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Counting Tomorrow's Risk: A risk-based land use planning assessment of the Ingleside Precinct

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Abstract

Commissioned by the Department of Planning and Environment (DPE), in collaboration with the New South Wales Rural Fire Service (NSWRFS) and Northern Beaches Council, a comprehensive bushfire risk assessment was conducted for the Ingleside Precinct, one of the first true large-scale risk assessment of its kind in New South Wales (NSW) to inform strategic land use planning.

In 2012 DPE identified a new 'planned precinct' at Ingleside, on Sydney's northern beaches, nestled between four protected bushland reserves including Ku-ring-gai Chase and Garigal National Parks, the Katandra Bushland Sanctuary and Ingleside Chase Reserve. A draft Structure Plan was subsequently released in 2017. This draft Structure Plan envisaged a population increase from approximately 1,000 existing residents to an ultimate population of over 9,000.

In 2018 and in acknowledgement of the 'changing face' of risk-based land use planning policy, strategy and dialogue both at international and domestic scales, the Department elected to revisit the draft Structure Plan. The purpose of this study was to identity the magnitude of tomorrow's potential risk, borne out of land use planning decisions made today.

As one of the first large-scale risk-based land use planning assessments conducted in NSW and in accordance with the newly revised NSWRFS *Planning for Bushfire Protection* guideline, this process examined existing versus proposed risk. The assessment considered likelihood, consequence and vulnerability across key areas of people, property, infrastructure, the economy and environment to evaluate primary and secondary fatality and building loss extents for the existing situation, as well as the draft Structure Plan scenario.

The assessment included the development of bushfire risk mapping which underpinned am analysis and evaluation of both the existing and draft Structure Plan scenarios with particular focus on settlement pattern and structure, land use allocation, population and building density, evacuation networks, etc. Central to the consideration of risk, is risk acceptability or risk tolerance. This risk assessment process benchmarked the potential mitigation options to provide a detailed understanding of residual risk. This process enabled risk-informed land use planning decision-making to respond to both current and future risk scenarios having particular regard to risk to life, property and infrastructure.

In November 2018, the NSW Government announced it would not proceed with the draft Structure Plan for the Ingleside Precinct.

Introduction

Strategic land use planning-based risk assessments for bushfire in Australia are not particularly commonplace however, the recent release of the Bushfire Risk Assessment for the Ingleside Planned Precinct may assist in streamlining such processes into the future, where new land releases are proposed. Strategic risk assessments for floodplain management in Australia are subject to numerous guidelines and best practice manuals however, the same guidance material for undertaking bushfire risk assessments, let alone that required to guide strategic land use planning decisions regarding future risk, is not so apparent. The particular issue relating to land use planning-based risk assessments is that they must merge both quantitative and qualitative data analyses in order to forecast potential future risk. Therein lies a considerable challenge – one where all stakeholders must have a consistent understanding of risk appetite, or level of risk acceptance. What is 'acceptable' risk in a land use planning context when it comes to matter of bushfire risk in new or expanding communities? This paper and the risk assessment process on which it based provide a process by which these key questions can be explored.

Location and context

The community of Ingleside is located within the Northern Beaches local government area (LGA) approximately 30 kilometres north of the Sydney CBD. It is situated between the developed urban areas of Bayview, Mona Vale and Elenora Heights to the east, and the suburb of Terrey Hills, Ku-ring-gai Chase National Park and Garigal National Park to the north-west and south-west respectively (DPE, 2017). To the east, Ingleside is flanked by the Ingleside Chase Reserve and Katandra Bushland Sanctuary, such that Ingleside is almost entirely enveloped by protected bushland. Ingleside is elevated, with sweeping views of the ocean to the east. Throughout the area, topographical changes are almost constant, with areas of steeply sloping topography in the north and west, including immediately adjacent to road reserves.

The area is subject to a range of environmental and topographical features which have to date and will continue to dictate the urban form of the area, including complex water catchment, drainage and biodiversity values. The Precinct is geographically divided by Mona Vale Road which transitions west to east through the centre of Ingleside. The area to the south, known as South Ingleside, is slightly more developed/urbanised at present than the area to the north which remains largely rural and rural residential in nature dispersed with a range of non-residential land uses. These include activities such as places of worship, home-based businesses (mechanical, earthmoving, construction, golf courses, equine services and facilities, etc.), nurseries, animal boarding and rescue facilities, etc. A faith-based retreat and conference facility which accommodates school groups is also located with the far north-western area of the Precinct, in a densely vegetated area which bounds Ku-ring-gai Chase National Park, along with a Scout camp. Generally, the density of the Ingleside as it currently stands is very low density, with detached dwellings on larger 'lifestyle' or rural residential sized allotments and maintains a generally 'semi-rural' nature.

Mona Vale Road varies in width from Terrey Hills through to Mona Vale from four lanes to two-lane (one lane in either direction). The two-lane portions lie to the immediate east and west of Ingleside, where Mona Vale Road traverses through national park and conservation

areas. Design studies and approvals to widen these stretches of Mona Vale Road have been sought but have not yet been implemented.

