

Hr Dylan,
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Alex. M.

Regional Director Hunter Region
Department of Planning and Environment
PO Box 1226
NEWCASTLE NSW 2300

Our Reference: SP-PP-14

Contact: Ms A Macvean
Telephone: 6591 7348

7 August 2014

Dear Sir/Madam,

Re: Submission of Planning Proposal for Section 56 Gateway Determination to Amend Great Lakes Local Environmental Plan 2014 Flood Planning Area Maps

Council has prepared a Planning Proposal under section 55 of the *Environmental Planning and Assessment Act, 1979* to amend *Great Lakes Local Environmental Plan 2014*.

The attached planning proposal has been prepared to amend the Flood Planning Area Maps in Great Lakes Local Environmental Plan 2014.

It is requested that the Planning Proposal be forwarded to the LEP Review Panel to for a gateway determination under section 56 of the Act.

In accordance with the provisions of the *Environmental Planning and Assessment Act 1979*, Great Lakes Council also request written authorisation from the Department to exercise its delegations for this planning proposal.

Should you require any further information please do not hesitate to contact Ms Alexandra Macvean on (02) 6591 7348 or email alexandra.macvean@greatlakes.nsw.gov.au.

Yours faithfully

Alexandra Macvean
Senior Strategic Land Use Planner
Planning and Environmental Services

Encl. Attachment 1 - Planning Proposal to amend Great Lakes LEP 2014 Flood Planning Area Maps

PLANNING PROPOSAL - GREAT LAKES COUNCIL

AMENDMENTS TO THE FLOOD PLANNING MAPS OF GREAT LAKES LOCAL ENVIRONMENTAL PLAN 2014

Endorsed 13/05/2014 for submission to Minister for Planning and Infrastructure



August 2014

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INTRODUCTION

This is a Planning Proposal primarily seeking to amend existing areas and identify additional areas affected by flooding in the Great Lakes Local Government Area.

The existing Great Lakes Local Environmental Plan 2014 flood planning areas were identified by several adopted flood studies and floodplain risk management studies, listed in Annexure D to this document.

The additional and amended flood planning areas have been identified by:

1. The Draft Nابیac Floodplain Risk Management Strategy & Wallamba River Flood Study;
2. The Draft Lower Myall River and Myall Lakes Flood Study; and
3. The Draft Smiths Lake Floodplain Risk Management Study; and
4. The First Pass Rural Flood Study.

The mapping of the additional and amended Flood Planning Area in Great Lakes LEP 2014 has been possible by using the WaterRIDE modeling tool. WaterRIDE is an interpretative tool that enables Council to produce flood mapping and 3D modeling of flood events, using data from the abovementioned study documents.

The existing Clause 7.3 Flood Planning in Great Lakes Local Environmental Plan 2014 is not amended by this planning proposal.



Figure No.1 Aerial Imagery of Great Lakes Local Government Area illustrating geographical features

PART 1 - OBJECTIVES OR INTENDED OUTCOMES

A statement of the objectives or intended outcomes of the proposed local environmental plan

The primary objective of the planning proposal is to amend the Flood Planning Maps of Great Lakes LEP 2014 in accordance with the recommendations of Council on 13 May 2014.

The existing Clause 7.3 Flood Planning in Great Lakes Local Environmental Plan 2014 is not amended by this planning proposal.

There are mapping amendments to the existing Flood Planning Areas in Great Lakes Local Environmental Plan 2014 as a result of refinement of the new methodology being use to update and consolidate Council's existing flood prone land information.

All new and amended Flood Planning Areas will be clearly identified in the public exhibition material.

PART 2 - EXPLANATION OF PROVISIONS

An explanation of the provisions that are to be included in the proposed local environmental plan

The planning proposal will amend the Flood Planning Area maps in Great Lakes Local Environmental Plan 2014.

Clause 7.3 Flood Planning in Great Lakes Local Environmental Plan 2014 is not amended by this planning proposal.

PART 3 - JUSTIFICATION

Section A - Need for the planning proposal.

1 Is the planning proposal a result of any strategic study or report?

The need for the Planning Proposal has arisen following Council's resolution on 13 May 2014 that:

- 1. The results of the First Pass Rural Flood Study and proposed LEP amendments are placed on public exhibition;*
- 2. The Lower Myall River and Myall Lakes Flood Study and proposed LEP amendments are placed on public exhibition;*
- 3. Council endorse the use of waterRIDE as the GIS planning tool to coordinate all existing flood studies and produce flood data suitable for engineering and planning purposes.*

An indicative map set of the Great Lakes local government area flood mapping that can be reliably produced as a result of this resolution is provided in Annexure C to this Planning Proposal. The indicative maps in Annexure C have been produced at the 1:80,000 map scale. The LEP maps that will be placed on public exhibition will be produced at a higher resolution in those areas with existing map tiles at a lower scale.

The mapping of flood prone land within the Great Lakes local government area will be significantly enhanced as a result of the resolution to incorporate existing study information into the new GIS mapping tools.

The range of existing studies available for incorporation is indicated in Annexure D to this Planning Proposal.

A copy of the draft studies are provided to the Department on a separate CD. It is anticipated that the draft studies will also be available on Council's website during public exhibition.

Any amendments to the existing flood planning areas in Great Lakes LEP 2014 will be clearly identified in the public exhibition material and in the community consultation program, referred to elsewhere in this planning proposal.

2 Is the planning proposal the best means of achieving the objectives or intended outcomes or is there a better way?

Great Lakes Council have endorsed the provision of flood hazard information within the local environmental plan and therefore this planning proposal provides the best and most appropriate means of updating the flood hazard information available to affected land owners and the broader community.

Section B - Relationship to strategic planning framework

3 Is the planning proposal consistent with the objectives and actions contained within the applicable regional or sub-regional strategy (including exhibited draft strategies)?

The new and amended Flood Planning Area maps recommended within Planning Proposal are consistent with Council Policy, NSW Planning & Environment LEP guidelines, Planning Proposal guidelines and S117 Directions.

The Mid North Coast Regional Strategy (MNCRS) states:

"Flooding is a major hazard that may result in community dislocation and substantial economic and social costs. The Floodplain development manual: the management of flood liable land (2005) defines the NSW Government's Flood Prone Land Policy. The manual outlines the process for councils to develop a flood risk management plan.

The aim is to reduce the impact of flooding. The plans should consider the potential for risks to increase under climate change especially in areas subject to ocean influence (including sea-level rise and more frequent and more intense storm events)."

Great Lakes Council have commenced a program for the preparation of Flood Risk Management Plans (FRMP) for known areas of flood prone land. The endorsement of the new flood planning area mapping will provide Council with reliable information on which to base future, expanded Flood Risk Management Plans.

In accordance with the requirements of the MNRCS, improved and expanded information on flood prone land will enable Council officers to give an appropriate level of consideration to flood hazards and provide information to affected land owners in order to reduce the impact of flooding in the future.

The incorporation of new and amended flood planning maps within the LEP in accordance with the new and improved data and information is also considered to be consistent with the requirements of the regional strategy and ensures consistent planning and decision making processes.

4 Is the planning proposal consistent with the local council's Community Strategic Plan, or other local strategic plan?

The Planning Proposal is consistent with the Great Lakes Community Strategic Plan 2010-2030:

Key Direction 1: Embracing and protecting our natural environment

Objective: Protecting the natural environment while addressing the challenges of population growth

Strategy 3: Planning for and minimising the potential impact of climate change

The Planning Proposal is also consistent with the Great Lakes 2030 Delivery Program 2011 - 2015 and Operational Plan 2011 - 2012:

Objective 3 Prepare for the impact of sea level rise and climate change				
Strategy 3.1 Establish a risk based adaptation response to sea level rise and climate change				
Activity ref.	4 Year Activities	2013/14 Actions	Performance Measure	Responsibility
3.1.1	Assess the impacts of climate change on the organisation and develop adaptation strategies to address such impacts through the Climate Change Coordination Group	Review risk assessment to reflect latest knowledge and studies	Review complete and priority risks addressed	MANEX
		Hold workshops to keep staff informed of climate change adaptation policies, procedures and long term flood mapping	Numbers of staff attended	MANEX
		Develop and implement procedures for the consideration of climate change risks in association with development application assessment	Procedures adopted	MANEX
3.1.2	Develop coastal management plans to address planning and adaptation to coastal erosion and climate change	Progress with preparing coastal management plans for Jimmys Beach, Blueys & Boomerang Beaches and the remaining beaches under Council's care and control	Plans completed and adopted by Council	Design & Investigation
3.1.3	Identify and implement a long term, sustainable adaptation management strategy for the protection of Jimmys Beach, Winda Woppa	Prepare and adopt a Management Plan for Jimmys Beach	Plan is adopted by Council	Parks & Recreation
		Seek grant funding to support adaptation plans associated with the long term management of Jimmys Beach	Funding applications reported to Council	Parks & Recreation
3.1.4	Integrate adaptation strategies to identify, value, prioritise and invest in infrastructure and natural assets under threat from sea level rise	Seek funding to develop prioritisation and investment/action models to identify assets under threat from sea level rise	Apply for funding in timely manner	Design & Investigation Natural Systems
3.1.5	Develop priority investigation areas and adaptation strategies to manage flood hazards in the Great Lakes area	Identify new projects, update floodplain management program and apply for grant funding in consultation with Great Lakes Floodplain Management Committee	Apply for funding in timely manner Undertake flood studies and plans identified in floodplain management program	Design & Investigation

Activity ref.	4 Year Activities	2013/14 Actions	Performance Measure	Responsibility
3.1.6	Undertake identified floodplain risk management adaptation measures	Seek funding to undertake floodplain risk management adaptation measures	Apply for funding in timely manner Undertake Risk Management adaptation measures for funded projects	Design & Investigation
		Implement adaptation priorities in floodplain risk management plans	Identified works undertaken within budget	Design & Investigation
3.1.7	Undertake improvements to Council facilities and operations to mitigate the impacts of climate change	Conduct audits of energy, water and greenhouse gas emission to inform priorities for reducing greenhouse gas footprint. Identification of future works for Council facilities based on reports	Improvements to results of audits over time	Natural Systems
3.1.8	Incorporate sustainability initiatives in the management of the Council fleet to mitigate the impacts of climate change	Update Council's fleet policies Continue to incorporate environmental performance in plant tender documentation and assessment, and implement monitoring procedures for fuel consumption	Overall plant and vehicle fuel consumption v emissions and comparisons to previous year	Operations

5 Is the planning proposal consistent with applicable environmental planning policies?

The implementation of the following State Environmental Planning Policies may be affected by the identification of additional flood prone areas in Great Lakes LEP 2014:

- State Environmental Planning Policy No 14—Coastal Wetlands
- State Environmental Planning Policy No 15—Rural Landsharing Communities
- State Environmental Planning Policy No 21—Caravan Parks
- State Environmental Planning Policy No 26—Littoral Rainforests
- State Environmental Planning Policy No 30—Intensive Agriculture
- State Environmental Planning Policy No 32—Urban Consolidation (Redevelopment of Urban Land)
- State Environmental Planning Policy No 33—Hazardous and Offensive Development
- State Environmental Planning Policy No 36—Manufactured Home Estates
- State Environmental Planning Policy No 44—Koala Habitat Protection
- State Environmental Planning Policy No 62—Sustainable Aquaculture
- State Environmental Planning Policy No 65—Design Quality of Residential Flat Development
- State Environmental Planning Policy No 70—Affordable Housing (Revised Schemes)
- State Environmental Planning Policy No 71—Coastal Protection
- State Environmental Planning Policy (Affordable Rental Housing) 2009
- State Environmental Planning Policy (Exempt and Complying Development Codes) 2008

- State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004
- State Environmental Planning Policy (Infrastructure) 2007
- State Environmental Planning Policy (Major Development) 2005
- State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007
- State Environmental Planning Policy (Miscellaneous Consent Provisions) 2007
- State Environmental Planning Policy (Rural Lands) 2008
- State Environmental Planning Policy (State and Regional Development) 2011

The extent of the impact is unknown at this time.

State Environmental Planning Policy Number 71 – Coastal Protection

The lands affected by flooding are located within the Coastal Zone and the provisions of State Environmental Planning Policy Number 71 (SEPP 71) – Coastal Protection are relevant.

Clause 8 of SEPP 71 specifically identifies matters that must be considered by Council during the preparation of a draft local environmental plan (planning proposal). These matters include:

Clause 8 matters SEPP 71	
(a) the aims of this Policy set out in clause 2,	The provisions of this Planning Proposal are consistent with the aims of SEPP 71.
b) existing public access to and along the coastal foreshore for pedestrians or persons with a disability should be retained and, where possible, public access to and along the coastal foreshore for pedestrians or persons with a disability should be improved,	Existing foreshore access arrangements are not affected by the provisions of this planning proposal.
(c) opportunities to provide new public access to and along the coastal foreshore for pedestrians or persons with a disability,	Existing opportunities for public access are not affected by the provisions of this planning proposal.
(d) the suitability of development given its type, location and design and its relationship with the surrounding area,	The planning proposal identifies areas potentially affected by flooding by 2100 and will allow for appropriate development assessment and decision-making within these areas.
(e) any detrimental impact that development may have on the amenity of the coastal foreshore, including any significant overshadowing of the coastal foreshore and any significant loss of views from a public place to the coastal foreshore,	The planning proposal identifies areas potentially affected by flooding by 2100 and will allow for appropriate development assessment and decision-making within these areas.
(f) the scenic qualities of the New South Wales coast, and means to protect and improve these qualities,	Existing reserves and scenic qualities of the New South Wales coast are not affected by the provisions of this planning proposal.
(g) measures to conserve animals within the meaning of the (<i>Threatened Species</i>	Terrestrial habitats and Threatened Species are not affected by the provisions of this planning

Clause 8 matters SEPP 71	
<u>Conservation Act 1995</u>) and plants (within the meaning of that Act), and their habitats,	proposal.
(h) measures to conserve fish (within the meaning of Part 7A of the <u>Fisheries Management Act 1994</u>) and marine vegetation (within the meaning of that Part), and their habitats,	Aquatic habitats and marine vegetation are not affected by the provisions of this planning proposal.
(i) existing wildlife corridors and the impact of development on these corridors,	Wildlife corridors are not affected by the provisions of this planning proposal.
(j) the likely impact of coastal processes and coastal hazards on development and any likely impacts of development on coastal processes and coastal hazards,	The planning proposal identifies areas potentially affected by flooding by 2100 and will allow for appropriate development assessment and decision-making within these areas..
(k) measures to reduce the potential for conflict between land-based and water-based coastal activities,	The planning proposal identifies areas potentially affected by flooding by 2100 and will allow for appropriate development assessment and decision-making within these areas.
(l) measures to protect the cultural places, values, customs, beliefs and traditional knowledge of Aboriginals,	Aboriginal heritage will not affected by the provisions of this planning proposal.
(m) likely impacts of development on the water quality of coastal waterbodies,	Coastal water quality will not affected by the provisions of this planning proposal.
(n) the conservation and preservation of items of heritage, archaeological or historic significance,	Heritage items and areas will not affected by the provisions of this planning proposal.
(o) only in cases in which a council prepares a draft local environmental plan that applies to land to which this Policy applies, the means to encourage compact towns and cities,	The planning proposal identifies areas potentially affected by flooding by 2100 and will allow for appropriate development assessment and decision-making within these areas.

The Planning Proposal is consistent with the aims of SEPP 71.

7 Is the planning proposal consistent with applicable Ministerial Directions (s.117 directions)?

The following Ministerial Directions are applicable to the Planning Proposal:

Ministerial Direction	Objective	Consistent?	Discussion
1.1 Business and Industrial Zones	The direction aims to protect and encourage growth of employment lands.	Yes	The planning proposal flood planning area provisions will overlay some lands in business and industrial zones. The planning proposal does not include the rezoning of business and industrial lands to any other zone.

1.2 Rural Zones	The direction aims to protect the agricultural production value of land.	Yes	The planning proposal flood planning area provisions will overlay some lands in rural zones. The planning proposal does not include the rezoning of rural lands to any other zone.
1.3 Mining, Petroleum Production and Extractive Industries	The direction aims to ensure access to natural resources is not compromised by inappropriate development.	Yes	The planning proposal does not reduce the existing areas identified for extractive industries or development protection standards that apply to these lands.
1.5 Oyster Aquaculture	The direction aims to protect Priority Oyster Aquaculture Areas.	Yes	The planning proposal flood planning area provisions will overlay some Priority Oyster Aquaculture Areas. The planning proposal does not reduce the Areas or development protection standards that apply to these Areas.
1.5 Rural Lands	The direction aims to protect rural lands and facilitate their orderly and economic development.	Yes	The planning proposal flood planning area provisions will overlay some lands in rural and environmental zones. The planning proposal does not include the rezoning of rural lands to any other zone.
2.1 Environmental Protection Zones	This direction aims to protect and conserve environmentally sensitive areas.	Yes	The planning proposal flood planning area provisions will overlay some lands in an environmental zone. The planning proposal does not reduce the existing zone and development protection standards that apply to these lands.
2.2 Coastal Protection	This direction aims to implement the principles of the NSW Coastal Policy.	Yes	The planning proposal identifies areas of potential flood prone land by 2100 and is consistent with the implementation principles of the NSW Coastal Policy 1997, Coastal Design Guidelines 2003, Local Government Act 1993 and NSW Coastal Management Manual 1990.
2.3 Heritage Conservation	The direction aims to conserve items and areas of heritage significance.	Yes	The planning proposal flood planning area provisions will overlay some items and areas of heritage significance. The planning proposal does not reduce the existing areas or number of items or the development protection standards that apply.
2.4 Recreation Vehicle Areas	This direction aims to protect sensitive land from adverse impacts from recreation vehicles.	Yes	The planning proposal does not enable land to be developed for the purpose of recreation vehicles.
3.1 Residential Zones	This direction encourages a variety of housing types; efficient use of infrastructure and services; and minimal impact of residential development on the environment and resources.	Yes	The planning proposal flood planning area provisions will overlay some lands within residential zones but does not prohibit this development. The existing LEP and planning proposal flood planning area provisions require additional

			consideration of the design of future residential development within areas identified as potentially being affected by flooding by 2100.
3.2 Caravan Parks and Manufactured Home Estates	This direction aims to provide opportunities for caravan parks and manufactured home estates.	Yes	The planning proposal flood planning area provisions will overlay some lands where caravan parks and manufactures home estates may be located but does not prohibit this form of development. The existing LEP and planning proposal flood planning area provisions require additional consideration of the design of future development within areas identified as potentially being affected by flooding by 2100.
3.3 Home Occupations	This direction encourages low-impact small businesses in dwelling houses.	Yes	The planning proposal flood planning area provisions will overlay lands where home occupations may occur but does not prohibit this activity.
3.4 Integrating Land Use and Transport	This direction ensures that land use and transport are given appropriate consideration in a planning proposal to rezone land.	Yes	The planning proposal flood planning area provisions will overlay lands within various zones and require appropriate consideration of flood risk when designing and locating development, access and transport requirements.
4.1 Acid Sulfate Soils	This direction applies to land that has been identified as having a probability of containing acid sulfate soils.	Yes	While some of the land affected by the planning proposal is identified as having a probability of containing Acid Sulfate Soils, the planning proposal does not remove, alter or affect the consideration of acid sulfate soils provisions.
4.3 Flood Prone Land	This direction applies to land that has been identified as flood prone.	Yes	The planning proposal expands those areas of land potentially affected by flooding by 2100 identified in the Flood Planning Area maps of Great Lakes LEP 2014. The additional areas are identified and will enable assessment of proposed development in these areas in accordance with the Flood Prone Land Policy and the principles of the Floodplain Development Manual 2005, commensurate with the potential flood hazard on affected lands. The planning proposal does not include the rezoning of any land. The flood planning area identified within the LEP is in accordance with the existing Flood Planning Area clause provisions of the LEP and does not impose any additional flood

			related development controls or a flood planning level inconsistent with the principles of the Floodplain Development Manual 2005.
4.4 Planning for Bush fire Protection	This direction applies when a Planning Proposal affects land that is mapped as Bushfire Prone.	Yes	While some of the land affected by the planning proposal is identified as bush fire prone, the planning proposal does not remove, alter or affect the consideration of bush fire protection provisions.
5.1 Implementation of Regional Strategy	This direction requires a planning proposal to be consistent with the Mid North Coast Regional Strategy.	Yes	The planning proposal is consistent with the Mid North Coast Regional Strategy requirements for Council to consider matters of risk in any development matter.
6.1 Approval and referral Requirements	This direction prevents a Planning Proposal from introducing requirements for concurrence or approval of a Minister or public authority.	Yes	The planning proposal will not introduce any concurrence or approval requirements.
6.2 Reserving Land for Public Purposes	This direction states that a planning proposal shall not create, alter or reduce zonings or reservations of land for public purposes unless it has the approval of the relevant authority and the Director General.	Yes	While some of the land affected by the planning proposal is identified as public or recreational reserves, the planning proposal does not create, alter or reduce existing zonings or reservations of land for public purposes

Section C - Environmental, social and economic impact.

