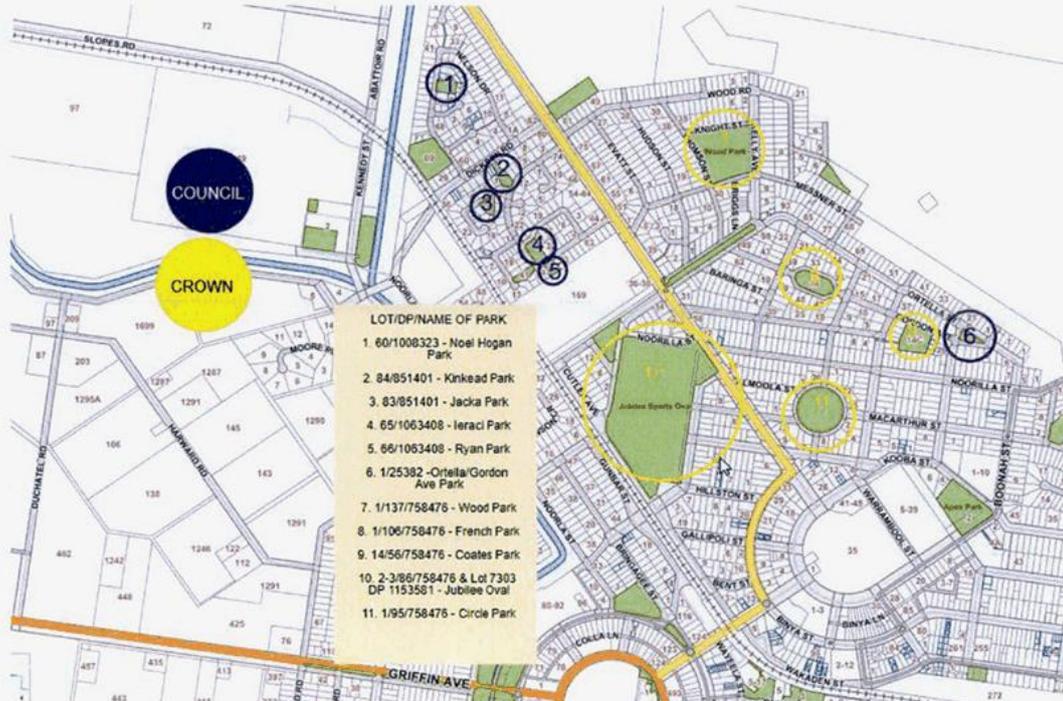
Circle, French, Coates, Ieraci, Kinkead and Noel Hogan Parks are all described in the above-mentioned *Playground Strategy* as being 'Neighbourhood Parks' being of a small scale offering a narrower scope of play than Precinct Parks and serving the immediate neighbourhood within which they are located.

Ryan, Jacka and Ortella/Gordon Avenue Parks are not listed in the *Playground Strategy* as they are only used for open space and contain no play associated equipment. Ryan and Ortella/Gordon Avenue Parks are not formally identified with any signage.

Jubilee Park with its primary focus on organised sporting activities and community interests is also not listed in the *Playground Strategy* as it doesn't contain any playground infrastructure per

se. The Park is used for passive recreational use in addition to formal sporting activities and the community use for radio station.

Figure 4 – North Griffith Precinct Parks



### 2.3 Lands excluded from the Plan

The following Table identifies land that has been excluded from this PoM with reasoning cited under 'Comments'.

Table 2 – Lands excluded from this PoM

Reserve No.	Name	Lot/DP	Purpose	Comments
240005	Danny Piccoli Park	1/114/758476, Campbell & Binguie Streets, Griffith	Public Recreation	Area used for drainage.
NA	Alexandra Park	64/1063408, between North Grove Drive & Simona Close, Griffith		Area used for detention basin.
NA	Peisley Park	28/1003506, Nelson Drive, Griffith		Area used for detention basin.
NA	Youll Street Park	Located on part Lot 7300 DP 1133143 adjacent to Youll and Edward Streets, Griffith		Park was established and continues to be maintained by local residents. This Park is located on part of Scenic Hill Reserve ( <b>Reserve 56353</b> for 'Preservation and Growth of Timber')

## 2.4 Owner of the Land

The PoM includes land which is owned by the State of New South Wales (as Crown land) and managed by Griffith City Council under the *CLMA 2016*, together with Council owned community land which is managed directly under the *Local Government Act 1993*.

Further to *Section 2.2 – Land to which this PoM applies*, (pg. 8), Jubilee Park was originally notified as Reserve 71914 for Public Recreation of 10 May 1946 and comprised the boundaries of Section 86, Town of Griffith (of 24acres 0roods 20perches (i.e., 9.76ha)). The Council of the Shire of Wade was appointed as Trustee on 26 July 1946 (Folios 1734 & 1735).

Jubilee Park was extended by the addition as notified in the Government Gazette of 13 February 1953 (Folio 486) –

*“Proposed closing of Roads - Road (being part Groongal Avenue) being a strip fifty links wide to be surveyed by survey adjoining the eastern boundary of R.71914 from Sale and R.71915 from Lease generally for Public Recreation notified 10 May 1946, town Griffith, parish Jondaryan, county Cooper, Land District Mirrool, Shire of Wade. R.52-360. Note. If closed, the above-described road is proposed to be added to the adjoining recreation reserve”.*

Two further additions of land were added to Jubilee Park as separate Reserves being:

- Reserve 78056 for Public Recreation (Additional) being allotment 2, section 86 (of 1acre 0roods 12perches (i.e., 4,350m<sup>2</sup>)) by Gazette notification of 4 November 1955 (Folio 3288). The Council of the Shire of Wade was appointed as Trustee on 13 January 1956 (Folio 80).
- Reserve 82326 for Public Recreation (Additional) being allotment 3, section 86 (of 2roods 11 ½ perches (i.e., approx. 2,302 m<sup>2</sup>)) by Gazette notification of 29 January 1960 (Folio 257). The Council of the Shire of Wade was appointed at Trustee on 25 March 1960 (Folio 922).

Council of the Shire of Griffith was further proclaimed as City of Griffith (Griffith City Council) by Government Gazette of 1 July 1987. Griffith City Council was reappointed Trustee of the reserves (i.e., Reserves 78173, 78175, 85013 and 240004) on 16 December 1994.

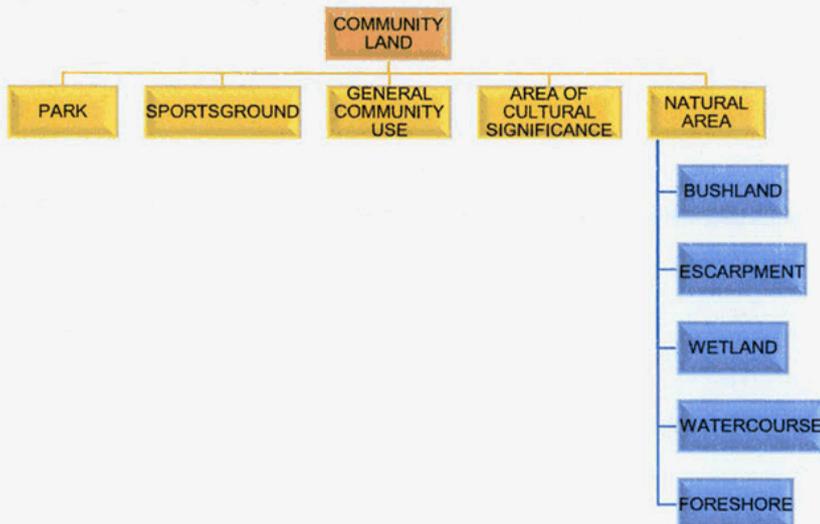
To enable Council to issue Licences in respect of part of Jubilee Park to user groups for specific areas, i.e., the Tennis Club and Community Radio studio, the respective Reserves of 71914, 78056 and 82326 were revoked in the Government Gazette of 26 March 2004 (Folios 1695 & 1696). Reserve 1010108 was notified in the same Gazette for the purpose of Public Recreation and Community Purposes being an amalgamation of the former collective of Reserves.

The management and use of Circle Park, French Park, Wood Park, Coates Park and Jubilee Park is subject to the provisions of the *CLMA 2016*, are not subject to any condition, restriction or covenant imposed by the owner.

## 2.5 Categorisation of Reserves

All community land is required to be categorised as one or more of the following categories. Section 36 of the Local Government Act defines five categories of community land referred to in Figure 5 below as:

Figure 5 – Prescribed categories of Community Land



The broader usage is further described as:

- **Park** – for areas primarily used for passive recreation.
- **Sportsground** – for areas where the primary use is for active recreation involving organised sports or the playing of outdoor games.
- **General community use** – for all areas where the primary purpose relates to public recreation and the physical, cultural, social, and intellectual welfare or development of members of the public. This includes venues such as community halls, scout and guide halls, and libraries.
- **Cultural significance** – for areas with Aboriginal, aesthetic, archaeological, historical, technical, research or social significance.
- **Natural area** – for all areas that play an important role in the area's ecology. This category is further subdivided into bushland, escarpment, foreshore, watercourse and wetland categories.

With the introduction of the *CLMA 2016*, Council is to manage dedicated or reserved Crown land held under their management control as community land under section 3.21 of the Act.

Under section 3.23(2) of the *CLMA 2016*, Council Crown Land Managers must assign to all Crown land under their management, one or more initial categories of 'Community Land' referred to above. The category is to relate most closely to the purpose(s) for which the land is dedicated or reserved.

For the purpose of section 3.23 of the *CLMA 2016*, the PoM for North Griffith Precinct Parks is a 'first Plan'.

The degree to which the reserve purpose relates to the assigned category of the land is important for ongoing management of the land as Council must obtain Native Title Manager advice as to the validity of the activities that they wish to undertake on the land prior to dealing with the land.

Both the *Aboriginal Land Rights Act (ALR) 1983* and the *Commonwealth Native Title Act (NTA (C'th)) 1993* recognises the intent of the original reserve purpose of the land so that a complying activity can be considered lawful or validated.

On Crown land, Native Title rights and interest must be considered unless:

- Native Title has been extinguished; or
- Native Title has been surrendered; or
- Determined by a court to no longer exist.

Examples of acts which may affect Native title on Crown land reserves managed by Council include: -

- The construction of new buildings and other facilities such as toilet blocks, walking tracks, tennis courts, grandstands and barbeques,
- The construction of extensions to existing buildings,
- The construction of new roads or tracks,
- Installation of infrastructure such as powerlines, sewerage pipes, etc.,
- The issue of a lease or licence,
- The undertaking of earthworks.

With the exception of Jubilee Park, Council applied for the categorisation of the Council Managed Crown Reserves as '**Park**' which closely relates to the reserves' purposes of Children's Playground, Public Park and Public Recreation. Noting Jubilee Park's significant sporting infrastructure, Council applied for the categorisation of '**Sportsground**' reflective of the reserves' purpose of Public Recreation. As part of Jubilee Park also has the purpose of Community Purposes, the category of '**General Community Use**' has also been applied to this park.

These categories were respectively approved by the Minister administering the *CLMA 2016* in relation to the reserves, and Council does not propose to alter the categories by this Plan of Management.

Figure 6 – Jubilee Park showing respective categories of land



Council does not propose to change the category of Park in relation to the Council Owned Community Lands of Ieraci, Jacka, Kinkead, Noel Hogan, Ryan and Ortella/Gordon Avenue Parks pursuant to the *Local Government Act 1993*.

Activities on the Council Managed Crown Reserves will need to reflect the intent of the gazetted purpose and will be assessed for compliance with relevant Local Government and Crown Lands legislation, including assessment of the activity under the *NTA 1993 (C'th)* and registered claims under the *ALRA 1983*.

Activities on Council Owned Community Land Parks will need to be assessed for compliance with relevant Local Government legislation.

## 2.6 Purpose of this Plan of Management

The purpose of this generic PoM is to:

- Develop a Plan of Management to provide a strategic framework for Council to guide sustainable development, land use and management of community lands contained within North Griffith.
- Meet and contribute to Council's broader strategic goals and vision as set out in the Community Strategic Plan "*Guiding Griffith 2040*" in accordance with Council's current *Playground Strategy (2014)*.
- Ensure consistent management that supports a unified approach to meeting the varied needs of the community.
- Develop Jubilee Park reflective of community needs.

## 2.7 Process of Preparing this Plan of Management

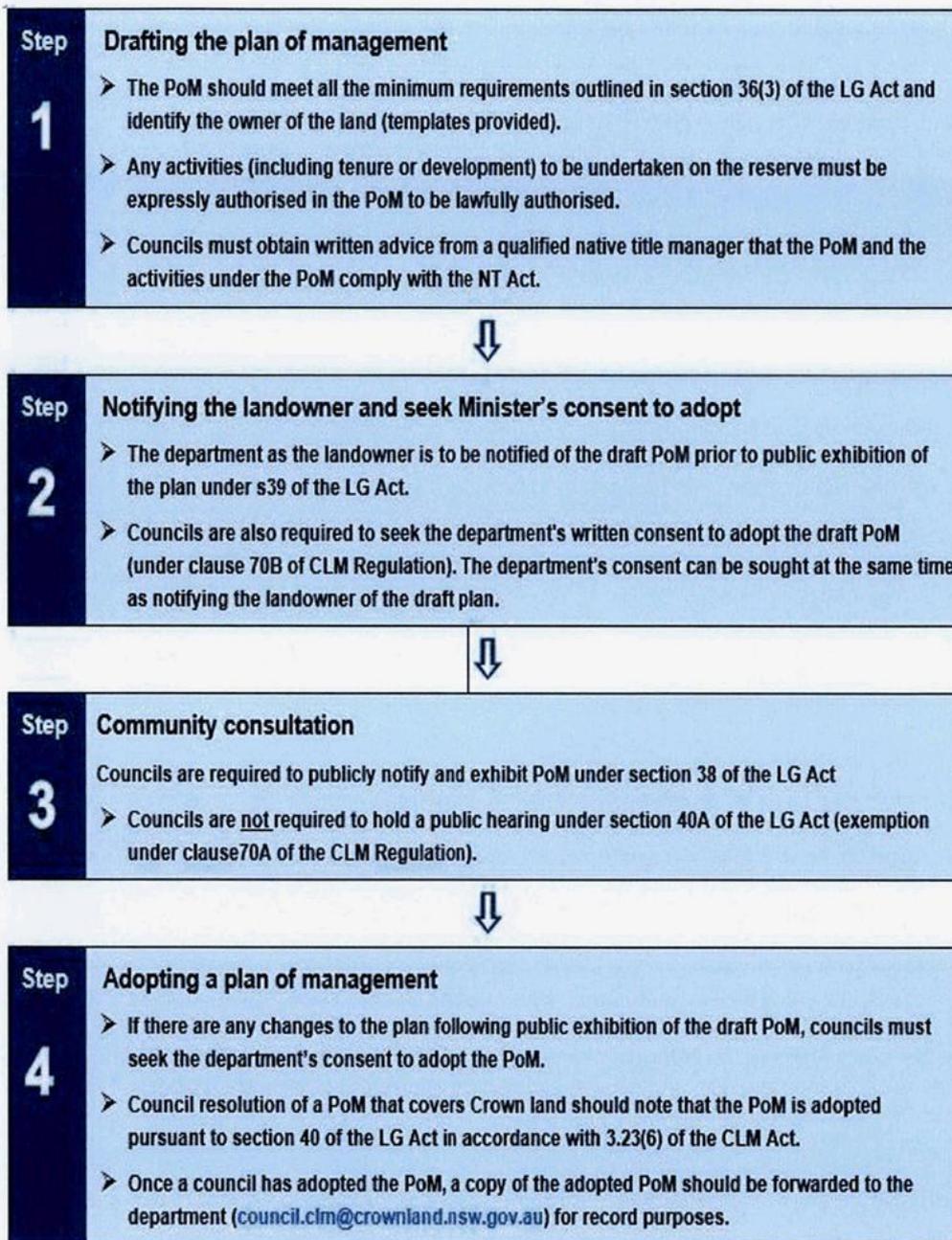
The process for preparing a PoM for Council managed Crown reserves is shown in Figure 7 (below) "*Flowchart for Consultation and Approval of an Initial Plan of Management*".

Council is required to submit the draft PoM to NSW Department of Planning & Environment, as representative of the owner of the land under section 39 of the *LGA 1993*. This process occurs prior to a public exhibition and community consultation of the PoM.

If after public consultation there is no change to the categorisation and no additional purpose is required to be added to the reserve, no additional ministerial consent is required. Council can then proceed to adopt the PoM.

If Council proposes a change in the categorisation of the land following public consultation, the plan must be referred again to the Minister administering the *CLMA 2016* for consent to adopt the PoM.

Figure 7 – Flowchart for Consultation and Approval of an Initial Plan of Management



## 2.8 Change and Review of Plan of Management

The use and management of the various parcels of land listed in Table 1 and in the Schedule of Lands in **Annexure 1** (refer pgs. 40-41), are regulated by this PoM.

This PoM will require regular review in order to align with community values and changing community needs, and to reflect changes in Council priorities.

Whilst the guidelines and principles outlined in the Plan may be suitable at present, the Plan should be reviewed from time to time to confirm its relevance. It is noted that Council is pending review of its *'Playground Strategy' (2014)* and such review may also impact on the relevance of this Plan should significant development or changes to use of the included Parks and Sportsground be identified.

Council has determined that it will review this PoM within 5 years of its adoption and the community will have an opportunity to participate in its PoM.

## 2.9 Community Consultation

Consultation with the community is an important part of the preparation of this PoM. Consultation gives Council a better understanding of the range of local issues affecting the use and enjoyment of the land to which this PoM applies and gives all sectors of the community the chance to have an input into the direction of policy development being undertaken by Council.

All stakeholders and identified Council Departments are given the opportunity to express their opinions and provide relevant information in relation to the planned management of the land, however as the land is Crown land, final approval for the PoM rests with the Minister administering the *Crown Land Management Act 2016* as owner of the land.

Community consultation is also offered as a result of the development application process in line with Council's Griffith Community Participation Plan of 16 December 2019 in response to Section 2.23 of the *Environmental Planning and Assessment Act 1979*.

### 3.0 LEGISLATIVE FRAMEWORK

This section describes the legislative framework applying to the land covered under this PoM.

#### 3.1 Local Government Act 1993

Community land must be managed according to the provisions of the *Local Government Act 1993* and the *Local Government (General) Regulations 2021 (LG Regulations)*.

*The Local Government Act 1993* requires all Council owned land to be classified as either Operational or Community land. Community land is defined as land that must be kept for the use of the general community and must not be sold. Under the *Local Government Act 1993*, Community land is required to be managed in accordance with a PoM and any other laws regulating the use of the land.

This PoM has been prepared in accordance with the *Local Government Act 1993* using the land categories approved by the Minister administering the *CLMA 2016* where lands are Council Managed Crown Reserves. The Plan of Management has further been prepared in accordance with the *Local Government Act 1993* solely where lands are Council Owned Community Lands.

Council must also consider the guidelines under Clause 101 of the *Local Government (General) Regulations 2021* for categorisation of community land when preparing PoMs. Refer to [Section 5.1 – Core Objectives for management of Community land](#).

The minimum requirements for a Plan of Management for community land is set out in Section 36(3) of the *Local Government Act 1993* and must identify the following:

- (a) the category of the land,
- (b) the objectives and performance targets of the plan with respect to the land,
- (c) the means by which the council proposes to achieve the plan's objectives and performance targets,
- (d) the manner in which the council proposes to assess its performance with respect to the plan's objectives and performance targets, and may require the prior approval of the council to the carrying out of any specified activity on the land.

#### 3.2 Crown Land Management Act 2016

Crown reserves are Crown land set aside on behalf of the community for a wide range of public purposes, including environmental and heritage protection, recreation and sport, open space, community halls, special events and government services.

Crown land is governed by the *CLMA 2016*, which provides a framework for the state government, local councils and members of the community to work together to provide care, control and management of Crown reserves.

Under the *CLM Act*, as Council Crown land managers, Councils manage Crown land as if it were public land under the *Local Government Act 1993*. However, it must still be managed in accordance with the purpose of the land and cannot be used for an activity incompatible with its

gazetted purpose – for example, Crown land assigned the purpose of ‘environmental protection’ cannot be used in a way that compromises its environmental integrity.

**Division 3.4** of the *CLMA 2016* specifically relates to Crown land managed by Councils and **Division 3.6** of the said act, refers to Plans of Management and other plans.

Councils must also manage Crown land in accordance with the objects and principles of Crown land management outlined in the *CLMA 2016* and set out below. The objects and principles are the key values that guide Crown land management to benefit the community and to ensure that Crown land is managed for sustainable, multiple uses. Section 1.4 of the *CLMA 2016* states:

“For the purposes of this Act, **the principles of Crown land management** are –

- (a) that environmental protection principles be observed in relation to the management and administration of Crown land, and
- (b) that the natural resources of Crown land (including water, soil, flora, fauna and scenic quality) be conserved wherever possible, and
- (c) that public use and enjoyment of appropriate Crown land be encouraged, and
- (d) that, where appropriate, multiple use of Crown land be encouraged, and
- (e) that, where appropriate, Crown land should be used and managed in such a way that both the land and its resources are sustained in perpetuity, and
- (f) that Crown land be occupied, used, sold, leased, licenced or otherwise dealt with in the best interests of the State consistent with the above principles.”

#### **Crown land management compliance**

In addition to management and use of Crown reserves that are aligned with the gazetted purpose of the reserve, there are other influences over Council management of Crown reserves. For example, Crown land managers may have conditions attached to any appointment instruments, or Councils may have to comply with specific or general Crown land management rules that may be published in the NSW Government Gazette. Councils must also comply with any Crown land regulations that may be made.

### **3.3 Zoning and Planning Controls**

The *Environmental Planning and Assessment Act 1979 (EPA Act)* establishes the statutory framework for environmental and land use planning in NSW.

The Griffith City Council Local Environmental Plan 2014 (GLEP) is the current planning instrument.

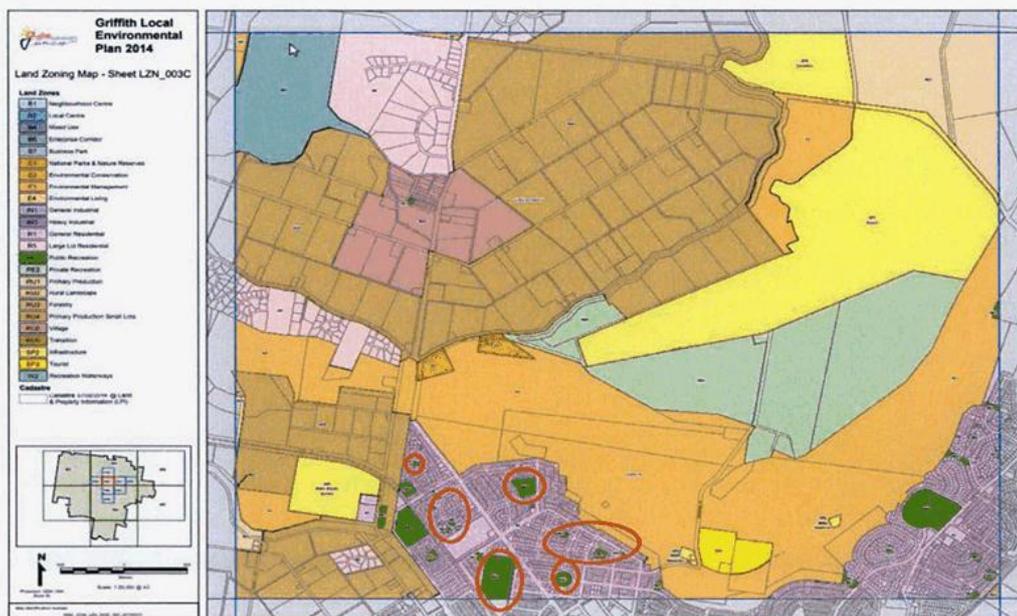
Under the current GLEP 2014, the various parcels of land are all zoned as RE1 – Public Recreation as shown by green colour in Figure 8 (below). The zoning of the land fits the current uses of the various lands contained within this PoM for Sportsground, Park and General Community Use as described in Table 3 below.

**Table 3 – Zoning requirements for RE1 – Public Recreation**

<p><b>Objectives of zone</b></p> <ul style="list-style-type: none"> <li>To enable land to be used for public open space or recreational purposes.</li> <li>To provide a range of recreational settings and activities and compatible land uses.</li> <li>To protect and enhance the natural environment for recreation purposes.</li> <li>To encourage the development of public open spaces in a way that addresses the community's diverse recreation needs.</li> <li>To offer opportunities for tourism development.</li> </ul>
<p><b>Permitted without consent</b></p> <p>Environmental protection works; Water reticulation systems.</p>
<p><b>Permitted with consent</b></p> <p>Amusement centres; Aquaculture; Boat launching ramps; Boat sheds; Building identification signs; Business identification signs; Camping grounds; Car parks; Caravan parks; Charter and tourism boating facilities; Centred-based Childcare facilities; Community facilities; Eco-tourist facilities; Educational establishments; Emergency services facilities; Entertainment facilities; Environmental facilities; Flood mitigation works; Function centres; Heliports; Information and education facilities; Jetties; Kiosks; Marinas; Markets; Mooring pens; Moorings; Recreation areas; Recreation facilities (indoor); Recreation facilities (major); Recreation facilities (outdoor); Respite day care centres; Restaurants or cafes; Roads; Signage; Water recreation structures; Water recycling facilities; Water supply systems; Wharf or boating facilities.</p>
<p><b>Prohibited</b></p> <p>Any development not specified in item 2 or 3.</p>

Planning Issues, Heritage and Flooding together with other discernible features are identified in **Annexure 2** (refer pg. 42).

**Figure 8 – GLEP (2014) – Land Zoning Map – Sheet LZN\_003C**



### 3.3.1 State Environmental Planning Policy (Transport & Infrastructure) 2021

This Policy – *SEPP (Transport & Infrastructure) 2021* – commenced on 1 March 2021 and provides that certain types of works do not require development consent by a public authority, other agencies or authorised person.

**Division 12** of the *SEPP (Transport & Infrastructure) 2021* defines parks and public reserves which this Policy covers, i.e., Crown land within the meaning of the *CLMA 2016* including a public reserve but not including a reserve that is dedicated or reserved for a public cemetery.

Section 2.73(2)(c) of the Policy provides that in respect of land reserved within the meaning of the *CLMA 2016*, development for any purpose can be carried out without consent by or on behalf of the Secretary, a Crown land manager of the land, the Ministerial Corporation or the Minister administering the *CLMA 2016*, if the development is for the purposes of implementing a PoM adopted for the land under the *CLMA 2016* in to such land or in accordance with the *Local Government Act 1993* in relation to Crown land managed by a Council.

The types of development that may comply with the provisions of *Section 2.73(2)(c)* of *SEPP (Transport & Infrastructure) 2021* are set out in Table 5 (pgs. 29-30).

Section 2.73(3) of the Policy provides for a range of construction or maintenance works that are applicable under this Policy which may be carried out by or on behalf of a public authority in connection with a public reserve.

### 3.3.2 Other Relevant Legislation and Policies

In addition to the requirements of the *CLMA 2016* and the *Local Government Act 1993*, there are a number of other pieces of legislation and Government Policies that are relevant to the ongoing management of the respective Crown reserves and Council owned community lands including:

- *Aboriginal Land Rights Act 1983 (ALRA 1983)*;
- *Companion Animals Act 2016*;
- *Environmental Planning and Assessment Act 1979 (EP&A Act 1979)*;
- *Native Title Act 1993 (NTA 1993 (C'th))*;
- *Pesticides Act 1999*;
- *State Environmental Planning Policies (SEPPs)*.

### 3.3.3 Council Plans and Policies

The following Council Plans and Policies are relevant to the on-going management of lands contained within the North Griffith Precinct Parks Plan of Management:

- Community Strategic Plan '**Guiding Griffith 2040**'
- *Playground Strategy (2014)* (pending review)
- Approvals – Fencing Adjoining Public Lands (CS-CP-311) (Local Policy)
- Asset Management Policy (AS-CP-201) (Public Policy)
- Council Services – All Users to be Charged (FS-CP-501) (Public Policy)

- Events Policy and Decision Tool (CS-CP-501) (Public Policy)
- Loans for Community Organisations & Sporting Bodies (FS-CP-702) (Public Policy)
- Prohibited Activities on Council Active & Passive Recreation Areas (PG-CP-301) (Public Policy)
- Roads and Parks – Naming and Renaming of (ICT-CP-201) (Public Policy)
- Smoke-Free Outdoor Areas (EH-CP-202) (Local Policy)
- Sporting Ovals Contribution Charges (PG-CP-201) (Public Policy)
- Tree Policy (PG-CP-402) (Local Policy)
- Tree Preservation Order (PG-CP-401) (Local Policy)
- Vandalism, Graffiti and Rubbish Dumping – Reward (GC-CP-314) (Public Policy)

## 4.0 DEVELOPMENT AND USE

### 4.1 Overview

Council is responsible for the management of various Crown Reserves and Council owned community land Parks, with the Crown Reserve Parks managed in line with the respective gazetted purposes.

The collective purposes align with the Reserves' past and current use and values identified in this Plan. In relation to Jubilee Park, management incorporates specific Licences in respect of the Tennis precinct and local FM community radio studio. Note: The current community radio studio was originally the Clubhouse for the Women's Bowling Club. The former bowling greens were located under what is now the carpark. Following cessation of the Women's Bowling Club, the Clubhouse was subsequently utilised by the local Rugby Union Club.

Council's *Playground Strategy (2014)* underwent an extensive community consultation process that has provided Council with direction for play provision, design, management and priority for all the Parks under Council's administration (Council Managed and Community owned). Council has been able to prioritise and budget for upgrades of both Precinct and Neighbourhood Parks in line with the Strategy and also in consideration of its Asset Management Plan completed in June 2018.

### 4.2 History of Parks

Historical records of Griffith City Council indicate the following in relation to the naming of the Parks:

- ❖ Circle Park – named after the street it is located in.
- ❖ French Park – history of name unknown.
- ❖ Coates Park – named after Mr B Coates, a community member who provided significant volunteer work in establishing the park.
- ❖ Wood Park – named after Messrs FA and GJ Wood. History - Name on Griffith Cenotaph.
- ❖ Jubilee Park – Known as Jubilee Oval since development in 1951.
- ❖ Ieraci Park – no known history of naming.
- ❖ Jacka Park – no known history of naming.
- ❖ Kinkead Park – no known history of naming.
- ❖ Noel Hogan Park – no known history of naming.
- ❖ Ryan Park – believed to be named after son of the developer.
- ❖ Ortella/Gordon Park – not formally named (temporary name only).

### 4.3 Current Use of Land and Structures on adoption of Plan

Jubilee Park offers the highest use potential for organised sporting fixtures for weekend use by various sporting Clubs and also weekly by school groups utilising the various sporting infrastructure in place. This Park with its large open space also provides opportunities for individuals and family groups to partake in passive recreation.

As identified in **Annexure 1** (refer pgs. 40-41), Jubilee Park provides for an exclusive Tennis Precinct at its northern end together with specific areas for football (junior rugby league and rugby union) and cricket (that seasonally overlap) together with netball which are the primary uses of the main park area. The FM radio studio is located at the southerly end and separately fenced, is located in what was previously the local rugby union clubhouse. Refer to the Infrastructure Map shown at **Annexure 3** (pg. 43).

Events held at Jubilee Park in recent years include:

- Netball Carnival (2017)
- Fire and Rescue NSW (FRNSW) Firefighter Championships (2018)
- 100<sup>th</sup> MIA Open Bronze AMT (2021)
- Junior Rugby League Competitions

A triangular section located to the north-east of the main area fronting Wyangan Avenue provides open space. A narrow strip of land adjoining the eastern boundary and generally adjacent to Groongal Avenue (i.e., road reserve) provides a shaded border for parking for spectators of the various sporting activities. These two parcels of land are surveyed separately to the main area of Jubilee Park.

An area to the north-west of the main area is currently utilised as an overfill for informal parking.

In recent years, upgrades have included sealed parking adjacent to the community radio station, synthetic netball courts and canteen.

Currently under construction (and nearing completion) is an expansive amenity building, a new rugby field and car park including new tree plantings (adjacent to Cutler Avenue / Campbell Street). This Project forms part of Council's Griffith Regional Sporting Precinct Master Plan and was funded via 'Stronger Country Communities Fund Round 2' [REDACTED] together with a Council contribution. These upgrades will facilitate local sporting teams competing at Jubilee Oval to enjoy new change rooms, toilets, canteen and cricket pitch while the rugby fields will be reconfigured to allow for additional fields and larger playing spaces.

Although it is proposed that Griffith Netball competition games will be transferred to the West End Sporting Complex (when upgraded), the current netball courts will remain in situ for use by schools, social games and as an overflow should the local Netball Association hold large netball events / carnivals in the future.

Storage for various sporting fixtures is housed in the former amenities building and the Griffith Rugby Union Club also has a shed located at the northern end of the park that has a combined use for storage and Club meetings.

Infrastructure has also been installed to enable Fire and Rescue NSW to hold State competitions at Jubilee Park.

Council has approved a number of Development Applications catering to the needs of various sporting clubs and activities since the mid 1950's including:

- Griffith Tennis Club Inc.
  - Tennis Club House – DA 17/55 (approved 22/02/1955)
  - Open Verandah – DA 52/59 (approved 02/06/1959)

- Additions – DA 34/63 (approved 02/04/1963)
- Relocation of the boundary fence – DA 111/90 (approved 17/12/1990)
- New garage – DA 945158 (approved 30/05/1995)
- To demolish and erect a new Clubhouse – DA 956049 (approved 05/10/1995)
- Clubhouse for Tennis – DA 950402 (approved 26/03/1996)
- Erection of 4 light poles – B347/1999 (approved 06/03/2000)
  
- Griffith Netball Association
  - Kiosk & Admin facility – DA 40/91 (approved 30/07/1991) – Building Application 35/92 (approved 19/02/1992)
  - Shipping Container used as Administration Building – DA 355/2005 (approved 08/08/2005)
  - Erection of four concrete poles and eight floodlights- DA 144/2007 (approved 17/07/2007)
  
- Change of Use - Community Radio studio and Internal alterations – DA253/2004 (approved 29/10/2004)
  
- Spanline Riverina – Proposed cover attached to canteen - DA 100/2009(1) (approved 29/04/2009)
  
- Western Riverina Community College – Sports Shelter - DA 61/2014(1) (approved 15/05/2014)
  
- Griffith City Council
  - Construct a car park – DA 9/2007 (approved 09/05/2007)
  - Construct a basketball court – DA 223/2007 (approved 17/07/2007)
  - State 1 – New amenities building incorporating 4x change rooms and associated facilities and disabled carparking/access. Stage 2 – 2(two)x additional change rooms. Stage 3 – In principle (concept) approval for carpark – DA 275/2019 (1) (approved 23/04/2020)

Wood Park although noted as a 'Precinct Park' is potentially under-utilised given its location and lack of facilities, i.e., limited play experiences, minimal seating and no shelter or BBQ facilities.

'Neighbourhood Parks' including French Park, Circle Park, Ieraci Park, Kinkead Park and Noel Hogan Park are located in either newer residential subdivisions (around 20 years old) or in established areas where residences built during the 1950's-60's are largely being renovated. With larger homes and less back-yard, the necessity for neighbourly outdoor play facilities continues to be a cornerstone for physical health, mental well-being and social engagement. These playgrounds are all valued assets within the communities within which they are located.

Ryan and Jacka Parks offer no playground experience although notably, are located relatively close to Ieraci and Kinkead Parks respectively. Their size however does lend themselves to informal activities of neighbourhood cricket or touch football and the like. These parks could remain as is, or potentially be developed into more native landscaping offering alternative play potential.

A description on the condition of the land and structures is not necessary for a PoM comprising multiple parcels of land, however this PoM has included information to express proposed

developments resultant from Council's former *Playground Strategy* and its Asset Management Plan.

Based on the descriptors of the Asset Condition Rating (physical condition rating scale), the following assets have specifically been identified for upgrade as shown in the Table below. Other issues have also been identified through consultation with Council representatives of Parks & Gardens and Planning directorates.

**Table 4 – Building Asset Report**

	BUILDING DESCRIPTION	YEAR BUILT	CONDITION RATING
<b>Jubilee Park</b>	Amenities Block and Changerooms	?	3
	Toilet Block	?	3
<b>Circle Park</b>	Park Furniture (table)	?	4
<b>Wood Park</b>	Slide	?	3
<b>Kinkead Park</b>	Rocker	?	3
CONDITION RATING	DESCRIPTION		
1	<b>Very Good:</b> Only planned maintenance required		
2	<b>Good:</b> Minor maintenance required plus planned maintenance		
3	<b>Fair:</b> significant maintenance required		
4	<b>Poor:</b> significant renewal / rehabilitation required		
5	<b>Very Poor:</b> Physically unsound and / or beyond rehabilitation		

At the time of PoM preparation, a new combined amenities block/changerooms and toilet facility accommodated for disabled use together with formal parking, is currently under construction in consideration of the above building asset report. The outdated facilities are proposed for storage.

Although not identified as requiring an upgrade, the *Playground Strategy (2014)* noted that playground equipment at Coates Park comprising of only a large slide and double swing both of steel construction, were outdated and the park was in need of an upgrade. There is no natural or built shade over the equipment and no seating within the park although the park size lends itself to passive recreational use, i.e., kicking a football, family cricket games etc. There is also evidence of unauthorised rear access through the park to some adjoining residences. Upgrade of this Park will be subject to future planning, budgetary constraints and community needs.

**Figure 9 – Photos showing infrastructure / use on various Parks**

Circle Park (The Circle, Griffith)



French Park (Gordon Avenue, Griffith)



Coates Park (Gordon Avenue, Griffith)



Wood Park (Cnr Messner and Thompson Streets, Griffith)



Jubilee Park (Groongal Avenue, Griffith)



Ieraci Park (North Grove Drive, Griffith)



Jacka Park (Robrick Place, Griffith)



Kinkead Park (Cnr North Grove Drive & Robrick Close, Griffith)



Noel Hogan Park (Nelson Drive, Griffith)



Ryan Park (North Grove Drive, Griffith)



Ortella/Gordon Avenue Park, Griffith (Intersection of Yoolooma and Ortella Streets & Gordon Avenue)



#### 4.4 Permissible Uses/Future Uses

Community land is valued for its important role in the social, intellectual, spiritual and physical enrichment of residents, workers, and visitors to the Griffith City Council area.

Griffith City Council encourages a wide range of uses of community land and intends to facilitate uses which increase the activation of its land, where appropriate. Within the recreational and sporting facilities in particular, Griffith City Council intends to permit and encourage a broad range of appropriate activities.

The use of community land is often supported by associated ancillary development such as playground equipment, amenity blocks or food kiosks. The general types of uses which may

occur on community land categorised as Park, Sportsground and General Community Use, and the forms of development generally associated with those uses, are set out in Table 5 below. The facilities on community land may change over time, reflecting the needs of the community.

The anticipated uses and associated development identified in the table are intended to provide a general guide. The terminology used is not intended to impose an exact meaning. For example, a reference to 'football' includes any variations of that game.

It is anticipated that new sports may develop, and others increase or decrease in popularity. If this occurs, then some community land may be modified to facilitate the changing forms of 'active recreation' enjoyed by the community. References such as 'field', or 'court', are not intended to exclude other sporting surfaces. Similarly, the current use for community radio may also change to incorporate other general community use.

**Table 5 - Permissible use and development of community land categorised as Park and Sportsground by council**

<b>Park</b>	
<p><b>Purpose/Use such as...</b></p> <ul style="list-style-type: none"> <li>• Active and passive recreation including children's play and cycling</li> <li>• Group recreational use, such as picnics and private celebrations</li> <li>• Eating and drinking in a relaxed setting</li> <li>• Publicly accessible ancillary areas, such as toilets</li> <li>• Markets and similar localised events and gatherings</li> <li>• Low intensity commercial activities (e.g., recreational equipment hire)</li> <li>• Filming and photographic projects</li> </ul> <p>NB: Some of the uses listed above require a permit from the council.</p>	<p><b>Development to facilitate uses, such as...</b></p> <ul style="list-style-type: none"> <li>• Development for the purposes of improving access, amenity and the visual character of the park, e.g., paths, public art, pergolas</li> <li>• Development for the purposes of active recreation such as play equipment, exercise equipment, bike racks, half-court basketball courts, bocce courts</li> <li>• Amenities to facilitate the safe use and enjoyment of the park e.g., picnic tables, BBQs, sheltered seating areas</li> <li>• Refreshment areas (kiosks) including external seating</li> <li>• Lighting, seating, toilet facilities, courts, paved areas</li> <li>• Hard and soft landscaped areas</li> <li>• Storage sheds</li> <li>• Car parking and loading areas</li> <li>• Commercial development which is sympathetic to and supports use in the area, e.g., hire of recreation equipment</li> <li>• Heritage and cultural interpretation, e.g., signs</li> <li>• Advertising structures and signage (such as A-frames and banners) that:                             <ul style="list-style-type: none"> <li>- relate to approved uses/activities</li> <li>- are discreet and temporary</li> <li>- are approved by the council</li> </ul> </li> <li>• Water saving initiatives such as stormwater harvesting, rain gardens and swales</li> <li>• Energy saving initiatives such as solar lights and solar panels</li> <li>• Locational, directional and regulatory signage</li> </ul>
<b>Sportsground</b>	
<p><b>Purpose/Use</b></p> <ul style="list-style-type: none"> <li>• Active and passive recreational and sporting activities compatible with the nature of the particular land and any relevant facilities</li> <li>• Organised and unstructured recreation activities</li> <li>• Community events and gatherings</li> <li>• Commercial uses associated with sports facilities</li> </ul>	<p><b>Development to facilitate uses</b></p> <p>Development for the purpose of conducting and facilitating organised sport (both amateur and professional), for example:</p> <ul style="list-style-type: none"> <li>• Sports field (cricket, football, baseball, softball)</li> <li>• Marked court (basketball, tennis, hockey, netball etc.)</li> <li>• Change room/locker areas</li> <li>• Shower/toilet facilities</li> <li>• Kiosk uses</li> <li>• Car parking and loading areas</li> <li>• Ancillary areas (Clubhouse/meeting rooms, recording rooms, equipment storage areas)</li> <li>• Shade structures</li> </ul>

	<ul style="list-style-type: none"> <li>• Storage ancillary to recreational uses, community events or gatherings, and public meetings</li> <li>• Facilities for sports training, e.g., batting cages, cricket practice nets, tennis walls</li> <li>• Provision of amenities to facilitate use and enjoyment of the community land including seating, change rooms, toilets, storage, first aid areas</li> <li>• Heritage and cultural interpretation, e.g., signs</li> <li>• Equipment sales/hire areas</li> <li>• Compatible, small scale commercial uses, e.g. sports tuition</li> <li>• Advertising structures and signage (such as A-frames and banners) that:             <ul style="list-style-type: none"> <li>- relate to approved uses/activities</li> <li>- are discreet and temporary</li> <li>- are approved by the council</li> </ul> </li> <li>• Water saving initiatives such as stormwater harvesting, rain gardens and swales</li> <li>• Energy saving initiatives such as solar lights and solar panels</li> <li>• Locational, directional and regulatory signage</li> </ul>
<b>General Community Use</b>	
<p><b>Purpose/Use</b></p> <ul style="list-style-type: none"> <li>• Provide a building suitable for range of community use (e.g., community radio station, clubhouse etc.)</li> </ul>	<p><b>Development to facilitate uses</b></p> <ul style="list-style-type: none"> <li>• Development for the purpose(s) of social, community, cultural or recreational activities dependant of needs of community and specific user group at the time.</li> <li>• Development (within the building) for the purpose of addressing the needs of a particular group.</li> </ul>

#### 4.5 Express authorisation of leases and licences and other estates

Under section 46(1)(b) of the LG Act, leases, licences and other estates formalise the use of community land. A lease, licence or other estate may be granted to organisations and persons, community groups, sports clubs and associations, non-government organisations, charities, community welfare services, non-profit organisations and government authorities.

The lease or licence must be for uses consistent with the reserve purpose(s), the assigned categorisation and zoning of the land, be in the best interests of the community as a whole, and enable, wherever possible, shared use of community land.

Any lease or licence proposal will be individually assessed and considered, including the community benefit, compatibility with this PoM and the capacity of the community land itself and the local area to support the activity.

A lease is normally issued where exclusive control of all or part of an area by a user is proposed. In all other instances a licence or short-term licence or hire agreement will be issued.

This plan of management **expressly authorises** the issue of leases, licences and other estates over the land covered by the plan of management, in accordance with section 46(1)(b) of the LG Act, provided that:

- specific to the reserve purposes for individual reserves i.e. Children’s Playground, Public Park, Public Recreation and Community Purposes

- the purpose is consistent with the core objectives prescribed by Section 36F (categorisation of Sportsground), Section 36G (categorisation of Park) and Section 36I (categorisation of General Community Use)
- the lease, licence or other estate is for a permitted purpose listed in the *Local Government Act 1993* or the *Local Government (General) Regulation 2021*
- the issue of the lease, licence or other estate and the provisions of the lease, licence or other estate can be validated by the provisions of the *Native Title Act 1993* (C'th)
- where the land is subject to a claim under the *Aboriginal Land Rights Act 1983* the issue of any lease, licence or other estate will not prevent the land from being transferred in the event the claim is granted
- the lease, licence or other estate is granted and notified in accordance with the provisions of the *Local Government Act 1993* or the *Local Government (General) Regulation 2021*
- the issue of the lease, licence or other estate will not materially harm the use of the land for any of the purposes for which it was dedicated or reserved.
- a tender process may be considered, for terms exceeding 5 years, unless it is granted to a non-profit organisation.

This PoM also allows the council to grant 'an estate' over community land for the provision of public utilities and works associated with or ancillary to public utilities and provision of services, or connections for premises adjoining the community land to a facility of the council or public utility provider on the community land in accordance with the *Local Government Act 1993*.

Section 3.17 refers to special provisions of Crown land managers (i.e. extending to leases, licences, permits, easements or rights of way) that may be granted with reference to Section 2.19 (Secondary Interest in dedicated or reserved Crown land); and Section 2.20 (short-term licences over dedicated or reserved crown land).

While occurrence of any tenure over the smaller Parks providing playground equipment and open space is generally considered infrequent, there may be occasion for small localised events to occur for which a Short-term Licence may be issued.

Short-term licences may be authorised for the purpose of:

- (a) the playing of a musical instrument, or singing, for fee or reward
- (b) engaging in a trade or business
- (c) the playing of a lawful game or sport
- (d) the delivery of a public address
- (e) commercial photographic sessions
- (f) picnics and private celebrations such as weddings and family gatherings
- (g) filming sessions
- (h) the agistment of stock.

Fees for short-term casual bookings will be charged in accordance with the council's adopted fees and charges at the time.

#### Direction of Funds

Any income produced from the Reserve, i.e., as per the approved Tenure, will be distributed to manage other community land in a fashion determined by Council.

Jubilee Park (R1010108), providing for a range of activities, currently has two Licences in place and has potential for future Licences to be issued. The following Licences are currently in place:

- Licence to Griffith Tennis Association Inc. – 17/10/2015 to 16/10/2025
- Licence to Griffith Community FM Association Inc. – 01/07/2014 to 30/06/2024

#### 4.6 Easements

No easements affect Crown Reserve parks managed by Council.

There are various easements identified on the following Parks all being Council owned community land, the details of which are held by Council as per respective Certificates of Title and 88B Instruments:

- Ieraci Park – Lot 65 DP 1063408
- Ryan Park – Lot 66 DP 1063408
- Noel Hogan Park - Lot 60 DP 1008323

#### 4.7 Native Title Assessment

Further to [Section 2.5 – Categorisation of Reserves](#) and reference to Native Title Assessment, Council is required under the provisions of the *CLMA 2016*, to undertake steps to identify whether the activity proposed on Crown land will affect Native Title. Council must further consider what provisions of the *NTA 1993 (C'th)* will validate the activity; and what procedures should be taken in relation to a particular activity prior to its commencement. Council must also have regard for any existing claims made on the land under the *NSW Aboriginal Land Rights Act 1983 (ALR Act)*.

The activity must be authorised through *Part 2 Division 3 of the NTA 1993 (C'th)*.

Council must obtain written advice from its Native Title Manager in relation to certain activities and acts carried out on Crown land where the land is not excluded land, in accordance with native title legislation and applicable to works and activities to be undertaken at Circle, French, Coates, Wood and Jubilee Parks.

#### 4.8 Aboriginal Land Claims

The Council managed Crown Reserves are not currently impacted by any Aboriginal Land Claims. Any future activities will need to take into account any Claim that may subsequently be lodged in respect of any of these lands.

## 5.0 BASIS OF MANAGEMENT

Griffith City Council intends to manage its community land to meet:

- assigned categorisation of community land
- the LG Act guidelines and core objectives for community land set out in Table 6 in [Section 5.1](#) below
- the council's strategic objectives and priorities
- development and use of the land outlined in Section 6 of the LG Act.

### 5.1 Core Objectives for management of Community land

The management of community land is government by the categorisation of the land, its purpose and the core objectives of the category.

For the purpose of this PoM, the categories of Sportsgrounds, Parks and General Community Use are defined in the *Local Government Regulations 2021, Part 4 Division 1 – Guidelines for the categorisation of community land* as:

*Table 6 – Categories of land as defined in the Sections 103, 104 & 106 Local Government Regulation*

<b>Guidelines – from the Local Government (General) Regulation 2021</b>	<b>Core objectives – from the Local Government Act 1993</b>
<p><b>Clause 103 – Sportsgrounds:</b></p> <p>Land used primarily for active recreation involving organised sports or playing outdoor games.</p>	<p><b>Category Sportsground (Section 36F):</b></p> <ul style="list-style-type: none"> <li>• to encourage, promote and facilitate recreational pursuits in the community involving organised and informal sporting activities and games</li> <li>• to ensure that such activities are managed having regard to any adverse impact on nearby residences.</li> </ul>
<p><b>Clause 104 – Parks:</b></p> <p>Land which is improved by landscaping, gardens or the provision of non-sporting equipment and facilities, and for uses which are mainly passive or active recreational, social, educational and cultural pursuits that do not intrude on the peaceful enjoyment of the land by others.</p>	<p><b>Category Park (Section 36G):</b></p> <ul style="list-style-type: none"> <li>• to encourage, promote and facilitate recreational, cultural, social and educational pastimes and activities</li> <li>• to provide for passive recreational activities or pastimes and for the casual playing of games</li> <li>• to improve the land in such a way as to promote and facilitate its use to achieve the other core objectives for its management.</li> </ul>
<p><b>Clause 106 – General Community Use:</b></p> <p>Land that may be made available for use for any purpose for which community land may be used, and does not satisfy the definition of natural area, sportsground, park or area of cultural significance.</p>	<p><b>Category General Community Use (Section 36I):</b></p> <ul style="list-style-type: none"> <li>• to promote, encourage and provide for the use of the land</li> <li>• to provide facilities on the land, to meet the current and future needs of the local community and of the wider public:                             <ul style="list-style-type: none"> <li>(a) in relation to public recreation and the physical, cultural, social and intellectual welfare or development of individual members of the public, and</li> <li>(b) in relation to purposes for which a lease, licence or other estate may be granted in respect of the land (other than the provision of public utilities and works associated with or ancillary to public utilities).</li> </ul> </li> </ul>

## 6.0 MANAGEMENT FRAMEWORK FOR CATEGORIES OF LAND

### 6.1 Management Issues

Management of the lands takes into consideration the reserves' purpose and the purpose for which the lands are classified and categorised.

Council recognises the importance of Reserves and community owned land in providing a range of open space, playground equipment together with sportsground and general community use infrastructure as considered necessary within its defined locality.

Council's current *Playground Strategy (2014)* provides guidance for the variety of playgrounds necessary to support the mental and physical health and well-being of its residents. Review of the said Strategy, community expectations, changing demographics and Council's budget and forecasting will further drive necessary improvements and upgrades of the various facilities within the North Griffith Precinct Parks.

Table 7 below provides Council's general management issues and guidelines.

**Table 7 – Management Issues and Guidelines**

Maintenance of infrastructure	<ul style="list-style-type: none"> <li>As required following routine inspections and / or identified site-specific issues.</li> <li>Review of the Council's <i>Playground Strategy (2014)</i> may further identify new and improved infrastructure other than as described in Section 4.3 Table 4.</li> </ul>
Mowing	Parks, Open Space Reserves and the Sportsground will be mowed in accordance with approvals, manuals or schedules as required.
Car Park	No formal car-park applies to the Parks and Reserves within this PoM; however, provisions of parking do apply to Jubilee Park.
Watering	Watering of the sportsground, parks and landscaped areas (as applicable) shall be undertaken as required and according to specific water restrictions that may be in place from time to time.
Vandalism	Vandalism will be addressed at the time of occurrence and may include issues such as unauthorised vehicle access; the riding of horses; damage to playground equipment or infrastructure; or other damage resultant from unauthorised activities referred to in PG-CP-301 "Prohibited Activities on Council Active & Passive Recreation Areas.
Companion Animals	Domestic pets may use the land where authorised by signage provided that they are under the control of a competent person at all times, on an adequate chain, cord or leash; and do not cause loss of amenity to other users of the Reserve, except where specifically publicly notified. Dogs are not permitted within any area that is: <ul style="list-style-type: none"> <li>In a children's play area.</li> <li>Within 10 metres of the kiosk or other food outlet or place where food is prepared (as per the Companion Animals Act 1998 as amended)</li> </ul>
Playground Equipment	Playground equipment has limited life-span. Further upgrades or replacement may be considered in line with the review of the <i>2014 Playground Strategy, Asset Report</i> and any deficiencies that may be identified at the time (subject to available funding).
Erection of Sporting Posts	The erection of posts on playing fields if allowed by this Plan of Management will be under authorisation of Council. Users, in certain circumstances may erect posts, provided that they have the approval of Council.
Weeds	Weed management practices will be undertaken in accordance with guidelines to ensure amenability of the park and playground areas.
Trees	Risk Assessment of Trees is currently being programmed by Council's Parks & Gardens staff

## 6.2 Plan Implementation

The following action plan sets out the requirements under Section 36 of the Local Government Act 1993 with respect to:

- The category of the land
- The objectives and performance targets of the plan with respect to the land
- The means by which the council proposes to achieve the plan's objectives and performance targets,
- The manner in which the council proposes to assess its performance with respect to the plan's objectives and performance targets.

Table 8 below sets out key objectives and performance targets for management of the land.

**Responsibility: Griffith City Council (GCC)**

*Table 8 - Objectives and performance targets of this Plan of Management*

Performance Target	Actions	Priority	Performance Indicator
<b>LEGISLATIVE</b>			
To ensure that relevant legislation is complied with in relation to preparation of the PoM.	1. The Plan is prepared in accordance with Native Title Manager advice, the LGA 1993, the CLMA 2016, NTA 1993 (C'th) and ALRA 1983 (as applicable)	High	<ul style="list-style-type: none"> <li>• The Plan is reviewed by Council's Native Title Manager and approved by Department of Industry – Crown Lands/</li> <li>• Council exhibits and adopts the PoM subject to community comments being addressed. (Where significant changes to the PoM are required, the PoM will be re-referred to Council and the Department).</li> </ul>
<b>MANAGEMENT</b>			
Provide quality facilities; assess the current facilities, condition and use of the land in accordance with community expectations.	2. Consultation and development in accordance with Council's Strategies and Policies. 3. Review of Council's Building Asset Report. 4. Review of Council's Playground Strategy (2014) 5. Provide maintenance to meet required service levels inclusive of grounds, trees, park infrastructure, lighting and footpaths. 6. Ensure appropriate tenure arrangement with users (as applicable).	Ongoing	<ul style="list-style-type: none"> <li>• Assets (current and future) are managed in accordance with prescribed Council standards and community expectations.</li> <li>• Community consultation in regards to meeting future community needs.</li> <li>• Maintenance service levels to meet requirements in accordance with adopted budgets.</li> <li>• Review of tenure conditions (as applicable).</li> </ul>
Asset Management Plan in place to maintain and enhance the sportsground and parks	7. Update Asset Management Plan (as required)	On-going	<ul style="list-style-type: none"> <li>• Asset renewal considered in 10-year financial planning (where applicable).</li> </ul>
Manage the buildings, sportsground, parks and open spaces (as applicable) for the safety of users including	8. Conduct regular safety audits to assess the property on a risk assessment basis	On-going	<ul style="list-style-type: none"> <li>• Equipment is in good working condition.</li> <li>• Reduction in vandalism.</li> <li>• Feedback from community is positive and negative</li> </ul>

addressing acts of vandalism			feedback acted upon as necessary.
<b>INFRASTRUCTURE</b>			
Upgrade sportsground and park infrastructure and remove obsolete and / or dangerous infrastructure (as and when necessary)	9. Ensure on-going inspection and assessment of all infrastructure (as appropriate) 10. Plan and renewal of infrastructure is in accordance with Asset Management guidelines, review of the Playground Strategy and budgetary constraints	On-going	<ul style="list-style-type: none"> <li>• Future upgrades and landscaping are carried out in accordance with the PoM and required development processes (where necessary).</li> <li>• Increased use of all facilities noted through survey or general observation.</li> <li>• Feedback from community is positive and negative feedback acted upon as necessary.</li> </ul>
Provide appropriate facilities to support use for community purposes	11. Support proposal(s) for upgrade to buildings to provide for community use for various uses (now and in the future as necessary)	On-going	<ul style="list-style-type: none"> <li>• Provide necessary approvals to development (as necessary) in accordance with community use.</li> <li>• Feedback from community is positive and negative feedback acted upon as necessary.</li> </ul>
Manage the areas to provide equal access to all users	12. Continually review infrastructure and ensure any plans for new facilities and equipment will allow access for all users	On-going	<ul style="list-style-type: none"> <li>• Facilities meet the requirements of all users.</li> <li>• Feedback from community is positive and negative feedback acted upon as necessary.</li> </ul>
<b>ENVIRONMENT</b>			
Provide quality sporting and passive recreational facilities	13. Maintain all facilities to a high standard 14. Consider and plan for future needs for varied use of Jubilee Park, expansion of playground areas, open space and / or landscaping as necessary	On-going	<ul style="list-style-type: none"> <li>• All facilities are maintained to meet service levels and continue to comply with Australian Standards.</li> <li>• Community feedback is positive and negative feedback acted upon as necessary.</li> </ul>
Manage environmental and user safety	15. On-going inspection and assessment of infrastructure in accordance with Council and Government WHS legislation 16. Consider the safety of the community in the maintenance of the various buildings, recreational areas and open space in regard to the use of chemicals and pest control	On-going	<ul style="list-style-type: none"> <li>• Audit process for safety and condition reporting working well.</li> <li>• Staff are appropriately trained in safe handling and use of appropriate chemicals for the land.</li> <li>• No unauthorised use of facilities.</li> <li>• Feedback from the community is positive and negative feedback is acted upon where necessary.</li> </ul>
<b>USE OF THE RESERVES</b>			
Signs	17. Review signs and follow guidelines provided by Statewide Mutual Signs as Remote Supervision 18. Signage should be amended to reflect the appropriate	On-going	<ul style="list-style-type: none"> <li>• Continually monitor all signs are legible and current and renew as required.</li> <li>• Update signage in respect of open space areas to reflect</li> </ul>

	legislation for management of the respective parks		<p>"Reserve" in lieu of "Park" where appropriate.</p> <ul style="list-style-type: none"> <li>Remove reference to "NSW Department of Primary Industries Catchment &amp; Lands" logo on Council Owned Community Land Parks.</li> </ul>
Provide adequate lighting to the areas	19. Examine existing and future lighting requirements	On-going	<ul style="list-style-type: none"> <li>Continue to monitor requirements for security lighting for unlawful activities (as necessary).</li> <li>Community feedback is positive and negative feedback acted upon as necessary.</li> </ul>
Parking	20. Provide adequate parking areas to meet the needs of users as appropriate	On-going	<ul style="list-style-type: none"> <li>Continue to monitor parking requirements to meet the needs of users and the respective facilities as appropriate.</li> <li>Plan and budget for any further parking needs at Jubilee Park regarding Tennis Association growth and / or community needs.</li> <li>Community feedback is positive and negative feedback acted upon as necessary.</li> </ul>

## 7.0 References

[https://www.google.com/search?q=Griffith+Clty+Council+populatioin&rlz=1C1GCEA\\_enAU854AU854&oq=Griffith+Clty+Co](https://www.google.com/search?q=Griffith+Clty+Council+populatioin&rlz=1C1GCEA_enAU854AU854&oq=Griffith+Clty+Co) sourced on 24 May 2021

Department of Planning, Industry & Environment – Crown Lands (NSW)

<https://trade.maps.arcgis.com/apps/webappviewer/index.html?id=99ed087615f24ab8aacc619ef3507155> sourced on 20 May 2021

<https://pp.planningportal.nsw.gov.au/publications/environmental-planning-instruments/griffith-local-environmental-plan-2014> sourced on 24 May 2021

[https://eplanningdlprod.blob.core.windows.net/pdfmaps/3450\\_COM\\_LZN\\_003C\\_020\\_20140310.pdf](https://eplanningdlprod.blob.core.windows.net/pdfmaps/3450_COM_LZN_003C_020_20140310.pdf) sources on 24 May 2021

[http://classic.austlii.edu.au/au/legis/nsw/consol\\_act/clma2016199/](http://classic.austlii.edu.au/au/legis/nsw/consol_act/clma2016199/) sourced on 9 July 2021

Griffith City Council

<https://www.griffith.nsw.gov.au/council-policies> sourced on 25 May 2021

[file:///C:/Users/Melva/Downloads/Playground\\_Strategy%20\(5\).pdf](file:///C:/Users/Melva/Downloads/Playground_Strategy%20(5).pdf) sourced on 28 May 2021

<https://www.griffith.nsw.gov.au/jubilee-oval-upgrades> sourced on 4 June 2021

[file:///C:/Users/Melva/Downloads/Sports\\_Precinct\\_Proposal\\_Presentation\\_Community\\_Forum\\_\(26\\_07\\_2018\)\\_Final.pdf](file:///C:/Users/Melva/Downloads/Sports_Precinct_Proposal_Presentation_Community_Forum_(26_07_2018)_Final.pdf) sourced on 4 June 2021

Local Government Act 1993

[http://www5.austlii.edu.au/au/legis/nsw/consol\\_act/lga1993182/](http://www5.austlii.edu.au/au/legis/nsw/consol_act/lga1993182/) sourced on 10 June 2021

Local sporting websites

<https://www.facebook.com/griffithnetballassociation/about/> sourced on 4 June 2021

<https://griffithtennisclub.com.au/> source on 4 June 2021

NSW Government Gazettes

<https://legislation.nsw.gov.au/gazette> sourced on 9 June 2021

<https://trove.nla.gov.au/newspaper/?type=gazette> sources 8 June 2021

## 8.0 ANNEXURES

- 1) Schedule of North Griffith Precinct Parks
- 2) Schedule of North Griffith Precinct Parks – Planning and other impacts
- 3) Jubilee Park Infrastructure Map
- 4) State Environmental Planning Policy (Exempt and Complying Development Codes) 2008

**ANNEXURE 1 – SCHEDULE OF NORTH GRIFFITH PRECINCT PARKS**

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	SCHEDULE OF NORTH GRIFFITH PRECINCT PARKS														
2	FACILITIES														
3	RESERVE NO.	PARK NAME	CROWN / COUNCIL	DATE OF GAZETTE	PURPOSE	CATEGORY	LOT/DP	AREA	PLAY'D	TOILET FACILITY	SEATING	SHELTER	BBQ	SIGNAGE	COMMENTS
4	78173	Circle Park	Crown	16/12/1955	Children's Playground; Public Park	Park	1/95/758476	1.379 ha	Y		Y			Y	Modular play equipment; Concrete footpath running north/south through park; old concrete table; 2x single seats (1@ aluminium & wood); wood table; concrete edging around playground; water bubbler; garbage bin; mature native & exotic trees
5	78175	French Park	Crown	16/12/1955	Children's Playground; Public Park	Park	1/106/758476	5369 m2	Y		Y			Y	Modular play equipment; Concrete edging around playground; Signage at eastern entry point only; mature native & exotic trees
6	85013	Wood Park	Crown	18/09/1964	Public Park; Public Recreation	Park	1/137/758476	2.425 ha	Y		Y			Y	Old brick entry with extended small steel pipe fencing at cnr. Thompson & Messnr Sts; Modular play equipment; Concrete edging around playground; concrete cricket pitch; 2x single wooden seats (one adjacent to playground); lightpole adjacent to playground
7	240004	Coates Park	Crown	3/04/1987	Public Recreation	Park	14/56/758476	6987 m2	Y					Y	Old steel swing and slippery dip only; lightpole adjacent to playground; some rear access to adjacent residents from Park
8	1010108	Jubilee Park	Crown	26/03/2004	Community Purposes; Public Recreation	General Community Use; Sportsground	2-3/86/758476 & 7303/1153581	10.348 ha		Y				Y	Significant sporting precinct comprising: 3x Rugby League/Union fields; Netball courts (6x synthetic & 1x grass); Basketball practice court (1/2 size); dressing sheds; storage; canteen; Cricket Pitch x3; Cricket Practice nets x4; storage sheds; field lighting; No playground equipment. FM Radio Station fenced separately. Tennis Precinct comprising of 11x sand & 2x synthetic courts; Clubhouse; brick practice wall; storage shed; lights and garden. Car park: Formal sealed and marked carpark adjacent to FM Radio Station together with other informal parking areas adjacent to the perimeter of Jubilee Park. New car park is under construction.
9	240005	Danny Piccoli Park	Crown	8/01/1988	Public Recreation		1/114/758746	3475 m2							Drainage infrastructure



**ANNEXURE 2 – NORTH GRIFFITH PRECINCT PARKS – PLANNING, ALC’S etc.**

1	SCHEDULE OF ALL NORTH GRIFFITH PRECINCT PARKS - PLANNING CERTIFICATES, AHIMS CERTIFICATES & HERITAGE SIGNIFICANCE													
2	RESERVE NO.	PARK NAME	LOT/DP	Crown/Council	Critical Habitat Y/N	Conservation Area Y/N	Part 7AA Threatened Species Conservation Act 1995 Y/N	Part 5 Biodiversity Conservation Act 2016 Y/N	Section 60ZC Local Lands Services Act 2013 Y/N	Biodiversity Values (as per mapping tool) Y/N	Flood Prone Land Y/N	Aboriginal Sites or Places Y/N	Heritage Significance Y/N	
3	78173	Circle Park	1/95/758476	Crown	N	N	N	N	N	N	N	N	N	
4	78175	French Park	1/106/758476	Crown	N	N	N	N	N	N	N	N	N	
5	85013	Wood Park	1/137/758476	Crown	N	N	N	N	N	N/L	N	N	N	
6	240004	Coates Park	14/56/758476	Crown	N	N	N	N	N	N	N	N	N	
7	1010108	Jubilee Park	2-3/86/758476 & 7303/1153581	Crown	N	N	N	N	N	N/L	N	N	N	
8														
9		Ieraci Park	65/1063408	Council	N	N	N	N	N	N	N	N	N	
10		Jacka Park	83/851401	Council	N	N	N	N	N	N	N	N	N	
11		Kinhead Park	84/851401	Council	N	N	N	N	N	N	N	N	N	
12		Noel Hogan Park	60/1008323	Council	N	N	N	N	N	N	N	N	N	
13		Ryan Park	66/1063408	Council	N	N	N	N	N	N/L	N	N	N	
14		Ortella/Gordon Avenue Park	1/125382	Council	N	N	N	N	N	N	N	N	N	
15														
16	Flood Prone Land: Land is considered below the Flood Planning Level (FPL) and therefore subject to flood related development controls (level of a 1:100 ARI (average recurrent interval) flood event.													
17	H=High; M/H=Medium-High; L/M=Low-Medium; L=Low; L/H = Low-High; N/L=no level indicator given to Low ;N=no level indicator given													
18														

**ANNEXURE 3 – JUBILEE PARK INFRASTRUCTURE MAP**



 <p>Griffith City Council PO Box 400 13 Riverbank Street Griffith NSW 2800 Telephone 0800 376 077 Email <a href="mailto:griffith@griffith.nsw.gov.au">griffith@griffith.nsw.gov.au</a></p>	<p><b>Disclaimers:</b> This map is intended for general information purposes only. Griffith City Council does not guarantee the accuracy, completeness or suitability for any particular purpose. Users must exercise their own skill and care in using this map and carefully evaluate the accuracy, currency, completeness and relevance of the map before relying on it. The map is not a substitute for independent professional advice and, to the extent permitted by law, Griffith City Council is not liable for any loss or damage arising out of any inaccuracy, error or omission contained in the map.</p>		<p>Drawn By: <i>Author</i> Projection: GDA94 / MGA zone 55 Date: 20/02/2021 1:52 PM</p>	<p>Map Scale: 1:2932 at A4</p>
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#### **ANNEXURE 4**

##### **State Environmental Planning Policy (Exempt and Complying Development Codes) 2008**

*State Environmental Planning Policy (Exempt and Complying Development Codes) 2008* (SEPP exempt) provides that certain types of works do not require development consent under Part 4 of the EP&A Act. The General Exempt Development Code is set out in Division 1 of the SEPP, providing the limitations and conditions of the exemptions. They include: -

- Access Ramps
- Advertising and signage
- Aerials, antennae and communication dishes
- Air-conditioning units
- Animal shelters
- Aviaries
- Awnings, blinds and canopies
- Balconies, decks, patios, pergolas, terraces and verandahs
- Barbeques and other outdoor cooking structures
- Bollards
- Charity bins and recycling bins
- Earthworks, retaining walls and structural supports
- Fences
- Flagpoles
- Footpaths, pathways and paving
- Fowl and poultry houses
- Garbage bin storage enclosure
- Hot water systems
- Landscaping Structures
- Minor building alterations
- Mobile food and drink outlets
- Playground equipment
- Screen enclosures
- Sculptures and artworks
- Temporary uses and structures
- Waste storage containers

Section 1-16 of Division 2 of the SEPP provides for General Requirements for exempt development.



