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Content:

Western Sydney Aerotropolis Land Use and Infrastructure Implementation Plan (LUIIP) Submission by the University of Sydney

The University of Sydney (the University) appreciates the opportunity for on-going participation in the planning and development of the Western Sydney Aerotropolis and associated lands in the vicinity of the Western Sydney Airport.

We would like to acknowledge that the recently released draft Land Use and Infrastructure Implementation Plan (LUIIP) is a significant step towards realising the employment, environmental and economic growth associated with the airport operations.

This is an important document for the University as it has significant land holdings in Western Sydney and is keen to ensure that the future uses of these lands are also to the benefit of the people of NSW. Our vision is to curate, facilitate and deliver the interface of education, industry and innovation in Western Sydney.

On close analysis of the LUIIP, we believe that there are some planning and development settings which may hinder the delivery of those outcomes.

It is in that context that the University is pleased to provide the following formal submission to the exhibited draft LUIIP which includes a technical review by BBC Consulting Planners commissioned by the University of Sydney. The review is entitled "Review of Western Sydney Aerotropolis: Draft Land Use and Infrastructure Implementation Plan, by BBC Consulting Planners prepared for The University of Sydney (October 2018)" and includes the following Expert Reports as attachments:

• Flooding advice prepared by Cardno;
• Flooding, Stormwater Management and Open Space Funding Commentary prepared by Warren Smith and Partners; and
• Civil Engineering Advice prepared by AT&I.

Of specific relevance to this submission is 343.5ha of land holdings in the one ownership of the University situated immediately on the northern gateway of the Western Sydney Airport.

A comprehensive Planning Proposal supported by evidence based studies and a structure plan for the entire site as consolidated was submitted to Penrith City Council on 19 February 2018 (the University's Planning Proposal). This followed a period of consultation with Council, the Greater Sydney commission (GSC) and the Department of Planning and Environment (DPE). Copies of the Planning Proposal were also supplied to these organisations, at the

time of submission to Penrith City Council. Council has committed to working with the University to further develop the Planning Proposal to deliver an outcome for the site.

Importantly, the University's Planning Proposal was prepared having regard to the planning principles outlined in the Greater Western Sydney District Plan which was to guide the expansion of the Western Sydney Employment Growth Area (now referred to as the Aerotropolis). The rationale behind the timing of lodgement of the University's Planning Proposal was to ensure that the Property would be able to be developed with uses that could support the new airport at the time the airport is operational in 2025/2026.

The Planning Proposal provides for approx. 154ha of open space, and transport and related infrastructure (45% of the site) and the delivery of an estimated 21,000 jobs. The executive Summary of the Planning Proposal, 'A Vision for Education and Innovation in Western Sydney' is also attached. This document was submitted to Penrith City Council on 20 August 2018 as an addendum to the Planning Proposal.

Despite the University's Planning Proposal being consistent with the planning strategies (including the Western Sydney District Plan) at the time it was prepared, the University is now concerned that the planning strategies, precincts and intended zoning of land under draft LUIIP will frustrate this process.

Accordingly, our comments regarding some of the planning and development settings of the LUIIP relate to our ability to promote the orderly and economic use and development of the Badgerys land for the future of NSW. A summary of the University's key findings in its submission is outlined below.

If The inclusion of part of the University's site in the Northern Gateway precinct as a priority initial precinct is welcomed. However, the exclusion and fragmentation of the remaining 161ha (known as FLUERS) is of serious concern as it will significantly inhibit the delivery of the employment and environmental outcomes. The integrated planning approach in the University's Planning Proposal demonstrates opportunity for a far superior outcome.

If The draft LUIIP provides for an accelerated rezoning process which is supported on the basis that its further development will provided a streamlined process that focuses on the delivery of early outcomes to meet the planned start of the airport by 2025/26. In particular, we request recognition of the University as a proponent landowner to progress its rezoning ahead of the SEPP process. The University's well-advanced Planning Proposal is consistent with the urban land uses advocated in the draft LUIIP and as such justifies progressing the University's Planning Proposal accordingly.

If The draft LUIIP introduces the PMF standard for flood mitigation/management as the basis for land use planning. The basis for deviating from the 1:100 flood level criteria and the significant implications on unnecessary sterilising land with no justifiable benefits are strongly disputed. The attached technical evidence-based analysis demonstrates the adverse implications of such an approach.

If The draft LUIIP adopts an irregular alignment that follows the PMF contour. This meandering shape reduces the University's ability to manage land-form to create efficient buildings for business and to effectively manage flood storage. It is noteworthy that the landform that is affected is already a very wide plain in the 1-in-100 zone and adopting a hard PMF-line actually works against creating employment lands which may result in the required yield in the draft LUIIP never able to be realised.

If The draft LUIIP could better address the need for improved local road infrastructure to provide critical 'elast mile' linkages between the airport and the established employment lands that extend to Erskine Park and Eastern Creek. This connectivity enhances airport related employment as well as supporting the established businesses in the region and should accelerate economic benefit.

We seek your support for creating education, industry and innovation benefits for Western Sydney by making the following adjustments to the LUIIP:

- A review of the boundaries affecting the University site so that a single consolidated site is possible.
- A re-think of the flood management approach and the use of the PMF standard.
- Showing improved connectivity to the north-east to link the airport to the WSEA lands.

• Acknowledging and committing to the University's progress towards merit considerations of the University's Planning Proposal.

In conclusion, whilst supportive of the concept and approach of the draft LUIIP in guiding future planning and development of the area, The University is particularly concerned about the immediate impact of fragmenting its land holding as well the sterilisation of land by the PMF approach which, together with allowances for other infrastructure, results in some 39% of the University's developable land being sterilised.

The University looks forward to further consultation with the Department on both the draft LUIIP and the opportunities

that early development of its land at Badgerys Creek will provide for the State.

Sincerely,

Greg Robinson
Director, Campus Infrastructure & Services
The University of Sydney

Attachments

Attachment 1: BBC Report on the LUIIP (supported by expert reports)

Attachment 2: Addendum to the University's Planning Proposal with Penrith City Council

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Submission: Online Submission from company University of Sydney (org_comments)

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THE UNIVERSITY OF
SYDNEY

Greg Robinson
Director, Campus Infrastructure & Services

1 November 2018

Submission to the NSW Department of Planning and Environment

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(LUIIP) Submission by the University of Sydney**

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REVIEW OF WESTERN SYDNEY AEROTROPOLIS: DRAFT LAND USE AND INFRASTRUCTURE IMPLEMENTATION PLAN STAGE 1: INITIAL PRECINCTS

**Prepared for
The University of Sydney**

**By
BBC Consulting Planners
with inputs from Cardno, Warren Smith and Partners, and at&i**

Job No. 17-226A

WSA Draft LUIIP University of Sydney Submission.DOCX

November 2018



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ATTACHMENTS

Attachment 1:	Structure Plan for the Property prepared by Cox Architects, as included in the University's planning proposal
Attachment 2:	Flooding, Stormwater Management and Open Space Funding Commentary prepared by Warren Smith and Partners
Attachment 3:	Flooding Advice prepared by Cardno
Attachment 4:	Civil Engineering Advice prepared by at&I
Attachment 5:	The University's Planning Proposal Zoning Map – Western Sydney Airport Planning Proposal, SG Haddad Advisory, December 2017
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1. INTRODUCTION

The University of Sydney (the “University”) is the owner of 343 Ha of land in the Western Sydney Aerotropolis (see **Figure 1**) and within the Broader Western Sydney Employment Area, known as McGarvie Smith Farm at No’s 1793-1951 Elizabeth Drive, Badgerys Creek and Fluers Farm at No. 885a Mamre Road, Kemps Creek (“the Property”). This report expands upon the University’s detailed and technical knowledge of the Property in recommending further LUIPP development and evolution of a rezoning and release strategy for the Aerotropolis.

The Department of Planning and Environment (“the Department”) is aware that the University has, for some time been preparing for and is committed to rezoning the Property and through this process has consistently consulted with the Department, the GSC and Penrith City Council. Part of that process included preparation of a planning proposal submitted to Government and Council in October 2016.

The outcome from this consultation was the lodgement by the University of a revised, more detailed Planning Proposal in February 2018 that was formally accepted by Penrith City Council with the required fees being paid (the **University’s Planning Proposal**). The University’s Planning Proposal was also supplied to the GSC and to the Department.

Since that time the University has engaged with Penrith City Council, including lodgement of an addendum to the University’s Planning Proposal on 20 August 2018. The addendum included a report prepared by Tactical Project Management, emphasising the need for urgent rezoning and subsequent approvals to permit commercial operations to be in line with the opening of the new Western Sydney Airport.

The University has commissioned this technical review of the LUIPP, in response to its exhibition, to consider the issues and offer solutions.

A summary of issues and possible solutions, is provided in Section 2.

Our observations on the content and structure of the LUIPP section-by-section (but excluding the two introductory Sections 1 and 2), are set out in Section 3. In Section 4, we provide a brief overview of the University’s Planning Proposal. In Section 5 we set out the University’s issues with the LUIPP. These concerns are informed by technical reports from the following expert consultants:

- Flooding, Stormwater Management and Open Space Funding commentary prepared by Warren Smith and Partners - see **Attachment 2**;
- Flooding Advice prepared by Cardno – see **Attachment 3**;
- Civil Engineering Advice prepared by at&I – see **Attachment 4**.

Section 5 identifies requested future actions to address the concerns with the LUIPP as set out in this report .

The University wishes to continue to work co-operatively with all levels of government, as it has to date.



In this regard, the University acknowledges that there are many positive aspects of the LUIIP including: -

- the acceleration of rezoning for key precincts;
- improved regional connectivity; and
- a consolidated transport plan.

However, the LUIIP also introduces significant adverse affectations on the Property which impact on its utility. The significant adverse affectations are: -

- the boundaries of the South Creek Precinct;
- the fragmentation of The Property and the associated timing consequences for rezoning by creating multiple precincts;
- the alienation of land caused by adopting the PMF as opposed to the 1-in-100 ARI flood zone; and
- the lack of local road connections between the new airport and the WSEA lands to the north-east.

Notwithstanding the above, the University is seeking to work with Government to ensure it can pursue the University's Planning Proposal in partnership with all key stakeholders.

The University and their technical advisors (including the author of the University's Planning Proposal) request an opportunity to meet with the Aerotropolis Activation Team to discuss the matters contained herein at a mutually convenient time after the public exhibition has closed, but before work commences on preparation of the Stage 2 LUIIP.

Whilst the submission identifies significant issues and concerns with the LUIIP, the University remains hopeful it will be able to partner with Government to ensure an exemplary planning and development outcome for the Property and for the broader social and economic benefit of Western Sydney as a whole.

2. SUMMARY

This report identifies issues and concerns with and potential solutions for, the LUIIP as exhibited. These are summarized in Table 2 below.

The LUIIP impacts the Property in a manner that severely constrains its economic development as summarized in Table 1 below.

Table 1: Summary of affectations of the Property

BADGERYS CREEK - Net Land Area after Impacts (approx Ha.)	Existing E2 Zone	University's Planning Proposal	Road & Rail Infrastructure	LUIIP	Total
Gross Land Area	343.5				343.5
Less					
E2 Existing Environmental Zoning	45.8				45.8
Land between E2 & 1:100 i.e. can be sculpted)		73.6			73.6
Land below PMF & above 1:100				39.7	39.7
M12 (excl. 1:100 Flood)			18.2		18.2
HIAL (est)			0.4		0.4
North/South Rail ex-M12 (est)			15.9		15.9
Elizabeth Dr transport Corridor				2.6	2.6
Elizabeth Drive - toe of land above PMF excl. infrastructure				11.0	11.0
Sub-total Affected	45.8	73.6	34.6	53.3	196.2
Green Space (est)		15.0			15.0
Roads (est)		15.0			15.0
Actual net available land	297.8	194.2	159.6	106.3	106.3

The Property forms part of the highly strategic Northern Gateway Precinct through which 100% of all passengers using the new Western Sydney Airport will pass. Additionally, around 80% of all air freight will pass through this Precinct. It is therefore appropriate that owners of land within the Northern Gateway Precinct are able to optimise the orderly and economic use and development of their land.

The issues and potential mitigations are summarised below, are addressed in detail in Section 5, and are supported by the expert reports that are attached to his report (see **Attachments 2, 3 and 4**).

Table 2: Summary of issues/ concerns

<u>Issue/ Concern</u>	<u>Possible solutions and Recommendations</u>	<u>Reference</u>
The University's Planning Proposal before Penrith City Council is well-reasoned and was prepared so that it was consistent with the Western Sydney District Plan which was the current guide for future development in this area. The LUIP should not delay the University's Planning Proposal from progressing.	The University believes that progressing the University's Planning Proposal so as to ensure the availability of developed land at the gateway to the new airport at the time of the airport's opening is appropriate.	Refer Section 4 of this report
There is a large (11Ha) part of the Property fronting Elizabeth Drive that sits outside the PMF and above the 1 in 100 ARI. There is no clear reason for it being in the South Creek Precinct.	The area has three old silted-up dams in-situ. The University believes that the Department may have mistaken these dams as part of an established water course using old aerial photography. This area is an ideal and unique-part of the Northern Gateway to the Aerotropolis. Accordingly, the constraint in the LUIP should be removed as it incorrectly assumes that they are existing watercourses on the Property.	Refer Cardno report figure S1 Refer Section 5.2.3 of this report
The Precinct boundaries overlook the value of, and economic benefits from, the connection to the WSEA lands. Fragmentation of land into smaller lots discourages economic investment.	The connectivity of the airport to the WSEA precinct via the Property is critical to support the ongoing expansion of Erskine Park and Eastern Creek towards the new airport and should be included as a logical element of the Northern Gateway.	Refer Section 5.2.5 & 5.3 of this report
Fragmentation of land within the immediate environs on the approach to the new airport should be mitigated by improved local road connections.	The immediate environs on the approach to the new airport, or the "last mile", are sacrosanct and critical to the logistics industry. Many logistical businesses seek to occupy this zone around major airports. It is the most "at risk" high value area around major infrastructure and it is recommended that it should be facilitated to be as congestion free as possible in order that as many critical	Refer Section 5.3, 5.6 & 5.7 of this report

<u>Issue/ Concern</u>	<u>Possible solutions and Recommendations</u>	<u>Reference</u>
	businesses as possible can be housed there.	
The basis of the precinct boundaries appear contrarian to their stated purposes or contradict previous GSC planning documents	There is a strong economic and planning case to permit the ongoing development of land at a market-based pace within the WSEA.	Note WSP report in Attachment 2 on Sewer solutions
Expansion of riparian zones seems to contradict established planning practices.	<p>The existing riparian corridors are already protected by the E2 Environmental Conservation Zone in Penrith LEP 2010.</p> <p>Land within 1-in-100 areas remain protected through local planning controls. These issues can be dealt with by Councils via design guidelines and the DA process.</p>	Refer Section 5.2.2 of this report
Use of the PMF (with some additional areas) contradict the Government's published planning directives and principles when defining planning boundaries for flood planning purposes.	<p>The PMF is a flood evacuation tool rather than a planning instrument.</p> <p>Previous GSC reports discounted its use or pointed only to localised issues in the Windsor / Penrith region and therefore the PMF should not be used in this area</p>	<p>Refer Cardno Report in Attachment 3</p> <p>Refer Section 5.2.2 of this report</p>
<p>The PMF has some unusual contradictions in this area as new data in 2016 revealed that flood levels are over 500mm lower than expected.</p> <p>This means very large areas of employment land that will never be flooded are now being sterilised.</p>	<p>As South Creek is a wide flood plain much of the PMF area is less than 500mm deep and may therefore be flood free. A more detailed study should be completed.</p> <p>As the land is in the 500mm zone which is actually the "freeboard" area of the PMF, it is in effect flood free and will never flood. These areas of land should therefore be excluded from the South Creek zone.</p> <p>The use of the PMF should be replaced by permitting Councils to manage this issue via established principles using design guidelines and the DA process.</p>	<p>Refer Cardno Report in Attachment 3: see Section 2.1</p> <p>Refer Sections 5.2.3, 5.2.5 & 5.5 of this report</p>

<u>Issue/ Concern</u>	<u>Possible solutions and Recommendations</u>	<u>Reference</u>
<p>The adoption of hard boundaries around the South Creek Precinct have “knock-on impacts” by creating inflexible zones that unreasonably limit job creation.</p>	<p>When business parks are developed, flooding impacts on land are required to be flood neutral, however the owners (with planning approval) are permitted to manage the landscape to design appropriate flood storage.</p> <p>By adopting a strict PMF or 1-in-100 flood line it limits the ability of owners to manage flood storage and hence limits the utility of employment lands (even those above the flood line). These issues can be flexibly and appropriately dealt with by Councils via design guidelines and the DA process.</p>	<p>Refer Cardno Report in Attachment 3:</p> <p>Refer Section 5.2.3 of this report</p>
<p>The Precinct boundaries (and the boundaries of Non-Urban Land on the Structure Plan) are contrary to the planning logic of the University's Planning Proposal (which has been developed with technical studies that take into consideration the condition of the Property).</p>	<p>The more contentious elements of the LUIIP such as the use of the PMF and the unusual area along Elizabeth Drive create a high degree of uncertainty, delay in development and fragmentation that diminishes the Northern Gateway Precinct.</p> <p>These issues can be appropriately dealt with by Councils via design guidelines and the DA process.</p>	<p>Refer Section 5 of this report</p>
<p>The extent of the identified “Non-Urban” land and the intent to use it for “infrastructure”, such as regional stormwater management, has an inequitable impact on landowners adjoining these intermittent water bodies.</p>	<p>Land along these creeks is best incorporated into open space areas that are curated by land-owners who have sufficient funds to care for these areas.</p> <p>Stormwater retention should be dealt with at its source rather in areas under high flow conditions as these have potential to damage green spaces and risk human life.</p> <p>Details of tree planting and green spaces can be dealt with by Councils via design guidelines and the DA process.</p>	<p>Refer Section 3 of this report</p>

<u>Issue/ Concern</u>	<u>Possible solutions and Recommendations</u>	<u>Reference</u>
The LUIIP approach to stormwater management will undermine the prospects of providing quality open space.	Expert consultants advise that the Stormwater Management can be more effectively managed by Councils via design guidelines and the DA process.	Refer WSP Report Refer Section 5.5 of this report
<p>The reservation of high value land with no environmental value on Elizabeth Drive along with a very large flood reservation seems unwarranted and does not promote the orderly and economic use and development of the land.</p> <p>The impact on the University's Property is significant and it is hard to understand the rationale.</p>	Please remove the reservation.	<p>Refer Table 1</p> <p>Refer Section 5.3 of this report</p>
The second stage LUIIP could consider incorporating a simple mechanism for promoting accelerated development of consolidated land holdings including circumstances where the land holdings extend across fragmented Precinct boundaries.	<p>There is a low success rate for applicants using the Unsolicited Proposal process elsewhere in NSW. This speaks to its unwieldiness and unnecessary complexity for these circumstances where economic progress is critical.</p> <p>The existing planning processes are well known and understood and therefore it may be easier to permit existing conventions to continue.</p>	Refer Section 5.2.4 of this report

3. THE LUIIP –Commentary

3.1 Contents and Structure

Comment: The LUIIP is missing key information for landowners to be able to fully understand the implications the LUIIP has for the development of their land. Specifically, the University is seeking further information so that it can better understand the obstacles to the gazettal of the University's Planning Proposal.

The LUIIP:-

- contains a "first-stage Structure Plan" (see **Figure 2**) to be followed by several detailed studies and a more detailed second stage "final" Structure Plan, the release of which will coincide with the second stage of the LUIIP;
- identifies three (3) initial precincts namely: "Aerotropolis Core", "Northern Gateway" and "South Creek" to "kick-start" the creation of the Aerotropolis;
- states how the initial three (3) precincts will be delivered and identifies the desired uses for each precinct;
- identifies six (6) other precincts namely: North Luddenham, Rossmore, Mamre Road, Kemps Creek and Badgerys Creek and the "Agriculture and Agri business Precinct" (see **Figure 3** for all precinct boundaries);
- describes how the Aerotropolis' precincts will be planned to integrate with designated growth areas and the delivery of infrastructure;
- identifies key "policy drivers" that will influence where appropriate development will be delivered within the precincts;
- says it is intended to deliver a flexible and adaptive planning framework through a new SEPP (yet to be prepared) which will identify three key zones which are unique to the NSW planning system (namely "infrastructure", "environment" and "urban development" zones); and
- states that all nine (9) precincts will be subject to more detailed planning before the release and rezoning of land.

The Property is partly in two (2) of the three (3) "accelerated precincts", namely the Northern Gateway and South Creek (the other accelerated precinct being the Aerotropolis Core) and partly in the non-accelerated precincts of Badgerys Creek and Kemps Creek (see **Figure 3**).

We note that the LUIIP is a "draft Stage 1 Plan" (see Executive Summary, page 4) and that there are key studies / reports / plans / other documents yet to be prepared. These include:-

- a South Creek study;

- a detailed transport analysis;
- a Cumberland Plain Conservation Plan;
- a biodiversity conservation strategy;
- State and local infrastructure contributions plans;
- a proposed SEPP;
- a foreshadowed Ministerial Section 9.1 Direction which will govern planning proposal preparation for individual land holdings; and
- Infrastructure NSW strategic plan for the proposed South Creek corridor.

The Department will appreciate the challenges faced by land owners, including the University, in providing informed comment on the LUIIP in the absence of the above studies, reports, plans and Ministerial direction. The Department will also appreciate the concern of landowners that planning proposals need to be consistent with the LUIIP. In this regard, there are major obstacles to the University's Planning Proposal that arise from the exhibited LUIIP, which may well be alleviated by further detail provided by the above-mentioned documents.

3.2 Initial Precinct Planning (Section 3 of the LUIIP)

Comment: It is recommended that the indicative range of "possible" uses in the Northern Gateway Precinct be further developed consistent with the land use terms set out in the Standard Instrument to provide a degree of clarity and certainty for landowners in that precinct.

Further clarity should be provided on the functional relationship between the open space and infrastructure required to support development should be provided.

It is also recommended that the Property is not divided across a number of precincts as this will frustrate the University's Planning Proposal and result in adverse impacts on the orderly economic use of the land.

This section of the LUIIP contains a "preliminary and high level" Structure Plan for the planned Aerotropolis to show how it "could" be arranged. Nine (9) planning principles are identified on which the Structure Plan is said to be based. However, these principles do not explain or clarify the adopted boundaries for the "Flexible Employment Land", "Urban Land" or "Non-Urban Land" identified by the Structure Plan (see **Figure 2**).

The LUIIP divides the Western Sydney Aerotropolis into nine (9) precincts (see **Figure 3**), the boundaries of which are said to be based on "opportunities and constraints" however these "opportunities and constraints" are not articulated in the LUIIP, and what is particularly unclear from the LUIIP is the rationale for the boundaries of the South Creek Precinct.

The LUIP states as follows in relation to the three (3) initial precincts:-

"Three initial precincts have been identified in recognition of the growth and open space opportunities enabled by major government infrastructure to support development, particularly the Western Sydney Airport, the proposed first stage of the North-South Rail Link and the Western Sydney Infrastructure Plan (see Chapter 4).

Two of the these initial precincts will be the focus of planning growth for the next five years while South Creek will create the parkland spine to the Aerotropolis and the broader Western Parkland City. All precincts will be subject to more detailed planning before the release and rezoning of land. The expected planning outcomes for these precincts are set out in the Appendix 8.1. Principles for planning of subsequent precincts in Appendix 8.3."

We note that for the Northern Gateway Precinct, in which approximately one-third of the University's 343 Ha is located, the LUIP (in Section 3.2.2) refers to the possibility for a high technology centre, focused on tourism, health, education, research and development associated with food production and processing. In the "central employment hub" (which is not shown on the maps in the LUIP) of the Northern Gateway Precinct there is to be a mix of employment and other complementary uses. Reference is also made to export-related activities adjacent to the airport to facilitate trade such as cold storage, food processing and packaging and agricultural warehousing and logistics.

The University recommends that this indicative range of "possible" uses be further developed into a format consistent with the land use terms set out in the Standard Instrument (which is the approach adopted by all new Environmental Planning Instruments) in order to provide a degree of clarity and certainty.

The LUIP refers to "open space opportunities enabled by major government infrastructure to support development" but does not explain the functional (or enabling) relationship between the open space, the infrastructure, and the intended development. In relation to the South Creek Precinct (see **Figure 3**), the LUIP states:-

"South Creek

The South Creek precinct is the central green spine of the Aerotropolis. It represents the central structure element to the Aerotropolis's connected open space network and the broader Western Parkland City. It will provide an important interface to surrounding development, providing open space, amenity, biodiversity and wellbeing values.

Planning for the South Creek precinct will embrace the urban design principles of A Metropolis of Three Cities:

- *orientate development to face towards the creek corridor;*
- *create a transect of creek-oriented place types and things to do;*
- *build a network of everyday uses within a walkable creek catchment;*

- *provide creek connections and encourage waterfront activities.*

The South Creek precinct and its broader catchment represents an opportunity to change the way waterways are planned for and managed in greenfield areas. Planning for the Aerotropolis will embrace natural systems as valuable assets, rather than constraints.

Rehabilitation of South Creek and its associated waterways will include replanting of appropriate vegetation to provide canopy cover, as well as the creation of permanent water bodies with the potential to provide a network within the South Creek corridor. This will contribute to urban cooling and encourage the residents to use and enjoy riparian lands.

The precinct will connect to the surrounding regional road network via Elizabeth Drive and Mamre Road. Regular pedestrian and cycle connections across waterways will support active transport use."

There are cross-references in this section of the LUIIP to Appendix 8.1 which is entitled "Expected planning outcomes – initial precincts". In relation to the South Creek Precinct, Appendix 8.1 of the LUIIP states that:-

- the area of this Precinct is 1,950 ha;
- desirable land uses are open space, recreation facilities, pedestrian and cycle connectivity, community facilities, and restaurants and cafes;
- the "key challenge" apart from airport noise is "flood management";
- "key potential infrastructure", other than road upgrade and a cycle network, is limited to "Stormwater Infrastructure";
- "Strategic Outcomes" for this Precinct include:-
 - *Establishment of a landscape buffer on the western boundary utilising the Badgerys Creek corridor;*
 - *Appropriate and activated interface with South Creek;*
 - *High-quality public domain along Elizabeth Drive to reflect the main approach to the Airport;*
 - *Mature trees retained along Elizabeth Drive where possible/ feasible;*
 - *Landscaped boulevard along major transport corridor, contributing to urban tree canopy and amenity;*
 - *Access points rationalised from Elizabeth Drive to service private development;*
 - *An urban tree canopy is to be provided along open space corridors and major roads and road connections to contribute to the amenity of the area;*

- *Enable innovative approaches to resource recovery and waste management, including appropriate urban design for collection facilities;*
- *Enable innovative approaches to sustainability outcomes including the incorporation of sustainable, adaptable and durable credentials as a key driver for the design and function of the precinct.*
- "Implementation Strategies" include:-
 - "Deliver the 5 Million Trees program to increase urban canopy cover to 40%".

Approximately 170 hectares (or nearly half) of the Property is within the South Creek Precinct (see **Figures 1 and 3**). All of the South Creek Precinct is identified as Non-Urban Land (see **Figure 2**).

Other Precincts affecting the University's land are: Badgerys Creek (est. 44.3 ha), and Kemps Creek (est. 44.3ha). Accordingly, by dividing the Property across a number of precincts it will frustrate the University's Planning Proposal and result in the fragmentation of land resulting in potentially adverse impacts on the orderly economic use and development of the land.

3.3 Policy drivers (Section 4 of the LUIP)

Comment: We do not agree that the extent of Non-Urban Land should be determined by the PMF nor do we agree with the extent of land identified for environmental conservation.

This section of the LUIP identifies "policy drivers" intended to safeguard:-

- "the future operation of the Airport", notably aircraft noise (see **Figures 5 and 6**) aviation safety and the National Airports Safeguarding Framework;
- "new environmental and water sensitive responses to development" – see comments below; and
- "important infrastructure corridors" (see **Figures 4, 7 and 8**).

Under the heading "A sustainable, liveable and green Aerotropolis" and specifically in relation to South Creek, Section 4.3.1 of the LUIP states:-

"Consistent with the strategic vision for the Western Parkland City, the Aerotropolis must develop in accordance with the principles of the Greater Sydney Region Plan that ensures green spaces and landscape are valued. This requires planning to value the quality of the natural environment of the Aerotropolis to achieve a cool, green parkland living and working community.

This plan and the Western City District Plan embrace the natural systems of the South Creek catchment as valuable assets rather than constraints. This requires a new approach that brings riparian lands to the centre of urban activity and form, while improving and preserving environmental values.



This will be delivered through a NSW Government, cross-agency program that involves Infrastructure NSW, the Greater Sydney Commission, the Department of Planning and Environment, the Environmental Protection Authority, Office of Environment and Heritage and Sydney Water. The program will establish a framework for the long-term integrated, sustainable management of South Creek, addressing its environmental, aesthetic, biodiversity and hydrological values.

The outcomes of this program will be incorporated into all future planning for the Aerotropolis. This will integrate management of water across the catchment and see South Creek incorporate linear parklands that also protect biodiversity and endangered ecological communities including remnant Cumberland Plain Woodland. South Creek will be accessible, attractive and environmentally rich. Activity centres will be focused on the creek line and development will be integrated within the corridor to provide surveillance, promote activity and encourage community ownership and identity.

East-west green links will connect the South Creek parklands to Kemps Creek and further east to the Western Sydney Parklands, offering recreational opportunities such as walking trails, picnic grounds, working farms, water sports and mountain biking tracks. A network or grid of new road and transport corridors will be developed as parkways to create vegetated corridors.

The Aerotropolis is in one of the warmest parts of Greater Sydney and heat can influence the health and lifestyle of residents and workers. The network of waterways offer potential to create greater environmental, social and amenity benefits through strategies and solutions to mitigate urban heat."

Alongside the above text in the LUIIP is a "South Creek Catchment" Plan (see **Figure 9**) which identifies the extent of the Probable Maximum Flood ("PMF"). The PMF boundaries coincide with the boundaries of the South Creek Precinct. Thus, pursuant to the LUIIP (with which planning proposals submitted by land owners are to be consistent) the extent of the Non-Urban Land has been determined by the PMF. The University does not agree with this approach for the reasons set out below in Section 5.

In relation to "environmental conservation in the Cumberland Plain" the LUIIP states:-

"Strategic biodiversity certification allows for biodiversity values to be considered early in the planning process. It protects areas of high conservation value, identifies areas suitable for development and offsets any residual impacts to biodiversity. Strategic biodiversity certification removes the need for site-by-site threatened species assessment, provides certainty for developers and landowners and enables better environmental outcomes.

The Cumberland Plain Conservation Plan, a strategic conservation plan, will support an application by the Department of Planning and Environment for the biodiversity certification of the Aerotropolis and other new development areas in Western Sydney under the Biodiversity Conservation Act 2016. It will also propose a range of conservation measures, including protection of high conservation value core and corridor areas, revegetation and renewal,



protection using development controls and investment in species recovery initiatives.

The development of the Cumberland Plain Conservation Plan and the biocertification of the Aerotropolis and other new areas in Western Sydney will run concurrently with precinct planning. The Aerotropolis includes an area which was biodiversity certified in 2007 and the conditions and planning controls that apply in this area will continue.

The Department of Planning and Environment has carried out field surveys to identify the biodiversity values in the Aerotropolis so that precinct plans can avoid or minimise impacts to biodiversity. The Department has also undertaken preliminary mapping of core biodiversity sites."

Alongside the above text in the LUIIP is a "Conservation Values" map (see **Figure 10**) which identifies various categories including "Potential and Existing Conservation Land" and "Environmental Conservation", the distinction between which is not explained. However, it can be seen from **Figure 10** that there is no relationship between the extent of land so identified and the boundary of the South Creek Precinct.

3.4 Planning framework (Section 5 of the LUIIP)

Comment: The LUIIP contains no details on the permissible/prohibited uses in the "Infrastructure Zone" or the "Environmental Zone". This makes it impossible for land owners to be able to make comments on the appropriateness of these zones.

This section of the LUIIP purports to identify the proposed planning framework for the Aerotropolis. It states (on page 45) that a SEPP (yet to be prepared) will apply new 3 zones to the Aerotropolis:-

- an "Urban Development Zone";
- an "Infrastructure Zone"; and
- an "Environment Zone".

Although this section of the LUIIP identifies the aims of the "Urban Development Zone" no such details are provided for the "Infrastructure Zone" or for the "Environmental Zone". This is particularly problematical as none of these zones are standard zones drawn from the "Standard Instrument": they are unique zones to be applied solely to the Aerotropolis, with no stated lists of permissible and prohibited uses. This makes it impossible for affected land owners to make informed comment on the appropriateness or otherwise of these proposed zones.

3.5 Infrastructure (Section 6 of the LUIP)

Comment: It is concerning that a large part of the Property will be part of the South Creek Precinct which is intended to be used for open space/recreation, stormwater management, biodiversity conservation and re-vegetation. This not only ignores the development potential of large areas of the Property but appears to assign a "public purpose" to private land without any indication of that land needing to be acquired.

This section of the LUIP says that the "Final Plan" will include a list of key infrastructure that will require further investigation and funding decision and a delivery framework for the initial precincts. Insofar as this section of the LUIP refers to "Open Space" as an element of infrastructure, Section 6.1.4 states that most of the creeks in the study area (i.e. Ropes Creek, Kemps Creek, Badgerys Creek and South Creek but not, for reasons unexplained, Cosgrove Creek) will "contribute to an open space network combining recreation, stormwater management and biodiversity conservation functions within the Aerotropolis", with no stated lists of permissible and prohibited uses.

Section 6.1.4 of the LUIP further states:-

"Ropes Creek, Kemps Creek, Badgerys Creek, Western Sydney Parklands and South Creek will all contribute to an open space network combining recreation, stormwater management and biodiversity conservation functions within the Aerotropolis. The open space network will provide a generous series of interconnected green corridors both north to south and east to west that combine to create a series of connected public areas.