- 8 Is there any likelihood that critical habitat or threatened species, populations or ecological communities, or their habitats, will be adversely affected as a result of the proposal?**

No.

- 9 Are there any other likely environmental effects as a result of the planning proposal and how are they proposed to be managed?**

No.

- 10 How has the planning proposal adequately addressed any social and economic effects?**

The planning proposal does not identify any land for rezoning but does identify additional lands as being potentially flood prone. The identification of these lands will affect a significant number of properties within the Great Lakes local government area as illustrated by the existing and draft maps provided in Annexure B & C.

The social and economic effect of identifying these lands as potentially flood prone is unknown at this time.

Section D - State and Commonwealth interests.

- 11 Is there adequate public infrastructure for the planning proposal?**

Not applicable.

- 12 What are the views of State and Commonwealth public authorities consulted in accordance with the gateway determination?**

Advice has not been sought from government agencies at this point. Council will commence consultation with agencies once the Planning Proposal is endorsed by Council and a Gateway Determination has been provided by NSW Planning & Infrastructure.

PART 4 - COMMUNITY CONSULTATION

Details of the community consultation that is to be undertaken on the planning proposal.

Officers from the Strategic Planning and Design & Investigation sections of Council propose that community consultation for the Draft Planning Proposal should be undertaken in conjunction with on-going community consultation on relevant flood studies and flood risk management plans.

The purpose of the combined consultation is to ensure that the different purpose and provisions of the flood studies, flood risk management plans and planning instruments are understood and given appropriate consideration by affected land owners and the broader community.

Officers are also in the process of reviewing related development control plan and policy provisions to ensure that a consistent approach to development assessment can be established within the areas identified as being potentially affected by flooding hazards.

Should the existing provisions require amendment, expansion or updating a separate report shall be tabled for Council's consideration so that these provisions can also form part of the community consultation process associated with the planning proposal.

CONCLUSION

The primary purpose of this planning proposal is to amend the Flood Planning Area Maps in Great Lakes Local Environmental Plan 2014 to incorporate additional areas identified as being potentially affected by flooding hazards by 2100, as identified by the Rural First Pass Flood Study adopted by Council at the 13 May 2014 Strategic Committee meeting.

The proposal is consistent with the relevant regional and local strategic plans for the site and surrounding areas, namely the Mid-North Coast Regional Strategy (2009).

ANNEXURES

Annex A

Great Lakes Council Reports & Minutes

Strategic Committee Meeting 13 May 2014 Report and Minutes

Subject: ES - Update of flood information
Index: Sewerage & Drainage - Flood Investigation
Author: Investigations Engineer - Geoff Love and Traffic Engineer - Wade Holmes
Strategic Committee Meeting: 13 May 2014

SUMMARY OF REPORT:

This report provides a summary of recent flood investigations carried out across the local government area, including the purchase of a new investigative tool called waterRIDE.

SUMMARY OF RECOMMENDATION:

It is recommended that:

1. The results of the First Pass Rural Flood Study and proposed LEP amendments are placed on public exhibition;
2. The Lower Myall River and Myall Lakes Flood Study and proposed LEP amendments are placed on public exhibition;
3. Council endorse the use of waterRIDE as the GIS planning tool to coordinate all existing flood studies and produce flood data suitable for engineering and planning purposes.

FINANCIAL/RESOURCE IMPLICATIONS:

Nil.

POLICY IMPLICATIONS:

Nil.

LEGAL IMPLICATIONS:

Nil.

LIST OF ANNEXURES:

- A: Sample results of the First Pass Rural Flood Study
B: Lower Myall Flood Study 1% AEP Flood Event

LIST OF ATTACHMENTS:

Nil.

REPORT:

First Pass Rural Flood Study:

Council regularly carries out studies of mainstream flooding close to population centres in accordance with principles and methods established in the NSW Floodplain Development Manual. Traditionally, studies have concentrated on population centres around major lake and river catchments, leaving minor streams and rivers (majority of the LGA) without reliable flood risk

information. This has meant that Council has been unable to identify rural properties which may be subject to flood issues.

The Rural First Pass Flood Study has been carried out by Council to identify the properties that are potentially affected by flooding issues but are located outside the extent existing flood studies. The Rural First Pass Flood Study is a quick way to determine if areas have a flooding concern without carrying out a detailed flood study on every location. BMT WMB was contracted by Council to carry out the study using software called TUFLOW-GPU. Techniques used in the analysis include:

- The use of LIDAR information (where available) to model ground heights. Shuttle Radar Topography Mission (SRTM) data was used for level data in areas where no LIDAR existed;
- 1% Annual Exceedance Probability (AEP) (100 ARI Flood) was modelled over the entire local government area;
- Calibration was carried out to match existing flood studies carried out previously at Stroud and Nabitac;
- The peak flood height of water over a series of durations (two hours to 36 hours) were noted and recorded. This allowed the determination of the critical flood condition in an area; and
- Areas that recorded a flood depth less than 0.2m were removed. Algorithms were also employed to remove isolated areas / small islands from the final results.

The result of the work is a GIS based layer that indicates locations that have a considered risk of flooding in the 1% AEP storm event. An example of some locations is provided in Annexure A.

The work on the Rural First Pass Flood study will enable Council to make informed decisions in relation to flood risk in rural areas that have no detailed flood study. The information has the ability to identify areas which may require further detailed studies, which will assist in obtaining funding from state government bodies. Council will also be better informed when giving advice and information to residents in terms of building controls and flood planning information. It will also enable Council to better address flood certificates and S149 enquiries, where current practice is for Council to add the notation "unknown" to property enquiries. Council staff intend to use the results of the Rural First Pass Flood Study when giving out advice in relation to flood enquiries for rural properties that are located outside an existing detailed flood study.

The results of the Rural First Pass Flood Study are now ready to be placed on public exhibition. A programme of public consultation should occur to inform residents of the new dataset, implications on planning proposals and development controls that Council may now place on land parcels, and potential implications for future LEP amendments. After public consultation has occurred, a report will be presented to Council outlining the process and results, with a view to adopting the findings of the Rural First Pass Flood Study for planning purposes.

Lower Myall River and Myall Lakes Flood Study

Council has engaged the services of BMT WBM to undertake a detailed revision of a PWD 1980 study for the Lower Myall River and Myall Lakes Flood Study. The Study has been carried out using joint funding from the NSW Office of Environment and Heritage.

The Study has included detailed flood analysis using TUFLOW two-dimensional model (an improvement from the previous one-dimensional model of 1980) and utilised existing LIDAR data for height information. The model was calibrated to observed tide information and to a flood event recorded in July 2011.

Of interest, the main finding of the Study was that the design flood conditions are significantly lower than those previously calculated in 1980 by the PWD. The Study also determined that peak flood levels upstream of Monkey Jacket are attributed to catchment derived flooding, whereas downstream of Monkey Jacket are attributed to ocean derived flood events.

Various outputs have come from the Study, including flood outputs for various storm events. The main output for the Study is the 1% AEP event, with a 0.9m Sea Level Rise Event (Annexure B). This is the main layer used for planning purposes, and will result in amendments to the LEP.

The new levels that Council is using for flood information as a result of this study are:

Condition	Paddy Marrs Bar	Corrie Island	Tea Gardens	Monkey Jacket	Brasswater	Bombah Broadwater	Myall Lake
1% AEP	1.5	1.4	1.4	1.4	2.3	2.4	2.4
1% AEP, 2060 SLR	2.0	1.9	1.9	1.8	2.5	2.6	2.6
1% AEP, 2100 SLR	2.4	2.3	2.3	2.3	2.7	2.8	2.8

The draft results of the Lower Myall River and Myall Lakes Flood Study are now ready to be placed on public exhibition. A programme of public consultation should occur to inform residents of the new dataset, implications on planning proposals and development controls that Council may now place on land parcel and potential implications for future LEP amendments. After public consultation has occurred, a report will be presented to Council outlining the process and results, with a view to adopting the findings of the Study for planning purposes.

WaterRIDE software

Council (and the NSW Government) has carried out a range of flood studies covering Wallis Lake, Port Stephens, Nahiack, Wallamba River, Bulahdelah, Myall River, Smiths Lake, Stroud and Karuah River. Traditionally results from the flood studies have been input into Council's GIS systems from paper copies or from GIS outputs from consultants. Planning levels have then been buffered around the 1% AEP flood extents, involving extensive staff resources to carry out the work. Often flood studies calculate several categories of flood events such as 20% AEP (5 year ARI) which do not calculate the extreme event but nonetheless are useful for emergency management planning. Council does not have a way to utilise those resources apart from paper copy maps.

Council has recently purchased waterRIDE software to enable better analysis of flood data. WaterRIDE allows Council to input all existing (and future) flood studies into the one system and provides interrogation of time-varying results from flood models. The software has the ability to simulate flood events based on estimated rainfall data (provided by the Bureau of Meteorology) and allows scenario testing. The results of waterRIDE will help in emergency planning and Council envisages a close relationship with the SES on the potential impacts of flood events using the results of waterRIDE>.

The software also has GIS capability, which will aid in the production of flood planning levels and LEP amendments. Council staff intend to produce planning levels from waterRIDE for the use in Flood Certificates, S149 notations and LEP boundary amendments. Other benefits from waterRIDE are the ability to make videos of simulated flood events that are derived from the results of flood studies. This tool may be used in future public consultation exercises. Importantly, waterRIDE provides a consistent, transparent reporting basis that is more readily defensible in a legal sense.

RECOMMENDATION:

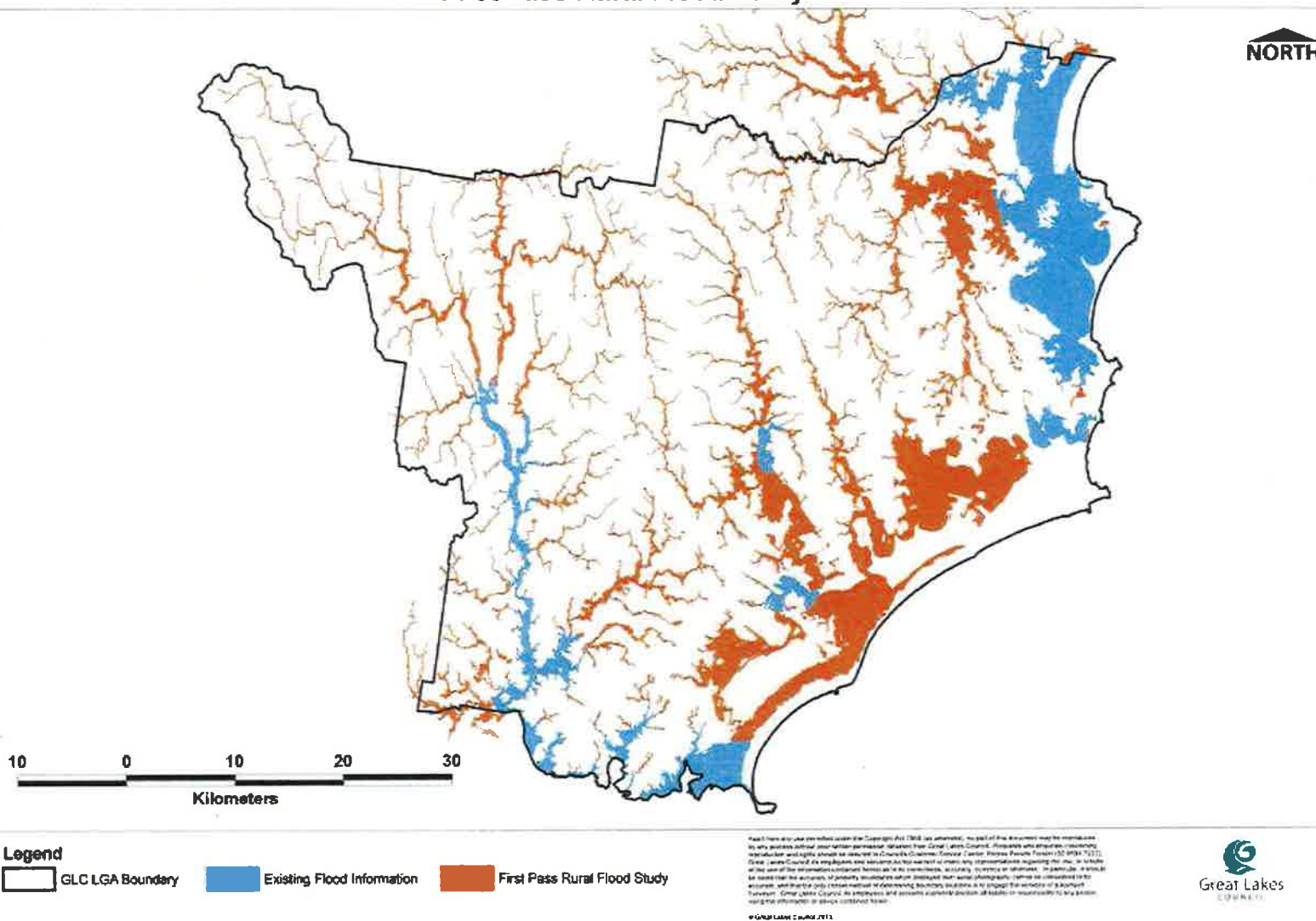
It is recommended that:

1. The results of the First Pass Rural Flood Study and proposed LEP amendments are placed on public exhibition;
2. The Lower Myall River and Myall Lakes Flood Study and proposed LEP amendments are placed on public exhibition;
3. Council endorse the use of waterRIDE as the GIS planning tool to coordinate all existing flood studies and produce flood extent data suitable for engineering and planning purposes.