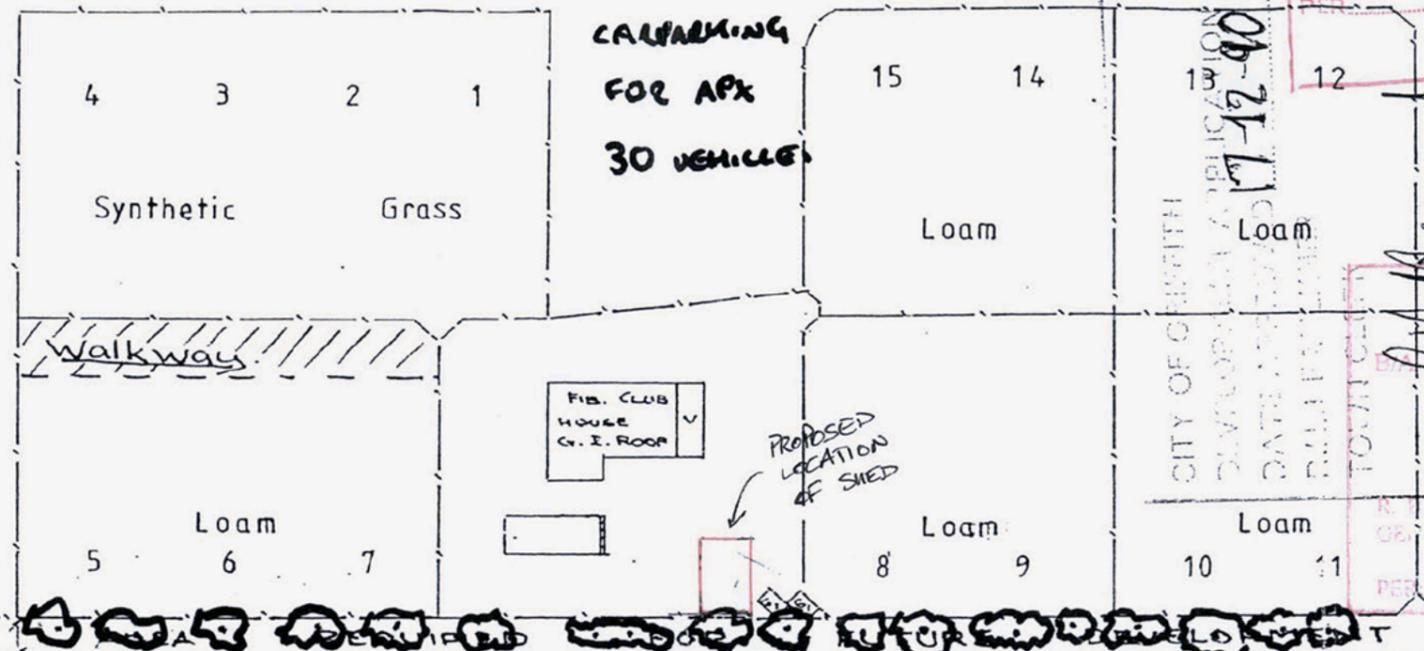
Annex D-

future  
Development  
Extra  
Courts

APPROVAL DOES NOT ALLOW  
CONSTRUCTION OF BUILDING WORKS.  
SUBMISSION OF A BUILDING  
APPLICATION FOR APPROVAL  
IS REQUIRED

NOORILLA

2 type/court



Approx 12'

To work in with the trees

JUBILEE PARK

APX LOCATION OF TREES

APX LOCATION  
of obstacles/  
in climbing  
apparatus

- RELOCATION OF FENCE SO AS TO CREATE  
WALKWAY WOULD INVOLVE LOPPING OF SOME TREE  
TREES

STREET NO 90

NO 117-12-90

CITY OF GRIFFITH  
DEVELOPMENT APPLICATION  
DATE APPROVED 30/5/95 NO 943158

John

Chief Town Planner

CITY OF GRIFFITH  
940970 Date 31.5.95

APPROVED SUBJECT  
TO CONDITIONS  
ATTACHED

PER GENERAL MANAGER

PLAN  
OF JACK SHANNON  
TENNIS COURT  
DRAWN 10-2-90  
RED. RATIO: 1 1000  
LESLIE K. WORLAND  
REGISTERED SURVEYOR

of the amount, if any, payable under  
the Building Services Corporation  
Act, 1909 so an insurance premium  
has been duly paid;  
or  
 of no amount is payable in respect  
of the [redacted]  
Certified [redacted]

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**The Sport Court Builders Pty Ltd**

u10/31 Warehouse Circuit  
Yatala, 4207  
Queensland

Griffith Tennis Club  
Noorilla Street  
Griffith  
New South Wales, 2680

**Site Address**  
Noorilla Street  
Griffith, 2680  
New South Wales

Job Number: SCB-757  
ABN: 70654628332  
Quote Date: 5th Sep 2025  
Valid Until: 19th Sep 2025

## Quote | 3x Pickleball Court Construction

Our Price Excludes The Following Unless Noted:

- Engineering/Soil Tests/Testing
- Skip Bins
- Water and Power Supply
- Access for machines/equipment
- Wash Out Area For Painting

	Quantity	Price	Total
<b>Earthworks</b>			
Price Includes:			
-Machine hire to remove grass and top spoil			
-Tippers to remove grass and spoil offsite			
-Dump fees capped at \$5k (unknown dumping sites)			
-Labour to supervise and set out each courts			
-Posi to laser grade subgrade			
-Crusher dust bed 50mm supplied and installed			
No cut and fill allowed			
No Wet spots allowed for			
No base material other than crusher dust allowed for			
Assumed grade works to suit courts existing			
Total Price	█	█	█

## Concrete Work

- Price Includes:
- 125mm thick concrete slab
  - S182 Mesh single layer
  - Plastic underlay
  - Small edge beam around perimeter
  - Boom Pump
  - Labour to complete
  - Soft cutting with dust control
  - Installed on grade

Total Price	█	█	█
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Quote SCB-757 (Version 3)

Page 1/3

### Engineering/Inspections

Engineering/Form 15	█	█	█
Inspections	█	█	█
Soil Test	█	█	█

### Fencing

- Price Includes:
- 3m black chainwire perimeter fence to each court
  - Footings and concrete
  - Labour to install
  - 50NB posts and 32NB top and bottom rail
  - Delivery of materials

Total Price	█	█	█
-------------	---	---	---

### Acrylic Sports Paint

- Price Includes:
- 2000m2 of painting (courts and 200m2 of footpath)
  - Cooltop Sports Paint
  - 3x Coat system
  - 2x tonne layout
  - Line marking to 3x courts

Total Price	█	█	█
-------------	---	---	---

### Pickleball Nets

- Price Includes:
- Grandslam Posts and Net - made in brisbane
  - Installed in Core drilled sleeves
  - Labour to install
  - 3x Sets

Total Price	█	█	█
-------------	---	---	---

### Lighting

- Price Includes:
- 4x Lights per court - 400w LED lights
  - GM Poles Powder coated black 6m out of ground
  - Cage and rag bolts cast into footing and then poles mounted after slab pour
  - Conduits and cable trenched and run
  - Concrete for footings
  - Sparky to connect poles and cables etc
  - Machine hire to dig trenches

Total Price	█	█	█
-------------	---	---	---

Subtotal	█
GST Amount	█
<b>Total</b>	█

The Sports Court Builders Pty Ltd  
 ABN: 70 654 628 332  
 QBCC: 15272714

ANNEX F



**GRIFFITH TENNIS CLUB INCORPORATED**  
**Year ended 31 December 2024**

Griffith Tennis Club Incorporated

## Committee's Report

Your committee members submit the financial report of the Griffith Tennis Club Incorporated for the financial year ended 31 December 2024 .

### Committee Members

The name of each member of the committee during the year and if different, at the date of the report;

Oliver Jacques  
Bernie Gray  
Matt Hocking  
Daniel Dossetor  
Elizabeth Barker  
Lorraine Maxwell  
Naomi Maxwell  
Peter Borella  
Robyn Meehan  
Bruno Salvitti  
Jamie Mitton

### Principal Activities

The principal activities of the association during the financial year were:

To support the funding of recreational and competition tennis in the Griffith and District area.

### Significant Changes

No significant change in the nature of these activities occurred during the year.

### Operating Result

The Profit/(Loss) of the association after providing for income tax amounted to \$13,924 Profit.

Signed in accordance with a resolution of the members of the committee.

### Committee Member:

Oliver Jacques  
President  
Date: 10 March 2025

Page 1 of 11

Griffith Tennis Club Incorporated

## **Committee's Report**

Robyn Meehan

Treasurer

Date: 10 March 2025

Page 2 of 14

Griffith Tennis Club Incorporated

## Appropriation Statement

For the year ended 31 December 2024

	Dec 2024	Dec 2023
	\$	\$
<b>Profit available for Appropriation</b>	██████	██████
Opening Balance at the Beginning of the Year	██████	██████
<b>Total available for Appropriation</b>	██████	██████
<b>Retained Association Funds at the End of the Year</b>	██████	██████

This statement should be read in conjunction with the attached appropriation report.

Page 2 of 14

Griffith Tennis Club Incorporated

## Balance Sheet

As at 31 December 2024

		Dec 2024	Dec 2023
	Note	\$	\$
<b>Assets</b>			
<b>Current Assets</b>			
Cash and Cash Equivalents	1	██████████	██████████
<b>Total Current Assets</b>		██████████	██████████
<b>Non Current Assets</b>			
Property, Plant and Equipment	1	██████████	██████████
<b>Total Non Current Assets</b>		██████████	██████████
<b>Total Assets</b>		██████████	██████████
Equity	1	██████████	██████████

Griffith Tennis Club Incorporated

## Statement of Changes in Equity

As at 31 December 2024

	Dec 2024	Dec 2023
	\$	\$
<b>Retained Association Funds</b>		
Opening Balance	██████	██████
<b>Comprehensive Income</b>		
Profit	██████	██████
<b>Total Comprehensive Income</b>	██████	██████
<b>Total Retained Association Funds</b>	██████	██████

Griffith Tennis Club Incorporated

## Notes to the Financial Statements

For the year ended 31 December 2024

### Financial Reporting Framework

The officers have prepared the financial statements on the basis that the Association is a non reporting entity because there are no users dependent on general purpose financial statements. The financial statements are therefore special purpose financial statements that have been prepared in order to meet the needs of the members.

The financial statements have been prepared in accordance with the material accounting policies disclosed in Note 1, which the officers have determined are appropriate to meet the needs of the members. Such accounting policies are consistent with the previous period unless stated otherwise.

### Basis of Preparation

The financial statements have been prepared on an accruals basis and are based on historical costs unless otherwise stated in the notes.

### Note 1 Accounting Policies

#### Cash and Cash Equivalents

Cash and cash equivalents include cash on hand, deposits held at call with banks, other short-term highly liquid investments with original maturities of three months or less, and bank overdrafts. Bank overdrafts are shown within short-term borrowings in current liabilities on the balance sheet.

#### Property Plant & Equipment

Property, plant and equipment are carried at cost or market value. All assets, excluding freehold land and buildings, are depreciated over their useful lives to the association.

Increases in the carrying amount arising on revaluation of land and buildings are credited to a revaluation reserve in equity. Decreases that offset previous increases of the same asset are recognised against fair value reserves directly in equity; all other decreases are recognised in profit or loss. Each year the difference between depreciation based on the revalued carrying amount of the asset recognised in profit or loss and depreciation based on the asset's original cost is transferred from the revaluation reserve to retained earnings.

#### Revenue Recognition

Revenue is measured at the fair value of the consideration received or receivable after taking into account any trade discounts and volume rebates allowed.

All revenue is stated net of the amount of goods and services tax (GST).

#### Goods and Services Tax (GST)

Revenues, expenses and assets are recognised net of the amount of GST, except where the amount of GST incurred is not recoverable from the Australian Taxation Office (ATO).

Receivables and payables are stated inclusive of the amount of GST receivable or payable. The net amount of GST recoverable from, or payable to, the ATO is included with receivables or payables in the balance sheet.

These statements should be read in conjunction with the attached compilation report.

Page 5 of 14

Griffith Tennis Club Incorporated

## Notes to the Financial Statements

For the year ended 31 December 2024

	Dec 2024	Dec 2023
Note	\$	\$
<b>Note 2 Cash and Cash Equivalents</b>		
<b>Bank Accounts</b>		
Commonwealth Bank - General Account	██████	██████
Westpac Cash Management Trust	-	██████
Beyond Bank 018	██████	-
Beyond Bank 809	██████	-
Beyond Bank Term Deposit 548	██████	-
Beyond Bank Term Deposit 549	██████	-
<b>Total Bank Accounts</b>	██████	██████
Cash on Hand	██████	██████
<b>Total Cash and Cash Equivalents</b>	██████	██████
<b>Note 3 Property, Plant and Equipment</b>		
Building at Cost	██████	██████
Property Improvements - at cost	██████	██████
Less: Accumulated Depreciation	██████	██████
Plant, Equipment & Vehicles - at cost	██████	██████
Less: Accumulated Depreciation	██████	██████
<b>Total Property, Plant and Equipment</b>	██████	██████
<b>Note 4 Equity</b>		
<b>Retained Association Funds</b>		
<b>Opening Balance</b>		
Retained Earnings	██████	██████
<b>Total Opening Balance</b>	██████	██████
<b>Current Year Earnings</b>		
Current Earnings	██████	██████
<b>Total Current Year Earnings</b>	██████	██████
<b>Total Retained Association Funds</b>	██████	██████
<b>Total Equity</b>	██████	██████

These statements should be read in conjunction with the attached compilation report.

Page 7 of 14

Griffith Tennis Club Incorporated

## Statement by Committee Members

The committee has determined that the association is a non reporting entity and that this general purpose financial statement should be prepared in accordance with the accounting policies outlined in Note 2 to the financial statements.

In the opinion of the committee the financial statements:

1. Present fairly the financial position of Griffith Tennis Club Incorporated as at 31 December 2024 and its performance for the year ended on that date in accordance with Australian Accounting Standards (including Australian Accounting Interpretations) of the Australian Accounting Standards Board.
2. At the date of this statement, there are reasonable grounds to believe that Griffith Tennis Club Incorporated will be able to pay its debts as and when they fall due.

This statement is made in accordance with a resolution of the committee and is signed for and on behalf of the committee by:

Oliver Jacques  
President  
Date: 10 March 2025

Robyn Meehan  
Treasurer  
Date: 10 March 2025

Page 2 of 11

Griffith Tennis Club Incorporated

## Compilation Report

To the Officers of Griffith Tennis Club Incorporated

We have compiled the accompanying special purpose financial statements of Griffith Tennis Club Incorporated, which comprise the balance sheet as at 31 December 2024 and profit and loss for the year then ended. The specific purpose for which the special purpose financial statements have been prepared is set out in Note 1.

### *The Responsibility of the Officers*

The Officers of Griffith Tennis Club Incorporated are solely responsible for the information contained in the special purpose financial statements, the reliability, accuracy and completeness of the information, and for the determination that the significant accounting policies as set out in Note 1 to the financial statements are appropriate to meet their needs and for the purpose that the financial statements were prepared.

### *Our Responsibility*

On the basis of information provided by the Officers we have compiled the accompanying special purpose financial statements in accordance with the significant accounting policies described in Note 1 to the financial statements and APES 315 Compilation of Financial Information.

We have applied our expertise in accounting and financial reporting to compile these financial statements in accordance with the significant accounting policies as set out in Note 1 to the financial statements. We have complied with the relevant ethical requirements of APES 110 Code of Ethics for Professional Accountants (including Independence Standards).

### *Assurance Disclaimer*

Since a compilation engagement is not an assurance engagement, we are not required to verify the reliability, accuracy or completeness of the information provided to us by management to compile these financial statements. Accordingly, we do not express an audit opinion or a review conclusion on these financial statements.

The special purpose financial statements were compiled exclusively for the benefit of the Officers of Griffith Tennis Club Incorporated who are responsible for the reliability, accuracy and completeness of the information used to compile them. Accordingly, these special purpose financial statements may not be suitable for other purposes. We do not accept responsibility for the contents of the special purpose financial statements.

Roy Spagnolo & Associates

Chartered Accountants

193 Yambil Street, Griffith NSW 2680

Roy Spagnolo

Date: 10 March 2025

Page 0 of 11

Griffith Tennis Club Incorporated

## Certificate By Committee Members

The Officers of Griffith Tennis Club Incorporated of Griffith Tennis Club Incorporated certify that:

- (a) I attended the annual general meeting of the association held on 10 March 2025 .
- (b) The financial statements for the year ended 31 December 2024 were submitted to the members of the association at its annual general meeting.

Oliver Jacques

President

Date: 10 March 2025

Robyn Meehan

Treasurer

Date: 10 March 2025

Griffith Tennis Club Incorporated

## Profit and Loss

For the year ended 31 December 2024

	Dec 2024	Dec 2023
	\$	\$
<b>Income</b>		
MIA Open Players Fees	██████████	██████████
Canteen Proceeds	██████████	██████████
Clubhouse Hire	██████████	██████████
Competition Fees	██████████	██████████
Court Hire - General	██████████	██████████
Membership Fees	██████████	██████████
Sponsorship Money	██████████	██████████
Grants	-	██████████
Return & Earn	██	-
<b>Total Income</b>	<b>██████████</b>	<b>██████████</b>
<b>Expenses</b>		
Accountancy Fees	██████████	██████████
Advertising	-	██████████
Affiliation Fees	██████████	██████████
Canteen	██████████	██████████
Cleaning	██████████	██████████
Depreciation	██████████	██████████
Fees & Charges	-	██████████
Gas	██████████	██████████
Grand Final Catering	██████████	-
Insurance	██████████	██████████
Light & Power	██████████	██████████
Permits, Licences & Fees	██████████	-
Postage	██████████	-
Purchases - Balls/Nets/Lines	██████████	██████████
Rates & Taxes	██████████	██████████
Registration Fees	██████████	██████████
Security Costs	██████████	██████████
Telephone	██████████	██████████
Tournament Expenses - MIA	██████████	██████████
Trophies & Prizes	██████████	██████████
Water	██████████	██████████

These statements should be read in conjunction with the attached compilation report.

Page 11 of 14

Griffith Tennis Club Incorporated

## Profit and Loss

For the year ended 31 December 2024

	Dec 2024	Dec 2023
	\$	\$
R&M - Courts	[REDACTED]	[REDACTED]
R&M - Grounds	[REDACTED]	[REDACTED]
R&M - General	[REDACTED]	[REDACTED]
R & M Equipment	[REDACTED]	-
<b>Total Expenses</b>	[REDACTED]	[REDACTED]
<b>EBIT</b>	[REDACTED]	[REDACTED]
<b>Interest</b>		
Interest Income	[REDACTED]	[REDACTED]
<b>Total Interest</b>	[REDACTED]	[REDACTED]
<b>Profit</b>	[REDACTED]	[REDACTED]

These statements should be read in conjunction with the attached compilation report.

Page 12 of 14

Griffith Tennis Club Incorporated

## Depreciation

For the year ended 31 December 2024

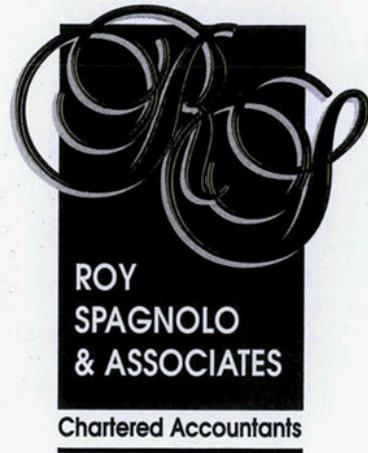
	Acq Date	Cost	Pvt	OAV	Adjust	Additions	Disposals	Type	Rate	Depr	Pvt	Bal Adj	CAV
<b>Property Improvements - at cost</b>													
Line Tiles	15/11/2001												
Court Surfaces	14/11/2002												
Security Door	31/12/2004												
Fences	14/03/2006												
3 Synthetic Grass Tennis Courts & 4 Synthetic Grass Hot Shot Courts	29/07/2014												
Brick Wall Court 7 & 8	13/09/2022												
New Lights	8/08/2023												
Upgrade Lights Court A-D	9/02/2024												
<b>Total Property Improvements - at cost</b>													
<b>Plant, Equipment &amp; Vehicles - at cost</b>													
Pie Warmer	1/01/1993												
Chairs & Cupboards	14/07/1993												
Shed	1/06/1995												
Tables & Chairs	10/11/1996												
Refridgerator	1/12/1998												
Lights	8/06/2000												
Television	22/10/2001												
Sprinkler System	16/11/2001												
Tennis Tournament Program	8/07/2002												
Honour Boards	6/09/2002												
Sprinkler System	18/07/2003												
2nd Hand Roller	15/08/2003												
Refurbished Roller	10/10/2003												
PA System	7/04/2004												
Television	9/07/2004												

Griffith Tennis Club Incorporated

## Depreciation

For the year ended 31 December 2024

	Acq Date	Cost	Pvt	OAV	Adjust	Additions	Disposals	Type	Rate	Depr	Pvt	Bal Adj	CAV
CD Player	9/07/2004												
Security System	3/09/2004												
Ride on Lawn Mower	31/12/2004												
Photocopier	17/02/2005												
Ride on Mower	13/12/2005												
Fire Extinguisher	11/03/2013												
Aussie Clean Sweep Broom	23/05/2015												
Glass Drinks Fridge	27/05/2015												
Bonaire Summer Breeze SBB1200 Evap Air con	4/11/2016												
Defibrillator	30/05/2018												
Book a Court Gate	19/08/2018												
Lawn Mower	13/09/2022												
Fridge x 2	9/06/2023												
Book A Court System Upgrade	11/03/2024												
<b>Total Plant, Equipment &amp; Vehicles - at cost</b>													
<b>Grand Total</b>													



**GRIFFITH TENNIS CLUB INCORPORATED**

**Year ended 31 December 2023**

7 March 2024

The Directors  
Griffith Tennis Club Incorporated  
PO Box 765  
GRIFFITH NSW 2680



**ROY  
SPAGNOLO  
& ASSOCIATES**  
Chartered Accountants

Roy Spagnolo &  
Associates Pty Ltd  
ABN 34 952 195 127

Postal Address  
PO Box 1444  
Griffith NSW 2680

Griffith Office  
193 Yambil St  
Griffith NSW 2680

Sydney Office  
Level 5 Challis House  
4 Martin Place  
Sydney NSW 2000

Dear Sirs and Mesdames

I wish to advise you of the completion of your financial accounts for the year ended 31 December 2023. These accounts comprise:-

- 1** **Committee's Report**
- 2** **Appropriation Statement**
- 3** **Balance Sheet as at 31 December 2023**
- 4** **Statement of Changes in Equity**
- 5-6** **Notes to and Forming Part of the Accounts**
- 7** **Statement by Committee Members**
- 8** **Compilation Report**
- 9** **Certificate By Committee Members**
- 10-11** **Detailed Profit and Loss Account**
- 12-13** **Detailed Taxation Depreciation Schedule  
for the year ending 31 December 2023**

It should be noted that all accounts hereto should be read in conjunction with the Compilation Report.

Operations for the year resulted in a **Net Profit of** [REDACTED]

After your reflections upon the results and qualifications contained in the attachments I shall be pleased to attend to any enquiries made in relation thereto or to furnish any further information or explanations which may be required.

Yours faithfully  
**ROY SPAGNOLO & ASSOCIATES**

Per: [REDACTED]



CHARTERED ACCOUNTANTS  
AUSTRALIA • NEW ZEALAND

Managing Partner  
ROY L SPAGNOLO  
BBus (Acc) FCA FCPA

Partners  
TRENT ROSATO CA  
SIMON DICKIE CPA  
MARK FARRONATO CA

Consultants  
MALCOLM WILMOT

Griffith Tennis Club Incorporated

## Committee's Report

Your committee members submit the financial report of the Griffith Tennis Club Incorporated for the financial year ended 31 December 2023 .

### Committee Members

The name of each member of the committee during the year and if different, at the date of the report;

Danny Dossetor  
Lorraine Maxwell  
Matt Hocking  
Robyn Meehan  
Bernard Gray  
Naomi Maxwell  
Andrew Noad  
Liz Barker  
Kevin Harris

### Principal Activities

The principal activities of the association during the financial year were:

To support the funding of recreational and competition tennis in the Griffith and District area.

### Significant Changes

No significant change in the nature of these activities occurred during the year.

### Operating Result

The Profit of the association after providing for income tax amounted to [REDACTED]

Signed in accordance with a resolution of the members of the committee.

### Committee Member:

Danny Dossetor  
President  
Date: 6 March 2024

Robyn Meehan  
Treasurer  
Date: 6 March 2024

Griffith Tennis Club Incorporated

## Appropriation Statement

For the year ended 31 December 2023

	Dec 2023	Dec 2022
	\$	\$
<b>Profit available for Appropriation</b>		
Opening Balance at the Beginning of the Year		
<b>Total available for Appropriation</b>		
<b>Retained Association Funds at the End of the Year</b>		

These statements should be read in conjunction with the attached compilation report.

Page 2 of 13

Griffith Tennis Club Incorporated

## Balance Sheet

As at 31 December 2023

	Note	Dec 2023 \$	Dec 2022 \$
<b>Assets</b>			
<b>Current Assets</b>			
Cash and Cash Equivalents			
<b>Total Current Assets</b>			
<b>Non Current Assets</b>			
Property, Plant and Equipment			
<b>Total Non Current Assets</b>			
<b>Total Assets</b>			
Equity			

These statements should be read in conjunction with the attached compilation report.

Page 3 of 13

Griffith Tennis Club Incorporated

## Statement of Changes in Equity

As at 31 December 2023

	Dec 2023	Dec 2022
	\$	\$
<b>Retained Association Funds</b>		
Opening Balance		
<b>Comprehensive Income</b>		
Profit		
<b>Total Comprehensive Income</b>		
<b>Total Retained Association Funds</b>		

These statements should be read in conjunction with the attached compilation report.

Page 4 of 13

Griffith Tennis Club Incorporated

## Notes to the Financial Statements

For the year ended 31 December 2023

### Financial Reporting Framework

The officers have prepared the financial statements on the basis that the Association is a non reporting entity because there are no users dependent on general purpose financial statements. The financial statements are therefore special purpose financial statements that have been prepared in order to meet the needs of the members.

The financial statements have been prepared in accordance with the significant accounting policies disclosed in Note 1, which the officers have determined are appropriate to meet the needs of the members. Such accounting policies are consistent with the previous period unless stated otherwise.

### Basis of Preparation

The financial statements have been prepared on an accruals basis and are based on historical costs unless otherwise stated in the notes.

### Note 1 Accounting Policies

#### Cash and Cash Equivalents

Cash and cash equivalents include cash on hand, deposits held at call with banks, other short-term highly liquid investments with original maturities of three months or less, and bank overdrafts. Bank overdrafts are shown within short-term borrowings in current liabilities on the balance sheet.

#### Property Plant & Equipment

Property, plant and equipment are carried at cost or market value. All assets, excluding freehold land and buildings, are depreciated over their useful lives to the association.

Increases in the carrying amount arising on revaluation of land and buildings are credited to a revaluation reserve in equity. Decreases that offset previous increases of the same asset are recognised against fair value reserves directly in equity; all other decreases are recognised in profit or loss. Each year the difference between depreciation based on the revalued carrying amount of the asset recognised in profit or loss and depreciation based on the asset's original cost is transferred from the revaluation reserve to retained earnings.

#### Revenue Recognition

Revenue is measured at the fair value of the consideration received or receivable after taking into account any trade discounts and volume rebates allowed.

Griffith Tennis Club Incorporated

## Notes to the Financial Statements

For the year ended 31 December 2023

Note	Dec 2023 \$	Dec 2022 \$
<b>Note 2 Cash and Cash Equivalents</b>		
<b>Bank Accounts</b>		
Commonwealth Bank - General Account		
Westpac Cash Management Trust		
<b>Total Bank Accounts</b>		
Cash on Hand		
<b>Total Cash and Cash Equivalents</b>		
<b>Note 3 Property, Plant and Equipment</b>		
Building at Cost		
Property Improvements - at cost		
Less: Accumulated Depreciation		
Plant, Equipment & Vehicles - at cost		
Less: Accumulated Depreciation		
<b>Total Property, Plant and Equipment</b>		
<b>Note 4 Equity</b>		
<b>Retained Association Funds</b>		
<b>Opening Balance</b>		
Retained Earnings		
<b>Total Opening Balance</b>		
<b>Current Year Earnings</b>		
Current Earnings		
<b>Total Current Year Earnings</b>		
<b>Total Retained Association Funds</b>		
<b>Total Equity</b>		

These statements should be read in conjunction with the attached compilation report.

Page 6 of 13

Griffith Tennis Club Incorporated

## Statement by Committee Members

The committee has determined that the association is a non reporting entity and that this general purpose financial statement should be prepared in accordance with the accounting policies outlined in Note 2 to the financial statements.

In the opinion of the committee the financial statements:

1. Present fairly the financial position of Griffith Tennis Club Incorporated as at 31 December 2023 and its performance for the year ended on that date in accordance with Australian Accounting Standards (including Australian Accounting Interpretations) of the Australian Accounting Standards Board.
2. At the date of this statement, there are reasonable grounds to believe that Griffith Tennis Club Incorporated will be able to pay its debts as and when they fall due.

This statement is made in accordance with a resolution of the committee and is signed for and on behalf of the committee by:

[Redacted Signature]

President

Date: 6 March 2024

[Redacted Signature]

Treasurer

Date: 6 March 2024

Griffith Tennis Club Incorporated

## Compilation Report

To the Officers of Griffith Tennis Club Incorporated

We have compiled the accompanying special purpose financial statements of Griffith Tennis Club Incorporated, which comprise the balance sheet as at 31 December 2023 and profit and loss for the year then ended. The specific purpose for which the special purpose financial statements have been prepared is set out in Note 1.

### *The Responsibility of the Officers*

The Officers of Griffith Tennis Club Incorporated are solely responsible for the information contained in the special purpose financial statements, the reliability, accuracy and completeness of the information, and for the determination that the significant accounting policies as set out in Note 1 to the financial statements are appropriate to meet their needs and for the purpose that the financial statements were prepared.

### *Our Responsibility*

On the basis of information provided by the Officers we have compiled the accompanying special purpose financial statements in accordance with the significant accounting policies described in Note 1 to the financial statements and APES 315 Compilation of Financial Information.

We have applied our expertise in accounting and financial reporting to compile these financial statements in accordance with the significant accounting policies as set out in Note 1 to the financial statements. We have complied with the relevant ethical requirements of APES 110 Code of Ethics for Professional Accountants (including Independence Standards).

### *Assurance Disclaimer*

Since a compilation engagement is not an assurance engagement, we are not required to verify the reliability, accuracy or completeness of the information provided to us by management to compile these financial statements. Accordingly, we do not express an audit opinion or a review conclusion on these financial statements.

The special purpose financial statements were compiled exclusively for the benefit of the Officers of Griffith Tennis Club Incorporated who are responsible for the reliability, accuracy and completeness of the information used to compile them. Accordingly, these special purpose financial statements may not be suitable for other purposes. We do not accept responsibility for the contents of the special purpose financial statements.

Roy Spagnolo & Associates  
Chartered Accountants  
193 Yambil Street, Griffith NSW 2680

  
Roy Spagnolo  
Date: 6 March 2024

Griffith Tennis Club Incorporated

## Certificate By Committee Members

The Officers of Griffith Tennis Club Incorporated of Griffith Tennis Club Incorporated certify that:

- (a) I attended the annual general meeting of the association held on 11th March 2024 .
- (b) The financial statements for the year ended 31 December 2023 were submitted to the members of the association at its annual general meeting.

  
President

Date: 6 March 2024

  
Treasurer

Date: 6 March 2024

Griffith Tennis Club Incorporated

## Profit and Loss

For the year ended 31 December 2023

	Dec 2023	Dec 2022
	\$	\$
<b>Income</b>		
MIA Open Players Fees		
Canteen Proceeds		
Clubhouse Hire		
Competition Fees		
Court Hire - General		
Donations	-	
Membership Fees		
Sponsorship Money		
Grants		-
<b>Total Income</b>		
<b>Expenses</b>		
Accountancy Fees		
Advertising		
Affiliation Fees		
Canteen		
Cleaning		
Depreciation		
Donations		
Fees & Charges		
Gas		
Insurance		
Light & Power		
Permits, Licences & Fees		
Purchases - Balls/Nets/Lines		
Rates & Taxes		
Registration Fees		
R&M - Courts		
R&M - Grounds		
R&M - General		
Security Costs		
Telephone		
Tournament Expenses - MIA		

These statements should be read in conjunction with the attached compilation report.

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Griffith Tennis Club Incorporated

## Profit and Loss

For the year ended 31 December 2023

	Dec 2023	Dec 2022
	\$	\$
Trophies & Prizes		
Water		
<b>Total Expenses</b>		
<b>EBIT</b>		
<b>Interest</b>		
Interest Income		
<b>Total Interest</b>		
<b>Profit</b>		

These statements should be read in conjunction with the attached compilation report.

Page 11 of 13

Griffith Tennis Club Incorporated

## Depreciation

For the year ended 31 December 2023

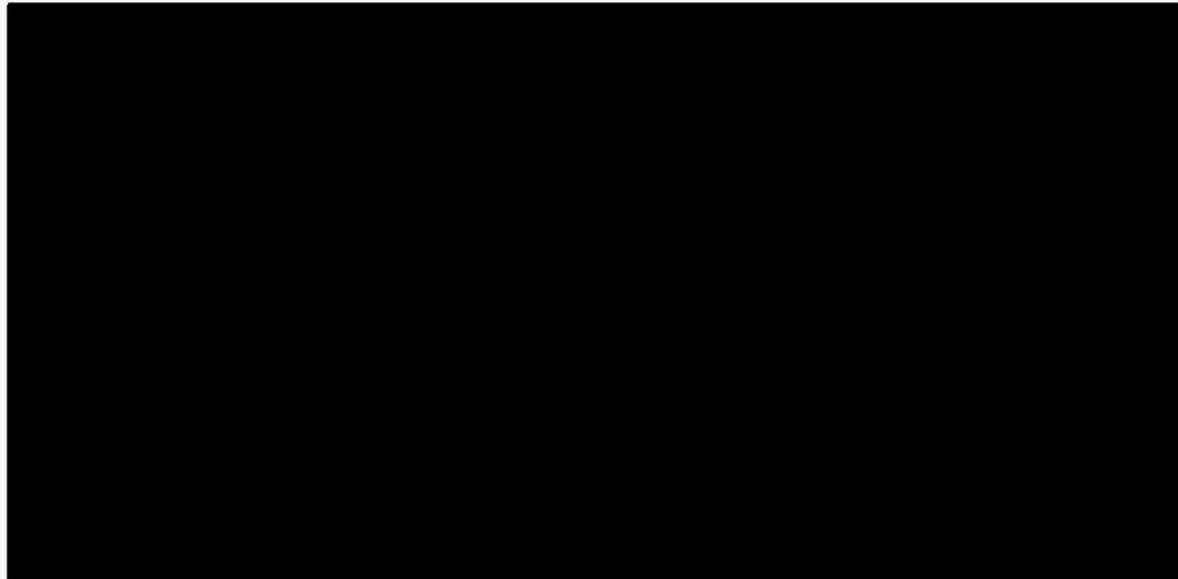
	Acq Date	Cost	Pvt	OAV	Adjust	Additions	Disposals	Type	Rate	Depr	Pvt	Bal Adj	CAV
<b>Property Improvements - at cost</b>													
Lino Tiles	15/11/2001												
Court Surfaces	14/11/2002												
Security Door	31/12/2004												
Fences	14/03/2006												
3 Synthetic Grass Tennis Courts & 4 Synthetic Grass Hot Shot Courts	29/07/2014												
Brick Wall Court 7 & 8	13/09/2022												
New Lights	8/08/2023												
<b>Total Property Improvements - at cost</b>													
<b>Plant, Equipment &amp; Vehicles - at cost</b>													
Pie Warmer	1/01/1993												
Chairs & Cupboards	14/07/1993												
Shed	1/06/1995												
Tables & Chairs	10/11/1996												
Refridgerator	1/12/1998												
Lights	8/06/2000												
Television	22/10/2001												
Sprinkler System	16/11/2001												
Tennis Tournament Program	8/07/2002												
Honour Boards	6/09/2002												
Sprinkler System	18/07/2003												
2nd Hand Roller	15/08/2003												
Refurbished Roller	10/10/2003												
PA System	7/04/2004												
Television	9/07/2004												

Griffith Tennis Club Incorporated

## Depreciation

For the year ended 31 December 2023

	Acq Date
CD Player	9/07/2004
Security System	3/09/2004
Ride on Lawn Mower	31/12/2004
Photocopier	17/02/2005
Ride on Mower	13/12/2005
Fire Extinguisher	11/03/2013
Aussie Clean Sweep Broom	23/05/2015
Glass Drinks Fridge	27/05/2015
Bonaire Summer Breeze SBB1200 Evap Air con	4/11/2016
Defibrillator	30/05/2018
Book a Court Gate	19/08/2018
Lawn Mower	13/09/2022
Fridge x 2	9/06/2023
<b>Total Plant, Equipment &amp; Vehicles - at cost</b>	
<b>Grand Total</b>	





**GRIFFITH TENNIS CLUB INCORPORATED**

**As at 31 December 2022**

6 March 2023

The Directors  
Griffith Tennis Club Incorporated  
PO Box 765  
GRIFFITH NSW 2680



**ROY  
SPAGNOLO  
& ASSOCIATES**  
Chartered Accountants

Roy Spagnolo &  
Associates Pty Ltd  
ABN 34 952 195 127

Postal Address  
PO Box 1444  
Griffith NSW 2680

Griffith Office  
193 Yambil St  
Griffith NSW 2680

Sydney Office  
Level 11, 90 Arthur St  
Nth Sydney NSW 2060

Dear Sirs and Mesdames

I wish to advise you of the completion of your financial accounts for the year ended 31 December 2022. These accounts comprise:-

- 1 Compilation Report**
- 2 Profit and Loss Account**
- 3 Balance Sheet as at 31 December 2022**
- 4-6 Notes to and Forming Part of the Accounts**
- 7 Detailed Profit and Loss Account**
- 8 Directors' Declaration**
- 9-10 Detailed Taxation Depreciation Schedule for the year ending 31 December 2022**

It should be noted that all accounts hereto should be read in conjunction with the Compilation Report.

Operations for the year resulted in a [REDACTED]

After your reflections upon the results and qualifications contained in the attachments I shall be pleased to attend to any enquiries made in relation thereto or to furnish any further information or explanations which may be required.

Yours faithfully  
**ROY SPAGNOLO & ASSOCIATES**

Per:- [REDACTED]



CHARTERED ACCOUNTANTS  
AUSTRALIA • NEW ZEALAND

Managing Partner  
ROY L SPAGNOLO  
BBus (Acc) FCA FCPA

Partners  
TRENT ROSATO CA  
SIMON DICKIE CPA  
MARK FARRONATO CA

Consultants  
MALCOLM WILMOT

**COMPILATION REPORT  
TO GRIFFITH TENNIS CLUB  
ABN 84 998 975 390**

We have compiled the accompanying special purpose financial statements of Griffith Tennis Club which comprise the balance sheet as at 31 December 2022, profit and loss statement for the year then ended, a summary of significant accounting policies and other explanatory notes.

The specific purpose for which these special purpose financial statements have been prepared is to provide information relating to the performance and financial position of the company that satisfies the information needs of the directors set out in Note 1.

**The responsibility of directors**

The directors are solely responsible for the information contained in the special purpose financial statements and have determined that the significant accounting policies adopted as set out in Note 1 to the financial statements are appropriate to meet their needs.

**Our responsibility**

On the basis of information provided by the directors, we have compiled the accompanying special purpose financial statements in accordance with the significant accounting policies adopted as set out in Note 1 to the financial statements and APES 315: Compilation of Financial Information.

Our procedures use accounting expertise to collect, classify and summarise the financial information, which the director provided, into a financial report. Our procedures do not include verification or validation procedures. No audit or review has been performed and accordingly no assurance is expressed.

The special purpose financial statements were prepared exclusively for the directors. We do not accept responsibility to any other person for the content of the special purpose financial statements.

**Name of Firm:** Roy Spagnolo & Associates  
Chartered Accountants

**Name of Partner:** \_\_\_\_\_  
Roy Spagnolo

**Address:** 193 Yambil Street GRIFFITH NSW 2680

**Dated this 6th day of March 2023**

**GRIFFITH TENNIS CLUB  
ABN 84 998 975 390**

**PROFIT AND LOSS STATEMENT  
FOR THE YEAR ENDED 31 DECEMBER 2022**

	Note	2022 \$	2021 \$
<b>Profit before income tax</b>			
Income tax expense			
<b>Profit after income tax</b>			
Retained earnings at the beginning of the financial year			
<b>Total available for appropriation</b>			
<b>Retained earnings at the end of the financial year</b>			

The accompanying notes form part of these financial statements.  
These statements should be read in conjunction with the attached compilation report of Roy Spagnolo & Associates.

**GRIFFITH TENNIS CLUB  
ABN 84 998 975 390**

**BALANCE SHEET  
AS AT 31 DECEMBER 2022**

	Note	2022 \$	2021 \$
<b>ASSETS</b>			
<b>CURRENT ASSETS</b>			
Cash and cash equivalents	■		
<b>TOTAL CURRENT ASSETS</b>			
<b>NON-CURRENT ASSETS</b>			
Property, plant and equipment	■		
<b>TOTAL NON-CURRENT ASSETS</b>			
<b>TOTAL ASSETS</b>			
<b>LIABILITIES</b>			
<b>TOTAL LIABILITIES</b>			
<b>NET ASSETS</b>			
<b>EQUITY</b>			
Retained earnings	■		
<b>TOTAL EQUITY</b>			

The accompanying notes form part of these financial statements.  
These statements should be read in conjunction with the attached compilation report of Roy Spagnolo & Associates.

**GRIFFITH TENNIS CLUB  
ABN 84 998 975 390**

**NOTES TO THE FINANCIAL STATEMENTS  
FOR THE YEAR ENDED 31 DECEMBER 2022**

---

The financial statements cover the business of Griffith Tennis Club and have been prepared to meet the needs of stakeholders and to assist in the preparation of the tax return.

Comparatives are consistent with prior years, unless otherwise stated.

**1 Basis of Preparation**

The company is non reporting since there are unlikely to be any users who would rely on the general purpose financial statements.

The special purpose financial statements have been prepared in accordance with the significant accounting policies described below and do not comply with any Australian Accounting Standards unless otherwise stated.

The financial statements have been prepared on an accruals basis and are based on historical costs modified, where applicable, by the measurement at fair value of selected non-current assets, financial assets and financial liabilities.

Significant accounting policies adopted in the preparation of these financial statements are presented below and are consistent with prior reporting periods unless otherwise stated.

**2 Summary of Significant Accounting Policies**

**Property, Plant and Equipment**

Each class of property, plant and equipment is carried at cost less, where applicable, any accumulated depreciation and impairment.

At the end of each annual reporting period, the depreciation method, useful life and residual value of each asset is reviewed. Any revisions are accounted for prospectively as a change in estimate.

**Cash and Cash Equivalents**

Cash and cash equivalents comprises cash on hand, demand deposits and short-term investments which are readily convertible to known amounts of cash and which are subject to an insignificant risk of change in value.

These notes should be read in conjunction with the attached compilation report of Roy Spagnolo & Associates.

**GRIFFITH TENNIS CLUB  
ABN 84 998 975 390**

**NOTES TO THE FINANCIAL STATEMENTS  
FOR THE YEAR ENDED 31 DECEMBER 2022**

---

**Revenue and Other Income**

Revenue is recognised when the business is entitled to it.

**Interest revenue**

Interest revenue is recognised using the effective interest rate method.

**Other income**

Other income is recognised on an accruals basis when the company is entitled to it.

These notes should be read in conjunction with the attached compilation report of Roy Spagnolo & Associates.

**GRIFFITH TENNIS CLUB  
ABN 84 998 975 390**

**NOTES TO THE FINANCIAL STATEMENTS  
FOR THE YEAR ENDED 31 DECEMBER 2022**

	2022 \$	2021 \$
<b>3 Cash and Cash Equivalents</b>		
Cash on Hand	█	█
Commonwealth Bank - General Account	█	█
Westpac Cash Management Trust	█	█
<b>4 Property, plant and equipment</b>		
<b>Land and Buildings</b>		
Building at Cost	█	█
<b>Total Land and Buildings</b>	█	█
Property Improvements - at cost	█	█
Less: Accumulated Depreciation	█	█
Plant, Equipment & Vehicles - at cost	█	█
Less: Accumulated Depreciation	█	█
<b>Total Plant and Equipment</b>	█	█
<b>Total Property, Plant and Equipment</b>	█	█
<b>5 Retained Earnings</b>		
Retained earnings at the beginning of the financial year	█	█
Net profit attributable to members of the company	█	█
Retained earnings at the end of the financial year	█	█

These notes should be read in conjunction with the attached compilation report of Roy Spagnolo & Associates.

**GRIFFITH TENNIS CLUB**  
**ABN 84 998 975 390**

**PROFIT AND LOSS STATEMENT**  
**FOR THE YEAR ENDED 31 DECEMBER 2022**

	2022 \$	2021 \$
<b>INCOME</b>		
Interest Received		
Tournament Entry Fees		
Canteen Proceeds		
Clubhouse Hire		
Competition Fees		
Court Hire		
Donations		
Membership Fees		
Sponsorship Money		
Grants		
<b>EXPENSES</b>		
Accountancy Fees		
Affiliation Fees		
Canteen		
Cleaning		
Depreciation		
Donations		
Fees & Charges		
Gas		
Insurance		
Light & Power		
Permits, Licences & Fees		
Purchases - Balls/Nets/Lines		
Postage		
Rates & Taxes		
Registration Fees		
Repairs & Maintenance		
Security Costs		
Telephone		
Tournament Expenses - MIA		
Trophies & Prizes		
Water		
<b>Profit before income tax</b>		

The accompanying notes form part of these financial statements.  
 These statements should be read in conjunction with the attached compilation report of Roy Spagnolo & Associates.

CL03 Attachment (a) Proposed Development of Adjoining and Parcel for Pickleball Facility - Crown Land - 92-104 Noorilla Street Griffith - Griffith Tennis Club

Taxation Depreciation Report - Detailed  
Period 01/01/2022 to 31/12/2022

Asset Code	Description	Private Use %	Acq. (Disp) Date	Original Cost	Opening W.D.V.	Additions (Disposals)	Profit (Loss) on Sale	Depn Method	Depreciation	Closing W.D.V.
<b>42</b>	<b>Property Improvements - at cost</b>									
401	Lino Tiles		15/11/2001							
402	Court Surfaces		14/11/2002							
403	Security Door		31/12/2004							
404	Fences		14/03/2006							
405	3 Synthetic Grass Tennis Courts & 4 Synthetic Grass Hot Shot Courts		29/07/2014							
406	Brick Wall Court 7 & 8		13/09/2022							
<b>52</b>	<b>Plant, Equipment &amp; Vehicles - at cost</b>									
501	Pie Warmer		01/01/1993							
503	Chairs & Cupboards		14/07/1993							
504	Shed		01/06/1995							
507	Tables & Chairs		10/11/1996							
509	Refridgerator		01/12/1998							
510	Lights		08/06/2000							
511	Television		22/10/2001							
512	Sprinkler System		16/11/2001							
513	Tennis Tournament Program		08/07/2002							
514	Honour Boards		06/09/2002							
515	2nd Hand Roller		15/08/2003							
516	Refurbished Roller		10/10/2003							
517	Sprinkler System		18/07/2003							
518	PA System		07/04/2004							
519	Television		09/07/2004							
520	CD Player		09/07/2004							
521	Security System		03/09/2004							
522	Ride on Lawn Mower		31/12/2004							
523	Photocopier		17/02/2005							
525	Ride on Mower		13/12/2005							
527	Fire Extinguisher		11/03/2013							
528	Glass Drinks Fridge		27/05/2015							
529	Aussie Clean Sweep Broom		23/05/2015							
530	Bonaire Summer Breeze SBB1200 Evap Air con		04/11/2016							
531	Book a Court Gate		19/08/2018							
532	Defibrilator		30/05/2018							
533	Lawn Mower		13/09/2022							

CL03 Attachment (a) Proposed Development of Adjoining and Parcel for Pickleball Facility - Crown Land - 92-104 Noorilla Street Griffith - Griffith Tennis Club

Taxation Depreciation Report - Detailed  
 Period 01/01/2022 to 31/12/2022

Asset Code	Description	Private Use %	Acq. (Disp) Date	Original Cost	Opening W.D.V.	Additions (Disposals)	Profit (Loss) on Sale	Depn Method	Depreciation	Closing W.D.V.
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TOTAL

Notes:

1. Assets allocated to taxation pools are not included in this report.
2. Where a taxation pool is set up refer to the relevant pool schedule report for details of decline in value for the pool.
3. For disposed assets that have non-taxable use refer to Capital Gains Schedule report for any gain or loss resulting from a CGT K7 event.
4. The Opening W.D.V. includes second element of cost (additional expense) incurred in the current year. Hence, this amount may vary from the Closing W.D.V. from the previous year.
5. The Original Cost for Motor Vehicle assets shows an amount as adjusted by the cost limit.

POSTAGE  
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AUSTRALIA



To: The General Manager  
Griffith City Council  
PO Box 485  
Griffith NSW 2680

Griffith City Council  
5 JAN 2026  
RECEIVED BY  
CUSTOMER SERVICE

Attention:



From: Griffith Tennis Club Committee  
@ 5/1/2026



3 March 2026

Mr Oliver Jacques  
President  
Griffith Tennis Club  
[REDACTED]  
GRIFFITH NSW 2680

Dear Mr Jacques,

**RE: Proposed Pickleball Facility – Adjoining Crown Land, Noorilla Street**

Thank you for the Tennis Club's detailed proposal regarding the development of a pickleball facility on Council-managed Crown land adjoining the existing tennis precinct at Jubilee Park.

Council acknowledges the time and effort invested by the Tennis Club in preparing the proposal, including the concept design, indicative costing, funding options and supporting material and recognises the growing interest in pickleball and its potential social and recreational benefits for the Griffith community.

The subject land is a Council-managed Crown Reserve and is covered by the North Griffith Precinct Parks Plan of Management, which identifies Jubilee Park as a sportsground intended to support active recreation and sporting uses.

The land is also subject to the State Environmental Planning Policy (Transport and Infrastructure) 2021. Under section 2.73(2) of that Policy, certain development may be carried out by or on behalf of Council, as Crown land manager, without development consent, provided the works are consistent with an adopted Plan of Management.

In practical terms:

- If the Tennis Club were to undertake the development directly, a development application would be required.

---

Griffith City Council, Wiradjuri Country, PO Box 485, Griffith NSW 2680, 1 Benerembah Street, Griffith  
NSW 2680

Ph: 1300 176 077 ABN: 81 274 100 792

Email: [admin@griffith.nsw.gov.au](mailto:admin@griffith.nsw.gov.au) Web: [www.griffith.nsw.gov.au](http://www.griffith.nsw.gov.au)

- If Council were to undertake the development, development consent would not be required, as the SEPP prevails over the Griffith Local Environmental Plan in this circumstance.

Any potential progression of the proposal would preferably need to occur through a Council-led delivery model, subject to Council consideration and external funding availability.

A possible model for progression would be:

- The Tennis Club would continue to provide the project information required to support any future funding application.
- If an appropriate State or Federal Government grant opportunity becomes available, Council may consider submitting an application utilising the information provided.
- Should funding be successful, Council would manage and deliver the project on Council-managed Crown land, subject to Council approval at that time.
- The final form of the project, including scope, staging, funding contributions and tenure arrangements, would be determined through Council's governance processes.

It is important to note that Council is not committing at this stage to:

- funding the project,
- providing a loan facility, or
- proceeding with construction in the absence of external grant funding.

Council's financial position and competing priorities mean that any future involvement would need to be carefully assessed and resolved by Council.

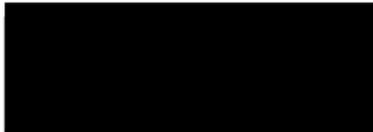
Council has also recently considered a policy regarding Grants and Works for Community Facilities on Council-controlled Land, which would assist the Griffith Tennis Club and Council work through the proposal. This policy will be available on Council's website when endorsed, and is currently on exhibition for public comment - [Draft Grants and Works for Community Facilities on Council-controlled Land Policy | Connect Griffith](#)

To commence progressing this proposal, a formal report will be presented to Council for consideration.

The information provided by the Tennis Club would form the basis of the report. The report would include consideration of land tenure, planning controls, funding, delivery responsibilities, financial risk and broader impacts within the Jubilee Park sporting precinct

Should Council resolve to adopt your proposal, Council officers will continue discussions with the Tennis Club to clarify information requirements and to ensure the proposal is suitably positioned should a relevant funding opportunity arise.

Yours sincerely,



**SHIREEN DONALDSON**  
**DIRECTOR ECONOMIC & ORGANISATIONAL DEVELOPMENT**



## Review of the Lake Wyangan Flood Study and FRMS&P Update

R.T2566.001.04



March 2026

Flood Study - Draft for Public Exhibition



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Griffith NSW 2680  
[admin@griffith.nsw.gov.au](mailto:admin@griffith.nsw.gov.au)  
1300 176 077

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Review of the Lake Wyangan Flood Study and FRMS&P Update - Draft for Public Exhibition  
**Glossary and Abbreviations**

## Glossary and Abbreviations

This list of commonly used floodplain risk management terms and associated abbreviations has been taken (and undergone some minor alterations) from the NSW Government Flood Risk Management Manual (2023). This has then been expanded to include additional technical terms used in hydrological assessment and flood modelling.

Term	Abbr.	Definition	Context / Additional Information
Annual exceedance probability	AEP	The chance of a flood of a given or larger size occurring in any one year, usually expressed as a percentage	AEP is generally the preferred terminology. ARI is the historical way of describing a flood event, for example, a 1% AEP flood has a 1% or 1 in 100 chance of being reached or exceeded in any given year
Annual maxima series	AMS	A format of data representing the maximum recorded value each year within a dataset, typically used for flow records input to a flood frequency analysis	
Areal reduction factor	ARF	An adjustment that is made to probabilistic point rainfall estimations to represent an appropriate catchment average rainfall condition	The design rainfall estimates represent a single point location within the catchment, which is appropriate for very small catchment areas (< 1 km <sup>2</sup> ). For larger catchments, the average rainfall intensity
Australian height datum	AHD	A common national surface level datum often used as a referenced level for ground, flood and flood levels	0.0 m AHD corresponds approximately to mean sea level
Australian water outlook	AWO	An interactive website that provides Australia-wide information on key landscape water balance components including soil moisture, runoff, evapotranspiration and precipitation	The systems use a range of climate inputs, cutting-edge climate post-processing and downscaling techniques and assimilation of near real-time satellite soil moisture states (for forecasts) as inputs to the Australian Water Resource Assessment model, which provides a consistent set of hydrological outputs at a ~ 5km grid across Australia
Australian rainfall and runoff	ARR	a national guideline document, data and software suite that can be used for the estimation of design flood characteristics in Australia	First published in 1958, with a major revision culminating in ARR 2019, which is now referenced as ARR version 4.0. ARRR 4.2 is the current revision, including updated guidance on the application of future climate change impacts
Average recurrence interval	ARI	The long-term average number of years between the occurrence of a flood equal to or larger in size than the selected event	ARI is the historical way of describing a flood event. AEP is generally the preferred terminology, for example, a 100-year ARI flood that has 1 in 100 chance of being reached or exceeded in any given year. It is equivalent to a 1% AEP flood
Backwater		A non-convective section of watercourse, where the water level is a function of the downstream conditions rather than being produced by a flow (discharge)	

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Review of the Lake Wyangan Flood Study and FRMS&P Update - Draft for Public Exhibition  
**Glossary and Abbreviations**

Term	Abbr.	Definition	Context / Additional Information
Catchment		The area of land draining to a specific location	It includes the catchment of the primary waterway as well as any tributary streams and flowpaths
Chance		Flooding due to prolonged or intense rainfall (e.g. severe thunderstorms, monsoonal rains in the tropics, tropical cyclones)	Types of catchment flooding include riverine, local overland and groundwater flooding
Coastal inundation		Inundation due to tidal or storm-driven coastal events, including storm surges in lower coastal waterways. This can be exacerbated by wind-wave generation from storm events	In FRM this generally relates to the adverse consequences of floods with chance being related to AEP, for example, 1% chance or 1 in 100 chance per year is equivalent to 1% AEP
Consent authority		The authority or agency with the legislative power to determine the outcome of development and building applications	This may be the relevant local council or Minister
Consequence		The outcomes of an event or situation affecting objectives, expressed qualitatively or quantitatively	Consequences can be adverse (e.g. death or injury to people, damage to property and disruption of the community) or beneficial
Continuing flood risk		Risk to existing and future development that may be reduced by EM measures	Flood risk to the existing development and future development may be reduced by EM measures depending on flood constraints, however, these measures cannot remove all risk and a residual risk will remain
Critical duration		The duration of intense rainstorm that produces the greatest peak runoff conditions at a specific location in a catchment for a given probability	
Cunnane plotting position		A formula that estimates the non-exceedance probability for ordered data, often used in hydrology. It provides a nearly unbiased quantile estimate for common hydrological probability distributions	
Defined flood event	DFE	The flood event selected as a general standard for the management of flooding to development	Aims to reduce the frequency of flooding but does not remove all flood risk, for example, in selecting a 1% AEP flood as a DFE you are accepting that there is a 1 in 100 chance that a larger event will occur in any year. This risk is being built into the decision
Department of Climate Change, Energy, the Environment and Water	DCCEEW	The section of NSW government that works to protect the state's environment and heritage	

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Review of the Lake Wyangan Flood Study and FRMS&P Update - Draft for Public Exhibition  
 Glossary and Abbreviations

Term	Abbr.	Definition	Context / Additional Information
Design flood		The flood selected as part of the FRM process that forms the basis for physical works to modify the impacts of flooding	The design flood may be considered the flood mitigation standard, for example, a levee may be designed to exclude a 2% AEP flood, which means that floods rarer than this may breach the structure and impact upon the protected area. In this case, the 2% AEP flood would not equate to the crest level of the levee, because this generally has a freeboard allowance, but it may be the level of the spillway to allow for controlled levee overtopping
Development		<p>May be treated differently depending on the following categorisation:</p> <ul style="list-style-type: none"> <li>• <b>infill development:</b> the development of vacant blocks of land that are generally surrounded by developed properties and is permissible under current land zoning</li> <li>• <b>new development:</b> development of a completely different nature to that associated with the former land-use (e.g. the urban subdivision of a previously rural area)</li> <li>• <b>redevelopment:</b> rebuilding in an area (e.g. as urban areas age, it may become necessary to demolish and reconstruct buildings on a relatively large scale)</li> </ul>	<p>New developments involve rezoning and typically require major extensions of existing urban services, such as roads, water supply, sewerage and electric power</p> <p>Redevelopment generally does not require either rezoning or major extensions to urban services</p>
Development control plan	DCP	See <i>Environmental Planning and Assessment Act 1979</i>	
Digital elevation model	DEM	A 3D digital representation of terrain, containing elevation as a grid of height values	This can be defined more specifically as a digital surface model (DSM) or digital terrain model (DTM), with the former including bridges and trees and the latter being a bare earth representation
Ecologically sustainable development	ESD	As outlined in the Local Government Act 1993	Principles of ESD are outlined in the <i>Local Government Act 1993</i>
Emergency management	EM	A comprehensive approach to dealing with risks to the community arising from hazards. It is a systematic method for identifying, analysing, evaluating and managing these risks	May include measures to reduce flood frequency or consequences through prevention and mitigation measures, and preparation, as well as response and recovery should a flood occur (see PPRR)

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Review of the Lake Wyangan Flood Study and FRMS&P Update - Draft for Public Exhibition  
**Glossary and Abbreviations**

Term	Abbr.	Definition	Context / Additional Information
Existing flood risk		The risk an existing community is exposed to as a result of its location on the floodplain	Existing flood risk may be reduced by existing or proposed FRM measures leaving a residual flood risk to the existing community. Residual flood risk may be further reduced by addressing continuing risk
Extreme flood		a severe inundation that far surpasses typical flood levels, causing significant damage and disruption, often exceeding established safety thresholds and posing serious threats to life and property, such as a probable maximum flood	See also probable maximum flood
Flood		A natural phenomenon that occurs when water covers land that is normally dry. It may result from coastal inundation (excluding tsunamis) or catchment flooding, or a combination of both	Flooding results from relatively high stream flow that overtops the natural or artificial banks in any part of a stream, river, estuary, lake or dam, and/or local overland flowpaths associated with major drainage, and/or oceanic inundation resulting from super-elevated ocean levels
Flood (hydrologic and hydraulic) modelling		Hydrologic and hydraulic computer models to simulate catchment processes of rainfall, run-off, stream flow and distribution of flows across the floodplain or similar	They typically involve consideration of the local flood history, available collected data, and the development of models that are calibrated and validated, where possible, against historic flood events and extended to determine the full range of flood behaviour
Flood affected land		Equivalent to flood prone land	See the definition of flood prone land
Flood awareness		An appreciation of the likely effects of flooding, and a knowledge of the relevant flood warning, response and evacuation procedures facilitating prompt and effective community response to a flood threat	In communities with a low degree of flood awareness, flood warnings may be ignored or misunderstood, and residents confused about what they should do, when to evacuate, what to take with them and where to go
Flood constraints		Key constraints that flooding place on land	These include flood function, flood hazard, flood range, and flood emergency response classification. These can be used to inform FRM including consideration of options such as mitigation works, EM and land-use planning
Flood damage		The tangible (direct and indirect) and intangible costs (financial, opportunity costs, clean-up) of flooding	Tangible costs are quantified in monetary terms (e.g. damage to goods)  Intangible damages are difficult to quantify in monetary terms and include the increased levels of physical, emotional and psychological health problems suffered by flood affected people that are attributed to a flood

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Term	Abbr.	Definition	Context / Additional Information
Flood education		Seeks to provide information to raise community awareness of flooding so as to enable individuals to understand how to manage themselves and their property in response to flood warnings	
Flood evacuation		The movement of people from a place of danger to a place of relative safety, and their eventual return	People are usually evacuated to areas outside of flood prone land with access to adequate community support  Livestock may be relocated to areas outside of the influence of flooding
Flood frequency analysis	FFA	Flood frequency analysis refers to procedures that use recorded and related flood data to identify underlying probability model of flood peaks, at a particular location in the catchment, which can then be used to perform risk-based design and flood risk assessment, while providing input to regional flood estimation methods.	In flood frequency analysis flood peaks are considered to be random variables. A probabilistic model is then fit to the recorded dataset to provide estimates of design peak flood flows
Flood fringe areas		That part of the flood extents for the event remaining after the flood function areas of floodway and flood storage areas have been defined	
Flood function		The flood related functions of floodways, flood storage and flood fringe within the floodplain	Flood function is equivalent to hydraulic categorisation
Flood hazard		A flood that has the potential to cause harm or conditions with the potential to result in loss of life, injury and economic loss	The degree of hazard varies with the severity of flooding and is affected by flood behaviour (extent, depth, velocity, isolation, etc.)
Flood impact and risk assessment	FIRA	A study to assess flood behaviour, constraints and risk, understand offsite flood impacts on property and the community resulting from the development, and flood risk to the development and its users	These studies are generally undertaken for development and are to be prepared by a suitably qualified engineer experienced in hydrological and hydraulic analysis for FRM
Flood liable land		Equivalent to flood prone land	See the definition of flood prone land
Flood plan (local or state)	Local (LFP)	A sub-plan of an EM plan that deals specifically with flooding; they can exist at state, zone and local levels	The NSW Government develops flood plans as a legislative responsibility to determine how best to respond to floods. These community-based plans describe the risk to the community, outline agency roles and responsibilities, the agreed community emergency response strategy and how floods will be managed