South Creek and its open space will be a key community asset with improved water quality and new crossings. The core open space and conservation corridor will provide for ecological protection and enhancement, high quality stormwater treatment and a regionally significant corridor.

Connections across South Creek and Kemps Creek and their floodplains will prioritise active transport. While the strategic road network will need to be flood free, other connections across the landscape will be integrated into the parkland setting.

Returning the floodplain to public ownership in certain locations, where feasible, will integrate passive and active recreation with the natural environment and water management mechanisms, while re-establishing tree canopy cover including Alluvial Woodland and Shale Plain Woodland.

Some sections of the core open space and conservation corridors will remain in private ownership and may continue to be used for activities compatible with the open landscape character, such as small grazing enterprises and market gardening subject to protection of ecological values.



Badgerys Creek, which defines the south-eastern boundary of Commonwealth-owned land, and running broadly from the south-west to the north, will create a landscape buffer between future employment lands and the Airport."

We understand from the above statement that the South Creek Precinct, with an area of 1,950 ha (of which 170 ha is within the boundaries of the Property), is to perform the functions (for the intended benefit of all of the Aerotropolis) of open space/recreation, stormwater management, biodiversity conservation and re-vegetation. This appears to be assigning a "public purpose" to private land without any indication of that land needing to be acquired. It also seems to ignore the actual urban development potential of a large part of what appears to be an unreasonably over-sized South Creek Precinct.

3.6 Staging / Timing (Section 7 of the LUIP)

This Section of the LUIP purports to set out a "roadmap to make the Aerotropolis development ready". Following community and industry consultation on the first stage LUIP, the LUIP will be reviewed and refined and a second stage LUIP containing a more detailed structure plan and details of infrastructure contributions will be released, to be followed by a SEPP which will rezone the three (3) initial precincts in accordance with precinct plans.

The LUIP states (in Section 7.2):-

"It is anticipated the rezoning process will commence after the release of the Final Plan and will be finalized before the end of 2019."

3.7 The anticipated SEPP (Appendix 8.2 of the LUIP)

Section 8.2 of the LUIP outlines the proposed SEPP and describes the three (3) proposed zones as follows:-

"Infrastructure Zone will apply to new and existing road and rail corridors and will facilitate necessary transport, education and health infrastructure provision.

Environment Zone will apply to high environmental value land or land identified for protection and will allow for development compatible with the protection of the environment.

Urban Development Zone (UDZ) will apply to developable lands. For urban development to be 'unlocked', consistency with the LUIP will need to be approved by the Secretary of the Department of Planning and Environment. Planning proposals to rezone land must be consistent with the LUIP and relevant provisions of the SEPP. Until the land is rezoned, the underlying planning controls of the relevant local environmental plan will continue to apply, although the SEPP will ensure uses approved are consistent with or don't interfere with the achievement of the LUIP." (our emphasis)

It will be appreciated from the above that in the case of land, such as the Property, which is already the subject of the University's Planning Proposal, the LUIP is of paramount significance.



4. THE UNIVERSITY'S PLANNING PROPOSAL

4.1 Requested Rezoning

The University's Planning Proposal was prepared by SG Haddad Advisory and was preceded by a detailed planning report prepared for the University by Jacobs in October 2016. It requests a rezoning of the Property from predominantly RU2 Landscape but part E2 Environmental Conservation to predominantly B7 Business Park but with exactly the same extent of E2 Environmental Conservation (see **Attachment 5**).

The University's Planning Proposal is currently being refined as part of the normal process associated with any rezoning and in line with detailed consultation with Penrith City Council. A supplementary package of information was provided to Penrith City Council in support of the University's Planning Proposal in August 2018. A copy of the University's Planning Proposal has also been provided to DPE and the GSC.

4.2 Background Studies

The October 2016 planning proposal report prepared for the University by Jacobs and submitted to Penrith City Council with copies provided to the GSC and DPE includes:-

- an economic market analysis;
- a traffic and transport analysis;
- a biodiversity analysis;
- an Aboriginal Heritage analysis;
- a Non-Aboriginal Heritage analysis;
- a flood analysis;
- a surface water analysis; and
- a water and waste-water analysis.

The University's Planning Proposal prepared by SG Haddad Advisory, includes: -

- an urban design and concept structure plan report prepared by Cox Architects;
- a Stage 1 assessment, Service Infrastructure prepared by Land Partners;
- an economic assessment prepared by Hill PDA; and
- a market and key opportunities analysis prepared by CBRE.



The supplementary package to the University's Planning Proposal submitted to Penrith City Council in August 2018 included:-

- an addendum comprising a vision for education and innovation in Western Sydney prepared by Sydney University; and
- a development program report prepared by Tactical Project Management.

4.3 Land Use

The Structure Plan included in the University's Planning Proposal (see **Attachment 1**) provides for approximately 196 ha (or 57%) of the total area of the Property as developable area 45.8 ha as riparian corridor, and significant other green space.

Of the 343 hectares of site area, 297.8 ha would be zoned B7 Business Park and 45.8 ha would be zoned E2 Environmental Conservation.

This is the list of land uses that the requested B7 Business Park zoning would make permissible on the Property:-

Standard permitted uses in the B7 zone in Penrith LEP 2010

- business premises;
- car parks;
- centre-based child care facilities;
- community facilities;
- educational establishments;
- environmental protection works;
- flood mitigation works;
- food and drink premises;
- function centres;
- garden centres;
- hardware and building supplies;
- health services facilities;
- hotel or motel accommodation;
- industrial retail outlets;
- industrial training facilities;
- information and education facilities;
- kiosks;
- light industries;
- passenger transport facilities;
- recreation areas;
- respite day care centres;



- roads;
- signage;
- warehouse or distribution centres.

Proposed additional permitted uses

- bulk goods centre;
- freight transport facility;
- highway service centre;
- retail premises;
- storage premises;
- transport depot;
- tourist and visitor accommodation;
- vehicle sales and hire premises.

The University's Planning Proposal will create business park clusters, the precise boundaries of which can respond to critical infrastructure corridors and designs once finally determined.

4.4 Employment

The combination of the huge investment in the Western Sydney Airport and in the associated infrastructure provides a significant opportunity to promote the increased delivery of employment land for increased job growth in Western Sydney.

In this regard, the University's Planning Proposal is predicted to provide a diversity of employment opportunities estimated at 6,500 Full Time Equivalent (direct) jobs. (We note that the 2036 employment target for Western Sydney is 100,000 jobs). In addition, the University's Planning Proposal will lead to another 20,800 Full Time Equivalent (indirect) support jobs.

4.5 Biodiversity initiatives

With the exception of the Badgerys Creek Corridor and smaller areas of the South Creek Corridor, the Property has largely been cleared and heavily disturbed by its former agricultural use. The University's Planning Proposal maintains the existing E2 Environmental Conservation zone which will secure the rehabilitation of Badgerys Creek and South Creek (to improve existing conditions) and otherwise have minimal impacts on the biodiversity of the area. The area of the Property currently zoned E2 Environmental Conservation is 45.8 ha. The University's Planning Proposal makes no reduction to the extent of this E2 zoned land.

Landscaping along new road corridors within the Property and on individual development sites (as will be required by a future DCP) will also add new Green Grid connections whilst contributing to an increased urban tree canopy.

5. ISSUES WITH THE LUIP

We have been advised by the University that:

- it supports the proposed early release of land at the Northern Gateway, however, the extent of proposed area is considered too small an amount given the significant demand over the next five years and given the airport will become a significant focal point in the city;
- the linkages to WSEA, via the Property, are critical and the University has and will continue to support solutions to assist this;
- the "last mile" on the approach to the new airport is considered critical in logistics, and every effort should be made to promote effective transport linkages around the airport zone in order to support the airport's success;
- it will continue to work with WSA Co on the High Intensity Approach Lighting.

The University notes that it has already been generous with facilitating the GSC' intent including in the University's Planning Proposal and understands the need for Western Sydney to have a set of "green lungs" but feels that there is a better way than is currently being suggested for South Creek.

5.1 The LUIP contradictions create planning and development uncertainty

The LUIP contains many unexpected elements and appears contrary to the NSW Government's own policies on flood planning.

The LUIP, proposes land use zones that are not contained in the Standard Instrument. With the LUIP's principles derived from the GSC District plans there also appear to inconsistencies with the Western City LUIP District Plan.

In many ways, the LUIP creates a level of inflexibility that diminishes and jeopardises, the urban development potential of the Property that is strategically and economically of great significance to Western Sydney as a gateway to the new airport.



5.2 The foundation of the precinct boundaries

5.2.1 The existing riparian corridors are already protected by the E2 Environmental Conservation Zone in Penrith LEP 2010

The Property is already part zoned E2 Environmental Conservation pursuant to the provisions of Penrith LEP 2010. Approximately 45.8 ha of the property (equivalent to 13.3% of the total area of the Property) has this zoning.

There is a rigorous process of environmental analysis leading to an E2 Environmental Conservation zoning (see Department of Planning Practice Note: PN 09-002) because otherwise this zoning can be seen as an acquisition zone by other means. It must therefore be assumed that there is a valid basis for maintaining the extent of the E2 Environmental Conservation zone. As a result, no change is required or is proposed to the boundaries or extent of the E2 Environmental Conservation zone in the University's Planning Proposal.

We can see no environmental or other valid planning reason why the LUIIP could not adopt those existing E2 Environmental Conservation zone boundaries for Badgerys Creek, South Creek, and Kemps Creek where those creeks traverse the Property.

The University is seeking to adopt appropriate and reasonable principles in the University's Planning Proposal based on the existing extent of E2 Environmental Conservation zoned land.

The University is concerned that the LUIIP is promoting acquisition by creating unworkable precinct boundaries that may hinder progression of the University's plans and the betterment of the region. It is therefore recommended that the E2 Zones be recognised and adopted as the precinct boundaries for the South Creek, Badgerys Creek and Kemps Creek zones.

5.2.2 The extent of the 1 in 100 year flood-prone land is already mapped in Penrith LEP 2010

The 1 in 100 year flood prone land is mapped in Penrith LEP 2010 (see **Attachment 6**).

The PMF is not an environmental management tool or a flood management tool. It is used to identify and manage emergency evacuation routes in case of a 1-in-2,400,000 type flood event.

It is difficult to understand why the LUIIP has not adopted the already mapped flood prone land.

The 1% AEP event is a "risk tool" and is not truly a basis for the determination of Precinct boundaries in the same way they do not form a basis for existing zoning boundaries in any standard template LEP.

5.2.3 Unintended consequences of adopting the PMF as the precinct boundary

This issue is of significant concern to the University.

As South Creek is a wide flood plain much of the PMF area is less than 500mm deep. We understand that a 2016 study of baseline flood data may have demonstrated that many flood levels in Western Sydney are overstated. This could mean that many areas might be flood free if this new more detailed study is completed.

Much of the land in question is in the 500mm depth zone which is actually the "freeboard" area of the PMF. It is in effect flood free and will never flood as it is simply reserved as the "contingency area" known as "freeboard".

Further the adoption of hard boundaries around the South Creek Precinct have "knock on impacts" by creating inflexible zones that unreasonably limit the development of employment land for the purpose of job creation.

When business parks are developed the flooding impacts on land are required to be designed as flood neutral, however the owners (as part of the planning approval process) are permitted to manage the landscape to design appropriate flood storage in order that flooding impacts remain neutral.

By requiring conformity to a strict PMF or 1-in-100 flood line it limits the ability of owners to manage flood storage and hence limits to sculpt building platforms. The current precinct boundaries result in reduced utility of employment lands (even those above the flood line) due to unusually shaped landforms.

As set out by Warren Smith & Partners in **Attachment 2:-**

- the proposed delineation of urban and non-urban zoning based on the PMF cannot be supported on technical grounds as it is contradictory to the NSW Government's ~~own~~ guidelines "Floodplain Development Manual NSW 2005";
- pursuant to the above guidelines, floodplains should not be sterilised;
- the NSW Government's Planning Circular (PS07-003) states that the PMF is not the proper flood management approach, but rather the 1 in 100 year (or 1% AEP) event, which is what currently applies to the Property pursuant to Penrith LEP 2010;
- notwithstanding the identification of the 1 in 100 year flood level in the LEP, opportunities exist to manage the 1% AEP event and optimise the economic use of a scarce resource (i.e. land capable of urban use adjacent to a new airport); and
- the flood modelling work on which the LUIP relies needs to be made available for detailed review given all of the above.

These opinions are confirmed by Cardno in their report in **Attachment 3**. Cardno also point to the 2007 Flood Planning Guideline, Section 117 Directions (now Section 9.1 Directions), Penrith DCP 2014, and the Western City District Plan to support their opinion.



Cardno's recommendation is for the boundaries of the South Creek Precinct to be redefined because the current boundaries are:-

- i. Inconsistent with the primary objective of the NSW Flood Prone Land Policy and the 2005 Floodplain Development Manual because the current boundaries unnecessarily alienate development of 38.9 ha of land within the subject property in areas between the mainstream 100 year ARI flood extent and the PMF extent;
- ii. Inconsistent with the 2007 Flood Planning Guideline;
- iii. Inconsistent with the Penrith LEP 2010 Flood Planning Area which is based on the 100 year ARI flood extent;
- iv. Inconsistent with the provisions of Penrith Development Control Plan 2014 because it prevents development of 38.9 ha of land within the property in areas between the mainstream 100 year ARI flood extent and the PMF extent;
- v. Based on extreme flooding conditions north of the Great Western Highway is not justified within the initial precincts;
- vi. Inconsistent in its inclusion and exclusion of areas subject to overland flow flooding. There does not appear to be any consistency in inclusion of areas subject to overland flow flooding with some areas included and other areas excluded. All such areas should be excluded from consideration when remapping the South Creek Precinct boundaries;
- vii. Inappropriately includes farm dams which should be removed from the precinct (e.g. adjacent to Elizabeth Drive west of South Creek);
- viii. Uniform revegetation of the watercourses and the floodplain within the South Creek Precinct has the potential to adversely increase 100 year ARI flood levels and PMF levels by up to 1 m or more depending on location; and because
- ix. Significant increases in flood levels due to revegetation of the complete floodplain would cause unsafe conditions on Elizabeth Drive and on any other similar roads to be experienced in more frequent floods, pose greater risks to vehicles due to greater flood depths and would be more prolonged than under current conditions.

This position is further confirmed in the advice from at&I provided in **Attachment 4**.

It is recommended that approval authorities retain the right to set flood/development boundaries by adopting the neutral flood impact principles.

5.2.4 Large consolidated land ownership can promote better planning results

The location of the Property immediately to the north of the northern boundary of the Western Sydney Airport makes this a strategically highly significant Gateway site as a uniquely consolidated lot.



The importance of the "last mile" and its linkages has been highlighted. Given the significant freight and passenger numbers passing through the Northern Gateway zone, large consolidated land holdings in this zone create opportunities to capture economic value in and for the region.

This Property is in single ownership (a significant virtue in a greenfield planning context). However it will become nevertheless fragmented by the proposed Precinct boundaries in the LUIIP. The Property is partly in the Northern Gateway Precinct, partly in the Badgerys Creek Precinct, partly in the South Creek Precinct, and partly in the Kemps Creek Precinct. Despite the fact that the Property is the subject of the University's Planning Proposal, it is partly in two (2) accelerated Precincts and partly in two (2) non-accelerated Precincts in LUIIP.

We note that the low success rates of applicants using the NSW Government's Unsolicited Proposal process elsewhere in NSW. This speaks to its unwieldiness and unnecessary complexity for these circumstances where economic progress is critical.

It is recommended that the second stage LUIIP could consider incorporating a simple mechanism for promoting accelerated development of consolidated land holdings including circumstances where the land holdings extend across fragmented Precinct boundaries.

5.2.5 The rational for the boundaries of the South Creek Precinct

The boundaries of the South Creek Precinct, which include that part of the Property also traversed by Badgerys Creek, are based on the PMF. The impacts of the proposed PMF are addressed in Section 5.2.3 above.

Similarly, the incorporation of the University's land into small portions that are fragmented across several of the planned precincts creates odd-shaped island sites that are alienated.

The way in which the Precinct boundaries of the Badgerys Creek and Kemps Creek Precincts are configured north of the planned alignment of the proposed M12 (see **Figure 7**), when all other parts of these two (2) Precincts are to the south of the M12 alignment, seems inappropriate and illogical.

The parts of the Property that are adjacent to the planned M12 alignment need to be included in the Northern Gateway Precinct, recognising their significant potential having regard to: -

- linkages to the existing WSEA lands and enhancing the "last mile";
- their potential for urban development (as per the University's Planning Proposal), and
- the fact that they are part of the University's consolidated land holding which should be treated as a single entity.



5.2.6 The Precinct boundaries work against the homogeneous planning logic of the University's Planning Proposal

The extent of Non-Urban Land on the Structure Plan is based on the extent of the PMF, at least insofar as those parts of the Property which are traversed by South Creek and Badgerys Creek are concerned. Similarly, the Precinct boundaries reflect the extent of the Non-Urban Land and the PMF (see **Figures 1, 2 and 3**).

In contrast, the University's Planning Proposal is based on the extent of E2 Environmental Conservation zoned land under Penrith LEP 2010, the conservation and augmentation of existing riparian vegetation, the 1% AEP event (with adjustments to ensure no greater flood impact on downstream properties), and well-established principles and conventions of employment land development.

It is recommended that this meritorious planning logic approach should be permitted to continue as a reasonable basis for creating a "gateway" precinct.

Furthermore, and as re-iterated below in Section 5.6, the University's Planning Proposal is entirely consistent with the Greater Sydney Commission's "Greater Sydney Region Plan: Our Greater Sydney 2056 – A Metropolis of Three Cities – Connecting People", and with the Western City District Plan.

5.2.7 Recommendation on why the precinct boundaries require significant modification

For the reasons set out in Section 5.2.1 – 5.2.7 above, the University invites the Department and GSC to consider that the second stage LUIIP examine drawing more flexible Precinct boundaries that avoid fragmentation and support proper realisation of the Property's development potential, based on known and approved planning and engineering principles and conventions that are consistent with the WSEA SEPP and the Western City District Plan.

5.3 The land mapped as "Non-Urban" does not reflect the reasonable development potential and capacity of the Property as established by the University's Planning Proposal

The Property has an extensive frontage to Elizabeth Drive (which is proposed to be a key component of the future transport network), will be traversed by the proposed M12, can be connected to the existing WSEA SEPP employment areas, and can potentially accommodate a new station on the planned new rail link.

The impetus for the University's Planning Proposal was the recognition that if the Northern Gateway to the Western Sydney Airport is to be actively undergoing redevelopment by the time the airport is operational (2026), the rezoning process needed to start in 2018. In contrast, the LUIIP creates a potential delay of two years, leaving the risk of the new airport in a greenfield setting upon the start of airport operations.



As the University's Planning Proposal is entirely consistent with the Greater Sydney Commission's "Greater Sydney Commission Plan: Our Greater Sydney 2056 – A Metropolis of Three Cities – Connecting People", and with the Western City District Plan, there is already available to the Department a detailed body of information which clearly demonstrates the urban development potential of the Property. It is to the detriment of Sydney as a whole that so much of that urban development potential be lost as a result of the proposed extent of "Non Urban" land identified in the LUIP.

5.4 The extent of the identified "non-urban" land and the intent to use it for "infrastructure" such as regional stormwater management is inequitable.

As detailed in **Attachment 2**, the delineation of "Urban Development" and "Non-Urban" zones, based on the extent of the PMF and the reduction of on-site capacity, has the potential to discourage "best practice" water management. The LUIP, as exhibited, diminishes the reasonable development potential of land by designating all land in the PMF as Non-Urban Land and then proposing the use of that Non-Urban Land for (inter alia) regional stormwater management in lieu of enhancing the amenity of Urban Development Areas by integrating into them Water Sensitive Urban Design and associated open space, which would be a more equitable and preferred planning outcome.

The University considers, having regard to the advice it has received from its consultants (as shown in the attached reports) particularly given its history of curated spaces, that by designating up to 46.3% of the Property as Non-Urban Land for stormwater management, open space, and re-vegetation purposes that it will not result in the orderly and economic use and development of the land. Instead, the zoning should be a reflection of the current characteristics and constraints of the Property. There is no justification for making large parts of the Property (outside the existing E2 Environmental Conservation Zone) as Non-Urban land.

5.5 The LUIP approach to stormwater management risks providing poor quality open space

As detailed in **Attachment 2**, the LUIP approach to stormwater management will reduce the amount of unconstrained land available for development and reduce the landowners' capacity to fund the quality open space which is envisaged. This is likely to result in large tracts of unused and un-maintained open space in the Non-Urban area. Better urban spaces and environments will be created by integrating passive water treatment ponds into quality open space within an urban area that is cognisant of the 1% AEP flood line.

Basing the extent of Non-Urban land on the PMF line will lead to unintended, and ultimately counter-productive consequences, including:-

- less Section 7.11 / 7.12 Development Contributions to pay for works in the creek corridor;
- less people accessing the corridor with consequential less surveillance;



- creation of a very large land area that requires intensive maintenance, without the funds for same; and
- if intensive maintenance does not happen, flood levels will be exacerbated in some areas (refer Cardno).

5.6 The impact on the University's Planning Proposal diminishes reasonable development potential

The University's Planning Proposal is consistent with:-

- NSW State Priorities;
- the Greater Sydney Region Plan;
- A Plan for Growing Sydney;
- the Western Sydney District Plan;
- the WSEA SEPP; and
- Penrith City Council's strategic planning and policy documents.

All of the above strongly support the optimisation of development of the Property for employment purposes. Furthermore, it is generally recognised that there is a shortage of greenfield employment land in Sydney with vacancy rates for developed employment land below 1%.

The Northern Gateway to the new Western Sydney Airport needs to be vibrant at the time that the Airport becomes operational. Therefore, it is essential that the Property is considered holistically based on current characteristics/constraints and not fragmented into differently-staged precincts. Otherwise, there is the risk that certain parcels of land will not be able to optimise the opportunity that a large holding in singular ownership brings.

5.7 The University's Planning Proposal should be incorporated as part of the Northern Gateway Precinct

With substantial proportions (343 hectares) and in single ownership the Property is one of the largest parcels of potential employment land in Western Sydney.

The B7 Business Park zone, as proposed in the University's planning proposal, will encourage a greater diversity of jobs in the Western Sydney Region and deliver a higher job density when compared to the logistics and warehousing uses that have been developed in other parts of the area to which the WSEA SEPP applies.

It is the intention of the WSEA SEPP and of the Western City District Plan that more employment land be provided in Western Sydney so as to allow greater job containment closer to new release areas thereby reducing the need for residents to travel further for work.

These are all sound reasons why the University's Planning Proposal should be incorporated within the boundaries of the Northern Gateway Precinct in the LUIIP.



6. CONCLUSION

Whilst the submission identifies significant issues and concerns with the LUIIP, the University's Property Team remains hopeful it will be able to partner with Government to ensure an exemplary planning and development outcome for the Property and for the broader social and economic benefit of Western Sydney as a whole.

Accordingly, the University's Property Team and technical advisors request an opportunity to meet with the Aerotropolis Activation Team to discuss the matters contained in this submission at a mutually convenient time before work commences on preparation of the Stage 2 LUIIP.

BBC Consulting Planners

A handwritten signature in black ink, appearing to read 'Robert Chambers', is written over a horizontal line.

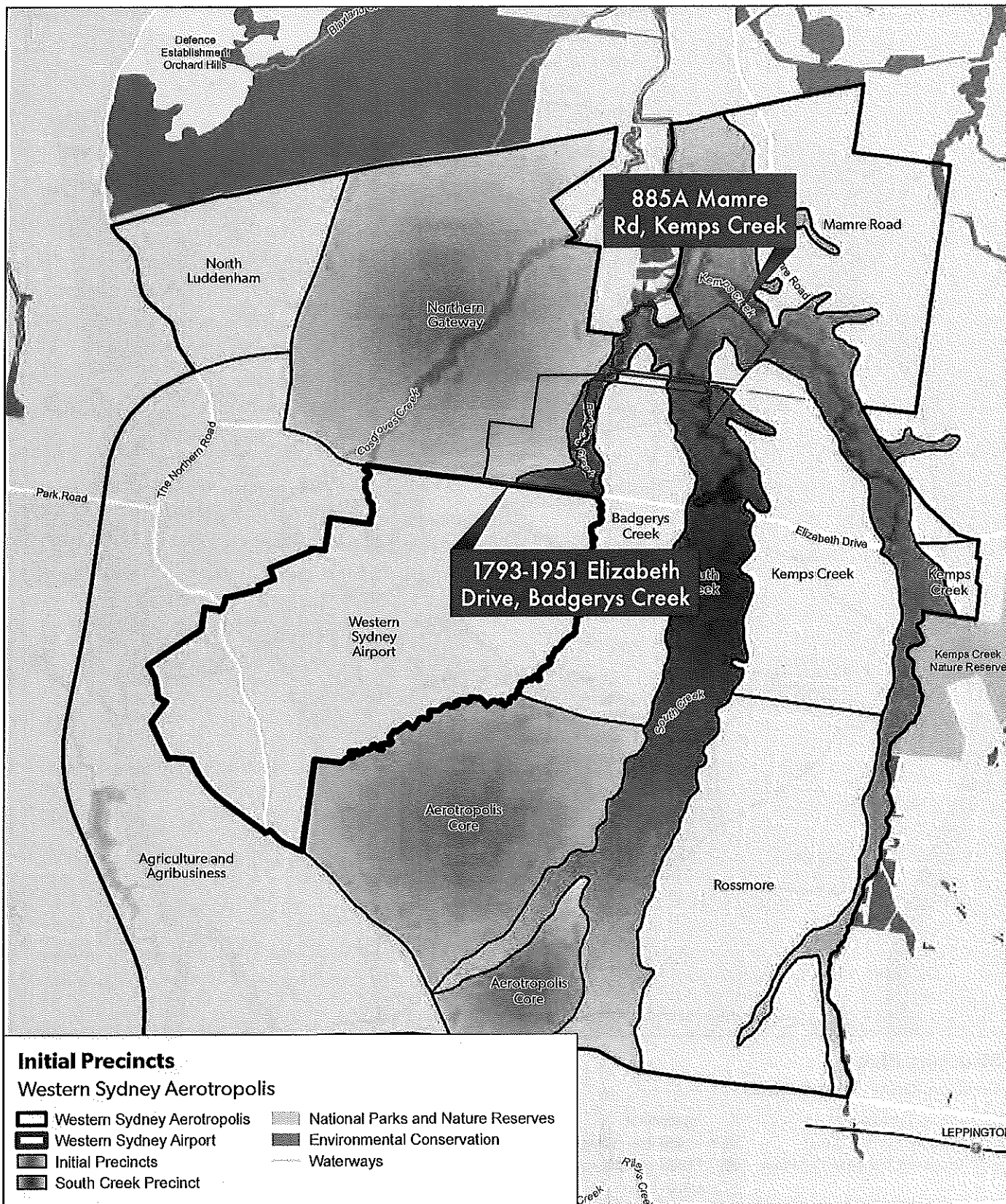
Robert Chambers

Director

Email bob.chambers@bbcplanners.com.au



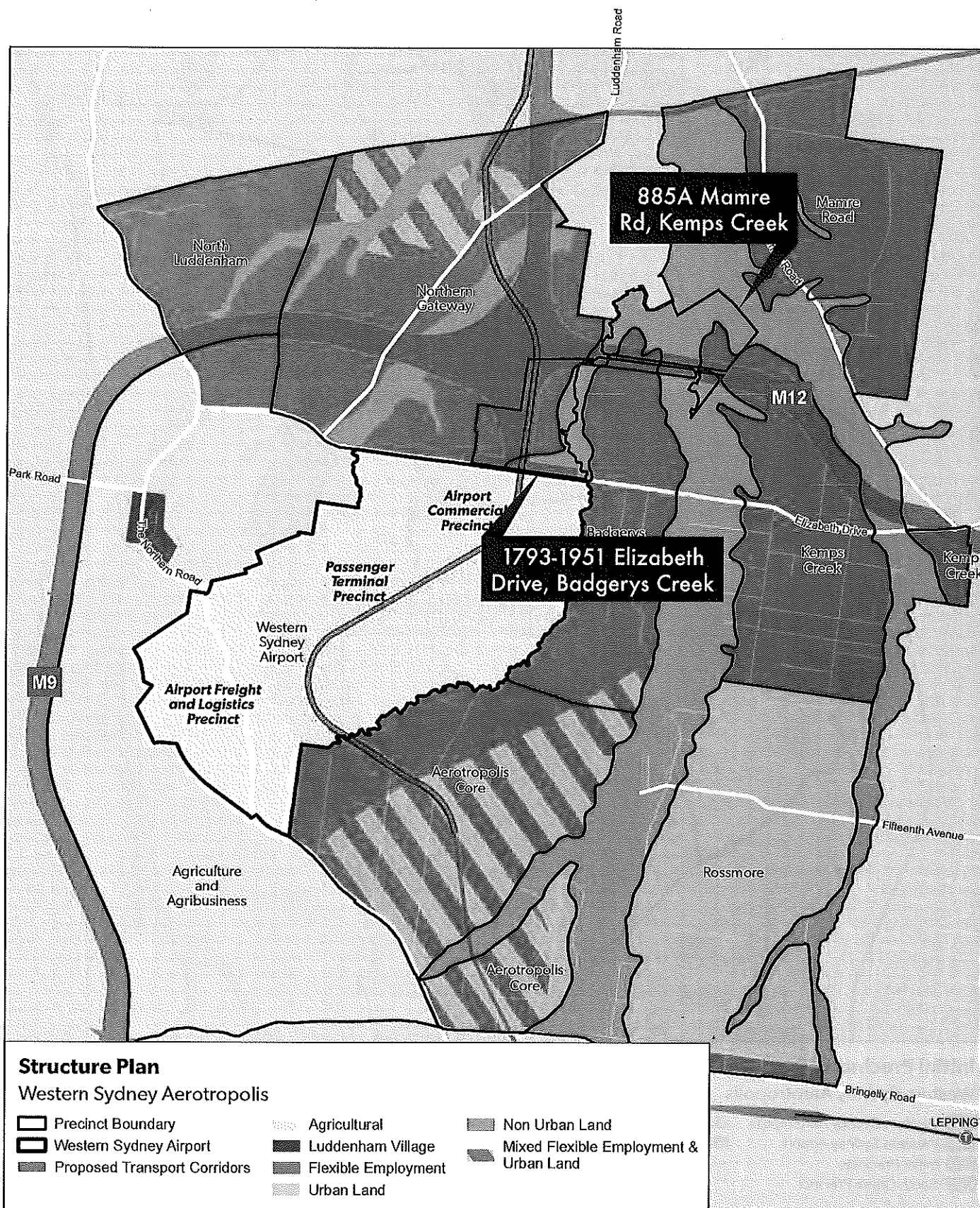
FIGURES



WESTERN SYDNEY AEROTROPOLIS, LAND USE AND INFRASTRUCTURE IMPLEMENTATION PLAN – STAGE 1: INITIAL PRECINCTS
Land owned by Sydney University at Badgerys Creek and Kemps Creek

FIGURE 1
Initial Precincts - Western Sydney Aerotropolis

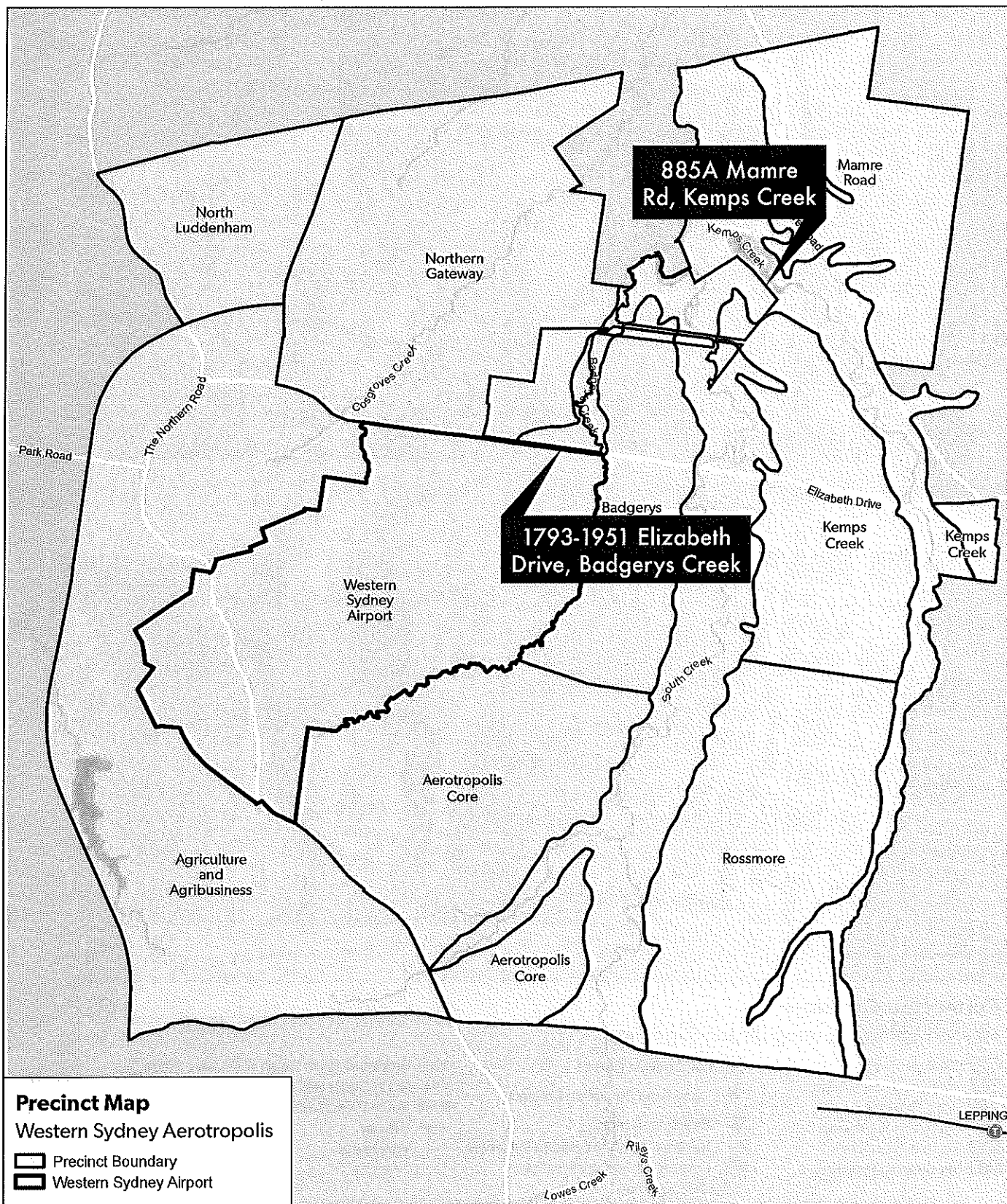
Prepared For - King & Wood Mallesons



WESTERN SYDNEY AEROTROPOLIS, LAND USE AND INFRASTRUCTURE IMPLEMENTATION PLAN – STAGE 1: INITIAL PRECINCTS
Land owned by Sydney University at Badgerys Creek and Kemps Creek