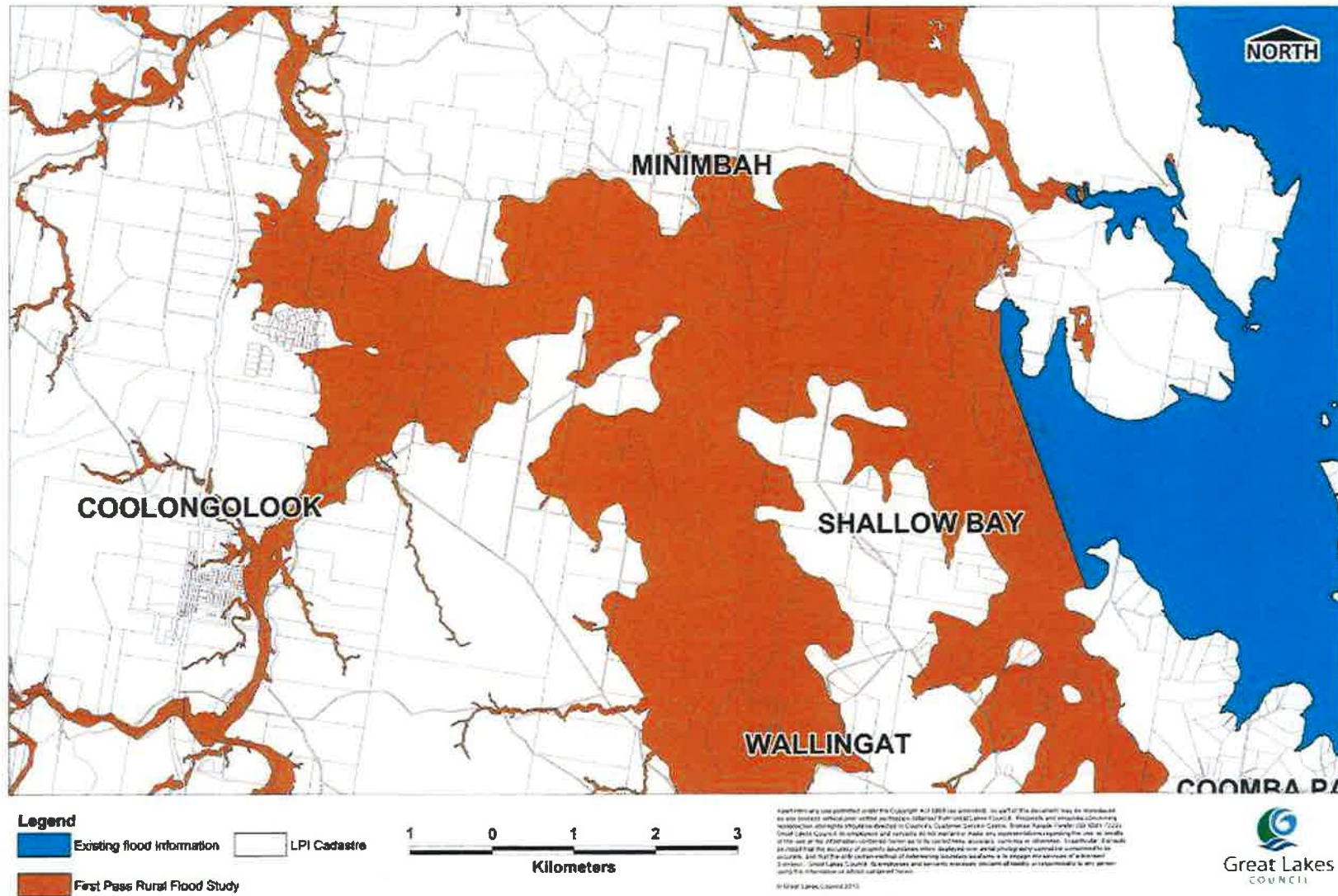
ANNEXURES:

A: Sample results of the First Pass Rural Flood Study

First Pass Rural Flood Study

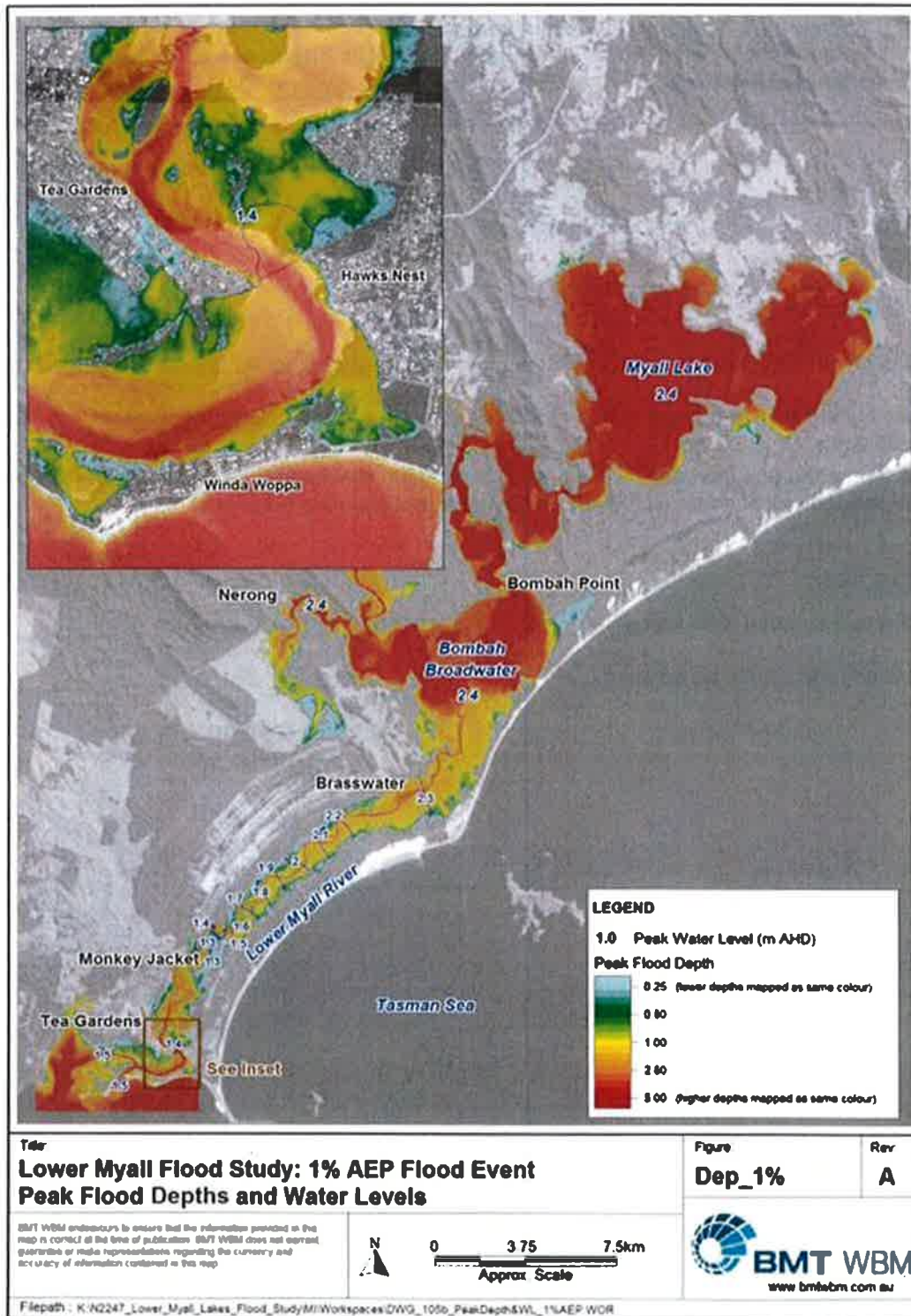


First Pass Rural Flood Study



B: Lower Myall Flood Study 1% AEP Flood Event





Subject: ES - Update of flood information
Index: Sewerage & Drainage - Flood Investigation
Author: Investigations Engineer - Geoff Love and Traffic Engineer - Wade Holmes
Strategic Committee Meeting: 13 May 2014

Engineering Development Officer, Mr Geoff Love provided a presentation to the Committee on Flood Modelling and waterRIDE.

RECOMMENDATION:

It is recommended that:

4. The results of the First Pass Rural Flood Study and proposed LEP amendments are placed on public exhibition;
5. The Lower Myall River and Myall Lakes Flood Study and proposed LEP amendments are placed on public exhibition;
6. Council endorse the use of waterRIDE as the GIS planning tool to coordinate all existing flood studies and produce flood extent data suitable for engineering and planning purposes.

RESOLUTION

(Moved A Summers/Seconded K Hutchinson)

That the above recommendation be adopted.

Annex B

Great Lakes LEP 2014 Clause and Maps

Great Lakes Local Environmental Plan 2014

Clause 7.3 Flood planning

(1) The objectives of this clause are as follows:

- (a) to minimise the flood risk to life and property associated with the use of land,
- (b) to allow development on land that is compatible with the land's flood hazard, taking into account projected changes as a result of climate change,
- (c) to avoid significant adverse impacts on flood behaviour and the environment.

(2) This clause applies to:

- (a) land identified as "Flood Planning Area" on the Flood Planning Map, and
- (b) other land at or below the flood planning level.

(3) Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that the development:

- (a) is compatible with the flood hazard of the land, and
- (b) will not significantly adversely affect flood behaviour resulting in detrimental increases in the potential flood affectation of other development or properties, and
- (c) incorporates appropriate measures to manage risk to life from flood, and
- (d) will not significantly adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses, and
- (e) is not likely to result in unsustainable social and economic costs to the community as a consequence of flooding.

(4) In determining a development application for development on land to which this clause applies, the consent authority must have regard to the following matters:

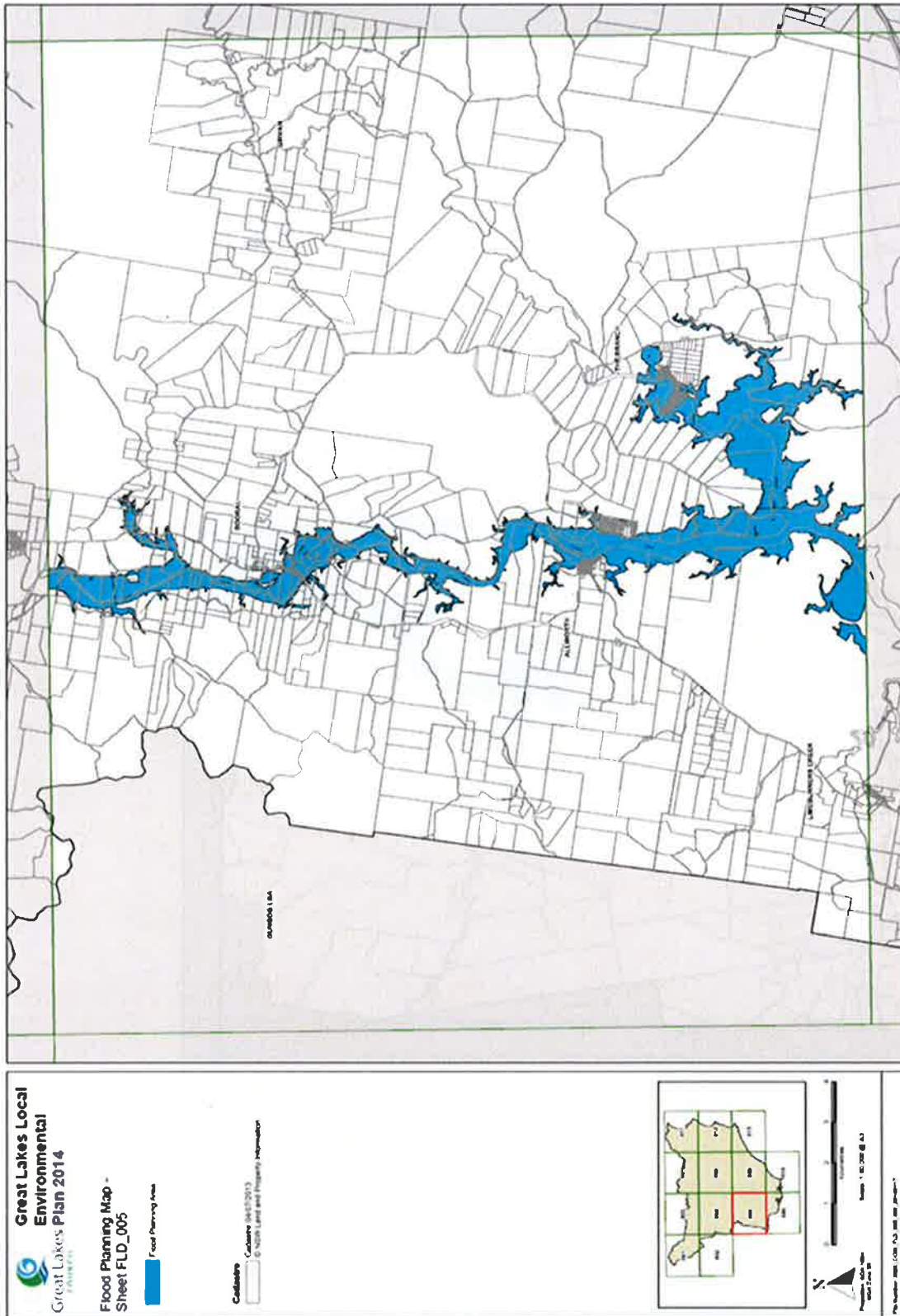
- (a) the intended design life and scale of the development,
- (b) the sensitivity of the development in relation to future effective self-evacuation of the land, and if that is not possible, the low risk occupation in time of flood,
- (c) the potential to modify, relocate or remove the development.

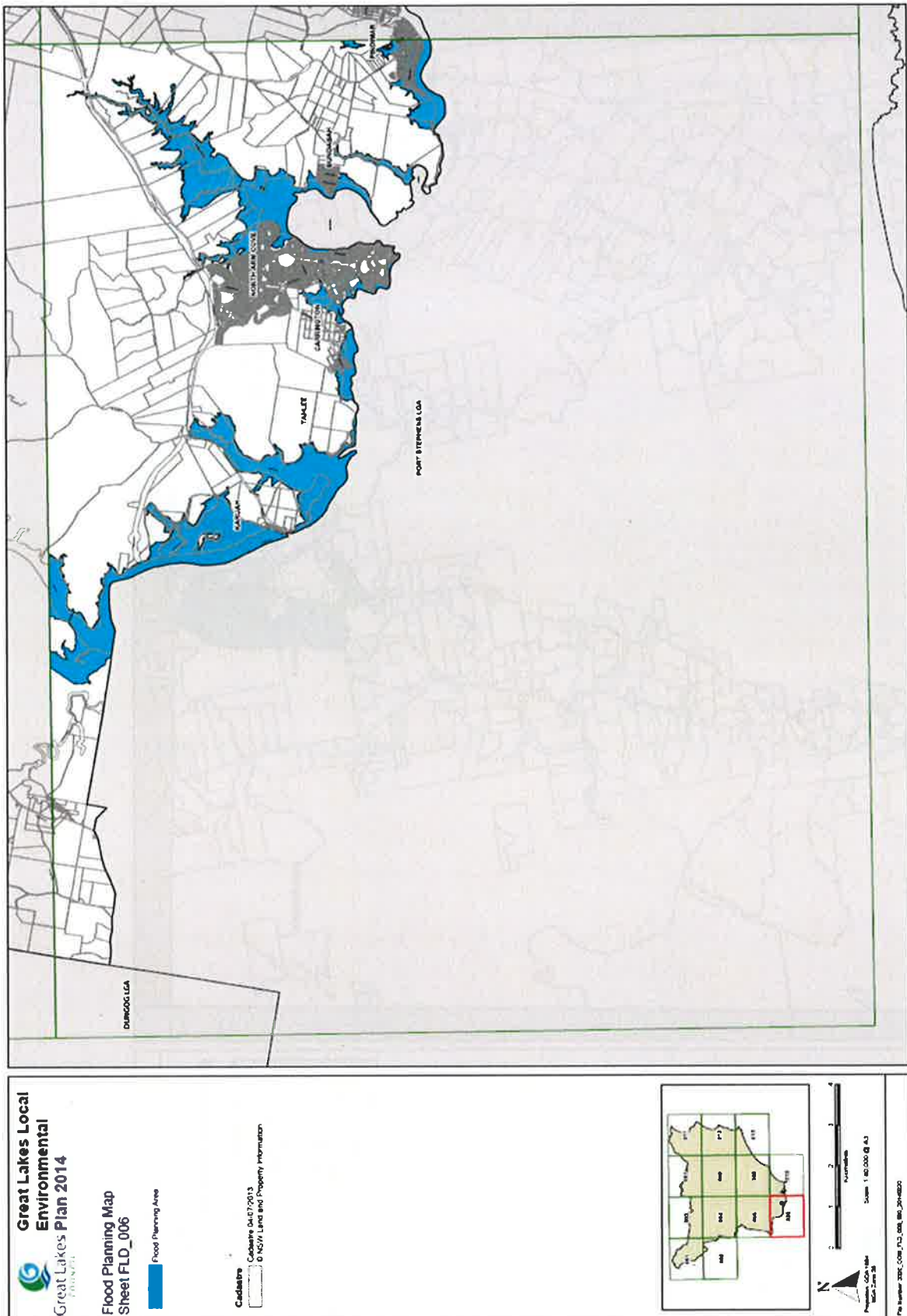
(5) A word or expression used in this clause has the same meaning as it has in the *Floodplain Development Manual (ISBN 0 7347 5476 0)* published by the NSW Government in April 2005, unless it is otherwise defined in this clause.

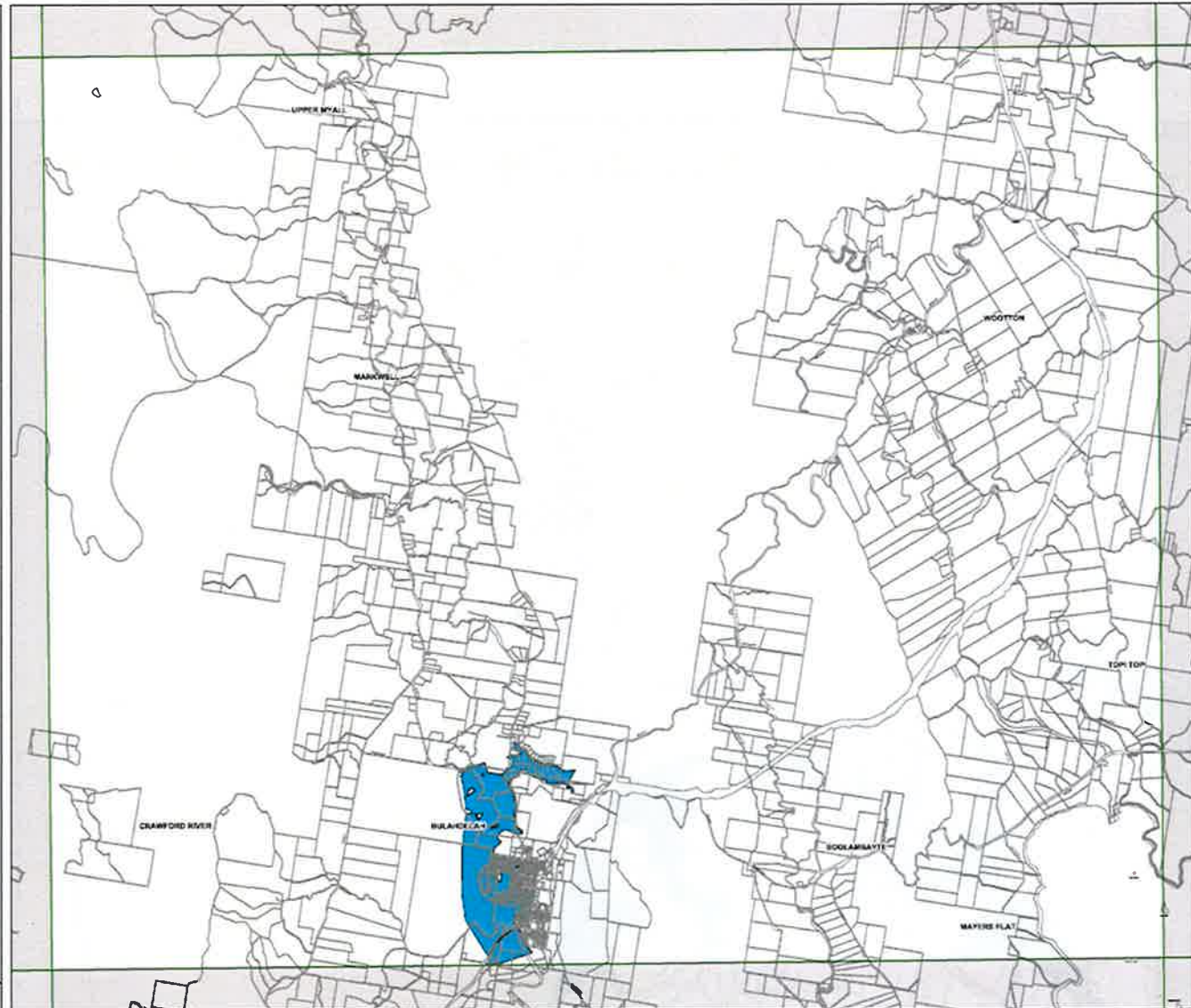
(6) In this clause:

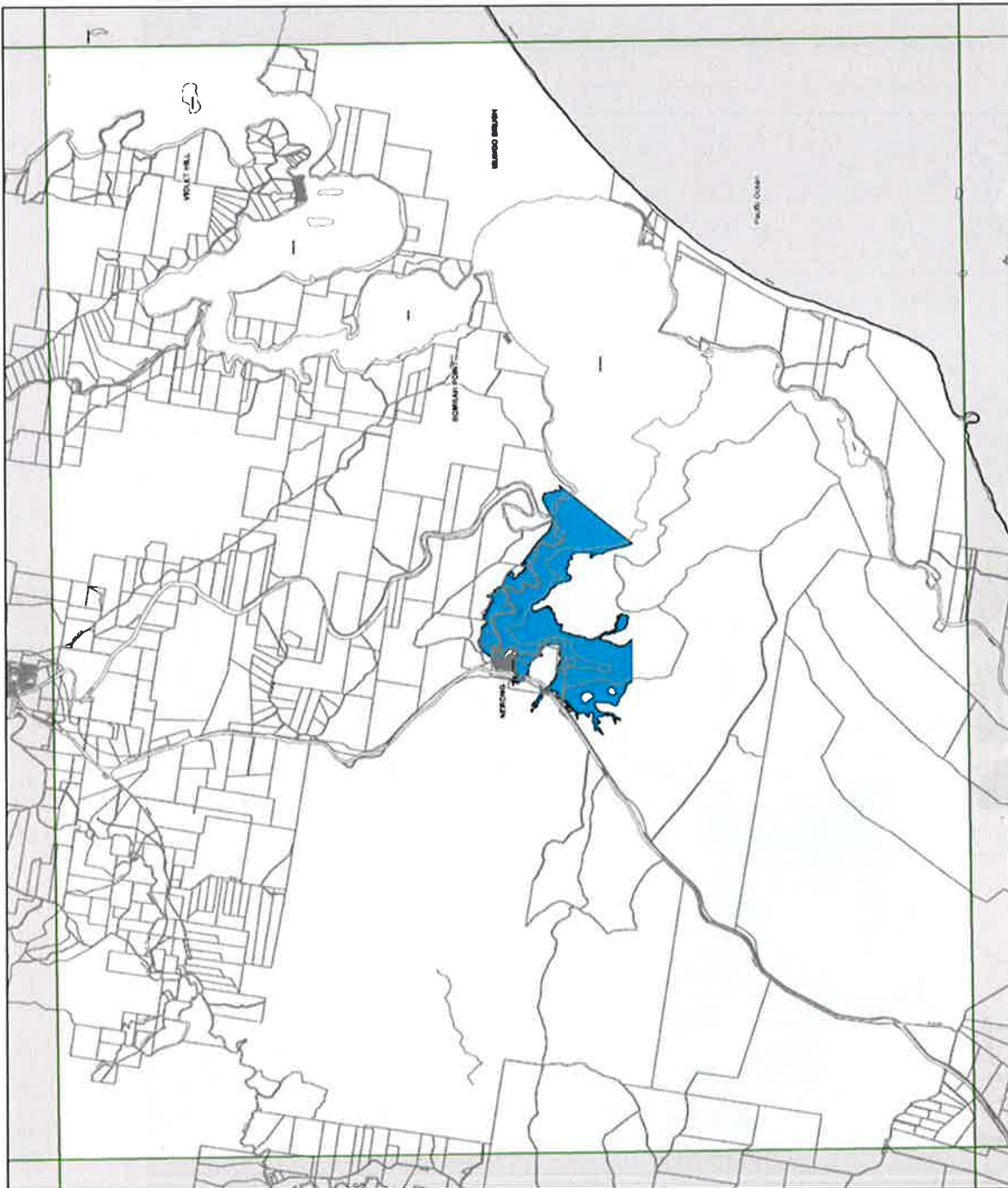
flood planning level means the level of a 1:100 ARI (average recurrent interval) flood event plus 0.5 metre freeboard and the projected 2100 sea level rise of 0.9 metres above the 1990 mean sea level.

(from NSW Legislation website - Great Lakes Local Environmental Plan 2014, published 4 April 2014)









**Great Lakes Local
Environmental
Plan 2014**

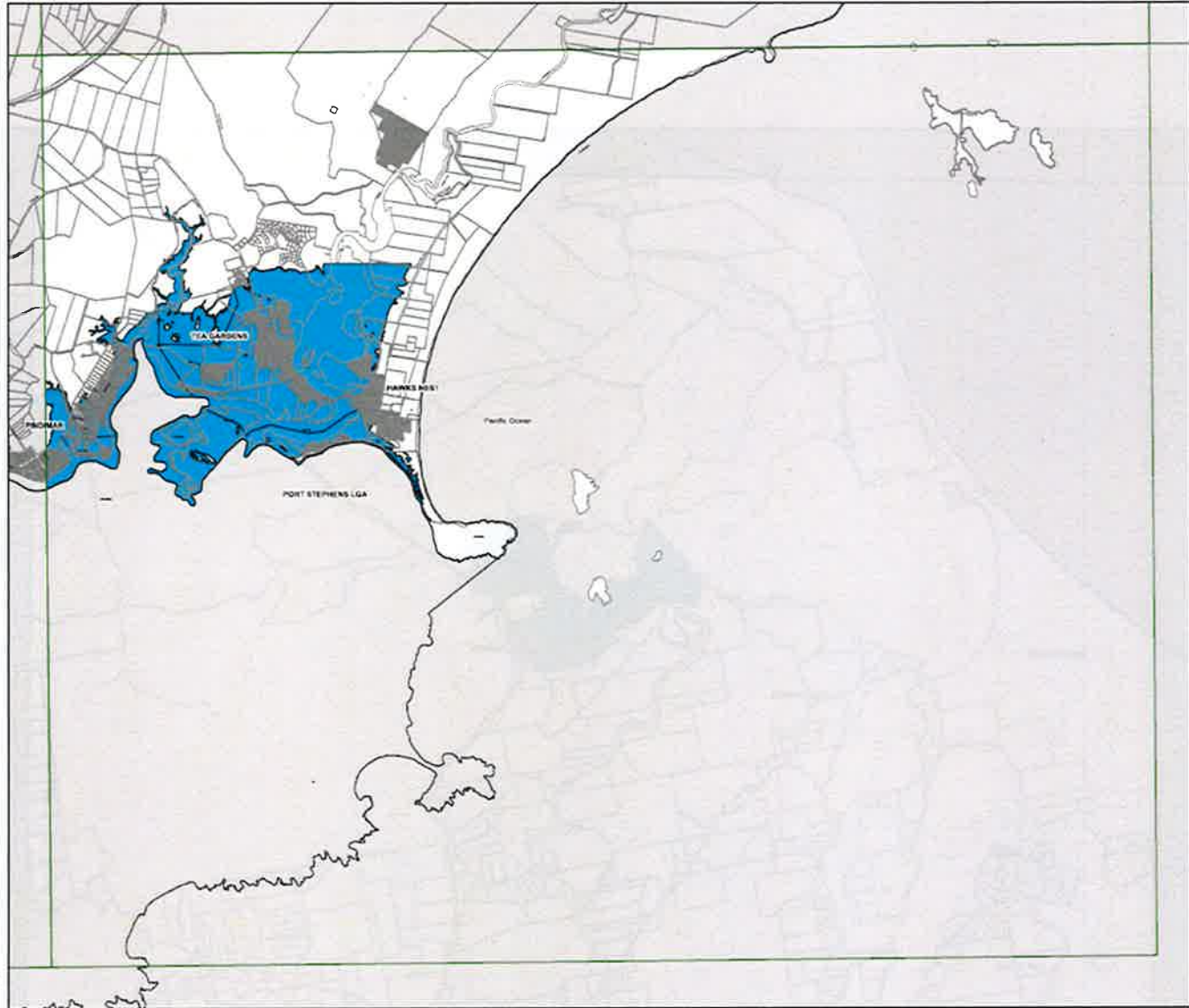
**Flood Planning Map -
Sheet FLD_009**

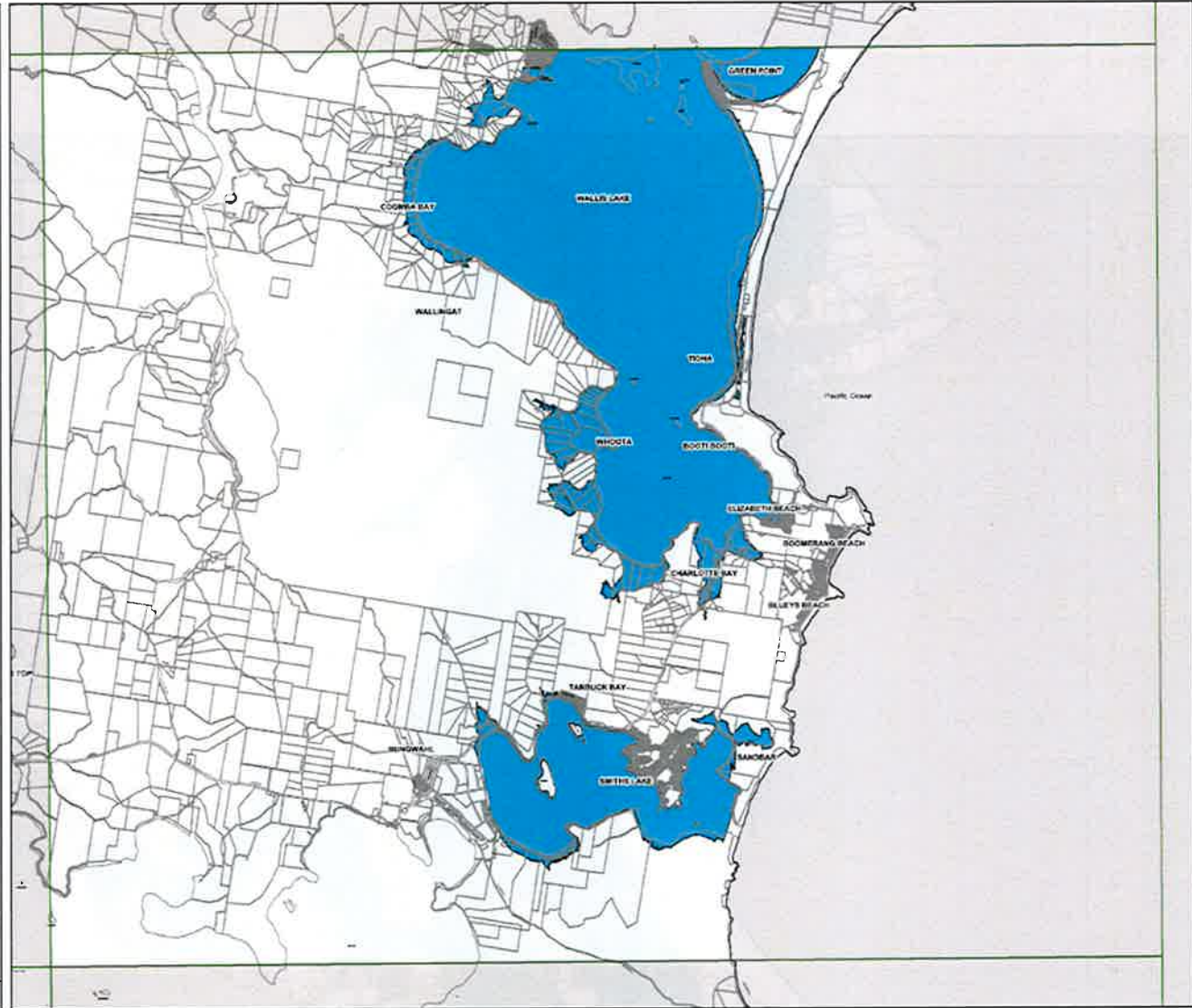


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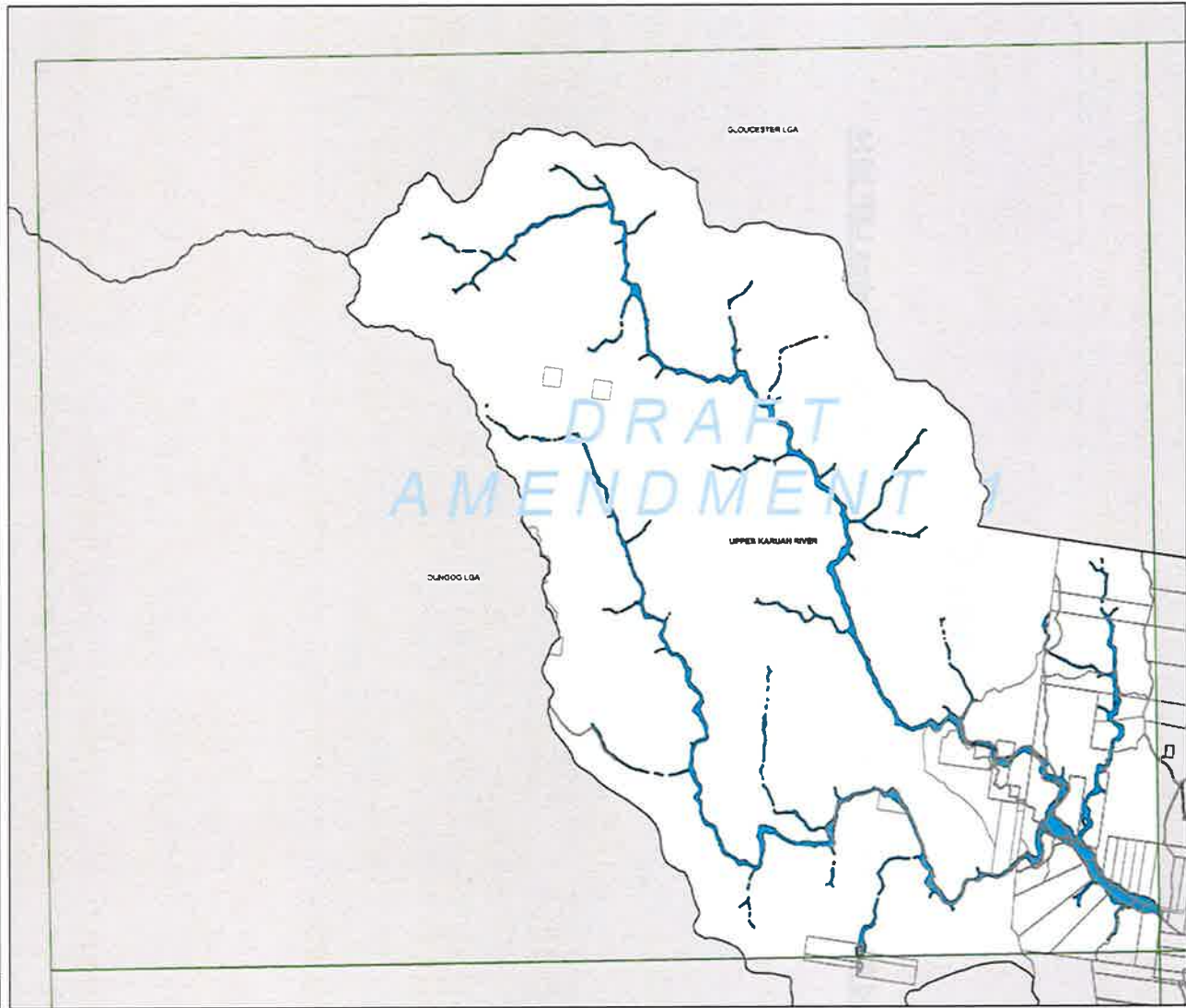
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Annex C

Draft Flood Planning Area maps to be incorporated into the Great Lakes LEP 2014





**Great Lakes Local
Environmental
Plan 2014**

**Flood Planning Area Map -
Sheet FLD_002**

Flood Planning Area

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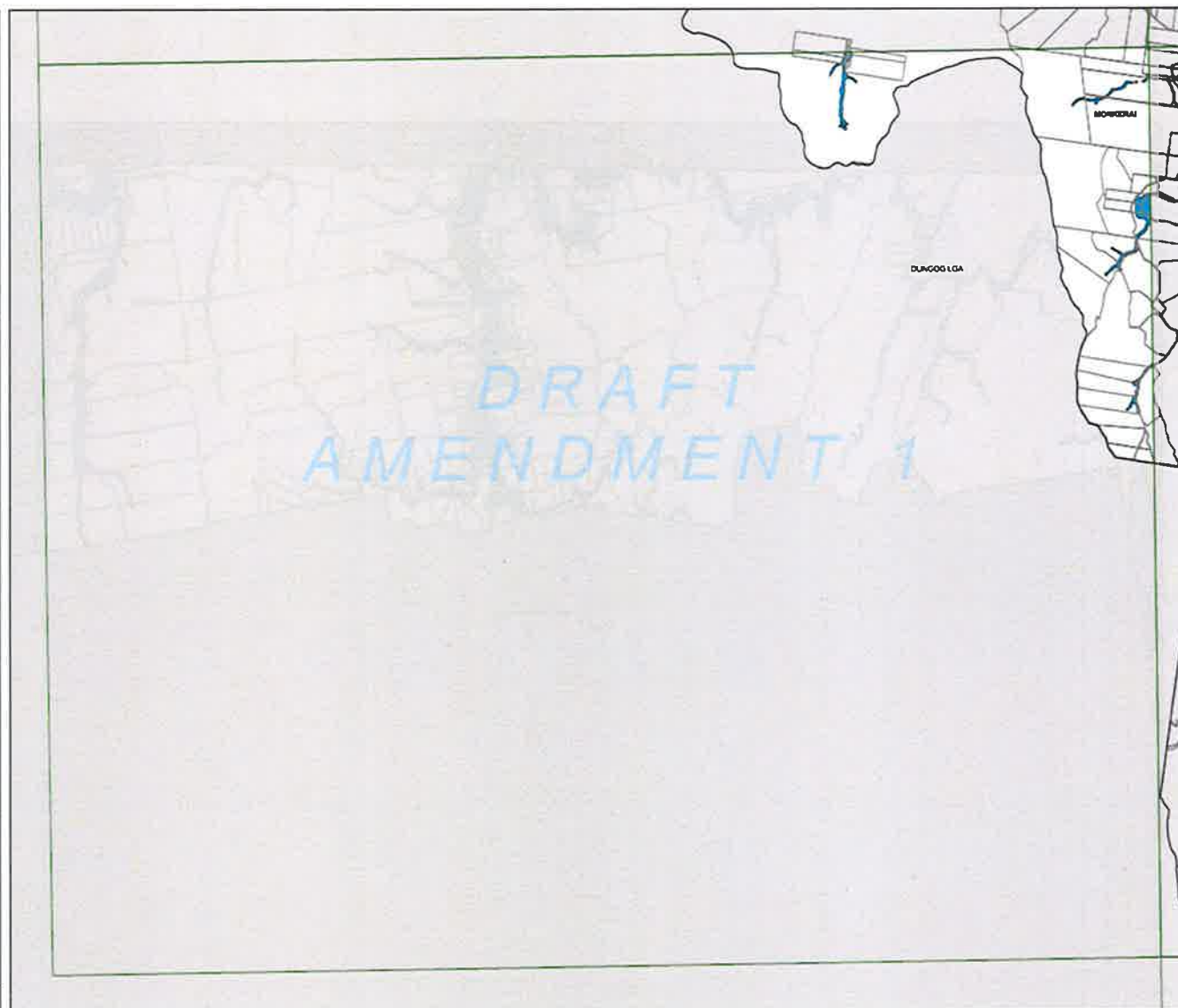