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Term	Abbr.	Definition	Context / Additional Information
Flood planning area	FPA	The area of land below the FPL	The FPA is generally developed based on the FPL for typical residential development. Different types of development may have different FPLs applied within the FPA. In addition development controls will vary across the FPA due to varying flood constraints
Flood planning level	FPL	The combination of the flood level from the DFE and freeboard selected for FRM purposes	Different FPLs may apply to different types of development  Determining the FPL for typical residential development should generally start with a DFE of the 1% AEP flood plus an appropriate freeboard (typically 0.5 m). This assists in determining the FPA
Flood prone land		Land susceptible to flooding by the PMF event	Flood prone land is also known as the floodplain, flood liable land and flood affected land
Flood risk		Risk is based on the consideration of the consequences of the full range of flood behaviour on communities and their social settings, and the natural and built environment	See also risk. The degree of risk varies with circumstances across the full range of floods. It is affected by factors including flood behaviour and hazard, topography and EM difficulties
Flood risk management	FRM	The management of flood risk to communities	
<i>Flood risk management manual: the policy and manual for the management of flood liable land</i>	the manual		The policy as outlined in this document sets the direction for FRM in New South Wales. The manual and its toolkit support the implementation of the policy through the combined efforts of all levels of government. This provides councils, statutory authorities, and state agencies and their staff, with indemnity for decisions they make and information they provide in accordance with the manual.
Flood storage areas		Areas of the floodplain that are outside floodways which generally provide for temporary storage of floodwaters during the passage of a flood and where flood behaviour is sensitive to changes that impact on temporary storage of water during a flood	See also flood function, floodways and flood fringe areas
Flood study		A comprehensive technical investigation of flood behaviour undertaken in accordance with the principles in this manual and consistent with associated guidelines  A flood study defines the nature of flood behaviour and hazard across the floodplain by providing information on the extent, level and velocity of floodwaters,	Flood study

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		and on the distribution of flood flows considering the full range of flood events up to and including extreme events, such as the PMF	
Flood warnings		Warnings issued when there is more certainty that flooding is expected, are more targeted and are issued for specific catchments	Flood warnings include more specific predictions of the severity of expected flooding and may give quantitative figures such as expected river water heights at gauge stations
Floodplain		An area of low-lying ground adjacent to a watercourse, formed mainly of alluvial deposition and subject to periodic flooding.	In the manual, the term 'floodplain' is used as being equivalent to that of 'flood prone land'.
Floodways		Areas of the floodplain which generally convey a significant discharge of water during floods and are sensitive to changes that impact flow conveyance. They often align with naturally defined channels or form elsewhere in the floodplain	Floodways are sometimes known as flow conveyance areas
Flow		The rate of flow of water measured in volume per unit time, for example, cubic metres per second (m <sup>3</sup> /s)	Flow is different from the speed or velocity of flow, which is a measure of how fast the water is moving
Freeboard		A factor of safety typically used in relation to the setting of minimum floor levels or levee crest levels	Freeboard aims to provide reasonable certainty that the risk exposure selected in deciding on a specific event for development controls or mitigation works is achieved. Freeboards for development controls and mitigation works will differ. In addition freeboards for development control may vary with the type of flooding and with the type of development
Frequency		The measure of likelihood expressed as the number of occurrences of a specified event in a given time	For example, the frequency of occurrence of a 20% AEP or 5-year ARI flood is once every 5 years on average
FRM measures		Measures that can reduce flood risk	FRM measures may include FRM, flood mitigation, EM and land-use planning measures
FRM options		The FRM measures that might be feasible for the management of a particular area of the floodplain	Preparation of an FRM plan requires a detailed evaluation of FRM options
FRM plan		A management plan developed in accordance with the principles in this manual and its supporting guidelines	Previously known as a floodplain risk management plan or floodplain management plan. It may describe how particular areas of flood prone land are to be used and managed to achieve defined objectives
FRM study		A management study developed in accordance with the principles in this manual and its supporting guidelines	Previously known as a floodplain risk management study or floodplain management study

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Term	Abbr.	Definition	Context / Additional Information
Future flood risk		The risk future development and its users are exposed to as a result of its location on the floodplain	Future flood risk may be reduced by existing or proposed FRM measures and land-use planning controls that consider the flood constraints on the land. This leaves a residual flood risk to the new development and its users. This residual flood risk may be further reduced by addressing continuing flood risk
Gauge height		The height of a flood level at a particular water level gauge site related to a specified datum	The datum may or may not be the AHD
Generalised extreme value	GEV	A probability distribution that is a single, flexible model in statistics combining three types of extreme value distributions (Gumbel, Fréchet, Weibull) to describe the behaviour of maximum (or minimum) values from a large set of random data	
Generalised short duration method	GSDM	A hydrological method for the estimation of extreme rainfall in Australia, appropriate for storm durations up to six hours	See also generalised south-east Australia method, generalised tropical storm method and probable maximum precipitation
Generalised south-east Australia method	GSAM	A hydrological method for the estimation of extreme rainfall in (southern) Australia, appropriate for storm durations of 12 hours	See also generalised short duration method, generalised tropical storm method and probable maximum precipitation
Generalised tropical storm method	GSAM	A hydrological method for the estimation of extreme rainfall in (northern) Australia, appropriate for storm durations of 12 hours	See also generalised short duration method, generalised south-east Australia method and probable maximum precipitation
Green-Ampt	GA	A model that represents water infiltration into a homogenous soil with a uniform initial water content	
Hazard		A source of potential harm or conditions that may result in loss of life, injury and economic loss due to flooding	
Hydraulic roughness		Measures the resistance water encounters flowing over a surface, influenced by friction and obstructions like bedforms (dunes, ripples) in channels or vegetation on land	Governs water velocity and water levels and is crucial for predicting flood levels. See also Manning's 'n'
Hydraulics		The study of water flow in waterways and flowpaths; in particular, the evaluation of flow parameters such as water level and velocity	
Hydrograph		A graph showing flow (discharge) in a watercourse over time, with key components including the baseflow, fast-rising rising limb (runoff), peak discharge, and slower falling limb (groundwater return)	

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Term	Abbr.	Definition	Context / Additional Information
Hydrology		The study of the rainfall and run-off process; in particular, the evaluation of peak flows, flow volumes and the derivation of hydrographs for a range of floods	
Hyetograph		A bar graph showing rainfall intensity over specific time intervals, used in hydrology to understand storm patterns for flood prediction and drainage design	
Integrated planning and reporting framework	IP&R framework	The IP&R framework includes a suite of integrated plans that set out a vision and goals and strategic actions to achieve them. It involves a reporting structure to communicate progress to council and the community as well as a structured timeline for review to ensure the goals and actions are still relevant	Preparation of FRMS and plans and implementation and maintenance of works requires linkages to the IP&R framework
Intensity-frequency-duration	IFD	A probabilistic estimation of rainfall across a 3-dimensional matrix of rainfall depth, storm duration and probability	Design rainfall depth estimations at a single point increase with the duration of the rainstorm and also with a reducing probability
Light detection and ranging	LIDAR	A remote sensing method that uses pulsed laser light to measure distances and create detailed 3D maps or models of the Earth's surface, objects, and environments	It is often mounted on aircraft or drones and generates dense "point clouds" of data, offering high accuracy and penetration of vegetative foliage
Likelihood		A qualitative description of probability and frequency	See also frequency and probability
Likelihood of occurrence		The likelihood that a specified event will occur	With respect to flooding, see also AEP and ARI
Local environmental plan	LEP	See <i>Environmental Planning and Assessment Act 1979</i>	
Local government area	LGA		The area serviced by the local government council
Local overland flooding	LOF	Inundation by local run-off on its way to a waterway, rather than overbank flow from a waterway	
Local strategic planning statement	LSPS		Local strategic planning statements assist councils to implement the priorities set out in

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Term	Abbr.	Definition	Context / Additional Information
			their community strategic plan and actions in regional and district plans
Log Pearson III	(LP3)	A key statistical method in hydrology, used for flood frequency analysis to predict extreme events like floods by fitting skewed data, commonly found in river flows.	It transforms data into logarithms, calculating the mean, standard deviation, and skewness of these log-transformed values, then using a table to find a frequency factor (K) to estimate future flood magnitudes at given probabilities, and finally converting back to original units
Loss		Any negative consequence or adverse effect, financial or otherwise	
Manning's 'n'		A common roughness coefficient used in hydraulic engineering, representing a channel's resistance to water flow, with higher 'n' values indicating rougher surfaces (like natural streams with debris) and lower values indicating smoother surfaces (like concrete pipes)	A dimensionless factor used in Manning's Equation to calculate flow velocity and discharge in open channels, with typical values varying significantly, from around 0.01 for smooth surfaces to over 0.10 for very rough or vegetated areas. See also hydraulic roughness
Merit-based approach		Weighs social, economic, ecological and cultural impacts of land-use options for different flood prone areas together with flood damage, hazard and behaviour implications, and environmental protection and wellbeing of the state's rivers and floodplains	The merit approach operates at 2 levels.  At the strategic level it allows for the consideration of social, economic, ecological, cultural and flooding issues to determine strategies for the management of future flood risk, which are formulated into council plans, policy and environmental planning instruments  At a site-specific level, it involves consideration of the merits of a development consistent with council LEPs, DCPs and local FRM policies, and consistent with FRM plans
Model for effluent disposal using land irrigation	MEDLI	A Windows-based computer model developed by the Queensland Government to simulate the long-term effects of irrigating land with treated effluent	It is used to design and assess wastewater reuse schemes for sewage treatment plants, abattoirs, and intensive rural industries, preventing soil degradation and groundwater contamination
NSW Floodplain Management Program	the program	The NSW Government's program of technical support and financial assistance to local councils to enable them to understand and manage their flood risk	The program, manual and FRM guides support the delivery of the policy through a partnership across governments
<i>NSW Flood prone land policy</i>	the policy	The <i>NSW Flood prone land policy</i> included in the manual	

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Term	Abbr.	Definition	Context / Additional Information
Peaks-over-threshold	POT	A technique in flood frequency analysis that models extreme river flows by analysing all events exceeding a set high flow rate (threshold)	
Pluviograph		An instrument that measures the amount of water that has fallen (i.e. a rain gauge), with a feature to register the data in real time, providing a detailed sub-daily dataset of the temporal pattern of recorded rainfall	
Prevention, preparedness, response and recovery	PPRR	Involves: <ul style="list-style-type: none"> <li>• <b>prevention:</b> to eliminate or reduce the level of the risk or severity of emergencies</li> <li>• <b>preparedness:</b> enhances the capacity of agencies and communities to cope with the consequences of emergencies</li> <li>• <b>response:</b> to ensure the immediate consequences of emergencies to communities are minimised</li> <li>• <b>recovery:</b> measures that support individuals and communities affected by emergencies in the reconstruction of physical infrastructure and restoration of physical, emotional, environmental and economic wellbeing</li> </ul>	In the flood context prevention involves FRM (including flood mitigation), EM and land-use planning measures
Probability		A statistical measure of the expected chance of a flood	For example, AEP
Probable maximum flood	PMF	The largest flood that could conceivably occur at a particular location, usually estimated from probable maximum precipitation (PMP), and where applicable, snow melt, coupled with the worst flood-producing catchment conditions	This is equivalent to the probable maximum precipitation flood in Australian Rainfall and Runoff (ARR)  The PMF in ARR is used for estimating dam design floods
Probable maximum precipitation	PMP	The greatest depth of precipitation for a given duration meteorologically possible over a given size storm area at a particular location at a particular time of the year, with no allowance made for long-term climatic trends (World Meteorological Organization 1986)	PMP is the primary input to PMF estimation
Rainfall intensity		The rate at which rain falls, typically measured in millimetres per hour (mm/h)	Rainfall intensity varies throughout a storm in accordance with the temporal pattern of the storm

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Term	Abbr.	Definition	Context / Additional Information
Rating curve		A hydrological graph showing the relationship between a watercourse's water level (stage) and its flow (discharge), typically employed at gauging station locations	A gauging station typically measures the water level within a watercourse, with estimates of flow being derived from the adopted rating curve. See also spot gaugings
Real-time kinetic	RTK	A high-precision satellite positioning technology that uses a fixed base station to send correction data to a mobile receiver, achieving centimetre-level accuracy for GNSS by correcting atmospheric and satellite errors	GNSS (Global Navigation Satellite System) is the umbrella term for satellite constellations like GPS (US), GLONASS (Russia), Galileo (EU), and BeiDou (China) that provide positioning, navigation, and timing (PNT) data globally via satellite signals, allowing receivers to calculate locations on Earth, land, sea, and air
Residual flood risk		The risk to the existing and future community that remains with FRM, EM and land-use planning measures in place to address flood risk	FRM measures cannot remove all flood risk, but rather they reduce residual flood risk
Risk		'The effect of uncertainty on objectives' (ISO 2018)	See also flood risk. Note 4 of the definition in ISO31000:2018 also states that 'risk is usually expressed in terms of risk sources, potential events, their consequences and their likelihood'
Risk analysis		The systematic use of available information to determine how often specified (flood) events occur and the magnitude of their likely consequences	
Run-off		The amount of rainfall that ends up as streamflow, also known as rainfall excess	
State environmental planning policy	SEPP	See <i>Environmental Planning and Assessment Act 1979</i>	
Scenario		A scenario may relate to current, historical or assumed future floodplain, catchment and climate conditions	Flood behaviour varies over time with changes in key catchment and floodplain (such as the scale of development) and climatic conditions (including climate change), and due to the implementation of FRM measures. A range of scenarios are generally needed to understand and assess flood behaviour
Shared socioeconomic pathways	SSPs	Scenarios used in climate modelling that describe plausible future global developments in society, economy, and technology (like population, growth, education, energy use) to explore different levels of greenhouse gas emissions and climate change impacts	
Spot gaugings		Specific, manual measurements of water flow (discharge) at predetermined points in a watercourse, often done periodically to	See also rating curve

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Term	Abbr.	Definition	Context / Additional Information
		calibrate rating curves at water level recording gauging stations	
Stage		Equivalent to water level; measured with reference to a specified datum	Measurement may relate to AHD, a local datum or a local water level gauge
Storm surge		The increases in coastal water levels above predicted astronomical tide level (i.e. tidal anomaly) resulting from a range of location-dependent factors	These factors may include the inverted barometer effect, wind and wave setup and astronomical tidal waves, together with any other factors that increase tidal water level
Tailwater		Waters located immediately downstream from a hydraulic structure, such as a dam, spillway, bridge or culvert	In the context of hydraulic modelling this term is also used when referencing the water level conditions at the downstream limit (boundary) of the model
Technical working group	TWG	A term typically associated with the people responsible for the ongoing review and project decision making process during the undertaking of a flood study	The TWG typically comprises staff from the consultancy responsible for delivery of the flood study, together with relevant local and state government staff
Two-dimensional unsteady flow	TUFLOW	A suite of advanced 1D/2D/3D computer simulation software for flooding, urban drainage, coastal hydraulics, sediment transport, particle tracking and water quality	With over 35 years of continuous development, TUFLOW is internationally recognised as the industry leader for hydraulic modelling accuracy, speed and workflow efficiency
Velocity		The speed of floodwaters, measured in metres per second (m/s)	
Vulnerability		The degree of susceptibility and resilience of a community, its social setting, and the built environment to flooding	Vulnerability is assessed in terms of ability of the community and environment to anticipate, cope and recover from flood events

## Executive Summary

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### Introduction

The Review of the Lake Wyangan Flood Study and Floodplain Risk Management Study and Plan Update is being prepared for Griffith City Council (Council) to improve the understanding of flood behaviour and impacts and better inform management of flood risk in the study area with consideration of the available information, and relevant standards and guidelines.

The study comprises an overland flow flood investigation of Lake Wyangan township and the surrounding rural environs to determine the suitability and feasibility of land uses consistent with supporting local growth and development.

The outcomes of this flood study will enable the understanding of flood-related issues across the study area and provide Council with a basis to prioritise floodplain risk management activities. The improved definition of flood behaviour will also aid in Council's management of flood risk and be used in conjunction with land use planning and development controls and flood emergency management and response.

### Study Background

The study considers rainfall-runoff from the entire catchment of Lake Wyangan. However, the focus of the study is within the southern part of the catchment, where most of the existing and future urban development is located. The main study area can be described as the area bounded by the Lake View Branch Canal to the north and east and the catchment divide to the south and west.

The Lake Wyangan catchment is an endorheic basin, having no natural drainage outlet. It includes the terminal lake and wetland storage areas of Lake Wyangan, Tharbogang Swamp, Nericon Swamp and Campbell's Swamp.

For this study, a TUFLOW model was developed for the simulation of catchment flood hydrology using the direct rainfall method to represent the rainfall-runoff process. The hydrological model incorporates the approach developed by Torrent Consulting's research, as presented at the Hydrology and Water Resources Symposium 2023, which uses the full functionality of the TUFLOW soil infiltration routines to address the shortcomings of other simplified rainfall loss methods. The design flood hydrology is simulated in accordance with the ARR 2019 guidelines, which is an updated approach from that used in the previous studies.

A key limitation in model calibration and design flood estimation identified in the previous studies was the very small amount of effective rainfall, i.e. that which is converted to observed catchment runoff following infiltration losses. This made the modelled catchment runoff highly sensitive to the adopted initial and continuing loss parameters. This current study sought to reduce this uncertainty using a more sophisticated infiltration loss model and the additional calibration data available. However, the uncertainty associated with the limited available rainfall records and highly complex catchment hydrology has prevented a meaningful calibration of model parameters to match the observed catchment runoff conditions.

Since the completion of the existing studies there have been two significant flood events in Sep-Oct 2016 and Oct-Nov 2022. Both events experienced prolonged periods of high monthly rainfall totals, which is different to the other recent major flood event of March 2012, which was a single intense rainstorm. Catchment runoff and localised flooding was also experienced in January 2022.

The impacts of flooding within the catchment can be broadly classified into three categories:

- Short duration intense rainfall within the local catchment area draining to Lake Wyangan from the hillslopes to the east, creating overland flood flow paths within the Lake Wyangan suburban area, such as occurred in March 1985.
- Intense rainfall of a longer duration resulting in catchment runoff from the broader catchment draining to Tharbogang Swamp and the Lake View Drain, which becomes more likely during periods of prolonged wet weather. This causes overland flood flow inundation through properties located between Dickie Road and the Kubank Estate, which may last for an extended period of days, such as occurred in March 2012 and January 2022.
- When the above mechanism extends for a period of weeks then a significant volume of water is discharged to the terminal lake systems within the catchment, resulting in flooding of areas surrounding Lake Wyangan and Tharbogang Swamp, such as occurred in Oct-Nov 2022. Being a terminal system, output from the lakes is limited to evaporation losses plus any pumped extraction. The elevated water level in Lake Wyangan persisted well into 2023 following the Oct-Nov 2022 flood event.

Flood behaviour was predicted for a range of design floods based on detailed TUFLOW hydrological and hydraulic modelling developed for the study catchments. Modelling of the local catchment and lake storage flood conditions was validated using flood information for historical events, where available.

### Community Consultation

A consultation plan to engage with the community at various stages throughout the project duration is an important component of the study. The key elements of the community consultation plan include:

- Meeting with local landholders that were impacted during the 2016 and 2022 flood events.
- Liaison with landholders from the upper catchment area to obtain additional rainfall records
- Community Information session at the public exhibition phase to inform of study progress and findings.
- Formal Public Exhibition of the Draft Flood Study document and request for feedback.

In addition to the broader community engagement, study progress at regular intervals is reported to the technical working group, including representatives from Griffith City Council and NSW DCCEEW.

### Model Development

Three TUFLOW models were developed to simulate flood behaviour within the study catchment:

- A hydrological model to simulate rainfall-runoff contributing to flooding in the terminal storages of Lake Wyangan and Tharbogang Swamp. This includes the main overland flow path within the catchment, which impacts the Kubank Estate. The details for key hydraulic controls were also represented in the model, as they impact the flood hydrology.
- A hydrological model to simulate rainfall-runoff of the local catchment areas in the south-eastern area of the catchment, which have a much shorter critical duration than the broader catchment.
- A detailed hydraulic model to simulate the main overland flood flow paths within the south-eastern area of the catchment, where most of the existing and future urban development is located. Details of local drainage channels and hydraulic structures were represented, with inflows being sourced from the local catchment hydrological model.

The Lake Wyangan / Tharbogang Swamp TUFLOW model is principally a hydrological model, developed to simulate the rainfall-runoff process of the study catchment. However, it also includes details of some key hydraulic controls that impact the flood hydrology, such as Lake View Drain and cross-drainage structures under the Lake View Branch Canal. The model is also suitable for the mapping of the main catchment flood flow path, which impacts the Kubank Estate and flows into Tharbogang Swamp. The model is also used for

the derivation of design flood levels in Lake Wyangan and Tharbogang Swamp that result from a single event-driven flood response.

The key inputs that inform the hydrological modelling process are:

- Topographic data – from the 2016 photogrammetric survey and 2021 LiDAR survey
- Hydraulic roughness – derived from aerial imagery of land surface coverage, used to represent the hydrological response (runoff routing) of the catchment to rainfall, including a higher roughness appropriate for shallow sheet flow conditions.
- Rainfall losses – derived from the Green-Ampt infiltration method, informed by soil texture, soil depth and soil moisture data. Irrigated agriculture areas were given higher initial soil moisture conditions, with areas of almond farming also given a degree of imperious surface coverage.
- Drainage infrastructure – key drainage channels and structures were included within the model to ensure that catchment runoff is directed to the applicable receiving terminal lake storage. Lake View Drain is particularly important in this regard, as it crosses the natural catchment divide between Lake Wyangan and Tharbogang Swamp.

The local catchment TUFLOW hydrological model covers an area of around 70 km<sup>2</sup> and includes the North and South Lake Wyangan catchments, and the Nericon Swamp and Campbell's Swamp catchments. The local catchment hydrological model extends from the ridgeline of the McPherson Range to the south and east, and to the natural divide of the Lake Wyangan and Tharbogang Swamp catchments to the north and west. The modelling methodology is largely consistent with that of the broader catchment model. Results from the local catchment model were extracted and input as flow hydrographs to the local catchment hydraulic model.

The TUFLOW hydraulic model covers an area of some 28 km<sup>2</sup>, including the residential and semi-rural localities bordered by Lake Wyangan, Lake View Branch Canal, and Mallinsons Road. The model was constructed using a 4 m horizontal grid cell resolution, with the sub-grid sampling (SGS) routine in TUFLOW implemented to utilise the full detail of the underlying DEM data within the model grid cell geometry. Again, key drainage channels and structures were incorporated within the model and debris blockage assumptions were also applied.

#### Model Calibration and Validation

The original Lake Wyangan Flood Study considered the March 1985, March 1989 and December 2007 events for model calibration. The March 2012 event occurred shortly after completion of the study and so it was investigated as part of the Lake Wyangan Floodplain Risk Management Study. Since the previous studies there have been additional events in Sep-Oct 2016 and Oct-Nov 2022, the latter of which produced the highest recorded flood level in Lake Wyangan. These events have all been considered in the context of this current study update.

The model calibration process for the original Lake Wyangan Flood Study found modelling the catchment flood hydrology to be extremely challenging, for reasons including:

- A general paucity of data including both rainfall and water level records
- The substantial apparent soil losses exhibited by previous flood events
- The sensitivity of modelled runoff volume to small changes in effective rainfall
- Cross-catchment flow transfer via the Lake View Drain.

The March 2012 event is the largest to impact the broader region in recent recorded history. The half-hourly rainfall record from Griffith Airport indicates a 24-hour duration event, which began on the morning of 3 March

and during which 143 mm was recorded. This exceeds a 1-in-200 AEP event when compared to the BOM IFD data.

Modelling of the March 2012 event was highly sensitive to small change in rainfall applied to the model and the antecedent soil moisture conditions. The degree of uncertainty associated with these datasets exceeds that of the model parameters. The model calibration process identified that combinations ranging between a 110 mm to 120 mm rainfall depth and initial soil moisture conditions ranging between 40% to 50% will produce simulated results that are comparable to the observed event conditions.

A mass balance assessment was undertaken for the Oct-Nov 2022 flood event, as the multi-storm composition of the event is too complex for hydrological simulation. However, the mass balance assessment enables some meaningful observations to be made:

- It is likely that most of the water entering Lake Wyangan and Tharbogang Swamp came from local catchment sources rather than the central and upper catchment areas.
- The 24 October rainfall event triggered the inflow of central and upper catchment runoff into the lower catchment area.
- Almost all the central and upper catchment inputs entered Lake Wyangan via Lake View Drain, with there being limited potential for significant contributions to Tharbogang Swamp given the recorded water levels in that waterbody.
- There is an additional loss of around 85 ML/d from Lake Wyangan between 24 November and 9 December, which closely matches the corresponding volumetric increase in the Tharbogang Swamp storage. This is a function of the emergency pump transfer that was undertaken from Lake Wyangan to Tharbogang Swamp.
- The gradients of volumetric loss associated with evaporation match the observed data at the end of the event, once the rainfall and pumping have ceased.
- There is estimated 4500 ML of runoff volume from the local catchments reporting to Lake Wyangan, which equates to an effective rainfall depth of 31 mm. From the approximately 315 mm of rainfall recorded during the period, this represents a runoff coefficient of around 10%.
- The estimated 3400 ML of additional runoff volume from the central and upper catchment areas equates to an effective rainfall depth of only 5 mm and a runoff coefficient of only 1.5%.

The March 1985 event is truly exceptional. A daily rainfall total of 150 mm was recorded at Griffith Airport, with only 45 mm recorded at Hanwood and 29 mm at Yenda. To the north and west, all rainfall gauges recorded zero for the day. It would be easy to dismiss this record as an error were it not for the photographic evidence (as presented within the original Lake Wyangan Flood Study), which shows a 200 m wide overland flood flow path from Smeeth Road flowing over Boorga Road at the intersection. A model validation process demonstrates reasonable consistency between the modelled and observed flood behaviour from local catchment runoff during very intense rainfall such as occurred during this historical flood event.

A detailed review of available satellite imagery was undertaken for the historical flood events and provides some insight into the catchment response to a range of rainfall conditions.

#### Design Flood Hydrology

Design flood hydrology was simulated using the TUFLOW models in accordance with the ARR 4.2 guidelines. The adopted design rainfall conditions considered the following key parameters:

- The spatial variability of rainfall across the catchment
- The application of an areal reduction factor

- A critical duration assessment
- Application of appropriate climate change impacts to design rainfall intensity.

The 24-hour storm duration was found to be the critical condition for the broader catchment flooding, with local catchment flooding typically exhibiting a 45-minute to 9-hour critical duration.

As per the updated ARR 4.2 climate change guidance, an adjustment was made to the adopted design rainfall to account for potential increases in rainfall intensity. The rainfall adjustment is determined through a combination of an expected increase in global mean temperature and an associated percentage increase in design rainfall intensity per degree of warming.

For this assessment the Shared Socioeconomic Pathway SSP2 was adopted for the near-term flood planning horizon, which represents a continuation of historic global attitudes towards climate policy, i.e. a neutral rather than optimistic or pessimistic outlook. The SSP3 climate change scenario was adopted for the long-term flood planning horizon, which assumes future challenges to climate change adaptation and mitigation. The SSP2-4.5 climate scenario has a best-estimate warming of around 1.2°C for the near-term (2021-2040) horizon, while SSP3-7.0 estimates around 3.3°C of warming for the long-term (2081-2100) horizon.

For the broader catchment model a total increase in design rainfall intensity of 9.7% was derived for the near-term horizon and 28.9% for the long-term horizon. For the local catchment flood mechanism, a total increase in design rainfall intensity ranging between 10.2% and 18.3% was derived for the near-term horizon and between 30.5% and 58.6% for the long-term horizon.

### Design Flood Results

The modelled peak flow and peak flood level conditions are tabulated at key locations across the study area within this report document. The full suite of design flood mapping outputs is provided in the accompanying appendices. Flood mapping outputs are provided for the near-term (2040) planning horizon, with additional outputs that are integral to future flood planning decisions also provided for the long-term (2100) planning horizon.

Flood hazard classification mapping was undertaken in accordance with Guideline 7-3 of the Australian Disaster Resilience Handbook 7 Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia (AIDR, 2017). Flood function mapping was produced using the following criteria:

- Floodway is defined as areas where the peak value of velocity multiplied by depth ( $V \cdot D$ ) > 0.2 m<sup>2</sup>/s, with all drainage channels also being considered as floodway
- Flood Storage comprises areas outside the Floodway where peak depth > 0.5 m, with all wetland areas also being considered as flood storage; and
- Flood Fringe comprises areas outside the Floodway where peak depth is less than the thresholds for Flood Storage.

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# 1 Introduction

---

## 1.1 Background

The Review of the Lake Wyangan Flood Study and Floodplain Risk Management Study and Plan Update is being prepared for Griffith City Council (Council) to improve the understanding of flood behaviour and impacts and better inform management of flood risk in the study area with consideration of the available information, and relevant standards and guidelines.

The existing studies completed by BMT WBM are now over a decade old and at that time there was limited catchment flood information available. However, subsequent flood events in Sep-Oct 2016 and Oct-Nov 2022 have provided a more comprehensive calibration dataset. The 2022 flood event is of particular importance, given that it exceeded the 0.5% AEP design flood level estimate in Lake Wyangan, resulting in the inundation of two residential properties, the causeway and other infrastructure surrounding the lake. The 2016 and 2022 events were the result of prolonged catchment rainfall and wet antecedent conditions rather than intense isolated rainstorms.

In addition to the recent flooding in the catchment, there has been significant agricultural development that will impact the volume of runoff being drained to Lake Wyangan. Accordingly, Council seeks to undertake a detailed review and update of the existing Flood Study and Floodplain Risk Management Study and Plan (FRMSP) to better understand the current flood risk and options for the long-term floodplain risk management. Since the undertaking of the existing studies there has been substantial agricultural development that has expanded the irrigated area in the vicinity of Dickie Road.

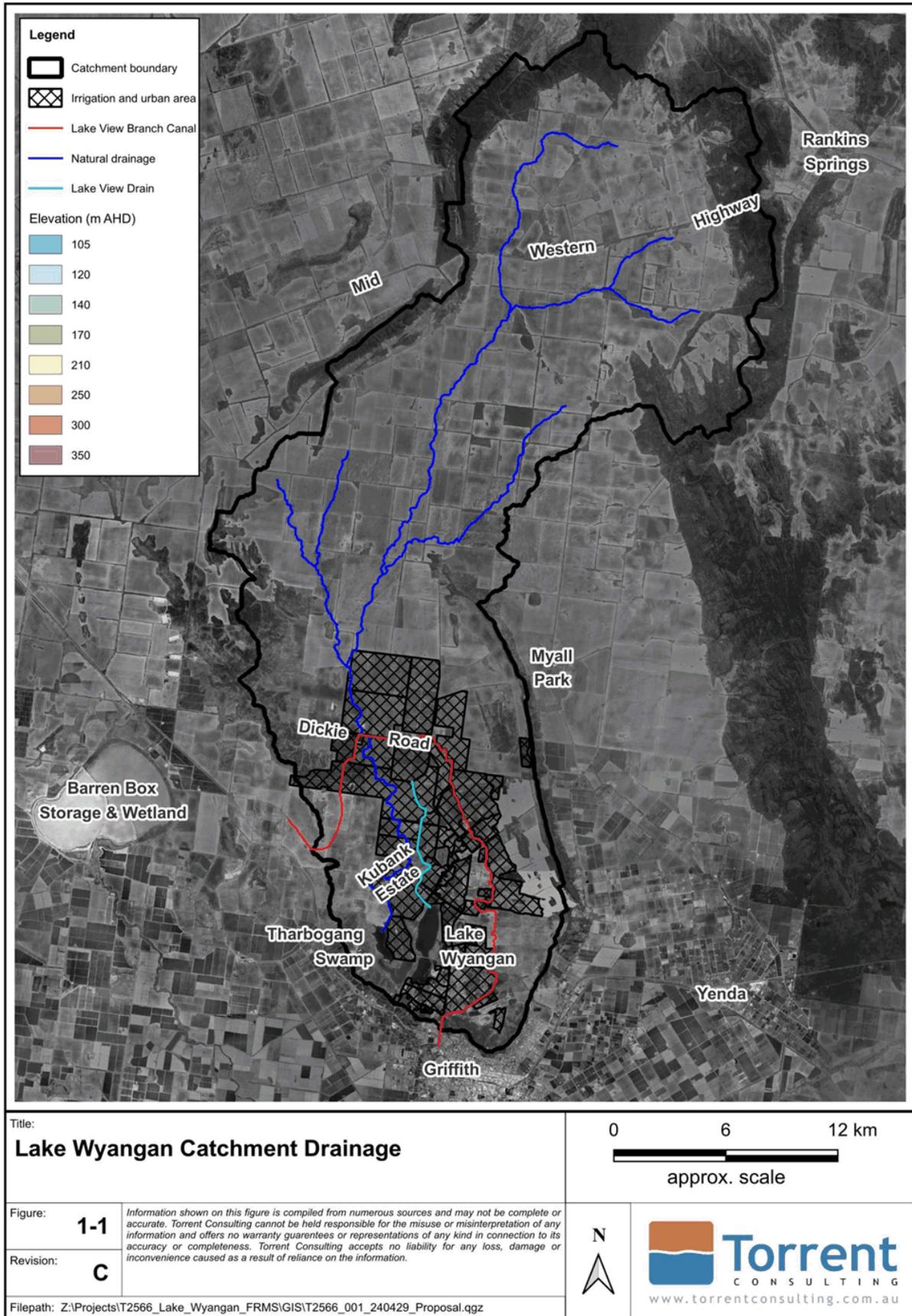
## 1.2 Study Location

Lake Wyangan is in the northern Riverina region of New South Wales, approximately 5 km north of Griffith. The Lake Wyangan / Tharbogang Swamp catchment covers an area of approximately 760 km<sup>2</sup> and incorporates the smaller catchments draining to Campbell's Swamp and Nericon Swamp, as shown in Figure 1-1.

Residential areas are located to the east and south of Lake Wyangan, with regional access available via Boorga Road north toward Rankins Springs or south toward Griffith. Irrigated agriculture covers a large portion of the southern part of the catchment, in proximity to the Lake View Branch Canal. The extent of irrigation has increased significantly in the Dickie Road area within the last 15 years.

## 1.3 The Floodplain Risk Management Process

The NSW Government has worked in partnership with Councils to understand and manage flood risk to communities across New South Wales under the NSW Flood prone land policy (the policy) since 1984. The primary objective of the policy is to reduce the impacts of flooding and flood liability on communities and individual owners and occupiers of flood prone property, and to reduce private and public losses resulting from floods, utilising ecologically positive methods wherever possible. The *Flood risk management manual: the policy and manual for the management of flood liable land* (NSW Dept. Planning & Environment, 2023) and its toolkit support the implementation of the policy.



Under the policy, the management of flood liable land remains the responsibility of Councils, with the State Government providing specialist technical advice to assist Councils in the discharge of their floodplain management responsibilities and may subsidise flood mitigation works to alleviate existing problems. Councils are encouraged to develop and implement Floodplain Risk Management (FRM) plans through the FRM process outlined in Figure 1-2.



Figure 1-2 Flood risk management process (NSW Flood Risk Management Manual)

This study represents the “Flood Study” stage of the above process and aims to provide an understanding of flood behaviour within the study area.

### 1.4 Study Objectives

The primary objective of the Flood Study is to define the flood behaviour within the study area through the establishment of appropriate numerical models. The developed models simulate expected flood behaviour within the local catchments, Lake Wyangan and Tharbogang Swamp storages, providing information on flood flows, velocities, levels and extents for a range of flood event magnitudes under existing catchment and floodplain conditions. Specifically, the study incorporates:

- Compilation and review of existing information pertinent to the study and acquisition of additional data, as required.
- Development of appropriate hydrological and hydraulic models and model calibration to observed historical event data, where available.
- Determination of design flood conditions for a range of design magnitude events up to the Probable Maximum Flood (PMF) event, also considering future flooding conditions incorporating potential climate change influence.
- Presentation of the study methodology, results and findings in a comprehensive report incorporating appropriate flood mapping.

The principal outcome of the flood study is the understanding of flood behaviour in the study area and in particular design flood level information to assist in future flood planning and assessment of flood risk management options.

## 1.5 Report Outline

This report documents the Study's objectives, results and recommendations.

**Section 1** introduces the study.

**Section 2** details the study area and provides information on the data collected for this study.

**Section 3** outlines the community consultation program undertaken.

**Section 4** provides an overview of the approach adopted to complete the study and details the development of the computer models.

**Section 5** details the model calibration and validation process.

**Section 6** details the development of the design flood hydrology.

**Section 7** presents the design flood simulation results and associated flood mapping.

## 2 Study Background

### 2.1 Study Area

The study considers rainfall-runoff from the entire catchment of Lake Wyangan, which is shown on Figure 1-1. However, the focus of the study is within the southern part of the catchment, where most of the existing and future urban development is located. The main study area can be described as the area bounded by the Lake View Branch Canal to the north and east and the catchment divide to the south and west.

#### 2.1.1 Catchment Description

The Lake Wyangan catchment is an endorheic basin, having no natural drainage outlet. It includes the terminal lake and wetland storage areas of Lake Wyangan, Tharbogang Swamp, Nericon Swamp and Campbell's Swamp.

There are two main flood mechanisms that impact the study area. Local catchment runoff activates overland flood flow paths within the south-eastern portion of the catchment, within which most of the existing and future urban development is located. Short duration, high intensity rainfall is the critical driver for flooding experienced in this area, as occurred in March 1985.

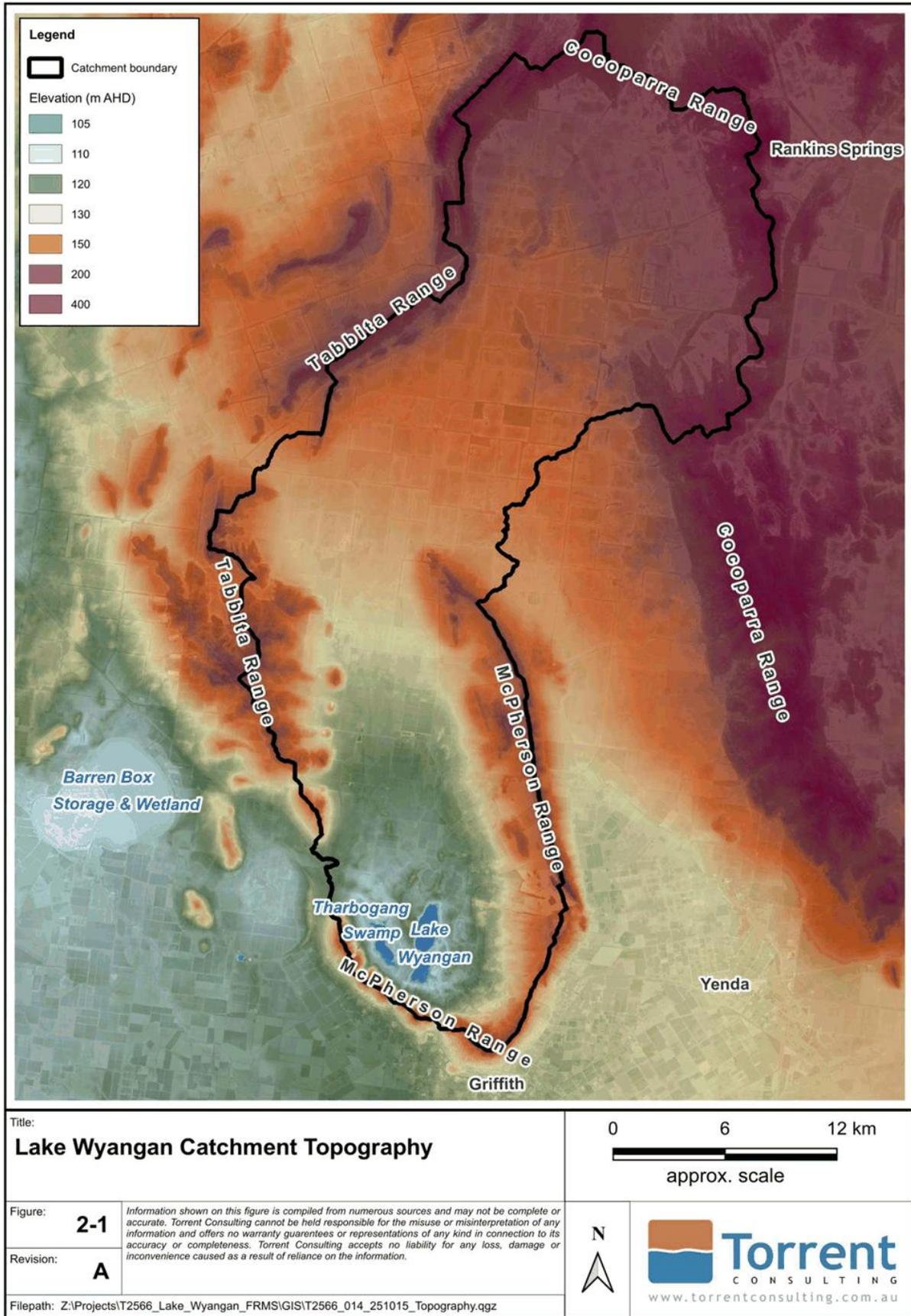
Elevated flood levels within the lake and wetland storages are more likely to occur in response to longer duration rainstorms, with heavy rainfall over a day or more, as occurred in March 2012. However, prolonged periods of wet weather with several smaller rainstorms can also combine to generate significant runoff volumes, as occurred in Sep-Oct 2016 and Oct-Nov 2022.

The catchment is mostly flat, with typical surface gradients of around 0.2%. However, the catchment boundary is often clearly defined by an elevated ridge of rock hills. The upper catchment area is fringed by high country that forms the northern limit of the Cocoparra Range, with the lower catchment being bound by the McPherson Range to the south and east and Tabbita Range to the west, as shown in Figure 2-1.

The catchment boundary between the northern end of the McPherson Range and the Cocoparra Range to the east is poorly defined, with potential for cross-catchment drainage. This area contains a few small terminal wetland catchments, located on the saddle between the Lake Wyangan catchment and the Myall Park catchment, which drains south towards Yenda. The Myall Park catchment is also a natural terminal system, but irrigation infrastructure now connects it to Main Drain J.

The catchment has been largely cleared of native vegetation, with remnants principally occurring along the ranges that form the catchment divide. However, there are some remnants on the valley floor, such as Pulletop Nature Reserve.

The catchment soils are naturally sandy, with a large capacity for rainfall and runoff infiltration. The local flood behaviour is therefore sensitive to changes in land use that increase the runoff potential.



## 2.2 Data Collection and Review

Upon commissioning, all relevant data and information for the catchment was obtained through Council and other relevant organisations (e.g. DCCEEW, Murrumbidgee Irrigation (MI), Bureau of Meteorology (BOM), etc.). The relevant data includes:

- LiDAR and photogrammetric survey datasets downloaded via the ELVIS Foundation Spatial Data Portal
- Weekly water level records for Lake Wyangan from December 2017 to September 2025
- Rainfall records from the BOM and Wunderground sites
- GIS information including cadastral boundaries, topography, watercourses, aerial photography, drainage networks, land zoning, vegetation communities, soil landscapes, etc.
- Relevant previous studies and planning documents, including the Lake Wyangan Flood Study (BMT 2012) and Lake Wyangan FRMSP (BMT 2013).

### 2.2.1 Review of Previous Studies

Despite there being an existing TUFLOW model developed for the previous studies undertaken by BMT, it is much more efficient to develop a new model from scratch for this review. The existing model required a 1D representation of the Lake View Branch Canal to separate and transition modelled runoff from a coarse upper catchment resolution (60 m) to a finer (10 m) resolution within the detailed study area. Subsequent developments in TUFLOW capabilities now enable multiple 2D model domains to seamlessly transition into one another (Quadtree functionality) and to capture detail beyond the resolution of the 2D model grid cell (sub-grid sampling). However, there are individual model layers that were transferred across to the new model for efficiency of model development.

For this study, a TUFLOW model was developed for the simulation of catchment flood hydrology using the direct rainfall method to represent the rainfall-runoff process. The hydrological model incorporates the approach developed by Torrent Consulting's research, as presented at the Hydrology and Water Resources Symposium 2023, which uses the full functionality of the TUFLOW soil infiltration routines to address the shortcomings of other simplified rainfall loss methods. The design flood hydrology is simulated in accordance with the ARR 2019 guidelines, which is an updated approach from that used in the previous studies.

A key limitation in model calibration and design flood estimation identified in the previous studies was the very small amount of effective rainfall, i.e. that which is converted to observed catchment runoff following infiltration losses. This made the modelled catchment runoff highly sensitive to the adopted initial and continuing loss parameters. This current study sought to reduce this uncertainty using a more sophisticated infiltration loss model and the additional calibration data available. However, the uncertainty associated with the limited available rainfall records and highly complex catchment hydrology has prevented a meaningful calibration of model parameters to match the observed catchment runoff conditions.

### 2.2.2 Historical Flood Events

Since the completion of the existing studies there have been two significant flood events in Sep-Oct 2016 and Oct-Nov 2022. Both events experienced prolonged periods of high monthly rainfall totals,

which is different to the other recent major flood event of March 2012, which was a single intense rainstorm. Catchment runoff and localised flooding was also experienced in January 2022.

The impacts of flooding within the catchment can be broadly classified into three categories:

- Short duration intense rainfall within the local catchment area draining to Lake Wyangan from the hillslopes to the east, creating overland flood flow paths within the Lake Wyangan suburban area, such as occurred in March 1985.
- Intense rainfall of a longer duration resulting in catchment runoff from the broader catchment draining to Tharbogang Swamp and the Lake View Drain, which becomes more likely during periods of prolonged wet weather. This causes overland flood flow inundation through properties located between Dickie Road and the Kubank Estate, which may last for an extended period of days, such as occurred in March 2012 and January 2022.
- When the above mechanism extends for a period of weeks then a significant volume of water is discharged to the terminal lake systems within the catchment, resulting in flooding of areas surrounding Lake Wyangan and Tharbogang Swamp, such as occurred in Oct-Nov 2022. Being a terminal system, output from the lakes is limited to evaporation losses plus any pumped extraction. The elevated water level in Lake Wyangan persisted well into 2023 following the Oct-Nov 2022 flood event.

To provide context to the relative catchment conditions experienced during the flood events, the BOM Australian Water Outlook (AWO) soil moisture data and daily rainfall records have been reviewed and are summarised in Figure 2-2, Figure 2-3 and Figure 2-4 for the years 2012, 2016 and 2022, respectively. The rainfall data represents an average of the two BOM daily rainfall gauges located within the catchment.

From comparison of Figure 2-3 and Figure 2-4 the November 2022 flood event does not appear as large as the September 2016 event. However, the November 2022 event resulted in the highest flood level on record in Lake Wyangan. This is likely a function of higher intensity of rainstorm that was experienced in 2022 than 2016, with the combination of wet antecedent catchment conditions and intense rainfall being required to initiate significant surface water runoff.

Satellite imagery indicates that some surface water flooding was generated sometime between mid-June and mid-July 2016, most likely associated with the ~50 mm rainstorm recorded in the 20 June daily rainfall record. However, the main flood event occurred prior to late-September, most likely associated with the ~45 mm rainstorm recorded in the 10 September daily rainfall record. Frequent but less intense rainstorms then occurred throughout the next 3-4 weeks, prolonging the flood event into early-to-mid October. The flooding principally impacted land holders between Dickie Road and Tharbogang Swamp, with the total volume of runoff being insufficient to result in adverse flooding in Lake Wyangan.

Figure 2-5 shows a still image from drone footage taken on 4 October 2016. It is from a location between Kubank Road and Lee Lane, looking north-west across fields newly prepared for future almond farming.

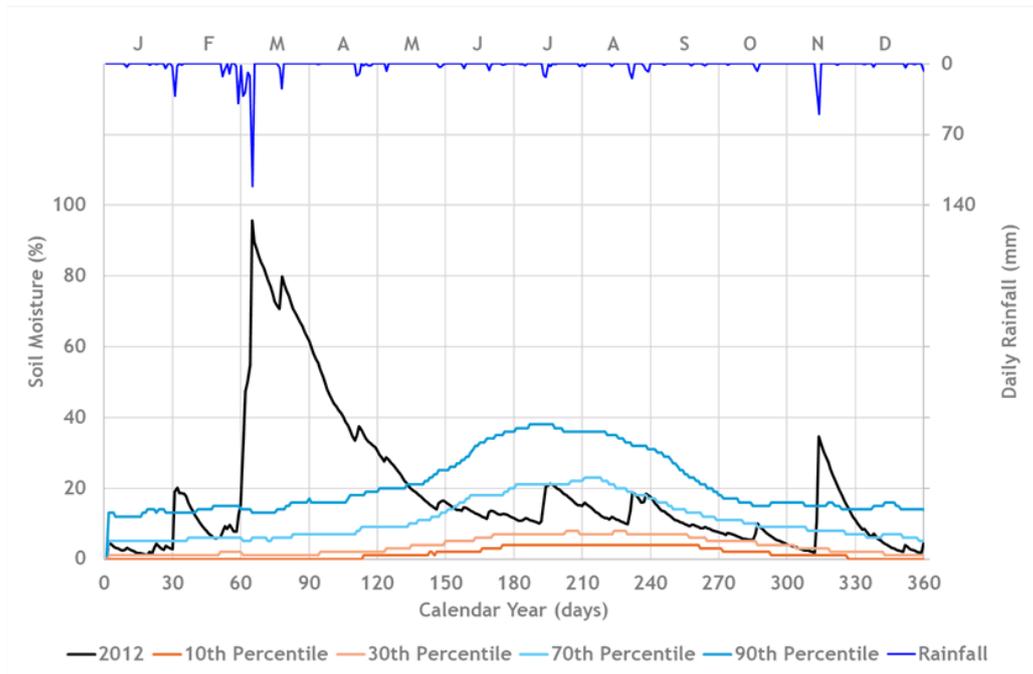


Figure 2-2 Catchment Rainfall and Soil Conditions for 2012

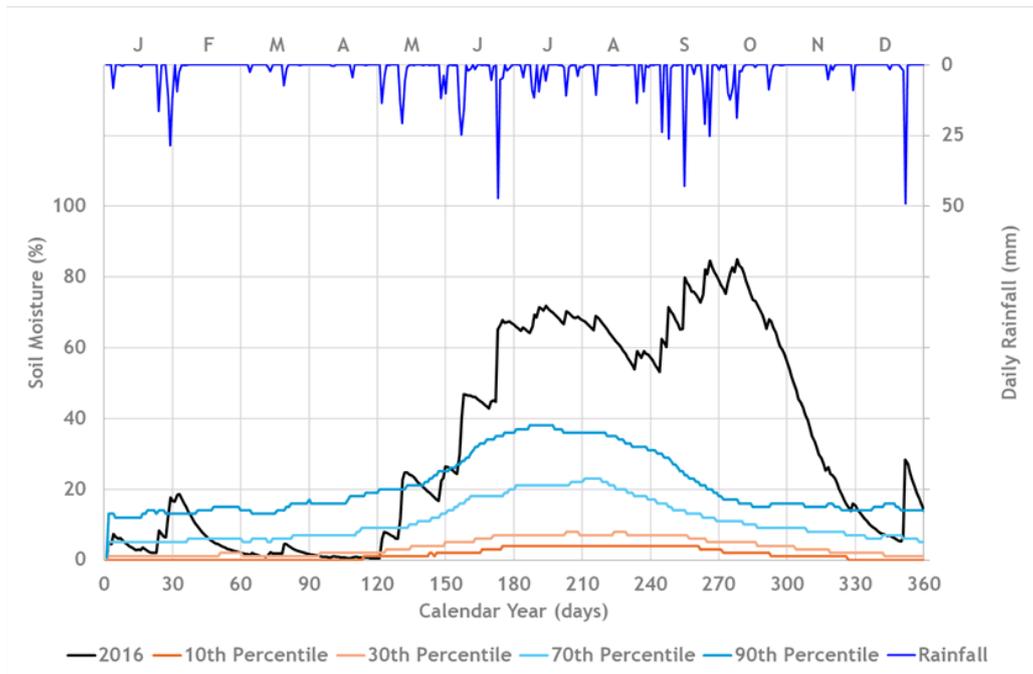


Figure 2-3 Catchment Rainfall and Soil Conditions for 2016

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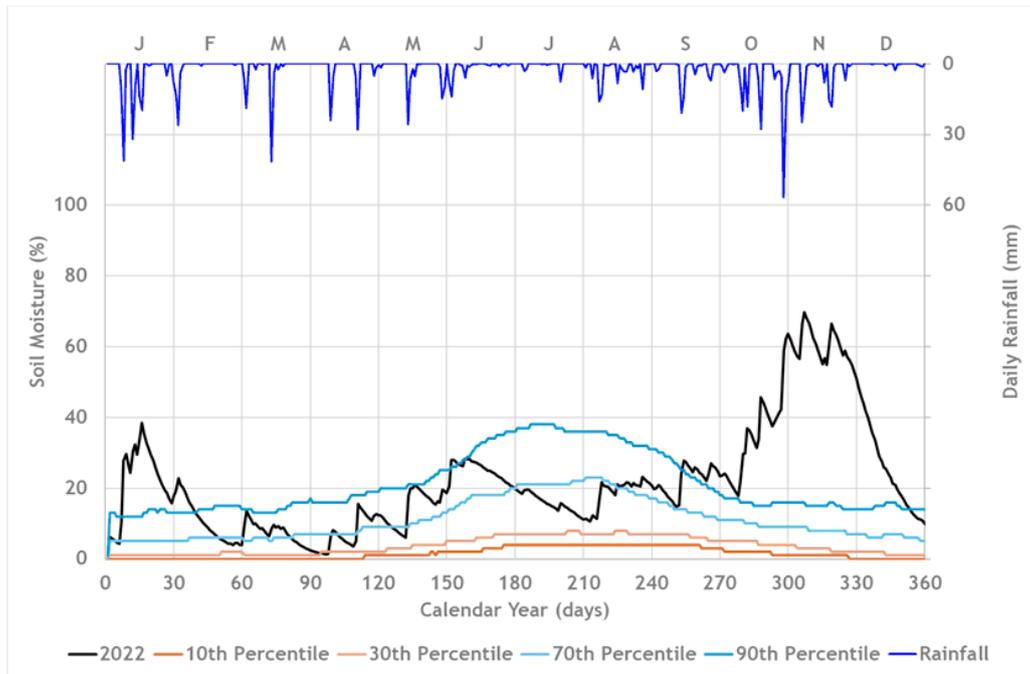


Figure 2-4 Catchment Rainfall and Soil Conditions for 2022



Figure 2-5 Surface Water Flooding near Lee Lane in October 2016

In 2022, satellite imagery shows some minor surface water flooding on 10 January, which further progresses on 12 January and 15 January but has receded by 4 February. Surface water runoff was likely initiated during the rainstorm associated with the ~50 mm recorded in the 6-7 January daily record. This was followed by a further two rainstorms of ~40 mm within the next week that will have further contributed to the flooding that was experienced. Again, the flooding principally impacted land holders between Dickie Road and Tharbogang Swamp, with the total volume of runoff being insufficient to result in adverse flooding in Lake Wyangan.

The main flood event in 2022 (and the largest recorded within Lake Wyangan) occurred during the spring. Satellite imagery shows that minor surface water flooding first occurred sometime between 4 September and 14 September, most likely associated with the ~35 mm rainstorm recorded in the 9-10 September daily record.

Further surface water flooding is evident in satellite imagery on 9 October and 17 October, with ~50 mm rainfall recorded 5-8 October, followed by ~35 mm rainfall 13-14 October. The main flood event occurred in late October, with over 100 mm rainfall recorded in a week, including a ~90 mm rainstorm 24-25 October. This late October rainfall initiated a response in Lake Wyangan, with the water level rising by around 1.6 m in the southern lake during November. The flooding was further contributed to by ~90 mm additional rainfall throughout November. The lake levels eventually returned to normal operating water levels around 12 months after the November 2022 flood event.

Figure 2-6 and Figure 2-7 show still images from drone footage taken on 25 October 2022. The former is looking north along Lake View Drain, from the point nearest to the intersection of West Road and Kubank Road. The latter is looking north-east along Zanotto Road in the Kubank Estate.



Figure 2-6 Flooding Along Lake View Drain in October 2022

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Figure 2-7 Flooding Along Zanotto Road in October 2022

### 2.2.3 Rainfall and Water Level Records

During the undertaking of the existing studies the availability of water level records for Lake Wyangan was very limited. Since the completion of the existing studies, weekly level readings have been recorded for the north and south lakes of Lake Wyangan, beginning December 2017. Therefore, this data is only useful for the analysis and model calibration for the November 2022 flood event. During that event additional level readings were occasionally taken for Lake Wyangan and in Tharbogang Swamp. In conjunction with a stage-storage relationship for the lakes, this enables the volume of water entering the terminal waterbodies to be determined.

Figure 2-8 shows the recorded storage level data for Lake Wyangan and Tharbogang Swamp converted to a total volumetric increase in storage volume across the period of the November 2022 flood event. An indicative cumulative rainfall total is also shown for reference, derived from the two BOM daily rainfall gauges located within the catchment.

There is a scarcity of BOM rain gauge data available for the study area. This is demonstrated in Figure 2-9, which shows the spatial location of currently active BOM daily rainfall gauges. Pluviograph data is available for the Griffith Airport gauge. The only other BOM gauge within the catchment is located at "Acres" on Pulletop Road, Boorga, about mid-way up the catchment.

The Wunderground website has data available from a range of privately operated weather stations. There are four gauges on Wunderground that were operational in 2022 that provide potentially useful

additional data for the analysis and model calibration of the November 2022 flood event. The location of these gauges is also shown in Figure 2-9.

The coverage of rainfall gauge data for the November 2022 flood event is reasonable for the lower quarter of the catchment but there is only a single daily gauge representing the upper three quarters of the catchment. This creates a substantial level of uncertainty for model calibration to such a degree that no meaningful conclusions can be drawn from the model results as to their accuracy at representing the rainfall-runoff process for the catchment.

To address this shortcoming in data availability, an effort was made to source additional rainfall records from a network of 12 landholders across the upper catchment area. However, only a single dataset was obtained, which is near the BOM gauge, as shown in Figure 2-9.

Temporal rainfall (pluviograph) data is available from the BOM Griffith Airport gauge and the network of Wunderground gauges.

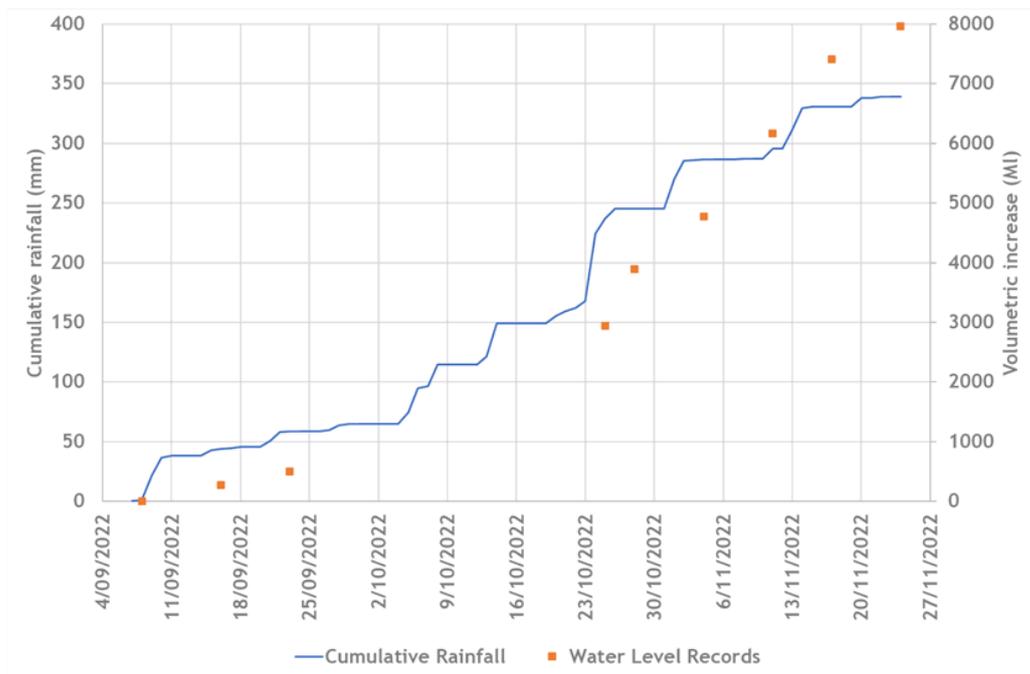
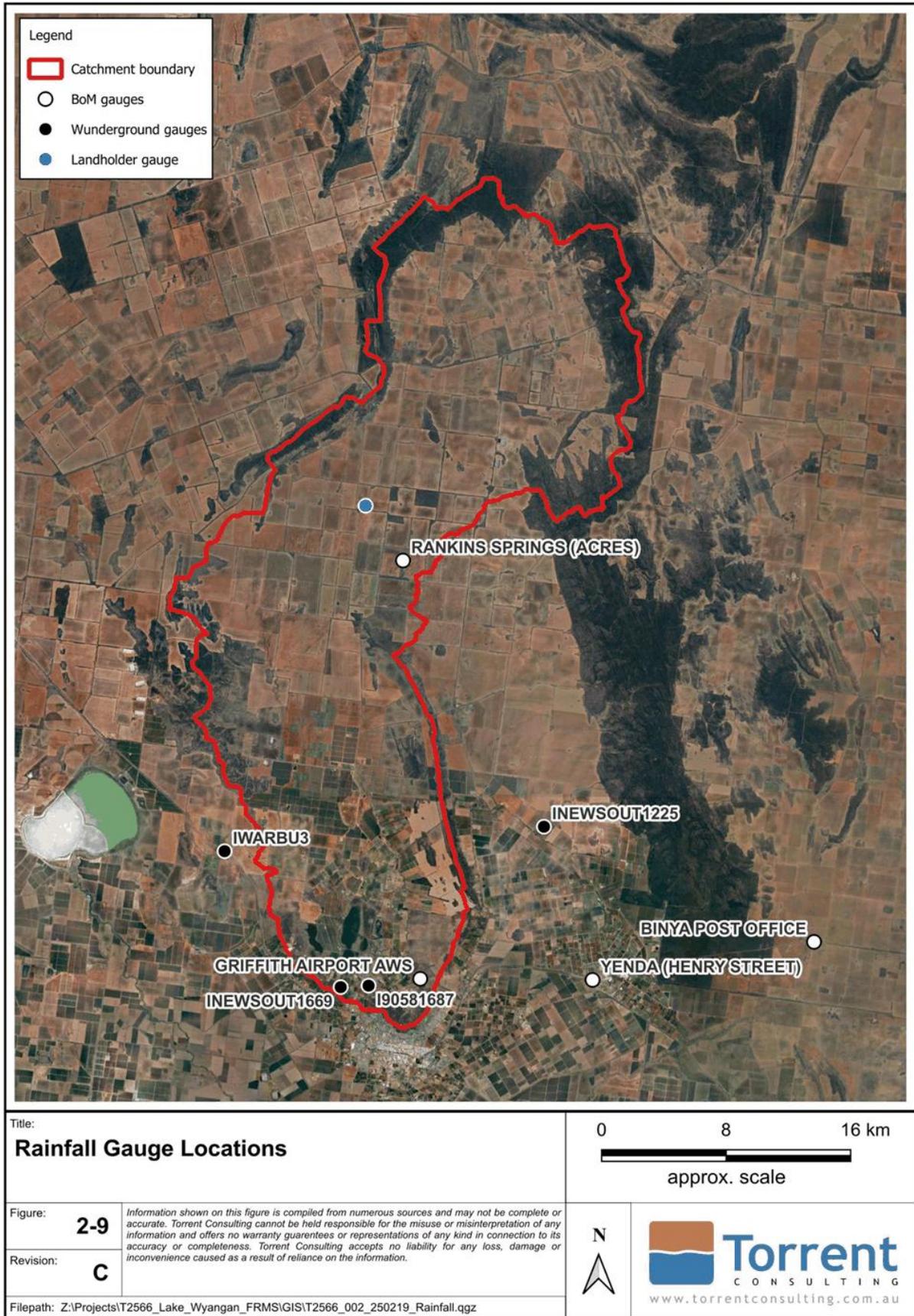


Figure 2-8 Cumulative Rainfall and Storage Volume Increase for Oct-Nov 2022 Flood Event

### 2.2.4 Soil Type and Moisture Data

At the time the modelling for the existing studies was undertaken, the whole-of-catchment direct rainfall simulation that was adopted was cutting-edge for such a large catchment. The method is necessary to represent the catchment hydrology given the dominance of runoff routing, transitional losses and complex flow paths.



There have been significant improvements in the capability of TUFLOW to represent catchment hydrological processes since the existing studies were completed. This includes the ability to better represent the physical soil characteristics of the catchment to derive infiltration losses and runoff volumes. Torrent Consulting has undertaken a research project developing a rainfall-runoff modelling method using this capability, which was presented in a technical paper at the Hydrology and Water Resources Symposium 2023.

The hydrological model structure also enables the impact of agricultural irrigation development to be readily assessed, through appropriate changes to local soil moisture conditions, which can even be varied seasonally, if required. This ability is not readily translatable to a lumped hydrological sub-catchment model or an initial and continuing loss model.

As well as the soil moisture data from the BOM AWO service discussed in Section 2.2.2, the TUFLOW hydrological simulation requires data indicating soil texture and depth across the catchment. An estimation of the soil texture can be derived from a NSW Government gridded dataset for the sand, silt and clay content at varying depths through the soil profile. A representative soil texture map for the catchment at soil depths of 0.1-0.3 m is shown in Figure 2-10.

A CSIRO gridded dataset is available estimating the spatial distribution of total soil (solum) depth. This indicates typical solum depths of 0.3-0.5 m throughout the range country of the upper catchment, around a 1.0 m solum depth through the mid-catchment area, and 1.8 m throughout much of the lower catchment.