FIGURE 2
Structure Plan - Western Sydney Aerotropolis

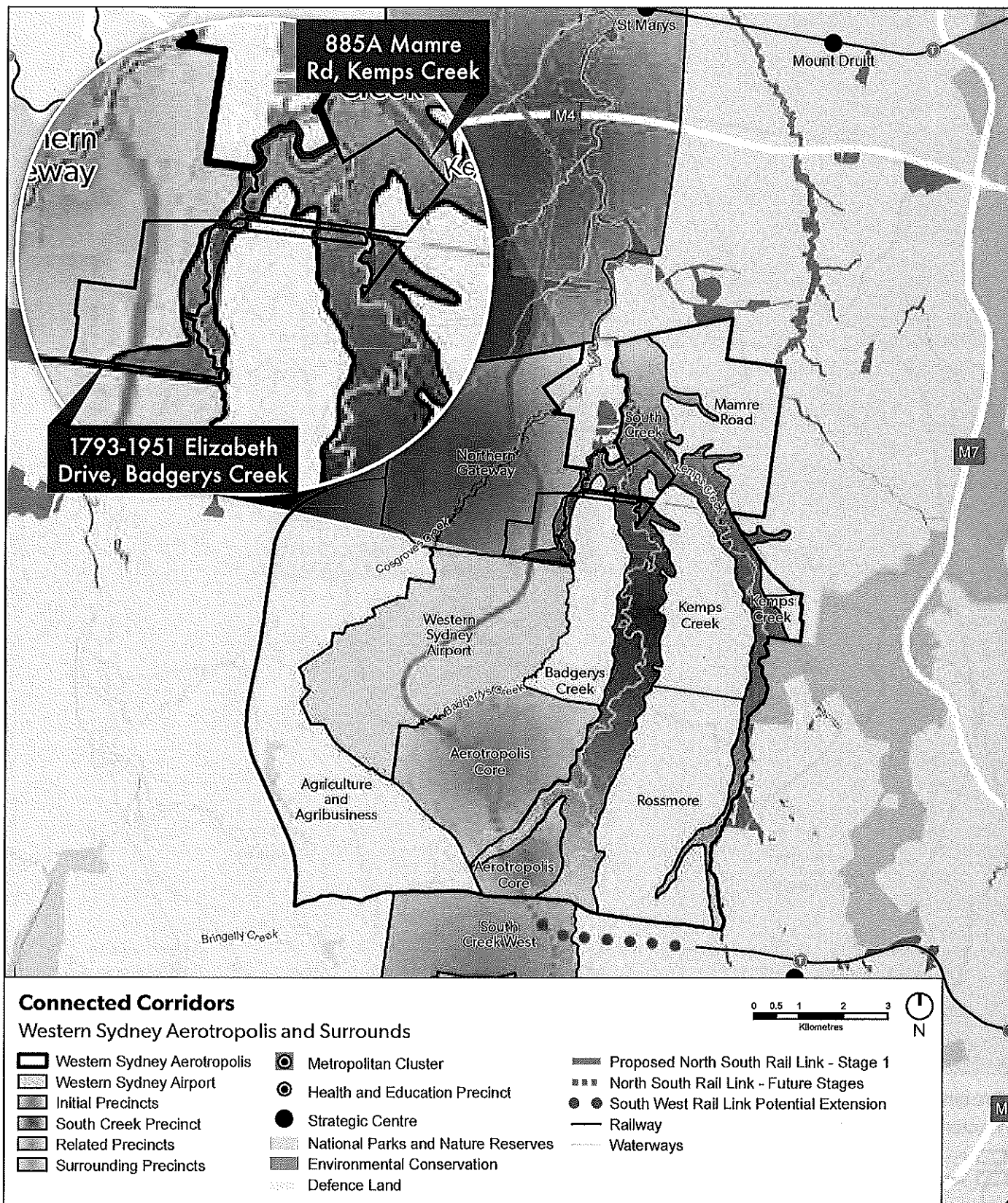
Prepared For - King & Wood Mallesons



WESTERN SYDNEY AEROTROPOLIS, LAND USE AND INFRASTRUCTURE IMPLEMENTATION PLAN – STAGE 1: INITIAL PRECINCTS
Land owned by Sydney University at Badgerys Creek and Kemps Creek

FIGURE 3
Precinct Map - Western Sydney Aerotropolis

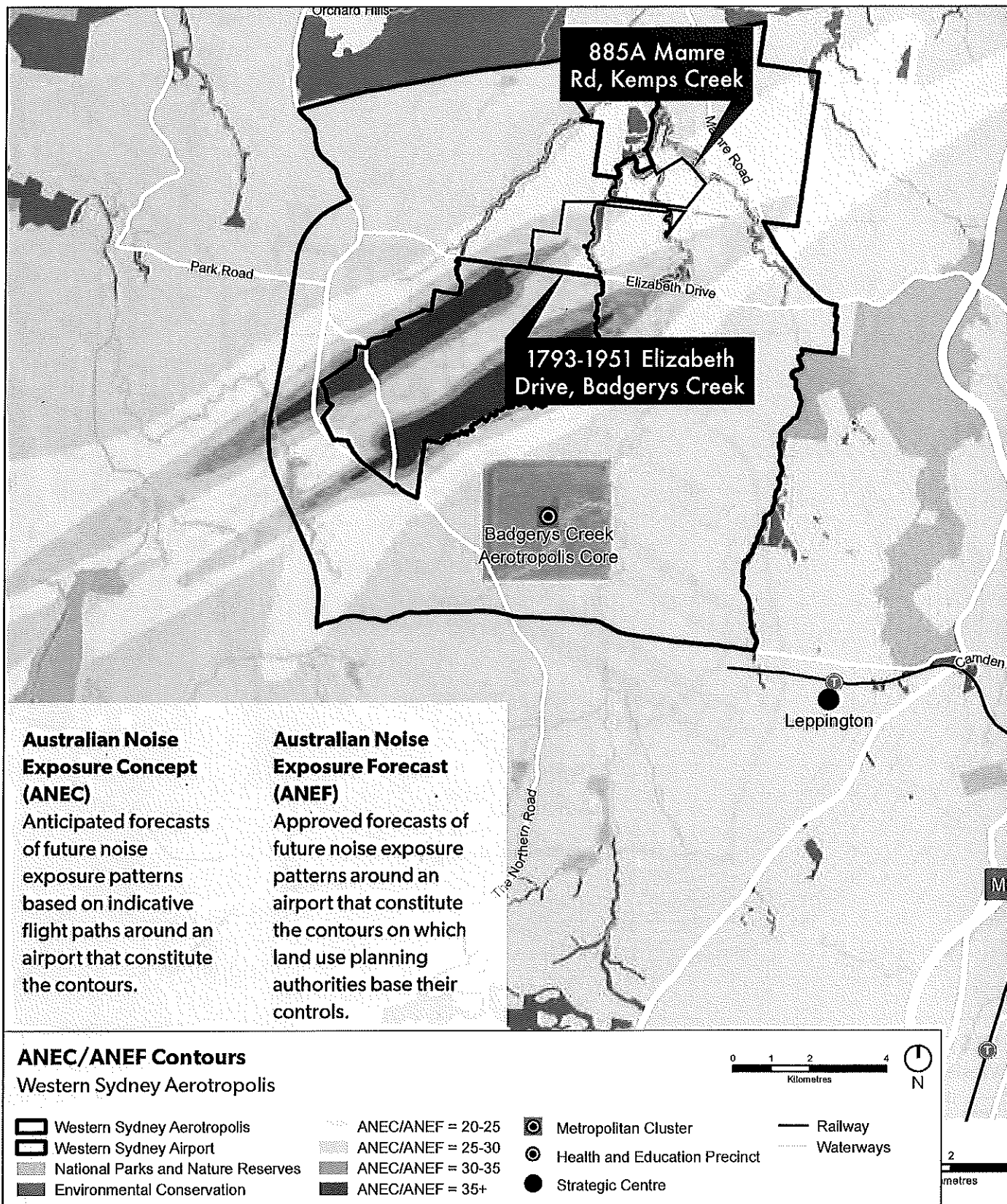
Prepared For - King & Wood Malletsons



WESTERN SYDNEY AEROTROPOLIS, LAND USE AND INFRASTRUCTURE IMPLEMENTATION PLAN – STAGE 1: INITIAL PRECINCTS
Land owned by Sydney University at Badgerys Creek and Kemps Creek

FIGURE 4
Connected Corridors - Western Sydney Aerotropolis and Surrounds

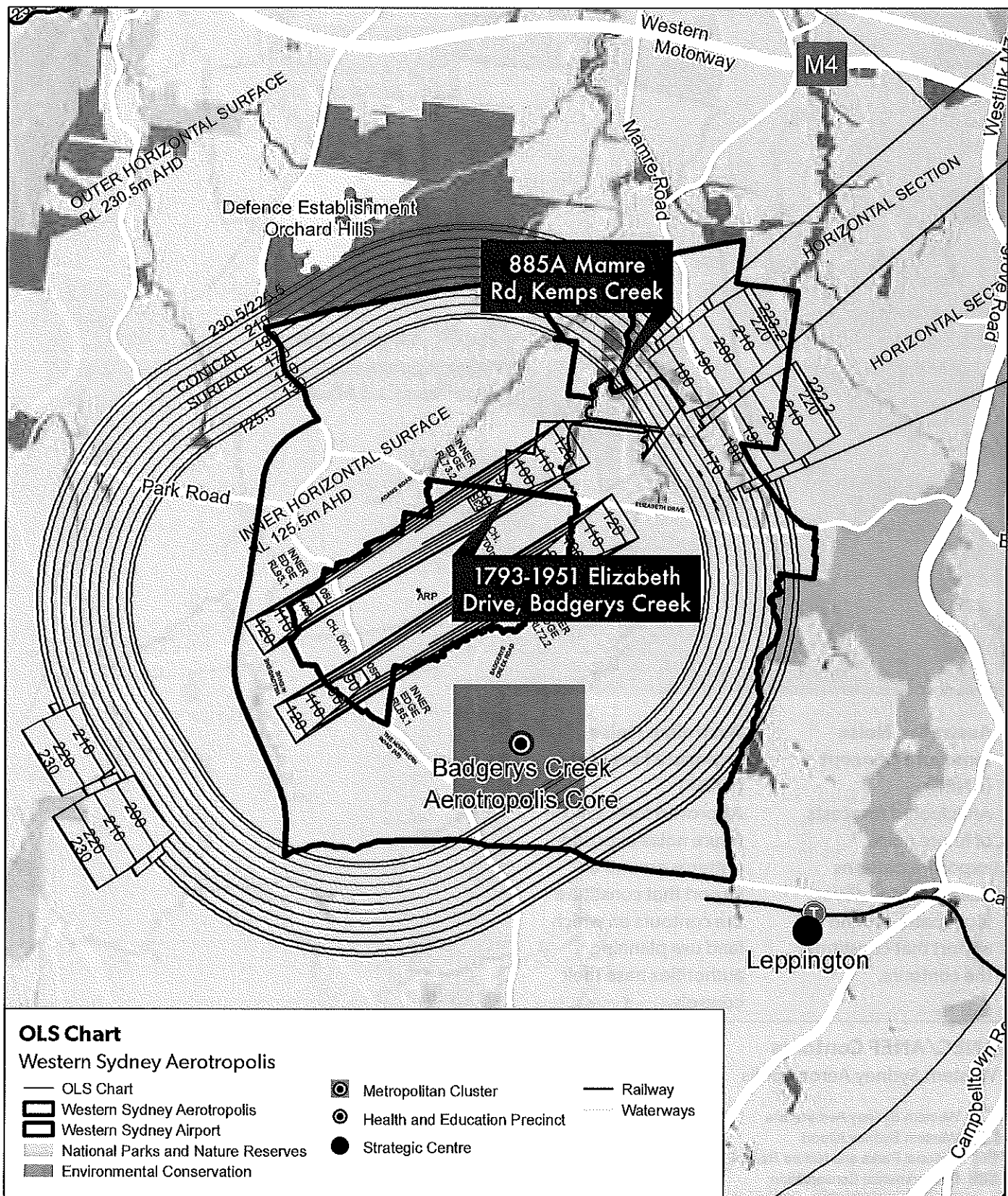
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WESTERN SYDNEY AEROTROPOLIS, LAND USE AND INFRASTRUCTURE IMPLEMENTATION PLAN – STAGE 1: INITIAL PRECINCTS
Land owned by Sydney University at Badgerys Creek and Kemps Creek

FIGURE 5
ANEC/ANEF Contours - Western Sydney Aerotropolis

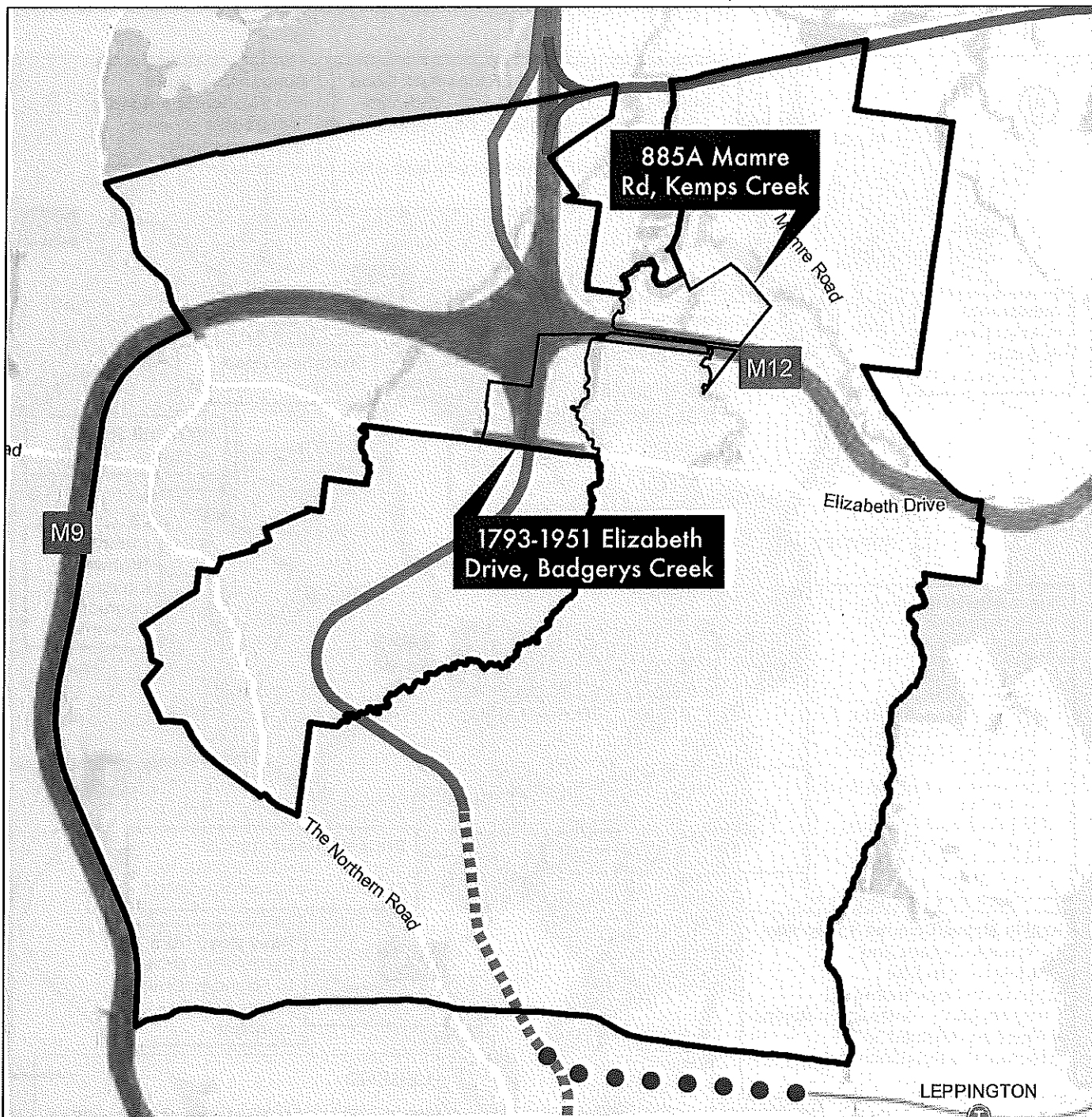
Prepared For - King & Wood Malleons



WESTERN SYDNEY AEROTROPOLIS, LAND USE AND INFRASTRUCTURE IMPLEMENTATION PLAN – STAGE 1: INITIAL PRECINCTS
Land owned by Sydney University at Badgerys Creek and Kemps Creek

FIGURE 6
OLS Chart - Western Sydney Aerotropolis

Prepared For - King & Wood Mallesons



Potential Transport Corridors

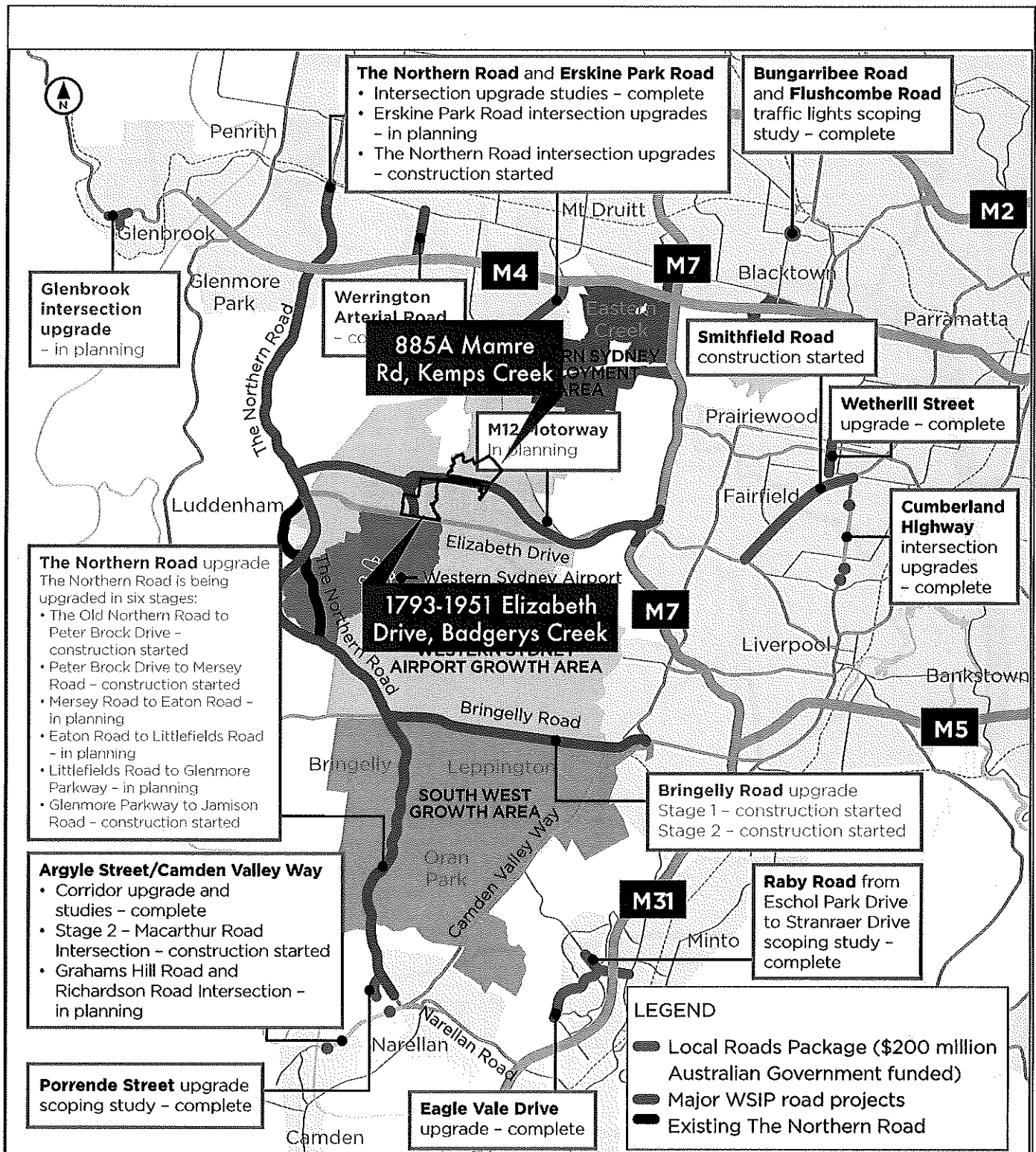
Western Sydney Aerotropolis

- | | |
|------------------------------------|--|
| Western Sydney Aerotropolis | Western Sydney Freight Line |
| Western Sydney Airport | Proposed North South Rail Link - Stage 1 |
| M9 - Outer Sydney Orbital Corridor | North South Rail Link - Future Stages |
| M12 Motorway | South West Rail Link Potential Extension |

WESTERN SYDNEY AEROTROPOLIS, LAND USE AND INFRASTRUCTURE IMPLEMENTATION PLAN – STAGE 1: INITIAL PRECINCTS
Land owned by Sydney University at Badgerys Creek and Kemps Creek

FIGURE 7
Potential Transport Corridors - Western Sydney Aerotropolis

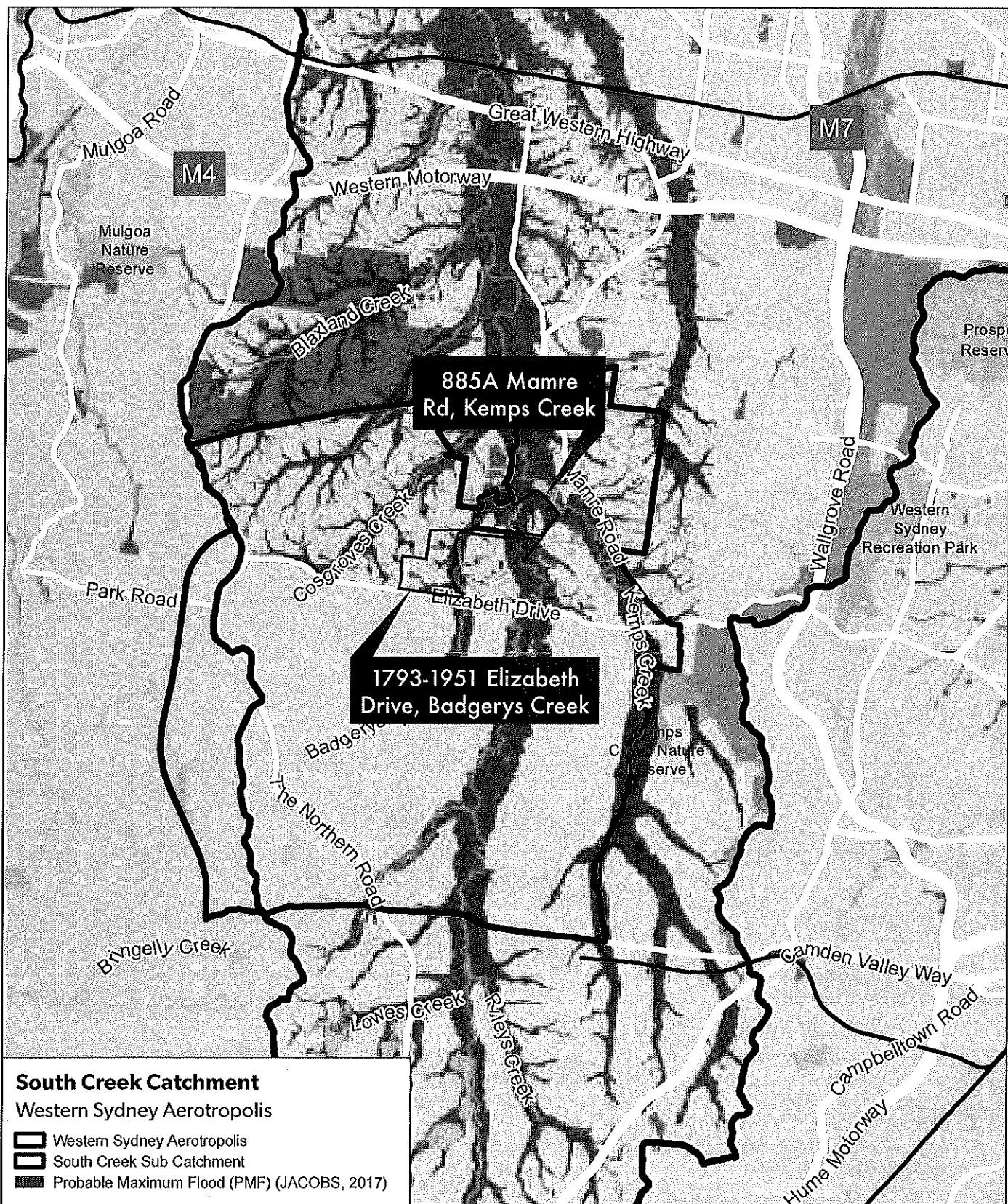
Prepared For - King & Wood Mallesons



WESTERN SYDNEY AEROTROPOLIS, LAND USE AND INFRASTRUCTURE IMPLEMENTATION PLAN - STAGE 1: INITIAL PRECINCTS
Land owned by Sydney University at Badgerys Creek and Kemps Creek

FIGURE 8
Western Sydney Infrastructure Plan - Roads and Maritime Services

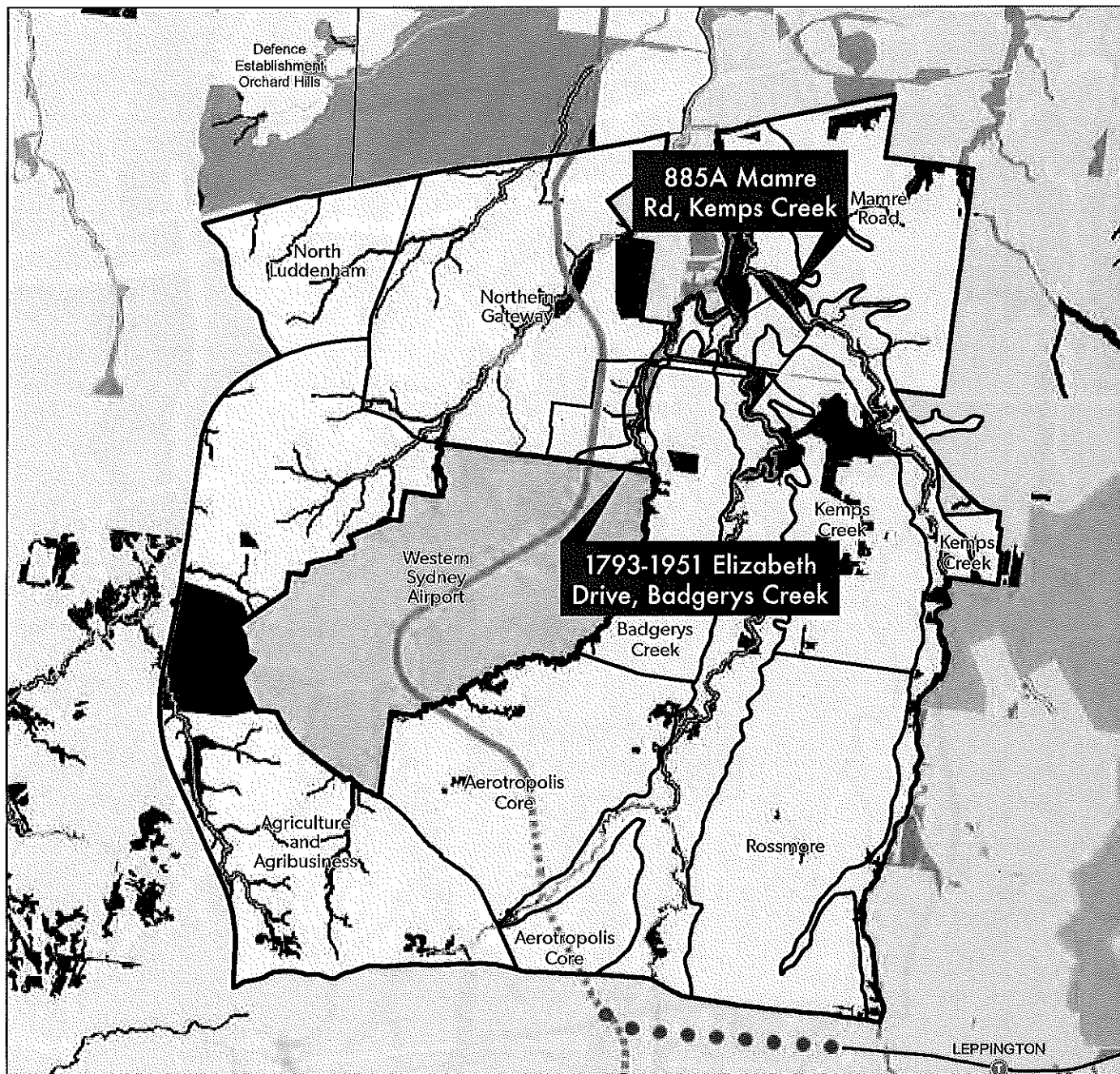
Prepared For - King & Wood Mallesons



WESTERN SYDNEY AEROTROPOLIS, LAND USE AND INFRASTRUCTURE IMPLEMENTATION PLAN – STAGE 1: INITIAL PRECINCTS
Land owned by Sydney University at Badgerys Creek and Kemps Creek

FIGURE 9
South Creek Catchment - Western Sydney Aerotropolis

Prepared For - King & Wood Mallesons



Conservation Values

Western Sydney Aerotropolis

- Western Sydney Aerotropolis
- Precinct Boundary
- Western Sydney Airport
- Potential and Existing Conservation Land
- National Parks and Nature Reserves
- Environmental Conservation
- Defence Land

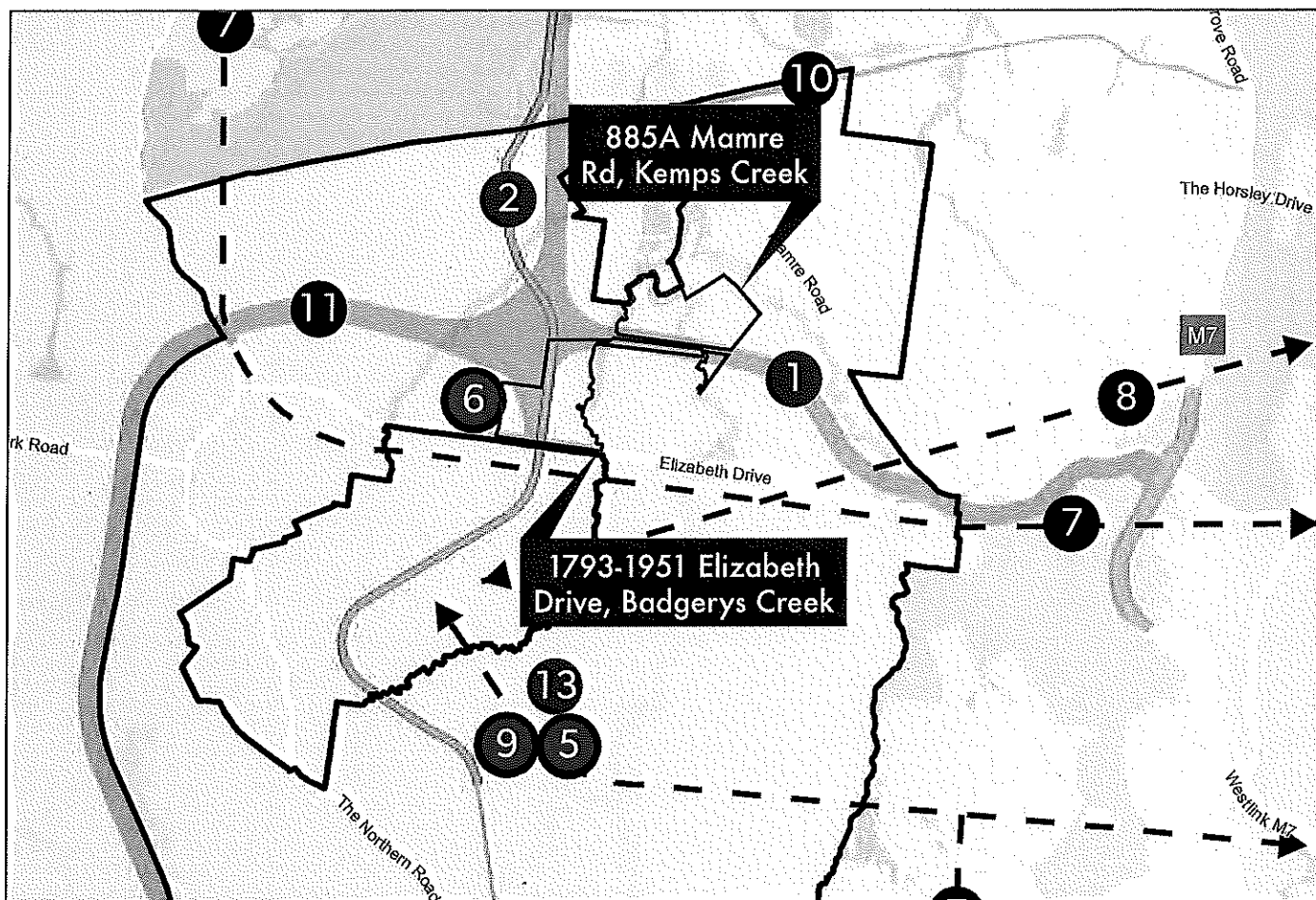
- Proposed North South Rail Link - Stage 1
- North South Rail Link - Future Stages
- South West Rail Link Potential Extension
- Railway
- Waterways