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Great Lakes Local Environmental Plan 2014
Great Lakes
KUNDA

Flood Planning Area Map -
Sheet FLD_003

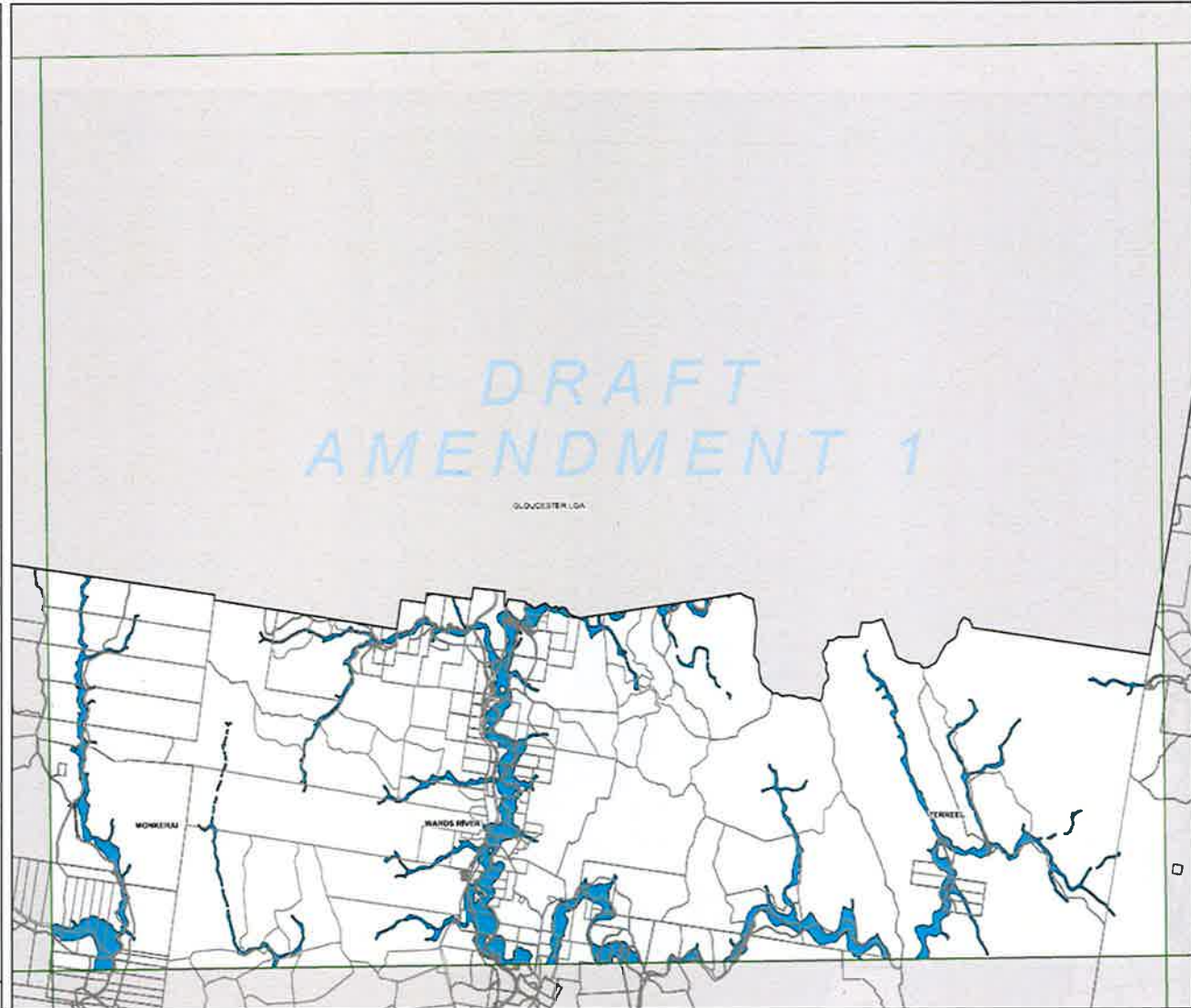
 Flood Planning Area

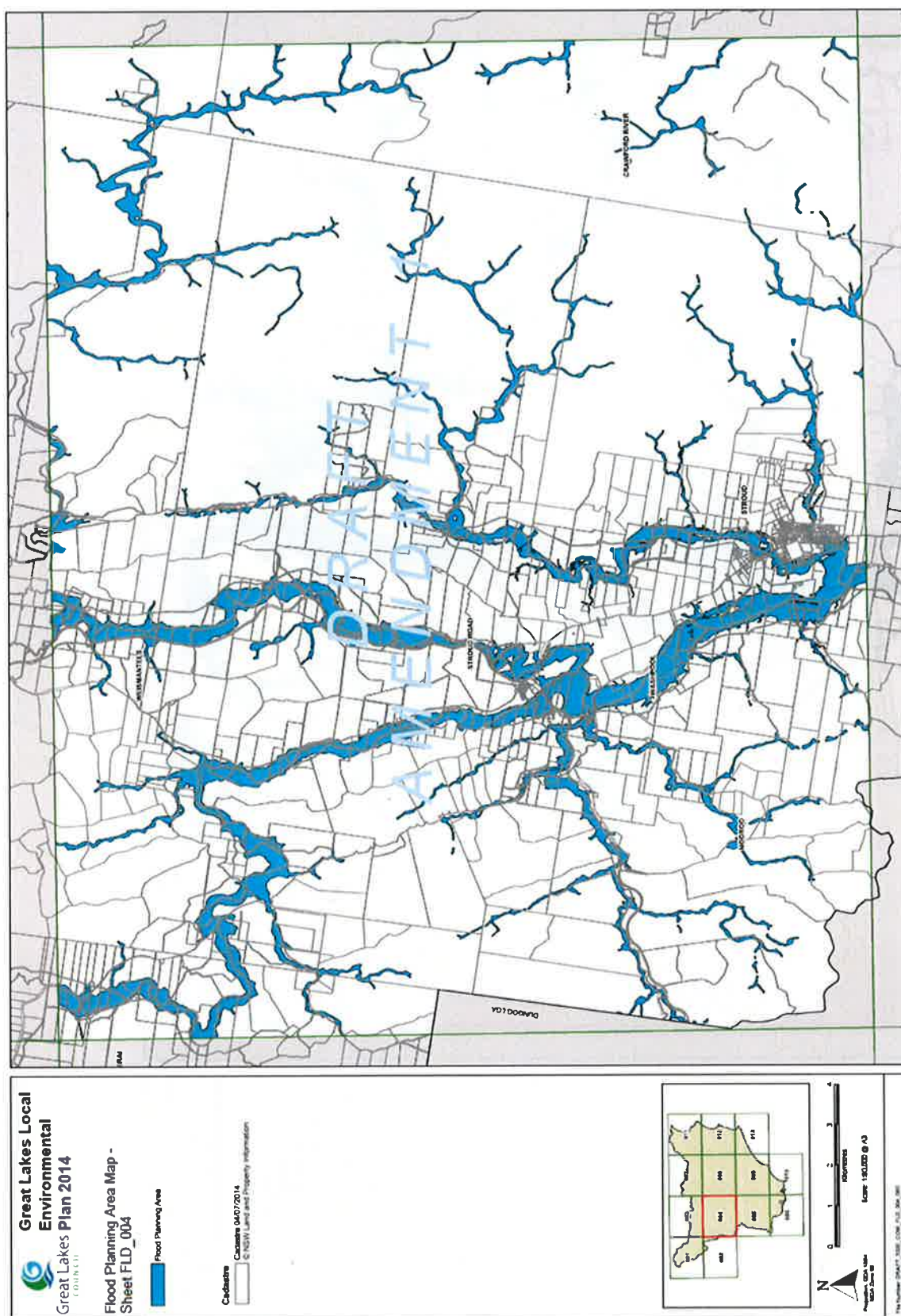
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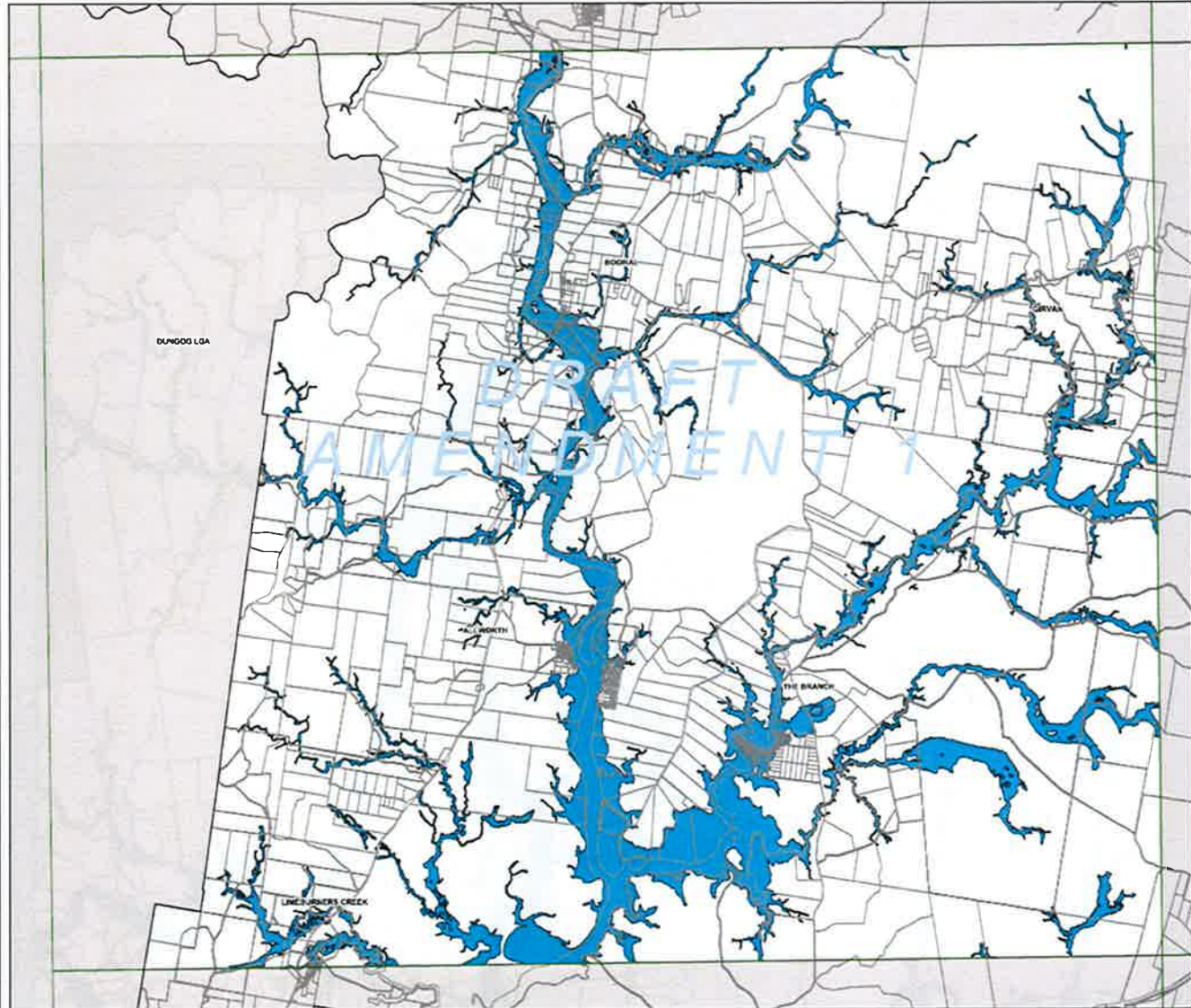
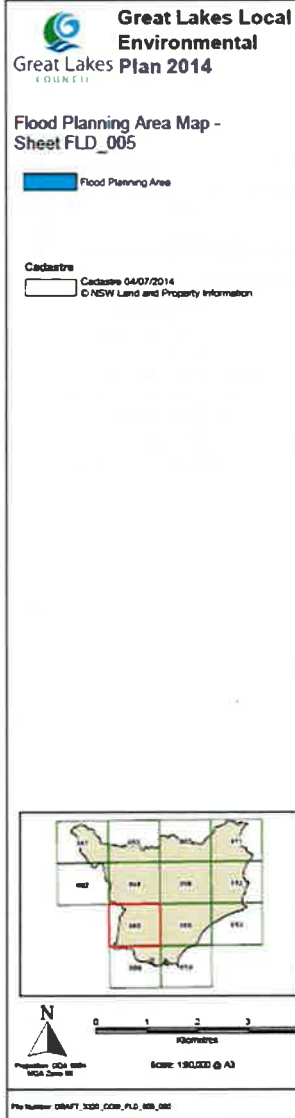


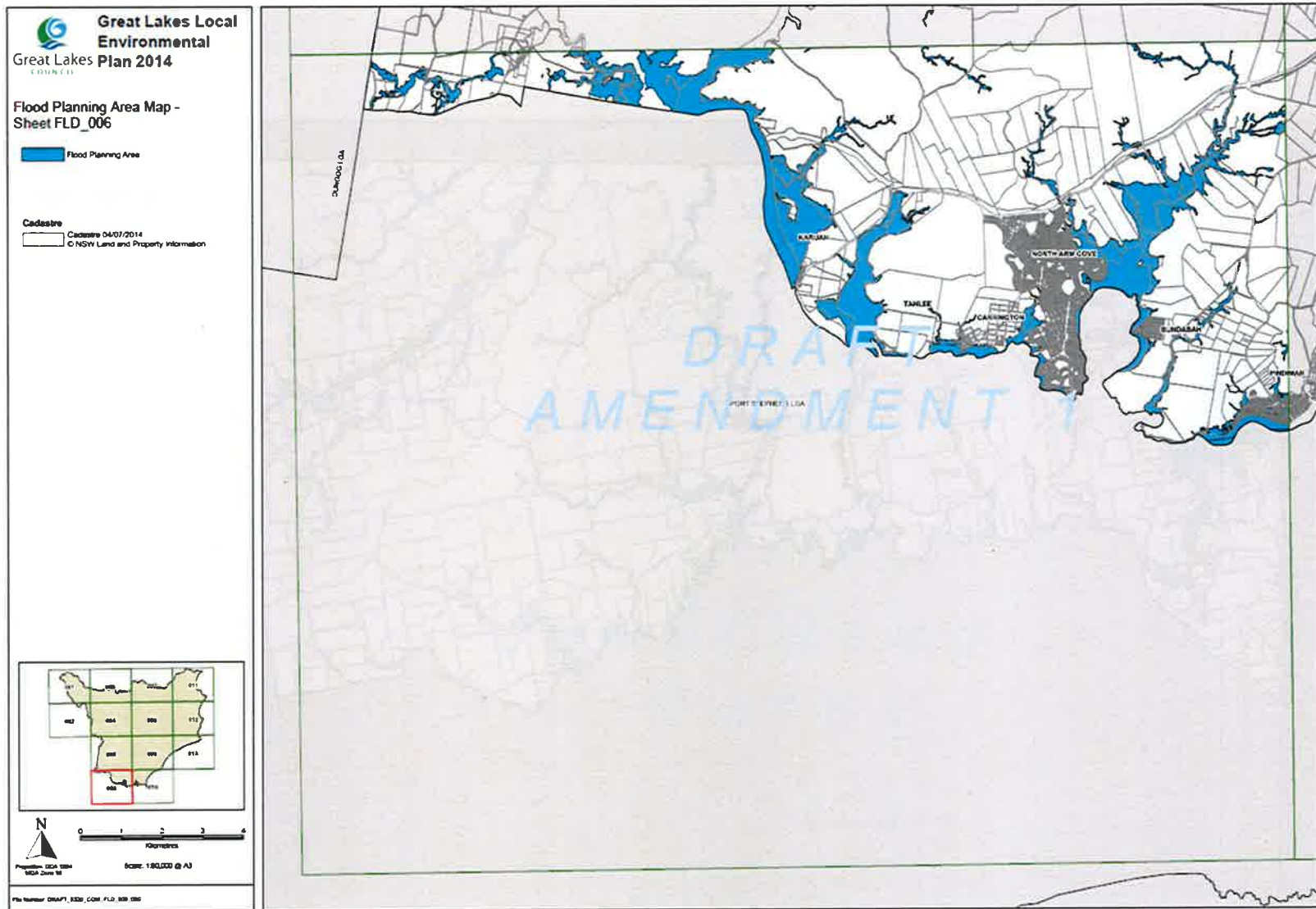

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Great Lakes Local Environmental Plan 2014
COUNCIL