Ingleside Planned Precinct

In 2014 the NSW Government launched the Priority Precinct program which focuses on identifying locations across greater Sydney with good access to existing or planned public transport connections, suitable for rejuvenation with new homes and employment. These areas have since evolved into Planned Precincts and have moved forward into the next stage of the planning process which focuses on the provision of priority infrastructure to support new development and redevelopment. The 700ha Ingleside Precinct is one of these Planned Precincts.

The NSW Government, via DPE, has worked alongside Northern Beaches Council, UrbanGrowth NSW, the local community and other government agencies to prepare a new plan for Ingleside which is intended to create new homes and coordinate infrastructure. The Ingleside Precinct has been identified as a potential opportunity to boost the supply of new homes in the North District of Sydney, a 'world city' which is under significant growth and housing affordability pressure.

In 2017, DPE released a draft Land Use and Infrastructure Strategy for public comment. It included a draft Structure Plan for the Ingleside Precinct, identifying potential future land uses and densities for the Precinct. The draft Strategy is based on detailed technical studies and extensive consultation with the former Pittwater Council (now part of the Northern Beaches Council), UrbanGrowth NSW, government agencies and the local community. This process built upon an initial round of community consultation which occurred in November 2014.

In 2017, comments from the community were received on the draft Strategy and draft Structure Plan, many of which flagging bushfire risk as a serious concern.

Identifying the need for a strategic land use planning-based risk assessment

Following the receipt of community submissions, DPE sought an expert peer review of work completed to date, including the land use rationale underpinning the draft Structure Plan. Completed in February 2018, the peer review assessment determined it was difficult to draw a conclusion that the risk profile relating to the existing and proposed community and land use context of Ingleside was sufficiently understood, to determine if the mitigation measures built into the draft Structure Plan were capable of reducing risk to an acceptable level. Part of this complexity involved a change to the state-wide policy relating to strategic planning for development in bushfire prone areas, with the draft release of the revised *Planning for Bushfire Protection* (PBP) guideline authored by the NSWRFS. This revised guideline introduced for the first time, specific provisions relating to the strategic appropriateness of development in bushfire prone areas, relative to risk profiles. These draft provisions had not previously been addressed as part of the draft Structure Planning process. Thus, the peer review recommended a full bushfire risk assessment be conducted to consider broader matters for consideration relating to bushfire resilient settlement patterns and structure, road and infrastructure networks, land use and density intentions for the Precinct.

Risk assessment methodologies

The risk assessment conducted was for the express purpose of informing strategic land use planning decision-making, which is inherently a question of whether acceptable risk exposure can be achieved via mitigation processes. The scope of the risk assessment specifically sought to determine:

a) the overall strategic suitability of the Ingleside Planned Precinct relative to bushfire risk; and
b) whether development of the Precinct, or part thereof, could be undertaken in a manner which mitigates risk to an 'acceptable' or 'tolerable' level.

The risk assessment represents a fit-for-purpose approach with a focus on determining and informing suitable risk-based land use planning approaches for the Ingleside Precinct. The approach to the risk assessment adopted a specific risk-based land use planning lens in order to critically analyse the extent of bushfire risk exposure in both existing and potential future (based upon the current draft Structure Plan) contexts.

The process was undertaken via processes outlined by the *National Emergency Risk Assessment Guidelines* (NERAG) published by the Australian Institute for Disaster Resilience (AIDR) as well as *AS/NZS ISO 31000:2009 – Risk management: Principles and guidelines (ISO 31000)*. A key reason a risk assessment was performed rather than a Bushfire Strategic Study, now flagged under the revised PBP Guidelines, was largely driven by the fact the risk assessment was needed to inform strategic land use planning decision-making relating to the draft Structure Plan. A Bushfire Strategic Study on the other hand, is ideally prepared once appropriate bushfire resilience urban design and mitigation methodologies have been employed through a structure planning exercise, such that the Study is justifying the approach take to assessing authorities. Thus, it remains the clear the different purposes of each approach.

Notwithstanding the above, whilst NERAG provides a robust risk assessment framework, the methodologies under it were not entirely fit-for-purpose, having specific regard to:

a) land use planning; and
b) bushfire-specific hazard and risk.

Although relevant to an extent, the nuances of decision-making and contextual considerations, as well as competing interests, of land use planning are not well addressed by a framework which primarily relates to disaster management processes.

Guidance material relating to floodplain risk assessment and management provide best practice direction, contextualised for the purposes of flood risk and incorporates land use planning considerations.

No such guidance material, either at a National or State level, exists for the conduct of bushfire risk assessments. This remains a large gap in current policy arrangements. In developing a fit-for-purpose approach befitting a risk-based land use planning lens, the strategic methodology adopted for the purposes of the risk assessment relies upon the consideration of the multitude of disciplines and mitigation approaches involved in the

development of bushfire resilience. To this end, the risk assessment process maintained a strong regard to the traditional aspects of the disaster management cycle, linking them to broader social, economic, environmental and settlement systems.

