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INQUIRY INTO PLANNING SYSTEM AND THE IMPACTS OF CLIMATE CHANGE ON THE ENVIRONMENT AND COMMUNITIES

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Topic: The Role of Developer Contributions in Increasing Disaster Resilience in New South Wales

Contents

Introduction and Context

In the last century, the planet has seen the average temperature increase by 1 degree Celsius, which is expected to rise even further. This is known as climate change. The increase in temperature brings social, economic, and environmental issues, including the increased frequency and intensity of natural disasters, including floods, droughts, and bushfires.

According to the European Environment Agency (2017), disaster adaptation refers to "anticipating the adverse effects and taking the appropriate action to prevent or minimise the damage they can cause or taking opportunities that may arise." Effective adaptation from climate change is reflective of effective mitigation strategies that have been implemented. Disaster mitigation refers to the "means making the impacts of climate change and natural disasters less severe by preventing or reducing the impact of these events" (European Environmental Agency, 2017). Mitigation can be achieved through adequate planning controls, including raising the minimum heights of buildings, or through the use of zoning to prevent higher density development in bushland. Effective mitigation can show areas prone to disasters to become more resilient. (McDaniels et al. 2008). According to Parsons and Morely (2017), "disaster resilience is the capacity of communities to prepare for, absorb and recover from natural disasters events and the capacity for communities to learn, adapt and transform towards resilience. There are two approaches to disaster resilience. These approaches are the bottom-up approach or the top-down approach. The bottom-up approach refers to the idea of where communities can be assessed based on a range of criteria that determines how resilient the area can be through indicators such as preparation, exposure and resources. Compare this to the top-down approach, which provides a broad range of sources and indicators, such as using census data to determine how a community contributes to disaster resilience. In Australia, the top-down approach is used primarily to address disaster resilience.

As development has increased to address population and the need for more affordable housing, urban sprawl, especially in Sydney, has meant that housing is being built on lands at risk of frequent natural disasters. As a result, along with

climate change, more people are being affected by more frequent natural disaster events, causing problems among communities as there is an increased need to adapt and mitigate disasters adequately. However, disaster mitigation and adaptation strategies come at a cost, a cost where it is becoming increasingly too difficult to afford, which means more people are at risk of being impacted by natural disasters caused by the onset of climate change. One way of addressing this funding issue is through developer contributions. Developer contributions or developer obligations are currently being used across many developed countries, including Australia and New South Wales. Contributions can primarily be monetary, but they also mean that developers have to dedicate land or infrastructure to an authority or embellish infrastructure works as part of their development (New South Wales Department of Planning and Environment, 2021).

Within New South Wales, developer contributions form part of the New South Wales planning system and its relevant legislation of the Environment Planning and Assessment Act 1979. Developer contributions are located in Section 7 of the Act, and several types of developer contributions exist. This includes voluntary planning agreements, where the developer agrees with the consent authority to pay monetary contributions, dedicate land or embellish infrastructure. Consent authorities can either be the New South Wales state government or the local council. Local infrastructure contributions can either be based on a fixed rate (7.11) or the percentage of the development cost (7.12). On a state level, special infrastructure contributions are when the developer has to pay towards infrastructure controlled by the state government, including public transport roads such as motorways and affordable housing.

Many local governments have set either section 7.11 or 7.12 plans. Section 7.11 local contribution plans are where developers are charged a fixed amount which goes towards funding for public infrastructure. This set amount is based on different types of development, such as secondary dwellings or subdivisions and the more impact a development has, the higher developer contributions are. Section 7.12 local contribution plans are similar to section 7.11 plans. However, instead of a fixed amount, it's a percentage of the development, which is usually 1-3% of the development cost (NSW Environmental Planning and Assessment Act, 1979).

Developer contributions can be dedicated towards roads and transport, open spaces, community facilities and planning administration.

Voluntary planning agreements are another form of developer contributions and are usually more complex compared to section 7.11 or section 7.12 contribution plans. Voluntary planning agreements are agreements between the developer and the planning authority which can be either the state government or the local council. This is when the developer has to either dedicate land for public infrastructure, such as a park or embellish works and then dedicate those works to the relevant planning authority, such as a road or community facility. Another type of developer contributions is the use of Special Infrastructure Contributions (SIC), which helps fund infrastructure that the state government has delivered. Examples of infrastructure funded by the SIC include funding public transport facilities and funding state-owned roads, and health and education facilities.