Flood Planning Area Map - Sheet FLD_007

 Flood Planning Area

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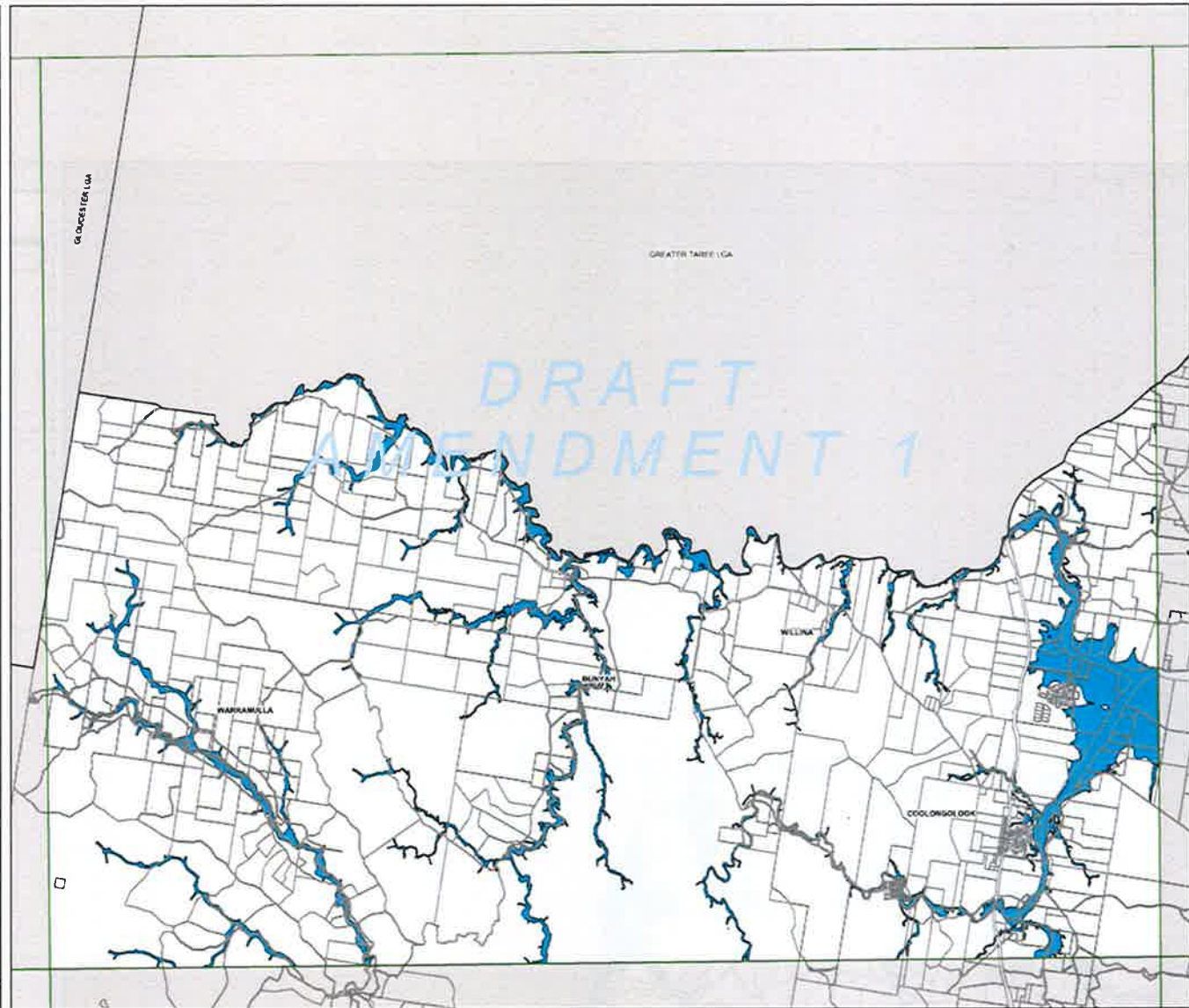


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File Number: DBA/17_2020_CON_FLD_007_002



Great Lakes Local Environmental Plan 2014
Great Lakes COUNCIL

Flood Planning Area Map - Sheet FLD_008

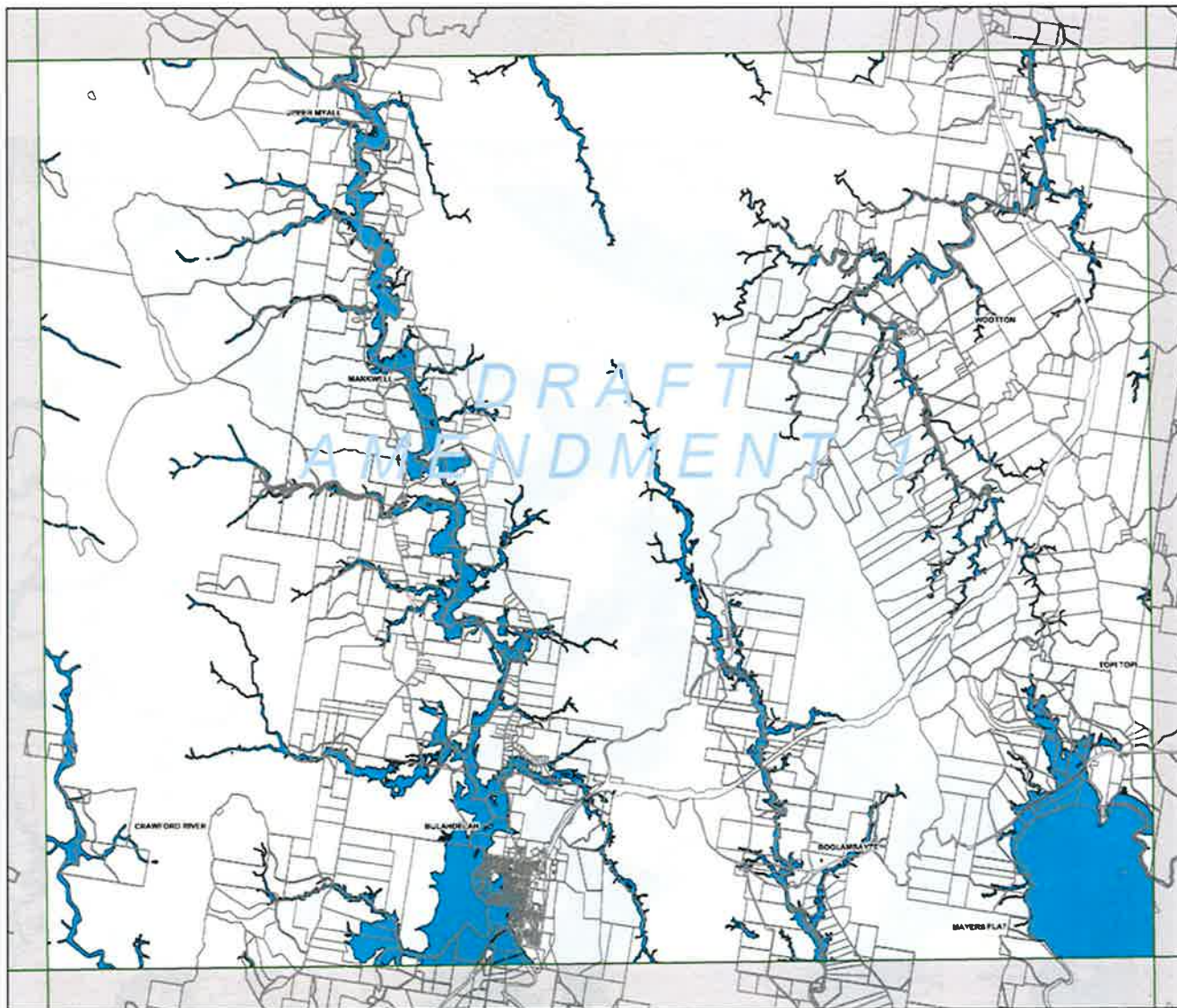
 Flood Planning Area

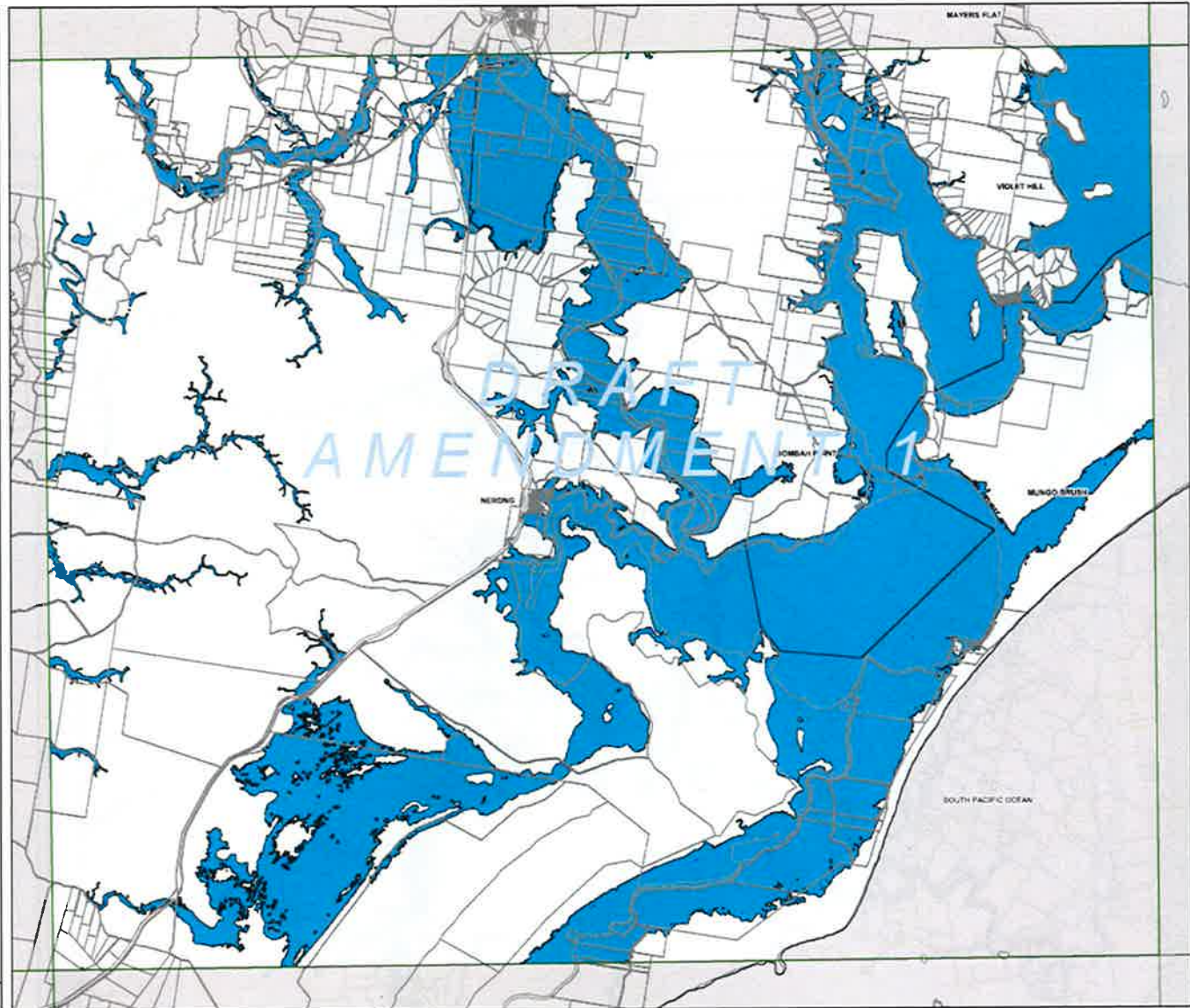
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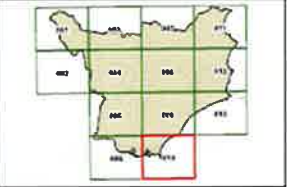
Great Lakes Local Environmental Plan 2014

Flood Planning Area Map - Sheet FLD_010

 Flood Planning Area

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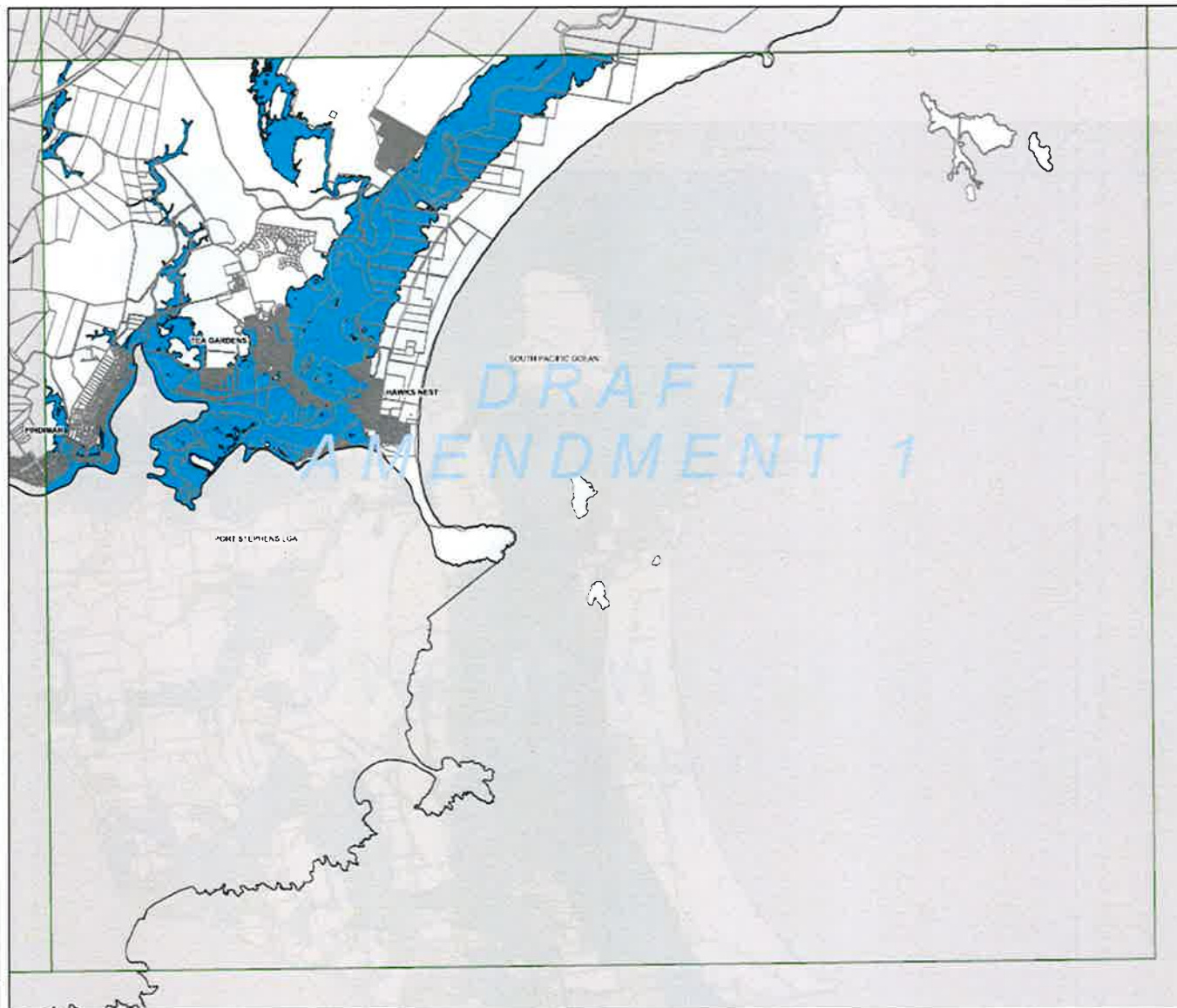


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Great Lakes Local Environmental Plan 2014
Great Lakes Council

Flood Planning Area Map - Sheet FLD_011

 Flood Planning Area

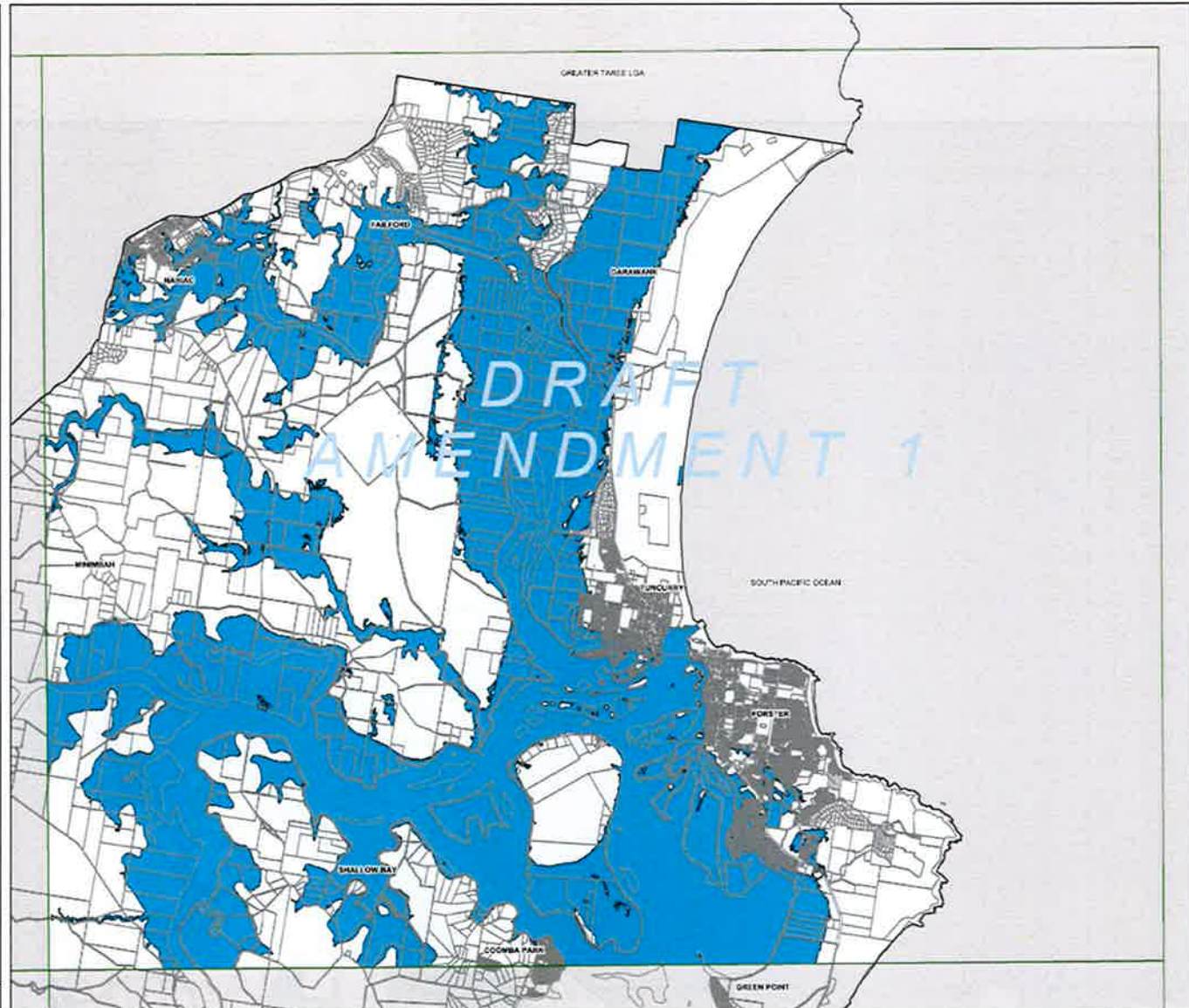
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 Great Lakes Council