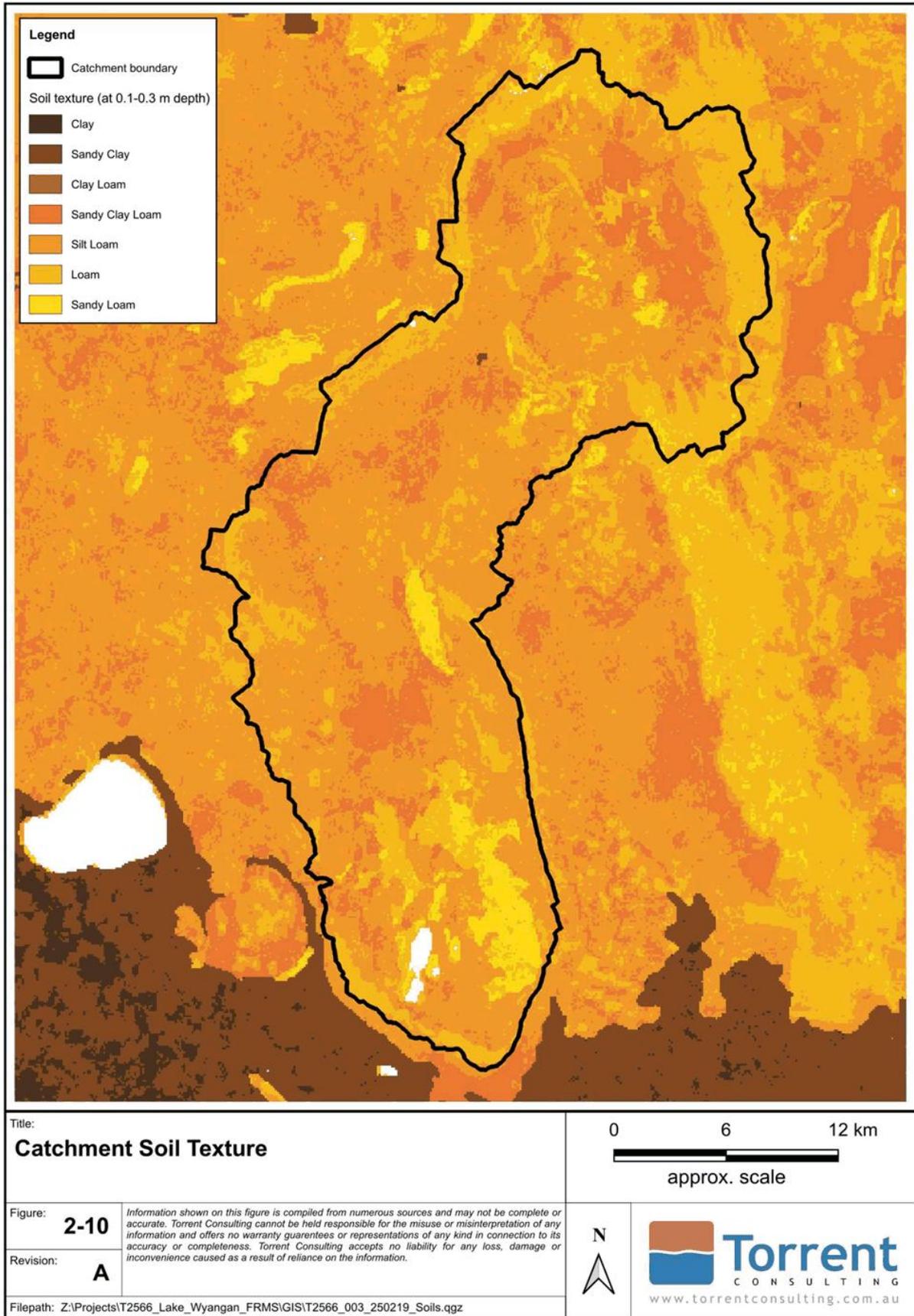
### 2.2.5 Topographic and Land Use Data

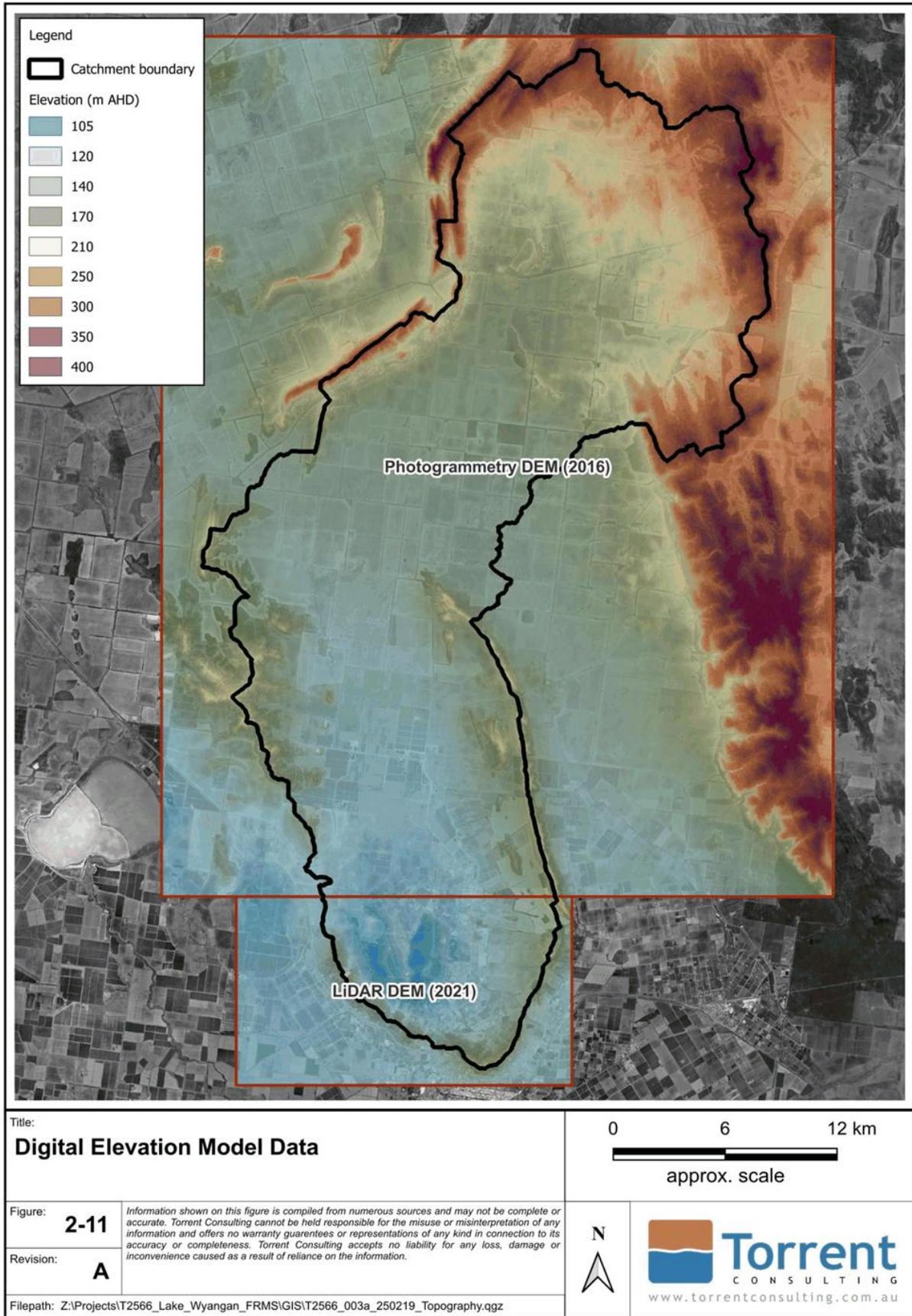
There are two key topographic survey datasets integral to the TUFLOW model development. The highest quality dataset providing full coverage of the catchment is the statewide 5 m grid resolution photogrammetric Digital Elevation Model (DEM), which is dated 2016 and was captured as part of the ADS40 aerial imagery survey. The southern 11% of the catchment area (south from approximately Nericon) is covered by a higher quality LiDAR DEM. It is dated 2021 and is available at a 1 m grid resolution. The DEM topography is presented in Figure 2-11, along with the extent of the corresponding source DEM.

Both the LiDAR and photogrammetric survey data are suitable for hydrological and rural flood modelling applications. Whilst the specified vertical accuracy of LiDAR is +/- 0.3 m and the photogrammetry is +/- 0.9 m, the typical apparent accuracies when using these datasets and comparing them to ground-based survey data are much better – more in the order of +/- 0.1 m and +/- 0.3 m, respectively.

These two aerial survey DEMs were filtered using a multi-directional lee method, which removes speckled noise inherent in aerially acquired survey whilst retaining hard edges of linear features such as channels and embankments.

MI provided a very high-quality photogrammetry derived DEM for use in the Griffith Main Drain J and Mirrool Creek Flood Study and have been contacted to obtain any terrain datasets that they might have in their possession for use in this study. MI has indicated a willingness to provide any such data, and it is understood that available data has been compiled and is pending approval to be issued.





### 2.2.6 Satellite Imagery

The use of satellite imagery proved invaluable in both the undertaking of the existing Lake Wyangan studies and the Mirrool Creek studies. For the September 2016 and November 2022 flood events there is Sentinel 2 satellite imagery available. The imagery is a higher resolution than the Landsat data used for the previous studies, being of around a 10 m grid rather than 30 m grid. It also has a higher frequency of repeat visits to each location, being around five days, rather than the 16 days of Landsat. This provides a high-quality data source from which to assess the surface water runoff condition from the catchment and the TUFLOW model in reflecting the observed runoff.

Sample Sentinel 2 images from the September 2016 and November 2022 flood events are shown in Figure 2-12 and Figure 2-13, respectively. The figures show false colour composites, projecting the Sentinel 2 spectral bands 11 (short wave infra-red), 5 and 8A (upper and lower limits of the vegetation red edge range) as red, green and blue, respectively. Surface water shows up as a dark inky blue colour, with faded areas of this colour identifying land that has recently experienced surface water flows. In each case, the selected images represent the maximum extent of flooding that was identified in the available satellite imagery.

The satellite images provide an excellent snapshot of the hydrological conditions across the catchment at the times for which they are available. As well as being an important source for model calibration of surface water flow paths, they are also a good indicator for when significant rainfall has not generated catchment runoff. Limitations in the use of satellite imagery for model calibration purposes include the intermittent capture dates, which may not represent the peak flood conditions experienced. This is further impacted by cloud cover, which reduces the period at which suitable images are available.

### 2.2.7 Data Gaps and Recommendations

The principal data gap is the lack of available rainfall data. The model calibration events typically exhibit a pronounced variance in rainfall recorded between the eastern and western sides of the catchment, which is likely the influence of both the MacPherson and Cocoparra Ranges. These significant topographic features are aligned north-south, with an effectively infinite expanse of flat land to the west and undulating topography of the western slopes of the Great Dividing Range to the east.

The interpolation of gridded rainfall data from BOM only has the single gauge at Boorga to inform what is precipitating within the catchment. The sensitivity of catchment runoff to threshold levels of soil moisture means that the soil parameters are a key factor in the hydrological modelling being able to reliably represent the expected catchment response to rainstorm events. With the current substantial uncertainty regarding observed rainfall records across the catchment, it is not possible to inform the modelled soil parameters with any meaningful certainty.

An effort was made to obtain additional rainfall data from landholders across the upper catchment area, although minimal additional data was ultimately available. However, through undertaking the model calibration process, it is apparent that the generation of surface water runoff (in both the real world and the modelling) is a complex function of both antecedent soil moisture conditions and rainfall intensity. Intense rainfall can produce surface water runoff which may then infiltrate into the soil later within its transition through the catchment.





Wetter preceding soil moisture conditions and the occurrence of subsequent rainfall events following the initiation of runoff both increase the probability of overland flood flow paths being maintained and reaching the lower catchment areas.

This highly complex catchment hydrological modelling cannot be calibrated without both a rich temporal and spatial availability of rainfall and soil moisture data. Lake level records at a daily or sub-daily (rather than the current weekly) interval would also be beneficial if improved model input data become available. However, none of these datasets are expected to exist in the near-term future. Whilst the modelling of local flood flow paths can be undertaken with a reasonable degree of certainty using standard design flood simulation approaches, the assessment of design flood levels in Lake Wyangan (and Tharbogang Swamp) require a higher level, first principles analysis.

## 3 Community Consultation

### 3.1 Consultation Plan

A consultation plan to engage with the community at various stages throughout the project duration is an important component of the study. The key elements of the community consultation plan were meeting with landowners affected by recent flood events of 2016 and 2022 and the formal public exhibition of the Draft Flood Study, which provides opportunity for review and submissions.

In addition to the broader community engagement, study progress at regular intervals is reported to the technical working group, including representatives from Griffith City Council and NSW DCCEEW.

A summary of the consultation elements undertaken since the study inception is provided below.

### 3.2 Community Consultation

Community consultation was undertaken through a meeting with local landholders from the Kubank Estate area that were affected by the 2016 and 2022 flood events, held on site on 9 August 2024. They were able to provide detailed information regarding the movement and extent of flood waters in the area, together with photographs and video footage.

The key issue raised by the landholders was that they perceive the expansion of almond farming north of Kubank Estate to have had an impact on surface water runoff through their land. The almond farming practices include significant channel diversion works and increased surface water runoff.

Another issue highlighted was that the levee created by the deposition of the excavated channel material along the western bank of Lake View Drain prevents the main overland flood flow path arriving from the north from entering the drain. This pushes more water through Kubank Estate and into Tharbogang Swamp. The landholders would like to see this water allowed to flow more freely into Lake View Drain.

Potential mitigation measures were also suggested by the landholders, including augmenting an existing drainage alignment that crosses Kubank Road on the bend around 3.9 km east of the Kidman Way. The potential for cutting a drainage channel through the catchment divide and divert water to Barren Box Storage and Wetland was also mentioned.

Contact was also made with landholders located further up the catchment, between Dickie Road and Rankins Springs. This was principally to acquire additional rainfall records, as the coverage of official gauges across that area is limited to a single daily-read gauge at Boorga. Unfortunately, only one additional set of rainfall data was able to be acquired, and this was close to the existing BOM gauge.

### 3.3 Site Inspection

A site reconnaissance of the study area and local catchment was undertaken in association with the Project Inception meeting. Whilst the Torrent Consulting team are highly familiar with the catchment, the site inspection provided the opportunity for a contemporary view of the study area and an appreciation of recent catchment modification or other local features influencing flooding behaviour. This included the expanded irrigated agriculture areas (e.g. around Dickie Road) and residential development areas.

Some of the key observations accounted for during the site inspection included:

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- Topographic features and hydraulic controls (e.g. current condition of embankments, hydraulic structures, culverts, bridges, drains, etc).
- Floodplain and waterway characteristics (vegetation growth and types, channel roughness, etc).
- Confirmation of structure locations, type and configuration.
- Extent of new development and changes to large scale farming practices.

### 3.4 Public Exhibition

*To be completed following Public Exhibition*

## 4 Model Development

### 4.1 Modelling Approach

The nature of catchment flood hydrology is better suited to the adoption of hydraulic simulation than traditional lumped catchment hydrological modelling, for reasons including:

- The lack of a natural watercourse within the catchment, with runoff conveyed in a series of braided overland flood flow paths
- The shallow catchment gradient and shallow depth of flood flow paths results in a significant attenuation of the flood wave propagation
- The sandy soils and long lag time for upper catchment runoff to reach the lower catchment result in transitional infiltration losses.

The advantages of using TUFLOW as a hydrological modelling tool were identified during the original Lake Wyangan Flood Study (BMT WBM, 2012) and this method has been retained for this current study update. There have been significant improvements in the capability of TUFLOW to represent catchment hydrological processes since the previous studies were completed. This includes the ability to better represent the physical soil characteristics of the catchment to derive infiltration losses and runoff volumes.

The adopted hydrological modelling uses a method developed by Torrent Consulting, which was presented in a technical paper at the Hydrology and Water Resources Symposium 2023. This represents the soil profile as three separate layers at depths of 0.0-0.1 m, 0.1-0.3 m and >0.3 m. The total soil depth is derived from a CSIRO gridded dataset and soil texture properties from a NSW Government gridded dataset.

The Green-Ampt infiltration routine is used in TUFLOW, with soil water holding capacity attributes taken from the MEDLI guidelines and soil moisture data for both event-specific (calibration) and long-term probabilistic (design) conditions from the BOM AWO. The hydrological model structure also enables the potential for the impact of agricultural irrigation development to be quantified, through appropriate changes to local soil moisture and runoff conditions.

Three TUFLOW models were developed to simulate flood behaviour within the study catchment:

- A hydrological model to simulate rainfall-runoff contributing to flooding in the terminal storages of Lake Wyangan and Tharbogang Swamp. This includes the main overland flow path within the catchment, which impacts the Kubank Estate. The details for key hydraulic controls were also represented in the model, as they impact the flood hydrology. The model development is discussed in further detail in Section 4.2.
- A hydrological model to simulate rainfall-runoff of the local catchment areas in the south-eastern area of the catchment, which have a much shorter critical duration than the broader catchment. The model development is discussed in further detail in Section 4.2.4.
- A detailed hydraulic model to simulate the main overland flood flow paths within the south-eastern area of the catchment, where most of the existing and future urban development is located. Details of local drainage channels and hydraulic structures were represented, with inflows being sourced from the local catchment hydrological model. The model development is discussed in further detail in Section 4.4.

## 4.2 Lake Wyangan / Tharbogang Swamp Catchment Model

The Lake Wyangan / Tharbogang Swamp TUFLOW model is principally a hydrological model, developed to simulate the rainfall-runoff process of the study catchment. However, it also includes details of some key hydraulic controls that impact the flood hydrology, such as Lake View Drain and cross-drainage structures under the Lake View Branch Canal. The model is also suitable for the mapping of the main catchment flood flow path, which impacts the Kubank Estate and flows into Tharbogang Swamp. The model is also used for the derivation of design flood levels in Lake Wyangan and Tharbogang Swamp that result from a single event-driven flood response.

### 4.2.1 Model Extent and Topography

The Lake Wyangan / Tharbogang Swamp TUFLOW model covers around 890 km<sup>2</sup> of potentially contributing catchment area. This includes some 120 km<sup>2</sup> of residual catchment area located between the Lake Wyangan / Tharbogang Swamp and Myall Park catchments, as shown in Figure 4-1. The residual catchment area is flat and drains to some small terminal ephemeral wetlands. It is included in the model to ensure that any potential cross-catchment flows are represented.

When discussing the flood hydrology, it is useful to refer to the sub-catchments identified in Figure 4-1. The North Lake Wyangan and South Lake Wyangan catchments drain to the respective halves of the Lake Wyangan waterbody. There are also two smaller terminal catchments located between these that drain to Nericon Swamp and Campbell's Swamp. The remainder (majority) of the catchment naturally drains to Tharbogang Swamp. However, part of the catchment is diverted through the Wyangan / Tharbogang catchment divide into North Lake Wyangan. The main overland flow path for runoff from the Upper and Central catchment areas is bisected by the Lake View Branch Canal, with siphon structures to facilitate cross-drainage.

Once having crossed the Lake View Branch Canal, the main overland flow path then naturally drains to Tharbogang Swamp. However, the construction of Lake View Drain (for return flows associated with irrigation offtakes from the Lake View Branch Canal) can divert a portion of overland flow across the catchment divide and into Lake Wyangan. Further, the recent expansion in irrigation agriculture in the Dickie Road area has further modified the natural drainage and will now direct additional surface flows east to the Lake View Drain.

The model is constructed using a 200 m horizontal grid cell resolution, with the Quadtree functionality of TUFLOW employed to provide a finer resolution of 25 m within the area bounded by the Lake View Branch Canal, as shown in Figure 4-1.

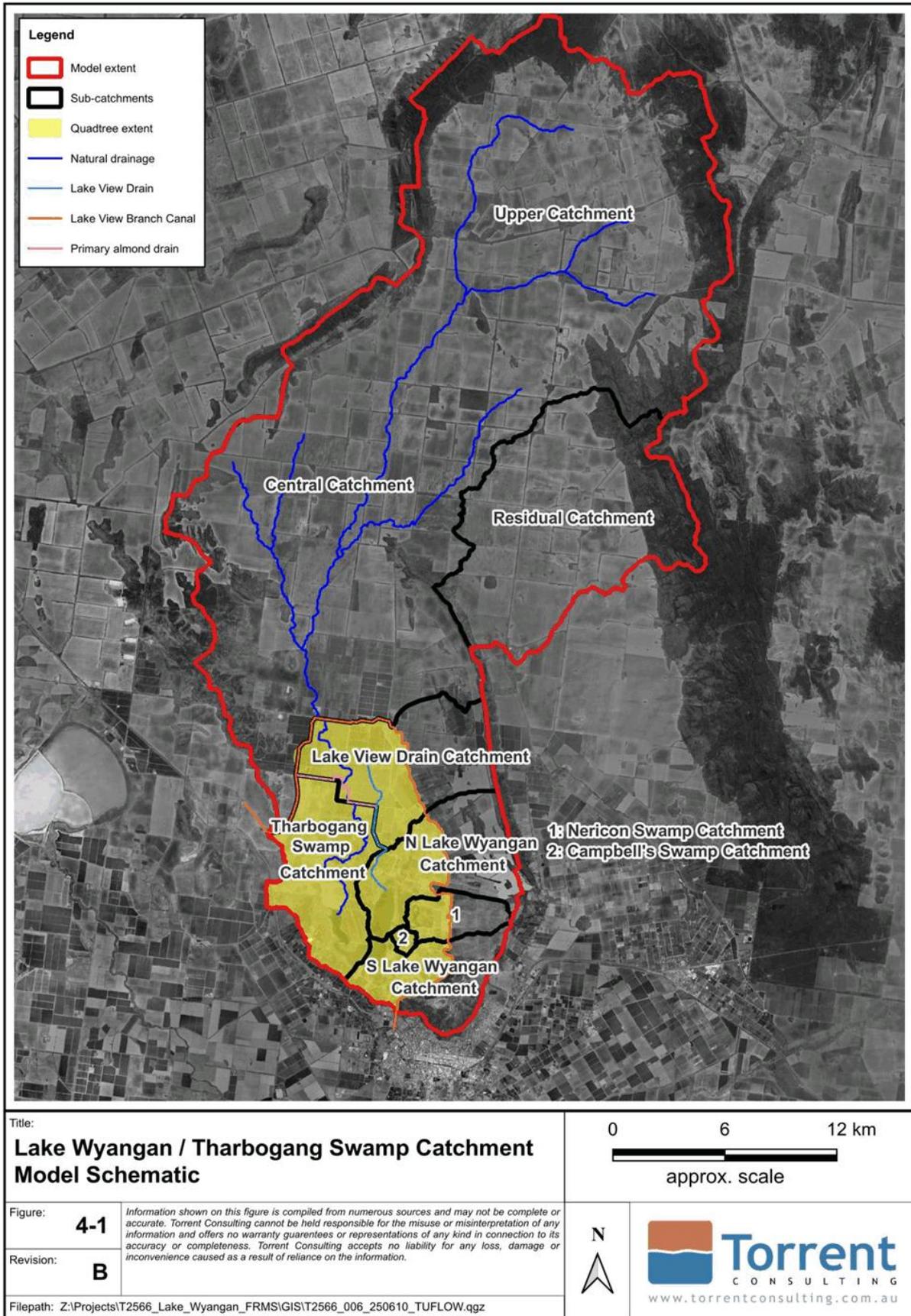
The model utilises the statewide photogrammetric survey dataset, for which the coverage is largely dated 2016-17. The dataset is a gridded Digital Elevation Model (DEM) with a 5 m horizontal cell resolution. Whilst not as accurate as LiDAR survey, it provides a good quality dataset for hydrological purposes.

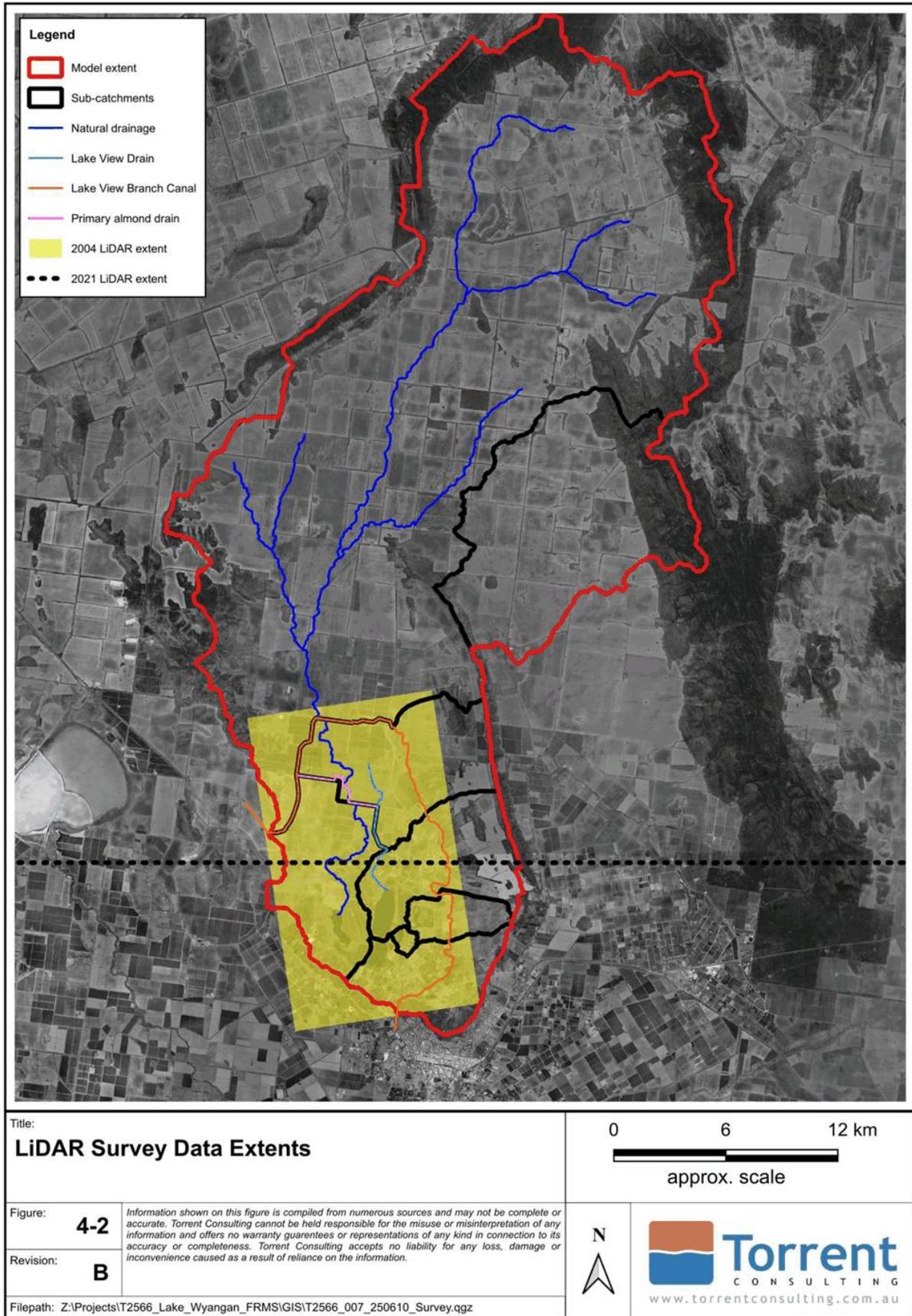
There is an NSW Spatial Services 2021 LiDAR survey dataset for Griffith accessible through the ELVIS Foundation Spatial Data portal. It is available as a 1 m horizontal resolution DEM and extends south from the 6216000 northing (GDA 2020 MGA Zone 55), as shown in Figure 4-2. Spatial layers from Figure 4-1 are retained in Figure 4-2 for context.

There is also a 2004 LiDAR survey dataset available as a 5 m horizontal resolution DEM from the TUFLOW model developed for the 2012 Lake Wyangan Flood Study. However, it is apparent that the quality of filtering is not comparable to the modern LiDAR datasets and so the photogrammetric

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data is preferred. Nevertheless, it is useful in providing a representative ground surface prior to the extensive agricultural expansion in the Dickie Road area, which predates the photogrammetry.

The sub-grid sampling (SGS) routine in TUFLOW has been implemented to utilise the full detail of the underlying DEM data within the coarser model grid cell geometry.

Design and work as executed (WAE) survey drawings for recent (2021) surfacing works and upgrades to Boorga Road, Dickie Road and Jones Road were provided by Council, the details of which have been incorporated within the TUFLOW model, including crest levels, table drains, and cross-drainage.

#### 4.2.2 Drainage Infrastructure

The principal drainage infrastructure asset in the Lake Wyangan / Tharbogang Swamp catchment is the Lake View Drain, the purpose of which is to take returned irrigation water from the Dickie Road area and drain it into North Lake Wyangan. Because of the functional importance of Lake View Drain to the catchment flood hydrology, it has been implemented as a 1D representation in the TUFLOW model, dynamically linked to the 2D domain. This ensures that any cross-catchment flow transfer is represented as accurately as possible. The primary drainage channel servicing the extensive almond growing area south of Dickie Road was also provided a 1D representation, as it diverts overland flows from the natural drainage alignment into Lake View Drain.

Details of cross-drainage structures were brought across from the TUFLOW model developed for the original Lake Wyangan Flood Study and were incorporated into the model developed for this study update. Most of these structures provide local catchment cross-drainage under the Lake View Branch Canal. Where possible, the details of these structures were verified through site inspection and additional structures were added, where required. The location of the modelled cross-drainage structures used in the Lake Wyangan / Tharbogang Swamp model is shown in Figure 4-3.

For the Lake Wyangan / Tharbogang Swamp model, minor cross-drainage structures and drainage channels throughout the area surrounding Lake Wyangan have not been incorporated as they are far too numerous, unnecessarily complicated and of little benefit to warrant a detailed representation. Sub-grid-sampling of the underlying 1 m LiDAR survey dataset provides a suitable representation for capturing the drainage alignments to ensure runoff is conveyed to the downstream storages.

#### 4.2.3 Hydraulic Roughness

When simulating the catchment-wide rainfall-runoff process in TUFLOW as a hydrological model, the adopted hydraulic roughness values play a key role in accurately modelling the catchment response. One of the key outcomes of the research undertaken for the Hydrology and Water Resources Symposium paper was that the application of the Log Law depth varying bed resistance produced a much-improved calibration to observed data than standard fixed values. This method applies a very high roughness at shallow depths, which then reduces to standard roughness values once the depths are more representative of major flow paths rather than sheet flow.

The catchment was split into areas of cleared and forested land, with Manning's 'n' values of 0.06 and 0.12 adopted, respectively. Water bodies and urban areas were also identified, with 'n' values of 0.02 and 0.05 being adopted.



#### 4.2.4 Rainfall Losses

Rainfall losses were modelled using the Green-Ampt infiltration method, with a three-layer soil model comprising a 0.1 m deep topsoil, 0.2 m transition zone and a variable depth subsoil layer. The depth of the subsoil layer was derived from the September 2019 CSIRO gridded soil depth mapping dataset.

Soil types for each layer were derived from the September 2022 NSW DPE gridded soil properties mapping dataset, with classification based on the clay, silt, and sand content. The available water holding capacity for each soil type was based on the MEDLI guidelines. Initial Soil Moisture (ISM) was calculated from data sourced from the Australian Water Outlook website published by BOM. The standard Green-Ampt parameters for suction and hydraulic conductivity were adopted.

Impervious areas were applied to the different land uses, with cleared/maintained and vegetated areas nominated at 100% pervious, water bodies at 100% impervious and urban areas at 40% impervious, with the Green-Ampt losses interpolated accordingly.

The Green-Ampt method effectively implements a continuous loss rate that diminishes as the soil begins to wet, approaching the specified saturated hydraulic conductivity. This better represents natural systems, with a loss decay curve rather than absolute values for initial and continuing loss rates. Whilst in heavy clay catchment the transition between the apparent initial and continuing loss can be reasonably approximated through the application of simple initial and continuing loss values, this transition occurs over a much longer period in sandy soils.

The BOM AWO data is representative of natural catchment systems, with drier conditions that persist across the irrigated agricultural and urban areas of the catchment. Therefore, initial soil moisture conditions were set to field capacity within these areas, to better represent the expected antecedent conditions.

Areas of irrigated agriculture used for almond farming were also assigned an impervious surface coverage of 60%. This is representative of the highly compacted surface between rows of trees, which is required for the efficient harvesting of almond crops. Urban areas were nominated at 40% impervious within the model, with the Green-Ampt losses reduced accordingly.

The soil infiltration occurs dynamically during the TUFLOW model simulation rather than directly to the input rainfall and therefore represents transitional losses.

### 4.3 Local Catchment Hydrological Model

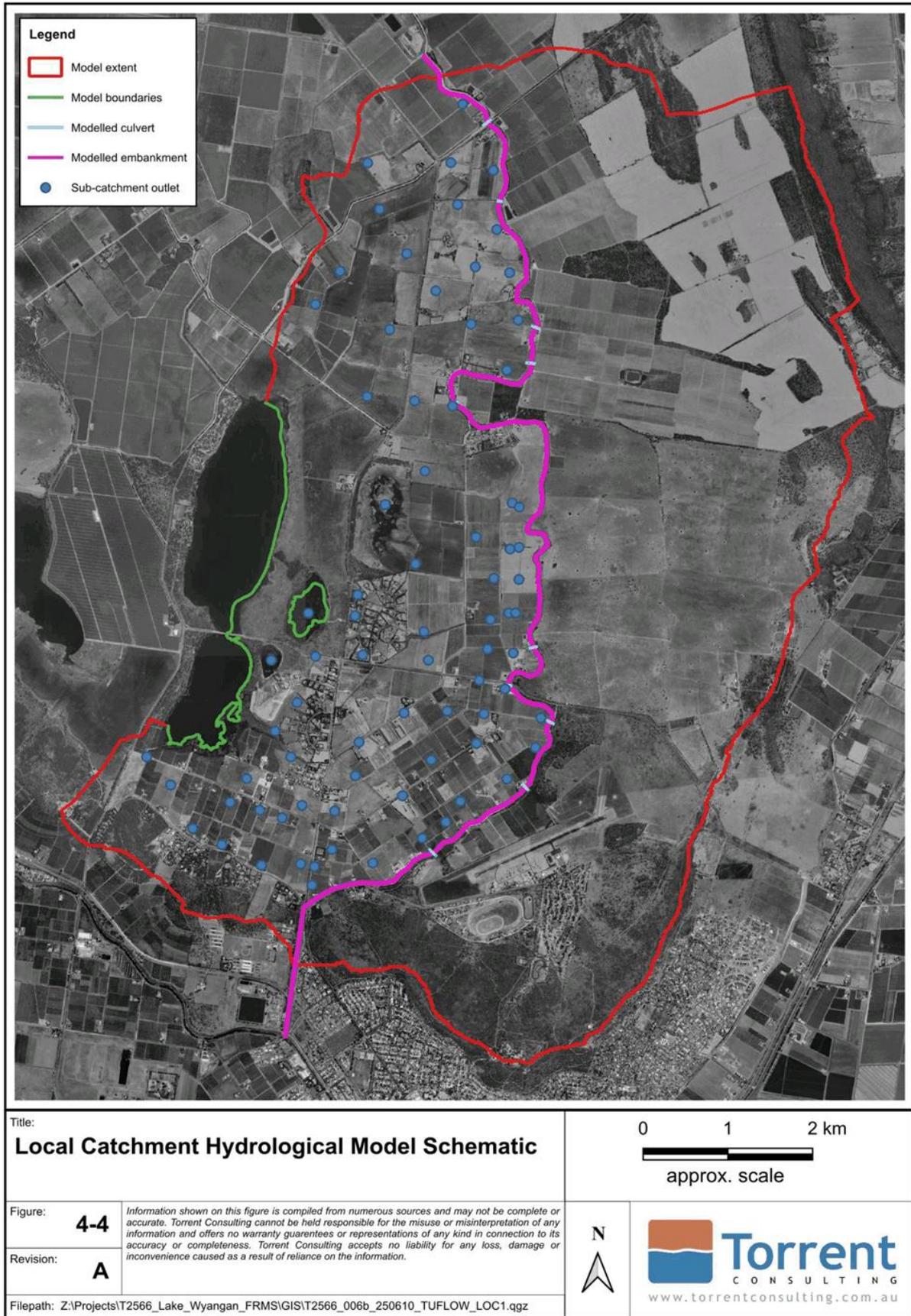
#### 4.3.1 Model Extent and Topography

The local catchment TUFLOW hydrological model covers an area of around 70 km<sup>2</sup> and includes the North and South Lake Wyangan catchments, and the Nericon Swamp and Campbell's Swamp catchments, as presented in Figure Figure 4-4. The local catchment hydrological model extends from the ridgeline of the McPherson Range to the south and east, and to the natural divide of the Lake Wyangan and Tharbogang Swamp catchments to the north and west.

The local model utilises the photogrammetric survey and the NSW Spatial Services 2021 LiDAR survey datasets used in the Lake Wyangan / Tharbogang Swamp model. The LiDAR data was pre-processed using GIS-based terrain analysis techniques to remove sinks within the grid and create a hydrologically corrected DEM. This prevents the initial loss of catchment rainfall to artificial storages.

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This was not undertaken for the Lake Wyangan / Tharbogang Swamp model, as natural depressions are a key characteristic of the catchment flood hydrology.

The Lake View Branch Canal formation is a major hydraulic obstruction to runoff draining the hillslopes to the east of Lake Wyangan and Nericon. Therefore, the Lake View Branch Canal embankments were enforced, and cross-drainage structures were included in the local hydrological model. This also ensures that the sink removal treatment of the DEM does not result in an overestimation of the discharge across Lake View Branch Canal when extracting flows for input to the hydraulic model.

To the west of Lake View Branch Canal, a series of interconnected drainage channels convey floodwater through the residential and semi-rural areas, downstream to the terminal lake and wetland storages.

The model was constructed using a 10 m horizontal grid cell resolution, with the sub-grid sampling (SGS) routine in TUFLOW implemented to utilise the full detail of the underlying DEM data within the model grid cell geometry.

#### 4.3.2 Drainage Infrastructure

As for the Lake Wyangan / Tharbogang Swamp model, cross drainage structures under the Lake View Branch Canal were represented within the hydrological model as 1D elements dynamically linked to the 2D domain, as shown in Figure 4-3 and Figure 4-4.

#### 4.3.3 Hydraulic Roughness

The hydraulic roughness parameters adopted for the local catchment model are consistent with the Lake Wyangan / Tharbogang Swamp model, as described in Section 4.2.3.

#### 4.3.4 Rainfall Losses

The soil infiltration and impervious surface coverages adopted for the local catchment model are consistent with the Lake Wyangan / Tharbogang Swamp model, as described in Section 4.2.4.

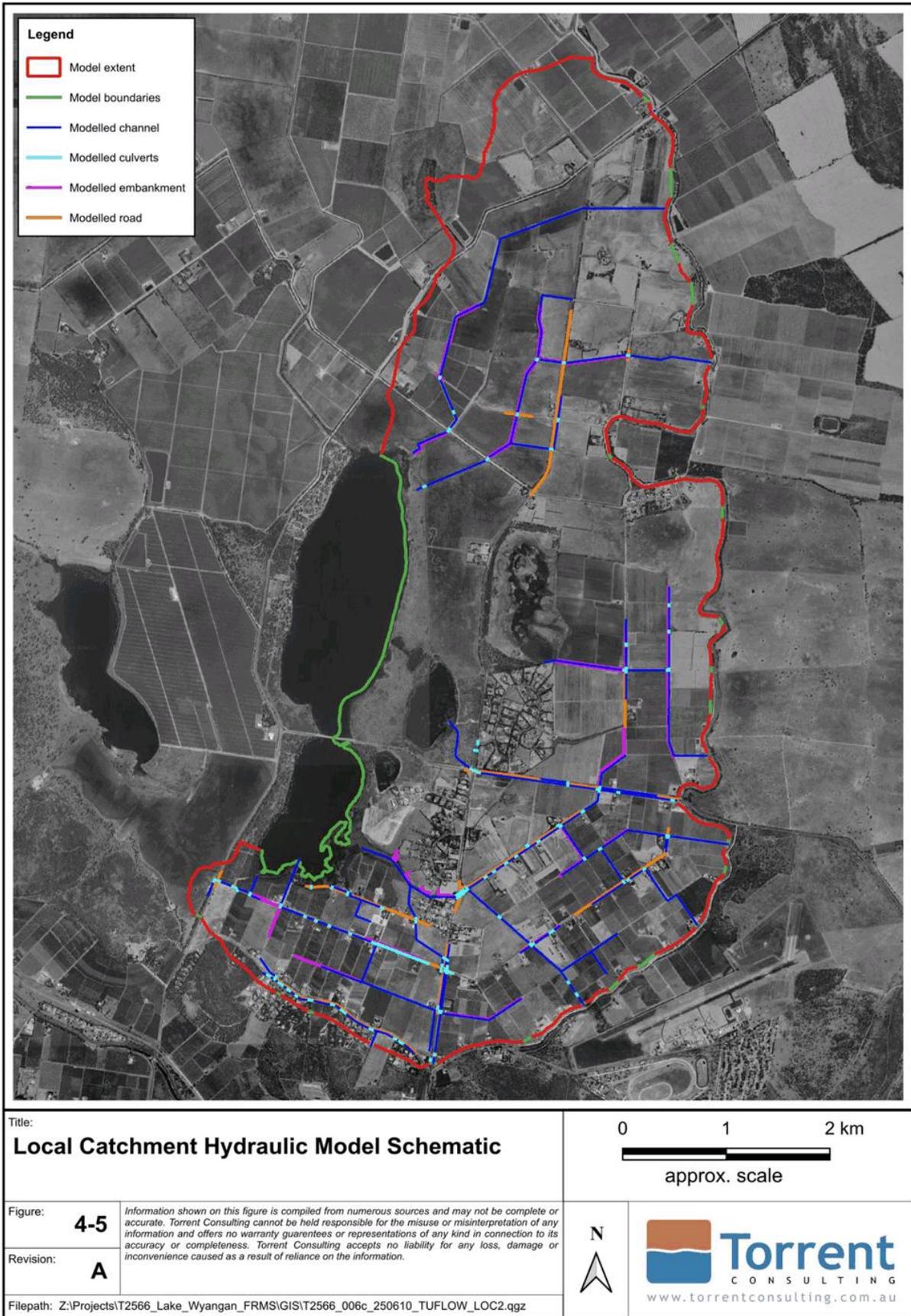
#### 4.3.5 Hydrograph Extraction

The flows simulated by the rainfall-runoff process of the TUFLOW hydrological model were extracted at major drainage alignments downstream of Lake View Branch Canal and Mallinsons Road, with 57 sub-catchment locations identified for input to the hydraulic model, as shown in Figure 4-4. The hydrological model was configured to enable extraction of local sub-catchment flows independently of the combined total flows, as is typically undertaken in traditional lumped catchment hydrological models.

### 4.4 Local Catchment Hydraulic Model

#### 4.4.1 Model Extent and Topography

The TUFLOW hydraulic model covers an area of some 28 km<sup>2</sup>, including the residential and semi-rural localities bordered by Lake Wyangan, Lake View Branch Canal, and Mallinsons Road, as presented in Figure 4-5.



The model was constructed using a 4 m horizontal grid cell resolution, with the sub-grid sampling (SGS) routine in TUFLOW implemented to utilise the full detail of the underlying DEM data within the model grid cell geometry.

The local field drainage network was enforced using a Z Shape representation, providing flow continuity along the drain alignments. Road crests and other raised embankment features were also enforced using a similar methodology. The alignment of these drains and embankments is shown in Figure 4-5.

A drainage design has been developed by Griffith City Council to support the expected increase in catchment runoff associated with future residential subdivision within Lake Wyangan. The details of this drainage design for which works are imminently due to be undertaken were incorporated into the TUFLOW hydraulic model for the simulation of the design flood conditions. Additional drainage upgrade works to support future population growth are assessed in the FRMS.

#### 4.4.2 Drainage Infrastructure

As discussed in Section 4.4.1, existing linear drainage channels and future upgrade works are represented in the 2D model domain, through modification of the model geometry. There are numerous cross-drainage structures located along the local drainage network, where the alignment crosses road corridors and driveway accesses, as shown in Figure 4-5. These were represented as 1D elements dynamically linked to the 2D domain. The limited data was used for these structures where available, however, the sizes of most were confirmed through site inspection and reasonable assumptions as to typical pipe sizes, with invert levels being estimated from the LiDAR data.

##### 4.4.2.1 Structure Blockage

Australian Rainfall and Runoff Guidebook Version 4.2 (ARR) recommends applying blockage to hydraulic structures and outlines a methodology to determine inlet blockage factors through consideration of debris availability, debris mobility, debris transportability and waterway opening of the structure.

The ARR guideline provides an assessment procedure for estimation of the design blockage condition. The guideline considers the characteristics of the debris source area to assess the potential for debris blockage at the structure.

This process determined a low debris potential, with an L10 width of 1.5 m being adopted. The structure blockage percentage applied in the modelled blockage scenario, based on the width of clear structure openings, is shown in Table 4-1. These values were adopted for the simulation of design flood event conditions.

**Table 4-1 Modelled Hydraulic Structure Blockage**

Inlet Width	Adopted L <sub>10</sub>	Blockage
$W < L_{10}$	$W < 1.5 \text{ m}$	25%
$L_{10} < W < 3 * L_{10}$	$1.5 \text{ m} < W < 4.5 \text{ m}$	0%
$W > 3 * L_{10}$	$W > 4.5 \text{ m}$	0%

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#### 4.4.3 Hydraulic Roughness

In the TUFLOW hydraulic model, the hydraulic roughness was consistent with that adopted for the hydrological model, with an additional roughness value represented along the drainage channel network. A value of 0.035 was adopted, which is a typical value for engineered channels with no in-channel obstructions and minor vegetative growth.

## 5 Model Calibration and Validation

Model calibration is limited to the Lake Wyangan / Tharbogang Swamp catchment model, as there is insufficient data available for calibration of the local catchment models. However, there is some limited data to enable validation of the local catchment models for the March 1985 event.

### 5.1 Selection of Calibration and Validation Events

The original Lake Wyangan Flood Study considered the March 1985, March 1989 and December 2007 events for model calibration. The March 2012 event occurred shortly after completion of the study and so it was investigated as part of the Lake Wyangan Floodplain Risk Management Study. Since the previous studies there have been additional events in Sep-Oct 2016 and Oct-Nov 2022, the latter of which produced the highest recorded flood level in Lake Wyangan. These events have all been considered in the context of this current study update.

The model calibration process for the original Lake Wyangan Flood Study found modelling the catchment flood hydrology to be extremely challenging, for reasons including:

- A general paucity of data including both rainfall and water level records
- The substantial apparent soil losses exhibited by previous flood events
- The sensitivity of modelled runoff volume to small changes in effective rainfall
- Cross-catchment flow transfer via the Lake View Drain.

It was hoped that in undertaking this study update, advances in hydrological modelling capability and data for the recent record event in Oct-Nov 2022 would serve to enable an improvement in model calibration and reduce the associated uncertainty in simulating catchment runoff. Unfortunately, this was not possible, as the paucity of data and substantial uncertainty in the spatial and temporal distribution of rainfall is still insufficient to calibrate the complex hydrological processes. Nevertheless, the model calibration process does provide some insights into further understanding of this terminal lake system and the inherent uncertainties, which are discussed in this section.

The March 2012 flood is the largest single rainstorm event recorded in the region. It has been used to validate the hydrological modelling of the event-driven rainfall runoff process, as detailed in Section 5.2. The Oct-Nov 2022 event has the largest observed response in Lake Wyangan flood level and is also the only event for which accurate flood level records are available. Information regarding flood levels reached within the lake storages for events prior to this is limited to estimates from satellite imagery, where available.

As discussed in Section 2.2.2, the Oct-Nov 2022 event is a series of rainstorms that combine with wet antecedent soil moisture conditions to generate the observed runoff volume, although the principal initiation of flooding relates to a ~90 mm rainstorm on 24-25 October. Representation of this event is beyond the capabilities of rainfall-runoff model simulation and so quantitative investigation of the event is limited to a water balance analysis, as detailed in Section 5.3.

The March 1985 event is a highly localised and intense rainstorm over the south-east hillslopes draining to Lake Wyangan. It is useful for model validation of local catchment rainfall-runoff conditions, as detailed in Section 5.4.

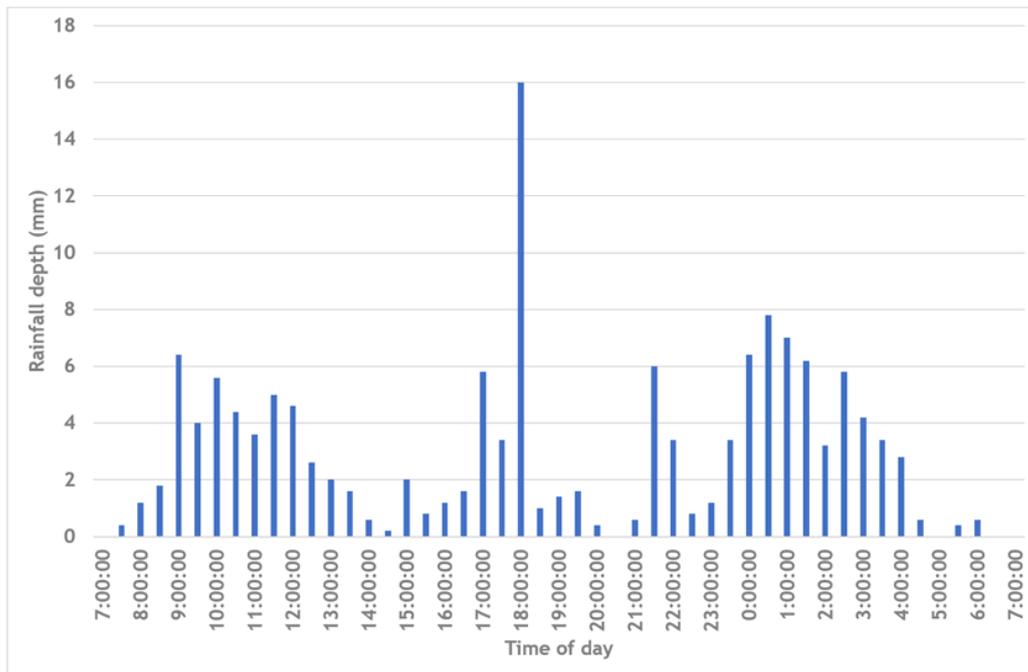
Sentinel 2 satellite imagery from both the Sep-Oct 2016 and Oct-Nov 2022 events is also used for visual validation purposes for the modelled overland flow paths, as detailed in Section 5.5.

### 5.2 March 2012 Event

The March 2012 event is the largest to impact the broader region in recent recorded history. The half-hourly rainfall record from Griffith Airport indicates a 24-hour duration event, which began on the morning of 3 March and during which 143 mm was recorded, as shown in Figure 5-1. This exceeds a 1-in-200 AEP event when compared to the BOM IFD data.

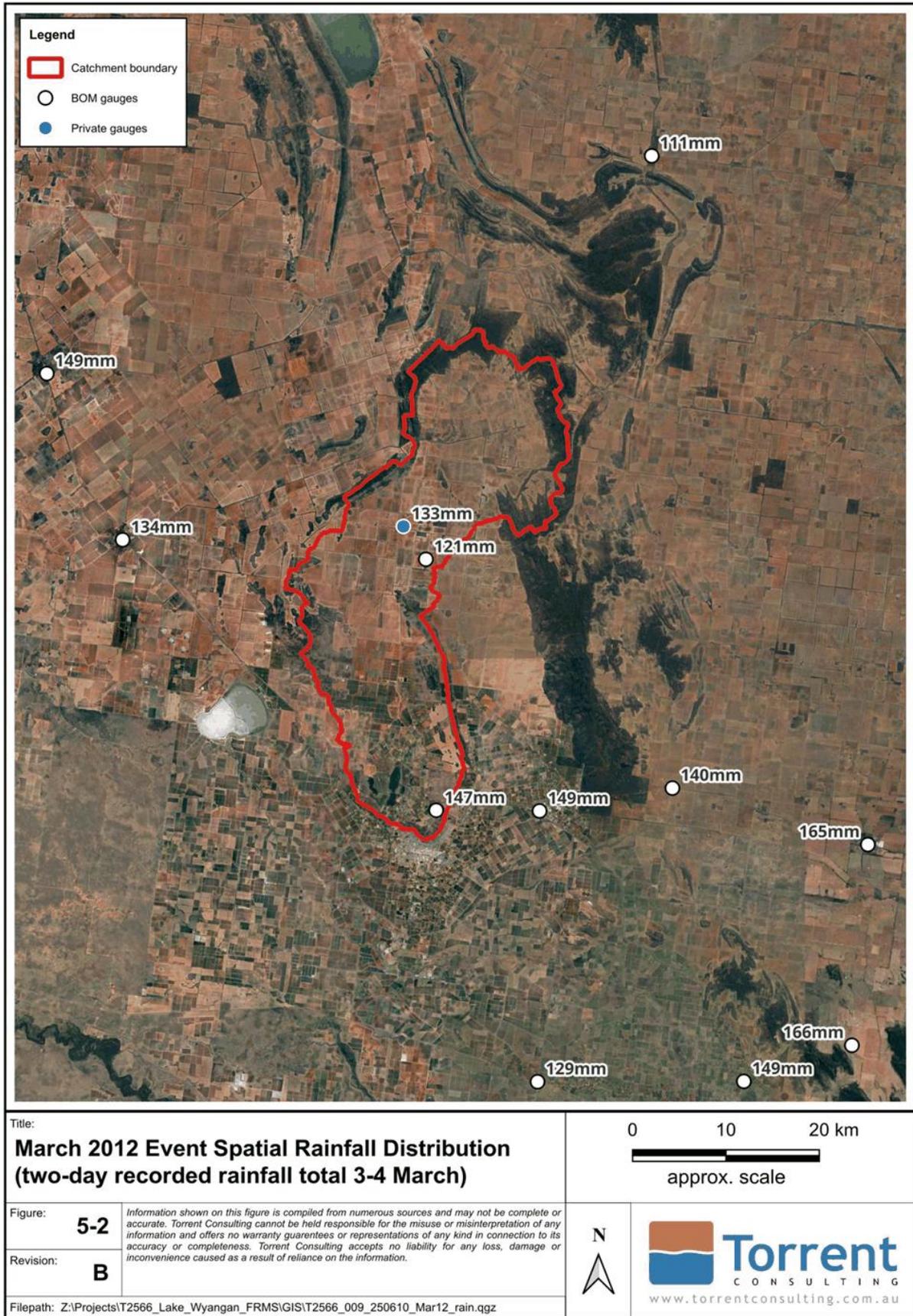
The Griffith Airport record represents the only available temporal data, with other data being limited to daily read gauges. The combined daily records for 3 March and 4 March from BOM gauges provide a good estimate as to the variability in spatial rainfall for the event. One additional set of private rainfall records has also been sourced from the central catchment area, as shown in Figure 5-2.

The rainfall totals in Figure 5-2 are a few millimetres higher than the event total, as there is a small amount of rainfall recorded outside of the 24-hour period of the main storm event. The paucity of data from the broader Rankins Springs area is evident, with only a single gauge located at Naradhan (which has subsequently closed). There is uncertainty regarding the total rainfall depth over the upper catchment, but it is expected to be between around 110 mm to 120 mm. The central to lower catchment area likely received a total rainfall of between around 130 mm to 145 mm.



**Figure 5-1 Griffith Airport Rainfall Hyetograph for March 2012 Event**

Gridded soil moisture estimates from the AWRA-L model (accessible through the BOM AWO site) prior to the March 2012 event vary between 41% in the lower catchment up to 62 % in the upper catchment.



There is no lake level record available for the March 2012 event to accurately derive the observed catchment runoff volume. It also predates the detailed Sentinel 2 satellite imagery and so the resultant peak flood levels in the lake storages have been estimated using a Landsat 7 satellite image from 12 March 2012. The best estimate of peak flood levels is around 106.8 m AHD in Lake Wyangan and 105.6 m AHD in Tharbogang Swamp. To estimate the lake storage levels prior to the event, the Landsat 7 image from 25 February 2012 has been used. The best estimate of initial water levels is around 104.5 m AHD in north Lake Wyangan and 105.5 m AHD in south Lake Wyangan, with Tharbogang Swamp being effectively empty. This represents an estimated runoff volume of around 7900 ML reaching the combined terminal lake storages.

When using the TUFLOW model to simulate the best estimate of rainfall and initial soil moisture conditions across the catchment, the resultant volume of runoff reaching the combined terminal lake storages is around 14,000 ML, which is an overestimation of almost 80%

The potential reasons for the overestimation of observed catchment runoff volumes for the March 2012 event include:

- The inherent uncertainty in the spatial and temporal rainfall record in representing the true conditions that occurred across the catchment.
- The initial soil moisture values are also a product of modelling and are subject to their own associated uncertainties.
- The adopted soil loss model relies on spatial datasets that also have inherent uncertainty.
- The relationship between antecedent catchment conditions, effective rainfall (the depth of rainfall resulting in runoff) and runoff volume in the catchment is also complex and the hydrological model may be limited in its capability to accurately reproduce the natural catchment systems.
- The significant uncertainty in estimating initial and resultant water levels in each of the lake storages.
- Evaporative losses from the lake storages and overland flow paths are not represented in the modelling.

To assess the sensitivity of the TUFLOW hydrological model to the uncertainties in rainfall and soil conditions, a range of simulations was undertaken varying parameters for:

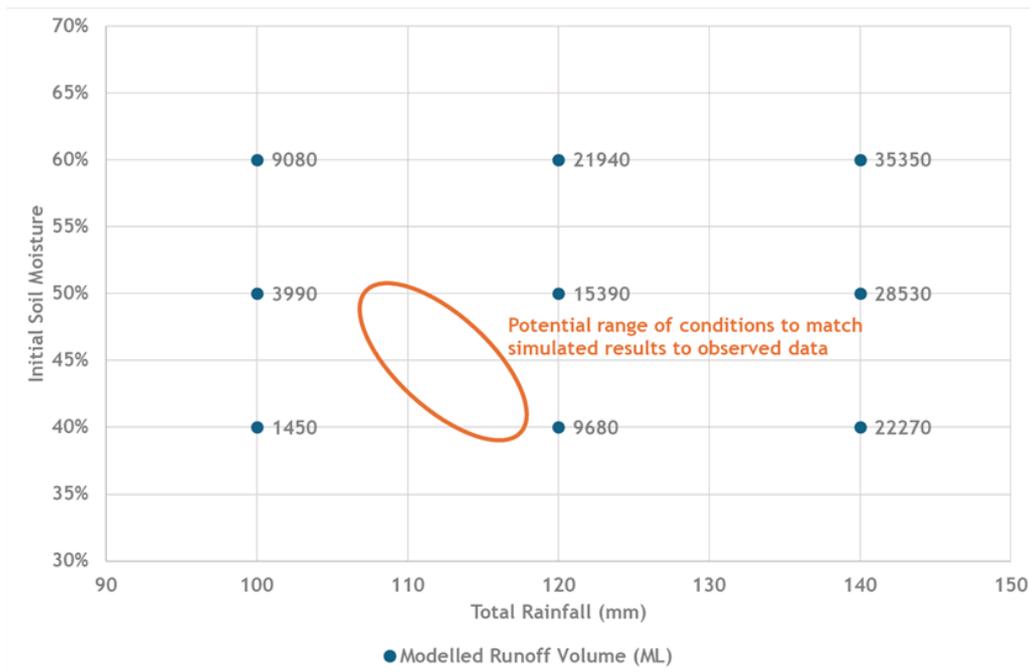
- The total catchment average rainfall depth during the event (adopting values of 100 mm, 120 mm and 140 mm)
- The initial soil moisture conditions (adopting values of 40%, 50% and 60%)
- The soil infiltration rates (adopting the default Green-Ampt values for saturated hydraulic conductivity (refer Table 5-1) and by raising and lowering these values by 33%)

The results of the model sensitivity testing are presented in Figure 5-3 for the combinations of modelled rainfall and initial soil moisture conditions. This identifies that combinations ranging between a 110 mm to 120 mm rainfall depth and initial soil moisture conditions ranging between 40% to 50% will produce simulated results that are comparable to the observed event conditions. This suggests that potentially the AWRA-L soil moisture estimation is too high, the catchment average rainfall was lower than is apparent from the few gauge records and/or the hydrological model tends to overestimate rainfall-runoff reaching the terminal lake storages.

The model also exhibited a large sensitivity to the adopted soil infiltration rates, albeit to a slightly lesser degree than that exhibited by the range of rainfall and soil moisture parameters that were tested.

**Table 5-1 Default Saturated Hydraulic Conductivity Values for Green-Ampt in TUFLOW**

Soil Texture	Saturated Hydraulic Conductivity ( $K_{sat}$ ) (mm/h)
Clay	0.3
Silty Clay	0.5
Sandy Clay	0.6
Clay Loam	1.0
Silty Clay Loam	1.0
Sandy Clay Loam	1.5
Silt Loam	3.4
Loam	7.6
Sandy Loam	10.9
Loamy Sand	29.9
Sand	117.8



**Figure 5-3 March 2012 Event Rainfall and Initial Soil Moisture Sensitivity Testing**

### 5.3 October-November 2022 Event

As for the September-October 2016 event, the flood event of October-November 2022 was more so a function of a prolonged period of wet weather rather than being driven by a single intense storm event, such as occurred in March 1985 and March 2012. On initial review of the long-term rainfall and soil moisture data that was presented in Figure 2-3 and Figure 2-4, it would appear that the 2016 event is much more significant than 2022, with a much longer sustained period of wet catchment conditions. However, although local runoff and flood inundation was experienced in the 2016 event, there is no evidence of a significant volume of water entering Lake Wyangan or Tharbogang Swamp.

In reviewing the available rainfall data in more detail, there is a potential explanation for why the 2022 event produced a much greater volume of catchment runoff volume when compared to the 2016 event. Once the catchment soils are initially wetted in May 2016, almost 450 mm of rainfall is recorded in the catchment over a period of around five months from June through October. During this period there are ten rainstorms of around 20 mm or more, totalling some 325 mm. Most of these events are no larger than 30 mm, with only two exceeding 50 mm, and one more over 40 mm. The two largest events are the first in the period, when the soil moisture level has not reached its highest levels.

In the 2022 event the catchment soils are initially wetted in September, followed by a 6–7-week period during which around 270 mm rainfall is recorded in the catchment. During this period there are six rainstorms of around 20 mm or more, totalling some 235 mm. Whilst these totals are lower than the prolonged wet period in 2016, they occur over only a third of the timeframe, as such, the average weekly rainfall in the 2022 wet period is almost twice that of 2016, being around 42 mm compared to 22 mm.

Further to this, there is a single event around 24 October in which 90 mm is recorded at Griffith Airport in an 18-hour period, although closer to 50 mm is recorded within the central catchment area. The Griffith record represents around a 2% AEP when compared to the BOM IFD data. Only one week later another event exceeding 50 mm is recorded in the central catchment area, albeit closer to 30 mm at Griffith that time. Another lesser rainfall event then follows around two weeks later.

It is expected that the significant rainfall event of 24 October generated a large volume of catchment runoff that was then further supplemented by the following rain events over the next three weeks. Photographic and video evidence received from the community is dated 25 October 2022, which supports the 24 October being the most significant in terms of flood-producing rainfall. The recorded water level in Lake Wyangan begins to rise significantly following this date and continues to rise steadily for a further month, peaking at 108.4 m AHD on 24 November, prior to water being pumped out and transferred to Tharbogang Swamp.

Attempts were made to simulate the catchment rainfall-runoff response, but the uncertainties and sensitivities associated with simulation of the March 2012 event are increased by an order of magnitude for 2022, with it being a quasi-continuous simulation rather than a single event. The soil loss model is principally for event-based rather than long-term simulation and so the individual rainfall events during the 6-7-week period need to be modelled individually, with different initial soil moisture, initial lake levels and rainfall inputs for each successive event. The anticipated method was to simulate the few largest events and compare the results to the observed data. However, the simulations failed to generate the volume of runoff that was recorded without unreasonably increasing the rainfall and/or soil moisture inputs.

Ultimately, the process of simulating the 2022 flood event didn't provide any opportunity to calibrate soil loss parameters, which was the principal intelligence to be gained from the calibration exercise. Therefore, a simple water balance spreadsheet model was created to provide some insight into the catchment flood hydrology. Daily rainfall records were obtained for the two catchment BOM gauges and the four local Wunderground gauges shown in Figure 2-9, plus the private gauge shown in Figure 5-2. Daily modelled soil moisture conditions from AWRA-L were sourced for three point locations in the lower, central and upper catchment areas, plus open water evaporation for the lower catchment.

The balance of net rainfall and evaporation for the north Lake Wyangan, south Lake Wyangan and Tharbogang Swamp waterbodies was calculated using their approximate surface area, which doesn't vary much with depth. The local catchment area contributing to each waterbody was then used to calculate a volumetric runoff based on the recorded rainfall data. The soil moisture multiplied by a coefficient of runoff was used to calculate the volume of effective rainfall. For the upper catchment area, a lower limit of soil moisture content had to be set below which runoff does not contribute to the lakes, with the effective rainfall and contributing runoff volume being calculated using the difference between the soil moisture and the threshold value.

The runoff coefficients were calibrated to match the recorded levels in the waterbodies, which were converted to volumes using a stage-storage relationship. Figure 5-4 shows the results of the water balance assessment, plotting the total recorded storage volume within Lake Wyangan. The calculated volumetric inputs from local catchment sources are shown and were calibrated to match the initial lake level observations in September. The additional volumetric input required to match the observed peak was used to calibrate the input from the central and upper catchment areas. The results for Tharbogang Swamp are provided in Figure 5-5.

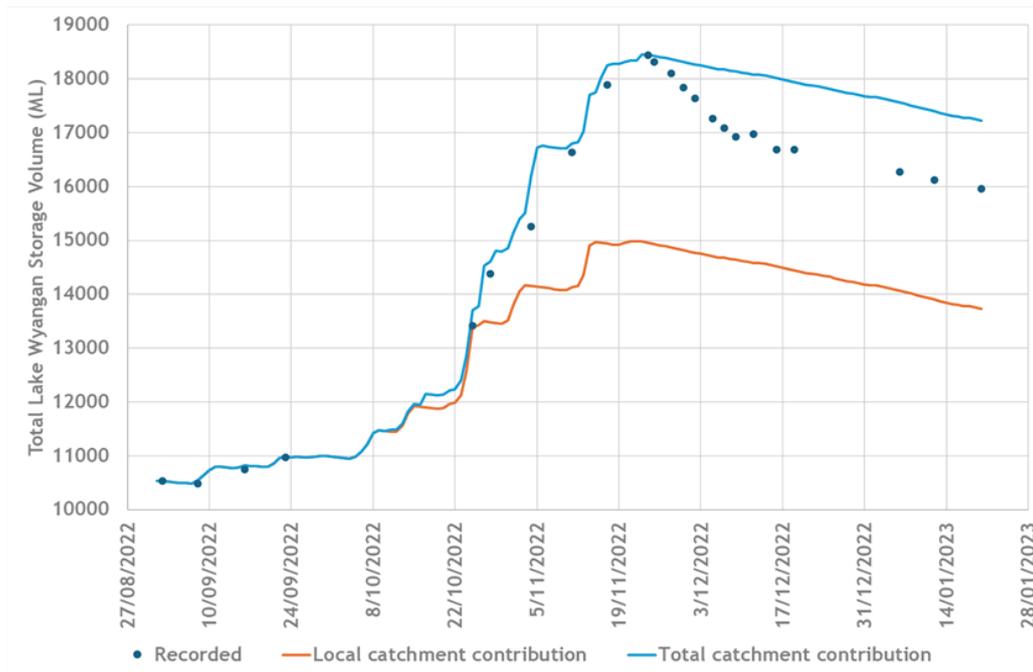
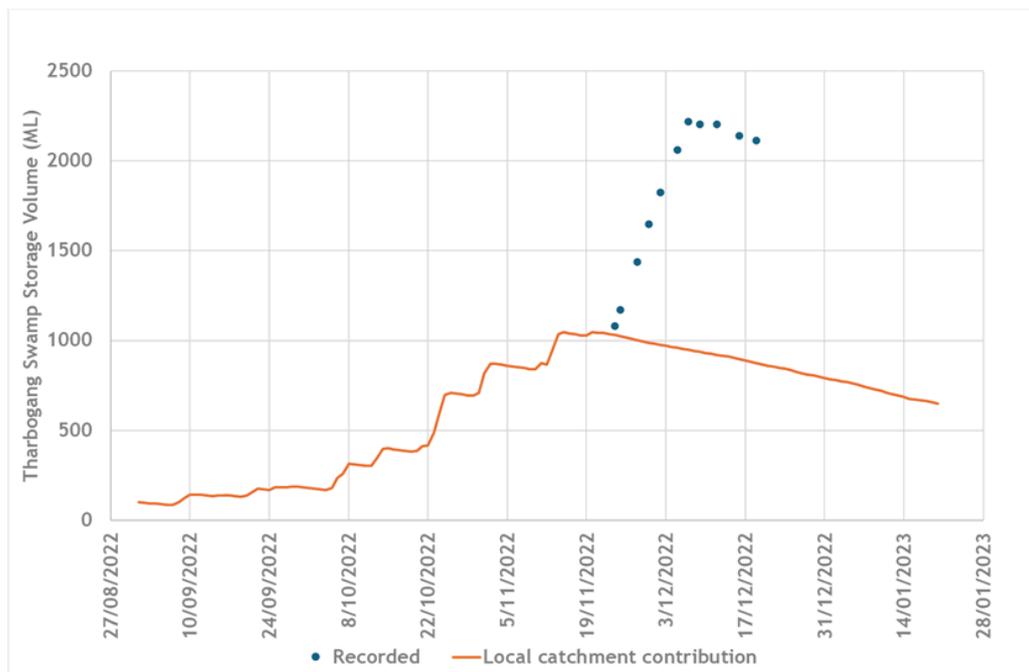


Figure 5-4 Mass Balance Calculations for Lake Wyangan 2022 Event

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**Figure 5-5 Mass Balance Calculations for Tharbogang Swamp 2022 Event**

As for the TUFLOW hydrological modelling, there are inherent data uncertainties associated with the mass balance assessment and assumptions made as to contributing catchments and the conversion of rainfall to effective rainfall. However, it does enable some meaningful observations to be made:

- It is likely that most of the water entering Lake Wyangan and Tharbogang Swamp came from local catchment sources rather than the central and upper catchment areas.
- The 24 October rainfall event triggered the inflow of central and upper catchment runoff into the lower catchment area.
- Almost all the central and upper catchment inputs entered Lake Wyangan via Lake View Drain, with there being limited potential for significant contributions to Tharbogang Swamp given the recorded water levels in that waterbody.
- There is an additional loss of around 85 ML/d from Lake Wyangan between 24 November and 9 December, which closely matches the corresponding volumetric increase in the Tharbogang Swamp storage. This is a function of the emergency pump transfer that was undertaken from Lake Wyangan to Tharbogang Swamp.
- The gradients of volumetric loss associated with evaporation match the observed data at the end of the event, once the rainfall and pumping have ceased.
- There is estimated 4500 ML of runoff volume from the local catchments reporting to Lake Wyangan, which equates to an effective rainfall depth of 31 mm. From the approximately 315 mm of rainfall recorded during the period, this represents a runoff coefficient of around 10%.
- The estimated 3400 ML of additional runoff volume from the central and upper catchment areas equates to an effective rainfall depth of only 5 mm and a runoff coefficient of only 1.5%.