Risk assessment findings

The issue of risk tolerance or risk acceptability remained a core challenge throughout the risk assessment process, in terms of the ability to clearly identify and articular exactly what represents acceptable risk. Despite this, it is the case that a number of challenges exist in relation to the potential increase of development and more particularly, population, as envisaged by the draft Structure Plan. Amongst the key issues identified were:

- A history of fire in the area, noting the entirety of the Precinct was impacted by the 1994 Cottage Point fire which yielded over $12m in damage (in 1994 dollars);
- No new road connections were identified between Ingleside and surrounding areas to aid in emergency evacuation as part of the draft Structure Plan, despite a population increase of over 8,000 persons (from an existing population of 1,000). Four out of five of the existing road network routes out of the Precinct traverse bushland to exit the Precinct;
- The complex and steep topography of the landscape and impact this has on the safe use of the road network in a bushfire emergency, coupled with the exposure of the strategic evacuation network to radiant heat flux or flame contact. Over 25 per cent of the central arterial road, representing a key component of the evacuation network, is subject to potential flame contact and measures to mitigate this are complex;
- Access to reticulated water supply cannot be provided for the entirety of the Precinct. This is noting the reticulated water supply is not currently available to most of the Precinct;
- The conflict between environmental values and the desire for a ‘green’ character remain at odds with bushfire resilience. The settlement and structure patterns of proposed urban areas flanks a number of key environmental corridors which are intended to traverse the Precinct pursuant to the draft Structure Plan, which connect with the adjoining National Parks in a direction which could inadvertently invite flame front and spot fires into the Precinct. These corridors might also isolate portions of the Precinct via a road network which traverses bushland to connect with the wider evacuation network;
- The proposed density of development, coupled with the retention of bushland and environmental corridors within the Precinct raises signification question with regard to potential for urban fire intrusion or house-to-house ignition. House-to-house ignition is not an aspect of urban planning which is currently regulated in NSW or Australia but remains a critical component of consideration in planning for a bushfire resilient community; and
- The potential impact of climate change is identified to result in the likely increased frequency and intensity of fire weather and fire events, reduced rainfall and increased likelihood of drought conditions, longer duration of fire seasons (with resultant reduced windows of opportunity for hazard reduction in ‘low’ seasons), etc.

In Australia, approximately 80 per cent of property loss occurs within 100m of the bushland interface. Likewise, approximately 85 per cent of fatalities due to bushfire occur within 100m

of the bushland interface. Both data sets are derived from research conducted by the CSIRO in analysing both property loss and fatality data over hundreds of fire events across the country. Even when taking into consideration the extent of clearing proposed in order to site development, over 70 per cent of the Precinct remains within 100m of the bushland interface. This remains a high level of exposure, but is reduced from 91 per cent at present. Whilst an improvement however, this must be balanced against the extent of increased population exposure intended under the draft Structure Plan. Further, the emergency evacuation network requires further investigation to determine at a conceptual level, the evacuation ability of existing and future residents.

Overall, the scale and complexity of the competing, compounding and cascading risks to life and property indicated by the draft Structure Plan, supported by the evidence base presented by this risk assessment, determined that currently available mitigation measures are unable to reduce the risk profile created by the draft Structure Plan to a level which was universally acceptable to DPE, NSWRFS or Northern Beaches Council and accords with the revised PBP guideline.

Lessons learnt

The Bushfire Risk Assessment for the Ingleside Planned Precinct yielded three specific learnings moving forward:

1) One of the fundamental challenges in undertaking the risk assessment was the lack of national or State guidance material setting out the specific methodologies to be considered by a land use planning-based and bushfire-specific risk assessment. This remains a considerable policy gap to be addressed.
2) State and local governments must consider, and make clear for communities, the development industry and infrastructure providers, respective expectations regarding what exactly constitutes 'acceptable' or 'tolerable' risk to assist in guiding risk assessments of this nature into the future, and set firm benchmarks relating to same.
3) Any strategic land use planning-based risk assessment relating to bushfire must be underpinned by a robust evidence base to inform decision-making, coupling both qualitative and quantitative data analysis and intelligence.

Conclusions

The Bushfire Risk Assessment for the Ingleside Planned Precinct is one of the first true, large-scale strategic land use planning-based risk assessments which quantifies the potential magnitude of tomorrow's risk, borne out of today's decision-making. Its approach melded a range of cutting-edge concepts, tools and methodologies to derive a formative evidence base upon which a critical assessment of potential future likelihood, consequence, vulnerability and exposure could be compiled, having regard to factors of settlement pattern, evacuation networks, urban density, etc. It is hoped this risk assessment process will enable existing policy gaps to be filled, and pave the way for future strategic consideration of bushfire risk via land use planning using a focussed, sophisticated, and fit-for-purpose methodology.

A copy of the Bushfire Risk Assessment for the Ingleside Precinct is available online at https://www.planning.nsw.gov.au/Plans-for-your-area/Priority-Growth-Areas-and-Precincts/Ingleside