Other types of developer contributions are embedded within section 7 of the New South Wales Environmental Planning and Assessment Act (1979). This includes Works in Kind Agreements (WIKA) and affordable housing developer contributions. Works in Kinds Agreements are where a developer can pay monetary contributions to carry out works that benefit the public, such as the construction of a park and dedication to the council through an agreement (Camden Council, 2022). Affordable housing developer contributions are where the developer has to cover the costs to help create affordable housing within the Local Government Area where the development occurs. Affordable housing developer contributions aim to supply new developments within a Local Government Area with unaffordable housing where the government can have a pool of funds to help create more affordable housing options in a local area. However, it is essential to note that only some Local Government Areas have developer contributions for affordable housing (City of Sydney, 2021).

Developer contributions can be used as an effective funding strategy to fund disaster adaptation and mitigation strategies in at-risk lands where developments have increased. A strategic framework can be implemented where developers have to pay for mitigation strategies, including bush regeneration or emergency services funding. Through developer contributions, it can provide funding for disaster mitigation and

adaptation strategies to be implemented, which can increase the overall disaster resilience of an area. This is important as upstream strategies, such as levees, as described by Hein et al. (2019). This means that strategies that improve the resilience of an area allow for development to occur in disaster-prone lands.

The objective of this report is to understand how developer contributions can be used in New South Wales to fund disaster mitigation and adaptation strategies to increase resilience. To meet the objective of this report, three research questions have been proposed.

1. How can developer contributions be used to address disaster resilience?
2. To what extent is climate change adaptation and mitigation is implemented in contributions plans across local government to allow development to occur in at risk lands?
3. What does the research findings tell us about the need for developer contributions to fund disaster mitigation and adaptation in the New South Wales planning system?

The report will follow the structure of a literature review, methodology, results and discussion, conclusion and references. The literature review will analyse literature based on developer contributions in an international context and literature regarding disaster resilience frameworks. The methodology section will highlight the different research methods used to help answer the research questions and meet the research objective. The research methods will be a mix of qualitative and quantitative data from the analysis of peer-reviewed journal articles and documents from local governments, including local contribution plans and voluntary planning agreements. Data collected from peer-reviewed journal articles and documents from local and state governments will be discussed to help find answers to the three research questions. This includes evidence of the effectiveness of upstream interventions to effectively adapt and mitigate impacts from natural disasters, what local contributions plans are doing to address disaster resilience and how the

information gathered from research questions 1 and 2 can be used to make changes to the New South Wales planning system and the contributions planning framework.

Literature Review

In terms of the literature to better understand how developer contributions can be used to address disaster resilience. There needs to be more information regarding the use of developer contributions to effectively adapt and mitigate natural disasters, especially in New South Wales and how it can be implemented within the New South Wales planning system. However, there is currently evidence from overseas studies on how developer contributions can be used to address disaster resilience and the need for upstream interventions for disaster resilience to be effective. The literature review will follow a structure of literature on developer contributions in an international context, followed by analysis of disaster resilience frameworks to adequately adapt and mitigate from natural disasters. The final section of the literature review will bring developer contributions and disaster resilience framework together to understand the development pressure in cities that allow developments to occur in disaster prone areas and the issue with funding for disaster adaptation and mitigation strategies in New South Wales.

Developer contributions or also known as developer obligations overseas, especially in countries across Asia and Europe. These countries include the United Kingdom, The Netherlands, Canada, Hong Kong and Indonesia.

In the United Kingdom, developer contributions are known by two terms which include the community infrastructure levy and Planning Obligations. A community infrastructure levy is a charge that local councils levy from new developments to be dedicated towards public infrastructure such as schools. (Community Infrastructure Levy (Amendment) (England) (No.2) Regulations 2019). Planning obligations in the United Kingdom planning system are under section 106 of the Town and Country Planning Act 1990. The act aims to mitigate the impacts associated with developments, such as traffic impacts. Both the community infrastructure levy and planning obligations can be measured through the use of land value capture. Land value capture is based on a number of variables, including the potential for the land to be redeveloped, planning controls to develop infrastructure and current market trends (United Kingdom House of Commons, 2018). Buck (2021) describes how the planning system, including the use of developer contributions in England, needs to

be used to its full potential. Developer contributions are funded from either the community infrastructure levy or planning obligation funds that can be used towards funding ecological resilience. However, it was discovered that with the current use of land value capture to charge developers for infrastructures such as roads, schools and hospitals, a similar method could be applied to allow more items to fund from developer contributions. This will hold developers to account if their development impacts the area socially, economically and environmentally.