Whilst the central and upper catchment runoff contribution to Lake Wyangan has been calibrated to match the recorded peak level, the timing of the inputs is a direct result of the catchment rainfall (with an allowance for a few days lag time being made). However, the inflow is expected to have occurred at a much steadier rate, with catchment runoff ponding upstream of the Lake View Branch Canal at Dickie Road and the cross-drainage transfer being limited by the capacity of the siphon structures. The capacity of Lake View Drain itself will also have been a limiting factor, with photographic evidence (refer Figure 2-6) indicating that it was at full capacity on 25 October near Kubank Road. The assessment indicates that over a period of 30 days, an average of around 115 ML/d was transferred to Lake Wyangan through Lake View Drain. At its peak this flow transfer was in the order of 315 ML/d.

#### 5.4 March 1985 Event

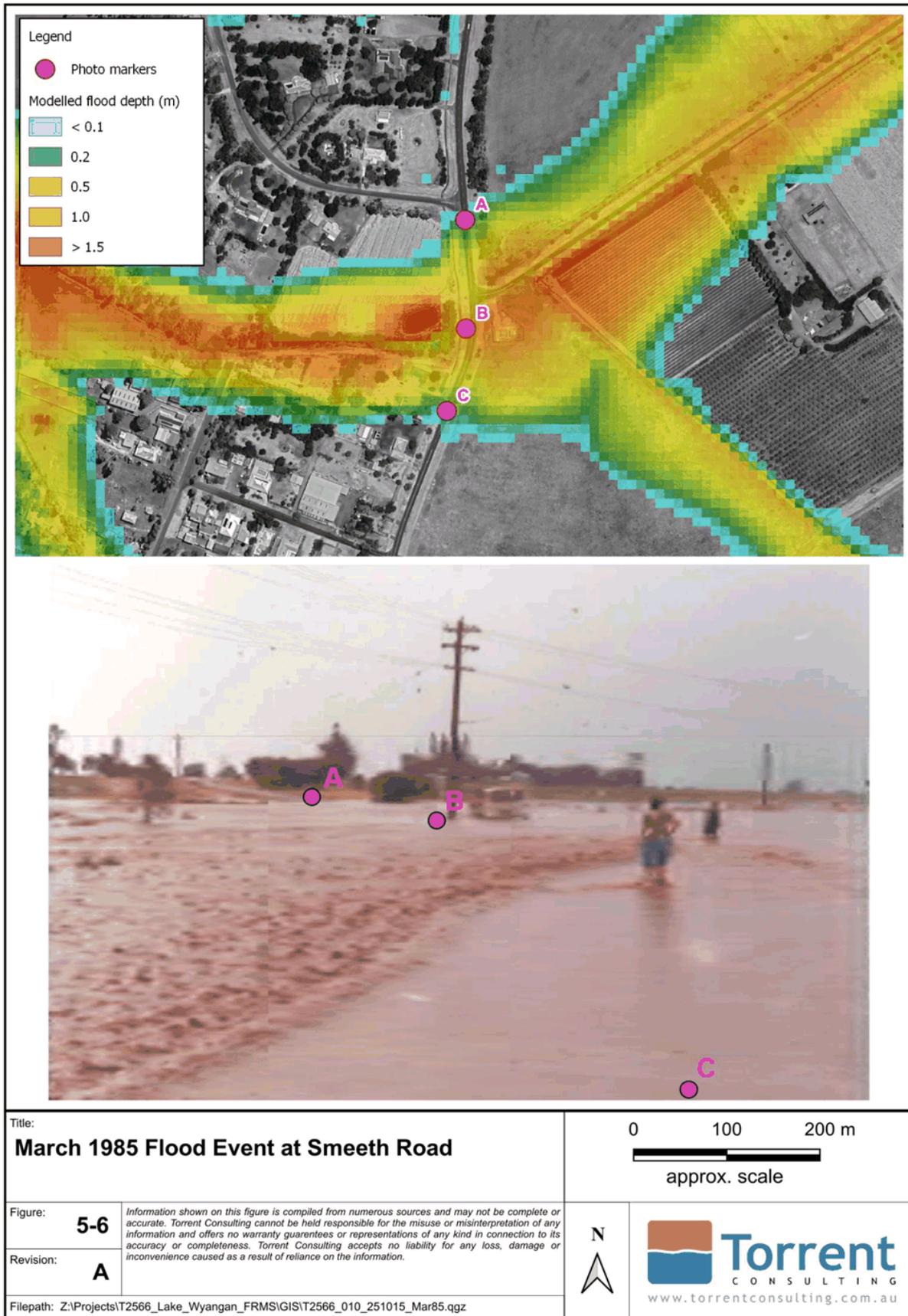
The March 1985 event is truly exceptional. A daily rainfall total of 150 mm was recorded at Griffith Airport, with only 45 mm recorded at Hanwood and 29 mm at Yenda. To the north and west, all rainfall gauges recorded zero for the day. It would be easy to dismiss this record as an error were it not for the photographic evidence (as presented within the original Lake Wyangan Flood Study), which shows a 200 m wide overland flood flow path from Smeeth Road flowing over Boorga Road at the intersection.

With no temporal rainfall record available, the original Flood Study modelled it occurring over a three-hour period and found the results to be consistent with the photographic record. This has been undertaken using the model developed for this current study review and again produced consistent results, despite using a different soil loss method, as shown in Figure 5-6. This is to be expected given the very high percentage of effective rainfall inevitably resulting from the rainfall intensity.

Given how locally concentrated the March 1985 rainstorm was, it is almost certain that it occurred over a much shorter duration than three hours, with a one-hour or two-hour duration seeming more likely. This is supported by anecdotal evidence published in editions of The Area News at the time. In the 20 March issue of the newspaper, the 45 mm record at Hanwood is noted as being between 11:00 and 14:00 on 19 March. There is also reference to the much greater depth recorded at the airport and that is mostly fell within an hour. The reference to the airport rainfall in the 21 March issue is that it fell in less than two hours.

The 1% AEP rainfall depths from the BOM IFD data are 48 mm, 60 mm and 67 mm for a one-hour, two-hour and three-hour duration, respectively. Extrapolating the IFD data (available up to the 1-in-2000 AEP) estimates the AEP of the recorded 150 mm depth at 1-in-1,000,000 for a 90-minute storm duration. The rainfall intensity local to the airport is therefore a real-world example of an Extreme Flood or Probable Maximum Flood (PMF) event.

When simulated over a shorter period than three hours, the modelled peak flood depths are greater than those shown in Figure 5-6. However, the photograph may not be representative of the peak condition reached during the event and it is also likely that less than 150 mm fell across some of the local catchment area draining to Smeeth Road. Nevertheless, the model validation process demonstrates reasonable consistency between the modelled and observed flood behaviour from local catchment runoff during very intense rainfall.



## 5.5 Satellite Imagery Observations

The remote-sensed imagery from the Landsat and Sentinel satellites represents the most comprehensive available model validation datasets, with only the lake level records for the Oct-Nov 2022 event and localised drone-captured images of flooding on 4 October 2016 and 25 October 2022 providing improved detail.

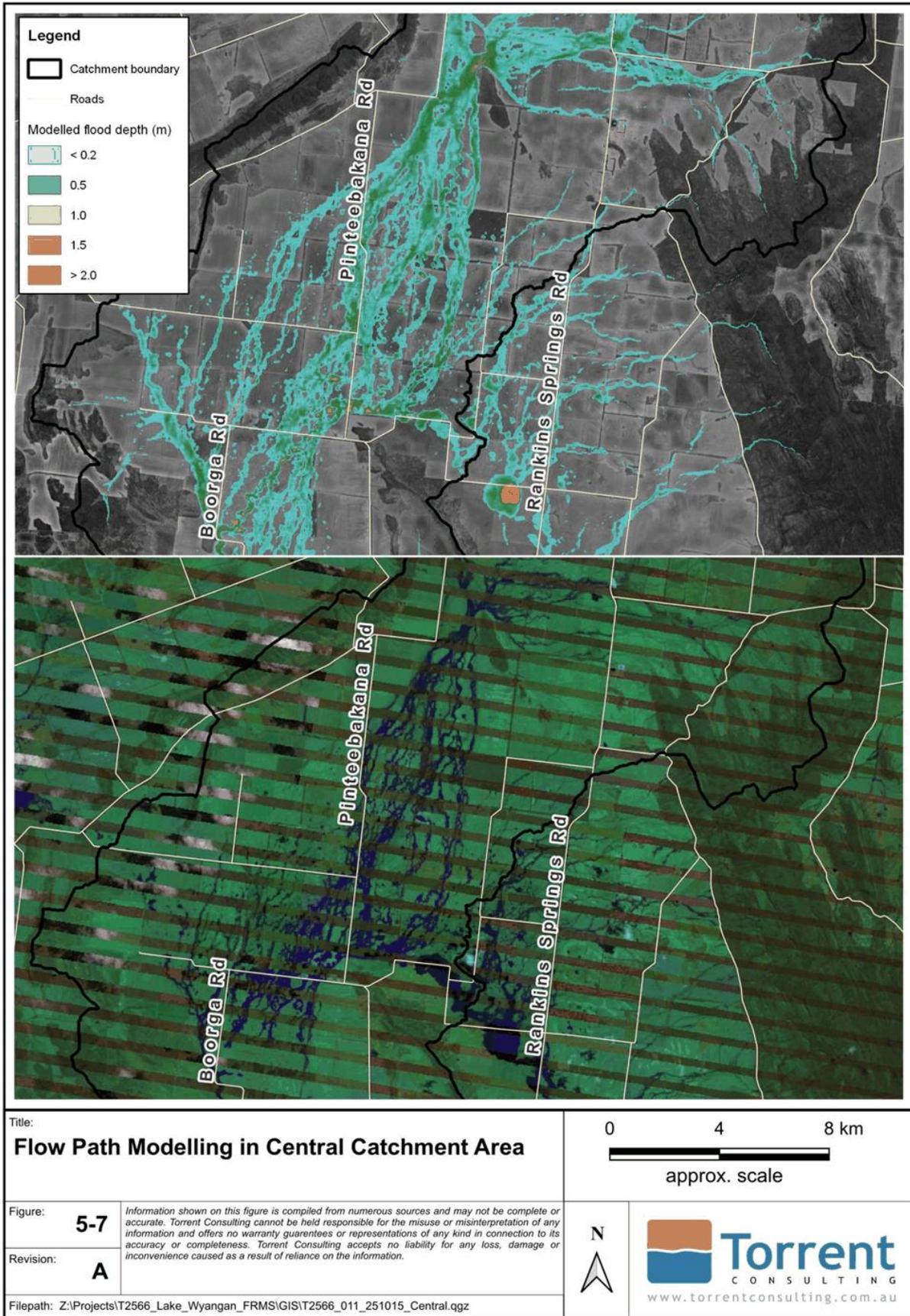
The high quality and temporal availability of the Sentinel 2 satellite imagery (as discussed in Section 2.2.6) provides additional insights into the observed catchment flood behaviour. Whilst these are beyond the scale of potential model calibration, they are useful in understanding any implications for the design flood scenarios, including further model development.

The Sentinel 2 imagery for the 2016 event shows no evidence of catchment runoff prior to 15 June, followed by a large response between then and 12 July, which will be a result of the 50 mm rain event around 20 June. The catchment then progressively dries until an even larger response between 21 August and 23 September, which will be a result of the 40 mm rain event around 10 September. The catchment then dries with no further runoff evident.

The Sentinel 2 imagery for 2022 shows that the catchment is dry at the turn of the year but with some localised runoff evident in an image from 10 January. There is increased runoff evident from 12 January and then even more so on 15 January. The rainfall record shows a series of events on 7, 11 and 14 January of around 40 mm to 60 mm each. There is also evidence of catchment runoff in early and mid-March, corresponding to a couple of rain events at those times but it is limited to the central catchment area.

The central catchment area dries following the March rainfall, although there is still evidence of scattered ponded water in depressions into July, with fresh runoff then evident in early to mid-September. The catchment then dries, before additional runoff can be observed in early to mid-October. There is a month-long gap in imagery that is substantially obscured by cloud cover between 17 October and 18 November, with the latter image showing a significant amount of additional runoff to the former, during which the primary and secondary rainstorms of the flood event have occurred. The catchment has largely dried by 6 December expect for scattered pockets of ponded water across the central catchment area.

From the multitude of imagery available, there are two locations within the catchment that exhibit more frequent occurrence of runoff than elsewhere. The first is in the central catchment area, in the proximity of Boorga – both to the east into the residual catchment area towards Myall Park and to the west on the main catchment flow path that heads south to Dickie Road. Figure 5-7 shows a composite satellite image of this area, using principally the Landsat 7 image from 4 March 2012, supplemented with the Sentinel 2 image from 18 November 2022. The former provides the greatest clarity and extent of flood flow paths in this area but has data gaps forming a striped image, associated with failure of one of the sensors following launch. The 2022 imagery is used to fill these gaps and provide a more complete picture of overland flood flow behaviour.



The green colouration within the satellite imagery shows cleared areas in light green and vegetated areas in darker green. There are some areas of red visible in the Sentinel 2 image that indicate a healthy crop coverage. Both images depict flood flow paths in inky blue, with brighter areas being wet at the time of image capture and duller areas being areas of shallower water or wet ground.

A modelled rainfall-runoff condition is provided in Figure 5-7 for visual comparison and shows a good degree of consistency between the modelled and observed patterns of overland flood flow paths and areas of ponded water.

A similar visual comparison confirming consistency between the modelled and observed patterns of overland flood flow paths is provided for the lower catchment area in Figure 5-8. Again, it utilises a composite satellite image combining Landsat 7 imagery from 4 March 2012 but in this instance supplemented with the Sentinel 2 image from 23 September 2016. The 2016 image has been used in preference to 2022 as it maintains consistency of flood flow paths with 2012. The extensive implementation of almond agriculture and realignment of the Lake View Branch Canal following the 2016 flood event has altered the extent of flooding, as evidenced in the 2022 Sentinel 2 imagery.

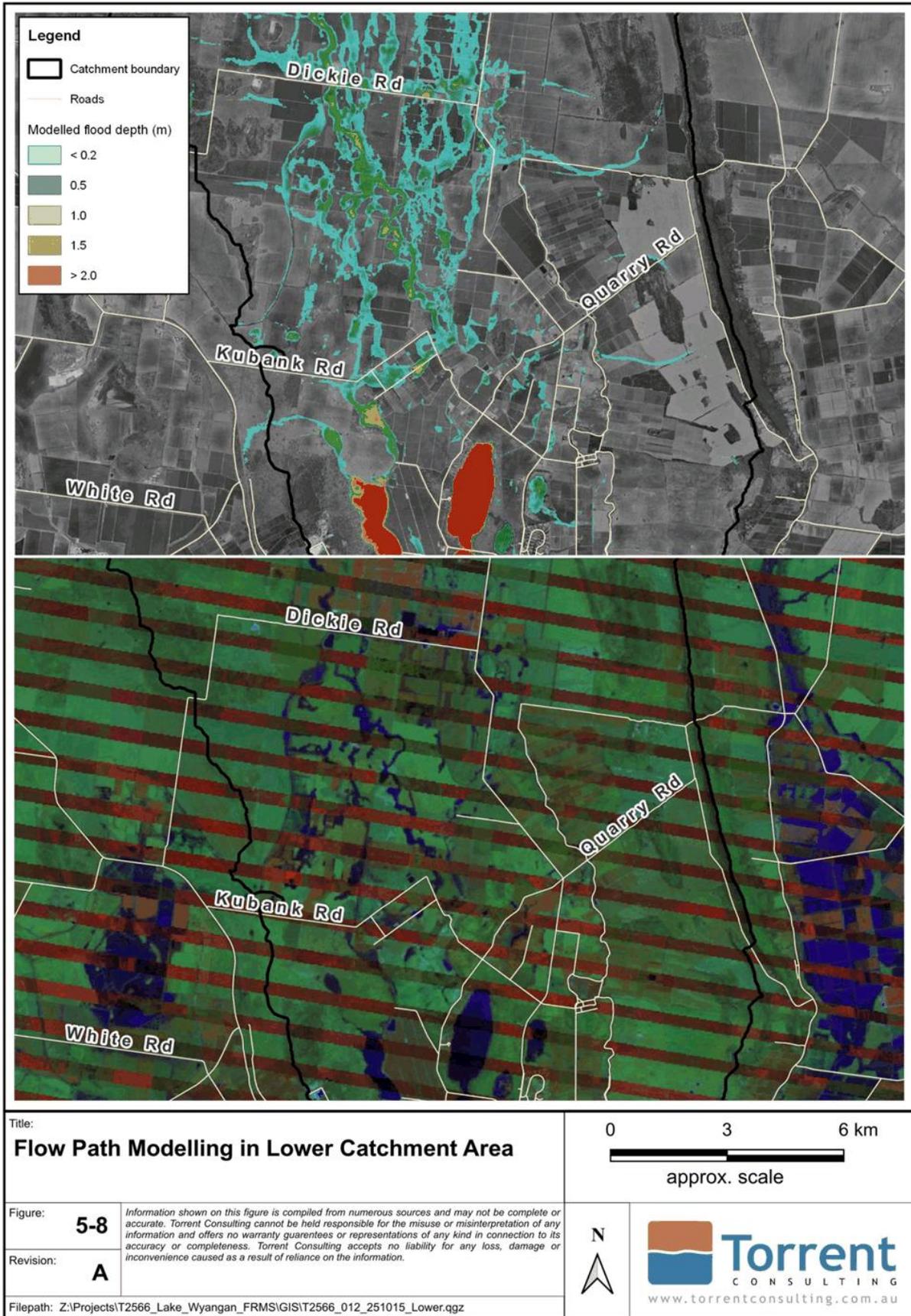
Figure 5-9 shows a comparison between the observed flood flow paths between Dickie Road and Kubank Road for the March 2012 and January 2022 events. A few changes in the flood extents captured by the satellite imagery can be observed between the two images, including:

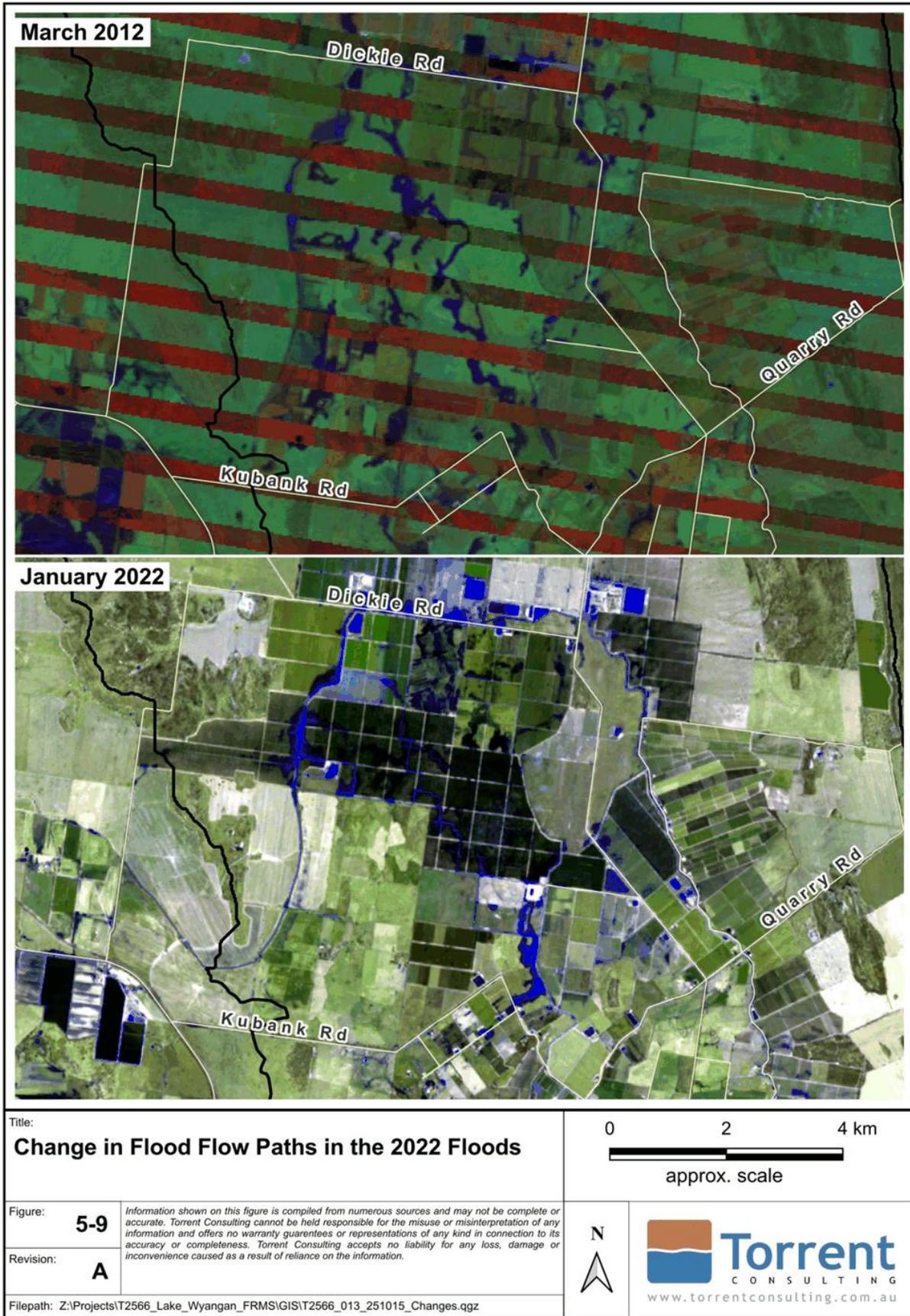
- The realignment (straightening) of the Lake View Branch Canal on the western side of the floodplain locally alters the extent of ponded water behind the canal.
- There is a reduction in overland flow paths in the area immediately east of the Lake View Branch Canal and north of Kubank Road, as the drainage channel along the southern boundary of the almond farming has diverted the natural flow paths east to Lake View Drain. This diverts more flow through the Kubank Estate that would previously have drained to the west.
- The main flood flow path arriving at the Kubank Estate is now aligned slightly further to the east, which is again attributable to the drainage diversion along the southern boundary of the almond farming.

The above modifications to the overland flood flow progression between Dickie Road and Kubank Road are important to capture in the design modelling that is undertaken to support the assessment of potential floodplain risk management options in the update of the FRMS.

Satellite imagery has also been used to estimate the volume of runoff entering the terminal lakes for historic flood events in lieu of available water level records, which are limited to the 2022 event:

- March 1989 event: 3400 ML.
- March 2012 event: 7900 ML.
- Sep-Oct 2016 event: 3400 ML.





## 6 Design Flood Hydrology

### 6.1 Lake Wyangan / Tharbogang Swamp Catchment

#### 6.1.1 Design Rainfall Spatial Variability

There is relatively little spatial variability of design rainfall within the BOM IFD data because of how flat the broader landscape is. However, there is a trend for increased rainfall in the upper catchment area associated with the increased elevation and topographic variability. Preliminary model simulations identified the 24-hour storm duration as being critical for catchment runoff volumes in the terminal lake systems. The BOM design rainfall IFDs were obtained for the lower catchment area for simulation in the local catchment model. These were then scaled to provide higher rainfall depths across the upper catchment, based on the spatial variability of the 1% AEP 24-hour duration rainfall.

The design rainfall inputs to the Lake Wyangan / Tharbogang Swamp model were varied spatially across the catchment using the five zones shown in Figure 6-1. The rainfall scaling applied to each zone is detailed in Table 6-1. The design rainfall across the northern end of the Cocoparra Range (Zone E, which forms the upper catchment divide) is around 14% higher than that within the lower catchment area (Zone A).

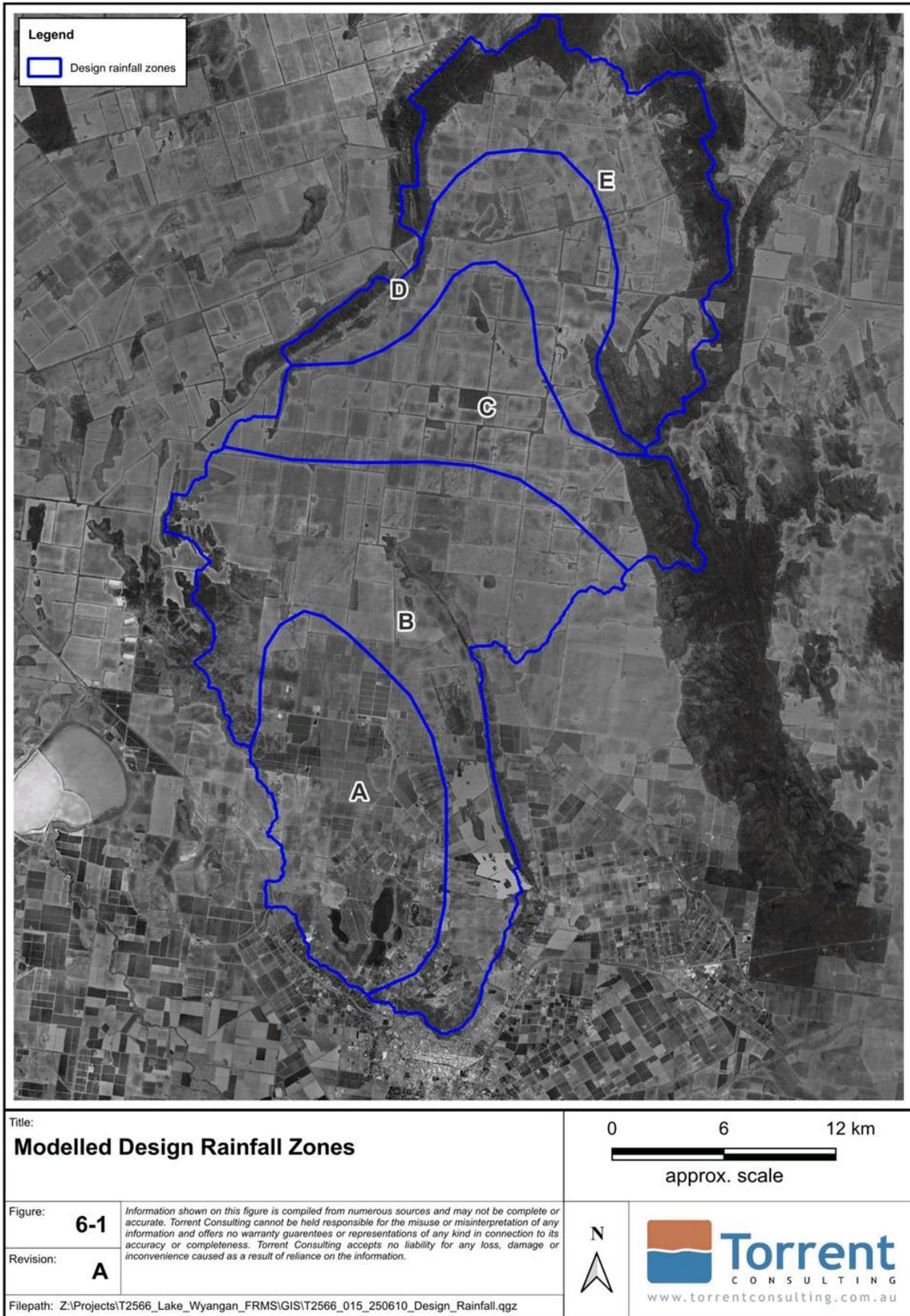
**Table 6-1 Modelled Spatial Variability of Design Rainfall**

Zone	IFD Scaling	ARF Adjustment	Composite Adjustment
A	1.000	1.040	1.040
B	1.025	1.010	1.035
C	1.055	0.991	1.046
D	1.095	0.986	1.080
E	1.140	0.970	1.106

#### 6.1.2 Aerial Reduction Factor

The Aerial Reduction Factor (ARF) is applied to design point rainfall data to account for spatial variability of rainfall, with the peak design intensities unlikely to occur over larger catchment areas. The BOM design rainfall IFDs obtained for the Lake Wyangan / Tharbogang Swamp catchment model adopted an ARF based on the total catchment area of around 780 km<sup>2</sup>. However, flooding in Lake Wyangan and Tharbogang Swamp is more likely to occur from rainfall within the lower catchment area, as the urban areas and irrigated agriculture generate a greater volume of runoff. The upper catchment area generates less frequent runoff, much of which is then infiltrated during transition of the flood wave, prior to reaching the Lake View Branch Canal and Dickie Road.

The ARF was therefore varied across the study catchment, consistent with the spatial zones used for design rainfall depth variability discussed in Section 6.1.1. The modelled rainfall was increased by 4% in Zone A, as shown in Table 6-1. This provides consistency with the adoption of an ARF applicable to the area of Zone A, which is around 160 km<sup>2</sup>.



As the cumulative catchment area increases with each design rainfall zone, the ARF adjustment is calculated on an area weighting basis accordingly. This gives a net adjustment of 1.000 across all five zones. Values representing the composite adjustment (i.e. the product of the IFD scaling and ARF adjustment) to the design rainfall are also provided in Table 6-1. This indicates that the design rainfall IFDs obtained from the BOM are being increased by around 4% for most of the catchment and by around 9% across the upper catchment. Adjustments for climate change impacts are applied independently, as discussed in Section 6.1.4.

### 6.1.3 Critical Duration Assessment

The design point rainfall with the corresponding adjustments discussed in Section 6.1.1 and Section 6.1.2 was applied directly to the hydrological model to simulate the rainfall-runoff process, with ten temporal patterns modelled for each storm duration. Storm durations ranging from 12 hours to 72 hours were simulated, with the results being analysed in the terminal catchment storages to identify the critical duration for each design flood event probability. A representative temporal pattern was then selected for each, as being best representative of the mean condition of the temporal pattern suite for each of the events. The 24-hour duration was found to produce the critical flood response in Lake Wyangan and Tharbogang Swamp across the full range of events.

### 6.1.4 Climate Change

As per the updated ARR 4.2 climate change guidance, an adjustment was made to the adopted design rainfall to account for potential increases in rainfall intensity. The rainfall adjustment is determined through a combination of an expected increase in global mean temperature and an associated percentage increase in design rainfall intensity per degree of warming.

For this assessment the Shared Socioeconomic Pathway SSP2 was adopted for the near-term flood planning horizon, which represents a continuation of historic global attitudes towards climate policy, i.e. a neutral rather than optimistic or pessimistic outlook. The SSP3 climate change scenario was adopted for the long-term flood planning horizon, which assumes future challenges to climate change adaptation and mitigation. The SSP2-4.5 climate scenario has a best-estimate warming of around 1.2°C for the near-term (2021-2040) horizon, while SSP3-7.0 estimates around 3.3°C of warming for the long-term (2081-2100) horizon.

Using Equation 1.6.1 of ARR 4.2, this gives a total increase in design rainfall intensity of 9.7% for the near-term horizon and 28.9% for the long-term horizon.

## 6.2 Local Catchment

### 6.2.1 Aerial Reduction Factor

For the local catchment model, adoption of the full model area to derive the ARF would likely underestimate rainfall depths for critical sub-catchment flows. Therefore, the ARF was derived from a typical contributing catchment size of around 5 km<sup>2</sup>. The resultant ARF values were applied to the design rainfall depths for the local catchment model.

### 6.2.2 Critical Duration Assessment

The design point rainfall with corresponding ARF was applied directly to the hydrological model to simulate the rainfall-runoff process, with ten temporal patterns modelled for each storm duration.

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Storm durations ranging from 10 minutes to 24 hours were simulated, with the model results analysed at 20 locations across the local catchment to identify the critical durations and temporal patterns that most consistently produced peak flow conditions.

Given the broad range of durations producing critical conditions across the catchment, four storm durations were selected for each design event probability that most comprehensively provide results that match or were otherwise as close as possible to the critical condition. The hydrological model results selected for simulation in the hydraulic model are shown in Table 6-2.

**Table 6-2 Adopted Critical Design Storm Events**

Design Probability	Critical Durations (mins)	Temporal Patterns
10% AEP	60, 270, 720 and 1080	4566, 4698, 4793 and 4830
5% AEP	60, 540, 720 and 1080	4566, 4761, 4790 and 4832
2% AEP	45, 180, 360 and 540	4550, 4649, 4720 and 4745
1% AEP	45, 180, 360 and 540	4550, 4649, 4720 and 4745
0.5% AEP	45, 120, 270 and 540	4550, 4615, 4684 and 4745
0.2% AEP	45, 120, 180 and 360	4550, 4613, 4651 and 4587

### 6.2.3 Climate Change

The procedures for the estimation of climate change impacts to flood hydrology in the ARR 4.2 guidance were adopted, consistent with that of the Lake Wyangan / Tharbogang Swamp catchment simulation discussed in Section 6.1.4.

Using Equation 1.6.1 of ARR 4.2, this gives a total increase in design rainfall intensity ranging between 10.2% and 18.3% for the near-term horizon and between 30.5% and 58.6% for the long-term horizon.

### 6.3 Extreme Flood Event

The PMF conditions were simulated for the full catchment and local catchment flood events. However, the results of the PMF event are excessive, particularly for the local catchment flood conditions. This is to be expected given the approximate 1-in-10,000,000 AEP of a local catchment PMF event. Therefore, an Extreme Flood Event condition has been simulated, which adopts three-times the rainfall of the 1% AEP event. This is consistent with the previous Lake Wyangan Flood Study and is expected to be closer to a 1-in-10,000 AEP condition than a 1-in-10,000,000 AEP.

## 7 Design Flood Results

### 7.1 Lake Wyangan / Tharbogang Swamp Catchment Model

The modelled peak flood levels reached within the storages of Lake Wyangan and Tharbogang Swamp were extracted from the catchment model results across the full range of simulated design events. The results of the near-term (2040) climate change scenario are shown in Table 7-1. The total catchment runoff volume contributing to the combined peak flood conditions in Lake Wyangan and Tharbogang Swamp is also provided for context. The results for the long-term (2100) climate change scenario are shown in Table 7-2.

**Table 7-1 Near-Term Design Flood Levels Lake Wyangan and Tharbogang Swamp**

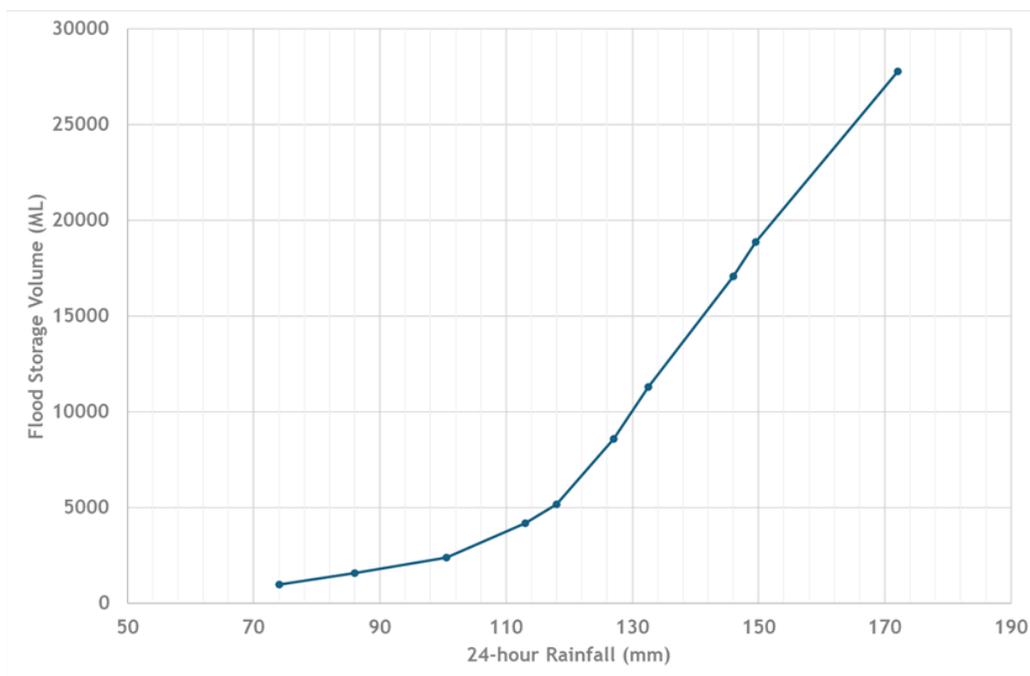
Design Probability	Lake Wyangan (m AHD)	Tharbogang Swamp (m AHD)	Total Runoff Volume (ML)
10% AEP	106.35	104.2	1000
5% AEP	106.5	104.25	1600
2% AEP	106.7	104.5	2400
1% AEP	107.1	104.9	4200
0.5% AEP	107.9	106.1	8600
0.2% AEP	108.6	108.8	17 100
Extreme	117.0	117.0	170 000
PMF*	120.2	120.2	340 000

**Table 7-2 Long-Term Design Flood Levels Lake Wyangan and Tharbogang Swamp**

Design Probability	Lake Wyangan (m AHD)	Tharbogang Swamp (m AHD)	Total Runoff Volume (ML)
10% AEP	106.5	104.25	1600
5% AEP	106.7	104.5	2400
2% AEP	107.3	105.25	5200
1% AEP	108.2	107.05	11 300
0.5% AEP	108.7	109.2	18 900
0.2% AEP	109.15	110.75	27 800
Extreme	118.1	118.1	220 000
PMF*	120.2	120.2	340 000

The runoff volume at the PMF event increases with the storm duration and by the 36-hour duration generates a sufficient volume of runoff to fill the entire depression storage of the endorheic basin. At a level of around 120 m AHD, water will spill from the catchment through the lowest point of the western divide and into the Barren Box Storage and Wetland via Warburn. The PMF level has therefore been capped at 120.2 m AHD, as flood levels greater than this cannot be reached.

The modelled runoff volume reaching the terminal lake storages of Lake Wyangan and Tharbogang Swamp is limited for 24-hour rainfall depths of less than 110 mm but then increases significantly once this threshold is exceeded. This is because the sandy catchment soils have a high infiltration to absorb most rainfall events. However, once a degree of saturation is reached, then the effective rainfall increases rapidly with additional event rainfall. Figure 7-1 shows the relationship between the modelled 24-hour rainfall depths and the total catchment runoff volume reaching the terminal lake storages.



**Figure 7-1 Relationship Between Modelled Event Rainfall and Total Runoff Volume**

Because of the sensitivity of the modelled peak flood levels in Lake Wyangan to relatively small changes in rainfall depth for the rare to very rare flood event range, careful consideration needs to be given to the adoption of an appropriate Flood Planning Level (FPL). This will be assessed in detail within the subsequent Floodplain Risk Management Study, including sensitivity analyses and residual risk analysis.

For context, the estimated runoff volume entering the terminal lake storages is around 8000-8500 ML for both the March 2012 and Oct-Nov 2022 flood events. That is in the order of a 0.5% (1-in-200) AEP under the near-term (2040) climate change scenario and between a 2% (1-in-50) and 1% (1-in-100) AEP under the long-term (2100) climate change scenario. The difference in flood level within Lake Wyangan experienced during those two historic events is principally a function of the

antecedent conditions. The storage level in Lake Wyangan was very low prior to the March 2012 event but was above normal operating level prior to the Oct-Nov 2022 event. The extensive increase in almond farming in the Dickie Road area will also have directed a greater proportion of catchment runoff into Lake Wyangan rather than Tharbogang Swamp during the more recent of the two events.

Flood mapping outputs of peak flood depth, flood hazard and flood function associated with Lake Wyangan / Tharbogang catchment flood events is provided in Appendix A. A flood depth cutoff limit of 50 mm has been applied to limit the mapped flood extents in areas of very shallow inundation.

## 7.2 Local Catchment Model

The flow hydrographs extracted from the TUFLOW hydrological model were applied to the hydraulic model to establish the design flood conditions within the local catchment. Figure 7-2 shows the modelled flood extents for the 5% AEP, 1% AEP, and Extreme Flood events for the near-term (2040) planning horizon, with the reporting locations corresponding to the locations presented in Table 7-3 and

Table 7-4.

### 7.2.1 Design Flood Conditions

Design flood flows for local catchment flooding are presented in Table 7-3 for the full range of design flood events. Modelled flood levels for these locations are presented in

Table 7-4. Locations have been principally selected to indicate conditions at road drainage crossings, with additional locations selected along major drainage paths.

The flood extent mapping presented in Figure 7-2 shows that local catchment runoff is generally contained within the local drainage network at the 5% AEP event, with some shallow overland flow paths activated due to spilling from the channels. At the 1% AEP event, these breakout flows are occurring across a wider area, with broad depressions beginning to fill with floodwater. The Extreme Event flooding is much more extensive across the local catchment, with most of the modelled area subject to inundation, creating several islands of high ground.

Except for at the Extreme Flood event, hazardous flood conditions are principally confined to the local drainage channel network. Urban areas of the catchment remain flood free up to the 0.2% AEP, however, some residential dwellings on rural properties are impacted by flooding.

The full suite of design flood mapping outputs for local catchment flood events is provided in Appendix B. Flood mapping outputs are provided for the near-term (2040) planning horizon, with additional outputs that are integral to future flood planning decisions also provided for the long-term (2100) planning horizon. A flood depth cutoff limit of 50 mm has been applied to limit the mapped flood extents in areas of very shallow inundation.

### 7.2.2 Flood Hazard

The flood hazards have been determined in accordance with Guideline 7-3 of the Australian Disaster Resilience Handbook 7 Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia (AIDR, 2017). This produces a six-tier hazard classification, based on modelled flood depths, velocities, and velocity-depth product. The hazard classes relate directly to the potential risk posed to people, vehicles, and buildings, as presented in Figure 7-3.

**Table 7-3 Modelled Design Flows (m³/s)**

Site	Location	10% AEP	5% AEP	2% AEP	1% AEP	0.5% AEP	0.2% AEP	Extrm.
1	Int. West and Zillotto Road	0.1	0.3	0.9	1.1	2.3	8.4	1120.4
2	West Road	0.5	1.2	2.0	2.5	5.1	16.2	N/A
3	Boorga Road	0.0	0.2	0.6	1.1	3.1	9.7	52.0
4	Boorga Road	0.1	0.3	1.2	2.4	3.8	7.6	982.1
5	Int. Masonwells and Boorga Roa	0.0	0.0	0.0	0.1	1.6	3.4	N/A
6	Boorga Road	0.1	0.5	1.6	5.1	14.2	25.5	543.1
7	Jones Road	0.7	1.5	2.8	3.9	5.2	6.9	84.2
8	Int. Mancini Dr and Boorga Rd	0.7	1.3	2.1	2.8	3.5	4.6	38.5
9	Smeeth Road	0.7	1.4	2.5	5.3	8.4	15.5	N/A
10	Smeeth Road	0.1	0.2	0.4	0.5	0.6	0.9	N/A
11	Int. Smeeth and Boorga Road	2.1	4.7	9.7	18.3	32.0	53.3	1323.6
12	Smeeth Road	0.0	0.0	0.0	0.0	0.0	2.7	1071.3
13	Jones Road	1.5	3.3	6.5	14.4	24.0	38.9	228.6
14	McCarthy Road	0.6	1.4	3.5	5.7	9.8	15.4	336.8
15	McCarthy Road	0.0	0.0	2.5	4.2	5.8	7.9	93.9
16	McCarthy Road	0.1	0.3	2.5	8.1	14.9	24.1	740.3
17	Todd Road	1.5	2.3	5.1	8.0	11.5	16.6	247.8
18	Boorga Road	1.2	1.8	4.2	7.2	10.3	15.0	340.7
19	Todd Road	0.2	0.4	0.9	1.2	1.5	3.1	239.8
20	Druitt Road	0.2	0.3	1.5	3.2	4.4	7.5	12.0
21	Drain	0.0	0.0	1.0	2.5	4.1	8.2	140.8
22	Drain	0.2	0.3	1.3	2.4	4.2	6.6	73.6
23	Druitt Road	0.4	0.7	1.2	1.7	2.3	4.5	79.8
24	Int. Lakes and Druitt Road	0.2	0.6	1.3	2.6	4.5	8.1	148.2

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**Table 7-4 Modelled Design Flood Levels (m<sup>3</sup>/s)**

Site	Location	10% AEP	5% AEP	2% AEP	1% AEP	0.5% AEP	0.2% AEP	Extrm.
1	Int. West and Zillotto Road	115.0	115.1	115.1	115.2	115.2	115.4	116.2
2	West Road	114.2	114.4	114.7	114.9	115.1	115.3	116.6
3	Boorga Road	115.9	116.0	116.1	116.1	116.3	116.4	117.3
4	Boorga Road	115.6	115.8	116.2	116.8	116.9	117.0	118.1
5	Int. Masonwells and Boorga Roa	N/A	N/A	N/A	N/A	118.8	118.8	119.1
6	Boorga Road	119.4	119.6	120.0	120.3	120.4	120.5	121.4
7	Jones Road	N/A	N/A	N/A	N/A	N/A	111.0	111.3
8	Int. Mancini Dr and Boorga Rd	111.8	111.9	112.2	112.4	112.6	112.7	113.0
9	Smeeth Road	118.9	118.9	118.9	118.9	118.9	119.0	119.4
10	Smeeth Road	117.2	117.5	117.6	117.6	117.7	117.8	118.7
11	Int. Smeeth and Boorga Road	110.3	110.5	110.8	111.2	112.1	112.5	114.8
12	Smeeth Road	114.1	114.2	114.2	114.5	114.6	114.7	116.6
13	Jones Road	117.4	117.4	117.4	117.4	117.5	117.5	118.0
14	McCarthy Road	118.0	118.3	118.4	118.4	118.4	118.4	118.8
15	McCarthy Road	N/A	N/A	119.9	120.0	120.0	120.0	120.4
16	McCarthy Road	119.6	119.8	120.2	120.3	120.4	120.4	121.2
17	Todd Road	110.3	110.4	110.6	110.8	111.0	111.3	113.0
18	Boorga Road	114.4	114.5	114.7	114.9	115.1	115.5	116.0
19	Todd Road	107.6	107.8	108.3	108.5	108.5	108.6	109.5
20	Druitt Road	113.8	113.8	113.9	114.1	114.3	114.3	114.6
21	Drain	N/A	N/A	119.4	119.5	119.6	119.6	119.9
22	Drain	117.4	117.5	117.7	118.0	118.2	118.5	118.8
23	Druitt Road	111.2	111.2	111.2	111.2	111.2	111.3	111.6
24	Int. Lakes and Druitt Road	111.3	111.7	112.2	112.3	112.4	112.4	112.5

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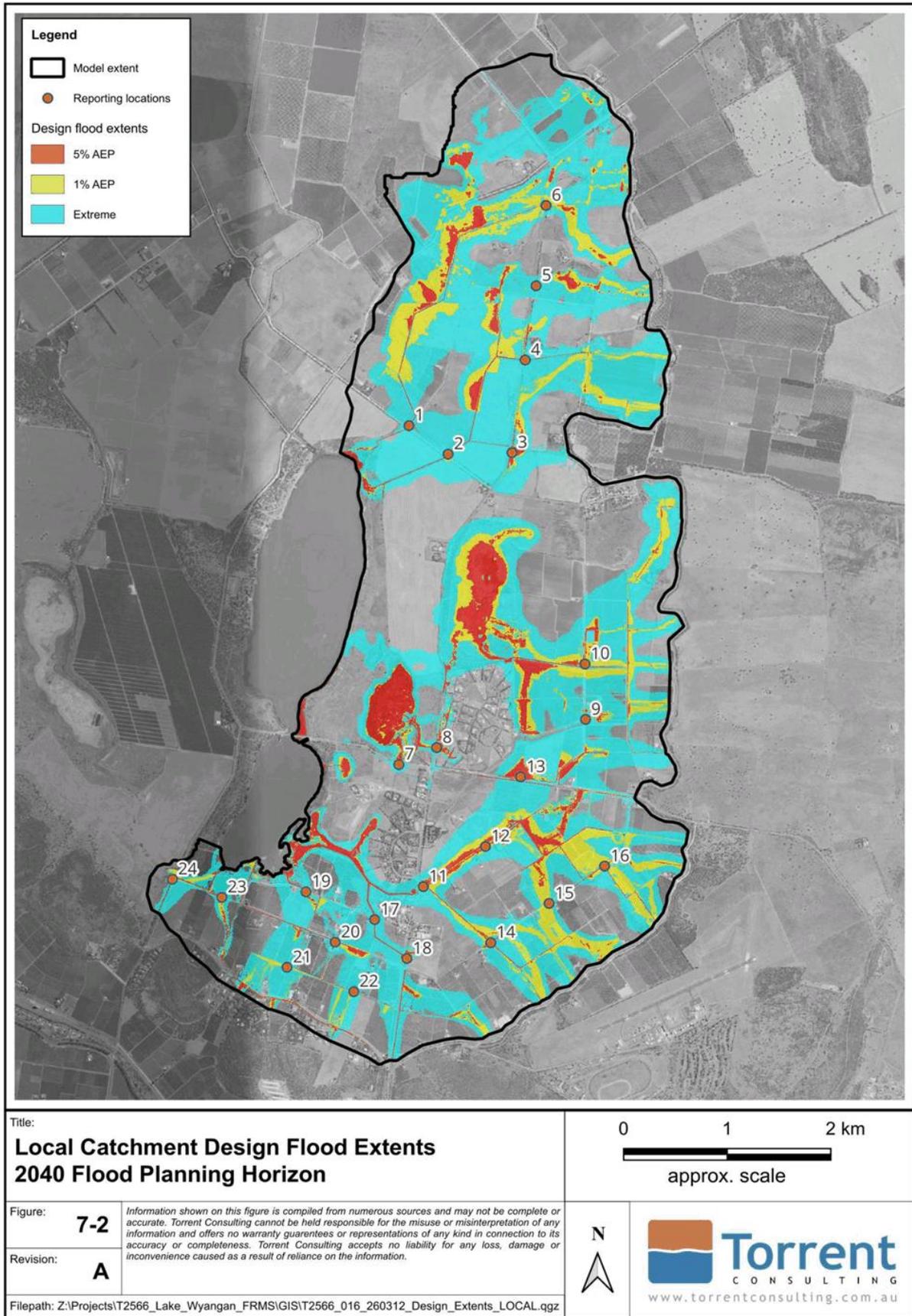


Table 7-5 Combined hazard curves - vulnerability thresholds (AIDR, 2017)

Hazard	Criteria	Description
H1	Depth < 0.3 m and Velocity < 2.0 m/s and Velocity*Depth ≤ 0.3 m <sup>2</sup> /s	Generally safe for vehicles, people and buildings
H2	Depth < 0.5 m and Velocity < 2.0 m/s and Velocity*Depth ≤ 0.6 m <sup>2</sup> /s	Unsafe for small vehicles.
H3	Depth < 1.2 m and Velocity < 2.0 m/s and Velocity*Depth ≤ 0.6 m <sup>2</sup> /s	Unsafe for small vehicles, children and the elderly.
H4	Depth < 2.0 m and Velocity < 2.0 m/s and Velocity*Depth ≤ 1.0 m <sup>2</sup> /s	Unsafe for vehicles and people.
H5	Depth < 4.0 m and Velocity < 4.0 m/s and Velocity*Depth ≤ 4.0 m <sup>2</sup> /s	Unsafe for vehicles and people. All building types vulnerable to structural damage. Some less robust building types vulnerable to failure.
H6	Depth > 4.0 m OR Velocity > 4.0 m/s OR Velocity*Depth > 4.0 m <sup>2</sup>	Unsafe for vehicles and people. All building types considered vulnerable to failure.

The flood hazard mapping shows that, for local catchment flooding, medium to high hazards are generally contained within the drainage channels and within Campell’s Swamp and Nericon Swamp up to around the 2% AEP event. Shallow overland flow generally remains at an H1 hazard level. At the 1% AEP shallow depressions, particularly in the northern part of the catchment, were modelled with hazard levels up to H3 due to deeper ponding of water. Hazard levels of up to H3 were modelled along Smeeth Road at the 0.2% AEP event.

At the Extreme Flood event, areas of H4-H5 hazard classification were modelled along the main overland flood flow paths due to flood depths exceeding 2 m, however, velocities remained relatively low, and so H6 hazard conditions were confined to the western end of Smeeth Road and the downstream channel, due to a combination of high depth and velocity (V\*D product).

7.2.3 Flood Function

The flood function categories of floodway areas, flood storage areas and flood fringe are defined in the Flood Risk Management Manual: the policy and manual for the management of flood liable land (the manual; DPE 2023) as follows:

- **Floodway** - are generally areas which convey a significant portion of water during floods and are particularly sensitive to changes that impact flow conveyance. They often align with naturally defined channels.
- **Flood Storage** - are areas outside of floodways, are generally areas that store a significant proportion of the volume of water and where flood behaviour is sensitive to changes that impact on the storage of water during a flood.
- **Flood Fringe** - are areas within the extent of flooding for the event but which are outside floodways and flood storage areas. Flood fringe areas are not sensitive to changes in either flow conveyance or storage.

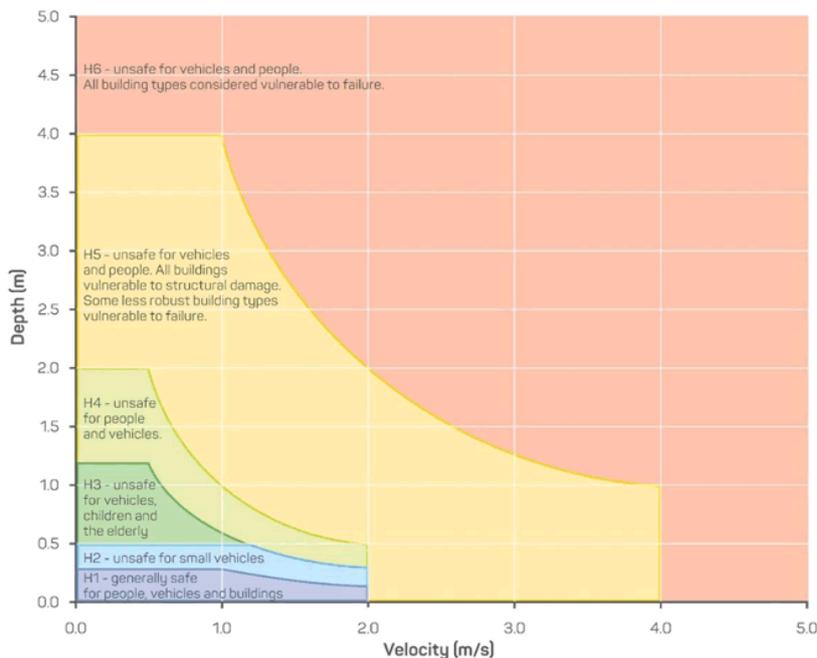


Figure 7-3 General Flood Hazard Vulnerability Curves (AIDR, 2017)

There are no prescriptive methods for determining what parts of the floodplain constitute floodways, flood storages and flood fringes. Descriptions of these terms within the Flood Risk Management Manual are essentially qualitative in nature and the definition of flood behaviour and associated impacts is likely to vary from one floodplain to another depending on the circumstances and nature of flooding within the catchment.

For this study, the multi-criterion approach considering peak flood depths, velocities and the velocity-depth product as described below:

- Floodway is defined as areas where the peak value of velocity multiplied by depth ( $V \cdot D$ ) >  $0.2 \text{ m}^2/\text{s}$  ( $1.0 \text{ m}^2/\text{s}$  at the Extreme Flood event), with all drainage channels also being considered as floodways;
- Flood Storage comprises areas outside the Floodway where peak depth > 0.5, with all wetland areas also being considered as flood storage; and
- Flood Fringe comprises areas outside the Floodway where peak depth is less than the thresholds for Flood Storage.

## 8 Conclusions

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The Lake Wyangan Flood Study was undertaken to define the historical, existing and potential future climate local catchment and lake storage flood conditions for the township of Lake Wyangan and throughout the surrounding rural. It provides an update of the original study, which was completed in 2012.

Flood behaviour was predicted for a range of design floods based on detailed TUFLOW hydrological and hydraulic modelling developed for the study catchments. Modelling of the local catchment and lake storage flood conditions was validated using flood information for historical events, where available.

The TUFLOW models were used to simulate a range of design events including the 10%, 5%, 2%, 1%, 0.5%, 0.2% AEP and Extreme/PMF events. The potential impacts of climate change, incorporating increased rainfall intensity, was also assessed for implications of managing the future floodplain environment. A suite of detailed design flood mapping has been prepared as a set of appendices to this report.

The outputs of this flood study provide an improved understanding of local catchment and lake storage flood behaviour that will aid in Council's management of flood risk and establish the subsequent Floodplain Risk Management stage of this Study.