WESTERN SYDNEY AEROTROPOLIS, LAND USE AND INFRASTRUCTURE IMPLEMENTATION PLAN – STAGE 1: INITIAL PRECINCTS
Land owned by Sydney University at Badgerys Creek and Kemps Creek

FIGURE 10
Conservation Values - Western Sydney Aerotropolis

Prepared For - King & Wood Mallesons



Future Transport Initiatives

Western Sydney Aerotropolis

Committed Initiatives (0 - 10 years)

- 1 Western Sydney Infrastructure Plan including the new M12
- 2 North-south Rail link in Western Parkland City: St Marys - Western Sydney Airport - Badgerys Creek Aerotropolis

Initiatives for Investigation (0 - 10 years)

- 3 Leppington to Western Sydney Airport - Badgerys Creek Aerotropolis Rail Link
- 4 Proposed North-south Rail Link in Western Parkland City: Western Sydney Airport - Badgerys Creek Aerotropolis - Campbelltown-Macarthur
- 5 Western Sydney Airport - Badgerys Creek Aerotropolis Connected and Automated Vehicles zone*
- 6 Western Sydney Fuel Pipeline*
- 7 Infrastructure to support Rapid Bus Connections and Improved Bus Connections between Western Sydney Airport - Badgerys Creek Aerotropolis and Penrith, Liverpool, Blacktown and Campbelltown-Macarthur

- 8 Western Sydney Airport - Badgerys Creek Aerotropolis - Parramatta Rail Link
- 9 Western Parkland City Bus Interchange*

Initiatives for Investigation (10 - 20 years)

- 10 Western Sydney Freight Line
- 11 Outer Sydney Orbital from Great Western Highway to Western Sydney Airport - Badgerys Creek Aerotropolis

Initiatives for Investigation (20+ years)

- 12 M5 motorway extension from Liverpool to Outer Sydney Orbital
- 13 Western Sydney Airport - Badgerys Creek Aerotropolis Inner and Outer Ring Roads
- 14 Outer Sydney Orbital from Western Sydney Airport - Badgerys Creek Aerotropolis to Hume Motorway

* Indicative Location

WESTERN SYDNEY AEROTROPOLIS, LAND USE AND INFRASTRUCTURE IMPLEMENTATION PLAN – STAGE 1: INITIAL PRECINCTS
Land owned by Sydney University at Badgerys Creek and Kemps Creek

FIGURE 11
Future Transport Initiatives - Western Sydney Aerotropolis

Prepared For - King & Wood Mallesons



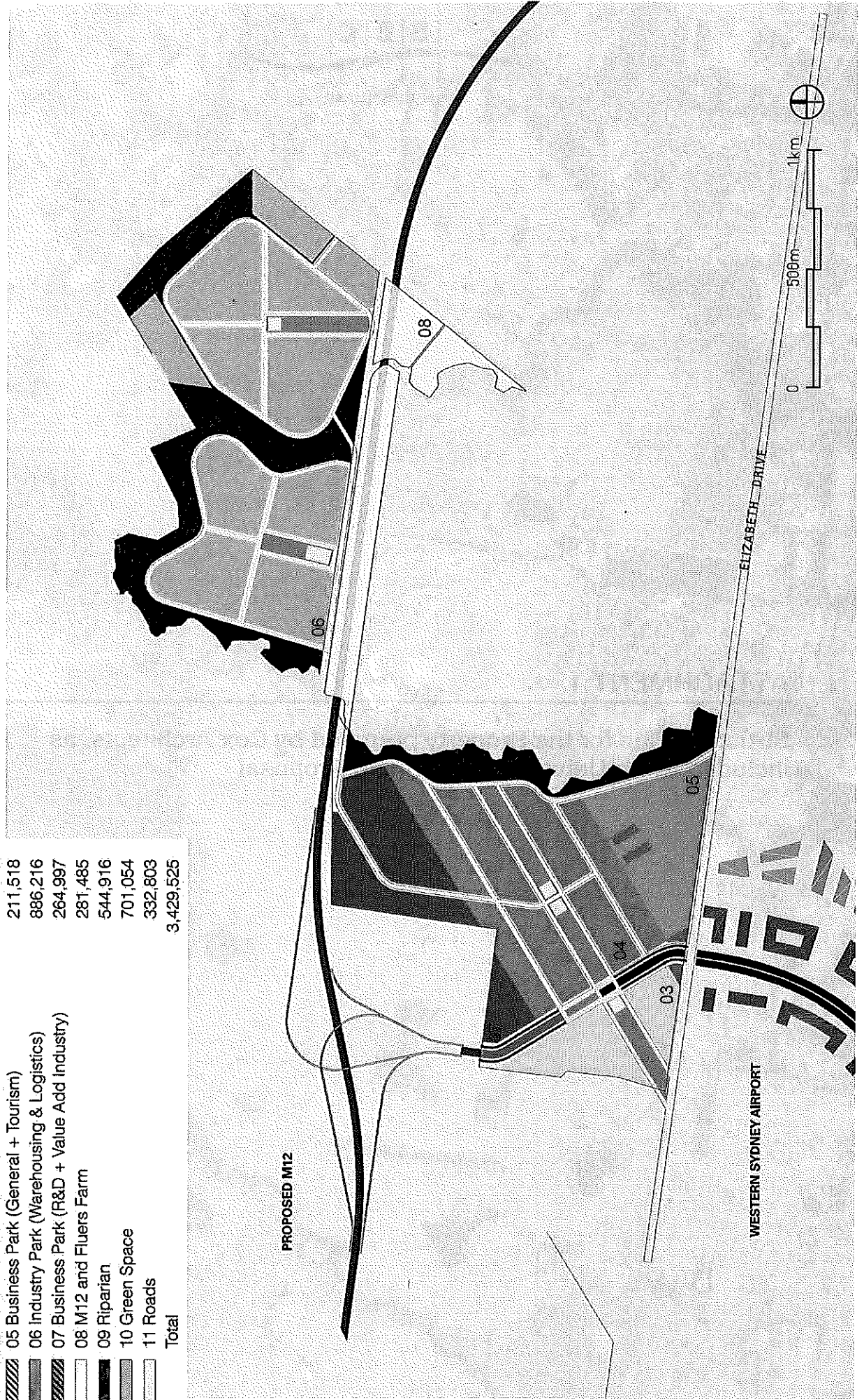
ATTACHMENTS



ATTACHMENT 1

**Structure Plan for the Property prepared by Cox Architects, as
included in the University's Planning Proposal**

Lot Type	Area m2
01 Hotel	14,511
02 Retail	173,69
03 Bulk Retail & Employment	141,263
04 Business Park (Professional Services + Innovation)	423,016
05 Business Park (General + Tourism)	211,518
06 Industry Park (Warehousing & Logistics)	886,216
07 Business Park (R&D + Value Add Industry)	264,997
08 M12 and Fluers Farm	281,485
09 Riparian	544,916
10 Green Space	701,054
11 Roads	332,803
Total	3,429,525





ATTACHMENT 2

Flooding, Stormwater Management and Open Space Funding Commentary prepared by Warren Smith and Partners

WESTERN SYDNEY AERTROPOLIS – GATEWAY SITE

REVIEW LANDUSE AND INFRASTRUCTURE IMPLEMENTATION PLAN

We believe a collaborative planning approach for the Northern Gateway site will provide opportunities for good design to add to the quality of the urban area. Our concern is that the current Land use and Infrastructure Implementation Plan will not bring about the best outcomes for the community and stakeholders, as outlined in the following sections.

1. FLOODING

The Land use and Infrastructure Implementation Plan describes flood management in the area as a "challenge". This in our opinion over-states the issue. Although parts of the South Creek are within the 1% AEP flood line, the flooding characteristics are such that flood management will not be particularly difficult and will not be constrained by existing developments. On the contrary

Firstly, the proposed delineation of urban and non-urban zoning around the PMF line cannot be supported on technical grounds as this contradicts the Government's own guidelines (Floodplain Development Manual NSW 2005) which explicitly states that the floodplain should not be sterilised (see below, opening 3 paras from FDM foreword (NSW, 2005)).

The primary objective of the NSW Government's Flood Prone Land Policy is to reduce the impact of flooding and flood liability on individual owners and occupiers of flood prone property, and to reduce private and public losses resulting from floods. At the same time, the policy recognises the benefits flowing from the use, occupation and development of flood prone land.

The policy promotes the use of a merit approach which balances social, economic, environmental and flood risk parameters to determine whether particular development or use of the floodplain is appropriate and sustainable.

In this way the policy avoids the unnecessary sterilisation of flood prone land. Equally it ensures that flood prone land is not the subject of uncontrolled development inconsistent with its exposure to flooding.

Secondly the use of the PMF, as per Planning Circular (PS 07-003) the use of the PMF is not the proper approach, but instead the 1% AEP event and no rarer event, should be used to determine appropriate development extents (see excerpt from PS-07-003 below).

The Greater Sydney Commission's document "A Metropolis of Three Cities" states that:-

"Managing flooding is an important priority for communities across the Western City District. The NSW Government has developed the Floodplain Development Manual 2005 to guide development on areas at risk of flooding. Councils are responsible for managing flood risk in their local government areas and typically impose flood related development controls in areas below the 1 in 100 chance per year flood level.

WESTERN SYDNEY AERTROPOLIS – GATEWAY SITE

In the case of the Hawkesbury-Nepean Valley, the significant depths between the one in 100 chance per year flood and the probable maximum flood, mean a risk-based approach that considers the full range of flood sizes is more appropriate"

Not only is the 1% AEP event the appropriate criteria for determining the flood liability of land for planning purposes, but further opportunities exist to significantly manage the 1% AEP event. This relates to the characteristics of flooding at the site which is:-

- A wide and reasonably well-defined floodplain, which means that in the 1% AEP event floodplain flow is relatively shallow and slow moving.
- Relatively minor works could dramatically reduce the extent of 1% AEP floods, without necessarily causing downstream impacts;

Land releases elsewhere (Oran Park for example), were based on the 1% AEP event flood extent and engineering works to change the 1% AEP flood behaviour were permitted. This brings into question why the approach proposed in this infrastructure plan is so radically different?

By not investigating potential works scenarios prior to zoning, the opportunity for significant land to be utilised for development is being lost.

Given the significance of the modelling work to the landowners it is critical that they be given the opportunity to review the flood modelling work in some detail. Some of the key points would be:

- If the 1987 version of Australian Rainfall and Runoff (ARR87) was used in the flood modelling the results would now be out of date. Revision of design flood behaviour elsewhere in the Sydney Basin has shown that flood estimates using the more recent edition (ARR2016) tend to be significantly lower than estimates achieved via ARR87;
- The accuracy of the modelling would depend on
 - The data and modelling tools used;
 - How the creek capacity was modelled, either as a one-dimensional or a two-dimensional model. If Lidar has been used, the significant conveyance capacity of the creek has not been accurately estimated. Lidar will not provide an accurate bathymetry for the creek given its lack of relative resolution and the fact that it will not penetrate water; and
 - How the conjunction of events has been used in the modelling. The site includes the confluence of the Kemps, Badgerys and South Creek systems, and it appears all watercourses have been modelled as simultaneously experiencing a PMF event. We would like to examine how this work has been done. Assuming a creek PMF event that occurs simultaneously with a proximate creek's PMF will grossly exaggerate the PMF flood extent.

WESTERN SYDNEY AERTROPOLIS – GATEWAY SITE

2. STORMWATER MANAGEMENT

We are also concerned that at a policy level, the delineation of 'urban' and 'non-urban' zones along the PMF line has the potential to discourage 'best-practice' water management.

The Greater Sydney Commission's document "A Metropolis of Three Cities" in the Infrastructure and Collaboration section states that:

"The Plan also introduces the concept of Collaboration Areas that focus on creating great places particularly as centres of economic productivity. The responsibility for delivering great places does not rest with any one organisation, as barriers to growth can be multi-faceted and complex. As a non-statutory initiative, Collaboration Areas offer a new way for Australian, NSW and local governments to work to deliver collective responses that support growth and change. This will be undertaken by identifying and aligning the activities and investments of the three tiers of government and key stakeholders, based on evidence, to respond to the unprecedented levels of growth and investment in Greater Sydney. The outputs of the collaborations are a series of strategies tailored to an area, that provide certainty to the community and the private sector and align the Government's investment and policies to achieving great places."

The Plan also sets out

"A tailored approach for each Collaboration Area is established through the following steps:

- establish a vision for the area*
- identify impediments and opportunities*
- agree to priorities for the Collaboration Area*
- identify projects and initiatives to deliver the vision.*

These elements will be documented in a Place Strategy supported by a suite of strategies that best deliver outcomes.

The Greater Sydney Commission has facilitated a collaborative process with key stakeholders to establish a shared vision and whole-of-government approach to the Greater Parramatta and the Olympic Peninsula (GPOP) and is piloting a growth infrastructure compact (refer to Objective 2 and Objective 15). The growth infrastructure compact will provide greater context for the NSW Department of Planning and Environment's Greater Parramatta Interim Land Use and Infrastructure Implementation Plan on issues such as optimal integration of land use and transport through staging and sequencing."

Hence the Greater Sydney Commission is already committed to a collaborative approach to achieve the best outcomes. A collaborative approach should be taken to flood planning in the Northern Gateway area.

The 'Metropolis of Three Cities' document also states that the future of the Western Sydney Parkland will be created by:

- "Enhancing and protecting South Creek, Georges River and Hawkesbury-Nepean river systems*
- Mitigating the heat island effect and providing cooler places by extending "urban tree canopy" and "retaining water in the landscape"."*

WESTERN SYDNEY AERTROPOLIS – GATEWAY SITE

This is reflected in the Western Sydney Aerotropolis, Land use and Infrastructure Implementation Plan, section 6.1.4 which says that

"South Creek and its open space will be a key community asset with improved water quality, and that the core open space and conservation corridor will provide forhigh stormwater treatment".

The concern with the policy statements in the current plan will lead to an unintended, but ultimately unproductive water planning process. The statements strongly suggest stormwater treatment will be contained within the open space in the 'non-developable' space within the PMF contour. This is undesirable as:-

- It will create a large area of undevelopable land, where there is little incentive to maintain and beautify the area.
- It creates a disincentive to plan quality urban places around open space and water.
- Reducing the developable proportion of the land (from the 1% AEP to the PMF line) will discourage landowners locating ponds and waterways (required for water quality management) in the urban area and to pipe water flow out of the catchment to the non-urban area.

Best practice stormwater planning is to design ponds and stormwater treatment in a 'Place making approach to precinct planning. This means locating water within the catchment's developable (urban) areas as well as the flood affected (non-urban) areas. This way the benefits of open space and 'water in the landscape' are distributed more evenly through the catchment. The population who live and work within the developable area can readily access quality open space with water and take pride and ownership of their local area.

Enhancement of the amenity of the urban area will require the deliberate integration of water management into the urban plans as they develop in a tailored approach for each Collaboration Area.

3. FUNDING QUALITY OPEN SPACE

The current approach will reduce the land available for development and reduce the landowners' capacity to fund the quality open space envisaged. In our experience elsewhere, this has resulted in large tracts of un-used and un-maintained open space in the non-urban area. We believe that better urban spaces and communities will be created by integrating passive water treatment ponds into quality open space within an urban area that extends to the 1% AEP flood line.

We believe the zoning of developable land outside the PMF line will lead to unintended, but ultimately counter-productive consequences. This loss of developable land could have the following impacts:-

- Less Section 94 money to pay for works in the creek corridor;
- Less people accessing the corridor – less surveillance;
- Creates a vast land area that requires intensive maintenance, without the funds to do it. (landholders currently maintain the land through or passive side effect of land use (grazing for example); and
- If maintenance doesn't happen, likely to see flood levels exacerbated in some areas.

WESTERN SYDNEY AEROTROPOLIS – GATEWAY SITE

4. SUMMARY

We understand the intent and support the intention to create first class creek corridors for public enjoyment/amenity and maximising benefit in terms of environment, water quality, flooding etc.

The Draft Land use and Infrastructure Implementation Plan will not achieve these objectives on the following basis:

FLOODING

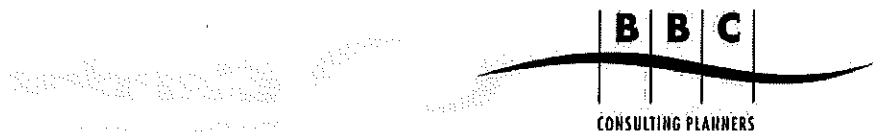
- The PMF shouldn't be used to define developable land as it is not consistent with the principles of the NSW Government's Floodplain Management Manual nor PS-007-003;
- The models should be reviewed as they currently over-estimate the extent of the 1% AEP flood line, with particular attention to rainfall intensity and modelling method used;
- Planning should be based on a consultative process where the 1% AEP line is adjusted to provide better outcomes without impacting downstream flood levels.

STORMWATER AND WATER QUALITY

Policy statements within the plan, and the pressure on land use brought on by reducing the area developable urban land is likely to result in inferior planning leading to water being piped out of urban areas to water management ponds in the non-urban areas. This will lead to poor urban amenity and place making within the urban area, and large tracts of undevelopable land without the funds or incentive to maintain these areas.

FUNDING AND AMENITY

Flooding and water quality should be integrated into the flexible servicing strategy proposed in the second stage of the Land Use Plan. This should include engagement with landowners in a constructive process that works co-operatively towards a better result within the bounds of commercial viability. This could be undertaken by the "new Authority" referred to in the Plan who will be responsible for co-ordinating timely delivery of infrastructure and services for the Aerotropolis



ATTACHMENT 3

Flooding Advice prepared by Cardno

Our Ref: 59919022-L01: BCP/bcp
Contact: Dr Brett C. Phillips

26th September 2018

The Divisional Manager, Property and Development
The University of Sydney
Campus Infrastructure & Services
Level 1, 22 Codrington Street G12
DARLINGTON NSW 2008

Attention: Mr Tim Johnson
Mr James Rendall

Cardno (NSW) Pty Ltd
ABN 95 001 145 035

Level 9
The Forum
203 Pacific Highway
St Leonards NSW 2065
Australia

Phone: 61 2 9496 7700
Fax: 61 2 9439 5170

www.cardno.com.au

Dear Tim, James,

**FLOODING ADVICE FOR SYDNEY UNIVERSITY PROPERTIES AT BADGERYS
CREEK, NSW IN RELATION TO THE LUIIP**

SUMMARY

The University of Sydney owns a significant landholding in Badgerys Creek known as 1793-1951 Elizabeth Drive, Badgerys Creek and 885a Mamre Road, Kemps Creek (refer **Figure 1**). The property comprises 343 hectares and is located wholly within the Penrith Local Government Area. The property is currently being used by the University to support the teaching and research facilities of the Faculty of Veterinary Science and is largely cleared and commercially unviable agricultural land.

Consistent with the long-term strategic plan for the property (which forms part of the Western Sydney Aerotropolis, the University is seeking to rezone the property so that the land uses are better-able to support the nearby Badgerys Creek Airport.

The South Creek Precinct is described by the LUIIP, 2018, in part, as follows.

The South Creek precinct is the central green spine of the Aerotropolis. It represents the central structural element to the Aerotropolis's connected open space network and the broader Western Parkland City. It will provide an important interface to surrounding development, providing open space, amenity, biodiversity and wellbeing values.

.....

The South Creek precinct and its broader catchment represents an opportunity to change the way waterways are planned for and managed in greenfield areas. Planning for the Aerotropolis will embrace natural systems as valuable assets, rather than constraints.

Rehabilitation of South Creek and its associated waterways will include replanting of appropriate vegetation to provide canopy cover, as well as the creation of permanent water bodies with the potential to provide a network within the South Creek corridor. This will contribute to urban cooling and encourage the residents to use and enjoy riparian lands.

It appears that the South Creek Precinct boundaries are based on the PMF extent mapped by Jacobs, 2017 (refer Figure 8) and that the boundary is either at or beyond the PMF extent. It is also noted that the precinct boundary appears to reflect mainstream flooding and overland flow flooding and that the boundaries are up to 1 km apart along a substantial length of South Creek.

Of particular concern is the proposed extent of the South Creek Precinct and the adverse impacts on the development of the subject property.

The review of the proposed South Creek Precinct boundaries has identified the following issues of concern in relation to flooding (see also **Figure S1**):

NSW Flood Prone Land Policy 2005 Floodplain Development Manual

The NSW Flood Prone Land Policy as produced within Section 1.1 of the 2005 Floodplain Development Manual. The primary objective of the NSW Flood Prone Land Policy recognises the following two important facts:

- flood prone land is a valuable resource that should not be sterilised by unnecessarily precluding its development; and
- if all development applications and proposals for rezoning of flood prone land are assessed according to rigid and prescriptive criteria, some appropriate proposals may be unreasonably disallowed or restricted, and equally, quite inappropriate proposals may be approved.

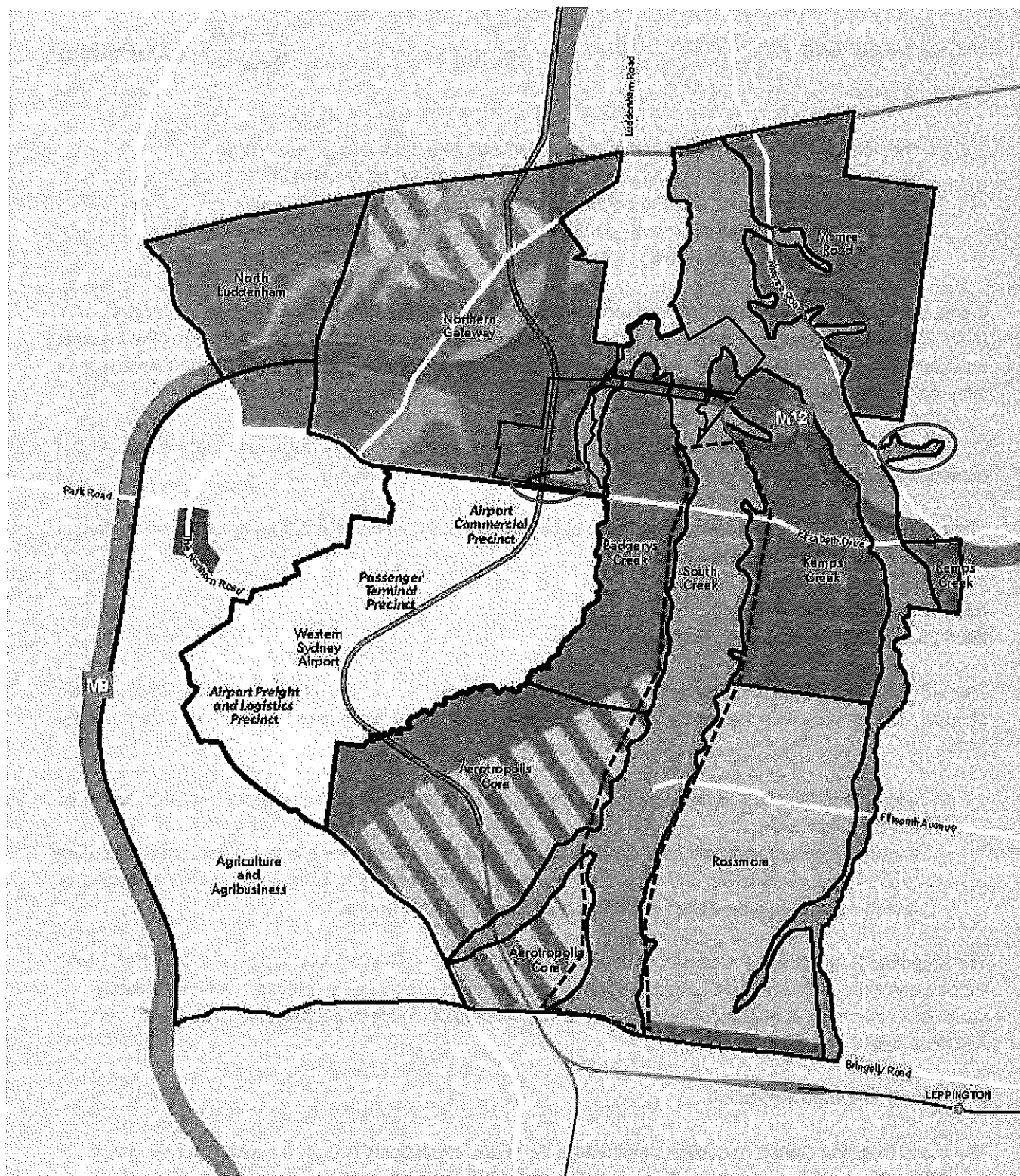
The proposed South Creek Precinct boundaries are inconsistent with the primary objective of the NSW Flood Prone Land Policy and the 2005 Floodplain Development Manual because the boundaries unnecessarily sterilise development of 38.9 ha of land within the subject property in areas between the mainstream 100 yr ARI flood extent and the PMF extent.

2007 Flood Planning Guideline

The Flood Planning Guideline confirms that unless there are "exceptional circumstances", Councils are to adopt the 100 year ARI flood as the flood planning level (FPL) for residential development, with the exception of some sensitive forms of residential development such as seniors living housing.

Within the South Creek Precinct the difference between the 100 yr ARI flood level and the PMF level is around 1.5 m only. A difference of 1 m to 2 m between the PMF level and the 100 yr ARI flood level is typical of many floodplains throughout Sydney and is not an exceptional circumstance.

The proposed South Creek Precinct boundaries are inconsistent with the 2007 Flood Planning Guideline.



Structure Plan

Western Sydney Aerotropolis

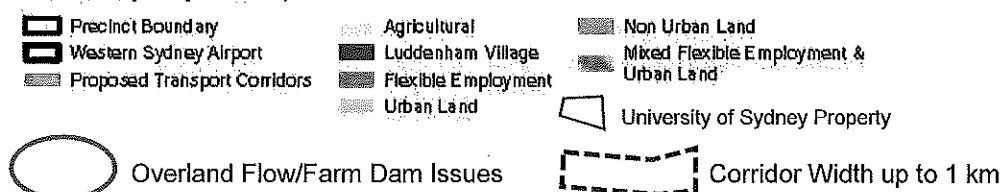


Figure S1 Issues of Concern with South Creek Precinct

Section 117 Directions

Ministerial directions pursuant to Section 117(2) of the EPA Act specify matters which local councils must take into consideration in the preparation of LEPs.

The Direction requires, in part:

- (7) *A planning proposal must not impose flood related development controls above the residential flood planning level for residential development on land, unless a relevant planning authority provides adequate justification for those controls to the satisfaction of the Director-General (or an officer of the Department nominated by the Director-General).*
- (8) *For the purposes of a planning proposal, a relevant planning authority must not determine a flood planning level that is inconsistent with the Floodplain Development Manual 2005 (including the Guideline on Development Controls on Low Flood Risk Areas) unless a relevant planning authority provides adequate justification for the proposed departure from that Manual to the satisfaction of the Director-General (or an officer of the Department nominated by the Director-General).*

No adequate justification for effectively adopting boundaries for the South Creek Precinct which impose a flood planning level which is inconsistent with the Floodplain Development Manual 2005.

Penrith Local Environmental Plan 2010

Clause 7.2 'Flood Planning' in the Penrith LEP2010 applies to all land at or below the flood planning level (100 year average recurrence interval (ARI) event plus 0.5m freeboard). The LEP also includes Flood Planning Land Maps defining the Flood Planning Area (FPA) (refer Figure 3). The South Precinct boundary is inconsistent with the Penrith LEP 2010 Flood Planning Area which is based on the 100 yr ARI flood extent.

Penrith Development Control Plan 2014

Chapter C3 Water Management of the Penrith Development Control Plan (DCP) 2014 outlines the controls on riparian corridors in Chapter 3.3 and flooding constraints on developments in Chapter 3.5

For South Creek, Table 3.3 of the Penrith DCP 2014 identifies a Total Riparian Corridor Width for a third order watercourse of "60m + channel width". In contrast the South Creek Precinct boundaries are up to 1 km apart along a substantial length of South Creek. There is a massive discrepancy between the proposed precinct boundaries and Penrith City Council's requirement for a riparian corridor.

As stated, in part, in Chapter 3.5

The 1% AEP (100 year ARI) flood event is a tool for broadly assessing the suitability of land for development.

15 Rezoning of Land

- a) *Council will not support the rezoning of any land located in a floodway or high hazard area.*

- b) Council will generally not support the rezoning of rural land situated below the 1% AEP (100 year ARI) flood where the development of that land may require or permit the erection of buildings or works even if the surface of the land can be raised to a level above the 1% AEP (100 year ARI) flood by means of filling.*
- c) Where land below the flood planning level is currently zoned to permit urban development, Council will generally not support the rezoning of land to permit a higher economic use or an increase in the density of development.*

It is concluded that within the initial precincts located within the Penrith LGA that Council will not support the rezoning of any land located in a floodway or high hazard area in a 100 yr ARI flood.

It appears that the South Creek Precinct boundaries are based on the PMF extent mapped by Jacobs, 2017 (refer Figure 8) and that the boundary is either at or beyond the PMF extent. This is inconsistent with the provisions of Penrith Development Control Plan 2014 because it prevents development of 38.9 ha of land within the property in areas between the mainstream 100 yr ARI flood extent and the PMF extent.

The Western City District Plan

The Plan, in part, states:

Managing flooding is an important priority for communities across the Western City District. The NSW Government has developed the Floodplain Development Manual 2005 to guide development on areas at risk of flooding. Councils are responsible for managing flood risk in their local government areas and typically impose flood related development controls in areas below the 1 in 100 chance per year flood level.

In the case of the Hawkesbury-Nepean Valley, the significant depths between the one in 100 chance per year flood and the probable maximum flood, mean a risk-based approach that considers the full range of flood sizes is more appropriate. Refer to following summary – Flooding in the Hawkesbury-Nepean Valley

The 2015 design flood profiles for South Creek indicate that this issue is of primary concern downstream (north) of the Great Western Highway. This is broadly the limit of PMF flooding in the Hawkesbury- Nepean River. The issue of concern is that near the confluence of South Creek and the Hawkesbury- Nepean River the difference between the 100 yr ARI flood level and the PMF level is around 9 m. This is not the case in the within the South Creek Precinct which is far above the influence of the Hawkesbury- Nepean River. In the precinct the difference between the PMF level and the 100 yr ARI flood level is only 1 m to 2 m which is typical of many floodplains throughout Sydney.

It is concluded that adopting a precinct boundary based on extreme flooding conditions north of the Great Western Highway is not justified.

Overland Flow Flooding

It appears that the South Creek Precinct boundaries are based on the PMF extent mapped by Jacobs, 2017. No details are given on how the PMF extents were obtained. However it appears that these extents were generated by 2D modelling using a "rainfall on grid" approach and include both mainstream and overland flow flooding extents.

Consequently the Precinct boundaries include areas subject to overland flow flooding (refer Figure 11). There does not appear to be any consistency in inclusion of areas subject to overland flow flooding with some areas included and other areas excluded. No justification is provided for the inclusion of drainage lines subject to overland flow flooding and all such areas should be excluded from consideration when re-mapping the South Creek Precinct boundaries.

Farm Dams

Indicative benchmark criteria for classification of a farm dam as a regional farm dam in the South Creek catchment whose active flood storage may need to be matched by compensatory flood storage in the event the regional farm dam is removed during development are:

- A catchment area greater than 125 ha;
- An area ratio which exceeds 0.05; and
- Active storage which exceeds 50,000 m³.

Based on these indicative benchmark criteria none of the farm dams on the property would be classified as a regional farm dam individually nor as a cascade of dams on several drainage lines. Consequently where the boundary of the South Creek catchment includes farm dams within the subject property then the boundary should be adjusted to remove the farm dams from the precinct eg. adjacent to Elizabeth Drive west of South Creek.

Revegetation of South Creek Floodplain

Substantial areas of the floodplain inundated within the South Creek PMF extents are mapped as "Grassed floodplain and sparse trees". If the vision is to revegetate the corridor to the PMF extent then this revegetation could have a substantial adverse impact (increase) on flood levels in the 1% AEP flood and the PMF. Uniform revegetation across watercourses and the floodplain to "Floodplain with dense trees" has the potential to increase:

- 100 yr ARI flood levels on the subject property by around 0.5 m – 0.9 m depending on location; and
- PMF levels on the subject property by around 0.6 m – 1.2 m depending on location.

These impacts are far in excess of the flood impacts that Penrith City Council and many other Council's would accept for any proposed change in landuse. Penrith City Council and many other Council's do not accept adverse impacts greater than 0.01-0.02 m on any adjoining property arising from a development proposal.

A significant increases in flood levels due to revegetation of the complete floodplain would cause unsafe conditions on Elizabeth Drive and on any other similar roads to be experienced in more frequent floods, pose greater risks to vehicles due to greater flood depths and would be more prolonged than under current conditions.