Flood Planning Area Map - Sheet FLD_012

 Flood Planning Area

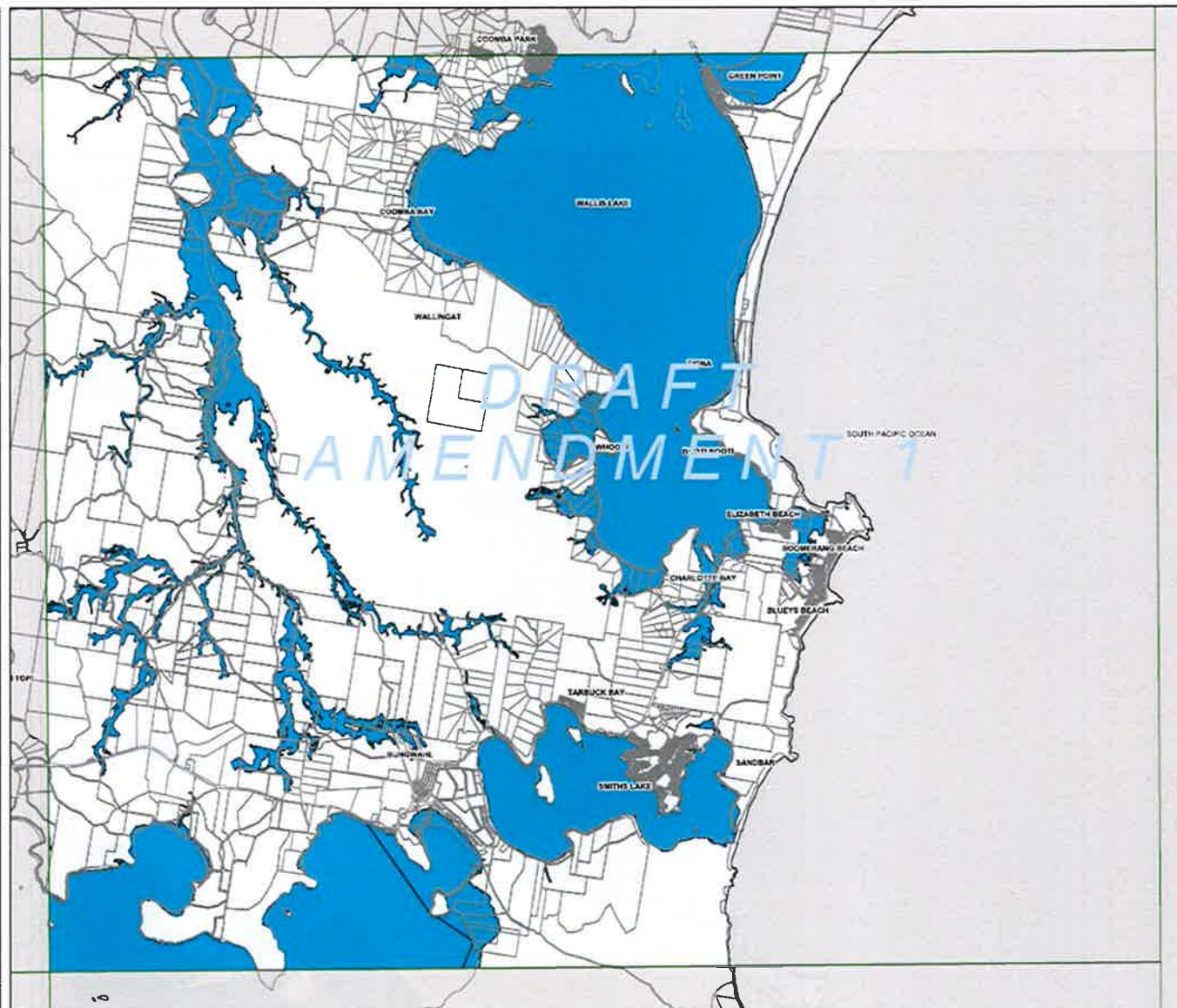
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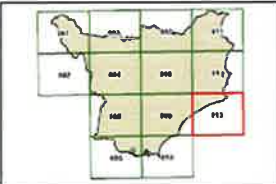


Great Lakes Local Environmental Plan 2014
Great Lakes Council

Flood Planning Area Map - Sheet FLD_013

 Flood Planning Area

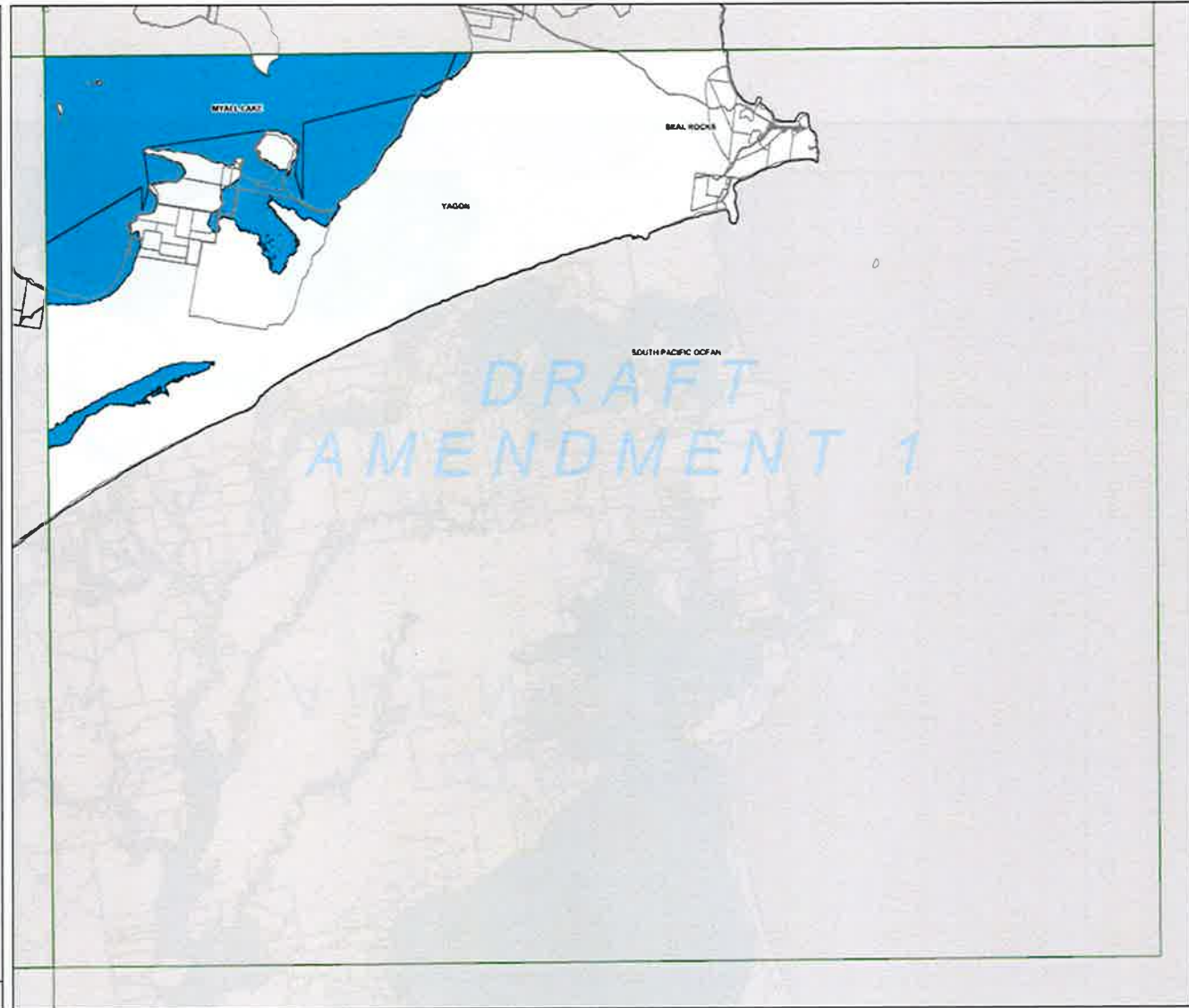
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Projection: GDA 1984
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Annex D

Great Lakes Adopted Flood Management Studies and Plans

Council has prepared a number of Flood Management Studies and Plans that are available download from Council's website.

Group 1: Wallis Lake, Forster and Tuncurry

- [Wallis Lake Flood Study Review](#)
- [Wallis Lake Flood Study Review Figures](#)
- [Forster / Tuncurry Flood Management Plan](#)
- [Wallis Lake Flood Management Study](#)

Group 4: Bulahdelah and Upper Myall

- [Bulahdelah Flood Appraisal](#)
- [Fry's Creek Flood Study](#)
- [Myall River Floodplain Risk Management Plan](#)
- [Myall River Floodplain Risk Management Study](#)

Group 2: Port Stephens and Lower Myall

- [Lower Myall River Flood Analysis](#)
- Port Stephens Flood Study
 - [Part 1](#)
 - [Part 2](#)
 - [Part 3](#)
- Port Stephens Foreshore Management Plan
 - [Part 1](#)
 - [Part 2](#)
- Port Stephens Foreshore Management Study
 - [Executive Summary](#)
 - [Report Sections 1-4](#)
 - [Report Sections 5-8](#)
 - [Appendices A-D](#)
 - [Appendices E-G](#)
- [Port Stephens Design Flood Levels CC Review](#)

Group 5: Smiths Lake

- [Smith's Lake Flood Study](#)

Group 6: Stroud

- [Stroud Flood Study](#)

Group 7: Karuah River

- [Karuah River Flood Study](#)

Group 3: Wallamba River and Napiac

- [Wallamba River Flood Study](#)
- [Wallamba River Risk Management Plan](#)
- [Wallamba Risk Management Study](#)

- [Nabiac Flood Study - Local Catchments](#)
- [Nabiac Flood Study - Local Catchments Figures 1](#)
- [Nabiac Flood Study - Local Catchments Figures 2](#)

Annex E

Great Lakes Draft Flood Management Studies and Plans

The following draft studies are available on a separate CD:

1. The Draft Nabitac Floodplain Risk Management Strategy & Wallamba River Flood Study;
2. The Draft Lower Myall River and Myall Lakes Flood Study; and
3. The Draft Smiths Lake Floodplain Risk Management Study; and

The information on the following pages has been provided regarding the First Pass Rural Flood Study.

Our Ref: DW: L.N20196.001.docx

Tel: +61 2 4940 8882
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9 May 2014

ABN 54 010 830 421

www.bmtwbm.com.au

Attention: Wade Holmes

RE: GREAT LAKES LGA FLOOD EXTENTS

First-pass flood modelling was completed for Great Lakes Council to generate LGA-wide flood extents. The primary objective of the modelling exercise was to map the floodplain extents within areas for which detailed flood modelling has not yet been undertaken. The approach adopted to complete the TUFLOW-GPU hydrological and hydraulic modelling, model validation and flood extent mapping are detailed in this document.

Modelling Methodology

The Great Lakes LGA was modelled in three separate models – one each to represent the Karuah catchment, the Myall River catchment and the Wallis Lake catchment.

The model topography is based on LiDAR elevation data where available and SRTM data elsewhere. The TUFLOW model adopted a cell size of 10m, comprising a 5m resolution LiDAR DEM and a 30m resolution STRM DEM. The SRTM data was modified across a 1km width to allow for a seamless transition into the LiDAR data. Additional local modifications were made where the interface between the two elevation datasets was presenting a barrier to flows. Connections were also provided across major obstructions such as the Pacific Highway, to prevent water from being trapped upstream

STRM data generally provides a reasonable shape of the topography, with elevation differing from LiDAR by around 1-2m. Given the upper catchment topography is adequately represented, this allows runoff and flood flows to be routed down to the LiDAR within the model. Due to the nature of each data set, the flood extents mapped within areas of LiDAR coverage will be much more reliable than those mapped within the STRM dataset.

The 1% AEP design rainfall has been modelled for these catchments, derived from the methods presented in AR&R (2001). The design rainfall intensity is applied as direct rainfall over the catchment, and is distributed as a time series for each of the storm durations using the standard design temporal patterns. The Karuah and Myall models use three different IFDs each to account for the spatial variation in design rainfall applicable to the upper, middle and lower catchment areas.

In order to achieve an appropriate catchment response, cleared areas, vegetated areas, urban areas and major watercourses/water bodies have been represented with different roughness parameters.

1% AEP downstream boundary conditions have been applied at the Tasman Sea and Port Stephens. These were adopted in accordance with previous flood studies and are detailed in Table 1.

Table 1 Adopted downstream boundary conditions

Location	Adopted 1% AEP Water Level (m AHD)
Tasman Sea	2.6
Karuah	1.9
Carrington	1.8
Bundabah	1.8
Lower Pindimar	1.7
Orungall Point	1.7
Pindimar	1.7
Teas Gardens	1.8
Wallis Lake	2.0

Once the modelling approach was finalised, the 100 year design flood event was simulated for the 2h, 3h, 6h, 9h, 12h, 18h, 24h and 36h durations.

Model Validation

The model was validated through comparison with peak flood hydrographs and peak flood level profiles available from local flood studies.

Model validation focussed on data available for Mill Creek and Laman's Creek presented in the Stroud Flood Study and for Woosters Creek, Town Creek and Pipeclay Creek in the Nabit Creek Flood Study. These creeks were chosen for comparison as they had the shortest critical durations (2h, 9h or 12h) of those available from the existing flood studies. Areas with shorter critical duration for flooding are of greater relevance for this study, given that areas within the LGA currently without flood mapping will generally be within sub catchment areas of smaller tributaries. It is not essential to validate the model for longer duration areas, as locations along larger river systems typically have existing flood studies that should be used for detailed flood mapping.

The modelled flow hydrographs were compared to those from the existing studies to determine whether the hydrological response within the model was performing as expected. The timing of the catchment response and shape of hydrographs modelled within the first pass modelling was found to match reasonably well to those in the available flood studies, presented in Figure 1 to Figure 5. These show that the hydrograph shapes and timing of peak flows is similar between the existing flood studies and the LGA-wide modelling.

As expected, there are differences between the peak flow estimates of the modelled hydrographs and the existing studies. There is a tendency for the LGA-wide models to overestimate the peak flow rates, which is due in part to the application of point rainfall intensities, rather than appropriate reduction factors. However, when the rainfall inputs are reduced to 70% (which provides for the best match with modelled flood levels from the previous studies) there is a tendency for the LGA-wide models to be underestimating the peak flow rates. This is compensating for the absence of channel capacity within the LGA-wide model topography, which typically represents the capacity of the floodplain only. Therefore, a lower flow rate is required to match the peak flood levels from the previous studies.