In the Netherlands, developer obligations are based on the Civil Code through legislation of the Netherlands' equivalent of the Planning Act and different capital gains tax taxation systems. The Netherlands also adopts non-negotiable developer contributions, similar to New South Wales's contributions framework. This is when land is rezoned, the developers have to pay for the impacts associated with the development. Otherwise, the municipality will have to develop a contributions plan. This ensures that municipalities are not losing money towards improved infrastructure that new developments have had an impact on (Gielen, 2019). In Canada, developer contributions known as developer obligations have been developed by local councils to address the need for ageing infrastructure and financial constraints. Land Value capture is a tool to measure the number of contributions developers pay for new infrastructure. Each state in Canada has their contribution system. For example, development obligations in Ontario are levied via the Development Charges Act 1979. However, it is up to each municipality in Canada to levy developer obligations through different methods, such as land value capture (Kaplinsky and Amborski, 2019). In Hong Kong, developer contributions have yet to be adopted. However, they are currently using land value capture as a mechanism to release land for development. Hong Kong’s Land value capture system is similar to the United Kingdom system. However, Chau et al. (2019) argues that reforms in Hong Kong need to occur via Hong Kong’s land readjustment system to allow for proper use of the developer contributions system. In Indonesia, developer contributions are known as developer obligations. They are split into two categories of non-negotiable developer contributions and negotiable developer contributions in exchange for issuing development permits to the developer. However, compared to other countries analysed, contributions have a minimal legal

basis where developers may be able to get away from developer obligations, except for the city of Surabaya (Pumungas and Samsura, 2019).

In Australia, all states and territories have a developer contributions framework implemented as part of each state and territory planning system, including New South Wales, where developer contributions are a part of section 7 of the Environmental Planning and Assessment 1979. In Queensland, developer contributions are infrastructure charges and can be levied through local governments. This forms part of the local government infrastructure plan underpinned by the Queensland relevant Planning Act 2016. In Victoria, development contributions are similar to both contributions' frameworks in New South Wales and Queensland. Developer contributions form part of Victoria's planning legislation, and developers either have to pay monetary contributions or deliver works in kind to deal with developments' impacts on public infrastructure (Victoria Government, 2017).

There are benefits to using developer contributions, as described by Kearney and Ritchie (2021). These benefits were based on the developer obligations framework in Northern Ireland. They included the opportunity to provide extensive, affordable housing as part of new developments where developers have to provide an offset to local housing authorities to give houses that are lower in affordability to people with lower incomes. The article also highlights the benefits of developer obligations towards shared community facilities such as open space. The socioeconomic benefits of developer contributions are described by Heagany et al. (2015) as the article describes how the maintenance and upgrades to open spaces, such as parks being funded from developer contributions, can create a safe environment for communities to come together. This has provided many benefits, including an increased social capital where communities can come together as they use open space and investment from communities towards local businesses near open spaces or through non-monetary investments with not-for-profit organisations. This resulted from developer contributions funding, delivering or maintaining community infrastructure such as open spaces.

Based on the review of the literature, there are two types of interventions to address disaster adaptation and mitigation of downstream and upstream interventions. As described by O'Sullivan et al. (2014), the downstream approach to disaster adaptation and mitigation has mitigation strategies implemented after a disaster has struck. This can include emergency service responses such as emergency services responding to people affected by disasters such as being trapped by flood waters. Compared to upstream interventions described as implementing mitigation strategies before a disaster occurs, such as using bushfire mitigation strategies like back burning. Shreve and Kellman (2014) support the idea that upstream interventions are beneficial for disaster mitigation and adaptation to reduce the risk of disasters.

As development is increasing throughout the urban fringes of cities due to urban sprawl, such as the growth of Sydney and higher frequency and intensity of natural disasters, more people will be impacted by natural disasters, and more money will need to be spent on resilient disaster strategies. Malagoda et al. (2014), discusses how there are increasing challenges to creating a disaster resilient built environment throughout cities. One challenge that was discussed was the lack of regulatory frameworks regarding the need for infrastructure to mitigate impacts caused by natural disasters. This can include poor planning policy where developers can build on flood prone lands or build in areas that are prone to bushfires. Wear (2016) argues that due to the urban sprawl in places such as outer Western Sydney, there is currently a lack of social infrastructures such as hospitals and schools and argues that disasters such as flooding could also be concerns as the areas are not as built up compared to parts of the inner city. This means it is currently creating pressure on resources in the outer suburbs as a lower population density and expansive urban sprawl, and high risk of disasters means higher costs in delivering and maintaining infrastructure, including infrastructure that addresses disaster resilience.