Recommendation

It is strongly recommended that the boundaries of the South Creek Precinct be redefined because the current boundaries are:

- (i) Inconsistent with the primary objective of the NSW Flood Prone Land Policy and the 2005 Floodplain Development Manual because the current boundaries unnecessarily sterilise development of 38.9 ha of land within the subject property in areas between the mainstream 100 yr ARI flood extent and the PMF extent;
- (ii) Inconsistent with the 2007 Flood Planning Guideline;
- (iii) Inconsistent with the Penrith LEP 2010 Flood Planning Area which is based on the 100 yr ARI flood extent;
- (iv) Inconsistent with the provisions of Penrith Development Control Plan 2014 because it prevents development of 38.9 ha of land within the property in areas between the mainstream 100 yr ARI flood extent and the PMF extent;
- (v) Based on extreme flooding conditions north of the Great Western Highway is not justified within the initial precincts;
- (vi) Inconsistent in its inclusion and exclusion of areas subject to overland flow flooding. There does not appear to be any consistency in inclusion of areas subject to overland flow flooding with some areas included and other areas excluded. All such areas should be excluded from consideration when re-mapping the South Creek Precinct boundaries;
- (vii) Inappropriately includes farm dams which should be removed from the precinct eg. adjacent to Elizabeth Drive west of South Creek;
- (viii) Uniform revegetation of the watercourses and the floodplain within the South Creek Precinct has the potential to adversely increase 100 yr ARI flood levels and PMF levels by up to 1 m or more depending on location; and because
- (ix) Significant increases in flood levels due to revegetation of the complete floodplain would cause unsafe conditions on Elizabeth Drive and on any other similar roads to be experienced in more frequent floods, pose greater risks to vehicles due to greater flood depths and would be more prolonged than under current conditions.

1. BACKGROUND

The University of Sydney owns a significant landholding in Badgerys Creek known as 1793-1951 Elizabeth Drive, Badgerys Creek and 885a Mamre Road, Kemps Creek (refer **Figure 1**). The property comprises 343 hectares and is located wholly within the Penrith Local Government Area. The property is currently being used by the University to support the teaching and research facilities of the Faculty of Veterinary Science and is largely cleared and commercially unviable agricultural land.

Consistent with the long-term strategic plan for the property (which forms part of the Western Sydney Aerotropolis (formerly the Western Sydney Airport Growth Area) under the Western City District Plan), the University is seeking to rezone the property so that the land uses are better-able to support the nearby Badgerys Creek Airport.

The property also forms part of the preferred corridor for the proposed M12 Motorway.

In August 2018 the Department of Planning and Environment released the Western Sydney Aerotropolis Land Use and Infrastructure Implementation Plan (LUIIP) – Stage 1 Initial Precincts which applies to the land comprising the Aerotropolis (including the property).

The LUIIP:

- identifies a first-stage Structure Plan (3 precincts) with the balance of 6 precincts to form part of Stage 2;
- states how the initial precincts will be delivered and the desired uses for each precinct;
- describes how the Aerotropolis' precincts will be planned to integrate with designated growth areas and the delivery of infrastructure;
- identifies the South Creek Precinct;
- identifies key policy drivers (for example, aircraft noise and aviation safety) that will influence where appropriate development will be delivered within the precincts; and
- a flexible and adaptive planning framework through a new SEPP which will identify three key zones (infrastructure, environment and urban development zones).

Figure 2 shows the relevant precincts that are proposed to apply to the property. They include the accelerated precincts of the Northern Gateway and South Creek, as well as the Stage 2 precincts of Badgerys Creek and Kemps Creek.

The South Creek Precinct is described by the LUIIP, 2018, in part, as follows.

The South Creek precinct is the central green spine of the Aerotropolis. It represents the central structural element to the Aerotropolis's connected open space network and the broader Western Parkland City. It will provide an important interface to surrounding development, providing open space, amenity, biodiversity and wellbeing values.

.....

The South Creek precinct and its broader catchment represents an opportunity to change the way waterways are planned for and managed in greenfield areas. Planning for the Aerotropolis will embrace natural systems as valuable assets, rather than constraints.

Rehabilitation of South Creek and its associated waterways will include replanting of appropriate vegetation to provide canopy cover, as well as the creation of permanent water bodies with the potential to provide a network within the South Creek corridor. This will contribute to urban cooling and encourage the residents to use and enjoy riparian lands.

Of particular concern is the proposed extent of the South Creek Precinct and the adverse impacts on the development of the subject property.

2. PLANNING CONTEXT

There are various planning instruments and development controls that are applicable to development located in the Penrith Local Government Area (LGA). These were identified by Jacobs, 2016¹, in part, as follows.

¹ Jacobs (2016) "Appendix H Flooding Analysis", Western Sydney Airport Gateway, Badgerys Creek: Planning Proposal Submission, prepared for the University of Sydney by Jacobs Group (Australia) Pty Ltd, Revision 5, 21 October 2016.

2.1 Penrith Local Environmental Plan 2010

The first stage of the Penrith Local Environmental Plan 2010 was published in 2010 and applied to Penrith's rural and industrial areas and St Marys Town Centre. The second stage of the Penrith LEP was published on 28 January 2015 and came into effect on 25 February 2015 to set planning controls for much of the areas not covered by Stage 1 of Penrith Local Environmental Plan 2010, including the City's residential and commercial areas.

The Penrith Local Environmental Plan (LEP) zones the land within the Penrith LGA and imposes standards to control development, or implements a state or local policy outcome. Clause 7.2 'Flood Planning' in the Penrith LEP provides the details of items which the consent authority must satisfy themselves of before providing development consent. The clause applies to all land at or below the flood planning level (100 year average recurrence interval (ARI) event plus 0.5m freeboard). The LEP aims to ensure that the development:

- *Is compatible with the flood hazard of the land*
- *Is not likely to adversely affect flood behaviour, flow distributions or velocities resulting in detrimental increases in the potential flood affectation of other development or properties or the environment (including stability of waterways and riparian vegetation)*
- *Is not likely to adversely affect the safe and effective evacuation of the land and the surrounding area*
- *Is not likely to result in unsustainable social and economic costs to the community as a consequence of flooding*
- *Manages the risk to life from flood*

The LEP also includes Flood Planning Land Maps defining the Flood Planning Area (FPA) (refer **Figure 3**). It appears that these maps have been prepared based on the 'Flood Study Report South Creek' (NSW Department of Water Resources, 1990) and/or 'South Creek Floodplain Management Study' (Willing & Partners, 1991).

2.2 Penrith Development Control Plan 2014

Chapter C3 Water Management of the Penrith Development Control Plan (DCP) 2014 outlines the controls on riparian corridors in Chapter 3.3 and flooding constraints on developments in Chapter 3.5.

Chapter 3.3 states in part:

Council reserves the right to assess each riparian corridor and each development on its merits. In general, however, the width will depend on the order of the stream/watercourse (see Figure C3.2) which provides an indication. The width should be measured from the top of the highest bank on both sides of the stream/watercourse, excluding any managed buffer zone, and shall comply with the requirements outlined in Table C3.3.

For South Creek, Table 3.3 identifies a Total Riparian Corridor Width for a third order watercourse of "60m + channel width".

As stated in Chapter 3.5:

The LEP contains provisions for development on land at or below the flood planning level, defined in the LEP as the level of a 1:100 Average Recurrence Interval (ARI) (1% AEP (100 year ARI)) flood event plus 0.5m freeboard.

The 1% AEP (100 year ARI) flood event is a tool for broadly assessing the suitability of land for development. It is not an assessment of flood risk, nor does reference to the 1% AEP (100 year ARI) flood event mean that properties and development above this level are not subject to flood risk.

....

Significant areas of Penrith are affected by the Probable Maximum Flood (PMF) and in some cases this will need to be considered in determining flood hazard.

....

13 Overland Flow Flooding

- a) *Council has undertaken a Penrith Overland Flow Flood 'Overview' Study. Consideration must be given to the impact on any overland flow path. Generally, Council will not support development obstructing overland flow paths. Development is required to demonstrate that any overland flow is maintained for the 1% AEP (100 year ARI) overland flow. A merit based approach will be taken when assessing development applications that affect the overland flow.*
- b) *Council's Stormwater Drainage Specification for Building Developments provides information on the details required in the preparation of an overland flow study.*

15 Rezoning of Land

- c) *Council will not support the rezoning of any land located in a floodway or high hazard area.*
- d) *Council will generally not support the rezoning of rural land situated below the 1% AEP (100 year ARI) flood where the development of that land may require or permit the erection of buildings or works even if the surface of the land can be raised to a level above the 1% AEP (100 year ARI) flood by means of filling.*
- c) *Where land below the flood planning level is currently zoned to permit urban development, Council will generally not support the rezoning of land to permit a higher economic use or an increase in the density of development.*

2.3 NSW Flood Risk Management Framework

As described by Jacobs, 2016:

NSW FRM Policy and Guidelines

The NSW Flood Prone Land Policy as produced within Section 1.1 of the Floodplain Development Manual² (FDM 2005) is consistent with that first introduced in 1984, which places the primary responsibility for implementation on local councils. Penrith City Council has adopted the principles and recommendations in the 2005 FDM and applied them to the plans and policies they have implemented.

² NSW Government (2005). *Floodplain Development Manual, The management of flood liable land*, April, 29 pp + Apps

The primary objective of the NSW Flood Prone Land Policy recognises the following two important facts:

- flood prone land is a valuable resource that should not be sterilised by unnecessarily precluding its development; and
- if all development applications and proposals for rezoning of flood prone land are assessed according to rigid and prescriptive criteria, some appropriate proposals may be unreasonably disallowed or restricted, and equally, quite inappropriate proposals may be approved.

The primary objective is as follows:

"To reduce the impact of flooding and flood liability on 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 study for South Creek was completed in 2015 and Penrith City Council is currently preparing the South Creek Floodplain Risk Management Study and Plan.

2007 Flood Planning Guideline

On January 31, 2007 the NSW Planning Minister announced a new guideline for development control on floodplains (the "Flood Planning Guideline"). An overview of the new Guideline and associated changes to the Environmental Planning and Assessment Act, 1979 (EPA Act) and Environmental Planning and Assessment Regulation 2000 (Regulation) was issued by the Department of Planning in a Circular dated January 31, 2007 (Reference PS 07-003). The Flood Planning Guideline issued by the Minister in effect relates to a package of directions and changes to the EPA Act, Regulation and the FDM.

This Flood Planning Guideline provides an amendment to the Manual. The Guideline confirms that unless there are "exceptional circumstances", Councils are to adopt the 100 year ARI flood as the flood planning level (FPL) for residential development, with the exception of some sensitive forms of residential development such as seniors living housing. The Guideline does provide that controls on residential development above the 100 year ARI flood may be imposed subject to an "exceptional circumstance" justification being agreed to by the Department of Natural Resources (now the Office of Environment and Heritage - OEH) and the Department of Planning (now the Department of Planning and Environment - DE) prior to the exhibition of a Draft LEP or Draft DCP.

The "Guideline on Development Controls on Low Flood Risk Areas – Floodplain Development Manual" defines Standards for Flood Controls for Residential Development. Whilst the flood used to define the residential FPL is a decision of Council, FDM highlights that FPLs for typical residential development would generally be based on the 100 year ARI flood plus an appropriate freeboard (typically 0.5m). Penrith City Council has adopted these recommendations provided in the guideline.

State Environmental Planning Policies

A State Environmental Planning Policy (SEPP) is a planning document prepared in accordance with the EPA Act by the NSW Department of Planning and Environment and eventually approved by the Minister, which deals with matters of significance for environmental planning for the State. Clause 1.19 of the Codes SEPP has been amended so that land identified as 'flood control lot' is no longer excluded from the application of the General Housing Code.

Instead, specified development and development standards have been added to the General Housing Code for development on low hazard flood control lots. The development standards have been designed to ensure that complying development is not allowed on high hazard or high risk flood control lots including floodways, flood storage areas, a flowpath or areas identified in local flood plans as high hazard or high risk.

Section 117 Directions

Ministerial directions pursuant to Section 117(2) of the EPA Act specify matters which local councils must take into consideration in the preparation of LEPs. Direction 4.3, as currently applies, deals specifically with flood [liable] prone land and has the following two objectives:

- "(a) To ensure that the development of flood prone land is consistent with the NSW Government's Flood Prone Land Policy and the principles of the Floodplain Development Manual, 2005.*
- (b) To ensure that the provisions of an LEP on flood prone land is commensurate with flood hazard and includes consideration of the potential flood impacts both on and off the subject land".*

The Direction applies to all councils that contain flood prone land when an LEP proposes to "create, remove or alter a zone or provision that affects flood prone land." In such cases, the Direction requires draft LEPs to ensure the following:

- (4) A planning proposal must include provisions that give effect to and are consistent with the NSW Flood Prone Land Policy and the principles of the Floodplain Development Manual 2005 (including the Guideline on Development Controls on Low Flood Risk Areas).*
- (5) A planning proposal must not rezone land within the flood planning areas from Special Use, Special Purpose, Recreation, Rural or Environmental Protection Zones to a Residential, Business, Industrial, Special Use or Special Purpose Zone.*
- (6) A planning proposal must not contain provisions that apply to the flood planning areas which:
 - a. permit development in floodway areas,*
 - b. permit development that will result in significant flood impacts to other properties,*
 - c. permit a significant increase in the development of that land,*
 - d. are likely to result in a substantially increased requirement for government spending on flood mitigation measures, infrastructure or services, or*
 - e. permit development to be carried out without development consent except for the purposes of agriculture (not including dams, drainage canals, levees, buildings or structures in floodways or high hazard areas), roads or exempt development.**
- (7) A planning proposal must not impose flood related development controls above the residential flood planning level for residential development on land, unless a relevant planning authority provides adequate justification for those controls to the satisfaction of the Director-General (or an officer of the Department nominated by the Director-General).*

- (8) For the purposes of a planning proposal, a relevant planning authority must not determine a flood planning level that is inconsistent with the Floodplain Development Manual 2005 (including the Guideline on Development Controls on Low Flood Risk Areas) unless a relevant planning authority provides adequate justification for the proposed departure from that Manual to the satisfaction of the Director-General (or an officer of the Department nominated by the Director-General).*

3. FLOODING IN THE SOUTH CREEK CATCHMENT

3.1 2006 Penrith Overland Flow Flood "Overview Study

In 2006 a study was undertaken to generate sufficient information to define flood risk and prioritise flood risk management across the Penrith LGA³. The results from this study provide Council with a sound basis upon which to undertake a program of more detailed overland flood studies. This will ultimately lead to a complete Floodplain Risk Management Plan for the LGA.

The study area covers the LGA and was divided into the following three zones:

- Zone 1 – 'Central Urban'
- Zone 2 – 'Northern Rural'
- Zone 3 – 'Southern Rural'.

The majority of the population resides within Zone 1, which also includes the Penrith CBD.

The primary objectives of the study were to:

- Identify, validate and map all major overland flow paths within the Study Area;
- Identify and map sub catchments for all catchments within the Study Area;
- Identify properties at risk of major overland flooding;
- Define local flood behaviour in the Study Area by producing information on flows, flood levels, depth of flows and velocities for the 20 year, 100 year ARI and the PMF events under existing catchment conditions;
- Assess provisional flood hazard for properties at risk from flooding for the 20 year and 100 year ARI events and the PMF; and
- Rank the nominated sub-catchment areas in terms of severity of flooding for further investigations. Council may also consider landuse, known flood affected areas and cost of potential mitigation works when prioritising the sub-catchments.

The above objectives were achieved through detailed hydrological/hydraulic modelling of the entire LGA described in the report. It is to be noted that ranking of the sub-catchments for further investigation was the main objective of the study and the majority of the other objectives were achieved through the process of establishing the sub-catchment rankings.

³ Cardno Lawson Treloar (2006) "Penrith Overland Flow Flood "Overview Study", Report J2453/R2251, Version 4, prepared for Penrith City Council, August.

The mapped extents of overland flow flooding in the vicinity of the property are given in **Figure 4**. Note the property boundaries are indicative only. It will be noted that the 100 yr ARI flood extent (mainstream flooding) was excluded from the study.

3.2 2015 Updated South Creek Flood Study

The Updated South Creek Flood Study was prepared by Worley Parsons Services on behalf of Penrith City Council, acting in association with Liverpool, Blacktown and Fairfield City Councils.

As described by Worley Parsons, 2015:

This flood study covers the South Creek catchment extending from Bringelly Road in the south to the Blacktown/Richmond Road Bridge crossing in the north. The total study area is about 240 km² and lies within the Hawkesbury, Penrith, Blacktown, Liverpool and Fairfield LGAs.

The hydrologic modelling for this study is based on the previous RAFTS (Runoff Analysis and Flow Training Simulation) hydrologic modelling (Version 2.56, 1991) that was developed by the Department of Water Resources for the 'South Creek Flood Study' (1990). As part of this study, the RAFTS model of the South Creek catchment has been updated to Version 6.52 (2005) XPRAFTS.

As part of the current study, the sub-catchment delineation and break-up was compared against the latest topographic data available for the study area to determine whether the sub-catchment boundaries required adjustments. Some further refinement of subcatchments was undertaken in order to improve the inter-relationship between the XPRAFTS model and the RMA-2 hydraulic flood model. This improved the interconnectivity between the hydrologic and hydraulic models and made possible the creation of additional localised inflows within the RMA-2 model.

The adopted roughness parameters for each sub-catchment were also reviewed against aerial photography in order to determine any changes in vegetation and/or floodplain development that may have occurred since 1990.

Intensity-Frequency-Duration (IFD) data was developed for the study catchment according to the standard procedures outlined in Chapter 2 of 'Australian Rainfall & Runoff – A Guide to Flood Estimation' (1987). Due to the significant spatial extent of the study area, across which numerous local catchments and tributaries apply, a total of nine (9) different IFDs were adopted.

As no definitive loss rate data is available for the catchment of South Creek and its tributaries, the adopted rainfall loss rates were based on data contained in the 1990 Flood Study. ...

The validation of the updated XP-RAFTS model was based on a comparison between the peak discharge and hydrograph shape produced by the RAFTS model developed for the 1990 Flood Study and the results of the latest XP-RAFTS model.

In order to undertake validation of the model, the updated XP-RAFTS model was used to simulate the 100 year ARI storm with a critical storm duration of 36 hours.

Since completion of the 1990 Flood Study, there have been many changes occur across the South Creek catchment. These changes include the implementation of a number of measures recommended in the South Creek Floodplain Management Study, including works upstream of Elizabeth Drive, at Overett Avenue, and at South St Marys. Major development of the ADI site at St Marys and small areas on the fringe of Erskine Park has also occurred. Changes have also occurred to areas of the floodplain including the construction of levees and earthworks that have the potential to alter flooding patterns.

Accordingly, a two-dimensional hydrodynamic model of the South Creek system has been developed using the RMA-2 software package. The model is based on the latest topographic data for the catchment, which was derived from Light Detection and Ranging (LiDAR) data that was gathered for the entire South Creek floodplain between 2002 and 2006. ...

.... The computer models identified in Sections 4 and 5 were used to derive design flood estimates for the 20, 50, 100, 200 and 500 year recurrence floods as well as an Extreme Flood.

The calculated 1% AEP flood depths and velocities in the vicinity of the property are plotted in **Figures 5**.

The 1% AEP hydraulic categories mapped in the 2015 study in the vicinity of the property are plotted in **Figure 6**.

The calculated 1% AEP flood extent and the PMF extent in the vicinity of the property are plotted in **Figure 7**.

3.3 2017 Jacobs Flooding Assessment

The Western Sydney Aerotropolis Land Use and Infrastructure Implementation Plan (LUIIP) – Stage 1 Initial Precincts include a plot of PMF extents generated by Jacobs in 2017. No details are given on how the PMF extents were obtained. However it appears that these extents were generated by 2D modelling using a “rainfall on grid” approach and include both mainstream and overland flow flooding extents.

The Jacobs, 2017 is not in the public domain and the DPE has advised that the flooding assessment will not be made available at this time.

The mapped PMF extents are given in **Figure 8**.

3.4 Regional Farm Dams

As outlined in a Discussion Paper on the flooding impact of regional farm dams in the upper South Creek catchment dated 12 September 2016⁴, a feature of the upper South Creek catchment upstream of Bringelly Road is the current operation of seven regional farms dams which have an impact of the flooding experienced on the upper South Creek floodplain.

These seven regional dams are identified in **Figure 9** and the properties of these dams are given in **Table 1**. The Area Ratio is the Dam Surface Area divided by the Catchment Area

⁴ Cardno (NSW/ACT). 2016 “Discussion Paper on Flooding Impact of Regional Farm Dams in the Upper South Creek Catchment”, *Internal Report*, prepared for Camden Council, September, 26 pp + Attachments.

Table 1 Properties of Regional Farm dams in the upper South Creek catchment

Dam	Catchment Area (ha)	Dam Surface Area (ha)	Airspace used in 1% AEP Flood (m3)	Area Ratio
A	209	18.06	216,720	0.086
B	376	19.42	213,620	0.052
C	87	35.36	388,960	0.139
D	76	17.46	192,060	0.096
E	461	34.17	410,040	0.074
F	125	6.07	78,897	0.049
G	181	6.16	43,134	0.034

Notes: Outflow from Dam E flows into Dam D
 Outflow from Dam D flows into Dam C
 Active Storage based on Farm Dams at Full Supply Level at start of 1% AEP flood
 Area ratio for Dams D and C based on cumulative areas

The objective of the 2016 study was to assess the impact of regional farm dams in the upper South Creek catchment and to inform Camden Council and DPE of the amount of active storage in regional farm dams which should be retained to achieve minimal adverse impact on flood events up to the 1% AEP event at the boundary between the Camden and Liverpool LGAs (ie. downstream of Bringelly Road).

Hydrological and hydraulic modelling was undertaken.

Several of the key findings of the hydrological and hydraulic assessment included, in part:

- If farm Dams A and G only are removed then the impact on 1% AEP flood level upstream of Bringelly Road is minor (0.03 m) while the impact on the 1% AEP flood level downstream of Bringelly Road is negligible.
- Consideration could be given to removing farm Dams A, C, D and G if the minor impacts on 1% AEP flood levels are deemed acceptable.
- The estimated 1% AEP flood levels downstream of Bringelly Road were all lower than the 1% AEP flood levels estimated by Worley Parsons, 2015 under all scenarios which were assessed.

Based on these findings the indicative benchmark criteria for classification of a farm dam as a regional farm dam whose active flood storage may need to be matched by compensatory flood storage in the event the regional farm dam is removed during development are:

- A catchment area greater than 125 ha;
- An area ratio which exceeds 0.05; and
- Active storage which exceeds 50,000 m³.

Based on these indicative benchmark criteria none of the farm dams on the property would be classified as a regional farm dam individually nor as a cascade of dams on several drainage lines.

3.5 Severity of the PMF in the South Creek Catchment

In the 2016 edition of Australian Rainfall & Runoff guidance is provided on "Assigning an Annual Exceedance Probability to the Probable Maximum Precipitation" in Chapter 3 Estimation of Very Rare to Extreme Rainfalls of Book 8 Very to Extreme Flood Estimation. Figure 8.3.2 is reproduced as follows.

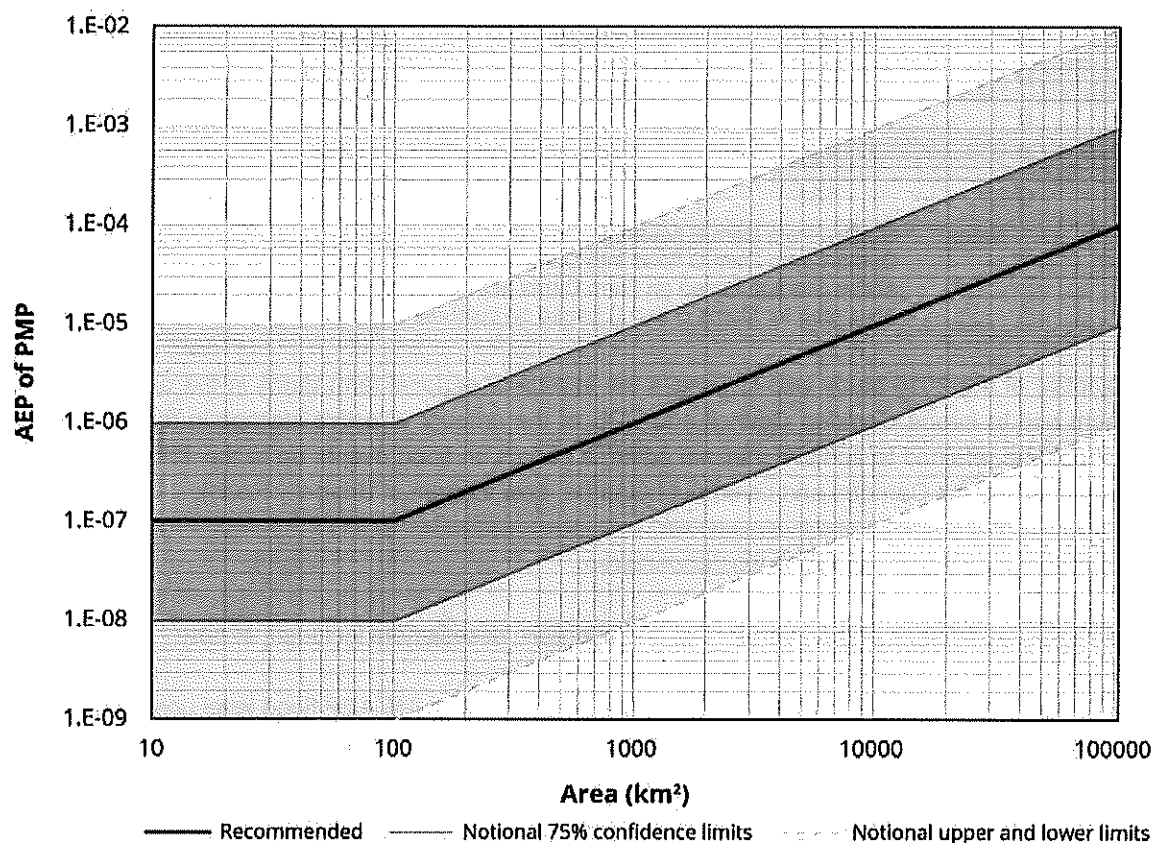


Figure 8.3.2. Recommended Regional Estimates for the AEP of PMP

(Source: Commonwealth of Australia (Geoscience Australia) 2016)

Based on the catchment areas of the Hawkesbury-Nepean River, South Creek and Cosgroves Creek (a representative tributary of South Creek). Table 2 lists the AEPs which would be assigned to PMFs resulting from the Probable Maximum Precipitation for these three watercourses.

Table 2 AEP of PMP at a range of Catchment Scales

Catchment	Catchment Area	Recommended AEP of Probable Maximum Precipitation		PMP Critical Duration
	(km²)		1 in Y (rounded)	(hrs)
Hawkesbury-Nepean River	22,500	2.2E-05	44,400	
South Creek	414	4.14E-07	2,415,000	6
Cosgroves Creek	21.4	1.0E-07	10,000,000	3

4. THE WESTERN CITY DISTRICT PLAN

As stated in the Western City District Plan:

The Western City District covers the Blue Mountains, Camden, Campbelltown, Fairfield, Hawkesbury, Liverpool, Penrith and Wollondilly local government areas.

The Western City District Plan is a 20-year plan to manage growth in the context of economic, social and environmental matters to achieve the 40-year vision for Greater Sydney. It is a guide for implementing the Greater Sydney Region Plan.

A Metropolis of Three Cities, at a district level and is a bridge between regional and local planning.

The District Plan informs local strategic planning statements and local environmental plans, the assessment of planning proposals as well as community strategic plans and policies. The District Plan also assists councils to plan for and support growth and change, and align their local planning strategies to place-based outcomes. It guides the decisions of State agencies and informs the private sector and the wider community of approaches to manage growth and change. Community engagement on the District Plan has contributed to a plan for growth that reflects local values and aspirations, in a way that balances regional and local considerations.

....

This District Plan has been prepared in accordance with section 3.4 of the Environmental Planning and Assessment Act 1979 which requires it to include or identify: the basis for strategic planning in the district, having regard to economic, social and environmental matters; Planning Priorities that are consistent with the relevant Objectives, Strategies and Actions in the Region Plan; Actions for achieving those Planning Priorities; and an outline of the basis on which the implementation of those Actions will be monitored and reported.

The Plan sets out a series of Planning Priorities including Sustainability Planning Priorities. This includes **Planning Priority W20**. Adapting to the impacts of urban and natural hazards and climate change (pages 135 – 139 of the Plan)

The objectives of Planning Priority W20 are stated as follows (page 135):

Objective 36

People and places adapt to climate change and future shocks and stresses.

Objective 37

Exposure to natural and urban hazards is reduced.

Objective 38

Heatwaves and extreme heat are managed.

The District's climate and natural landscape can create natural hazards such as heatwaves, bushfire, flooding and storms. Climate change will exacerbate these natural hazards, leading to higher temperatures and changes in rainfall, with consequent flooding. While planning for resilience has traditionally focused on responses to natural hazards and climate change, it is increasingly being used to consider a wider range of social and economic shocks and stresses.

Effective planning can reduce the exposure to natural and urban hazards and build resilience to shocks and stresses. Planning for population growth and change needs to consider exposure at a local level as well as cumulative impacts at district and regional levels.

Page 137 of the Plan in part states:

Managing flooding is an important priority for communities across the Western City District. The NSW Government has developed the Floodplain Development Manual 2005 to guide development on areas at risk of flooding. Councils are responsible for managing flood risk in their local government areas and typically impose flood related development controls in areas below the 1 in 100 chance per year flood level.

In the case of the Hawkesbury-Nepean Valley, the significant depths between the one in 100 chance per year flood and the probable maximum flood, mean a risk-based approach that considers the full range of flood sizes is more appropriate. Refer to following summary – Flooding in the Hawkesbury-Nepean Valley

The 2015 design flood profiles given in **Attachment A** indicate that this issue is of primary concern downstream (north) of the Great Western Highway. This is broadly the limit of PMF flooding in the Hawkesbury- Nepean River. The issue of concern is that near the confluence of South Creek and the Hawkesbury- Nepean River the difference between the 100 yr ARI flood level and the PMF level is around 9 m. This is not the case in the vicinity of Elizabeth Drive which is far above the influence of the Hawkesbury- Nepean River. In this location the difference between the 100 yr ARI flood level and the PMF level is around 1.5 m only. A difference of 1 m to 2 m between the PMF level and the 100 yr ARI flood level is typical of many floodplains throughout Sydney. Therefore it would appear difficult to justify controls which seek to respond to conditions north of the Great Western Highway to the upper reaches of tributary catchments where flooding is controlled by upstream runoff only.

Comments on the application of the planning principles (which target primarily the floodplain subject to the influence of the Hawkesbury- Nepean River) to the property are as follows:

While this work is underway, the following planning principles will be applied to both local strategic planning and development decisions:

avoiding intensification and new urban development on land below the current 1 in 100 chance per year flood event (1 per cent annual exceedance probability flood event)

This principle envisages urban development to the 100 yr ARI flood extent.

applying flood related development controls on land between the 1 in 100 chance per year flood level and the PMF level

This principle envisages urban development can be undertaken between the 100 yr ARI flood extent and the PMF extent subject to development controls.

providing for less intensive development or avoiding certain urban uses in areas of higher risk and allowing more intensive development in areas of lower flood risk, subject to an assessment of the cumulative impact of urban growth on regional evacuation road capacity and operational complexity of emergency management

The zone between the 100 yr ARI flood extent and the PMF extent would be viewed as low risk in this location.

balancing desired development outcomes in strategic centres with appropriate flood risk management outcomes

The aim of any Flood Impact Assessment is to limit the impacts of planned development on adjoining properties.

avoiding alterations to flood storage capacity of the floodplain and flood behaviour through filling and excavation ('cut and fill') or other earthworks

The aim of any Flood Impact Assessment is to assess the impact of proposed cut and fill and to limit the impacts of planned development on adjoining properties.

applying more flood-compatible building techniques and subdivision design for greater resilience to flooding.

Depending on the proposed platform levels of any proposed development, it is expected that any development will be above the 100 yr ARI flood levels and in parts above the PMF level and will deliver resilience to flooding. Flood-compatible building techniques are more relevant to buildings located within the area of flooding from the Hawkesbury- Nepean River where building could be completely inundated in an extreme flood.

5. DEFINING THE SOUTH CREEK PRECINCT

As stated in the Western Sydney Aerotropolis LUIIP (page 38):

This Plan and the *Western City District Plan* embrace the natural systems of the South Creek catchment as valuable assets rather than constraints.

It appears that the approach formulated in the Western City District Plan, which was based on concerns regarding flooding in the Hawkesbury-Nepean River, has been applied to the upper reaches of the South Creek catchment without any consideration of the AEP of the PMP. Near the confluence of South Creek and the Hawkesbury- Nepean River the difference between the 100 yr ARI flood level and the PMF level is around 9 m. This is not the case in the vicinity of Elizabeth Drive which is far above the influence of the Hawkesbury- Nepean River. In this location the difference between the 100 yr ARI flood level and the PMF level is around 1.5 m only.

It further appears that the South Creek Precinct boundaries are based on the PMF extent mapped by Jacobs, 2017 (refer Figure 8) and that the boundary is either at or beyond the PMF extent. It is also noted that the precinct boundary appears to reflect mainstream flooding and overland flow flooding and that the boundaries are up to 1 km apart along a substantial length of South Creek.