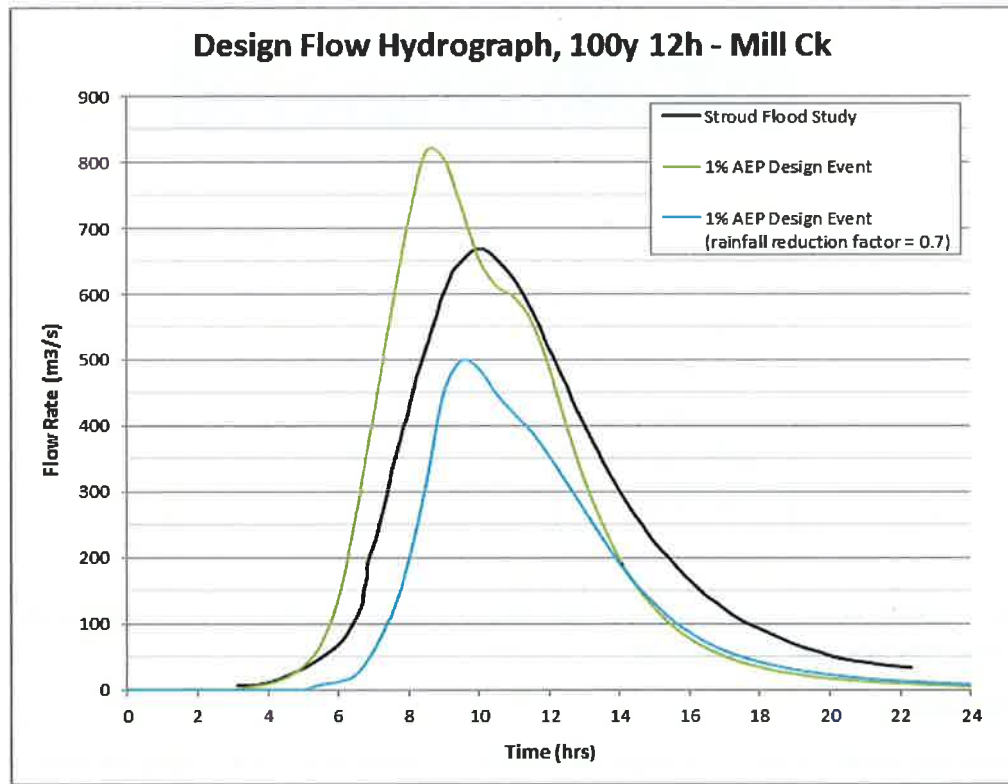


Figure 1 Design Flow Hydrograph, 1% AEP 12h duration - Mill Creek

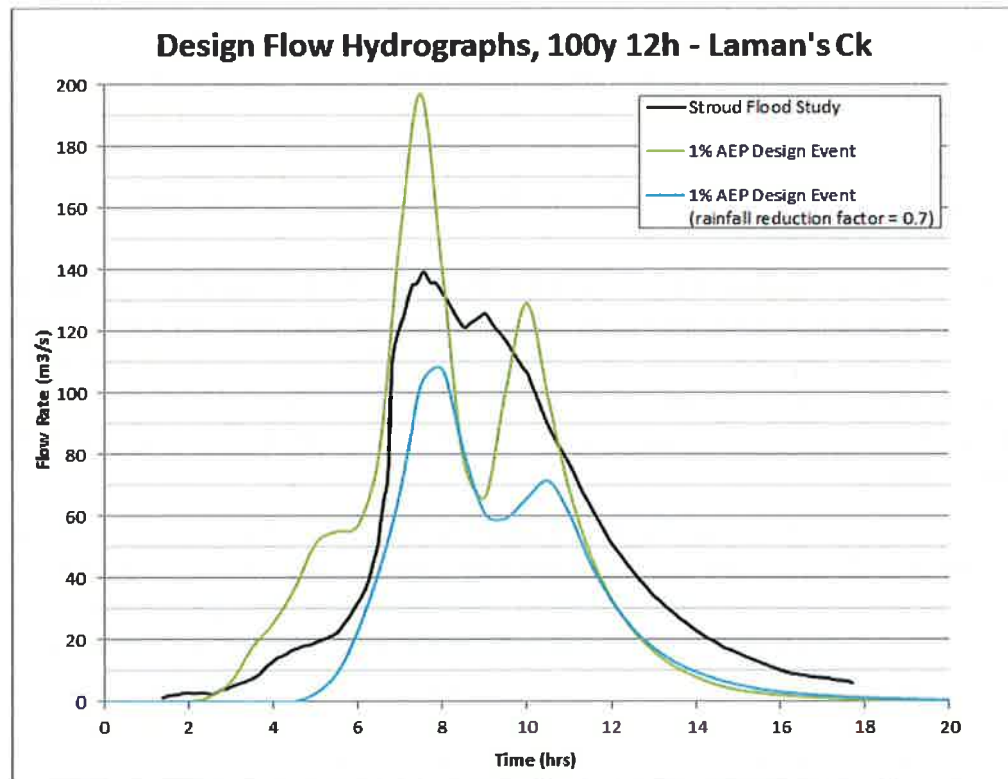


Figure 2 Design Flow Hydrograph, 1% AEP 12h duration - Laman's Creek

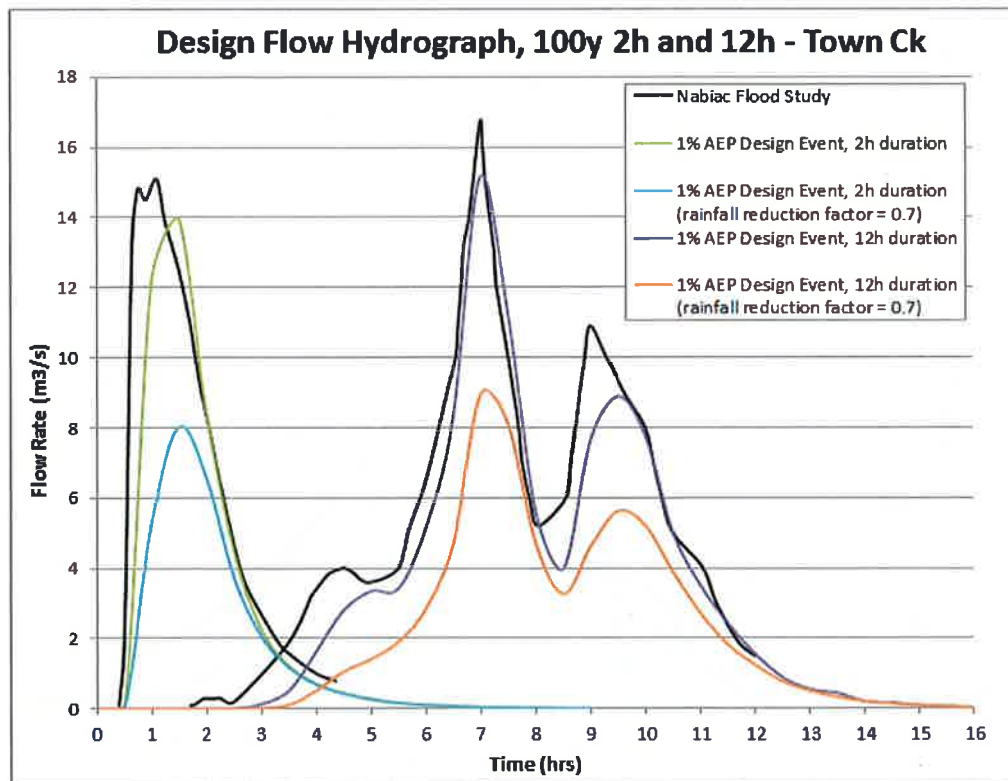


Figure 3 Design Flow Hydrograph, 1% AEP 2h and 12h durations - Town Creek

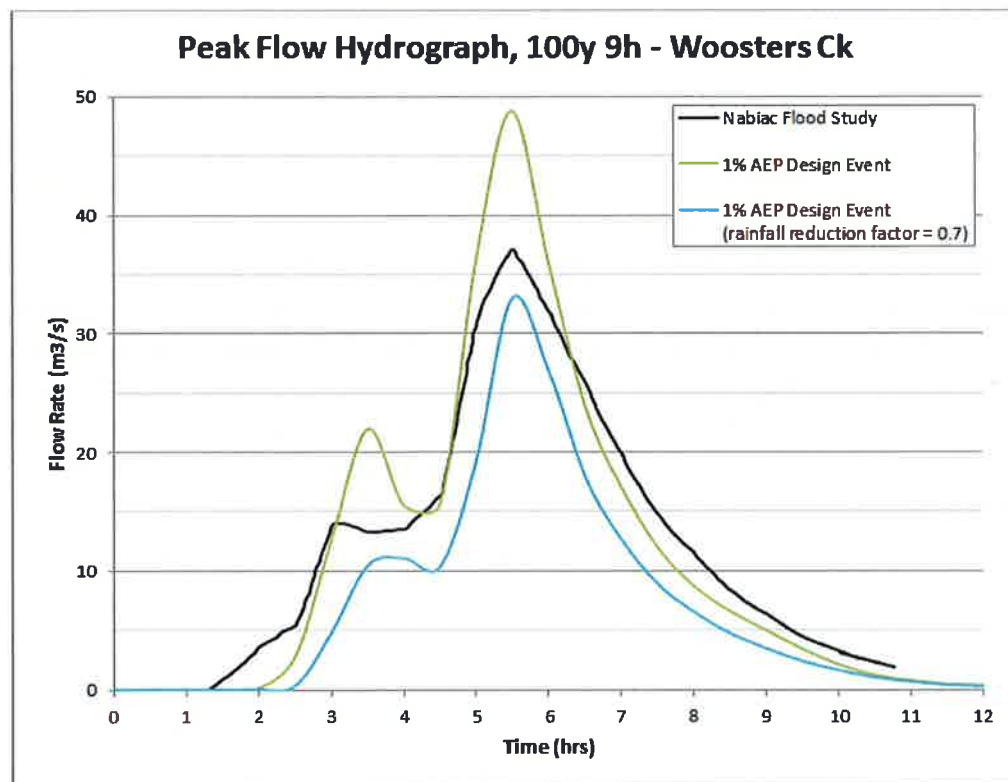


Figure 4 Design Flow Hydrograph, 1% AEP 9h duration - Woosters Creek

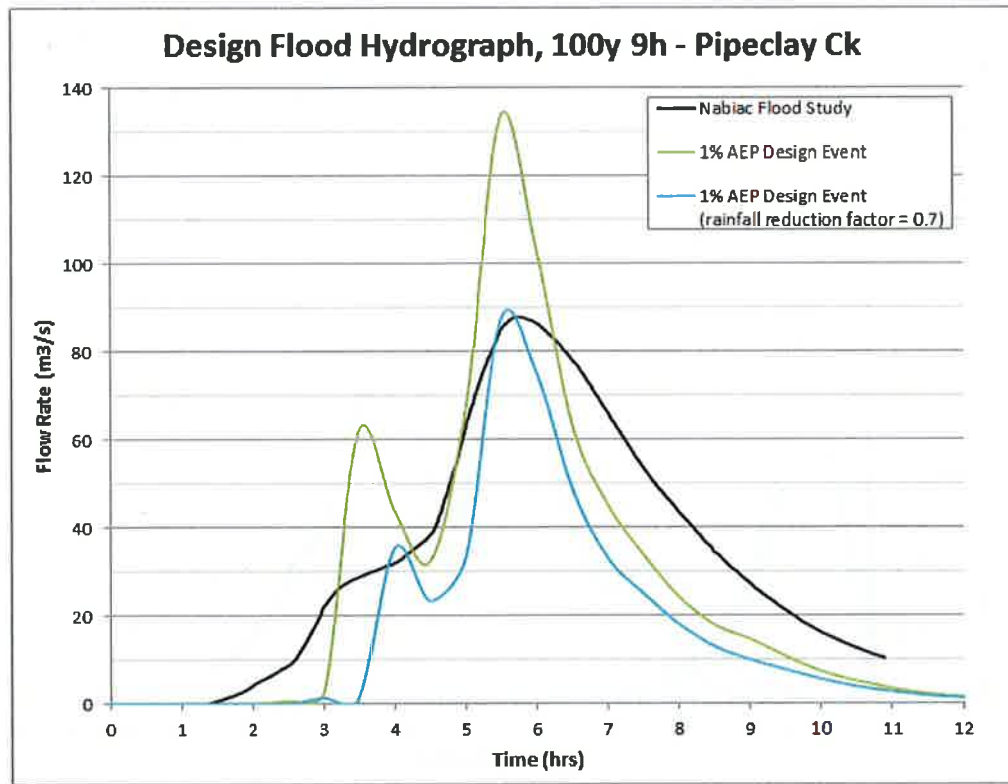


Figure 5 Design Flood Hydrograph, 1% AEP 9h duration - Pipeclay Creek

It was anticipated that a reduction in rainfall inputs would be required to compensate for the lack of channel details in the model and to account for aerial reduction factors that might have been applied in existing flood studies. Different rainfall reduction factors were applied with the aim of obtaining a better match to peak flood level profiles detailed in existing flood studies. Again, the focus was on upper catchment areas, as flood inundation extents for these locations are generally not covered in existing flood studies. Scaling down the 1% AEP rainfall inputs to 70% provided the best match between modelled flood levels and those from the validation creeks from existing studies

Peak flood level profiles for Mill Creek and Laman's Creek in the Karuah catchment model are presented in **Error! Reference source not found.** and **Error! Reference source not found.**. These show the 1% AEP flood level profiles from the existing flood studies and the 1% AEP LGA-wide model, both for 100% and 70% rainfall inputs. The exact location used to extract the peak flood level profiles in the Stroud Flood Study were not available, and minor discrepancies noted in the alignment of the peak flood level profiles occurred as a result of this.

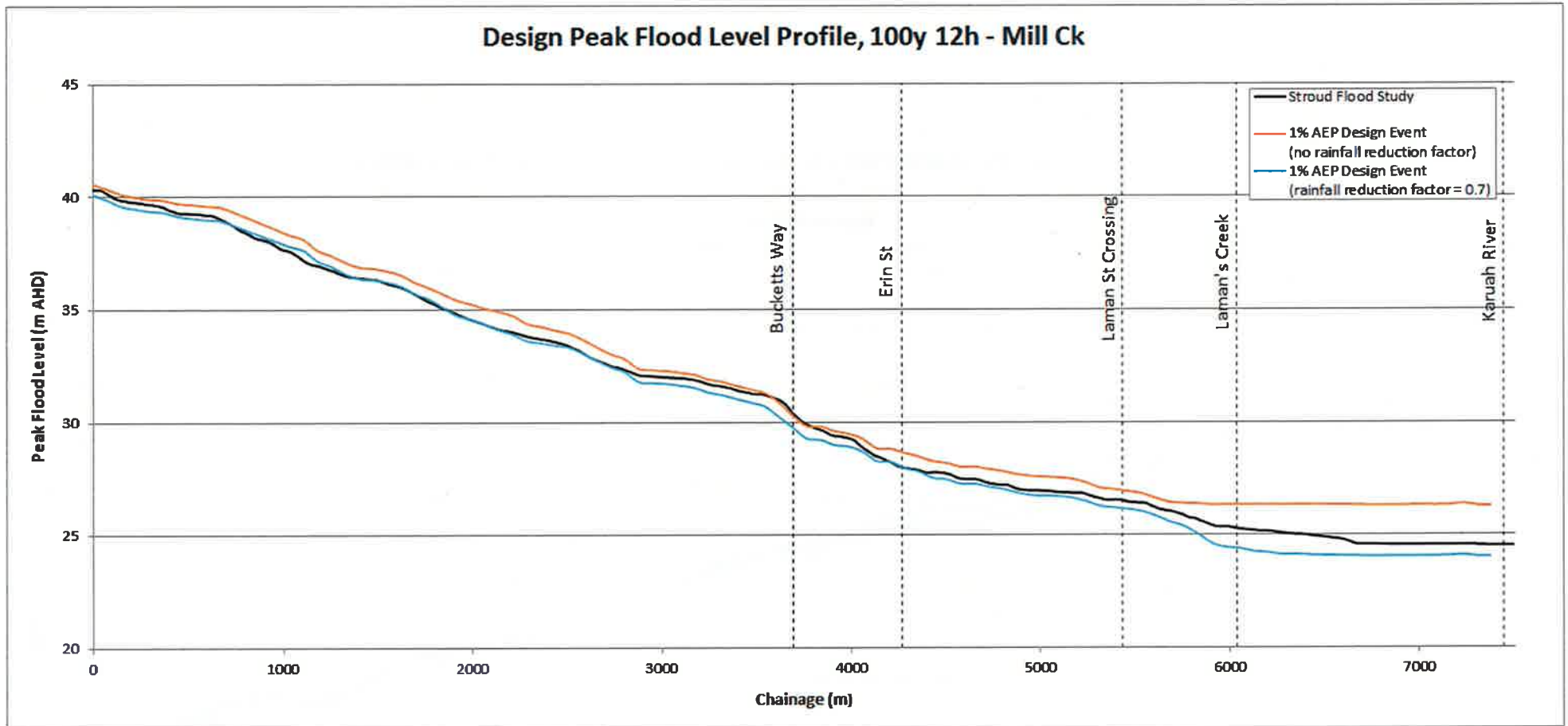


Figure 6 Design Peak Flood Level Profile, 1% AEP 12h duration - Mill Creek

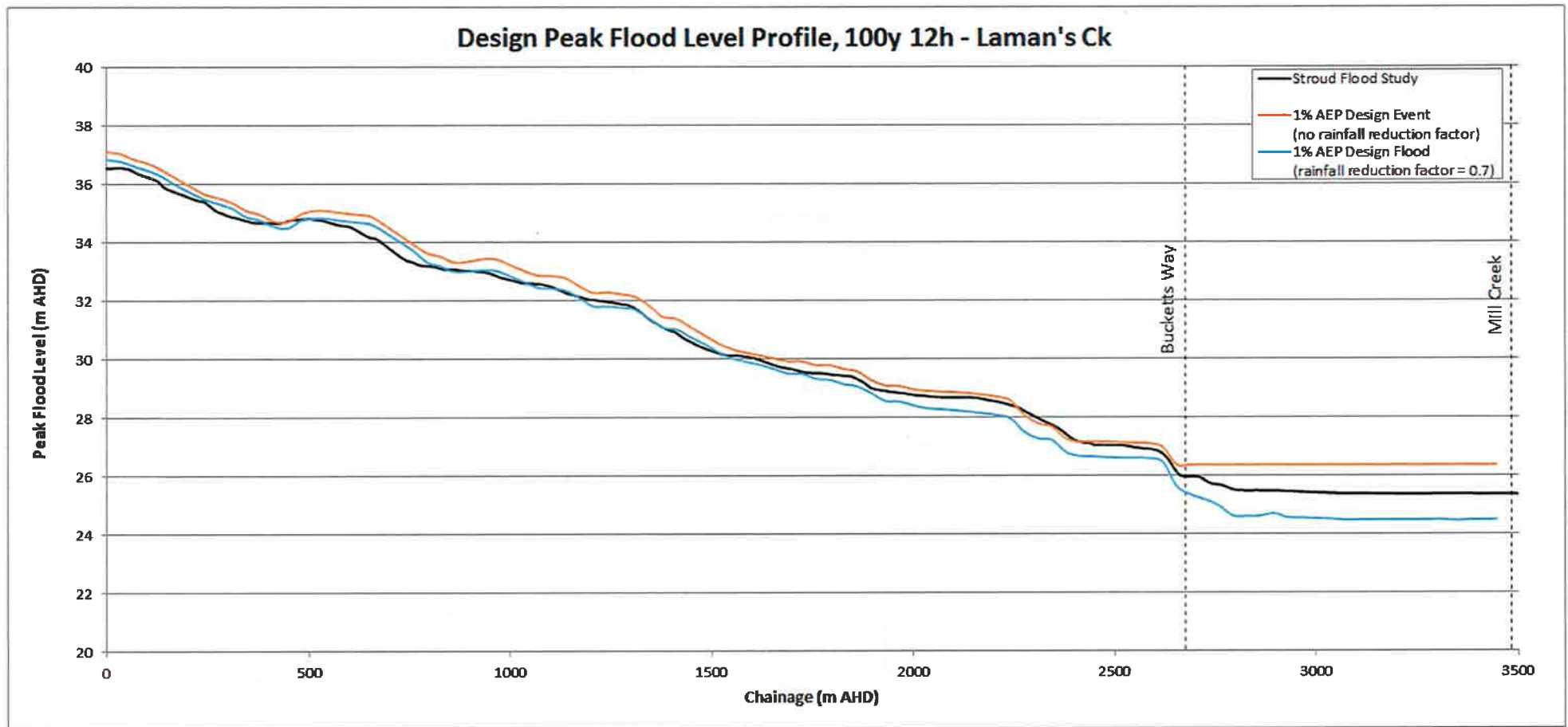


Figure 7 Design Peak Flood Level Profile, 1% AEP 12h duration - Laman's Creek

Mapping Methodology

To provide simplified flood extents representing critical flood conditions across the LGA, the modelled results required GIS processing. Peak flood level outputs from each of the durations were combined to derive an envelope of peak flood conditions across the catchments. As the raw model outputs map anywhere with a modelled depth greater than 0.1m, the results were processed using a workflow developed to provide a set of much cleaner flood extents. This consisted of the following steps:

- For the LiDAR data areas, the modelled flood levels were mapped back on to the 2m LiDAR DEM to provide a more detailed edge to the flood extents. Flood extents in the SRTM areas are mapped at a 5m grid size (half the modelled cell size of 10m).
- The flood extents were filtered to remove areas with less than 0.2m depth.
- Flooded and non-flooded cells were filtered to remove speckling and provide smoother edges.
- Flood extents were converted from grids to polygons.
- Small islands and isolated areas were removed.
- Stream centrelines derived using CatchmentSIM were used to clip the mapped flood extents to watercourses where the stream order was 3 or higher.
- Further localised cleaning was undertaken to remove isolated patches of flooding from areas such as the dune systems.

Given the variation in accuracy between results derived using LiDAR and SRTM data sets, the flood extents were clipped at the LiDAR/SRTM interface with the elevation source detailed within the flood extents file.

If you have any further questions regarding the LGA-wide flood extent modelling and mapping then please do not hesitate to contact the undersigned.

Yours Faithfully,

BMT WBM



Daniel Williams
Senior Flood Modeller
Newcastle Water & Environment