To address disaster resilience, the United Nations has adopted frameworks to better support communities as they deal with the increased risk of natural disasters, especially in developing areas, as described by Cutter et al. (2008) and Martinho and reis (2022). Cutter et al. (2008) describes the need for an effective framework, a critical tool to minimise the impact of natural disasters impact communities. Concepts such as vulnerability and coping capacity are used as a measure of disaster

resilience, forming part of the framework developed by the United Nations. This is backed by Martinho and Reis (2022) as they expand on this information, and they investigate the framework's effectiveness in disaster risk reduction in Portugal. The case study found that adopting the United Nations framework for disaster resilience created a reduction in the impact of natural disasters, including reduced vulnerability and increased coping capacity. In their article, Conant and Brewer (2022) describe how disaster reduction and resilience are needed within Australia. They argue that the current frameworks other countries have adopted from the United Nations have clearly not been utilised in New South Wales despite Australia's increased risk of natural disasters. However, funding issues currently exist to implement disaster adaptation and mitigation strategies. Buck (2021) explains how land value capture and developer contributions increase ecological resilience in areas throughout England. This can also have the potential to fund upstream disaster mitigation and adaptation strategies. This can also be completed through other strategies to allow funding for upstream strategies, such as the cost-benefit analysis as described by Kim et al. (2022), which argues that if strategic frameworks were implemented to allow disaster mitigation and adaptation strategies were implemented based on cost-benefit analysis would allow disaster adaptation and mitigation strategies to be implemented early on. Dennjean et al. (2017) also suggest that using cost benefit analysis to prevent the risks associated with natural disasters from occurring can allow for the suitable development of green-grey infrastructure. However, it also argued there is a funding issue to implement upstream disaster adaptation and mitigation strategies.

The article developed by Koutifaritis and Mangioni (2012) looked at whether or not developer contributions would be beneficial instead of using contribution rates. While the Australian constitution underpins the funding arrangements as traits for local governments are paid by the residents, there is no income to support infrastructure to cater for development growth. There needs to be more funding for local governments in Australia to use infrastructure, and developer contributions can be the most effective way in helping to fund infrastructure in Local Government Areas alongside rates paid by residents. However, developer contributions cannot be utilised to their full potential due to legislation of section 500 of the New South Wales Local Government Act (1993) and regulation and economic appraisal of the

Independent Pricing and Regulatory Tribunal (IPART). This is due to the cap on the amount Local Government Areas can charge per dwelling for contribution payments. For section 7.11 payments, they can only be capped to $20,000 unless there is approval from IPART to raise the cap. Furthermore, the cap can only be raised if there is a critical need for infrastructure in a certain area, such as a greenfield development. (New South Wales Department of Planning and Environment, 2019; Searle et al. 2019).

Evidence from the literature suggests that developer contributions are crucial in delivering public infrastructure, such as contributions being levied towards affordable housing. However, the evidence from the literature suggests that funding was the main issue regarding disaster resilience. Using developer contributions is an effective way to fund disaster mitigation and adaptation strategies in overseas studies. However, there remains a gap in the literature regarding developer contributions to fund for disaster mitigation and adaptation to increase resilience in New South Wales and its respective planning system.

Methodology

To meet the objective of this research and to answer the three research questions to meet the aim of this research a range of qualitative and quantitative research methods will be applied. These research methods include analysing peer-reviewed journal articles, analysing local contribution plans and using the information to provide recommendations for both the state and local levels to implement in the developer contributions framework and the New South Wales planning system.

To answer research question 1 of “how can developer contributions be used to address disaster resilience”, the qualitative research method of analysing peer-reviewed journal articles. When the research question was developed, google scholar was used to analyse peer-reviewed journal articles. When analysing each article, data was placed into a spreadsheet into different categories, which included the article title, the theme that the article explores, the location of the case study of each article, the methodology used for each piece and results and conclusion from each journal article. After collecting 15 journal articles, each article was split into two categories: the need for upstream interventions and the use of developer contributions to mitigate natural disasters. This data was written into two separate sections for the report. Based on the information collected, the research question was tweaked to reflect the data collected to help meet the objective of the research question. A benefit of using peer-reviewed journal articles for this research is that it provides a broad scope of research from overseas studies demonstrating the importance of developer contributions and implementing disaster adaptation and mitigation strategies. There were two limitations of this research method: the lack of access to peer-reviewed journal articles, as the ones that could be accessible, were either free to use or provided access from the university. The timing was also a limitation as this research was to be conducted in a short time period.