The 2012 Hawkesbury Floodplain Risk Management Study and Plan proposed the following flood risk categories:

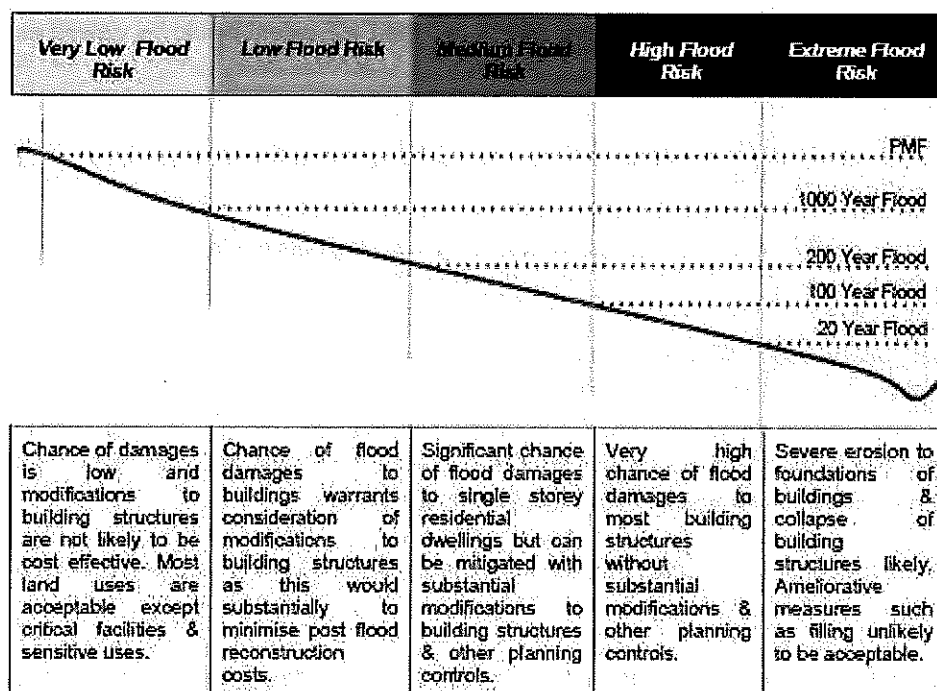


FIGURE 3.2 – Flood Risk Categories used for Development Control Purposes

These risk categories, which have not been widely adopted to date, offer a further alternative way of defining the South Creek Precinct boundary.

Discussion

As indicated in the table above the AEP of the PMP and the resulting PMF for the Hawkesbury-Nepean River catchment is around 1 in 44,400. However in the case of the South Creek catchment the AEP of the PMP and the resulting PMF is 1 in 2,415,000.

If the probability of flooding inherent in the approach adopted in the Western City District Plan is applied to the South Creek Precinct boundary, namely the boundary is based on a 1 in 44,400 flood in South Creek then it is broadly estimated that only 60% of the land between the 100 yr ARI and PMF extents would fall within the precinct boundary.

Alternatively if the precinct encompassed only the Extreme, High, Medium and Low Flood Risk zones (ie. the 1,000 yr ARI flood extent as defined by the 2012 Hawkesbury Floodplain Risk Management Study and Plan) then it is broadly estimated that only 25% of the land between the 100 yr ARI and PMF extents would fall within the precinct boundary.

Alternatively if the precinct encompassed only the Extreme, High and Medium Flood Risk zones (ie. the 200 yr ARI flood extent as defined by the 2012 Hawkesbury Floodplain Risk Management Study and Plan) then it is broadly estimated that only 7% of the land between the 100 yr ARI and PMF extents would fall within the precinct boundary.

6. POTENTIAL IMPACT OF REVEGETATION OF THE SOUTH CREEK PRECINCT

An indicative assessment of the potential impact of complete revegetation the South Creek and Kemps Creek floodplain within the PMF extent has been undertaken.

Figure 9 provides an overlay of the property boundary and indicative PMF flood extents over a map of the roughness zones adopted for flood modelling purposes in the 2015 study. It will be noted that substantial areas of the floodplain inundated within the PMF extents are mapped as "Grassed floodplain and sparse trees" ($n = 0.05$). If the vision is to revegetate the corridor to the PMF extent then this revegetation could have a substantial adverse impact (increase) on flood levels in the 1% AEP flood and the PMF.

Six reference locations on South Creek and its floodplain within the property boundary are also identified in **Figure 9**.

The two scenarios were assessed:

- | | |
|-------------------------|---|
| Revegetation Scenario 1 | Uniform revegetation across watercourses and the floodplain to "Floodplain with moderately dense trees" ($n = 0.1$) |
| Revegetation Scenario 2 | Uniform revegetation across watercourses and the floodplain to "Floodplain with dense trees" ($n = 0.12$) |

The results of the indicative assessment are given in **Table 3**.

It is concluded that under Revegetation Scenario 1 the:

- 1% AEP flood levels are increased on the property by around 0.2 m – 0.45 m depending on location; and
- PMF levels on the property are increased by around 0.3 m – 0.6 m depending on location

It is concluded that under Revegetation Scenario 2 the:

- 1% AEP flood levels are increased on the property by around 0.5 m – 0.9 m depending on location; and
- PMF levels on the property are increased by around 0.6 m – 1.2 m depending on location.

These impacts are far in excess of the flood impacts that Penrith City Council and many other Council's would accept for any proposed change in landuse. Penrith City Council and many other Council's do not accept adverse impacts greater than 0.01-0.02 m on any adjoining property arising from a development proposal.

A significant increases in flood levels due to revegetation of the complete floodplain would cause unsafe conditions on Elizabeth Drive and on any other similar roads to be experienced in more frequent floods, pose greater risks to vehicles due to greater flood depths and would be more prolonged than under current conditions.

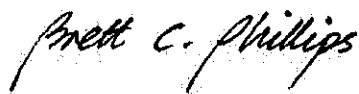
Table 3 Flood Level Differences resulting from Revegetation of the PMF Extent

1% AEP Flood					
Reference Location	Current Vegetation (m AHD)	Revegetated Scenario 1 (m AHD)	Flood Level Difference (m)	Revegetated Scenario 2 (m AHD)	Flood Level Difference (m)
	a	b	b-a	c	c-a
P1	37.88	38.10	0.22	38.19	0.31
P2	37.92	38.20	0.27	38.30	0.38
P3	38.40	38.81	0.41	38.94	0.54
P4	39.05	39.46	0.41	39.61	0.55
P5	37.76	38.14	0.38	38.27	0.51
P6	38.62	39.07	0.45	39.23	0.60
Min			0.22		0.31
Max			0.45		0.60

Probable Maximum Flood (PMF)					
Reference Location	Current Vegetation (m AHD)	Revegetated Scenario 1 (m AHD)	Flood Level Difference (m)	Revegetated Scenario 2 (m AHD)	Flood Level Difference (m)
	a	b	b-a	c	c-a
P1	39.10	39.66	0.56	39.88	0.78
P2	39.11	39.71	0.60	39.94	0.83
P3	39.57	40.31	0.74	40.55	0.98
P4	40.26	41.13	0.87	41.38	1.13
P5	39.07	39.68	0.61	39.90	0.84
P6	39.85	40.36	0.51	40.52	0.67
Min			0.51		0.67
Max			0.87		1.13

We would be pleased to further discuss our findings with you upon your request.

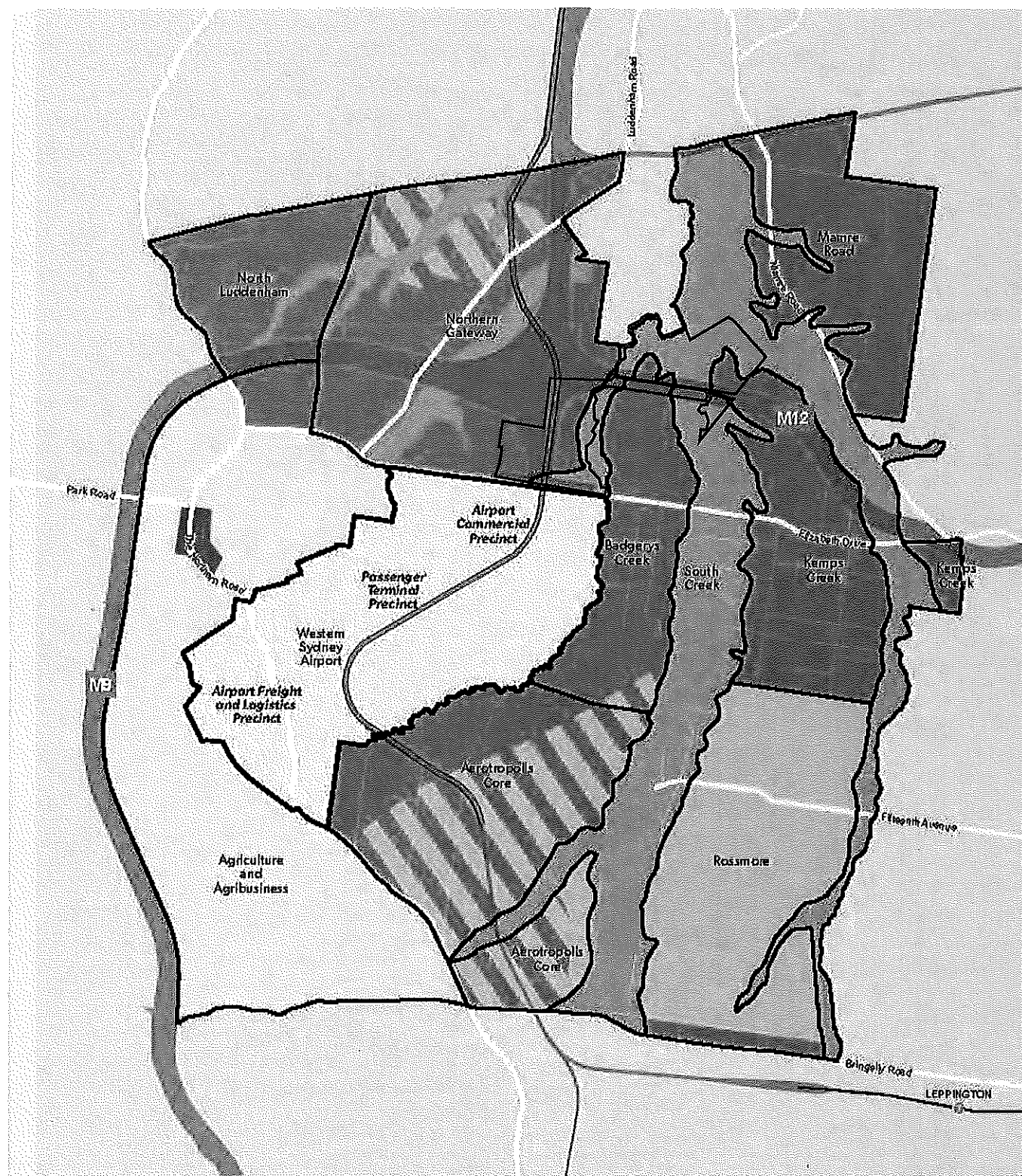
Yours faithfully



.....
 Dr Brett C. Phillips
 Director, Water Engineering
 for Cardno



Figure 1 Location of 1793-1951 Elizabeth Drive, Badgerys Creek and 885a Mamre Road, Kemps Creek



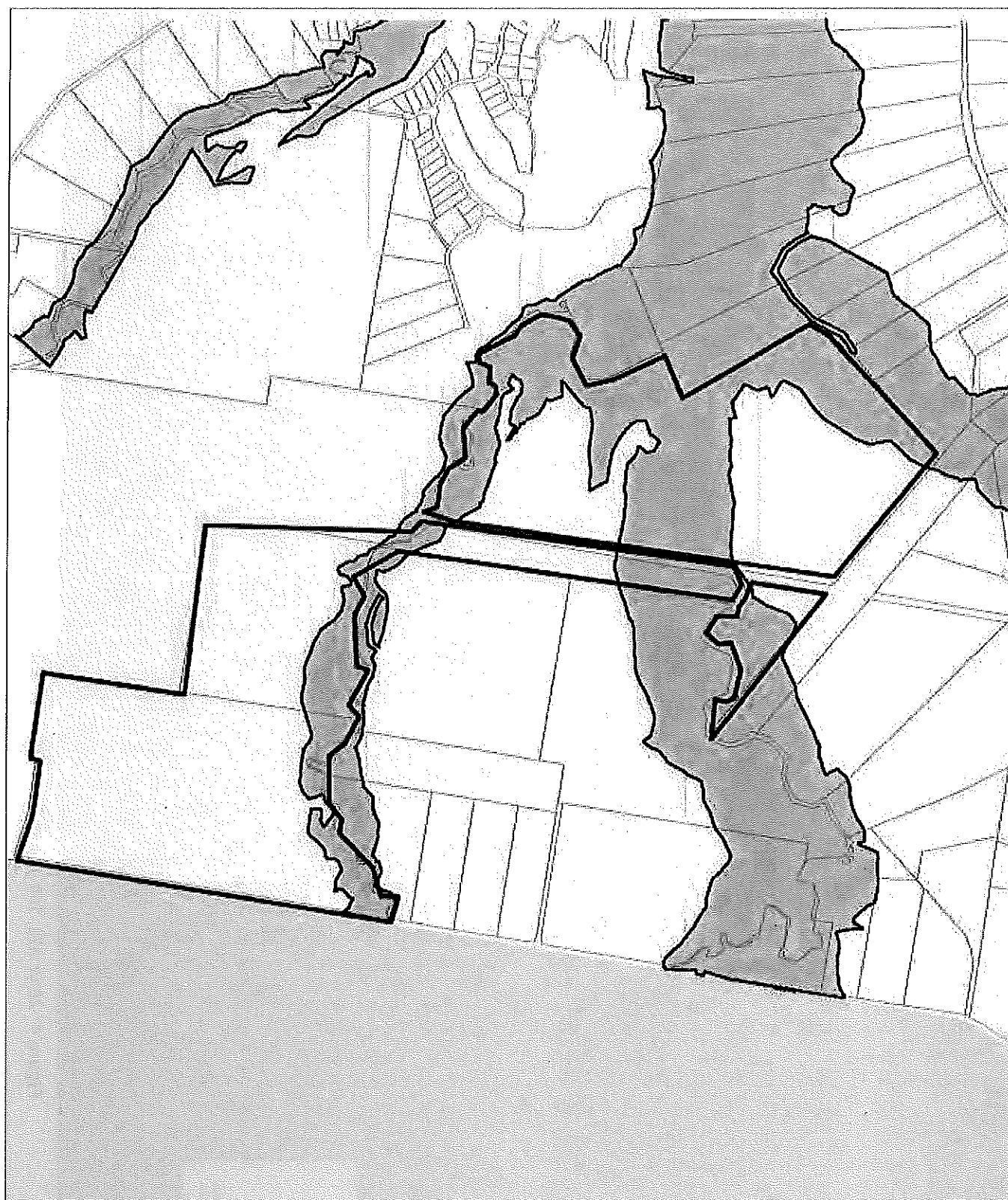
Structure Plan

Western Sydney Aerotropolis

- | | | |
|------------------------------|-------------------------------|--|
| Precinct Boundary | Agricultural | Non Urban Land |
| Western Sydney Airport | Luddenham Village | Mixed Flexible Employment & Urban Land |
| Proposed Transport Corridors | Flexible Employment | Urban Land |
| | University of Sydney Property | |



Figure 2 Property Relationship to Proposed Precincts



Flooding

 Flood planning area

Cadastral


 Cadastral DB/04/2010 © Penrith City Council

Figure 3 Penrith LEP 2010 Flood Planning Area

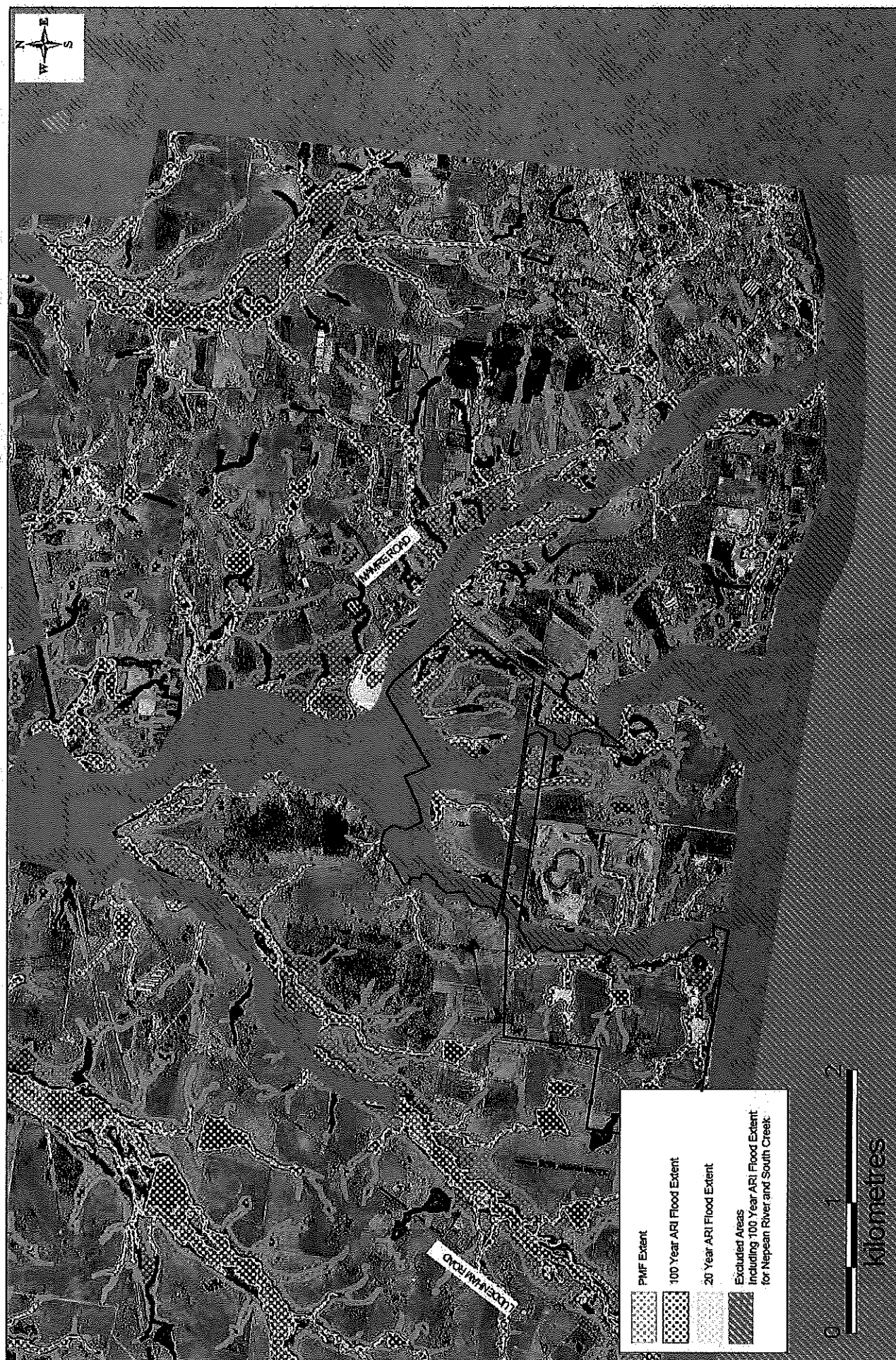


Figure 4 20 yr ARI, 100 yr ARI and PMF Overland Flow Flood Extents (after Figure 6.1K, Cardno Lawson Treloar, 2006)



Figure 5 1% AEP Flood Depths and Velocities (after Figures 6.109 & 6.110, Worley Parsons, 2015)

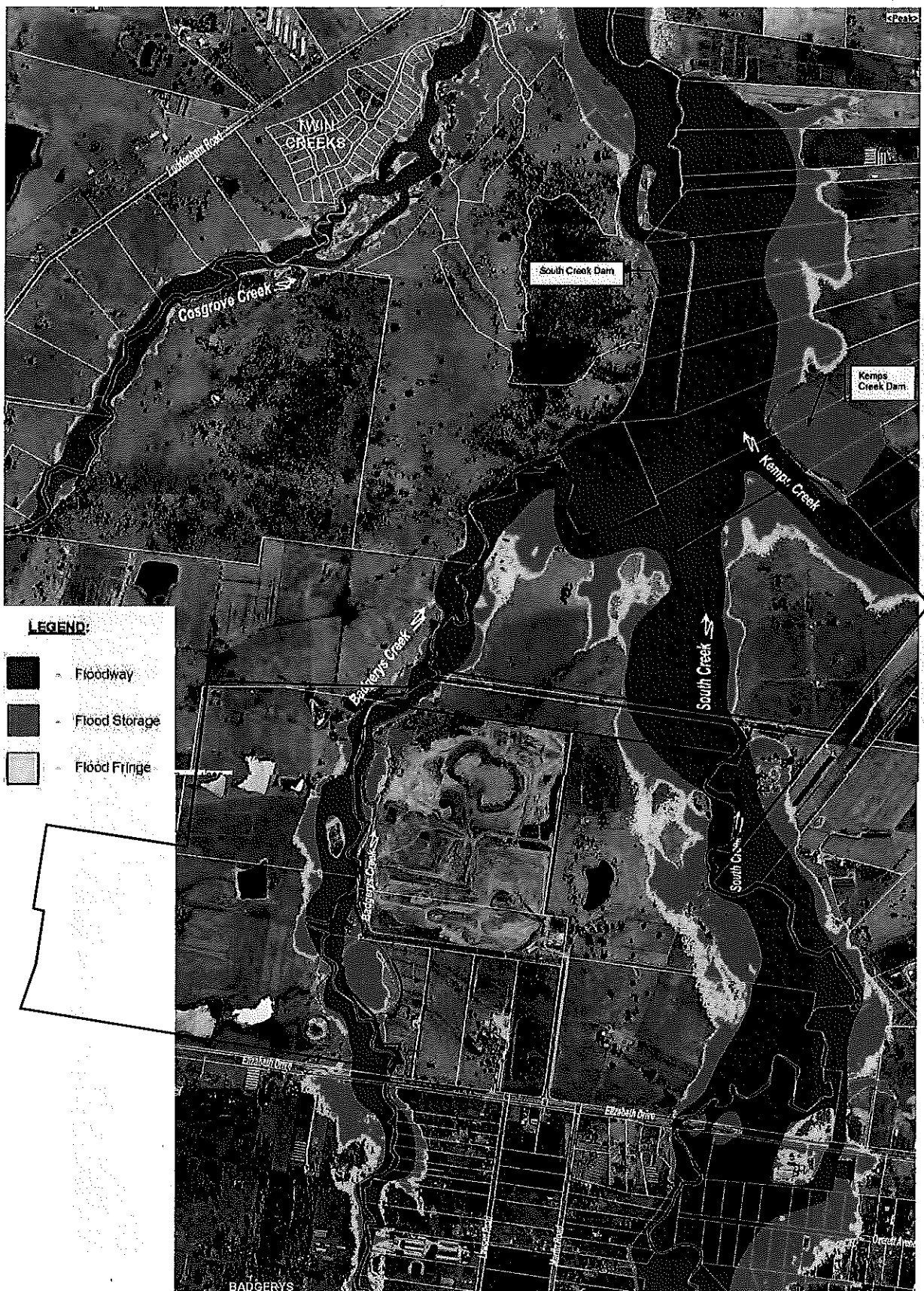


Figure 6 1% AEP Hydraulic Categories (after Figures 6.109 & 6.110, Worley Parsons, 2015)

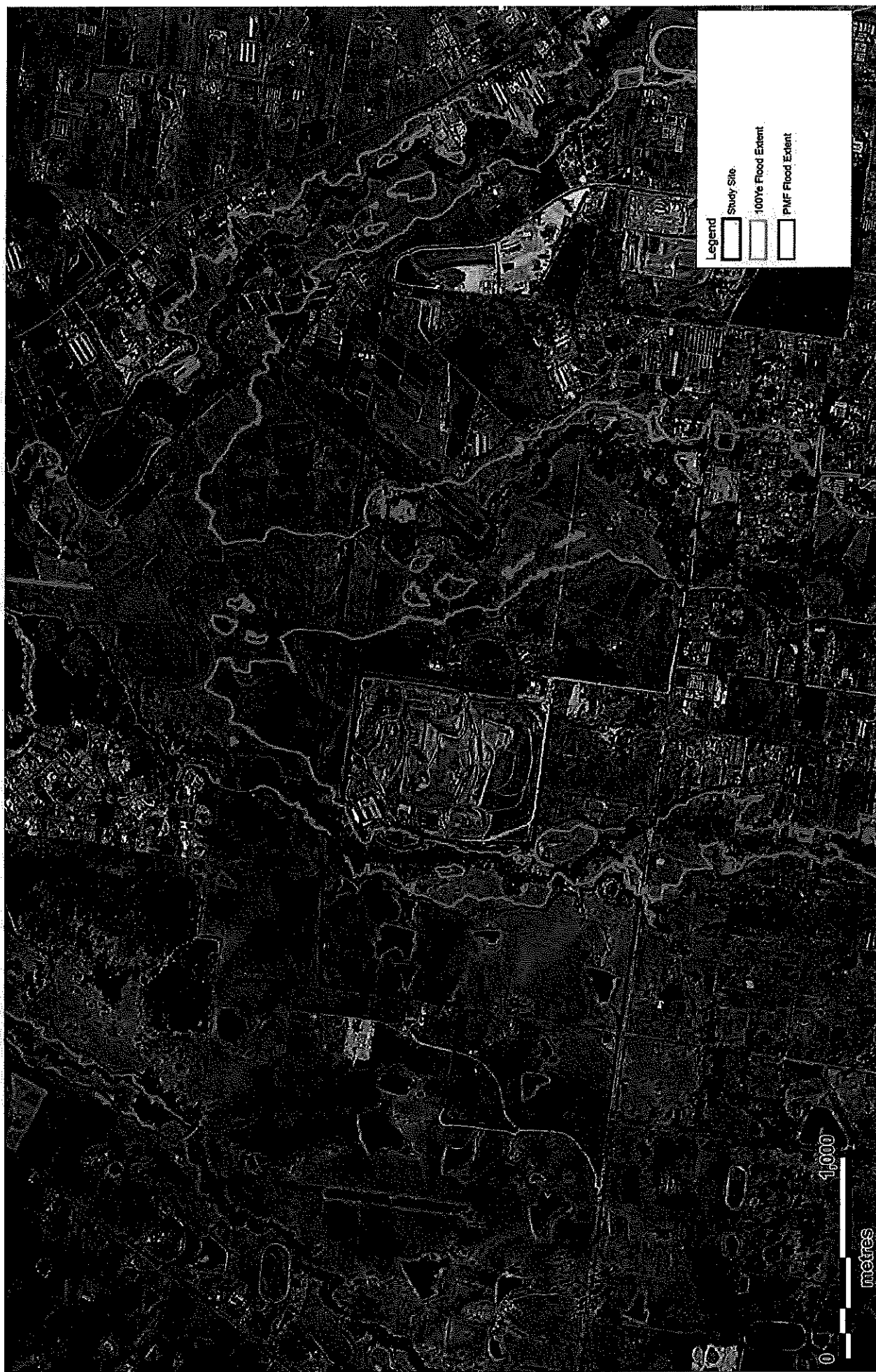
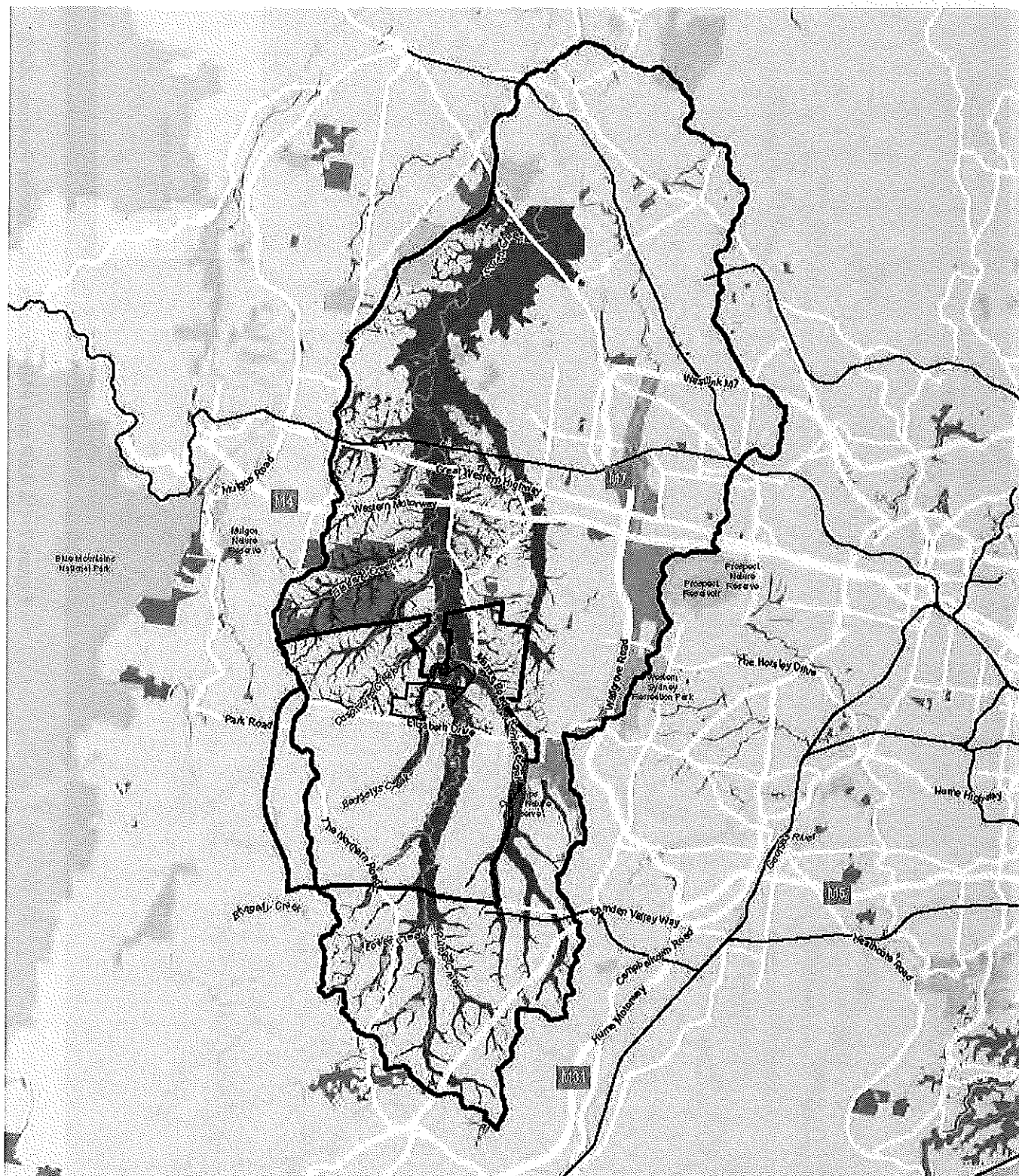


Figure 7 1% AEP and PMF Extents (after Worley Parsons, 2015)



South Creek Catchment
Western Sydney Aerotropolis

- Western Sydney Aerotropolis
- South Creek Sub Catchment
- Probable Maximum Flood (PMF) (JACOBS, 2017)
- University of Sydney Property



Figure 8 PMF Extents (After LUIIP, 2018)

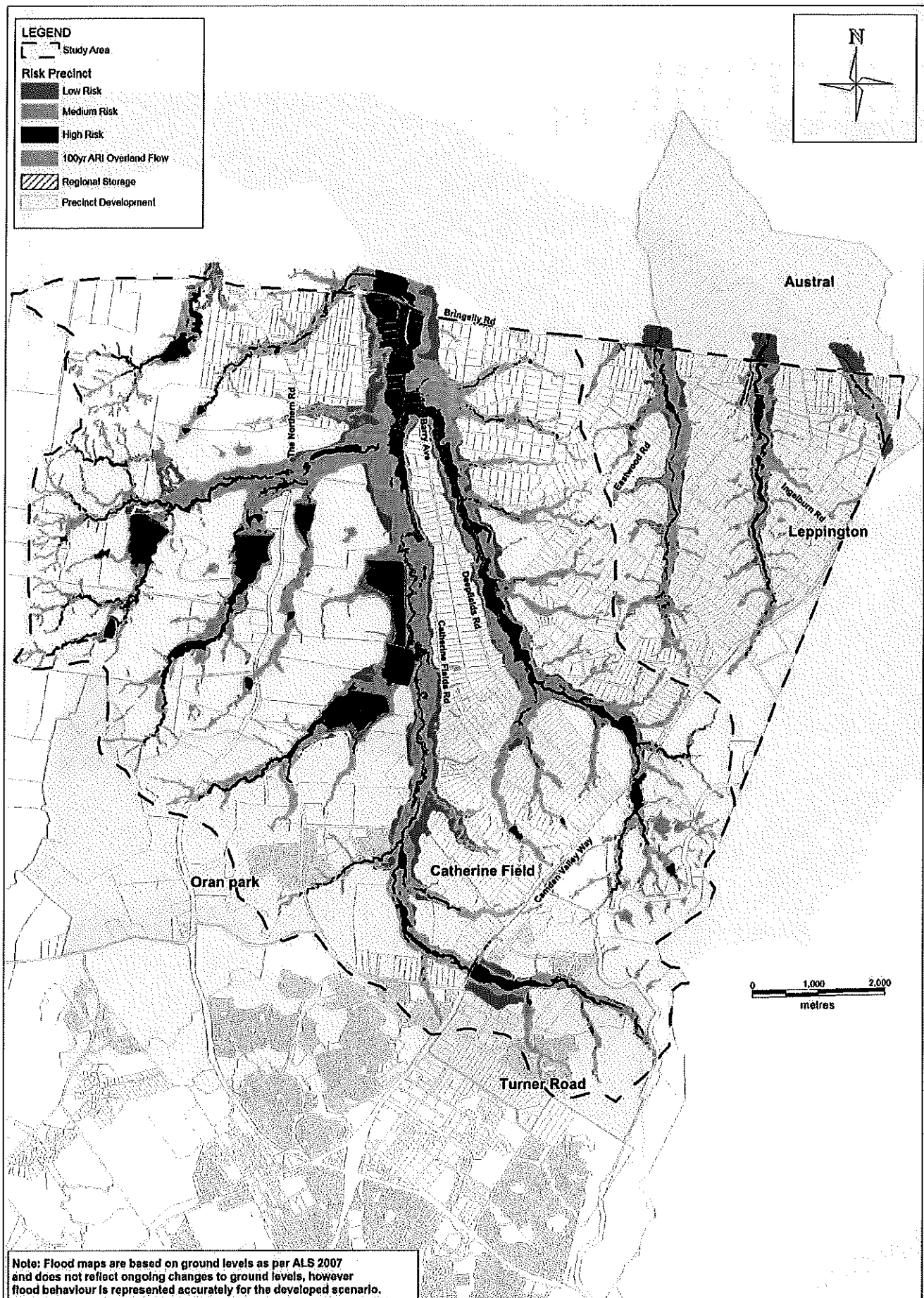


Figure 9 Flood Risk Precincts and Regional Farm Dams
 (after Figure 8.2, 2014 Upper South Creek Floodplain Risk Management Study and Plan)