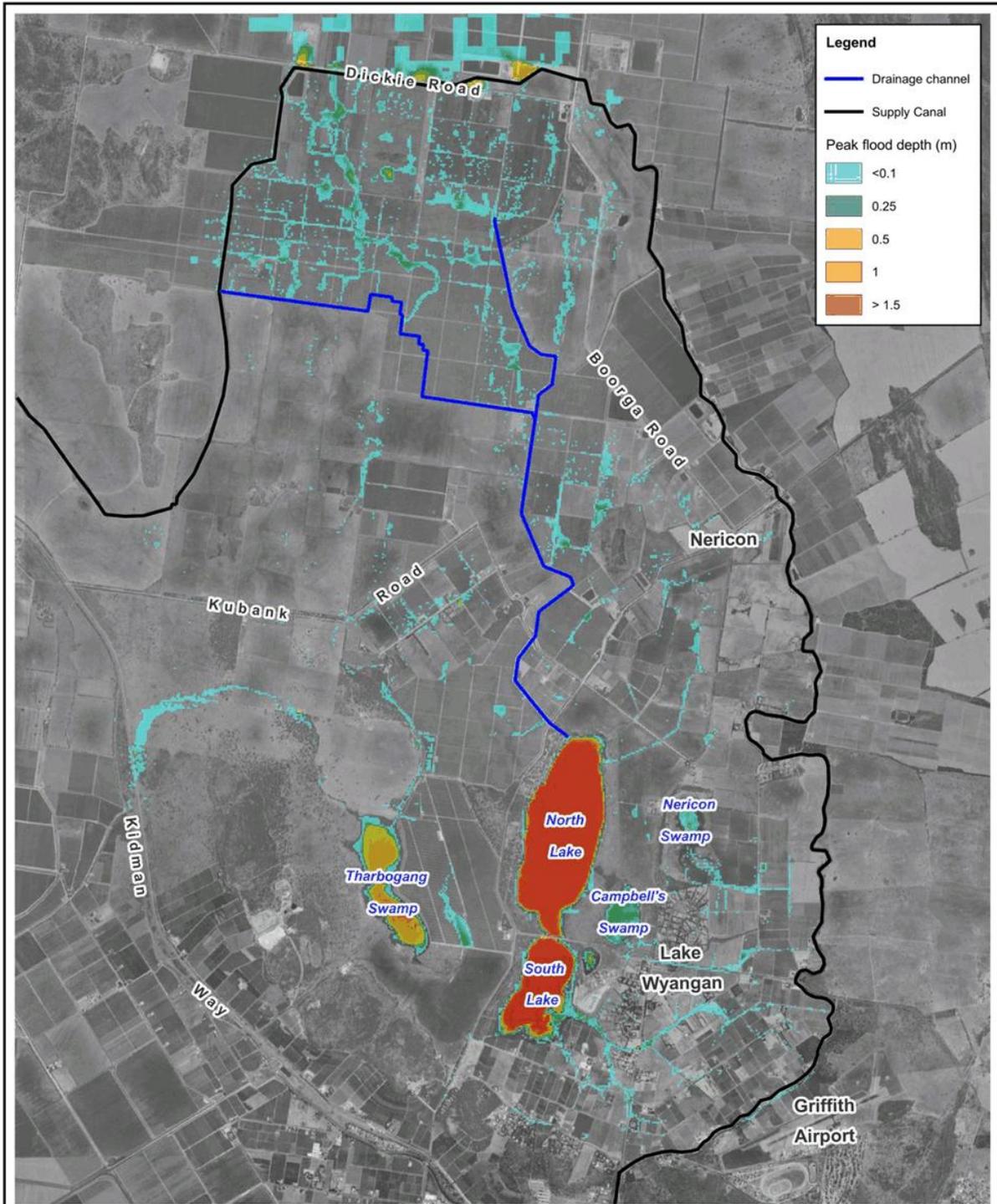
## 9 References

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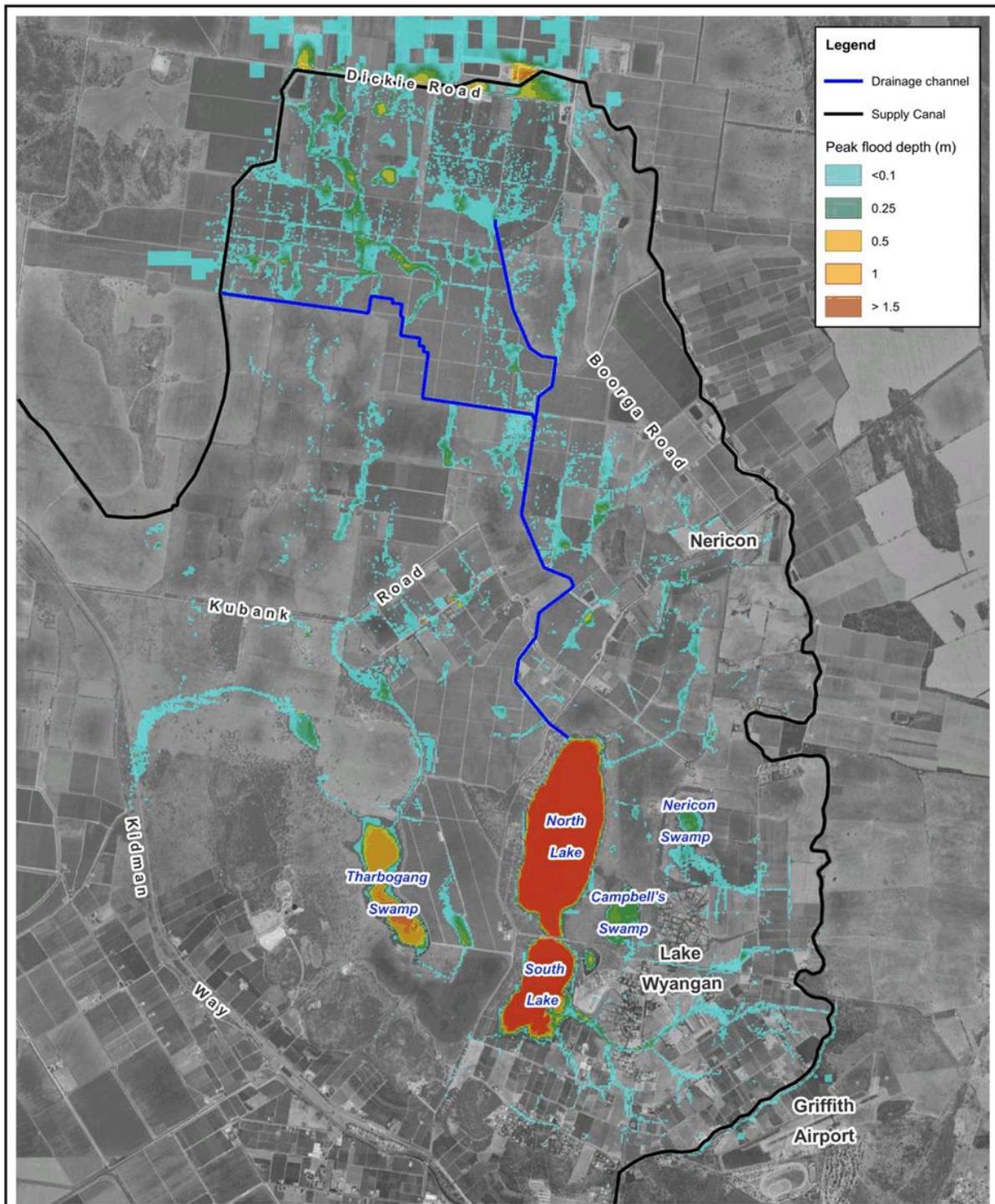
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## Appendix A Lake Wyangan / Tharbogang Swamp Design Flood Mapping

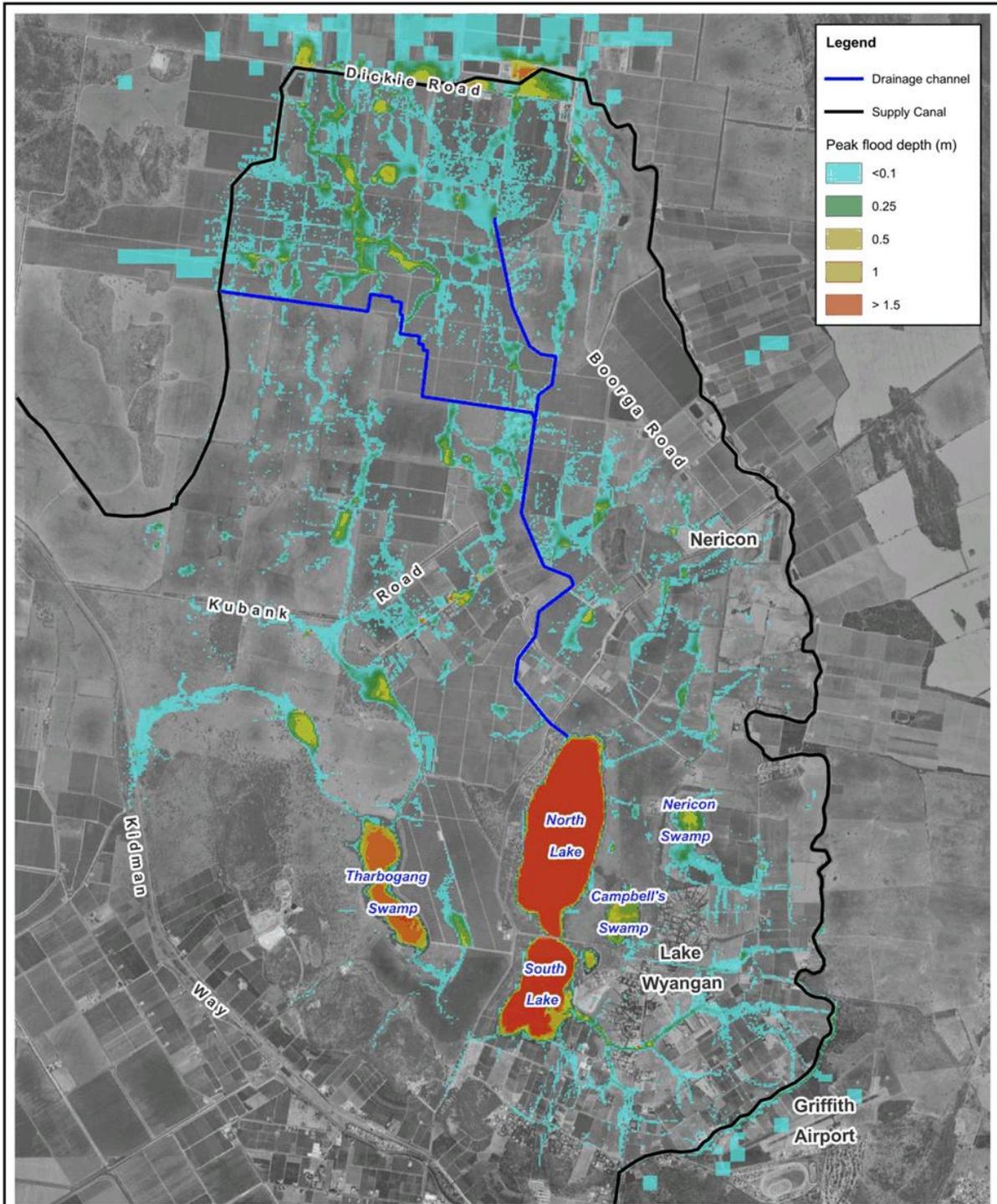
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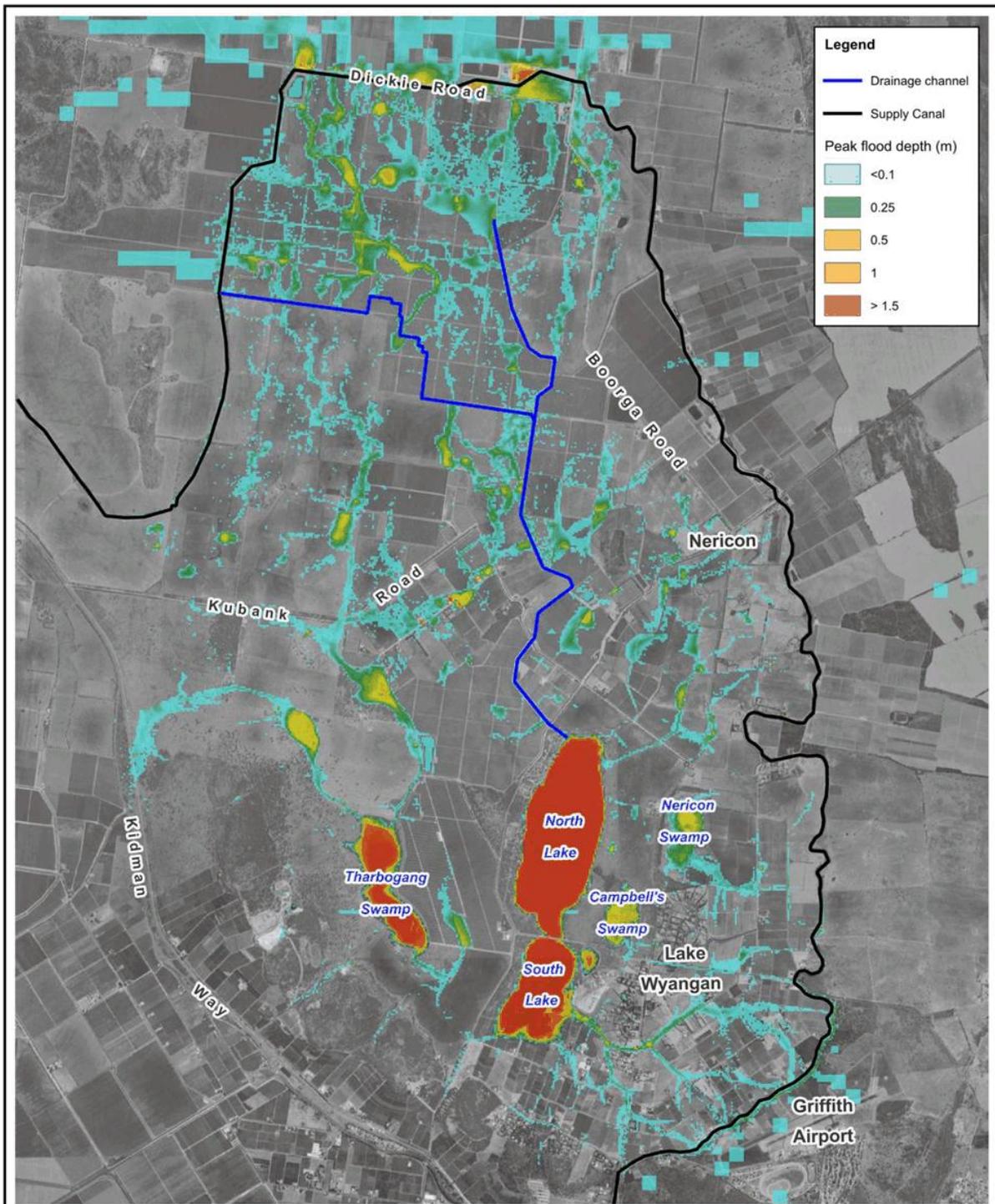
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<p>Figure:</p> <p><b>A-1</b></p>	<p><i>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</i></p>		
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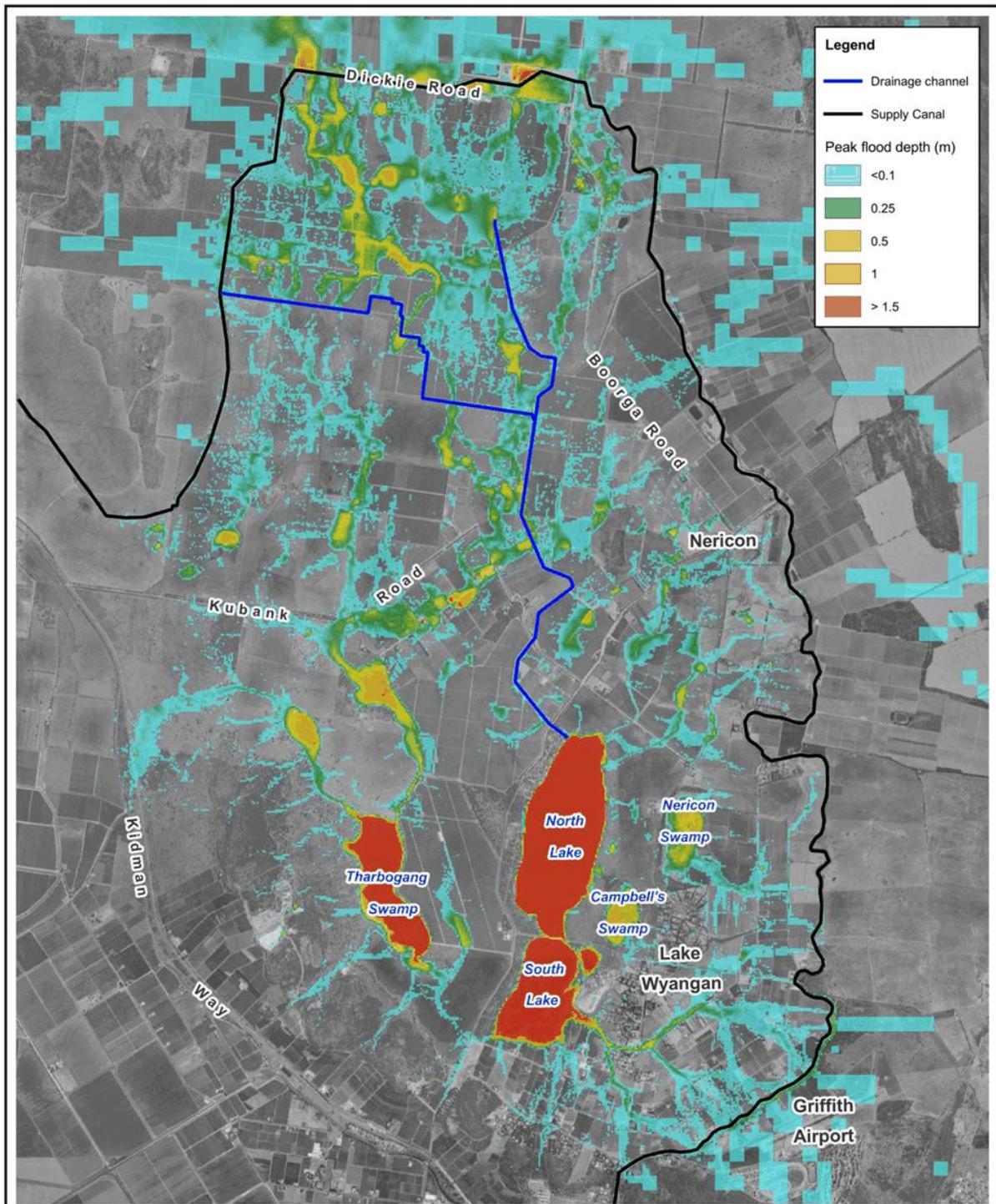
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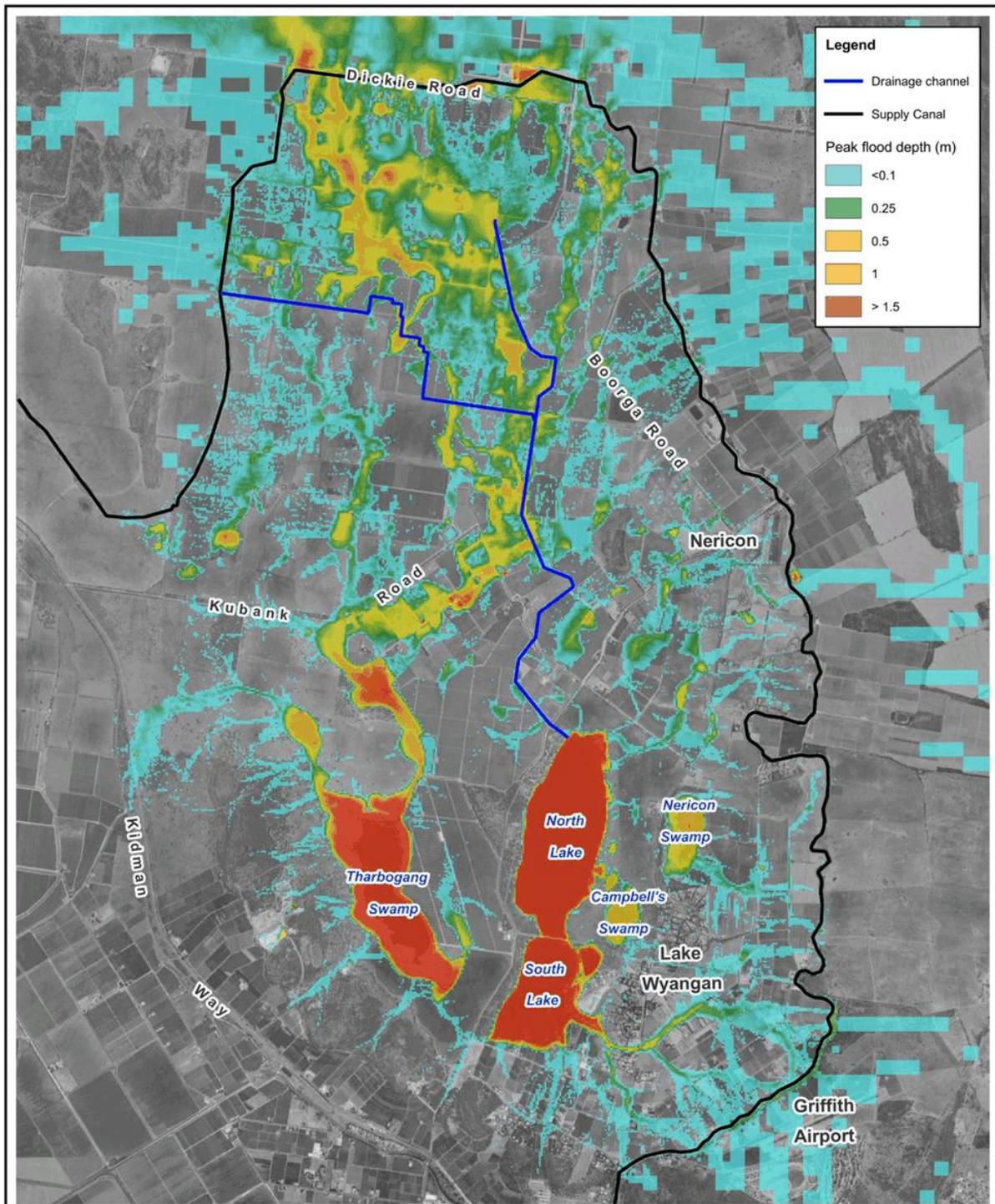
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<p>Figure:</p> <p><b>A-3</b></p>	<p><i>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</i></p>		
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<p>Title:</p> <p><b>1% AEP Modelled Peak Flood Depth 2040 Flood Planning Condition</b></p>		<p>0 1 2 km</p> <p>approx. scale</p>	
<p>Figure:</p> <p><b>A-4</b></p>	<p><i>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</i></p>		
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<p>Title:</p> <p><b>0.5% AEP Modelled Peak Flood Depth 2040 Flood Planning Condition</b></p>		<p>0 1 2 km</p> <p>approx. scale</p>	
<p>Figure:</p> <p><b>A-5</b></p>	<p><i>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</i></p>		
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Title:  
**0.2% AEP Modelled Peak Flood Depth  
 2040 Flood Planning Condition**

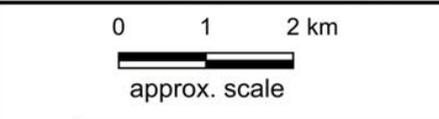


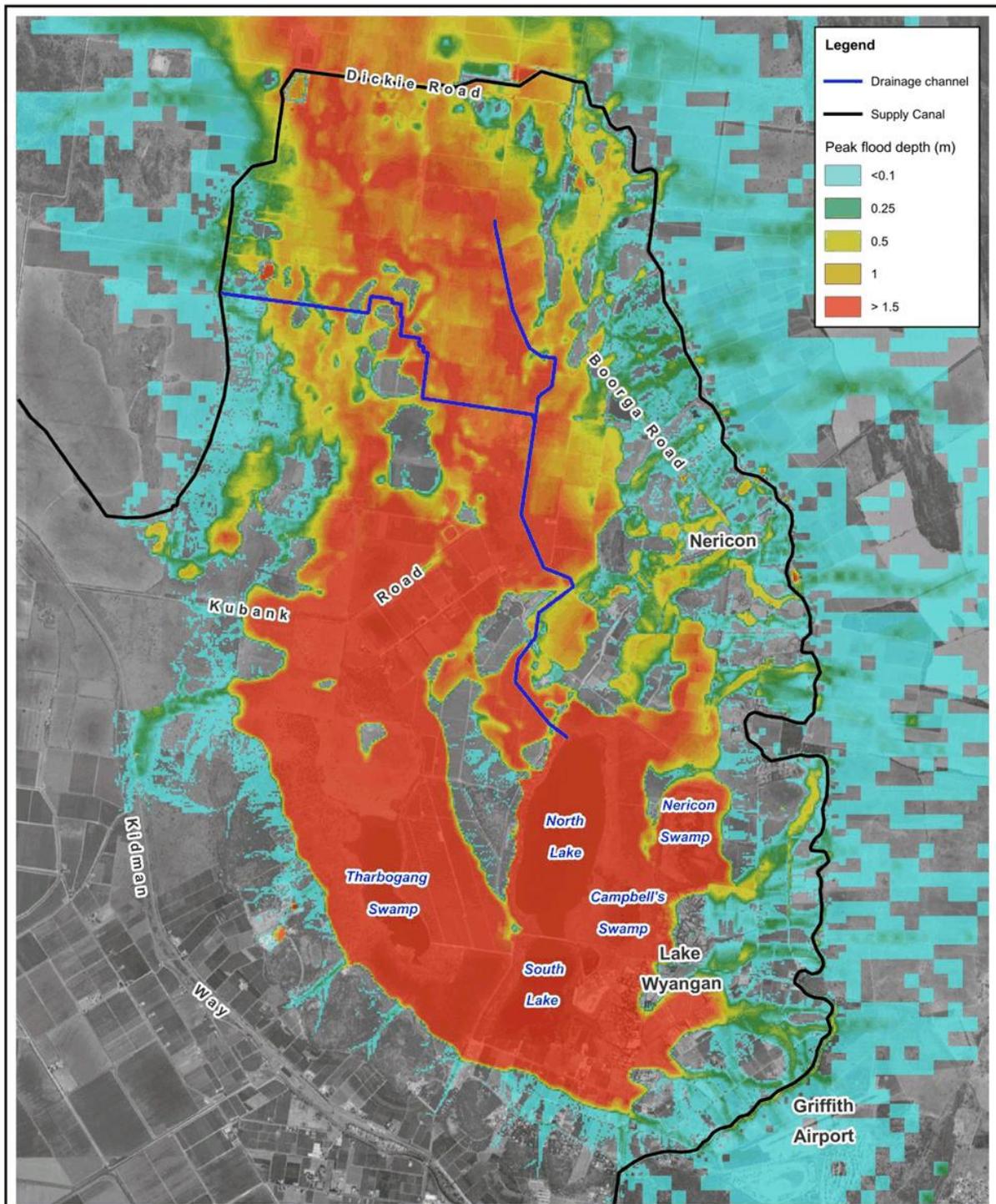
Figure: **A-6** *Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.*

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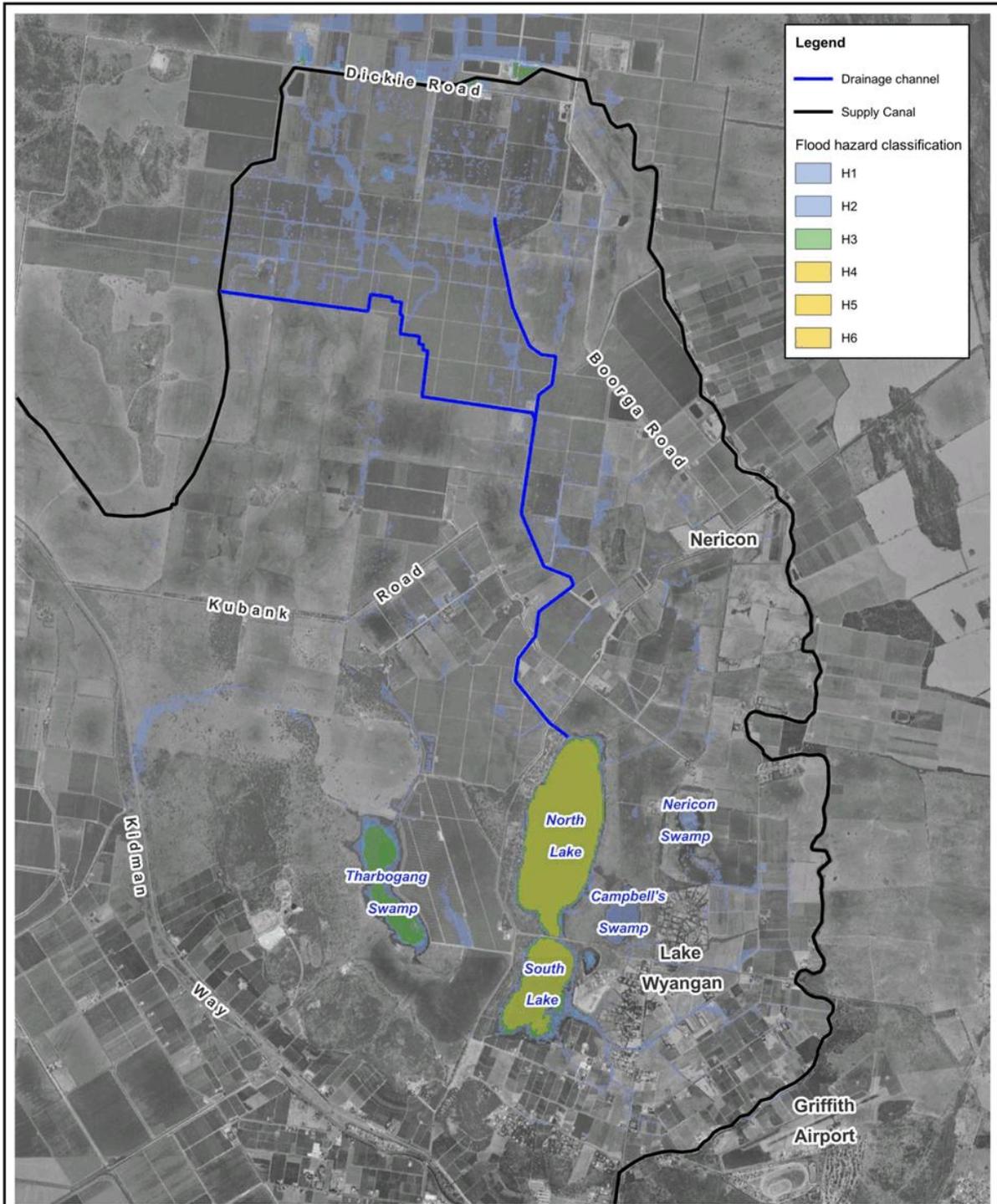
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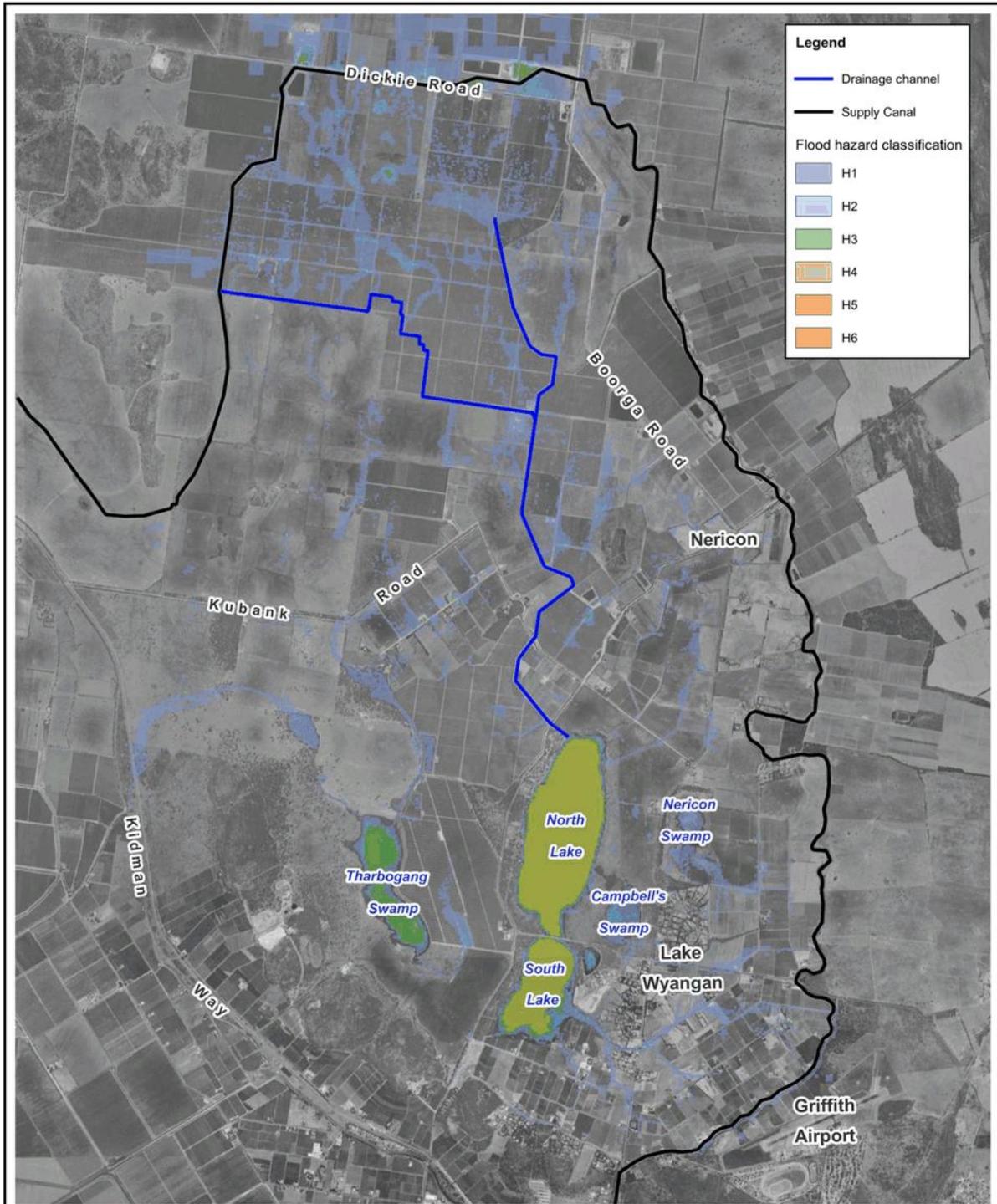
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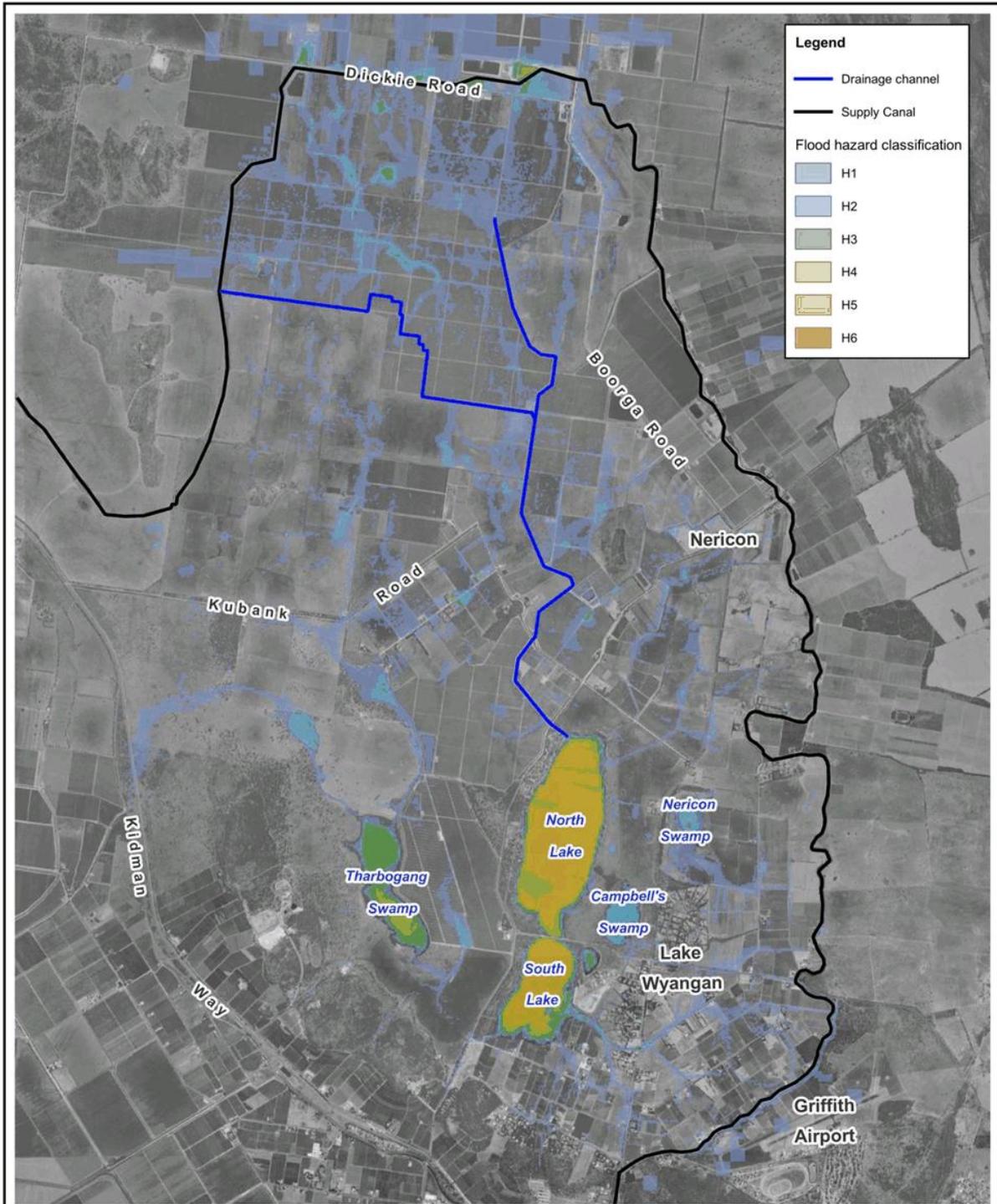
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<p>Figure:</p> <p><b>A-7</b></p>	<p><i>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</i></p>		
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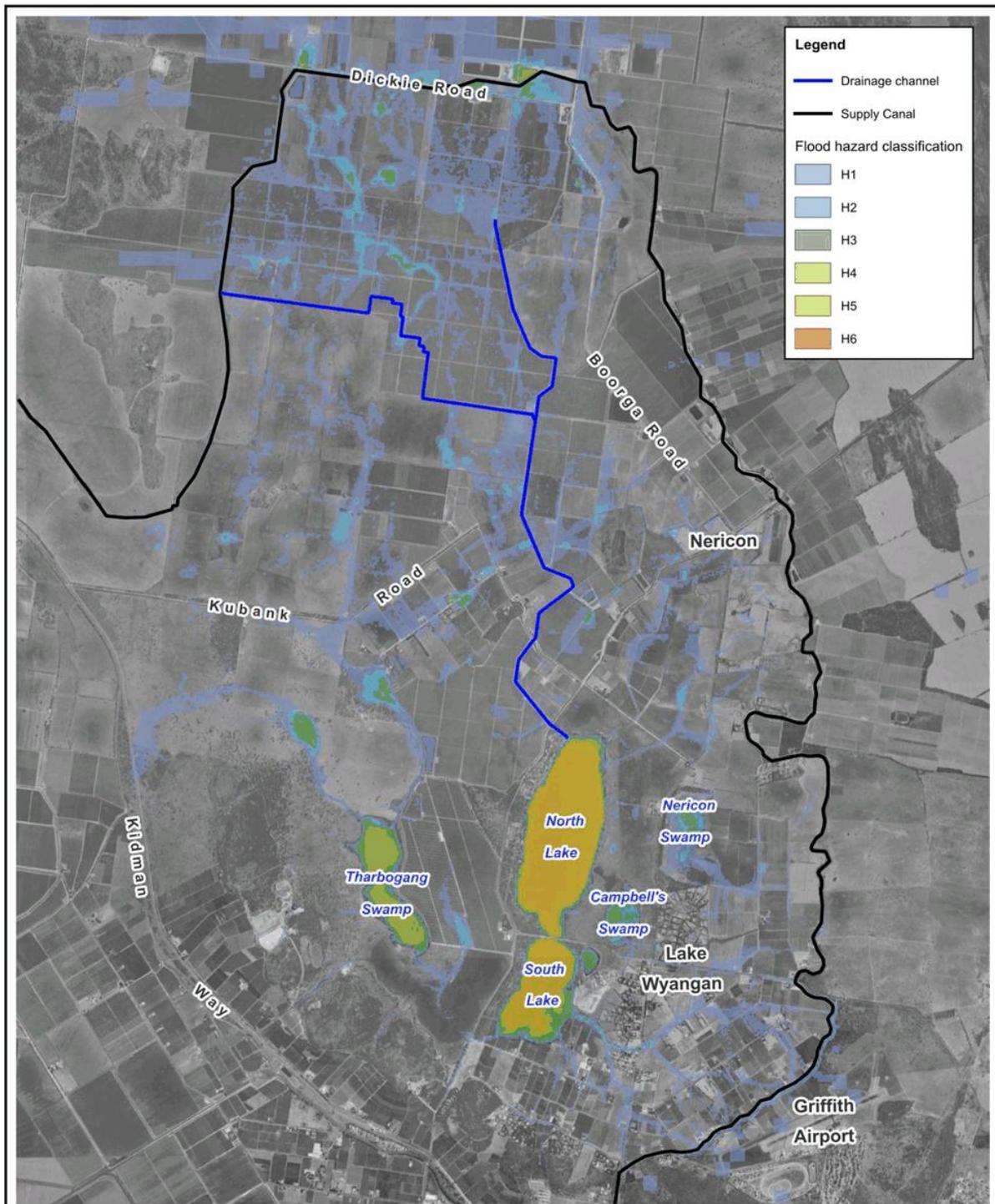
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<p>Figure:</p> <p><b>A-8</b></p>	<p><i>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</i></p>		
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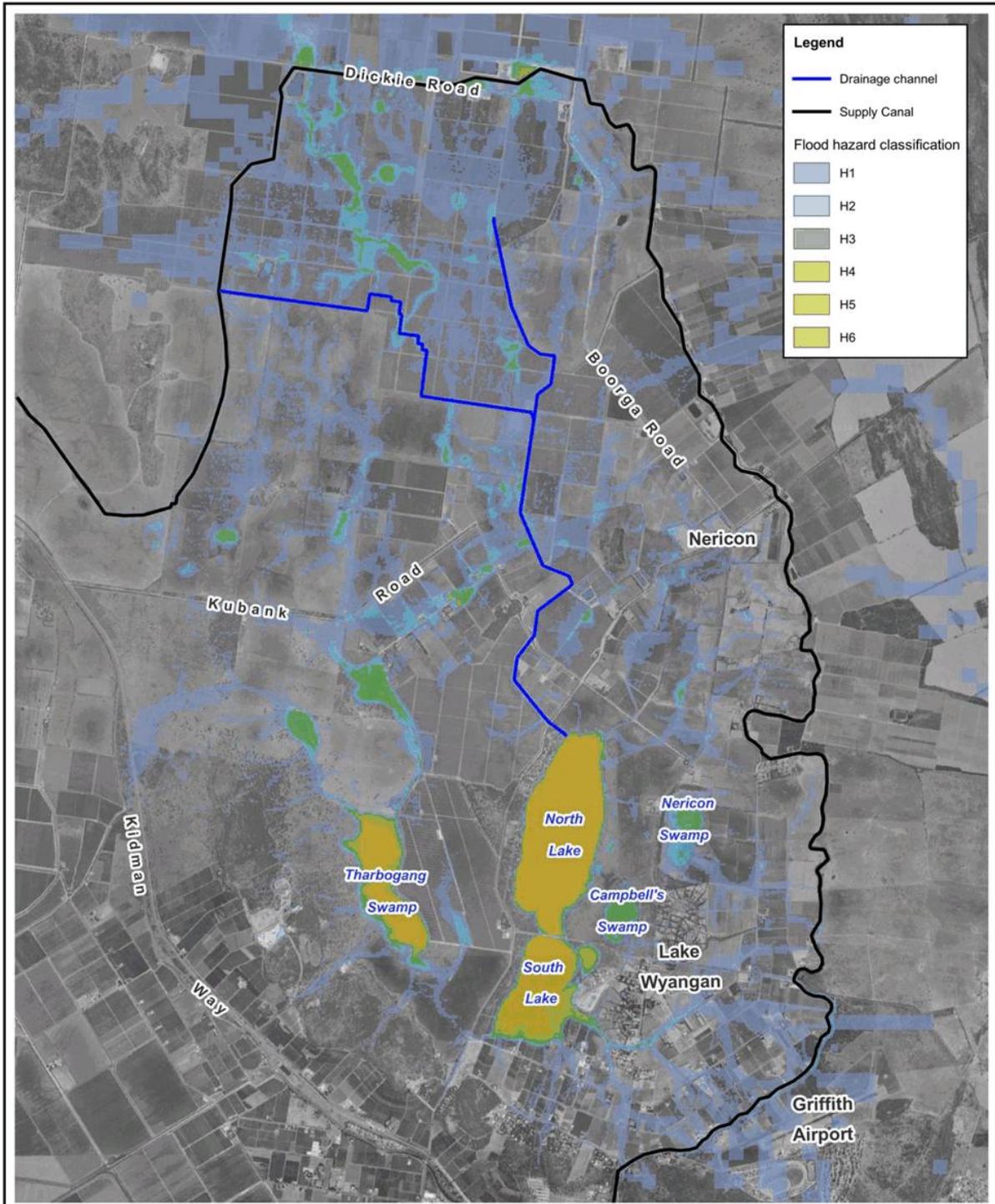
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<p>Figure:</p> <p><b>A-9</b></p>	<p><i>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</i></p>		
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<p>Figure:</p> <p><b>A-10</b></p>	<p>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</p>	<p>N</p>	<p><b>Torrent</b> CONSULTING</p> <p>www.torrentconsulting.com.au</p>
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<p>Title:</p> <p><b>1% AEP Modelled Flood Hazard Classification 2040 Flood Planning Condition</b></p>		<p>0 1 2 km</p> <p>approx. scale</p>	
<p>Figure:</p> <p><b>A-11</b></p>	<p><i>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</i></p>		
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**Legend**

- Drainage channel
- Supply Canal

Flood hazard classification

- H1
- H2
- H3
- H4
- H5
- H6

Title:  
**0.5% AEP Modelled Flood Hazard Classification  
 2040 Flood Planning Condition**

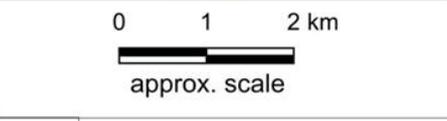


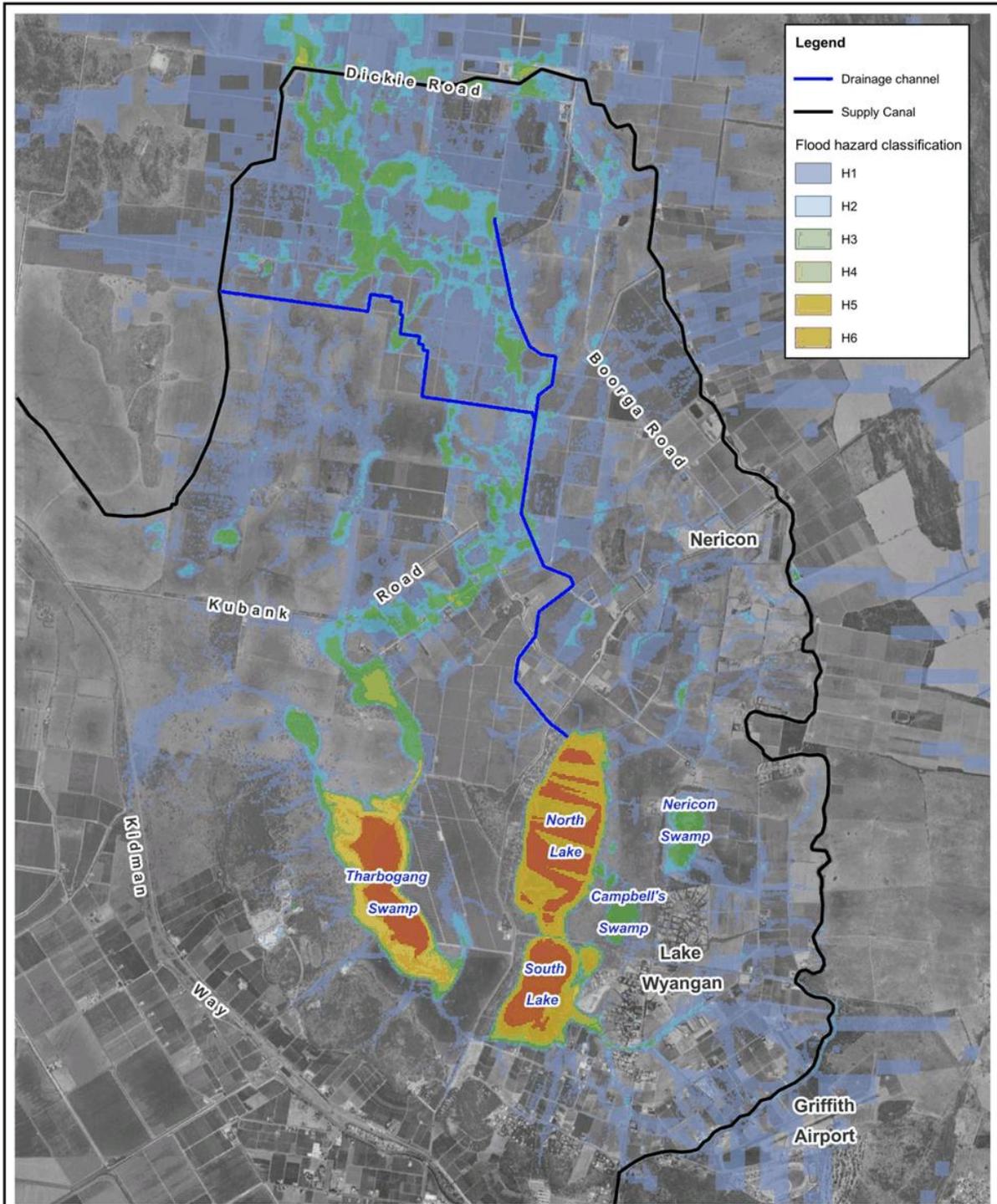
Figure: **A-12** *Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.*

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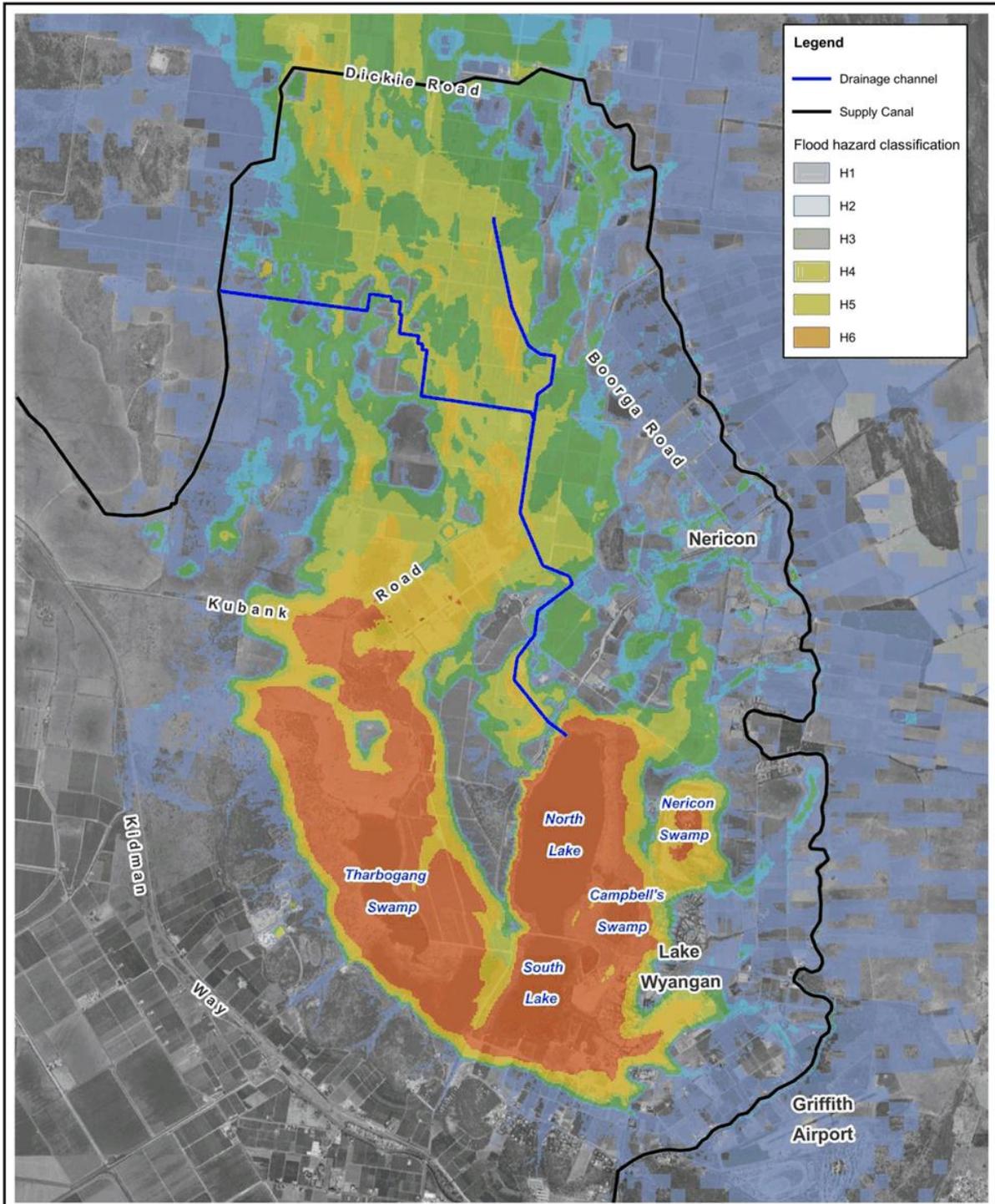
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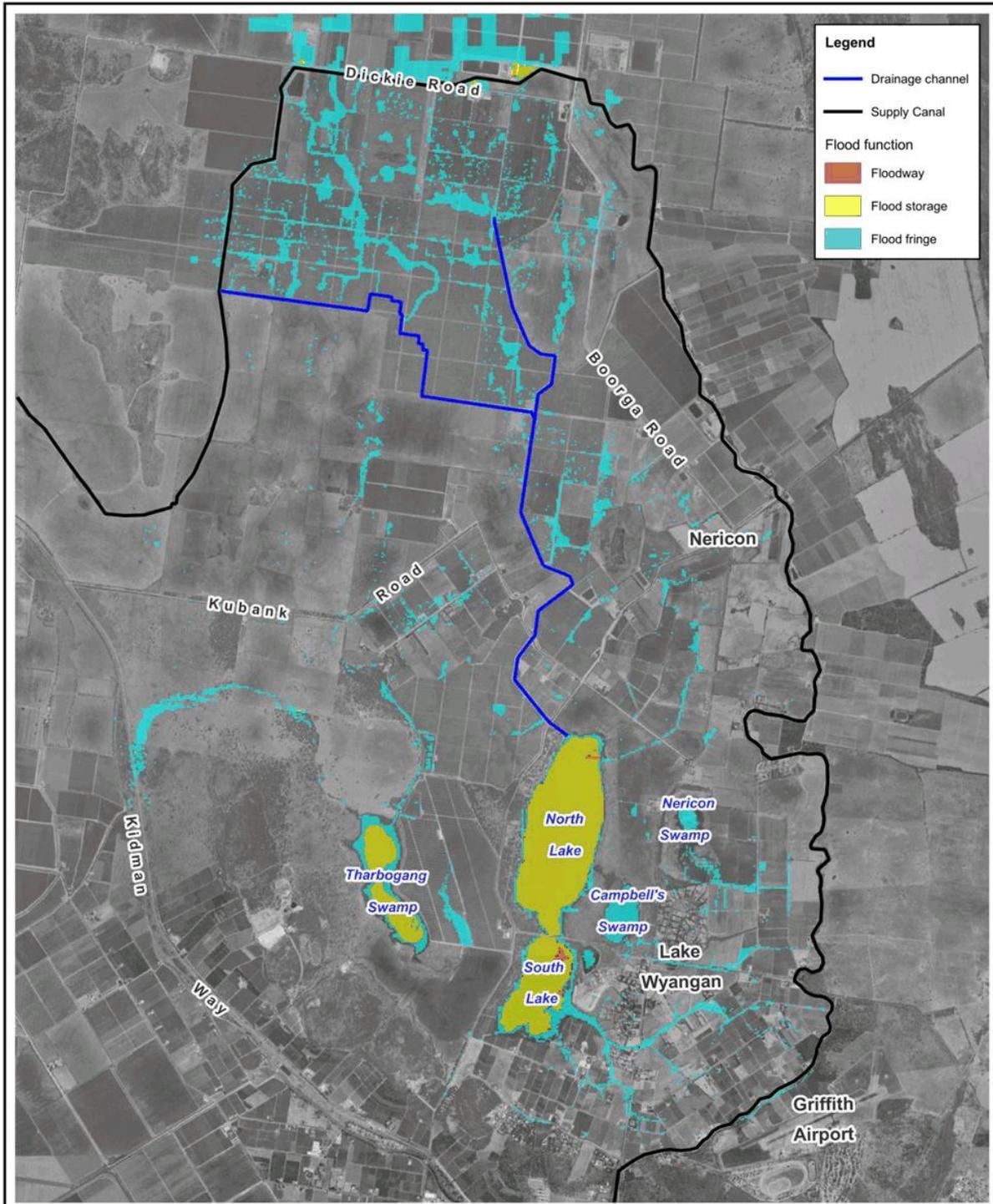
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<p>Title:</p> <p><b>0.2% AEP Modelled Flood Hazard Classification 2040 Flood Planning Condition</b></p>		<p>0 1 2 km</p> <p>approx. scale</p>	
<p>Figure:</p> <p><b>A-13</b></p>	<p>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</p>	<p>N</p>	<p><b>Torrent</b> CONSULTING</p> <p>www.torrentconsulting.com.au</p>
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<p>Figure:</p> <p><b>A-14</b></p>	<p><i>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</i></p>		
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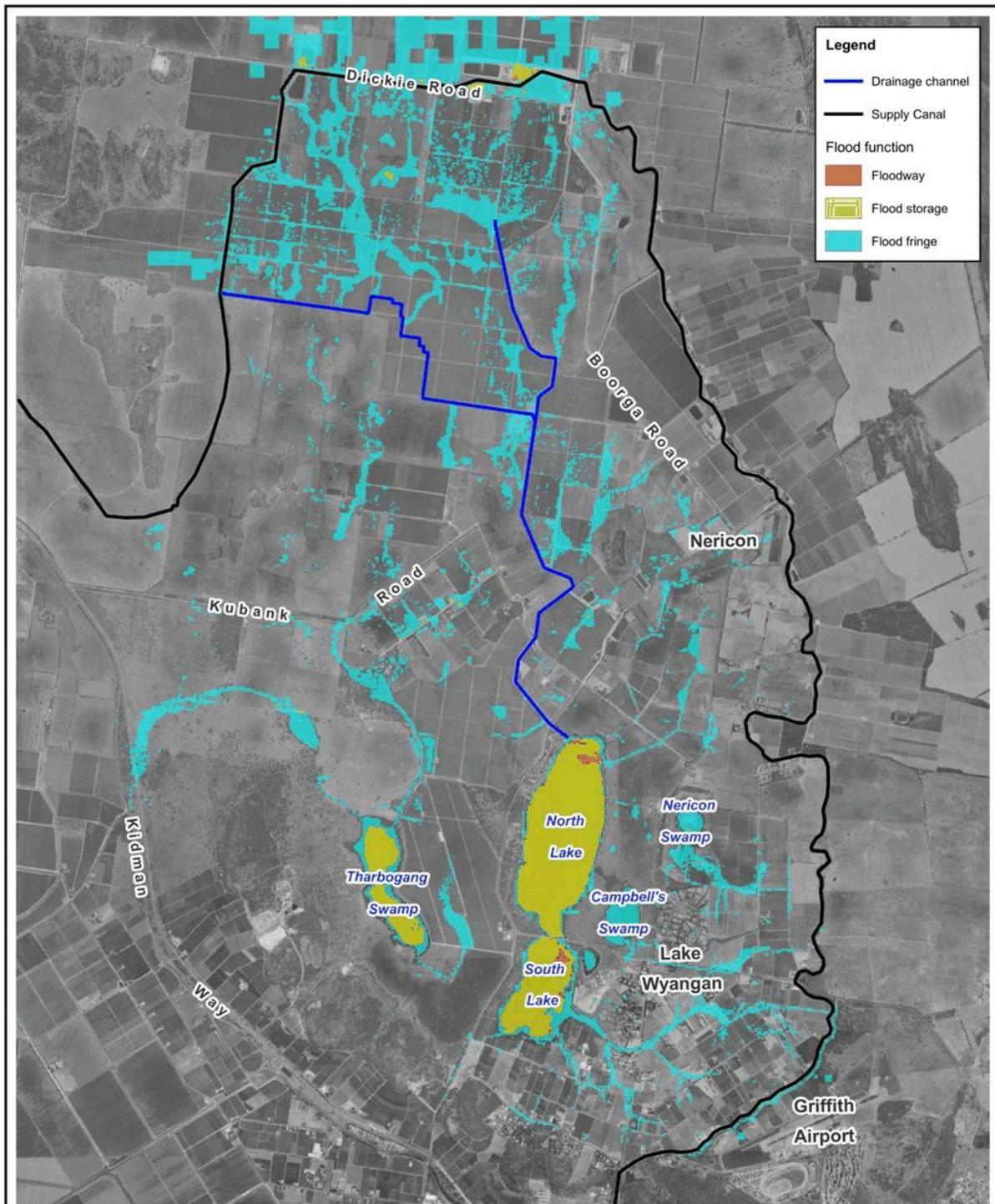


Figure: **A-15** *Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.*

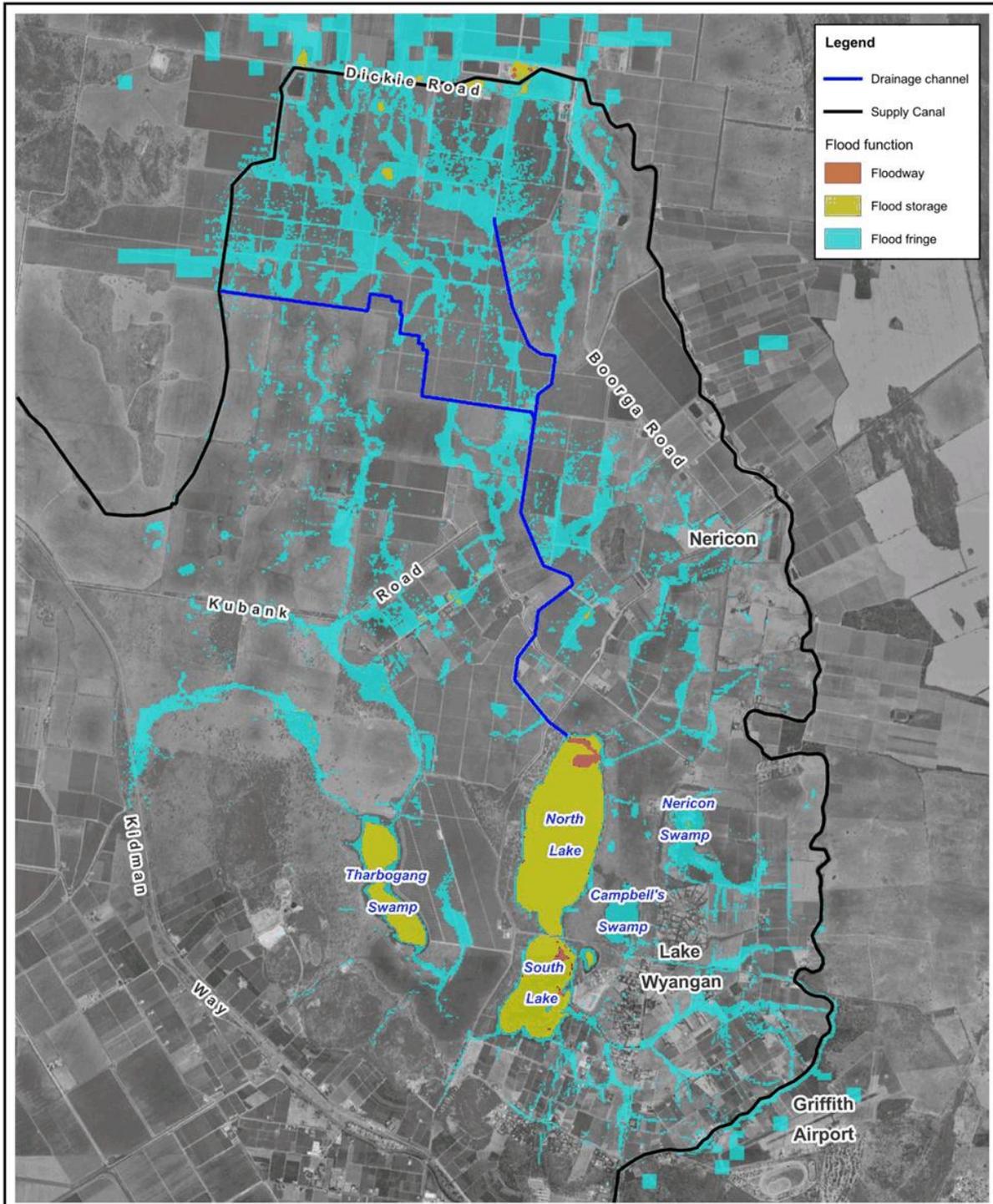
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<p>Figure:</p> <p><b>A-16</b></p>	<p><i>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</i></p>		
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Title:  
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 2040 Flood Planning Condition**

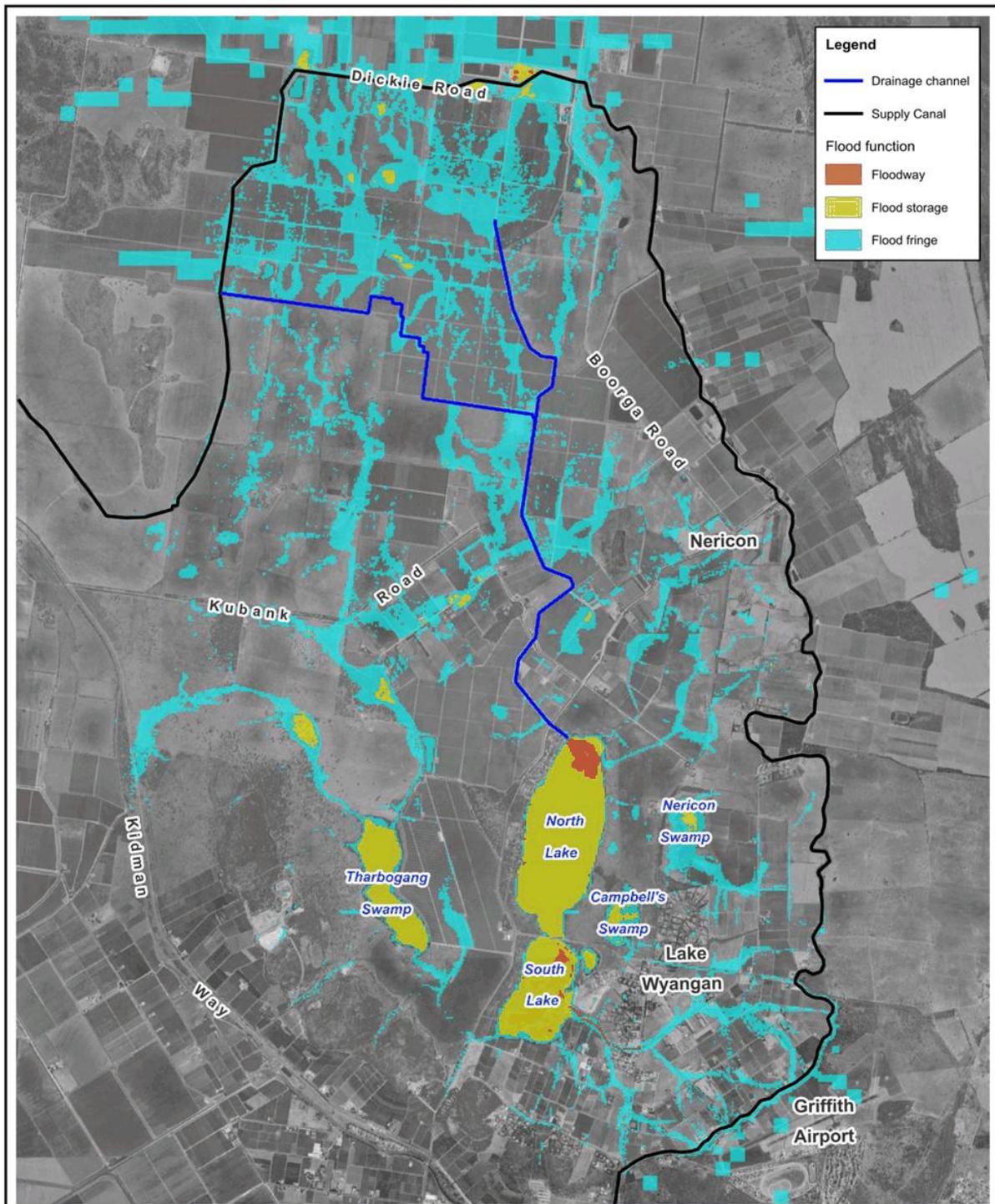
0 1 2 km  
 approx. scale

Figure: **A-17** Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.