To answer research question 2: "to what extent is climate change adaptation and mitigation implemented in multiple contributions plans to allow development to occur in at risk lands?" Quantitative research methods will be applied. The quantitative analysis method of a desktop review will be used to analyse ten local contributions and regional strategic plans. This process began by reading through section 7 of the

Environmental Planning and Assessment Act 1979, the legislation of where developer contributions are enforced in the New South Wales planning system. Ten Local Government Areas were selected to analyse local contribution plans and voluntary planning agreements that have been adopted in each Local Government Area. When selecting each Local Government Area in New South Wales, ten Local Government Areas were selected to provide enough coverage of local contribution plans. Each Local Government Area was selected based on how prone they were to natural disasters. They were either chosen from growth areas in western Sydney or were based on or near the coast from Clarence Valley Local Government Area in the North to Bega Valley Local Government on the far South Coast. Desktop analysis was done by reading each contribution plan, and the information gathered was placed on an excel spreadsheet. Data was placed into categories consisting of: the year the plan was adopted if they have more than one contribution plan; if they have disaster resilience and/or mitigation strategies implemented in their contribution plan; disaster resilience and/or mitigation strategies implemented through other words; how many catchment areas are in each local contribution plan; where contributions get levied towards such open spaces and community facilities. A similar process was undertaken with Voluntary Planning Agreements executed across each Local Government Area, where a desktop analysis was undertaken on whether disaster mitigation strategies have been implemented. This process was going to be conducted with State Voluntary Planning agreements. However, due to the lack of information and their link to regional strategic plans, analysis of regional strategic plans occurred instead. The method of desktop analysis of both local contribution plans and regional strategic plans is beneficial as it gives a broad scope of all developer contributions that are used across New South Wales and how each local council is addressing disaster adaptation, mitigation and resilience. A limitation of this research method is the use of bias in data collection. As the analysis will only occur in a set amount of Local Government Areas. Local Government Areas can be chosen based on what has been implemented in their local contribution plans. This can change how the data can be presented, and a conclusion is determined. For example, only analysing local contribution plans that don't have disaster mitigation strategies. Contribution plans were only analysed from Local Government Areas on or near the coast or in greenfield development areas.

To answer research question 3, “What does the research findings tell us about the need for developer contributions to fund disaster mitigation and adaptation in the NSW planning system.” Both quantitative and qualitative research methods will be used with information gathered that was used to help answer research question 1 and research question 2. This process analysed the results from the research question about the best approach around the effectiveness of developer contribution to be used. Information was gathered from research question 2 to explore what is currently being done in Local Government Areas with developer contributions being used in local contribution plans. Suppose there was a need to implement disaster mitigation and adaptation strategies into local contribution plans. This was followed by recommendations to improve the developer contributions framework as part of the New South Wales planning system at the state and local levels. Overall, the use of both qualitative and quantitative research methods of analysing peer-reviewed journal articles, analysing local contribution plans and using the information to provide recommendations for both the state and local level to implement in the developer contributions framework and the New South Wales planning system. This will be beneficial to help answer the research questions and to meet the objective of this research of understanding how developer contributions can be used in New South Wales to fund disaster mitigation and adaptation strategies to increase resilience.

Results and Discussion

Research Question 1 - What is the potential of developer contributions to address disaster resilience?

To address research question 1 of “How can developer contributions be used to address disaster resilience,” and is based on the analysis of peer reviewed journal articles. The key findings are summarised below.

With disaster mitigation, adaptation and resilience, the literature analysis suggests that upstream intervention is the most effective to minimise the impact of climate change and the onset of natural disasters affecting a larger population. For example, the article written by Sharifi and Yamagata (2016) highlights the tools needed to address disaster resilience for communities, especially in developing areas. Tools were selected from a framework and were based on how effective they were in mitigating natural disasters. Upstream interventions from the framework were proven to be the most effective. This is further supported by the disaster framework set by the United Nations, as highlighted by Martinho and Reis (2022), which in their case study of this framework implemented by the Portuguese government a wider acceptance of the need for disaster risk reduction. This resulted in Portugal being better prepared for natural disasters and having a higher disaster resilient capacity that could efficiently respond to severe natural disasters, which has socioeconomic benefits. This can also be supported by an article by Handmer et al. (2018) highlighting the existing disaster frameworks within Australia that was adopted in 2001. It found that with the increase in intensity and frequency of natural disasters, the current framework is not able to cope, and that Australia's disaster resilience framework needs to be updated to reflect the impacts of recent natural disaster events from larger population groups.

Similarly, Kim et al. (2022) and Mukerjee (2005), where both articles also set out a disaster resilience framework that suggests that upstream interventions play a vital role in reducing the impacts of natural disasters. Kim et al. (2022) describes upstream mitigation strategies, such as appropriate funding for disaster mitigation and adaptation, to reduce the effects of disasters in population centres, especially in new population centres. This was highlighted by the case study conducted using

cost-benefit analysis on different types of disasters. The framework also supported post disaster economic funding, which should help fund mitigation strategies to reduce the impacts of future disasters. Mukerjee (2005). also expands on this framework through the creation Sustainable Living Environment (SusTLE) approach, which aims to provide a framework where disaster mitigation strategies can occur towards the settlement development process, which creates new employment and housing opportunities. This allows disasters to be effectively mitigated from the early stages of development, reducing the costs from the impact of natural disasters and having a lower carbon footprint to lower the effects of climate change and natural disasters.