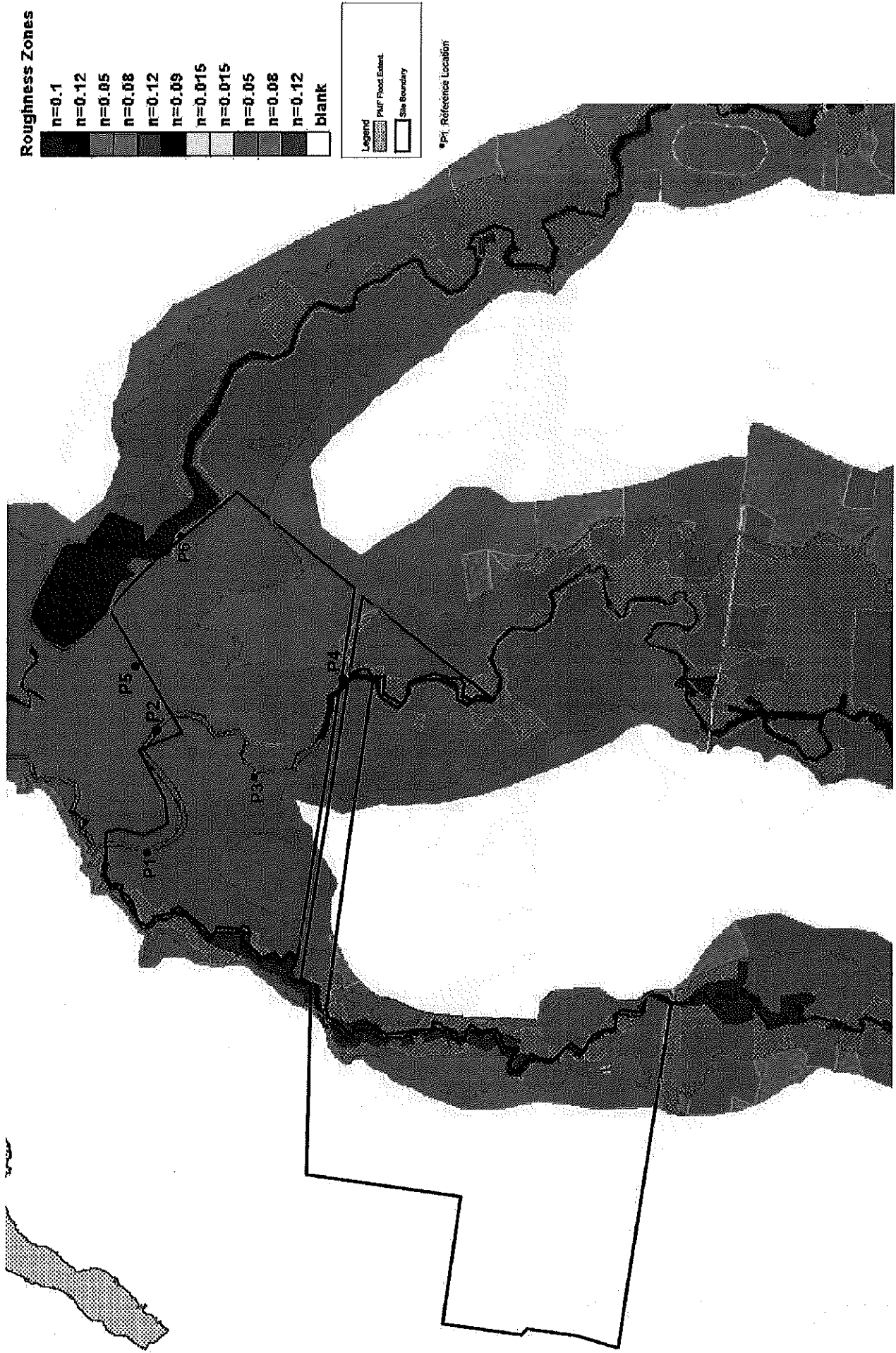


Figure 10 South Creek and Kemps Creek Roughness Zones (after Worley Parsons, 2015)

FIGURE 6.1

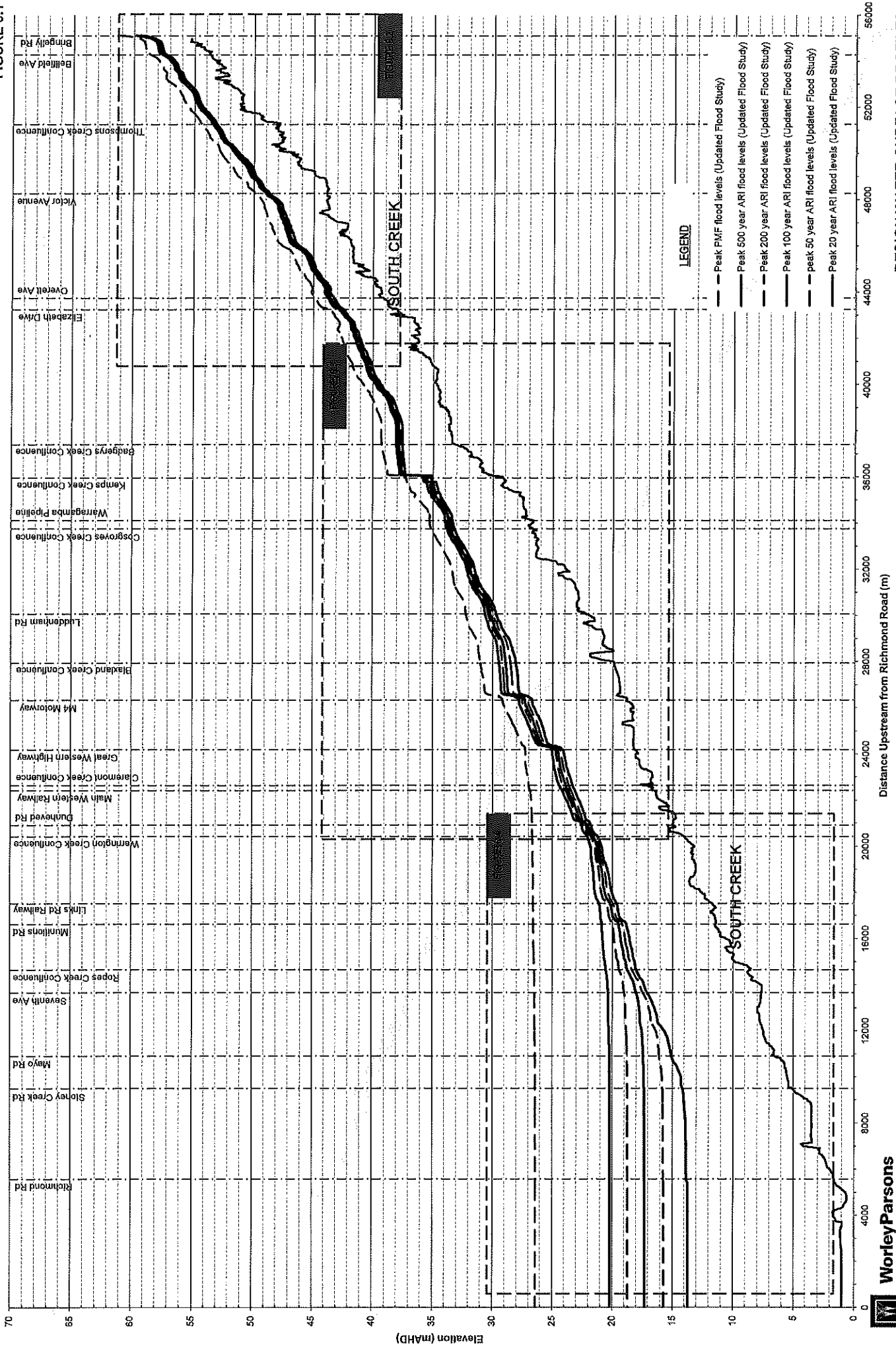
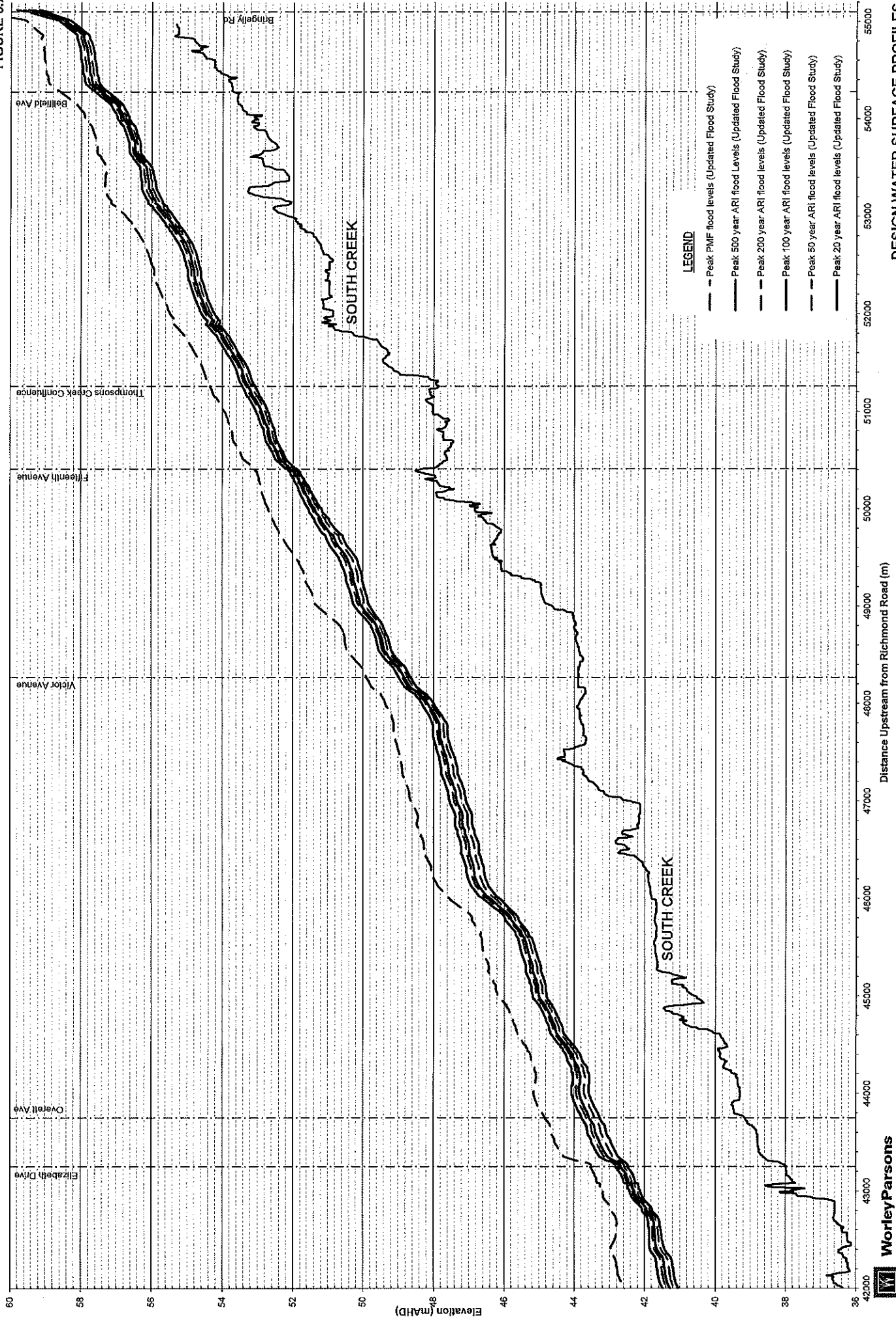
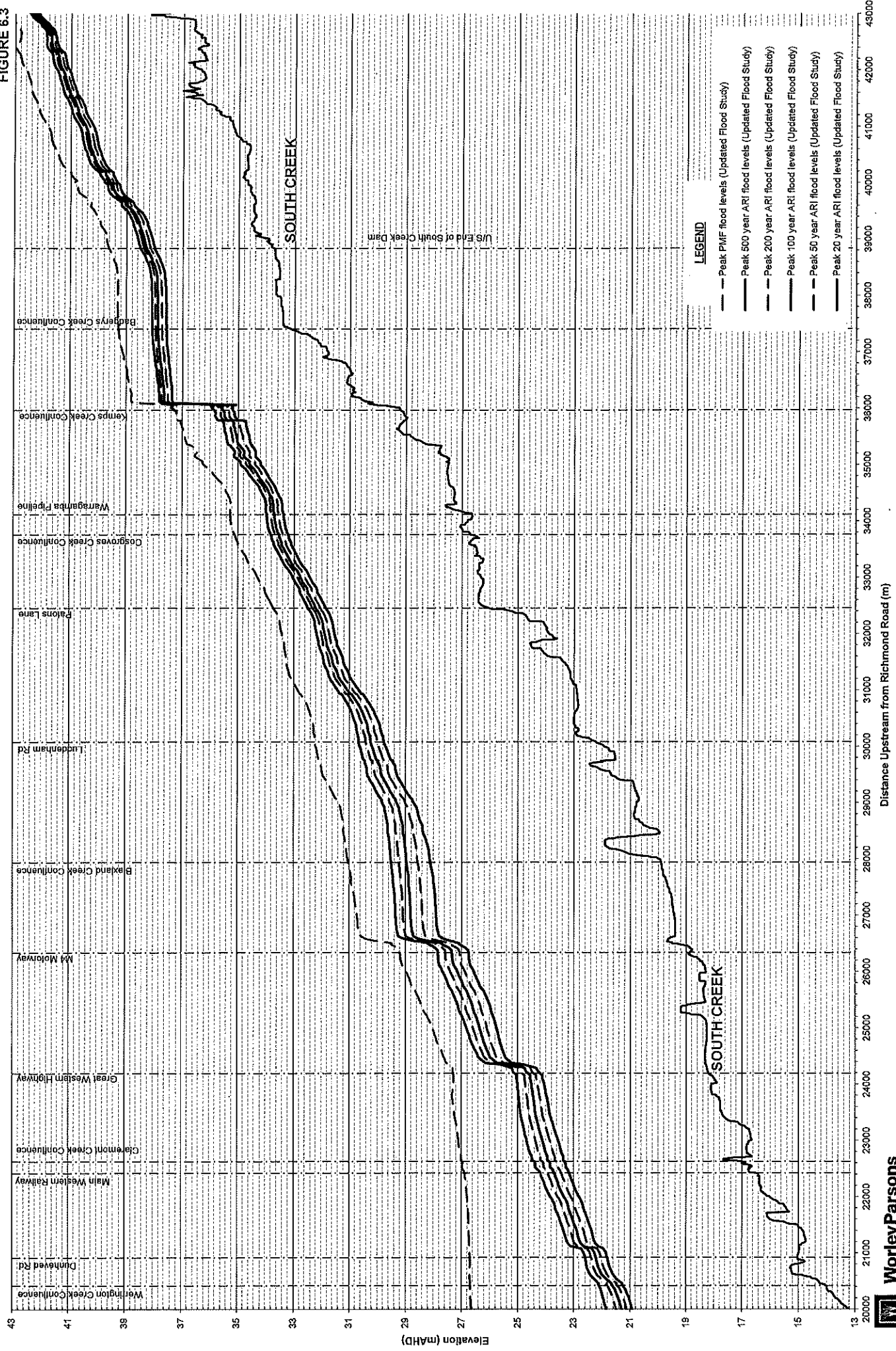


FIGURE 6.2



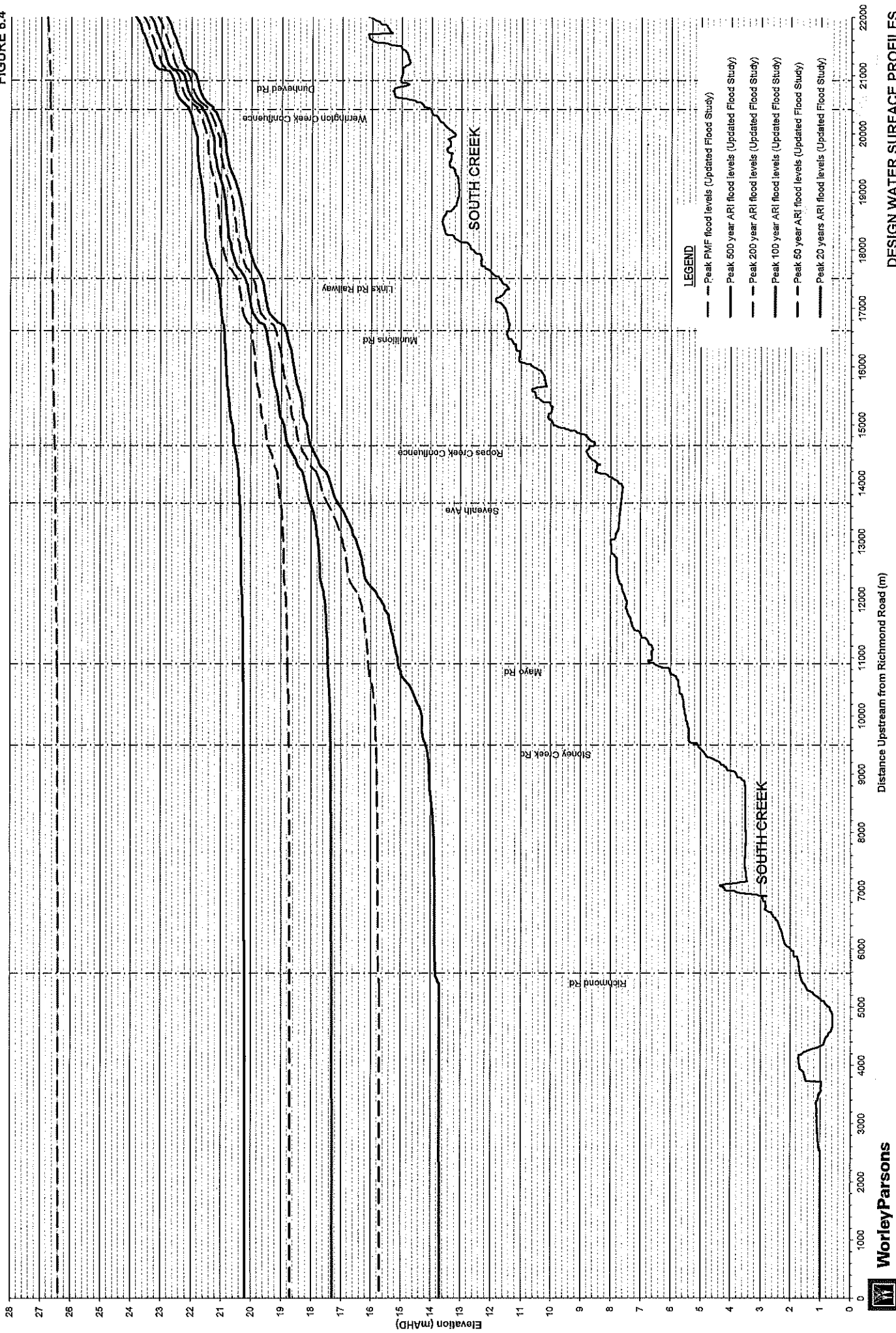
DESIGN WATER SURFACE PROFILES
ALONG SOUTH CREEK [1 of 3]

FIGURE 6.3



DESIGN WATER SURFACE PROFILES
ALONG SOUTH CREEK [2 of 3]

FIGURE 6.4



DESIGN WATER SURFACE PROFILES
ALONG SOUTH CREEK [3 of 3]

10/1/13



ATTACHMENT 4

Civil Engineering Advice prepared by at&I



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4th October 2018

The University of Sydney
Campus Infrastructure and Services
Level 1, 22 Codrington Street
Darlington NSW 2008

Your Ref:
Our Ref: L001-02-18-584Civil
Response to LUIIP
Direct phone: 02 9439 1777

Attention James Rendall

This document is subject to legal professional privilege. To ensure privilege is not waived, please keep this document confidential and in a safe and secure place.

Dear James,

CIVIL ENGINEERING ADVICE FOR SYDNEY UNIVERSITY PROPERTIES AT BADGERYS CREEK, NSW IN RELATION TO THE LUIIP

Scope of Works

This letter report seeks to respond to the *Western Sydney Aerotropolis Land Use and Infrastructure Implementation Plan Stage 1: Initial Precincts (dated August 2018)* issued by the Department of Planning and Environment (DP&E).

This letter seeks to provide advice on the civil and infrastructure implications arising from the Land Use and Infrastructure Implementation Plan (LUIIP), having regard to best practise civil and infrastructure design, rainfall and our experience working in Penrith City Council (PCC) including:

- Whether there is any merit in using the PMF for land development planning in the precincts
- The additional civil and stormwater requirements to design within a PMF event
- The impact on land efficiency and building levels in the South Creek area
- The impact on existing development controls for industrial/commercial land in PCC if they were to be applied within the PMF
- Any other matters that are considered relevant from a civil and infrastructure engineering perspective.

South Creek Precinct

Within the LUIIP the South Creek Precinct is described as follows:

The South Creek precinct is the central green spine of the Aerotropolis. It represents the central structural element to the Aerotropolis's connected open space network and the broader Western Parkland City. It will provide an important interface to surrounding development, providing open space, amenity, biodiversity and wellbeing values.

As highlighted within the Flooding Advice letter prepared by Cardno dated 26th September 2018 it is apparent that the South Creek Precinct boundaries are based on the Probable Maximum Flood (PMF) extent mapping

Civil Engineers & Project Managers

undertaken by Jacobs in 2017. It is noted in Cardno's letter that the precinct boundary appears to reflect mainstream flooding and overland flow flooding and are up to 1km apart along lengths of South Creek.

It is noted the proposed extents of the South Creek Precinct severely impact the developable lands available to the University of Sydney.

PCC Development Controls

The land owned by the University of Sydney is known as 1793-1951 Elizabeth Drive, Badgerys Creek and 885a Mamre Road, Kemps Creek. Refer Figure 1 below.

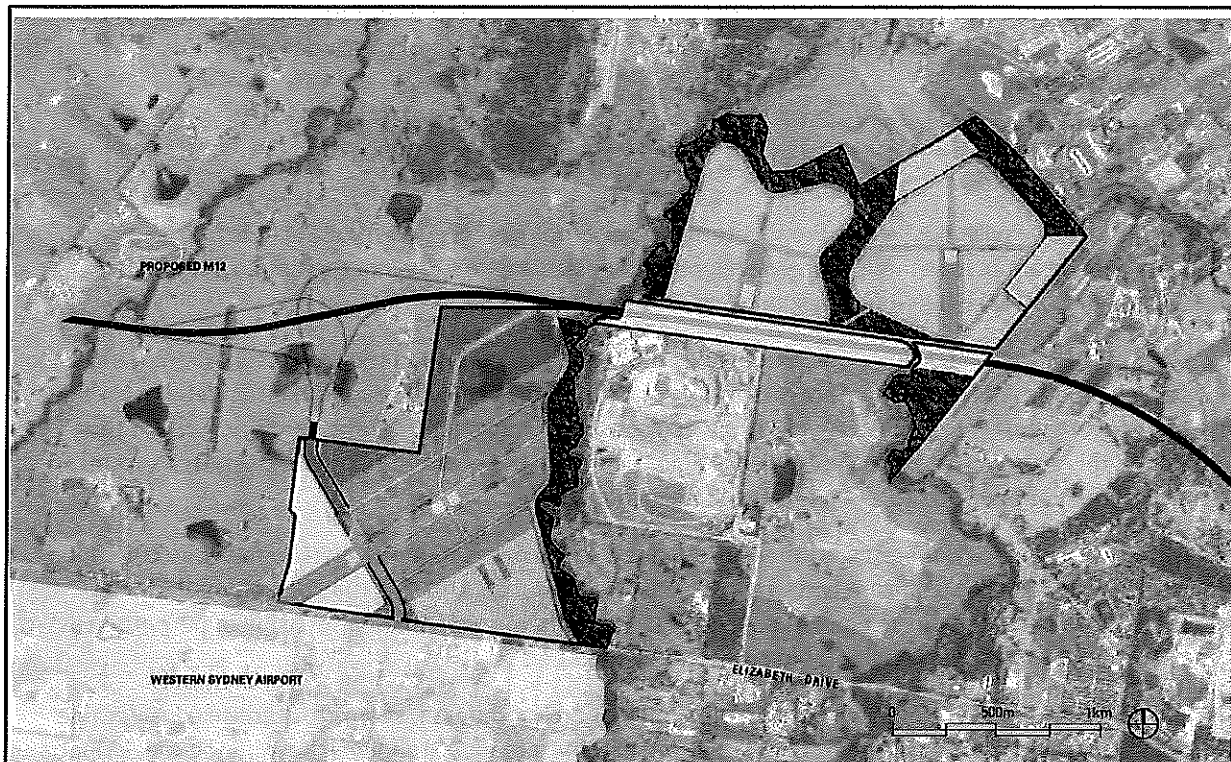


Figure 1 - University of Sydney lands

The entirety of the site falls within the Penrith City Council (PCC) Local Government Area (LGA). As such it is assumed all development control plans within PCC's guidelines would be applicable for this development.

The PCC Design Guidelines for Engineering Works for Subdivisions and Developments November 2013 would be the applicable design guidelines required to be used for any civil design works within the above-mentioned site.

Civil and Infrastructure Design

PCC require all stormwater infrastructure to be designed for a minor and major storm event. The minor storm event varies between the 5- and 20-year Average Recurrence Interval (ARI) depending on the land use. The major storm event is classified as the 100-year ARI. Within the PCC design guidelines there is no requirement to design stormwater infrastructure and overland flows to the PMF event.

Within the South Creek Precinct all stormwater infrastructure would need to be designed in accordance with PCC guidelines. There would be no requirement to design infrastructure for the PMF event based on PCC guidelines and our previous design experience working within PCC and other Councils within Western Sydney.

Building Floor Levels

Another important aspect of the PCC engineering guidelines is setting finished floor levels of buildings relative to the surrounding flood levels.

Within the PCC guidelines all building floor levels need to be set relative to the 100-year ARI event plus a freeboard above (typically between 300 and 500mm depending on the building type). There is no requirement within PCC's guidelines to be setting finished floor levels relative to PMF extents and as such should not be considered for building levels.

It should be noted PCC would likely require the PMF extents be plotted to determine emergency excavation routes and procedures for the developed site. This would and should not preclude development within the PMF extents though.

Infrastructure Corridor

AT&L have been heavily involved in the Western Sydney Employment Area (WSEA) lands for the past 10 years and significant involvement in the development, design and approval of the employment lands adjacent to Eastern Creek, Reedy Creek and Ropes Creek.

In all instances the 100-year ARI flood extents has been the determining extent of development (subject to site specific flood studies) and in most cases, this zone has extended well beyond the regulated riparian zone. In most recent works, the 100-year ARI extent engulfed some considerable lands and whilst the flooding in this area was relatively low, we are able to demonstrate key infrastructure services such as basins and recreational/fire access paths could be located in these areas.

The obvious bio diversity offsetting of these areas has also encouraged developers to maximise the flood plains and to undertake significant re-vegetation and maintenance. Utilising the current legislation to create credits has resulted in significant parcels of land within the WSEA being set aside in perpetuity as natural bush lands at some considerable cost to the developer.

Utilising the PMF to determine an infrastructure corridor, in our opinion, seems to sterilise considerable lands for apparently no gain. Given the 100-year ARI extents already extend well beyond the creek riparian zones, as they do within the WSEA, and provide a real opportunity to locate any required key infrastructure, it's unlikely the area beyond the 100-year ARI to the PMF would ever be utilised with key infrastructure. This corridor would likely ultimately become a burden on the public authority taking ownership. As noted previously the extent of the PMF is beyond 1km wide in places.

Conclusion

Based on the above-mentioned engineering guidelines and our experience working within Penrith City Council and other Councils within Western Sydney on numerous residential, commercial and industrial subdivisions it is typical that the 100-year ARI flood levels and extent would be used for land development planning for developments.

It is our opinion for the development of the University of Sydney lands that the 100-year flood extents set the controls for the site and determine which portions of the site can be developed upon. Adopting the PMF for this purpose is not a typical development control which Council would likely enforce on a development of this nature. As such we do not believe there is any merit or precedence in using the PMF for land development planning within the precinct.



Should there be any questions regarding the above please contact me on 9439 1777.

Yours sincerely

A handwritten signature in cursive script, appearing to read 'Andrew Tweedie'.

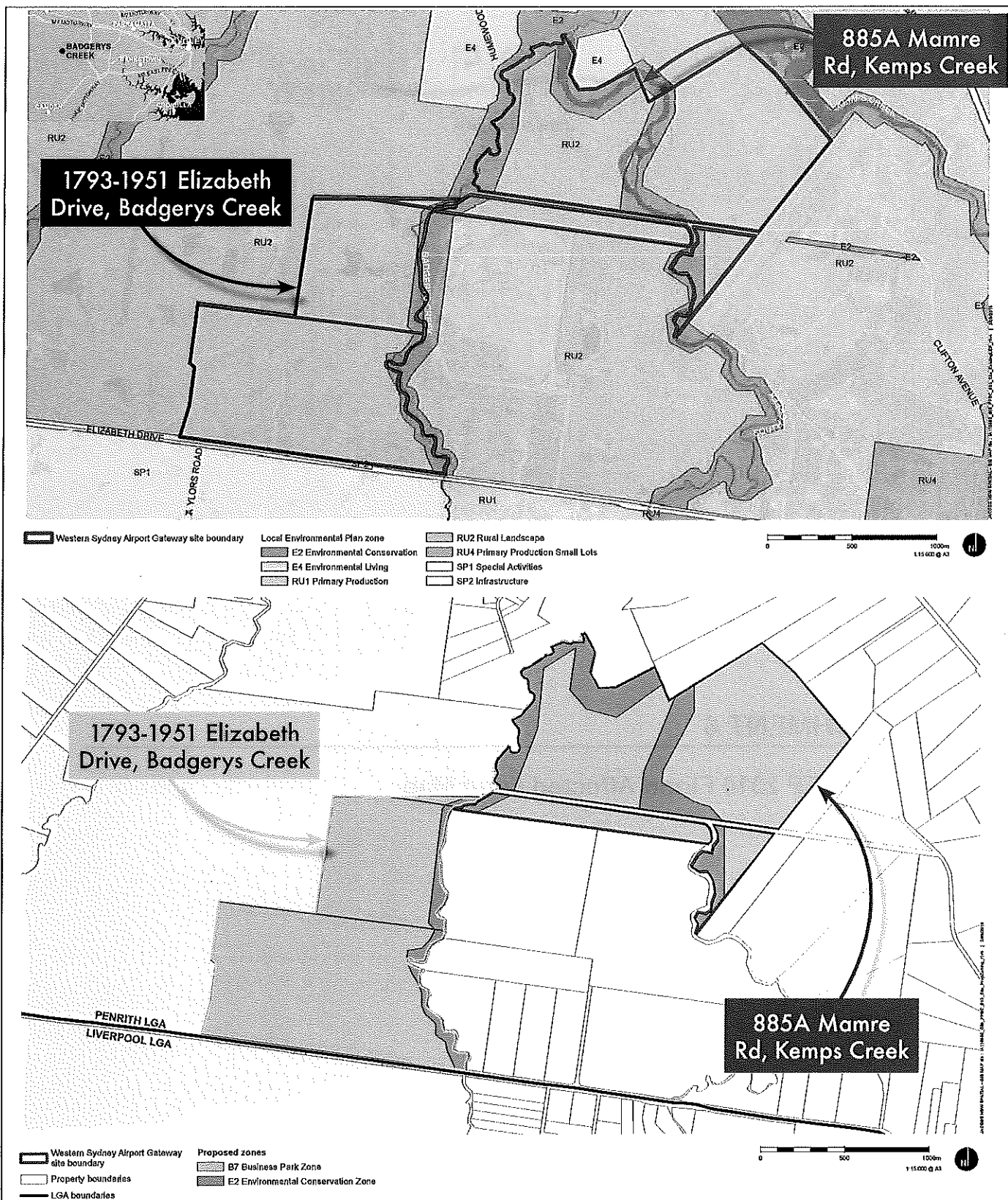
Andrew Tweedie

Associate Director



ATTACHMENT 5

**The University's Planning Proposal Zoning Map – Western Sydney
Airport Planning Proposal, SG Haddad Advisory, December 2017**



PLANNING ADVICE

Land owned by Sydney University at Badgerys Creek and Kemps Creek

FIGURE 7A.1

Planning Proposal Zoning Map:
Western Sydney Airport Planning Proposal, SG Haddad Advisory, December 2017