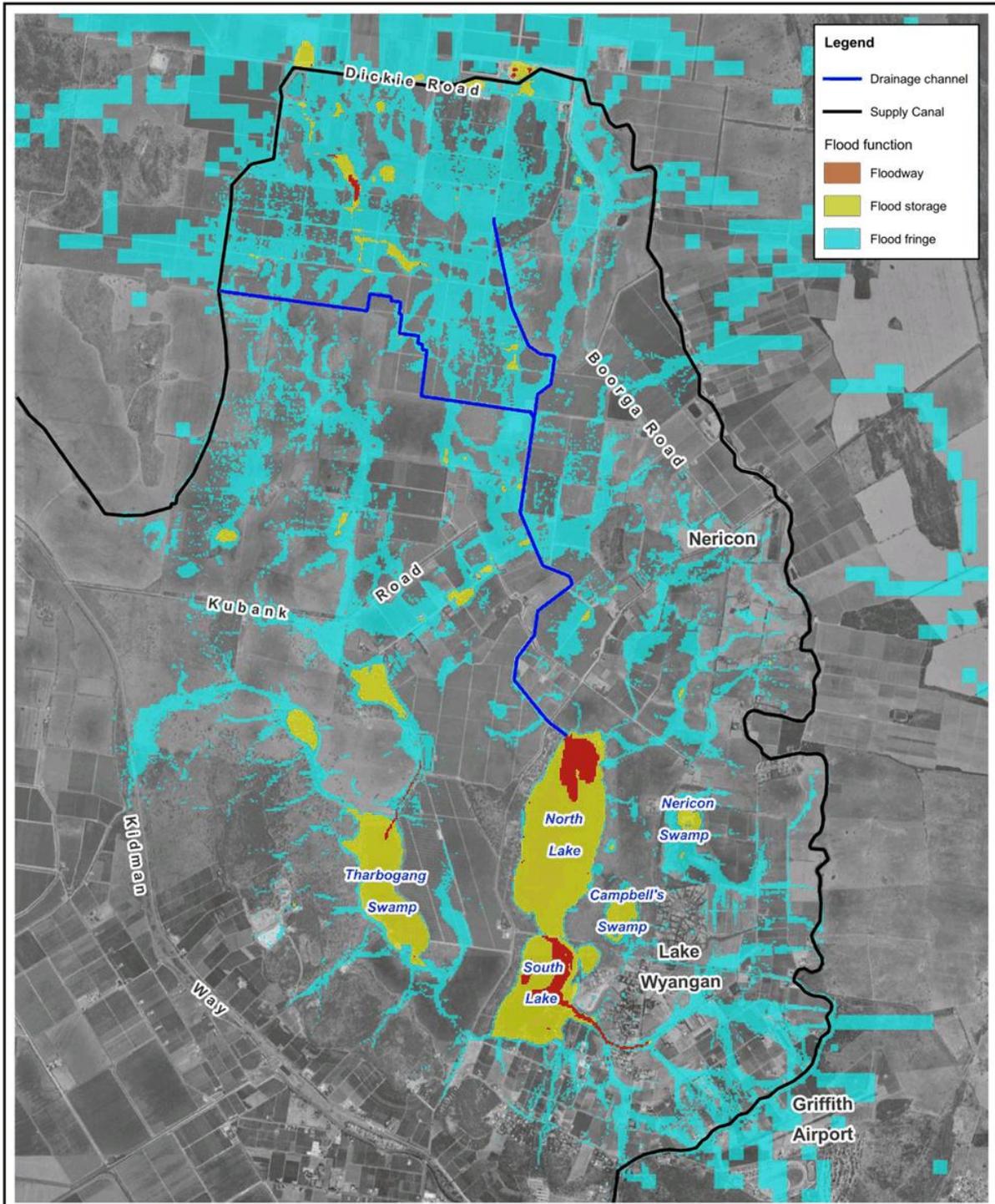
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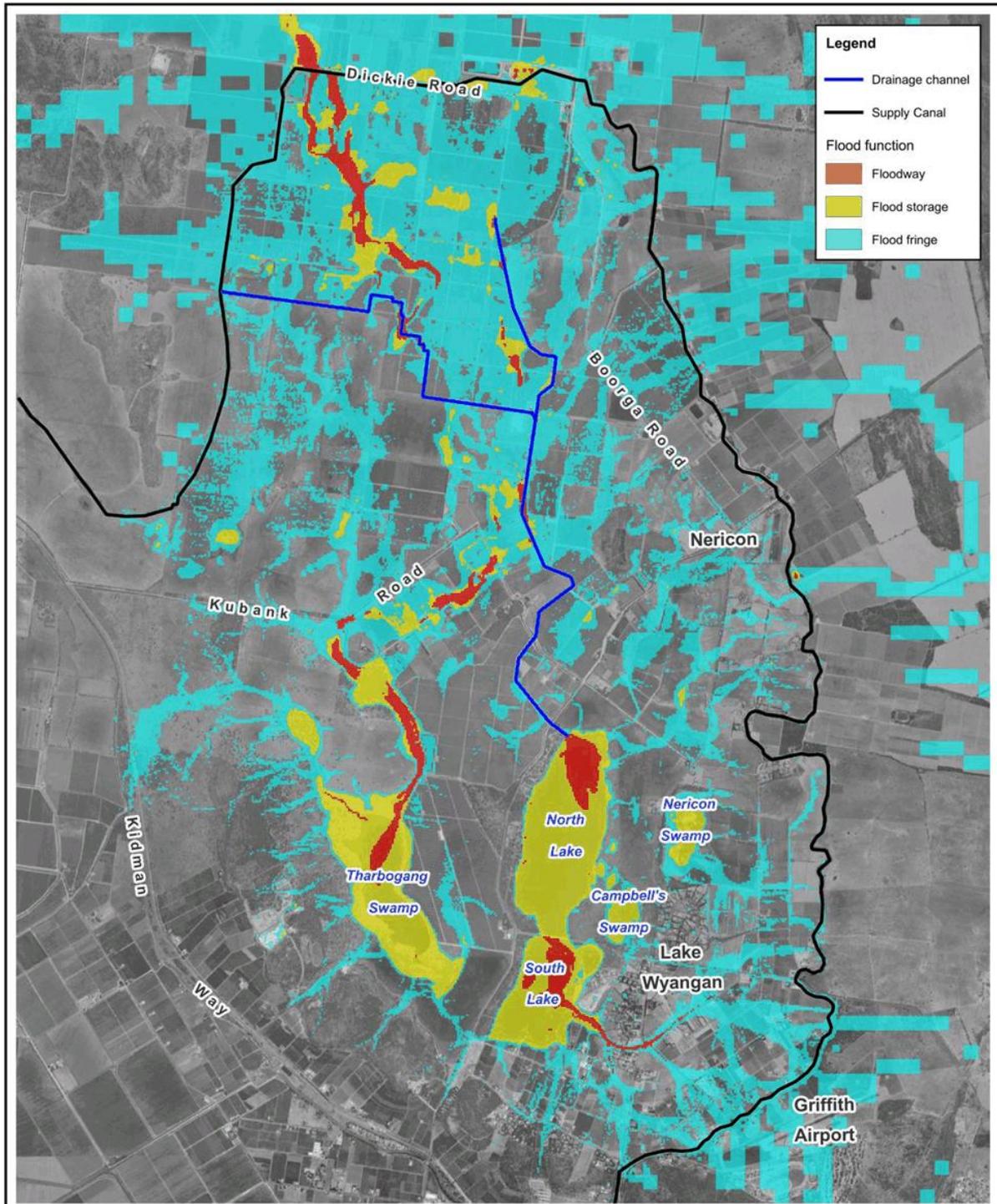
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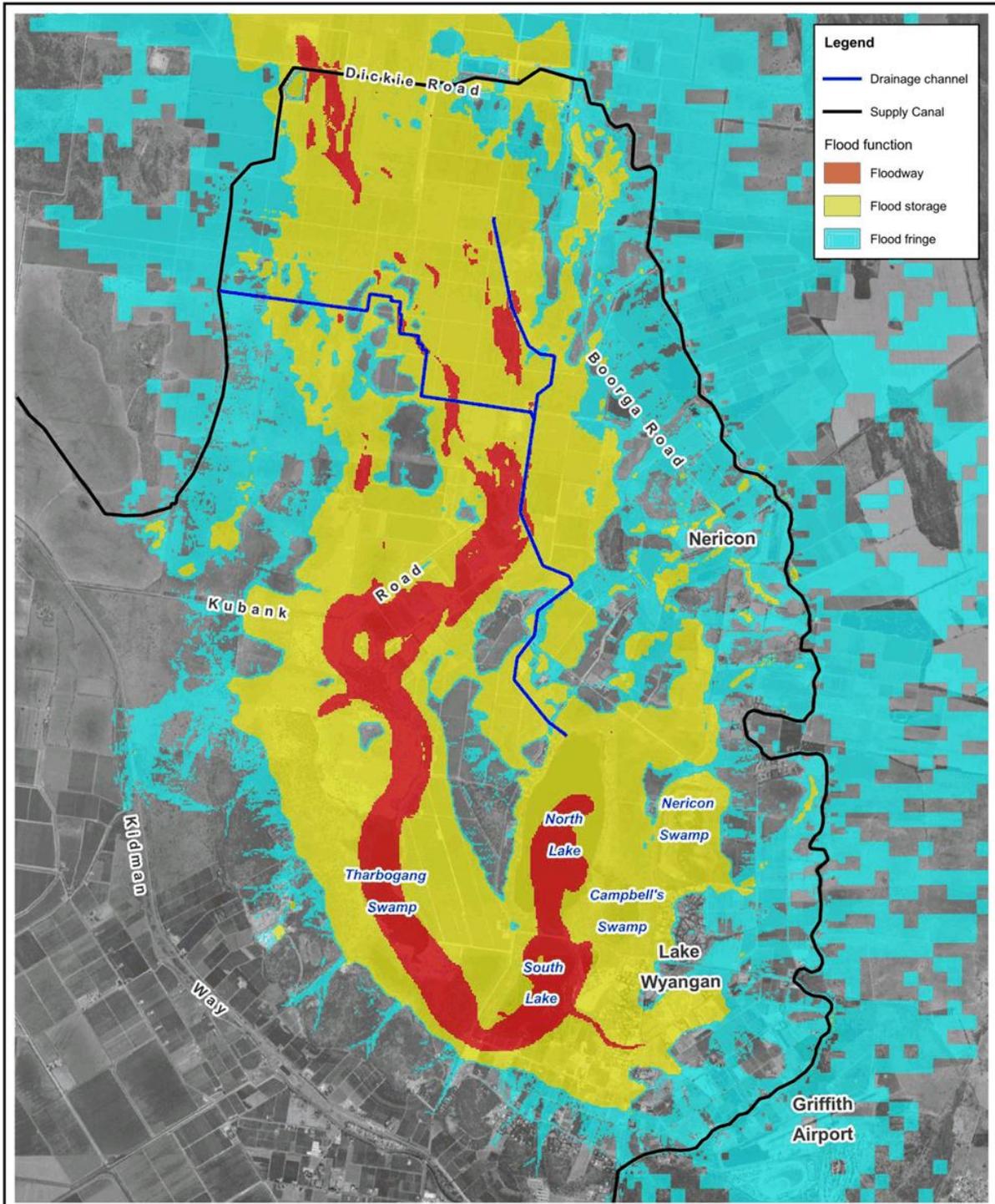
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<p>Figure:</p> <p><b>A-18</b></p>	<p><i>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</i></p>		
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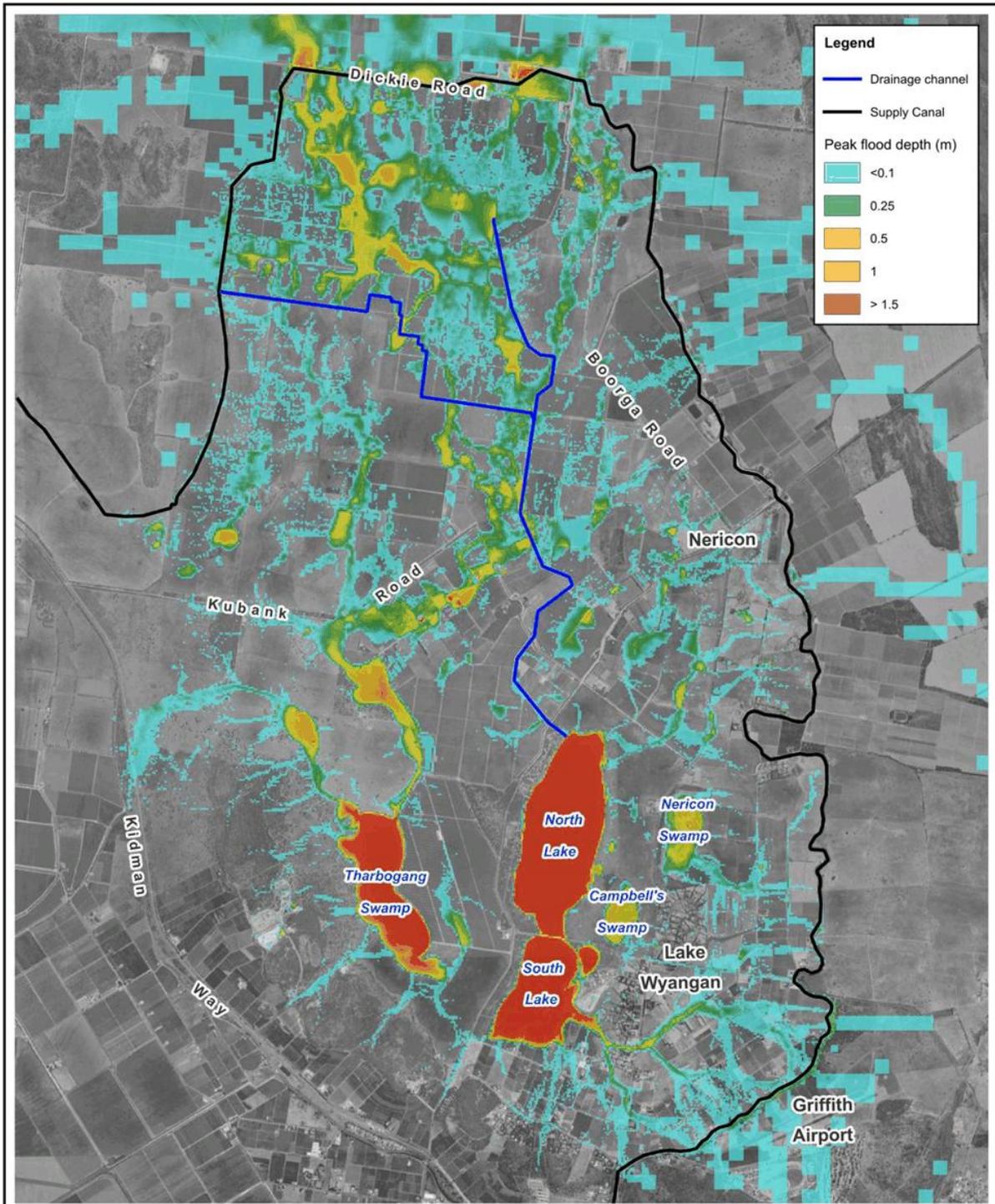
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<p>Figure:</p> <p><b>A-19</b></p>	<p><i>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</i></p>		
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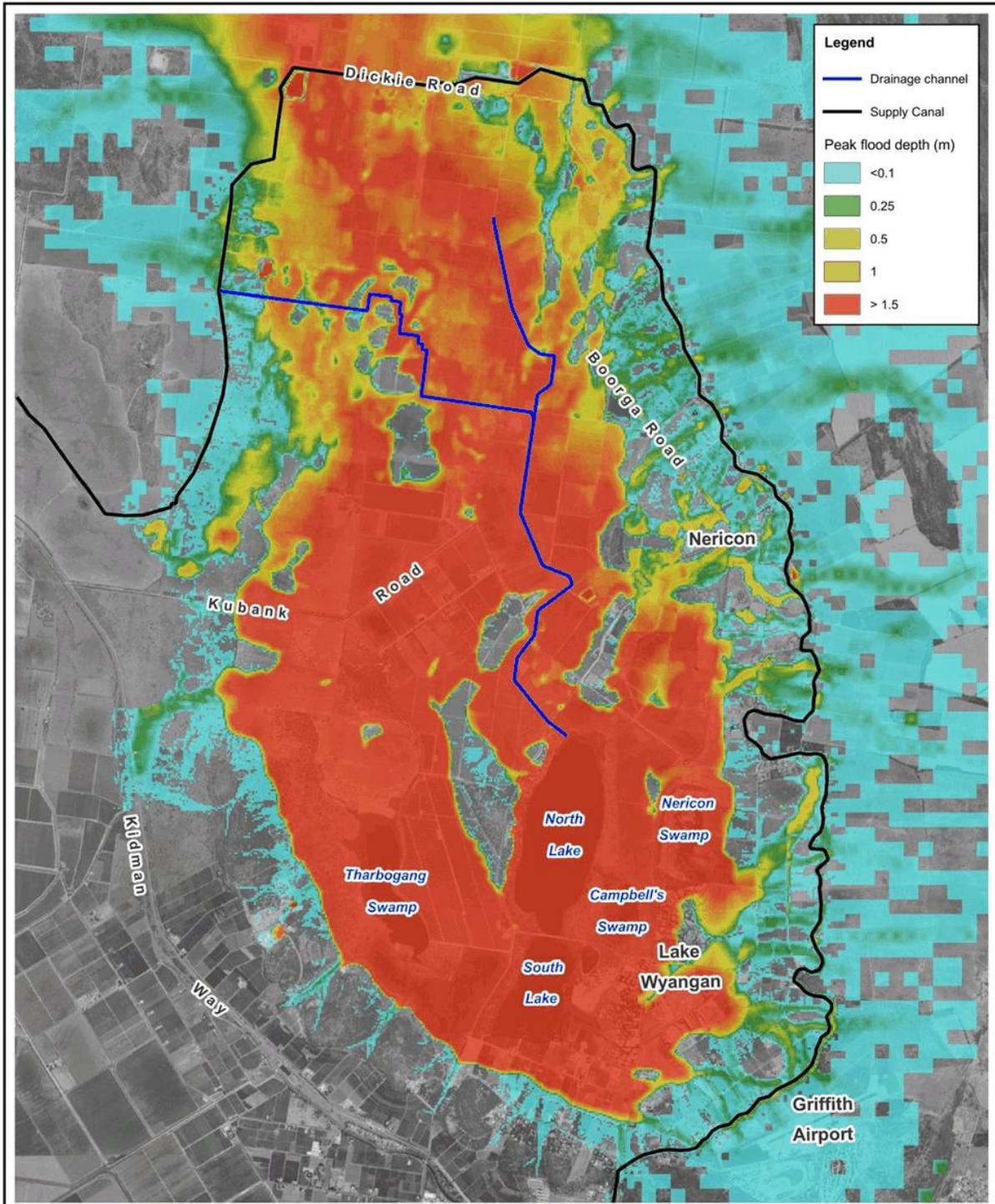
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<p>Figure: <b>A-20</b></p>	<p><i>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</i></p>		
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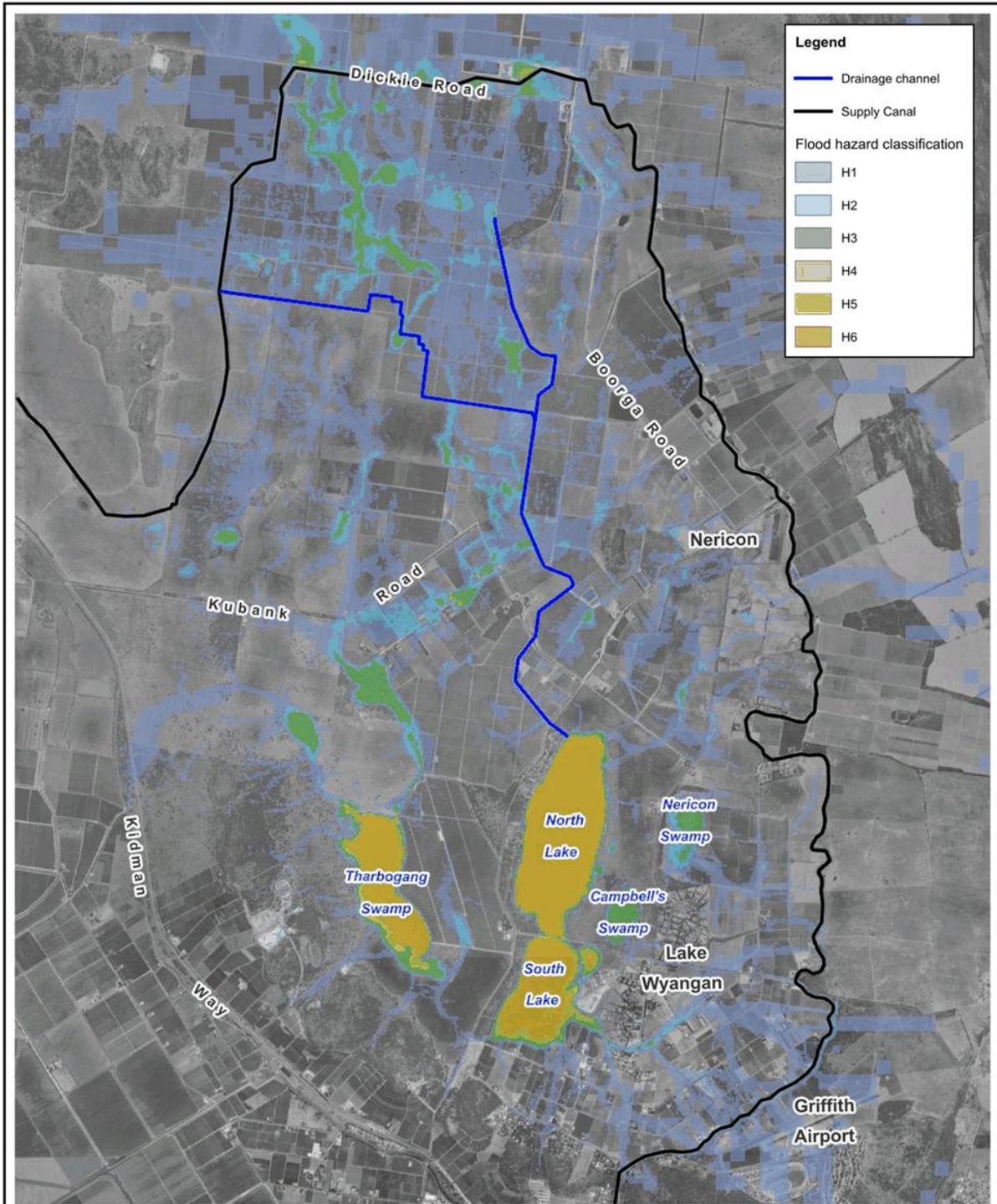
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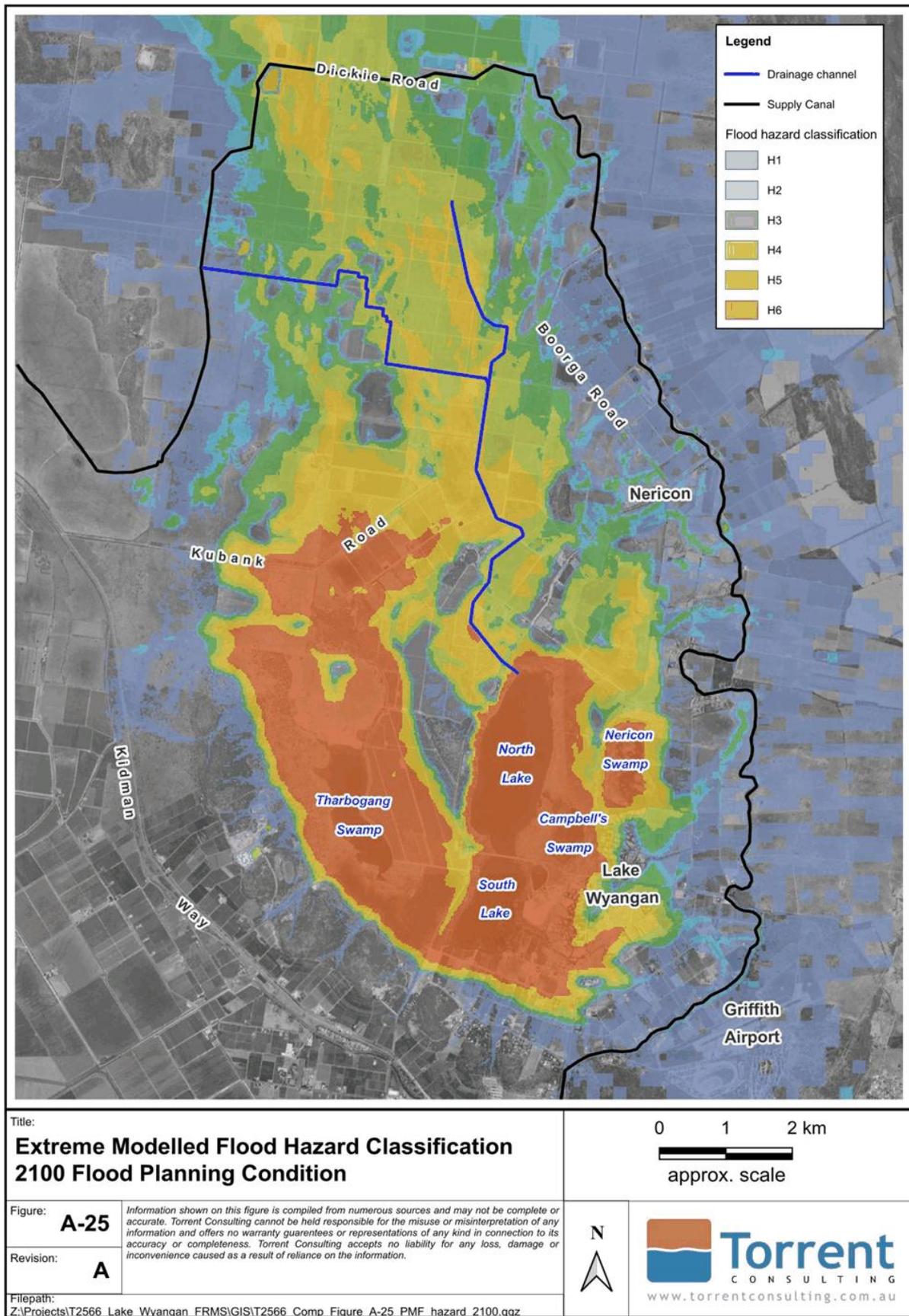
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<p>Figure:</p> <p><b>A-22</b></p>	<p><i>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</i></p>		
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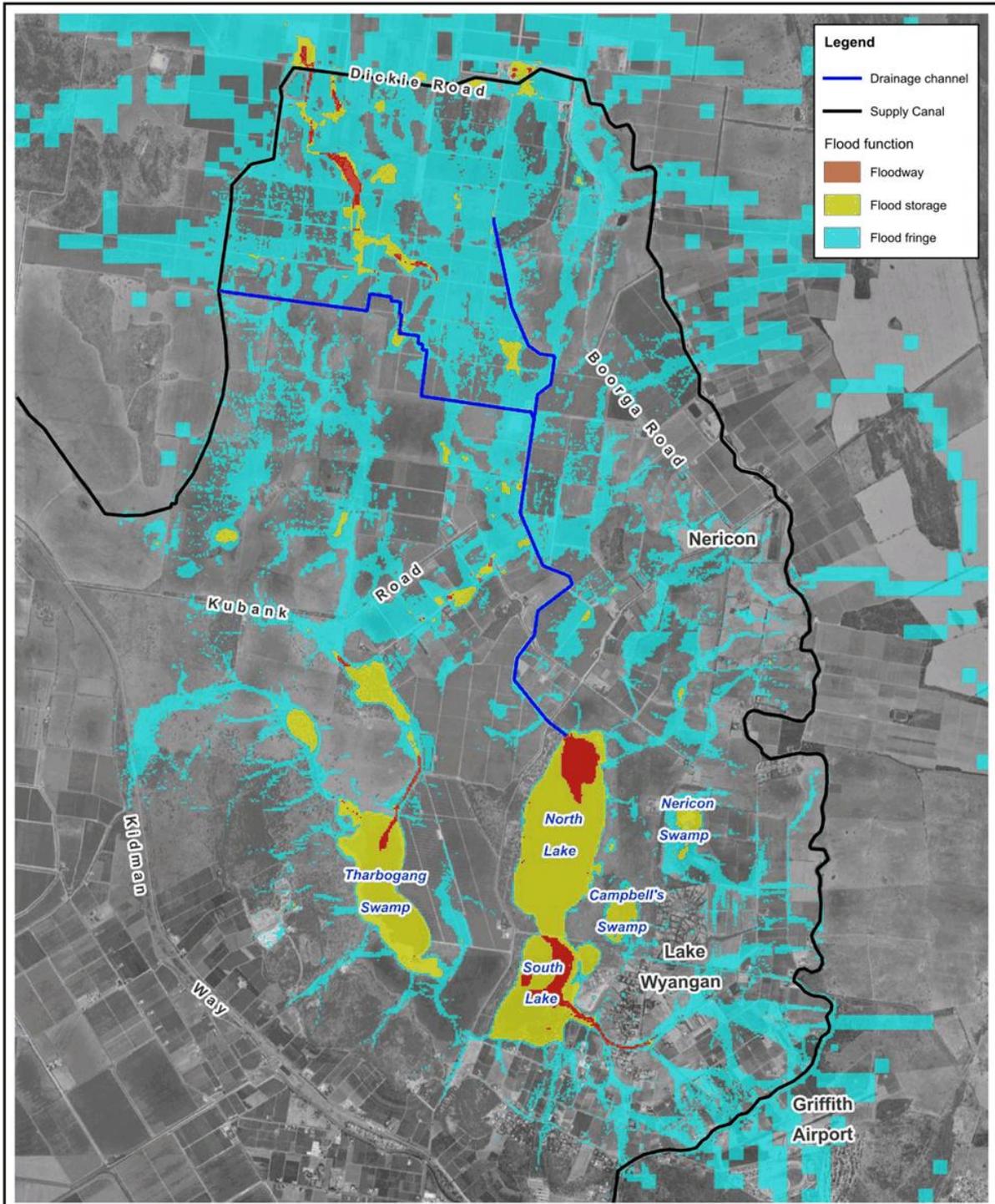


<p>Title:</p> <p><b>Extreme Modelled Peak Flood Depth 2100 Flood Planning Condition</b></p>		<p>0 1 2 km</p> <p>approx. scale</p>	
<p>Figure:</p> <p><b>A-23</b></p>	<p><i>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</i></p>	<p>N</p>	<p><b>Torrent</b> CONSULTING</p> <p><a href="http://www.torrentconsulting.com.au">www.torrentconsulting.com.au</a></p>
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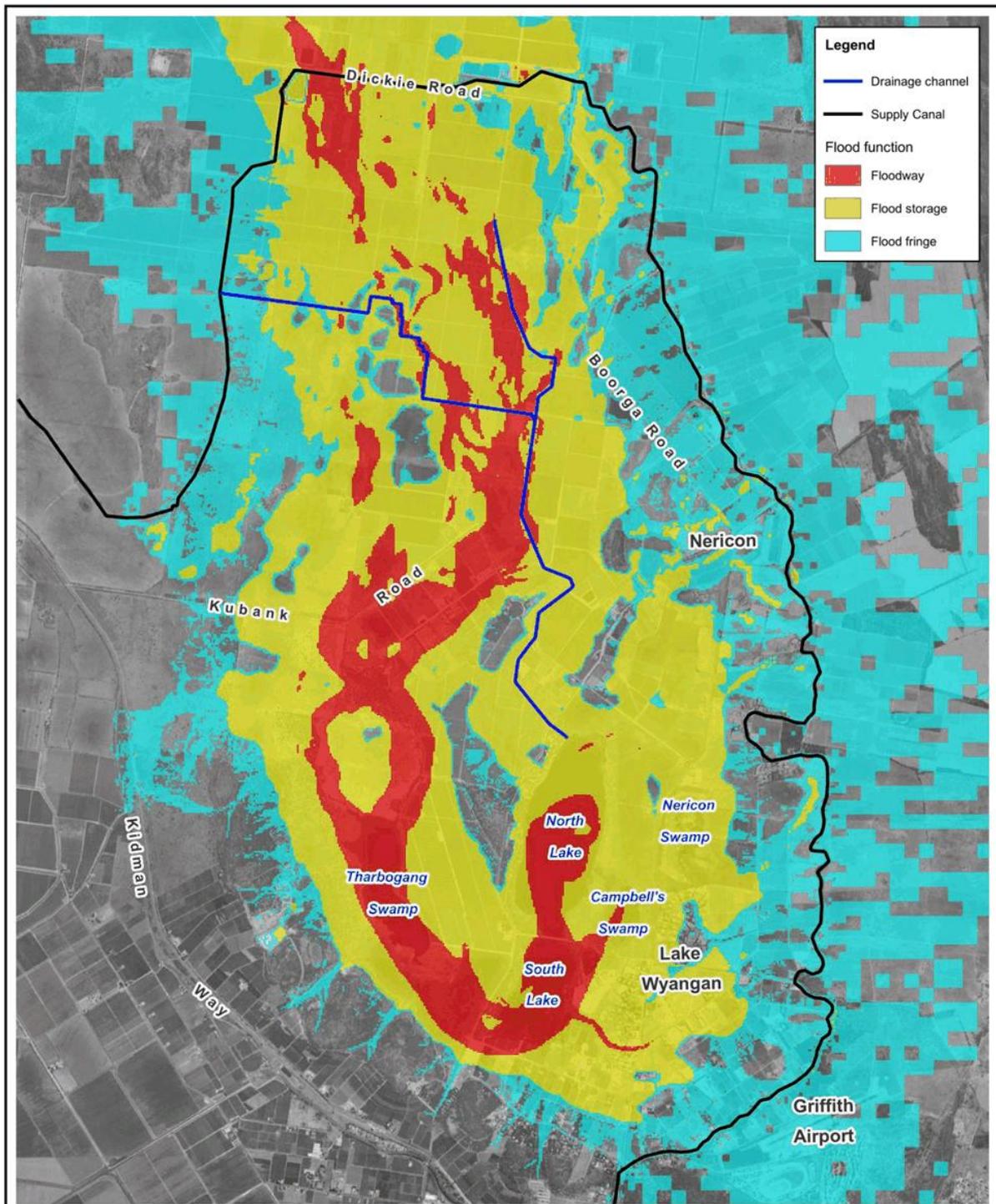


<p>Title: <b>1% AEP Modelled Flood Hazard Classification 2100 Flood Planning Condition</b></p>		<p>0 1 2 km approx. scale</p>	
<p>Figure: <b>A-24</b></p>	<p><i>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</i></p>		
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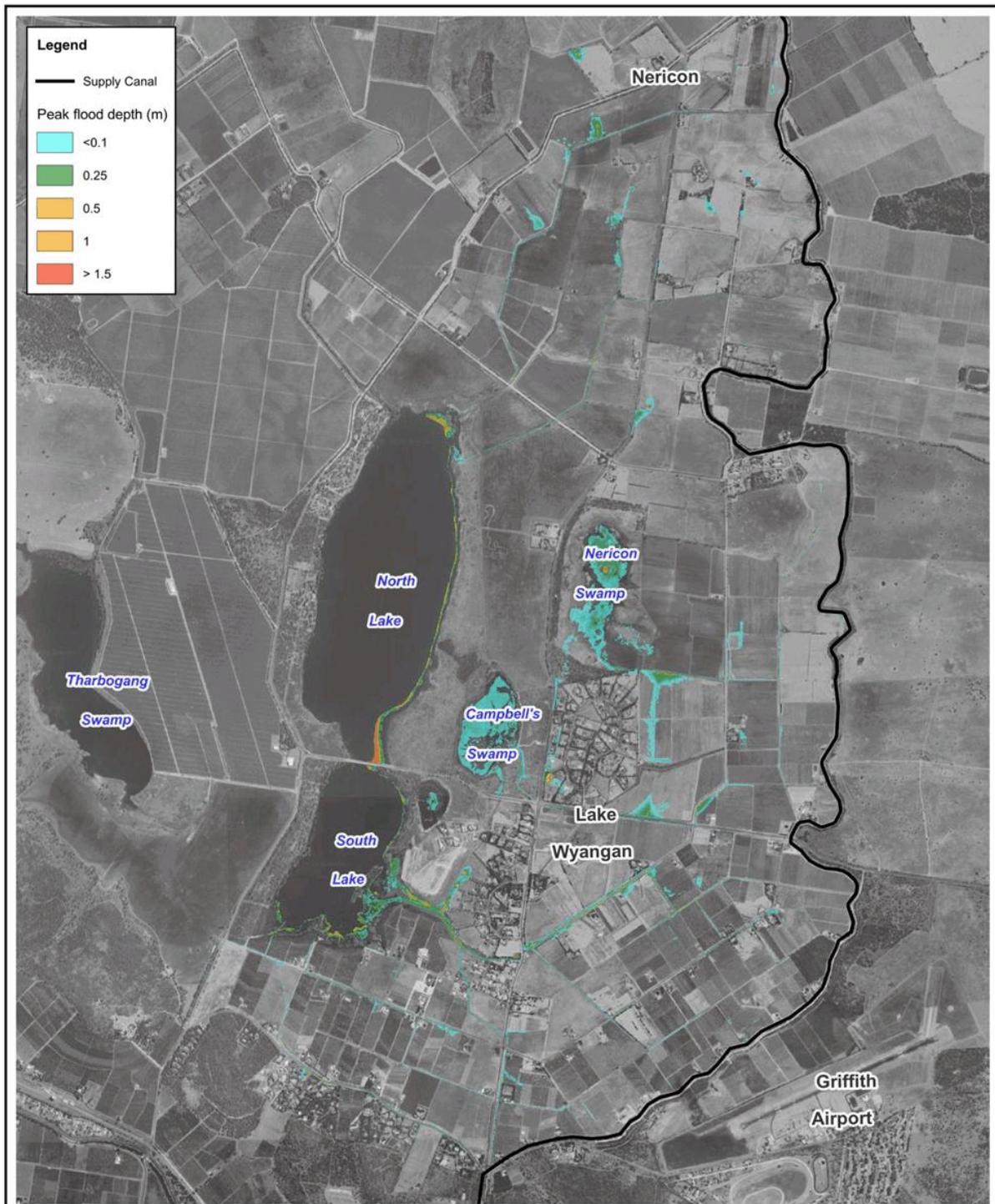
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<p>Figure:</p> <p><b>A-26</b></p>	<p><small>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</small></p>		
<p>Revision:</p> <p><b>A</b></p>	<p>N</p> <p><b>Torrent</b> CONSULTING <a href="http://www.torrentconsulting.com.au">www.torrentconsulting.com.au</a></p>		
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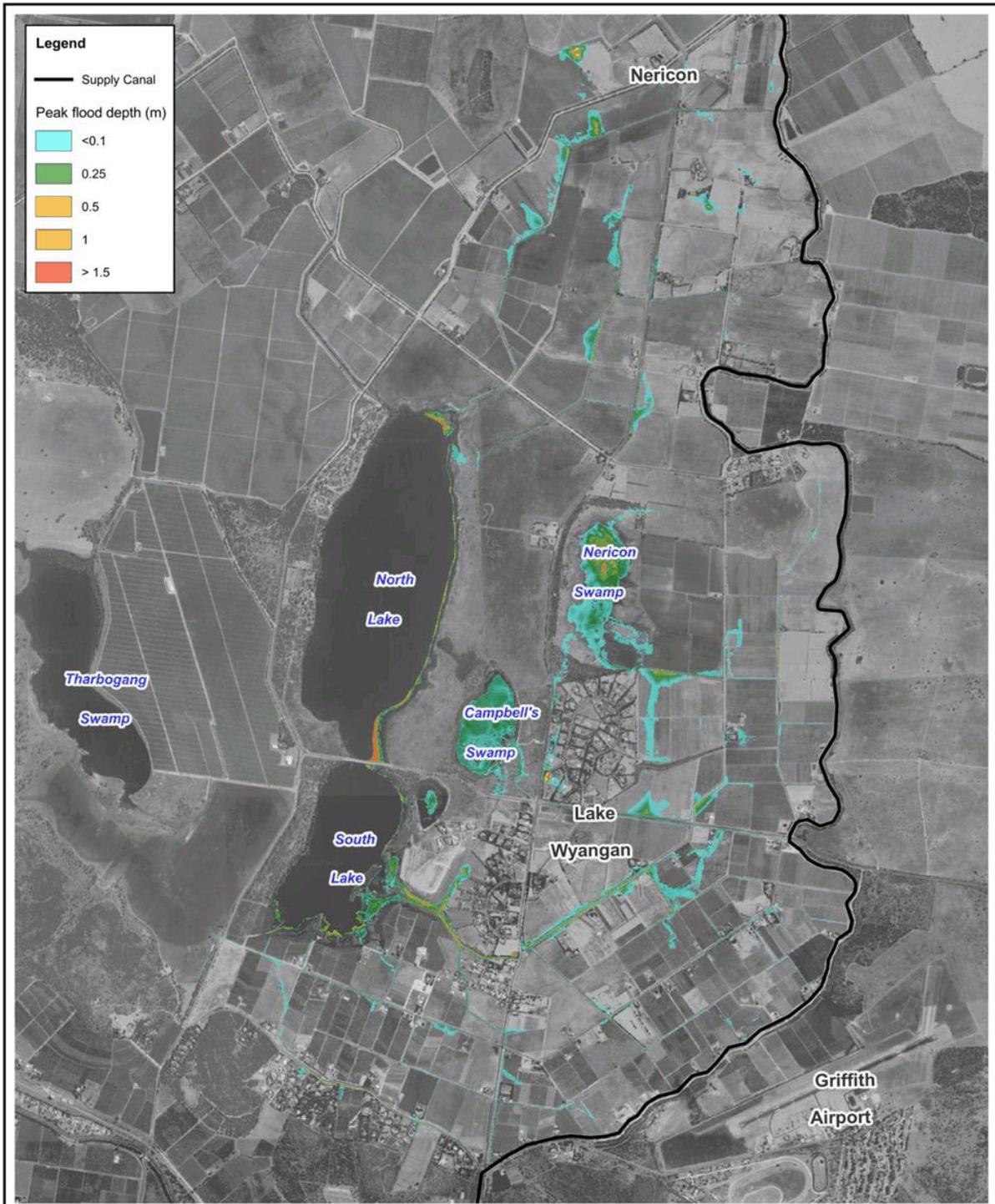
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<p>Figure:</p> <p><b>A-27</b></p>	<p>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</p>	<p>N</p>	<p><b>Torrent</b> CONSULTING</p> <p>www.torrentconsulting.com.au</p>
<p>Revision:</p> <p><b>A</b></p>			
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## Appendix B Local Catchment Flood Mapping

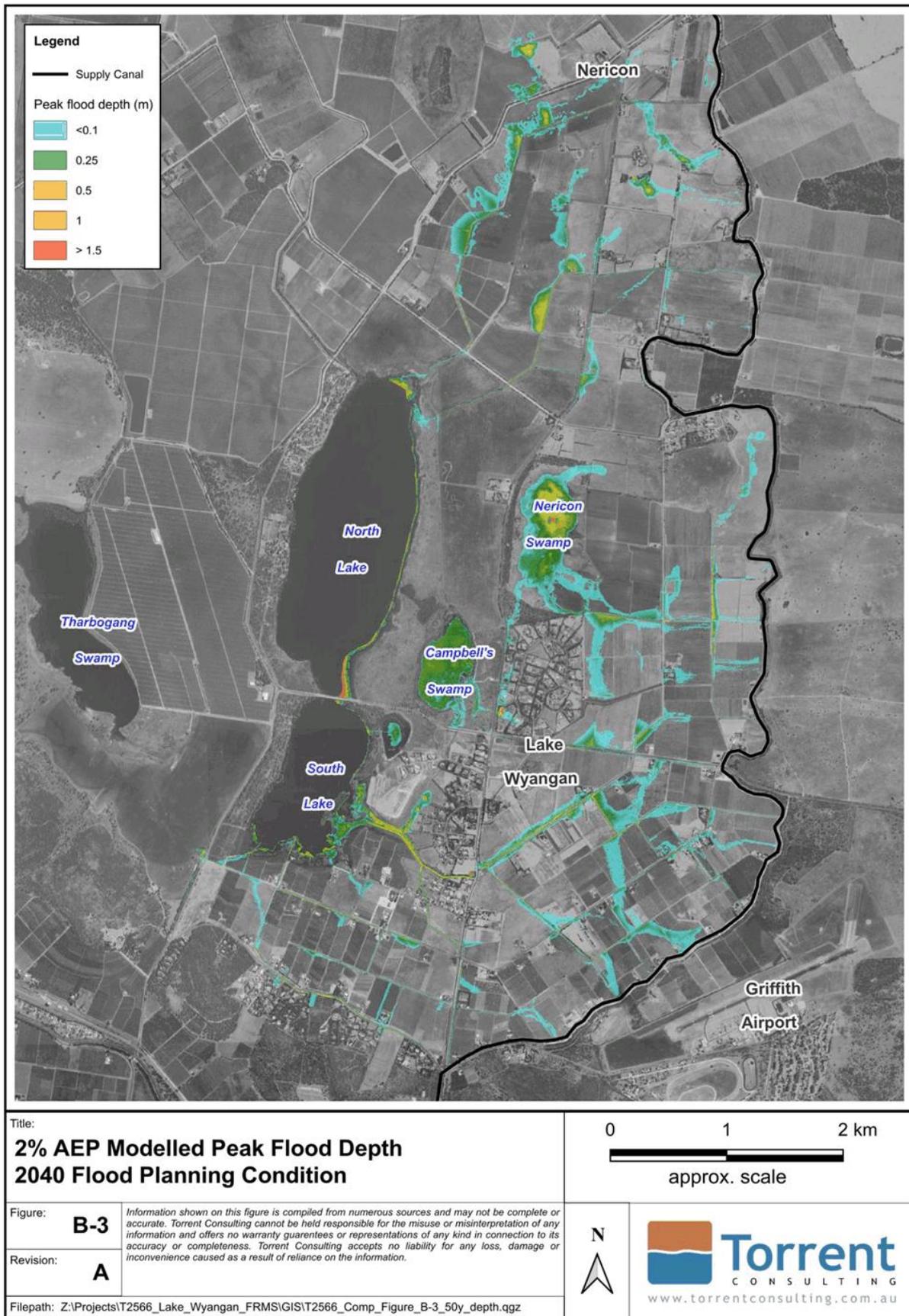
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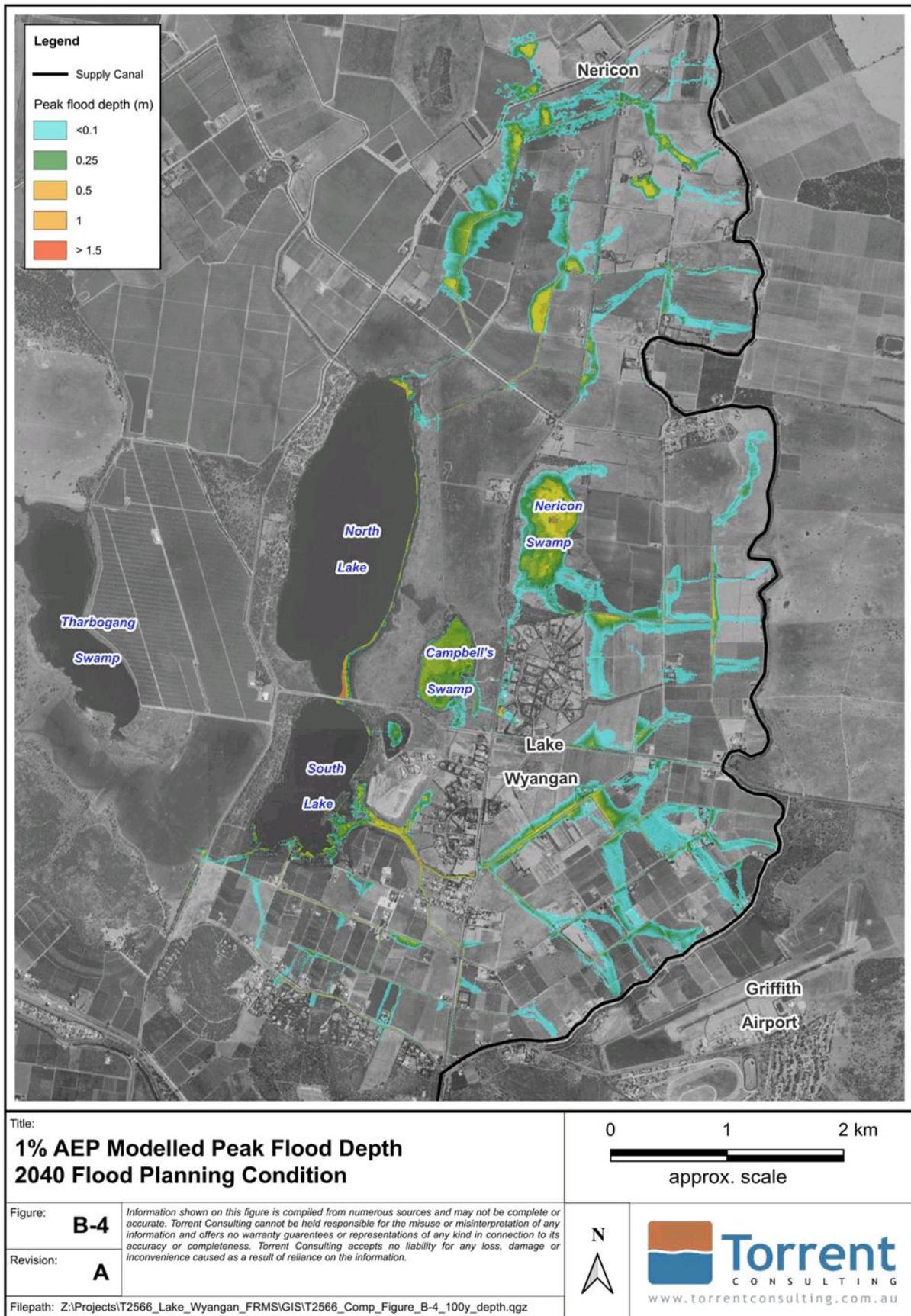


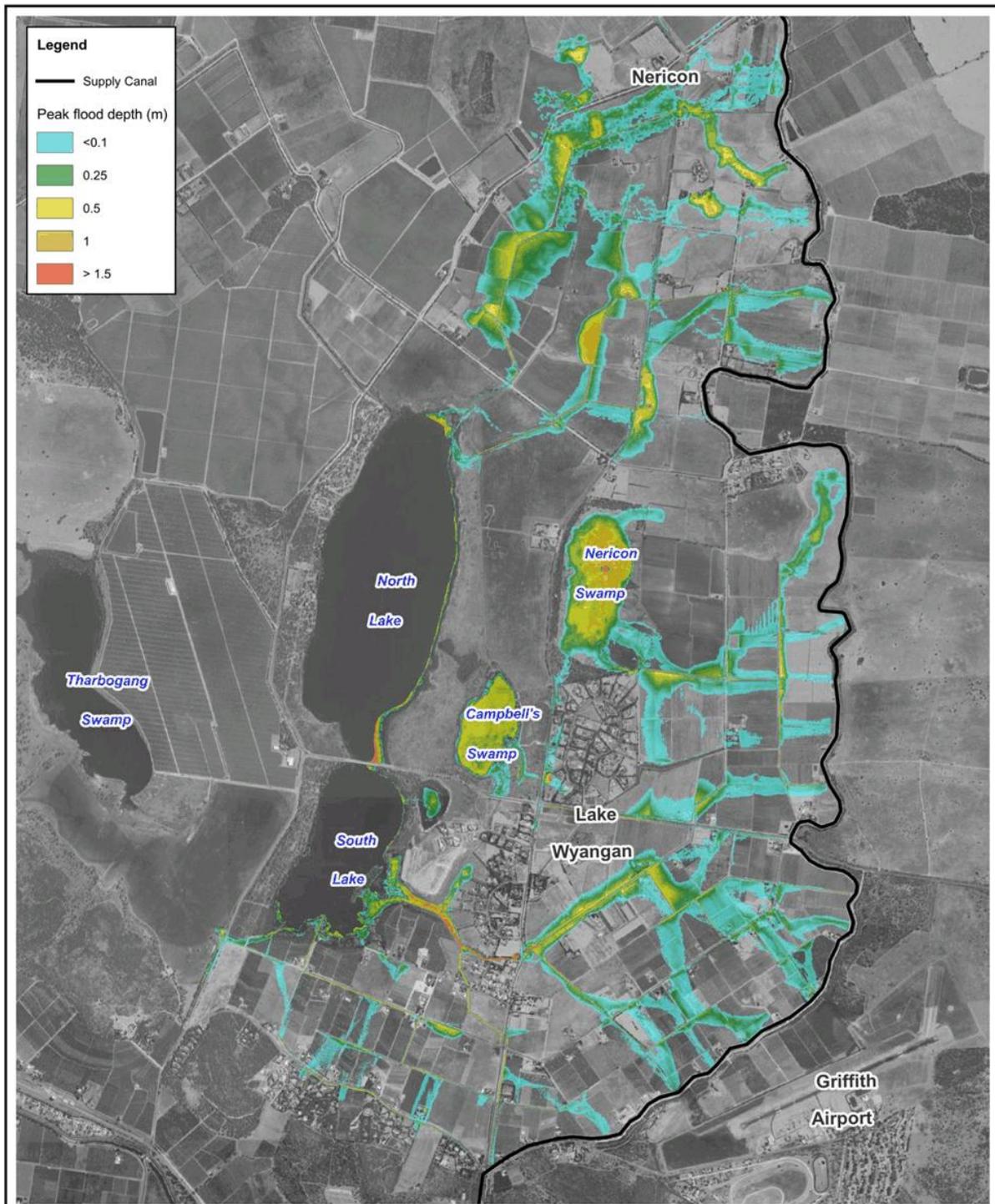
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<p>Figure:</p> <p><b>B-1</b></p>	<p><i>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</i></p>		
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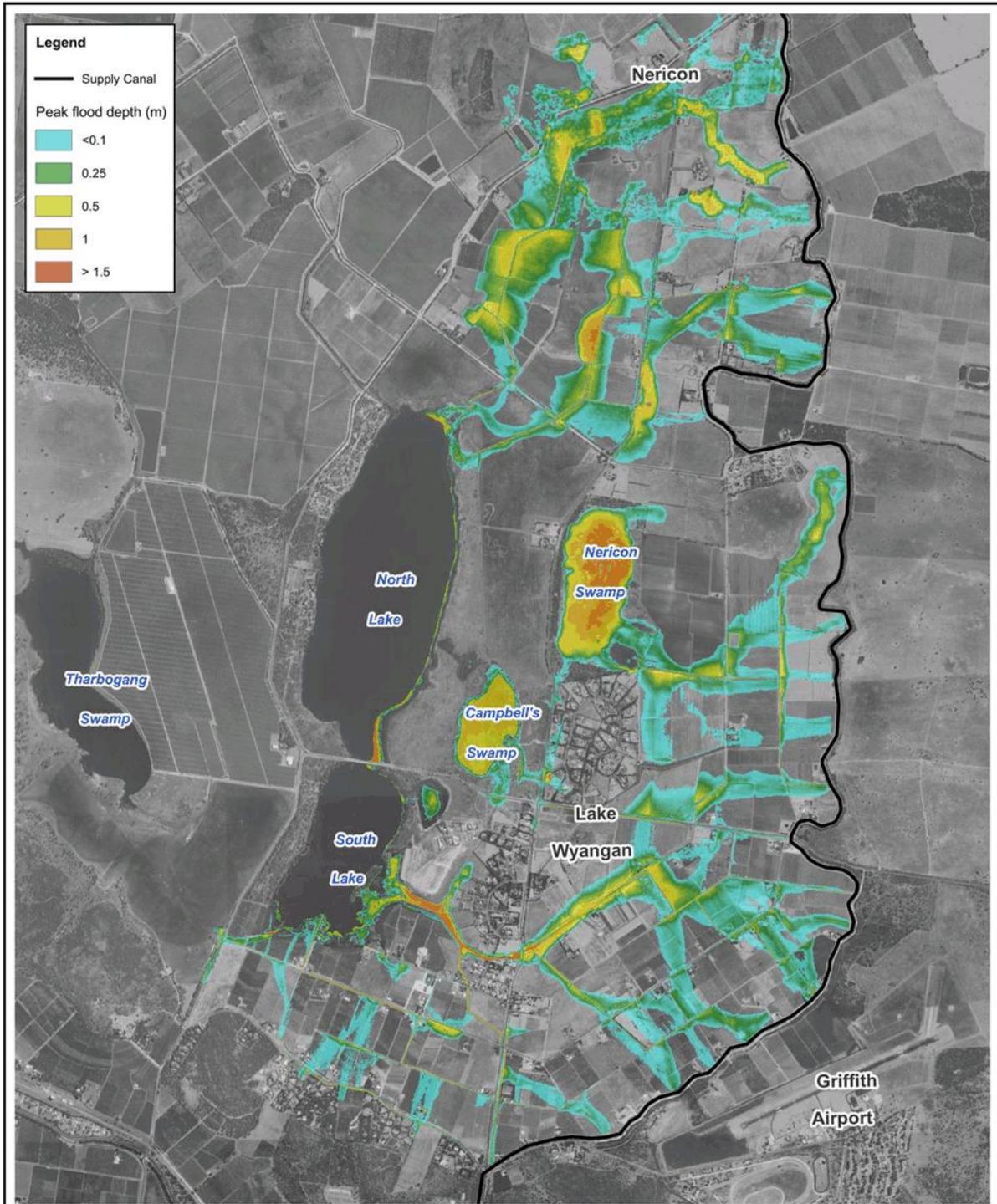
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<p>Figure:</p> <p><b>B-2</b></p>	<p><small>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</small></p>		
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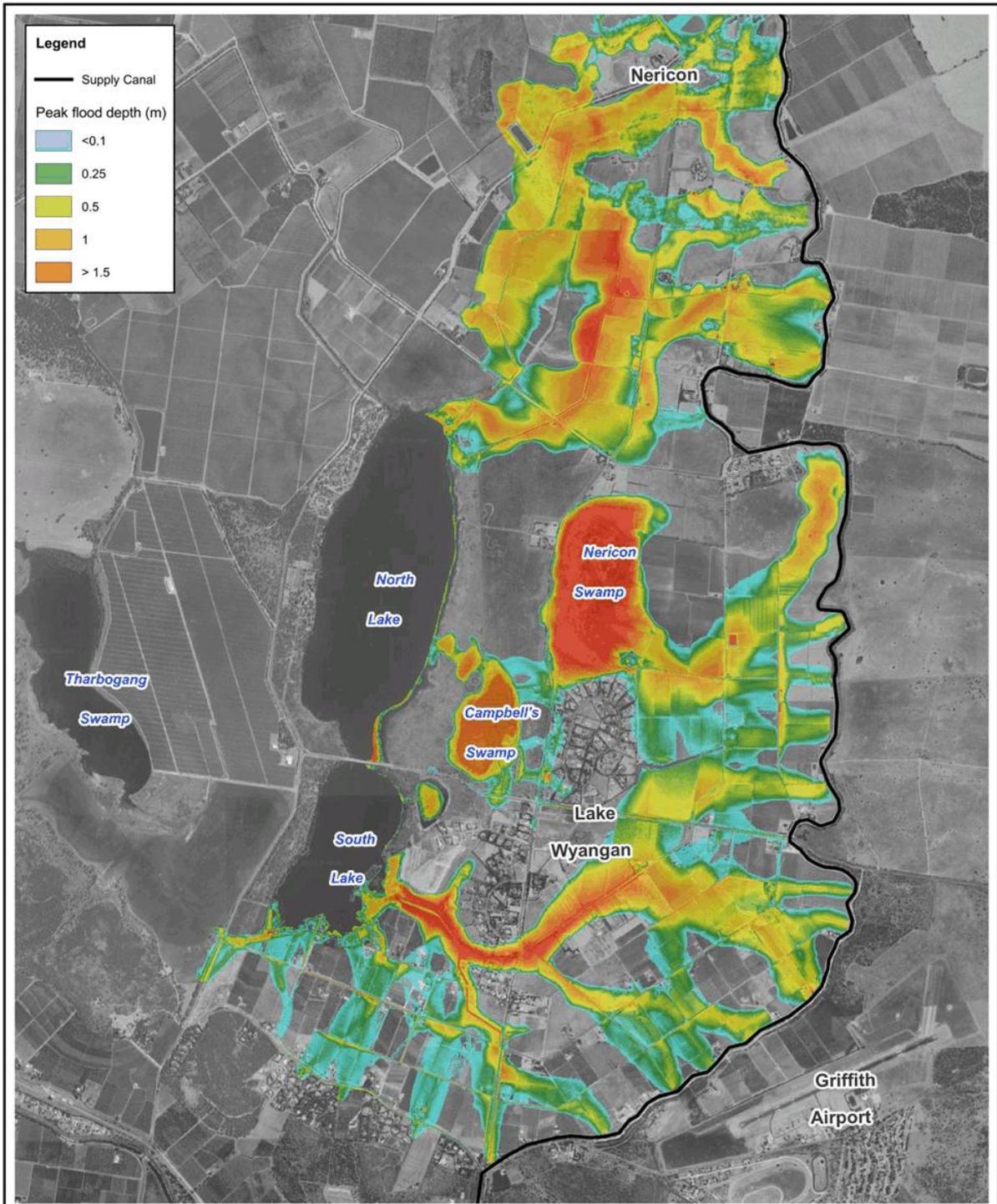




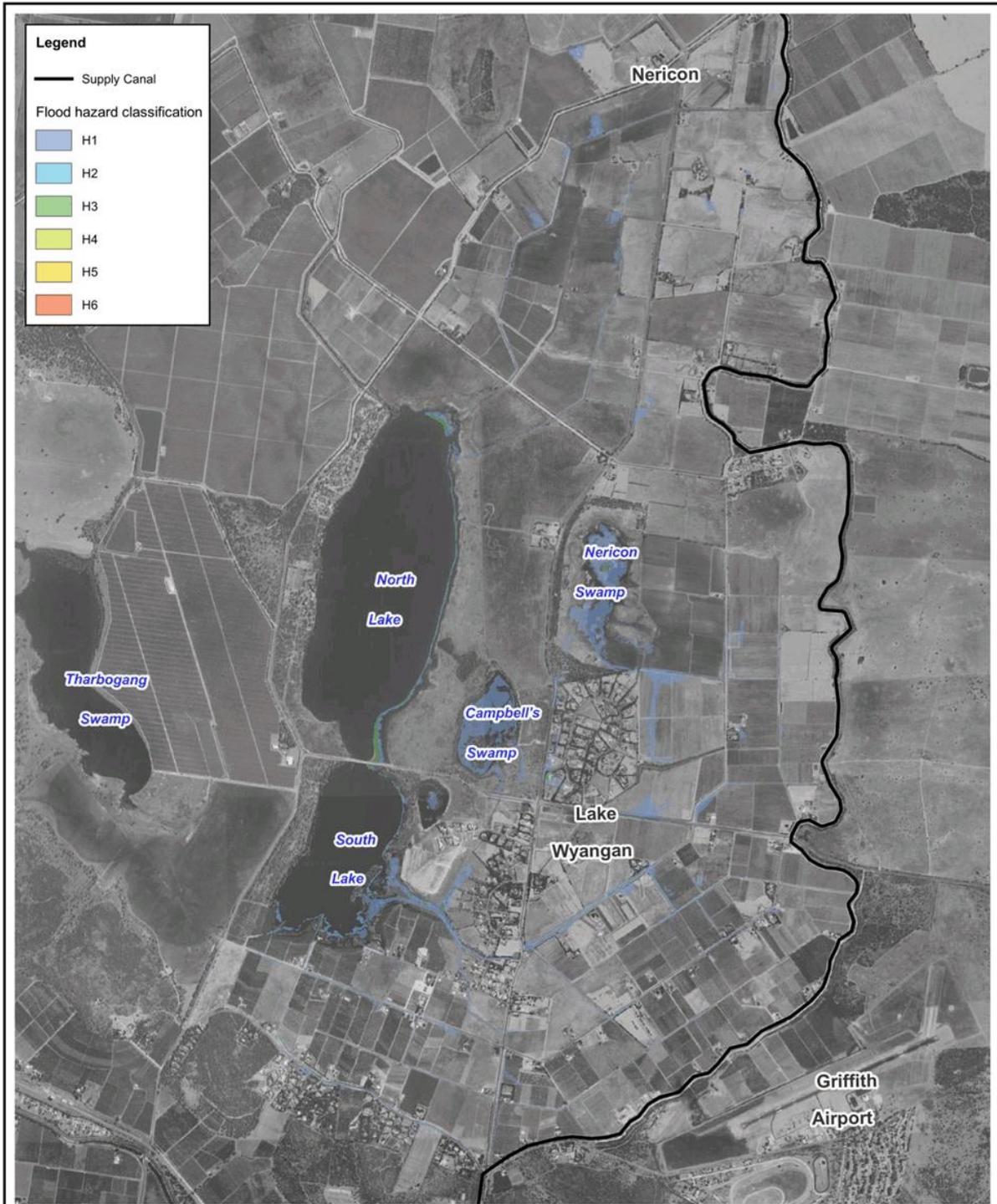
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<p>Figure:</p> <p><b>B-5</b></p>	<p><i>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</i></p>		
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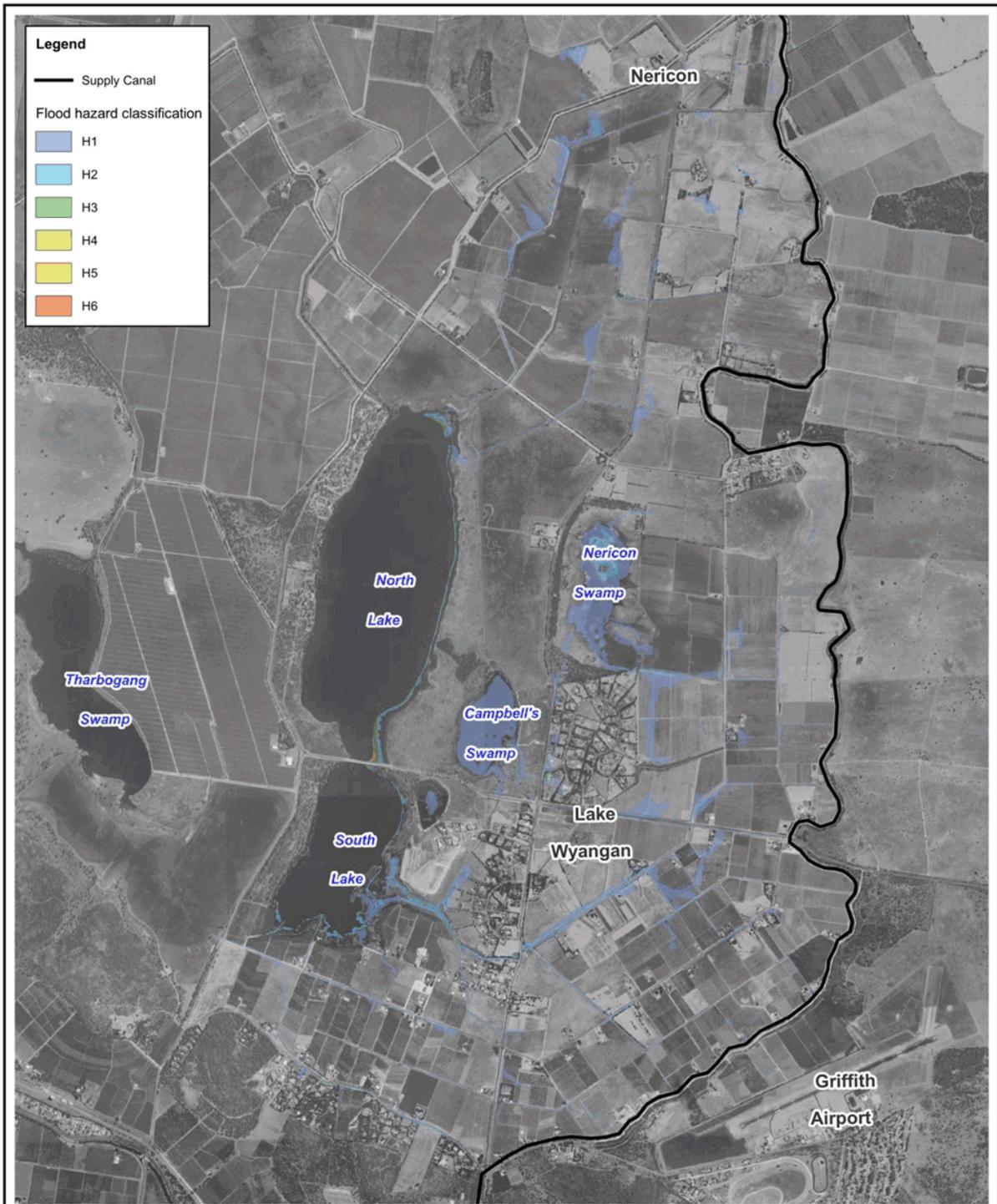
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<p>Figure:</p> <p><b>B-6</b></p>	<p><i>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</i></p>		
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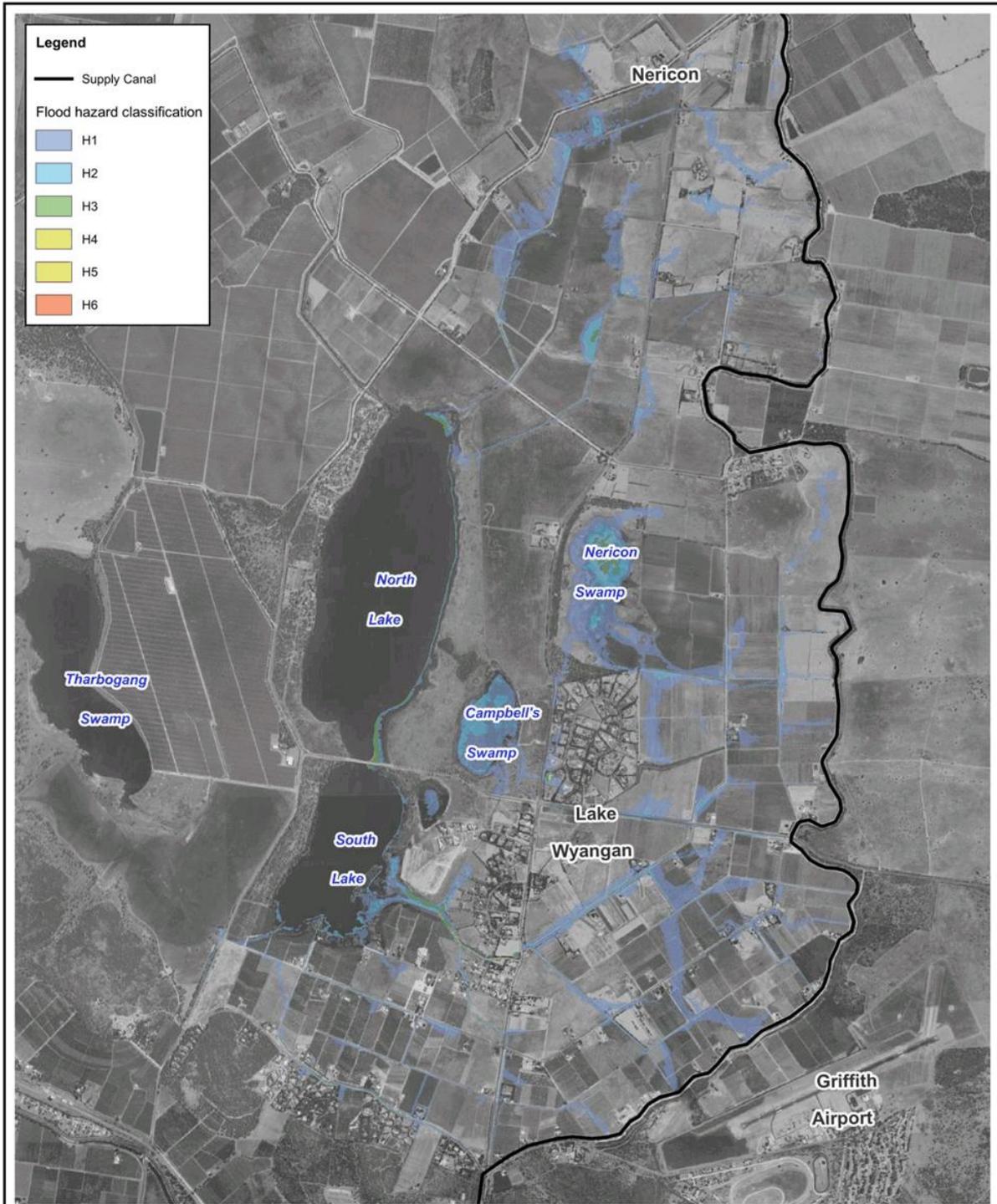
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<p>Figure:</p> <p><b>B-7</b></p>	<p><i>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</i></p>		
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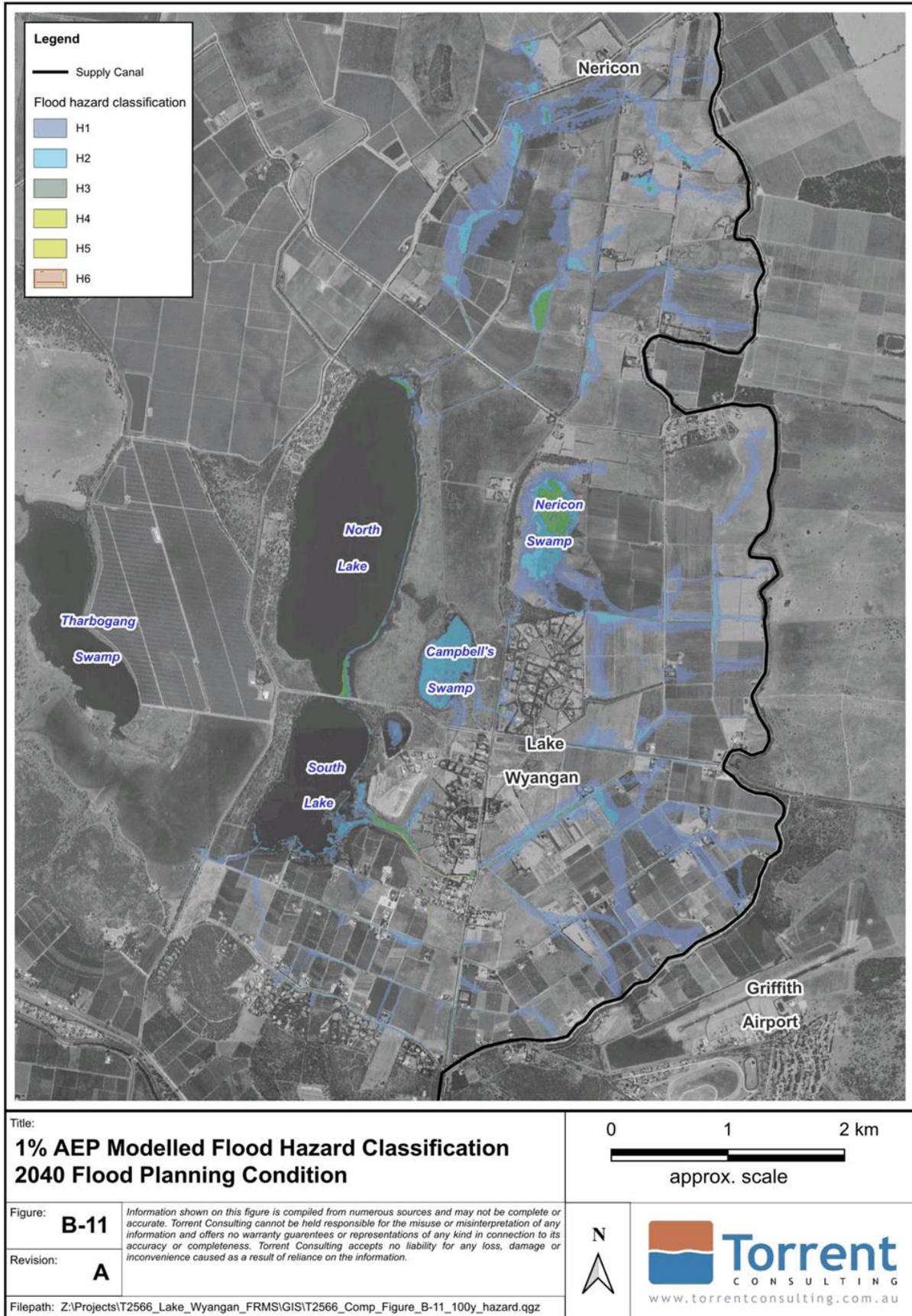
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<p>Figure:</p> <p><b>B-8</b></p>	<p><i>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</i></p>		
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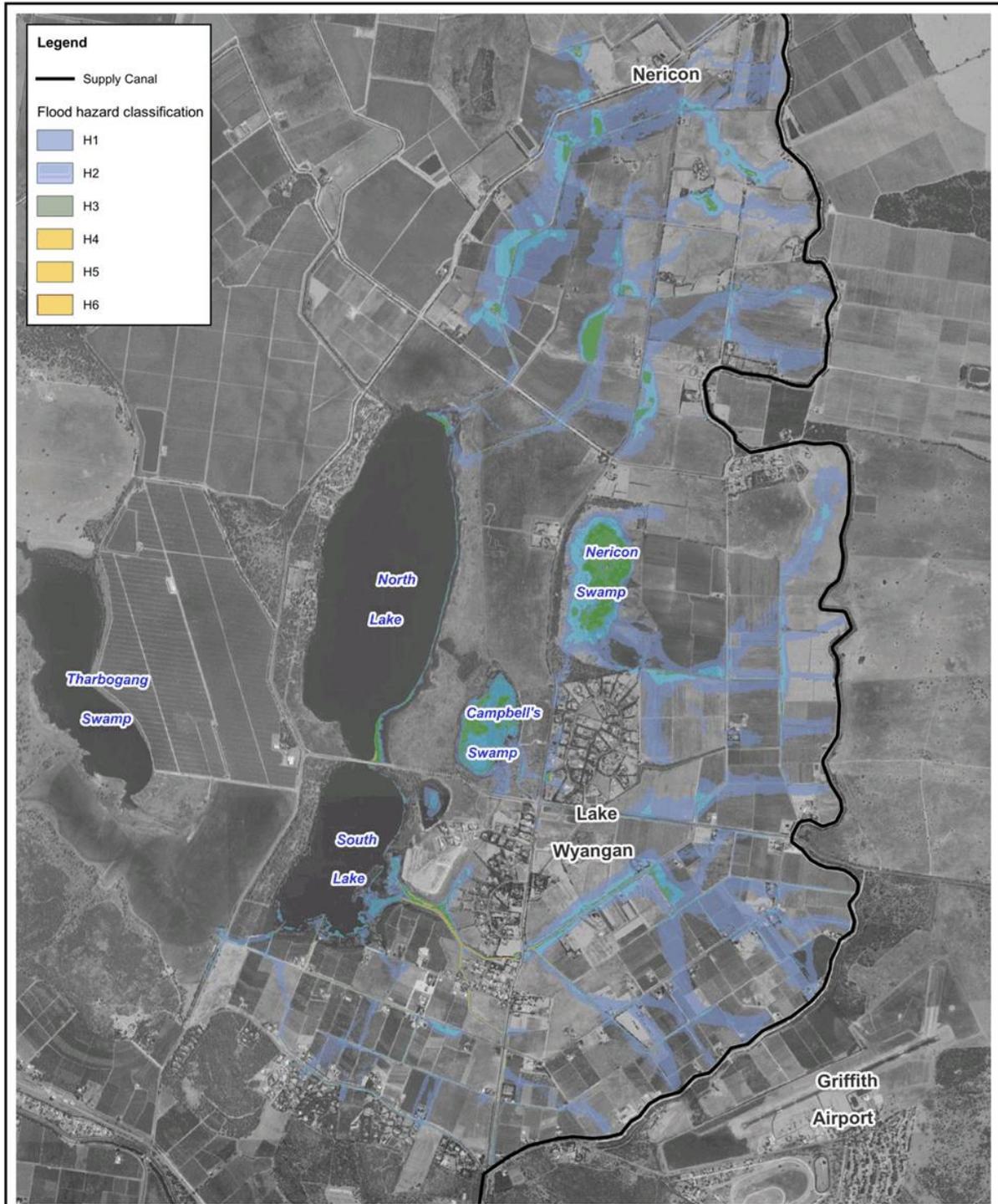