The disaster resilience framework is designed to address the challenges of creating a disaster resilient built environment as upstream interventions are crucial to minimise the long term costs of natural disasters, as described by Malagoda et al. (2014). This is evident, especially in unplanned cities, as the lack of frameworks to deal with natural disasters and to plan cities effectively so natural disasters do not impact the population of cities. The article provides a set of recommendations to allow unplanned cities to prepare for the occurrence of natural disasters, with several recommendations including investing in infrastructure that adequately mitigates natural disasters, which can be considered an upstream strategy. The research can back this up by Bouwer et al. (2014) focuses on the importance of upstream disasters mitigation in Europe. The research discovered that disasters were being measured by their direct cost of the disaster, i.e., measuring the financial impacts of a natural disaster after it has struck. To change from the direct approach, a cost assessment framework was created to help determine the costs of natural disasters with consultation from a variety of stakeholders. The framework was designed and aimed towards decision makers to help them determine the need to invest monetary funds into disaster mitigation strategies. However, the cost also varied based on factors such as climate, population density, proximity to the coast and rivers and the time of year the disaster occurs. Changing the approach through a cost assessment framework helps inform decision makers to use upstream interventions to make areas more disaster resilient.

The need for upstream disaster mitigation and adaptation strategies can be utilised through the use of developer contributions, especially in areas that are more vulnerable to the impacts of disasters and where there is an increase in development. Hein et al. (2019) conducted a study where government intervention can have significant socioeconomic benefits, significantly if funding from developers can mitigate the impacts of disasters before they occur. Empirical evidence was collected from 3 separate disaster events in Queensland. The results found that with upstream mitigation strategies, including management for coastal erosion from cyclone events, the public was not concerned about the risk erosion would have on their open space or homes. This was due to the funding of adaptation and mutation strategies from developer contributions which lowered the impacts of natural disasters and increased disaster resilience. This article reflects the framework that was set out by Van den Honert (2016) and Wear (2016), where frameworks were created based on decision making and developing funding strategies to deliver social infrastructure to improve disaster resilience. Through the use of a cost benefit analysis, effective decision making allows for development to occur where there could be less of a risk of natural disasters having an impact on new developments, especially in outer urban areas making of natural disasters and the economic costs through the use of a cost benefit analysis. Early intervention meant less money overall was being spent on natural disaster management and can be directed to other forms of infrastructure. This can then form the basis of using contribution plans to adequately direct funds from developers to infrastructure that supports disaster resilience, such as bushfire management but is also cost effective. Having cost effective disaster mitigation strategies can also mean that contributions can be put towards other critical social infrastructure such as schools and hospitals (Reyers et al. 2022).

However, for upstream disaster resilient strategies to be implemented and cost-effective, there needs to be effective governance, as described by Zurita et al. (2018). This can be explained through the natural disasters that have affected Australia in recent years, where local councils are mainly held responsible for cleaning up the impacts of natural disasters. The article argues that disaster mitigation strategies and other resources used to address disaster adaptation and mitigation strategies need to expand over all areas and that local councils. This

should include the responsible State and Federal Government departments and agencies that need to work together and share knowledge and resources to reduce the cost effect of natural disasters. This is also reflected in the shift to the responsibility of disaster mitigation to create an insurable future and to prevent disasters from wreaking havoc, as described by De Vet et al. (2019). The article argues that state and federal governments need to be held more responsible in funding upstream disaster mitigation strategies to allow more to be insurable as the risk of a disaster will be less likely to occur. This should be embedded into legislation where governments and developments will be held responsible for funding disaster adaptation and mitigation strategies. This will allow decision makers in governments to invest in upstream disaster adaptation and mitigation strategies rather than downstream strategies when a natural disaster strikes, and people are significantly impacted. Investing in upstream disaster mitigation strategies will reduce the impact of natural disasters and will have long term economic, social and environmental benefits as areas of disaster-prone lands become resilient.

Research Question 2 - To what extent is climate change adaptation and mitigation is implemented in contributions plans across local government to allow development to occur in at risk lands?

To address research question 2 of “to what extent is climate change adaptation and mitigation implemented in contributions plans across local governments to allow development to occur in at-risk land,” and is based on the desktop analysis of analysing local contribution plans, voluntary planning agreements and regional strategic plans. The key findings are summarised below.