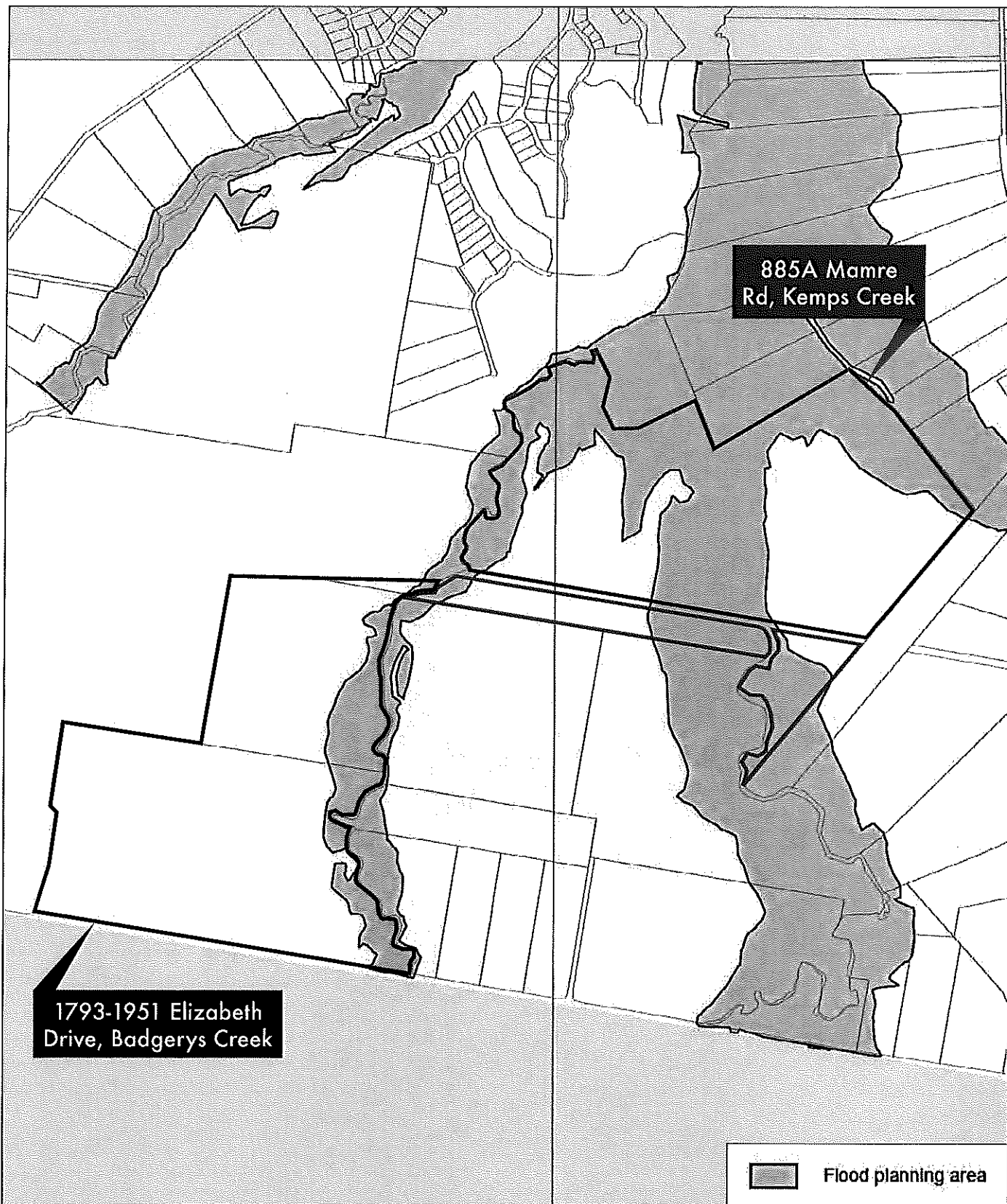
Prepared For - King & Wood Mallesons





ATTACHMENT 6

Penrith LEP 2010 Flood Affected Land Map



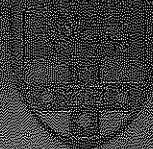
PLANNING ADVICE
Land owned by Sydney University at Badgerys Creek and Kemps Creek

FIGURE 5E
Flood Planning Land Map - Penrith LEP 2010

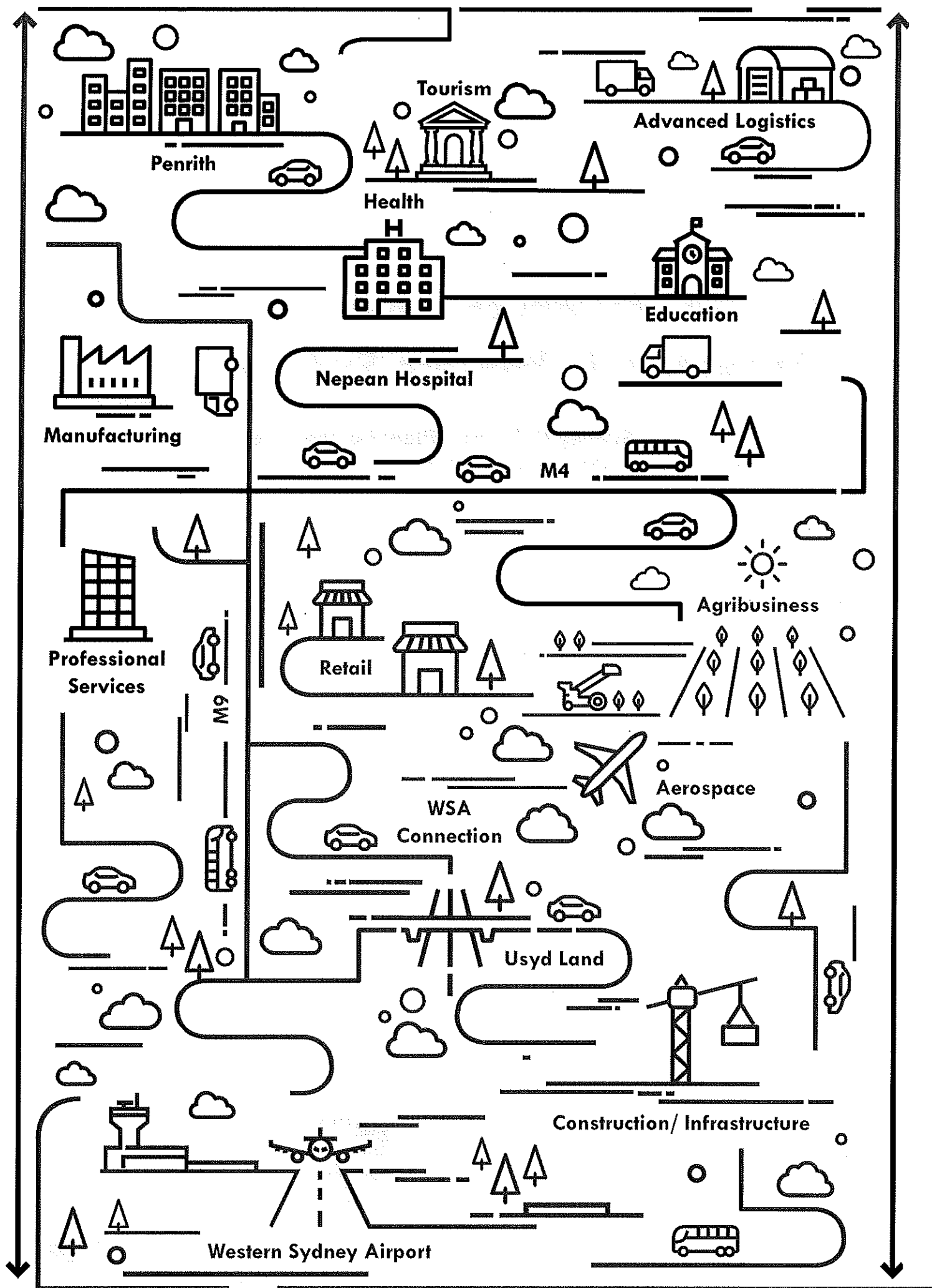
Prepared For - King & Wood Malleons

A vision for education and innovation in Western Sydney

**Addendum to the Sydney University Planning Proposal
submitted to Penrith City Council February 2018**



THE UNIVERSITY OF
SYDNEY



A vision for education and innovation in Western Sydney

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THE UNIVERSITY OF
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Our vision is to curate, facilitate and deliver the interface of education, industry and innovation in Western Sydney. This opportunity will benefit Penrith and wider Western Sydney, and Australia for generations to come.

Sydney University is a curator of value in the Airport Economic Zone



Unlike private developers, the University is not for profit, meaning we can work more cooperatively with Penrith City Council to bring forward the strategic intent for the region and do what is best for the community in Western Sydney



Our Badgerys Creek site can become a long term economic gateway in Western Sydney that links education, industry and innovation in the region



We will work with Penrith City Council to develop an employment strategy that responds to emerging industries and research opportunities generated by the airport



Sydney University plays a leading role in supporting wider development of the precinct, such as our involvement in the NSW Government's Agri-port



We are ready to mobilise new industries on the site which will deliver between 7,000 and 10,000 jobs for the Penrith region

"We are the University for Sydney and we don't put a boundary on this." Vice Chancellor (May 2018)

The University of Sydney has been in Western Sydney for over 80 years. We've invested millions of dollars at Nepean Hospital and we're planning to expand our presence at Westmead. In the near future we want to take our presence in Western Sydney to the next level.

As thought leaders, we have been looking to the future of Sydney and see the potential in Western Sydney. Our significant landholdings through Badgerys Creek, Bringelly and Camden provides an opportunity for our partners to share in the potential value of that land.

Our land at Badgerys Creek offers a unique opportunity to catalyze economic opportunity by linking the Airport with new and evolving industries in the Western Sydney Employment Area. This site can be used to engage with industry via placements and joint research – an innovative approach that will enable thousands of new, smart jobs in high tech industries

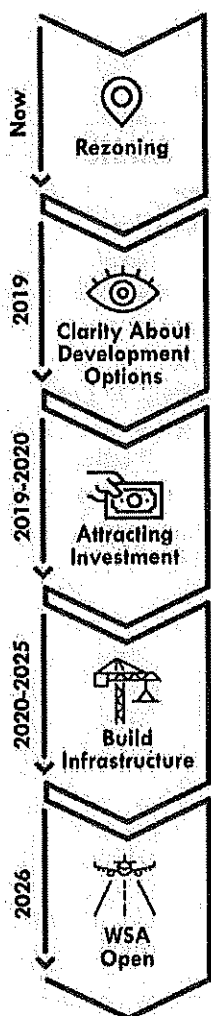
Penrith City Council understands the potential of the Western Sydney Airport as a job generator. Our partnership with Penrith City Council will help to realise the 'Third city' vision and deliver 20 minute connections to the rest of the region.



Now is the time to act

The University's vision is to use our land at Badgerys Creek to achieve the best outcome for the people of Sydney. We are not selling the land. We will manage it to support new, high-tech industries and as a result, create thousands of new jobs for the Penrith area.

To make this happen the University needs flexible zoning for its land at Badgerys Creek now.



Critical Timeline

To ensure the right infrastructure is ready when the airport opens and can support economic growth, It is critical for the rezoning to occur now.

Figure 1: Critical timeline



We are embedded in Western Sydney and ready to support growth of the region

Western Sydney is very important to University of Sydney strategic objectives and aspirations for growth. Over 20% of our students are drawn from the region and a new campus is currently being planned for Westmead.

The University of Sydney is anchored in Penrith via its presence at Badgerys Creek and Nepean Hospital. Our Science faculty at our Camden and Cobbitty Campus remains critical to our significant Agricultural, Veterinary and Environmental Research and Teaching. We plan for the campus at Camden to remain in the area, with enhanced research capabilities and links to industry.

Rezoning our land at Badgerys Creek will allow us to create opportunities for our students to be exposed to a wide range of industries and gain real-work experiences.

Using the site in this way will encourage change and economic growth in the region by sending clear signals to industry that the necessary intellectual and physical infrastructure, and social capital is in place to support innovation.

Sydney University will drive economic growth in Western Sydney

Rezoning the Sydney University land at Badgerys Creek will enable development of new industry and technology-driven opportunities for research and innovation. As a result, we anticipate between 7,000 - 10,000 jobs will be created across the Penrith region over the next 10 years.

Our aim is to use the University's existing expertise and industry partnerships in defence, advanced manufacturing, robotics and aerospace industries to support new jobs and economic opportunity for the Western City.

These new land uses will complement the existing Sydney Science Park and the planned Aerotropolis near the airport. In this way, the University's land will link the Airport to Western Sydney Employment Area, and catalyze the whole area for growth.

We want to work with Penrith City Council to develop targeted employment plans for the region to ensure Penrith experiences maximum gains from new industries and investment.



Case Study:

Collaboration to deliver value for Western Sydney

The University has a track record of delivering and successfully operating national, leading collaborative research infrastructure – the same approach to infrastructure delivery that we are proposing for the Penrith area.

The University is substantially investing in improved infrastructure at Westmead Health and Education Precinct in partnership with Health Infrastructure NSW, the local Health District, Sydney Children's Hospital Network and the Children's Medical Research Institute.

A suite of buildings at Westmead is scheduled for completion by 2020, including the Central Acute Services Building, the Westmead Innovation Centre and core research facilities. The delivery of landmark research infrastructure will benefit our local Westmead partners and facilitate new and expanded collaborations with other NSW and interstate universities, independent research groups and industry research and development.

We will work with our partners to co-design and co-deliver contemporary, holistic and sustainable models of health care that are fit for purpose for Western Sydney and address key health priorities.



Growth of new jobs for the Penrith region

As shown below, the industries planned to grow around the University's land at Badgerys Creek will complement Penrith's target industries. This will result in a jobs corridor that produces thousands of highly skilled local jobs in new industries.

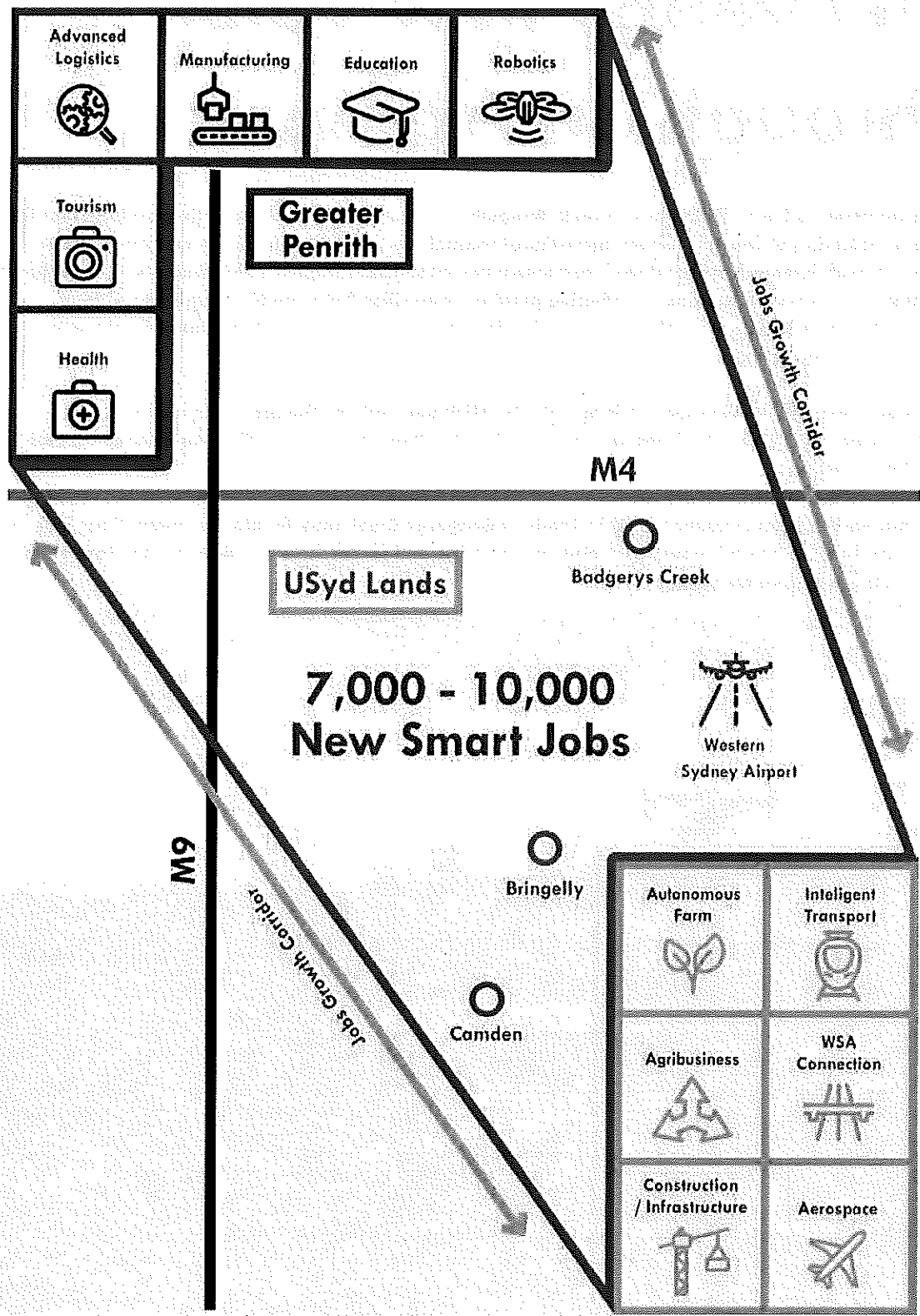


Figure 2: Jobs Growth Corridor



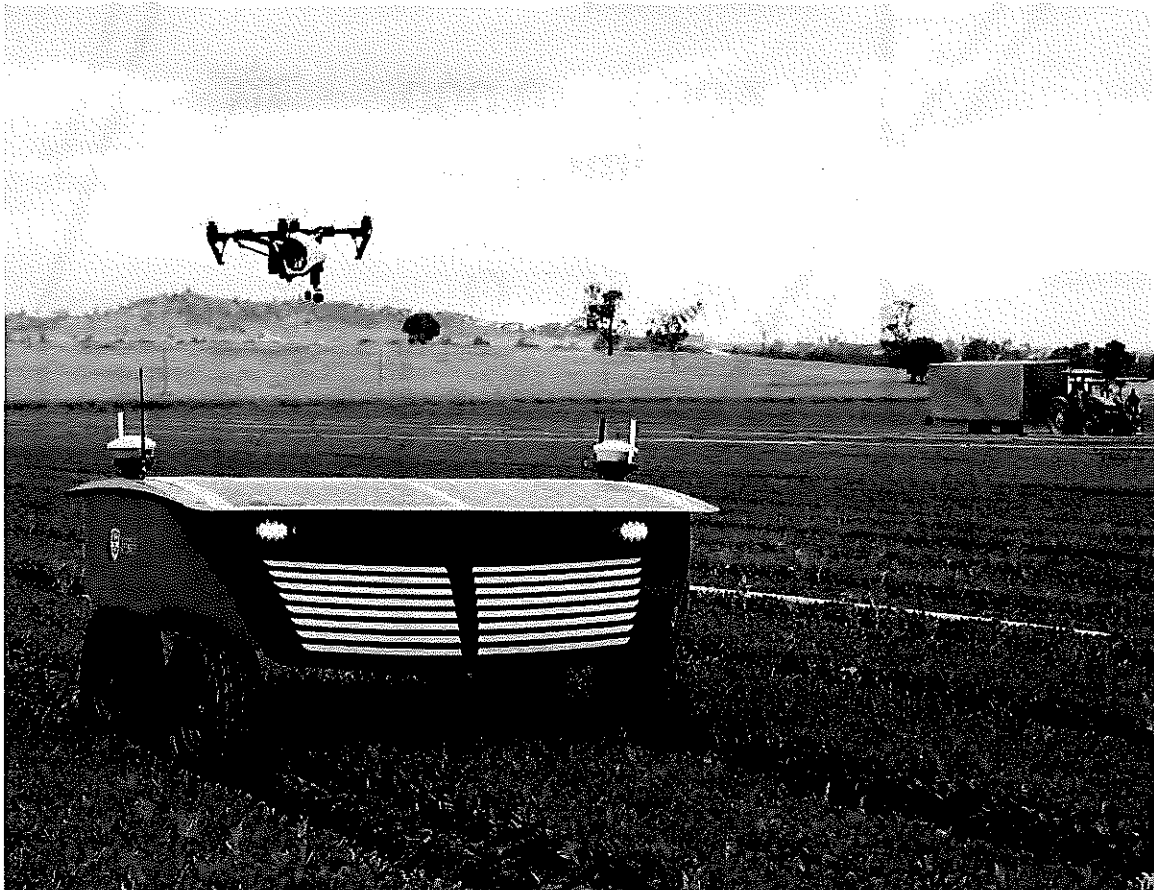
Case Study:

Delivering new value through an Agri-port

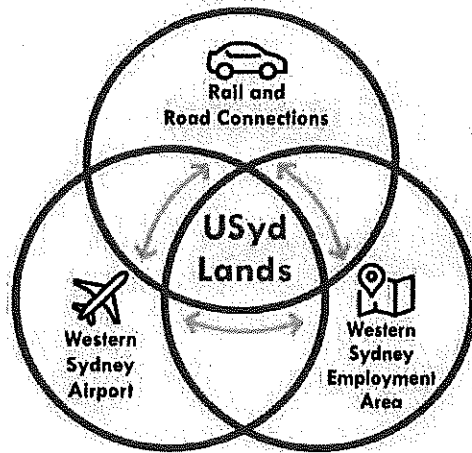
The University's lands at Badgerys Creek, Bringelly and Camden are strategically positioned for the future clustering of industry where agricultural technology, research, education and innovation can link with light industry and business areas; this clustering comprises the elements of a potential Agri-port. This would provide an effective point of connection between NSW agricultural food production research and development and the Sydney, Australian and International food market through the new airport.

Sydney University has started working with the NSW and Federal Governments and potential industry partners on an Agri-port as a way to develop these new possibilities for agriculture and food production.

The University is investigating how its lands at Badgerys Creek may fit into the critical "last mile" of this supply chain to find ways to involve our students and researchers via learning and innovation across the Agri-port Network.



Our lands are a critical connector for Greater Penrith



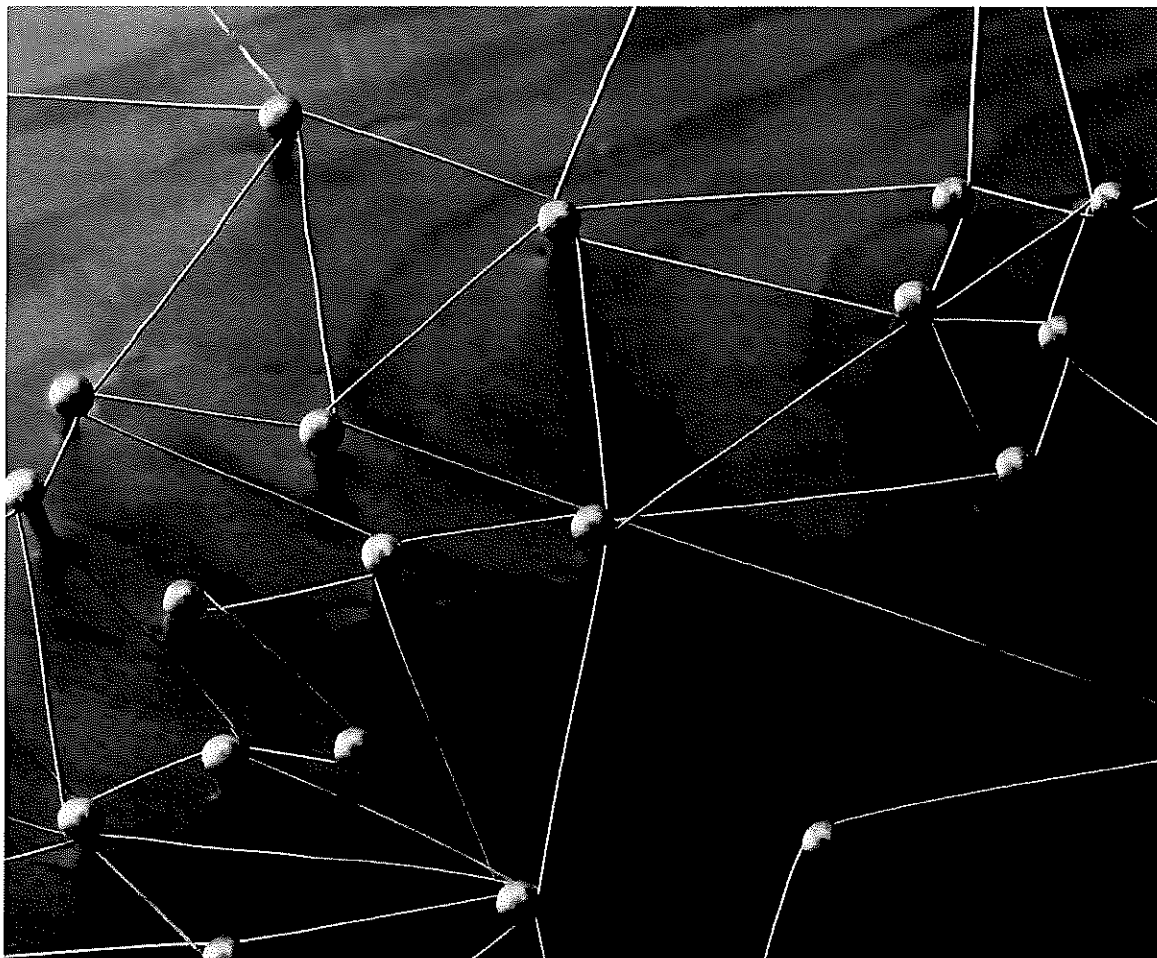
The University's lands are situated around the Western Sydney Employment Area and can generate economic value by providing two critical linkages that benefit Penrith:

1. Elizabeth Drive where traffic needs to be able to pass readily into the airport surrounds to support the local economic zone, and
2. A connection below the M12 to link via the McGarvie Smith farm to the former Fluers Radio telescope in order that all of WSEA is linked to the airport.

Figure 3: Connection through USyd lands

Transport options are fundamental to helping achieve this vision – specifically north/ south links to maximize mobility through the area and to connect it to surrounding precincts.

We will work with Penrith City Council to develop support for stations on the Northwest Rail Line including within our lands.



Case Study:

The University's recent investment at Nepean Hospital

Nepean Hospital is one of our primary teaching and placement facilities. We have invested \$30 million to place our satellite teaching and research centre at the Nepean Clinical School, that incorporates:

- The Charles Perkins Centre for Diabetes, Obesity and Cardiovascular Research
- The Brain Mind Centre
- Research Wet-labs that are used for Immunology
- Haematology and other similar processes such as Gynaecology, Obstetrics and predictive epidemiology, and
- An outpatient centre run with the Local Area Health District.

We also have an Obesity Clinic supported by the Boden Institute and a Student Accommodation building in Rodgers Street that hosts students on a rotating basis.

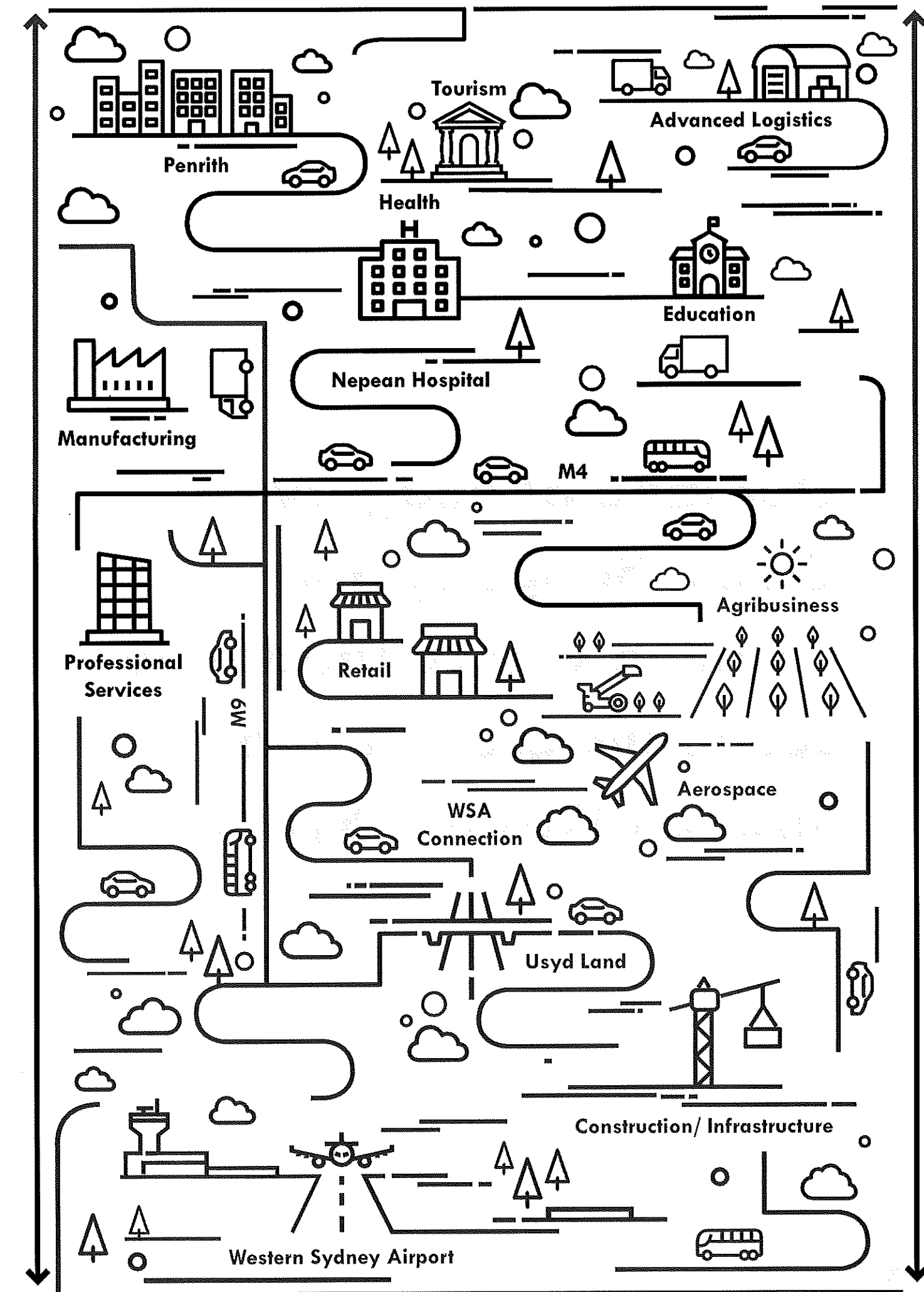
Our population at Nepean Hospital at any given time that incorporates:

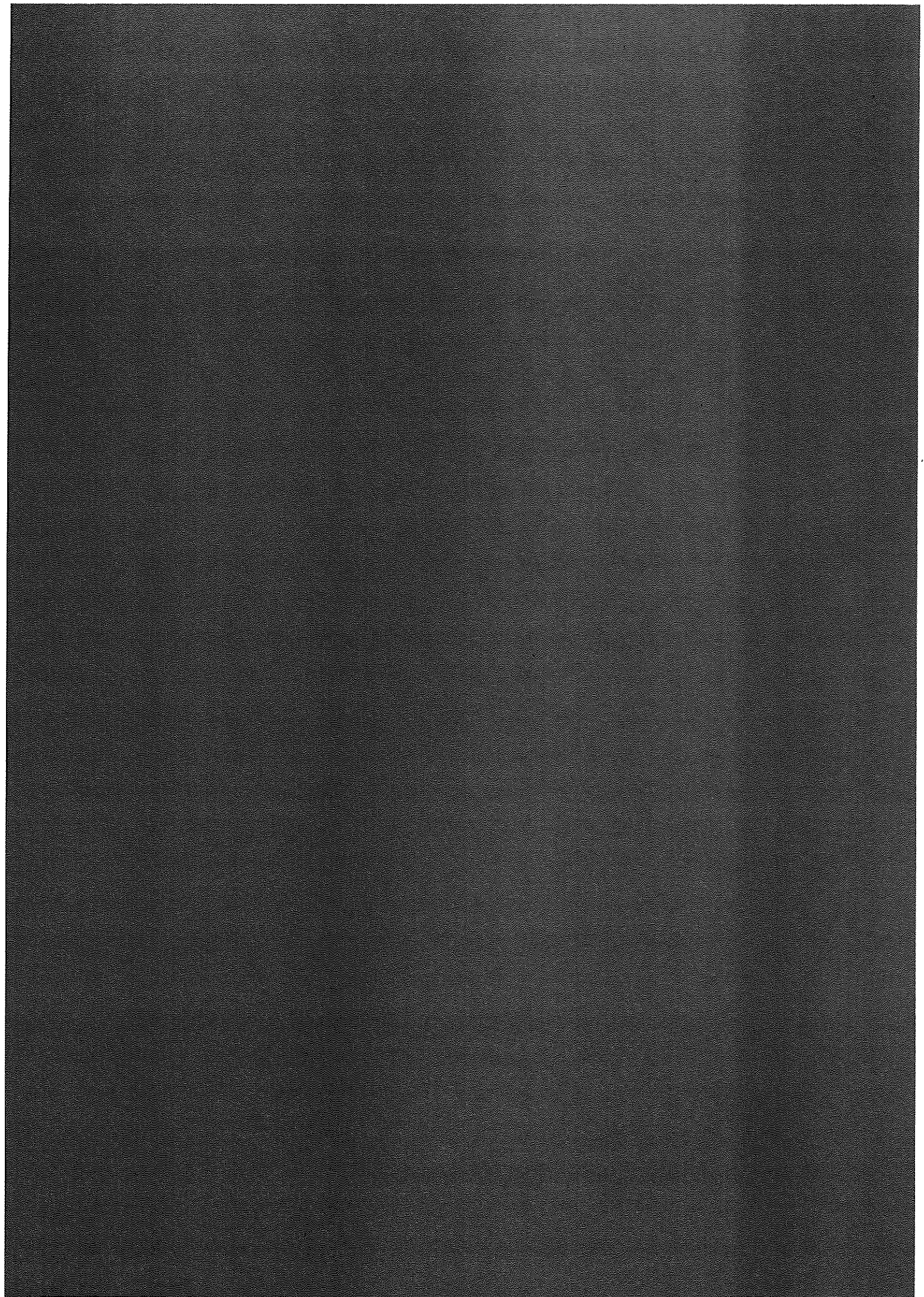
- The Clinical School's graduate medical program, which normally has four cohorts of 30 Graduate Medical Students (circa 120 students)
- Our third largest dental school with 15 -20 dental placements for postgraduate Masters in oral medicine
- 50 postgraduate PhD and Masters Students
- 17 full time equivalent academics, and
- Eight professional staff.



**Our land at Badgerys
Creek, Bringelly and
Camden will connect new
economic growth hubs
through Western Sydney**



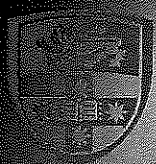




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