<p>Title:</p> <p><b>5% AEP Modelled Flood Hazard Classification 2040 Flood Planning Condition</b></p>		<p>0 1 2 km</p> <p>approx. scale</p>	
<p>Figure:</p> <p><b>B-9</b></p>	<p><small>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</small></p>		
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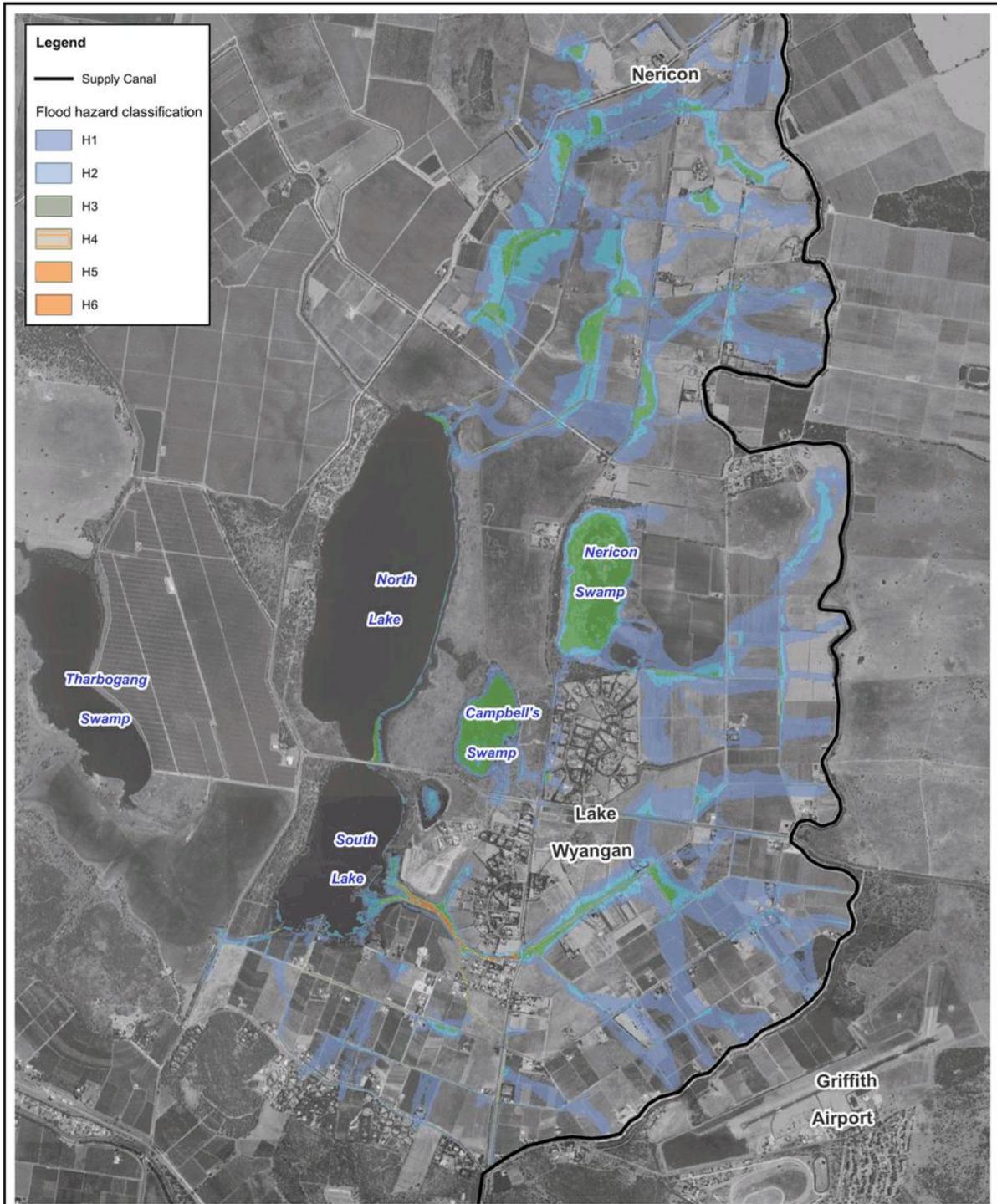


<p>Title:</p> <p><b>2% AEP Modelled Flood Hazard Classification 2040 Flood Planning Condition</b></p>		<p>0 1 2 km</p> <p>approx. scale</p>	
<p>Figure:</p> <p><b>B-10</b></p>	<p><small>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</small></p>		
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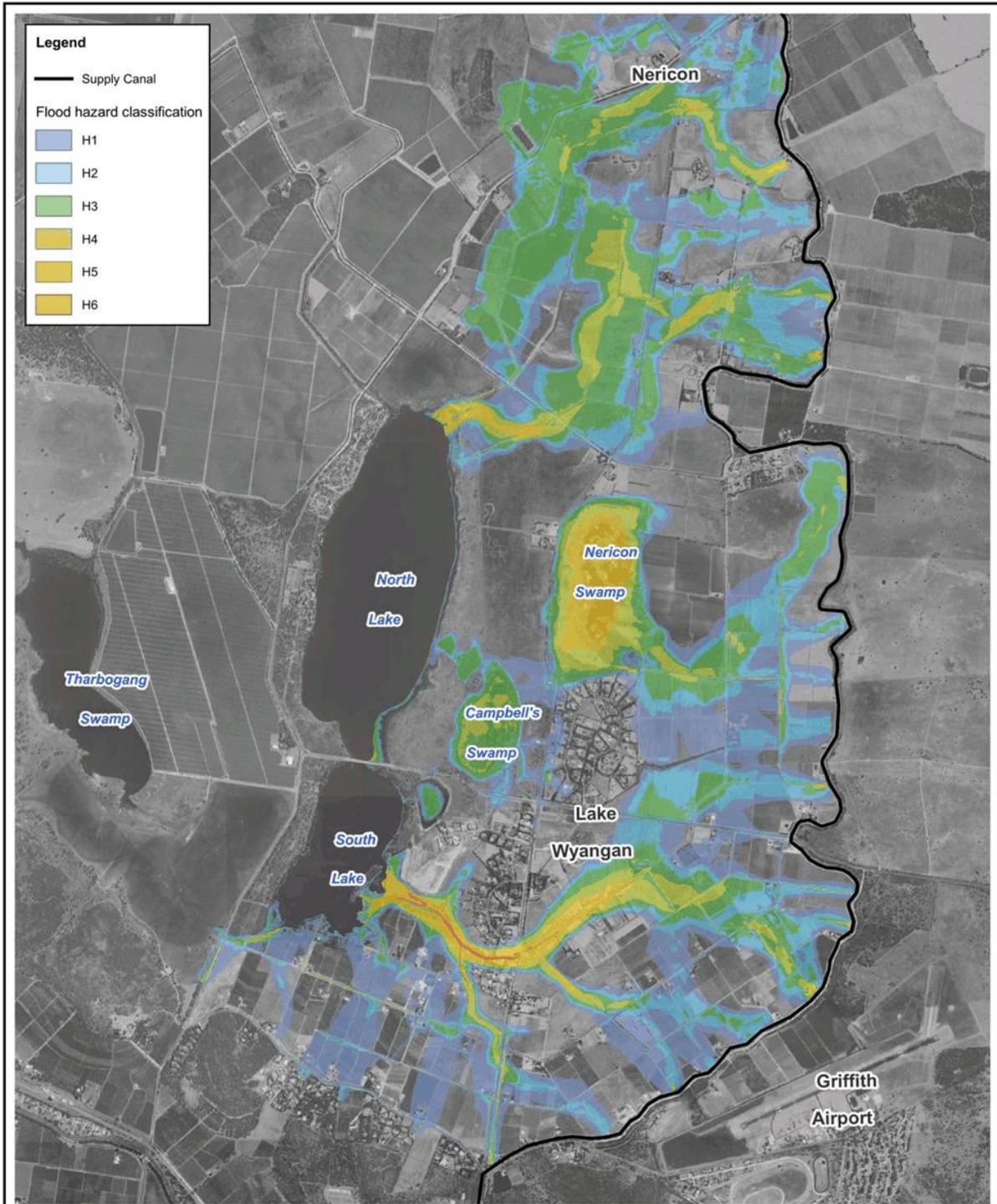




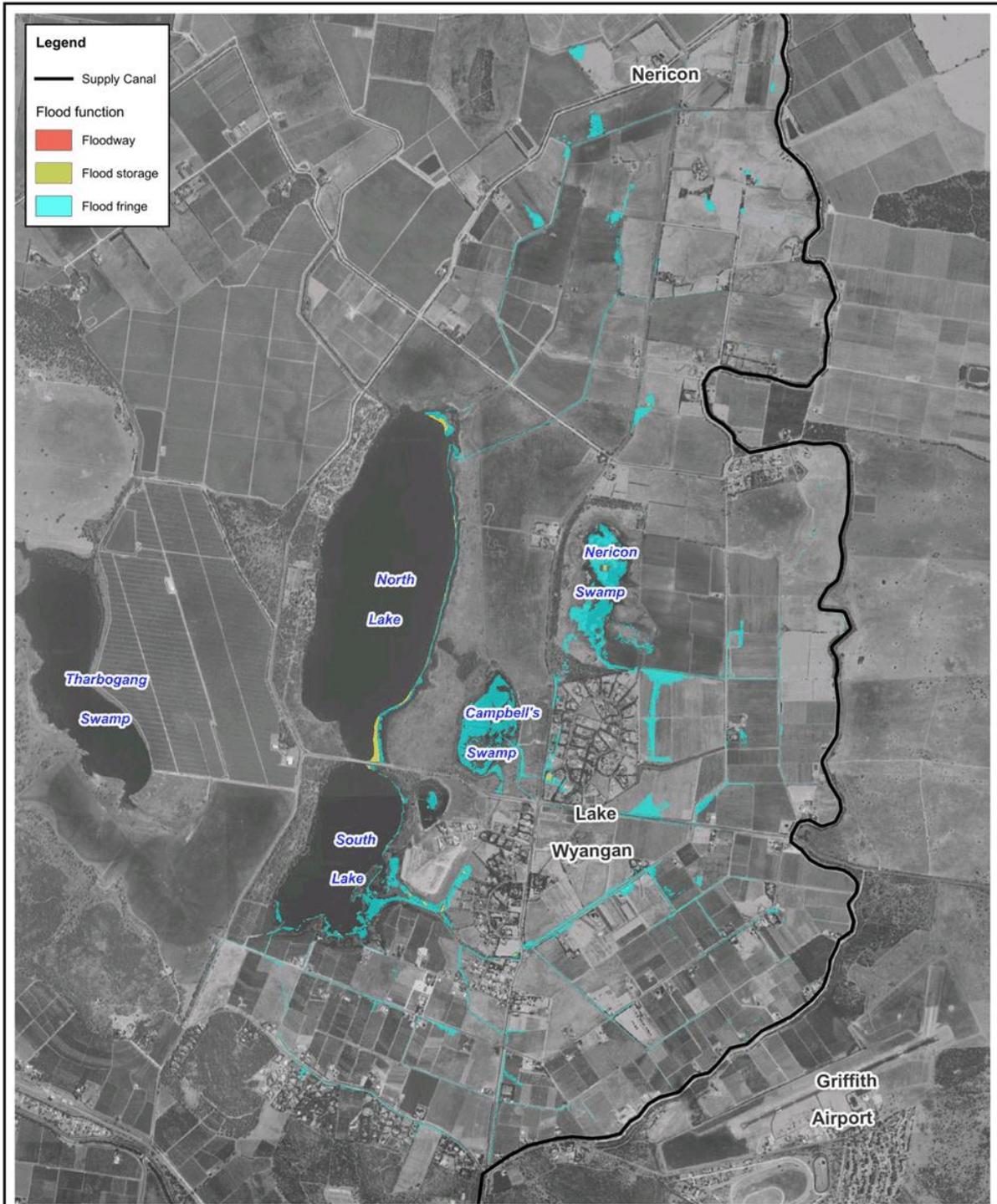
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<p>Figure:</p> <p><b>B-12</b></p>	<p><small>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</small></p>		
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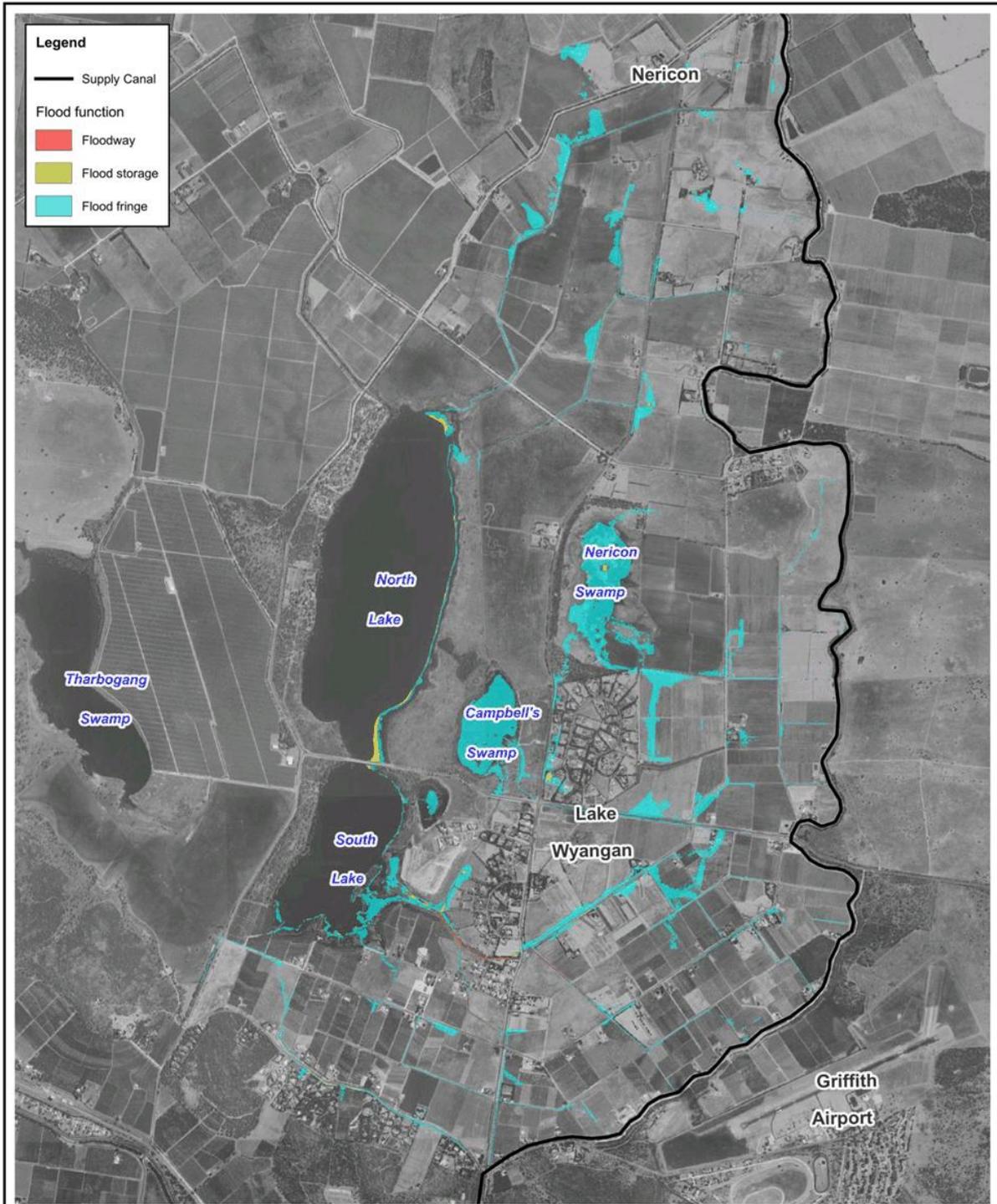
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<p>Figure:</p> <p><b>B-13</b></p>	<p><small>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</small></p>		
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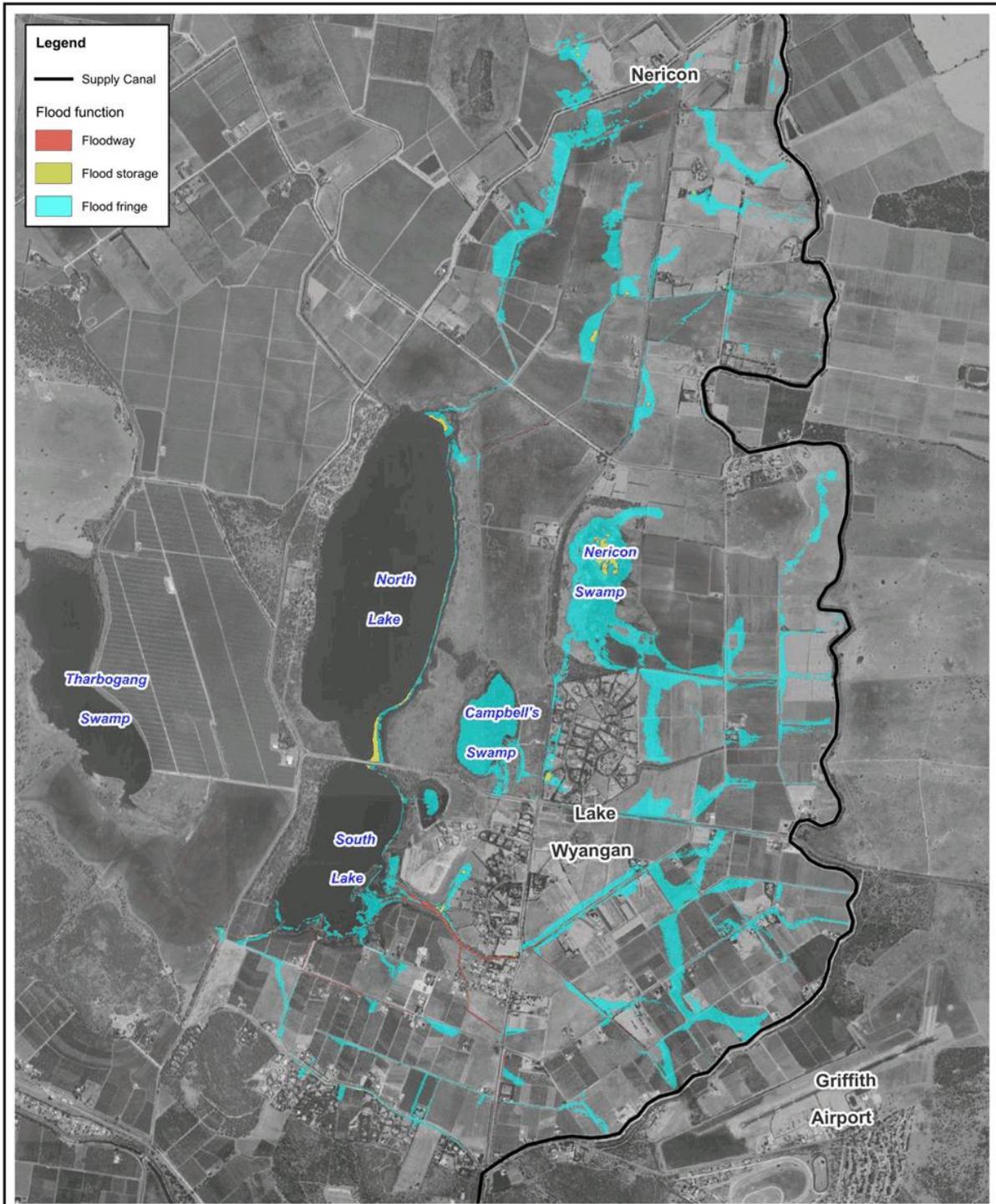
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<p>Figure:</p> <p><b>B-14</b></p>	<p><small>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</small></p>		
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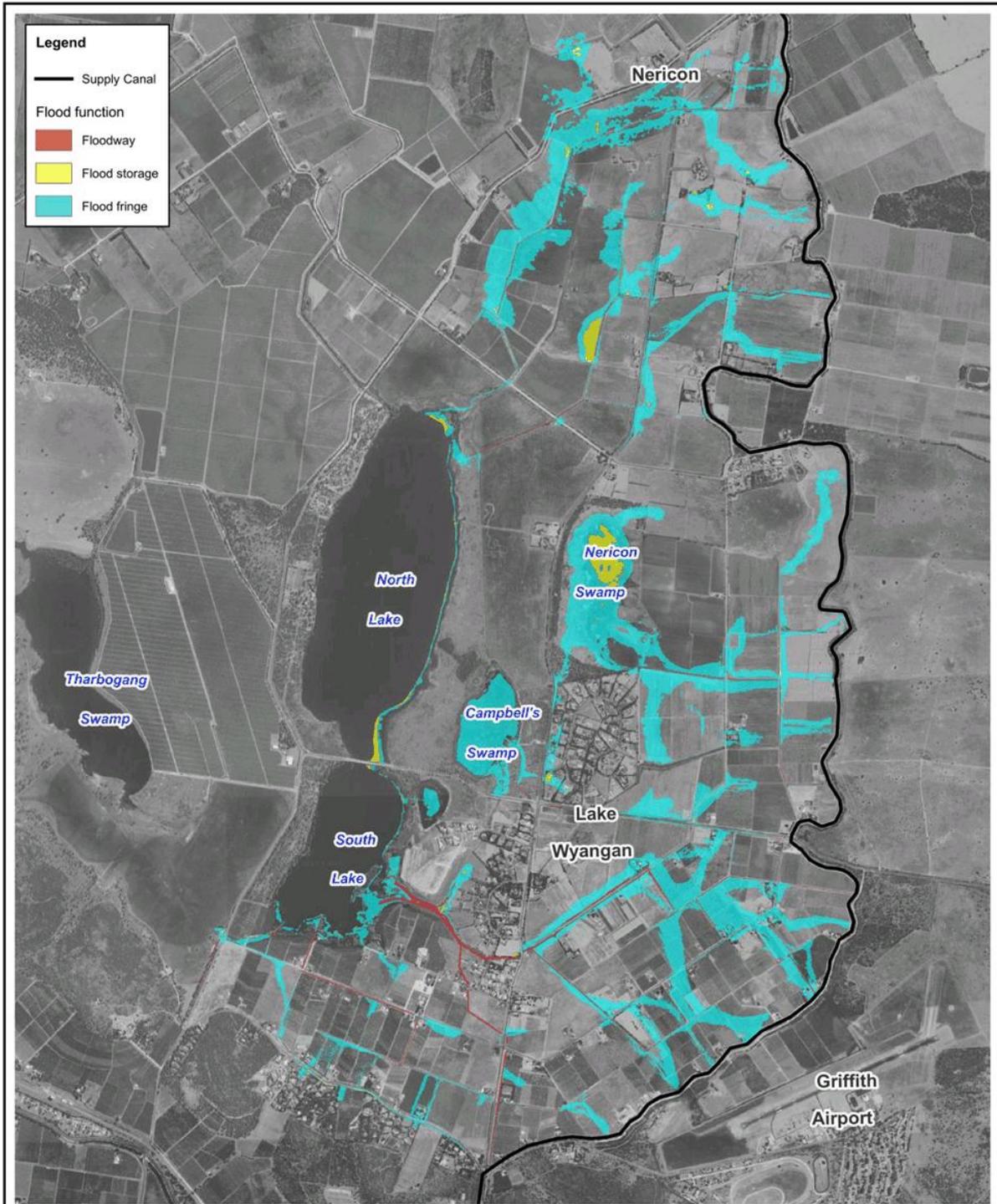
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<p>Figure:</p> <p><b>B-15</b></p>	<p><small>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</small></p>		
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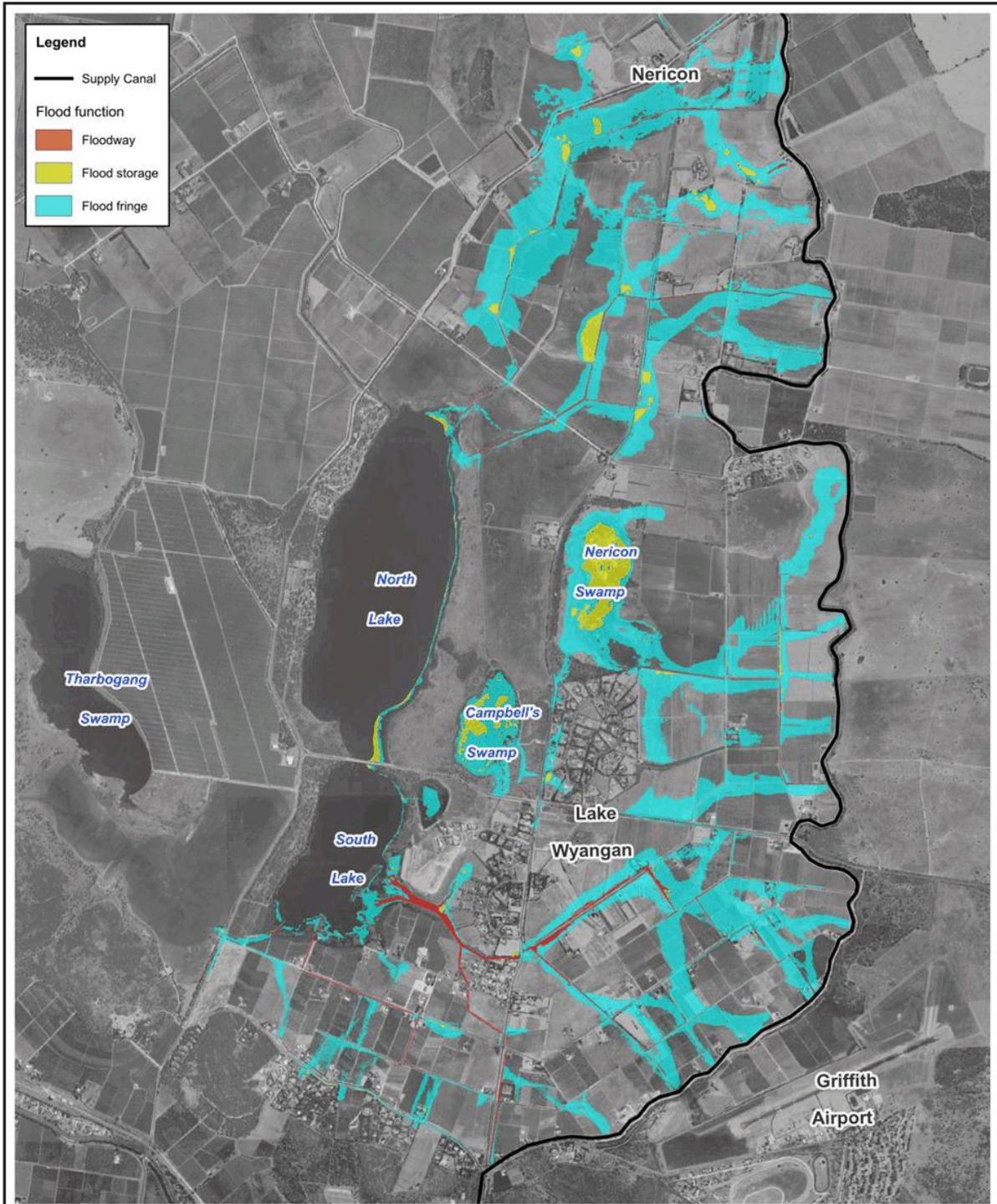
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<p>Figure:</p> <p><b>B-16</b></p>	<p><small>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</small></p>		
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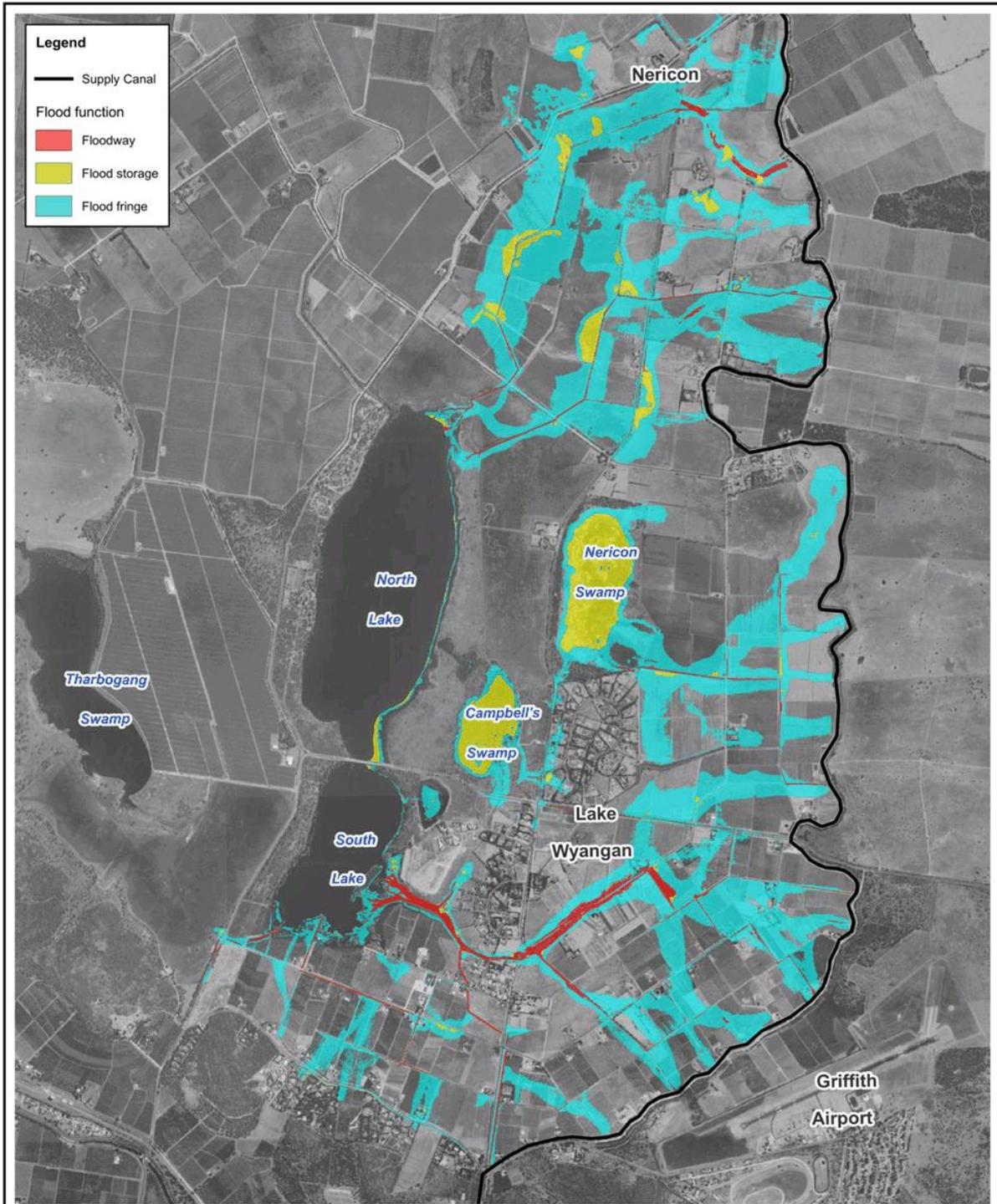
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<p>Figure:</p> <p><b>B-17</b></p>	<p><i>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</i></p>		
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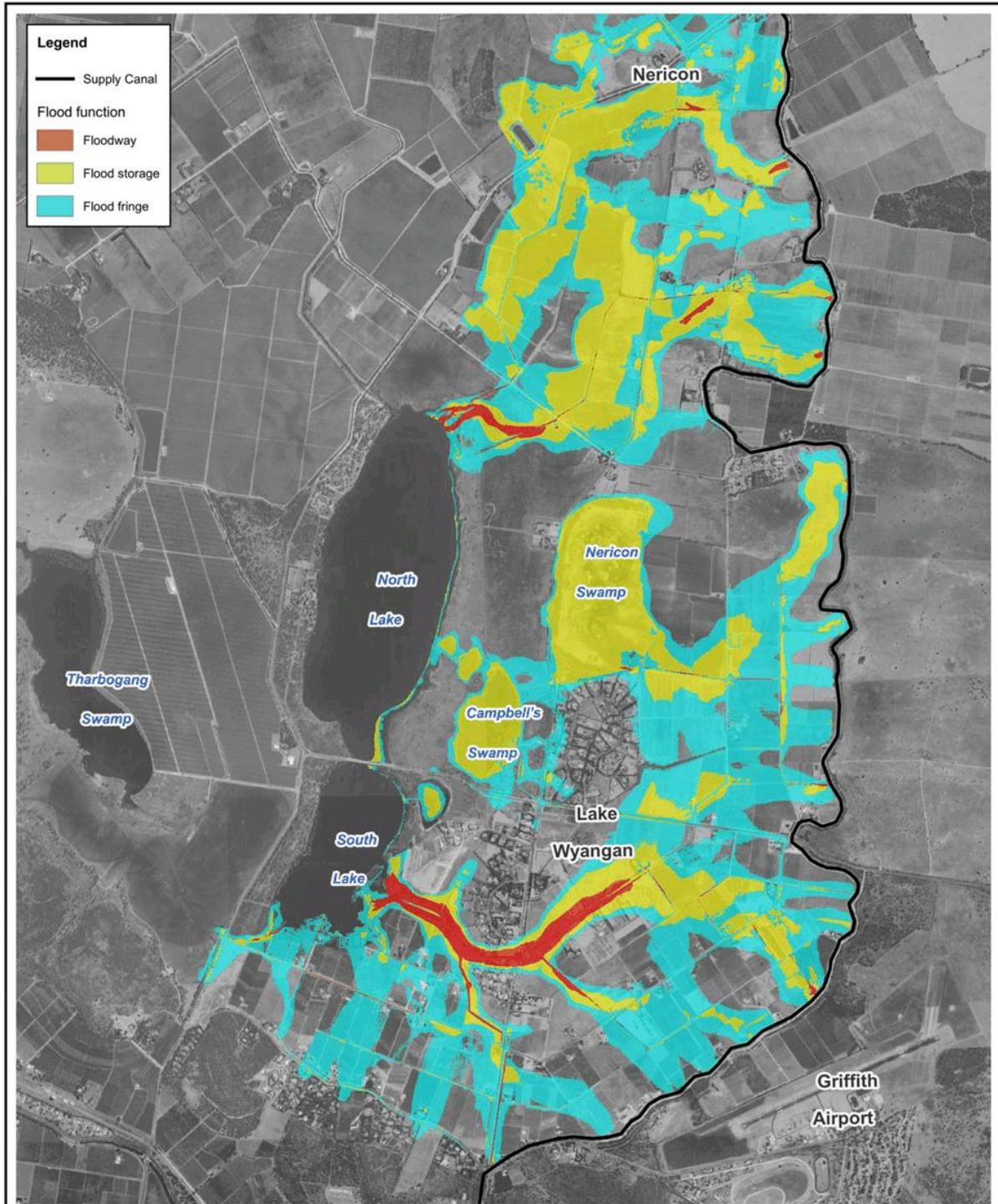
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<p>Figure:</p> <p><b>B-18</b></p>	<p><small>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</small></p>		
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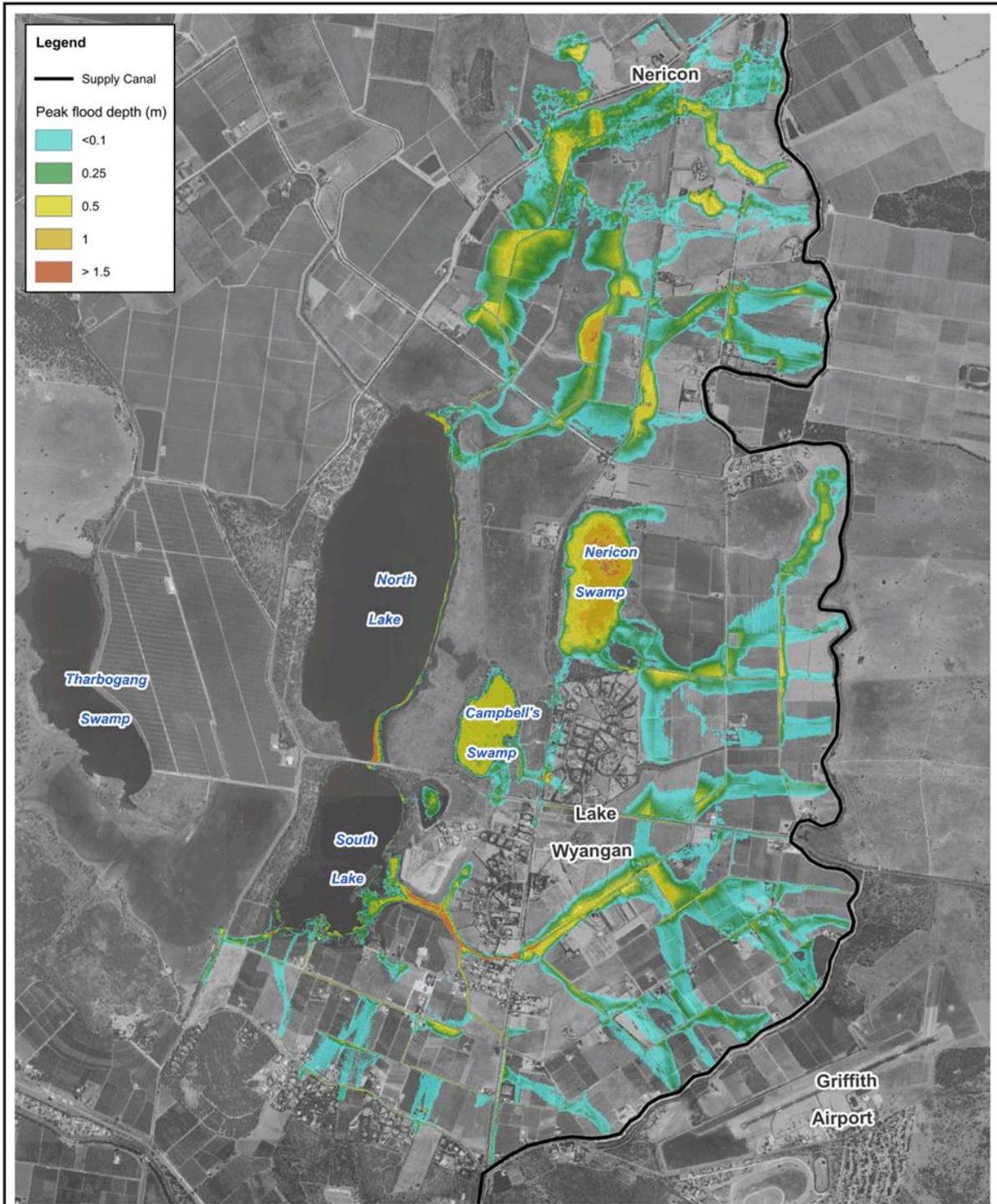
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<p>Figure:</p> <p><b>B-19</b></p>	<p><small>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</small></p>		
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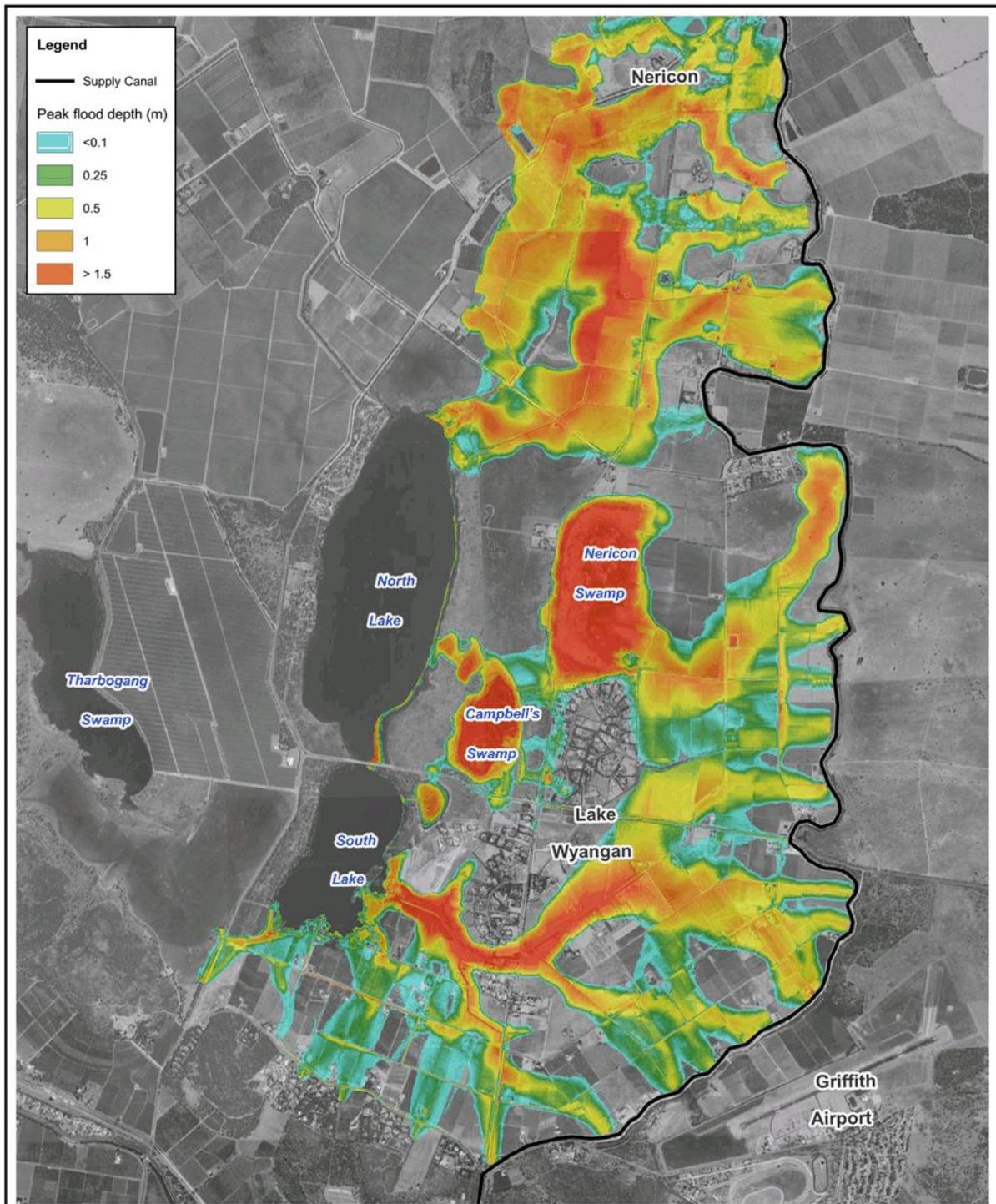
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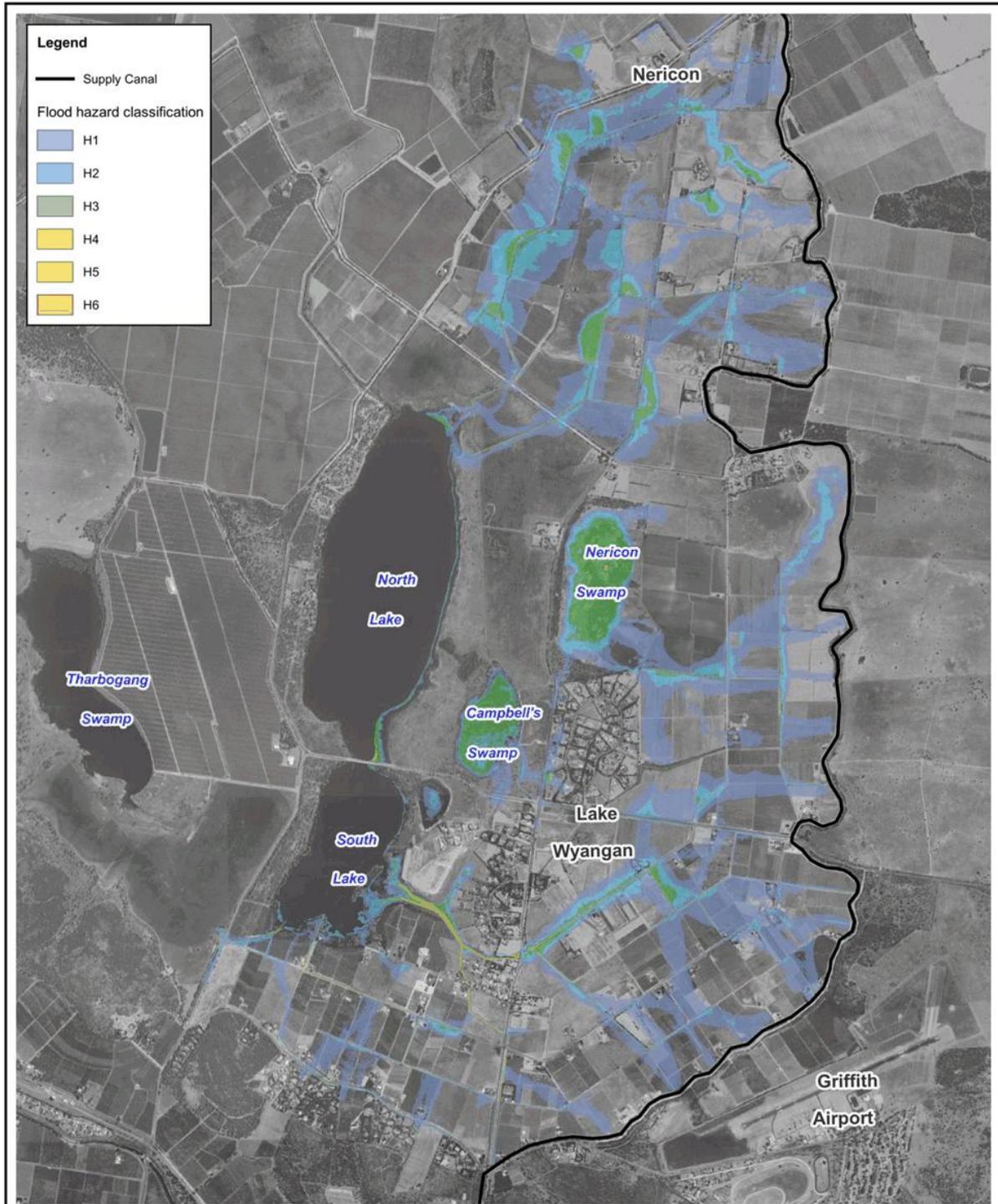
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<p>Figure:</p> <p><b>B-21</b></p>	<p><small>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</small></p>		
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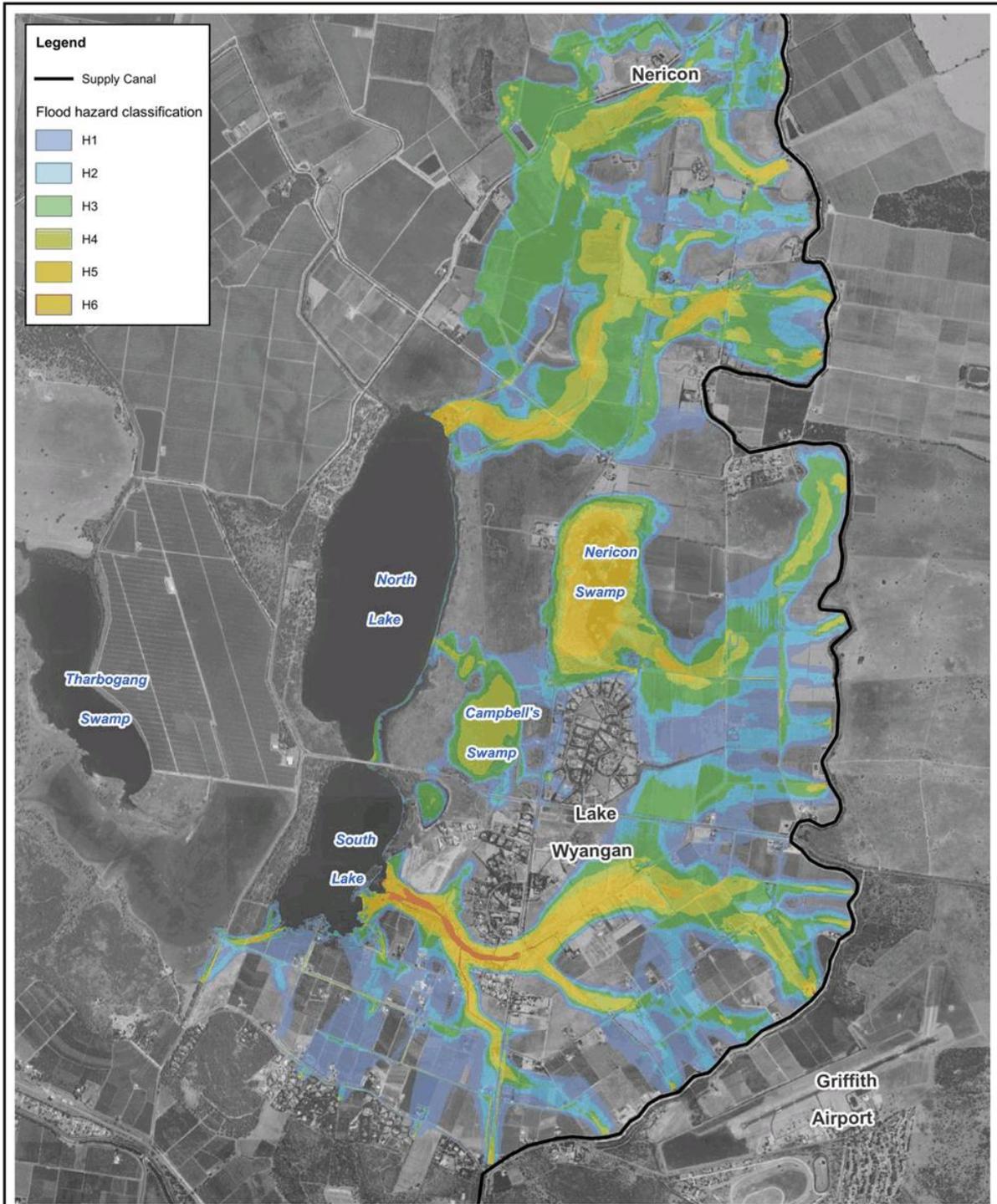
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<p>Figure:</p> <p><b>B-22</b></p>	<p><small>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</small></p>		
<p>Revision:</p> <p><b>A</b></p>	<p>N</p> <p><b>Torrent</b> CONSULTING <a href="http://www.torrentconsulting.com.au">www.torrentconsulting.com.au</a></p>		
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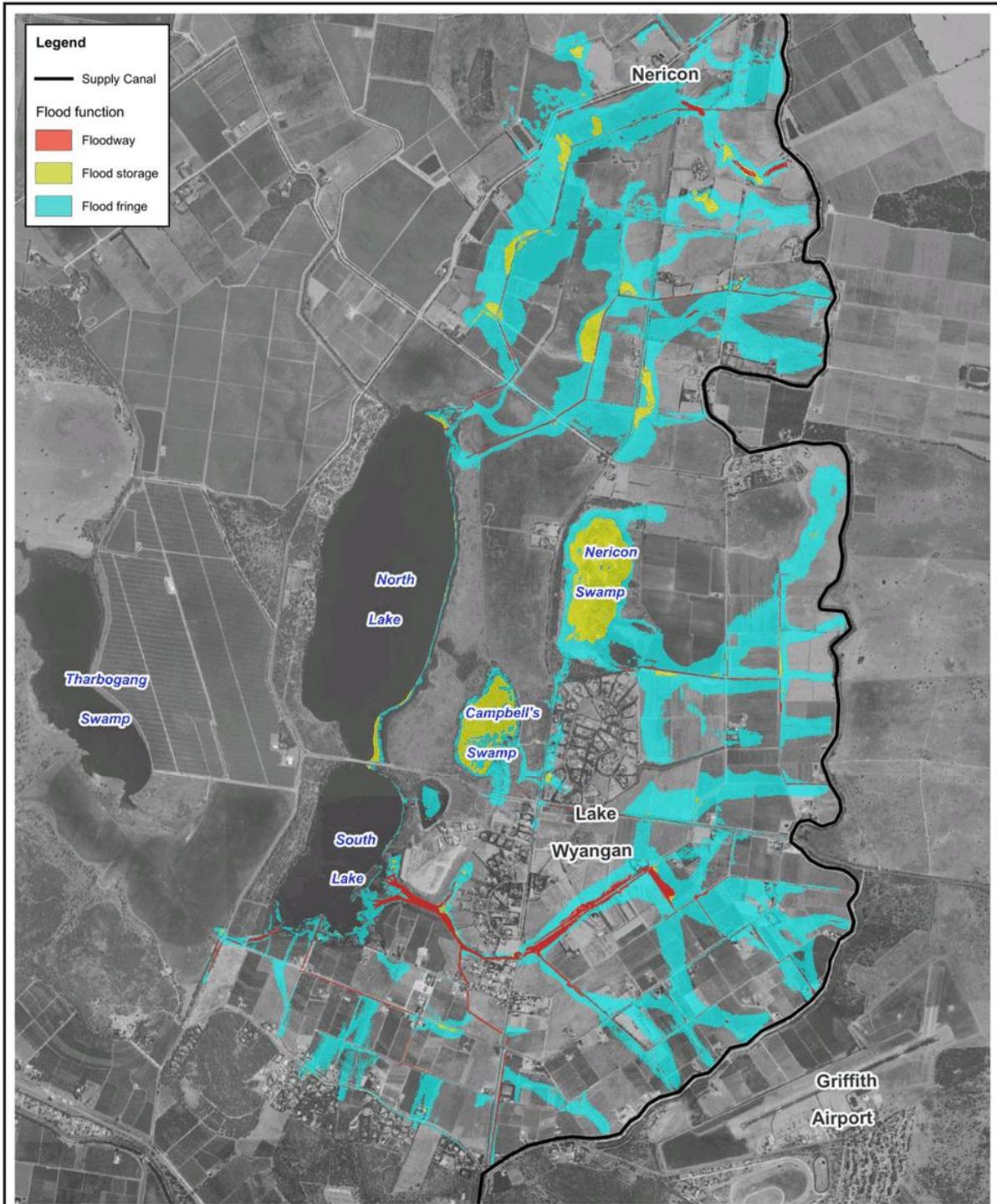
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<p>Figure:</p> <p><b>B-23</b></p>	<p><i>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</i></p>		
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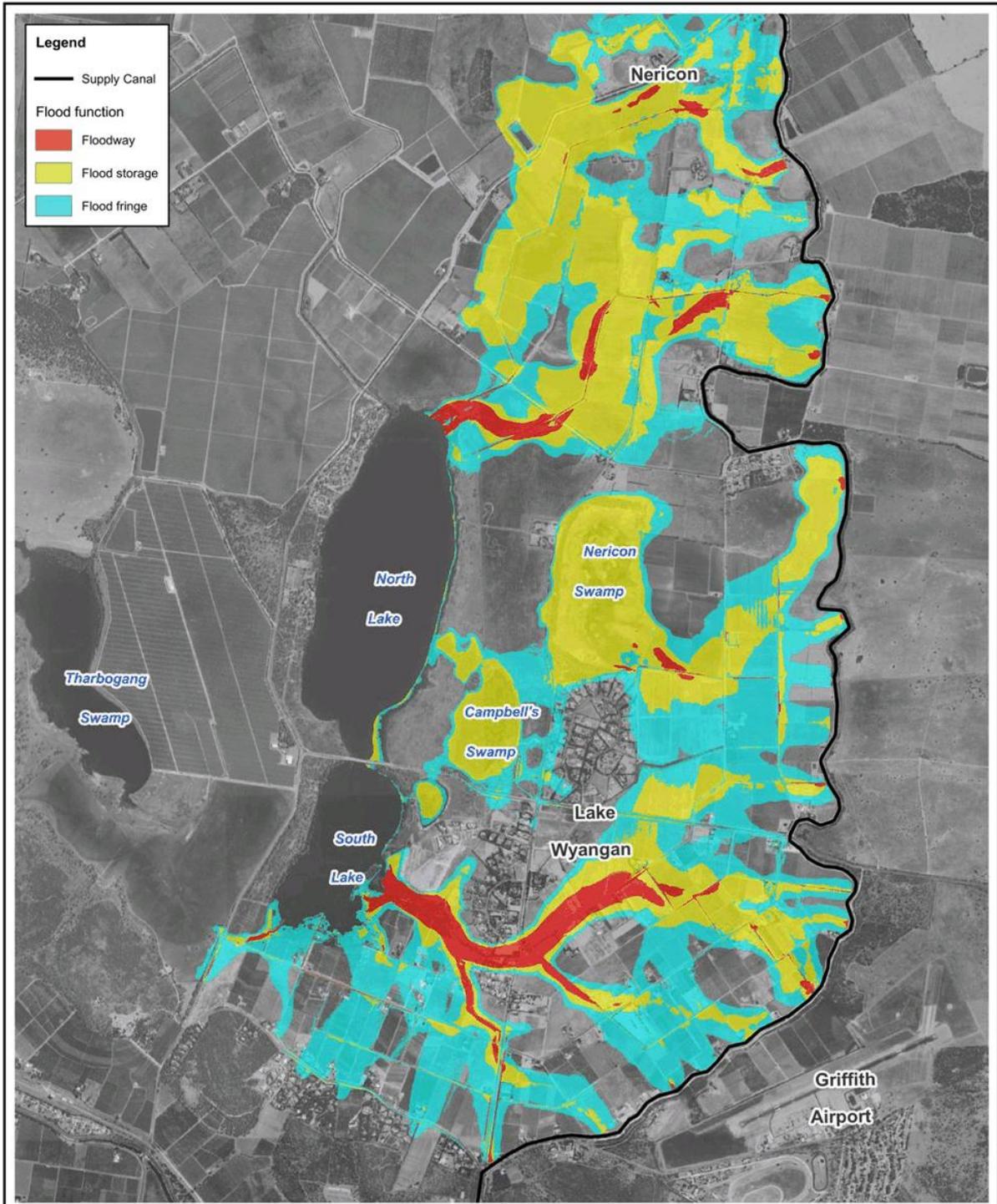
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<p>Figure:</p> <p><b>B-24</b></p>	<p><i>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</i></p>		
<p>Revision:</p> <p><b>A</b></p>	<p>N</p> <p><b>Torrent</b> CONSULTING www.torrentconsulting.com.au</p>		
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<p>Title:</p> <p><b>Extreme Modelled Flood Hazard Classification 2100 Flood Planning Condition</b></p>		<p>0 1 2 km</p> <p>approx. scale</p>	
<p>Figure:</p> <p><b>B-25</b></p>	<p><small>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</small></p>		
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<p>Filepath: Z:\Projects\T2566 Lake Wyangan FRMS\GIS\T2566 Comp Figure B-25 Extreme hazard 2100.gqz</p>			



<p>Title:</p> <p><b>1% AEP Modelled Flood Function 2100 Flood Planning Condition</b></p>		<p>0 1 2 km</p> <p>approx. scale</p>	
<p>Figure:</p> <p><b>B-26</b></p>	<p><small>Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.</small></p>		
<p>Revision:</p> <p><b>A</b></p>	<p>N</p> <p><b>Torrent</b> CONSULTING <a href="http://www.torrentconsulting.com.au">www.torrentconsulting.com.au</a></p>		
<p>Filepath: Z:\Projects\T2566_Lake_Wyangan_FRMS\GIS\T2566_Comp_Figure_B-26_100y_FF_2100.qgz</p>			



Title: <b>Extreme Modelled Flood Function                  2100 Flood Planning Condition</b>		0 1 2 km  approx. scale	
Figure: <b>B-27</b>	Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarantees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.		
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