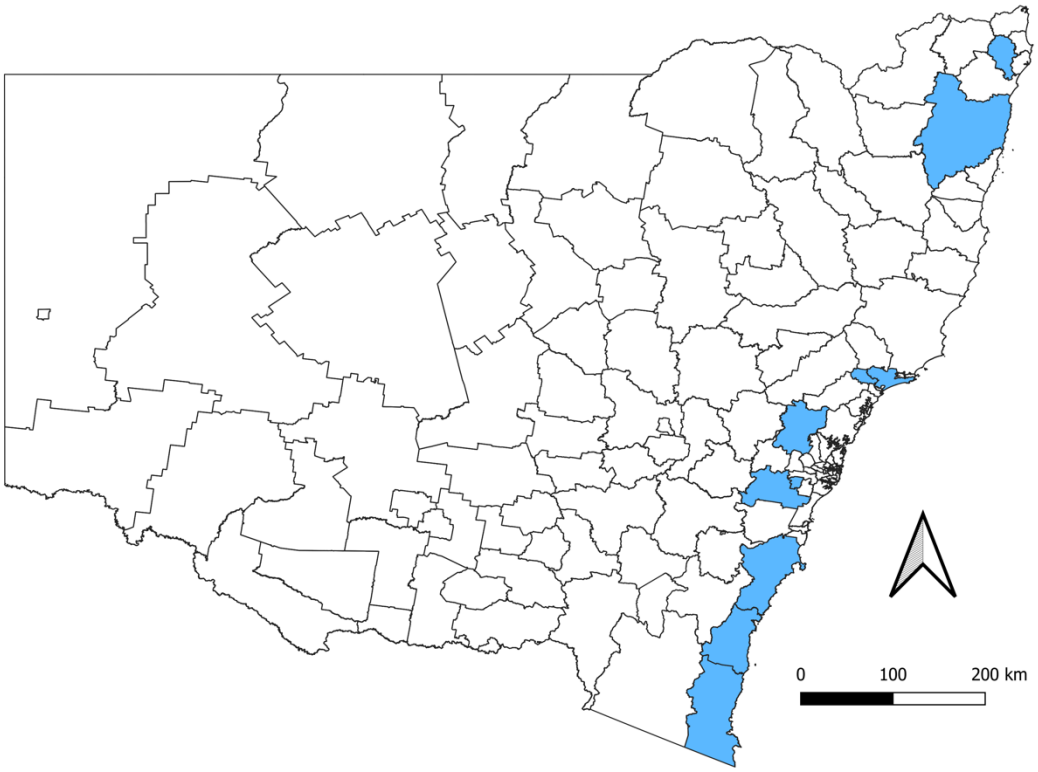

Figure 1: Map of Local Government Areas analysed.

The ten Local Government Areas local government plans that were analysed include three councils in Western Sydney of Wollondilly Shire Council, Camden Council and Hawkesbury City Council; three Local Government Areas on the South Coast, including the City of Shoalhaven Council, Eurobodalla Shire Council, and Bega Valley Shire Council; two Local Government Areas in the Hunter region of Port Stephens Council and Maitland City Council; and three Local Government Areas in North Coast of Clarence Valley Council and Lismore City Council. The Local Government Areas were chosen to be analysed for a number of reasons, including opportunities for greenfield development, proximity to the coast and how prone each Local Government Area is to natural disasters such as floods and bushfires. All Local Government Areas had a stormwater and sewer management as part of their contributions plan that was embedded in their respective local contributions plan or as a section 64 of the New South Wales Environmental Planning and Assessment Act (1979) plan. This wasn't included as a disaster mitigation strategy as all new developments have to provide stormwater infrastructure either part of private land or dedicated to the council or state government as public land. However, this is not to

be confused with flood mitigation strategies as this focus on major flooding instead of everyday storm events.

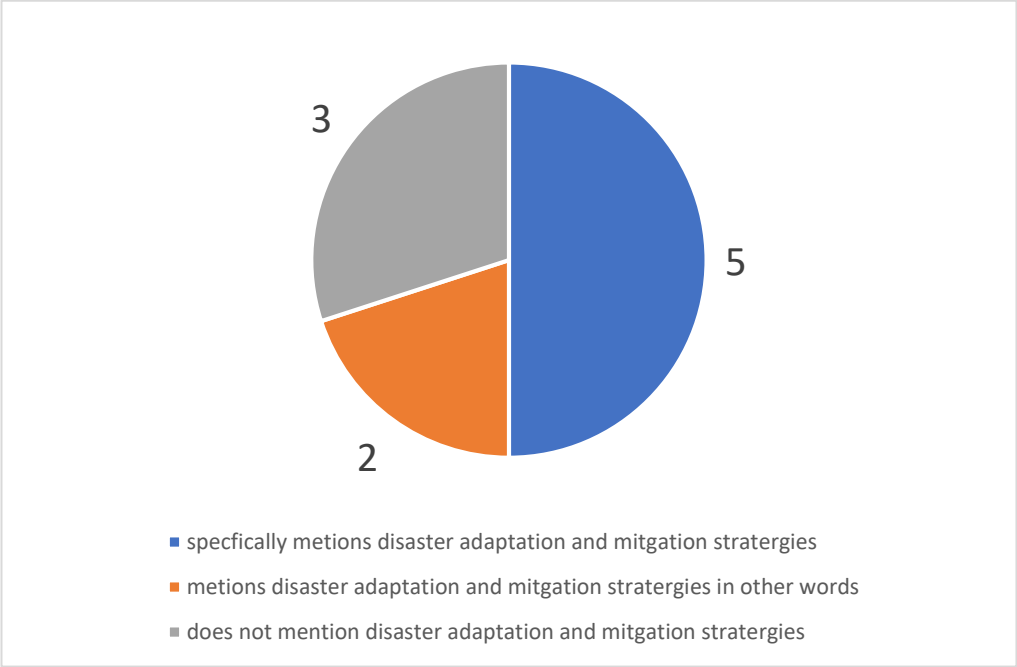

Figure 2: Disaster adaptation and mitigation strategies in local contribution plans.

Out of the ten contribution plans analysed, only five Local Government Areas had disaster mitigation specifically mentioned disaster mitigation in their respective local contribution plan. These Local Government Areas are Eurobodalla, Port Stephens, Camden, Lismore and Shoalhaven. The Eurobodalla section 7.11 contributions plan (2022) levies funds towards marine management, including strategies for residents to use marine facilities for recreation purposes. Eurobodalla's maritime infrastructure strategy also includes retaining walls to prevent coastal erosion along the foreshore and river banks. However, this strategy may not be effective as previous research on the management of levees as a disaster adaptation and mitigation. Levees have more of an environmental impact than other forms of mitigation strategies as they disrupt the waterfall along floodplains and disasters such as hurricane Katrina which hit New Orleans and impacted millions of people (Park et al. 2013).

In the Port Stephens contributions Plan (2022), disaster mitigation is specifically mentioned through different categories; funding for fire and emergency services and

flood and drainage works. In the Shoalhaven local contribution plan (2019), some developer contributions are funded towards fire control centres. This could be explained through the amount of bushland and how quickly impacted the area has been by the black summer bushfires. Developers wishing to construct on bushfire prone land should have to pay for improvements towards fire control centres (Nolan et al. 2021).

In the Camden contributions plan (2011) and Lismore (2014) contribution plan, contributions funding goes towards voluntary emergency services, including funding for the Rural Fire Service due to the amount of bushland located within both Local Government Areas and funding for the State Emergency Service due to both Local Government Areas being vulnerable to extreme flooding events.

The local developer contributions plans adopted within the last three years have specifically mentioned disaster mitigation and adaptation strategies in their respective plans, except for Camden Council and Lismore Council. This suggests that it was a requirement for all Local Government Areas to have emergency management and other mitigation strategies before the state government changed legislation on how to for emergency services. The New South Wales Fire and Emergency Services Levy Act 2017, changed how the emergency services and their related activities, such as bushfire mitigation strategies, were changed in how they were funded. Funding for emergency services was changed from the developers to an agreement with the emergency services, the New South Wales state government and local councils. Despite this, funding for emergency services, including the rural fires services and State Emergency Services, still remains part of the Camden, Port Stephens Shoalhaven, and Lismore local contributions plans, and developers are held responsible for funding for the Rural Fire Service (Wallace and Dollery, 2021).

For the remaining five Local Government Areas, only two Local Government Areas mention disaster mitigation strategies; in other words, embedded in their respective contribution plans, these Local Government Areas are Wollondilly and Clarence Valley. In the Wollondilly local contribution plan (2020), disaster mitigation strategies are funded via open space, with both flood and bushfire mitigation strategies being implemented. In the Clarence Valley local contribution plan (2011), funding for open

space goes towards conservation management, including disaster management and infrastructure to support riverways and coastal areas. However, the plan does specifically mention disaster mitigation strategies.

The remaining three Local Government Areas of Hawkesbury, Bega Valley and Maitland didn't mention any disaster mitigation strategies throughout their contributions plan. This is to suggest that either disaster mitigation strategies are funded through other means, such as state and federal government funding for councils unaware that funding for disaster adaptation and mitigation strategies can occur via developer contributions.

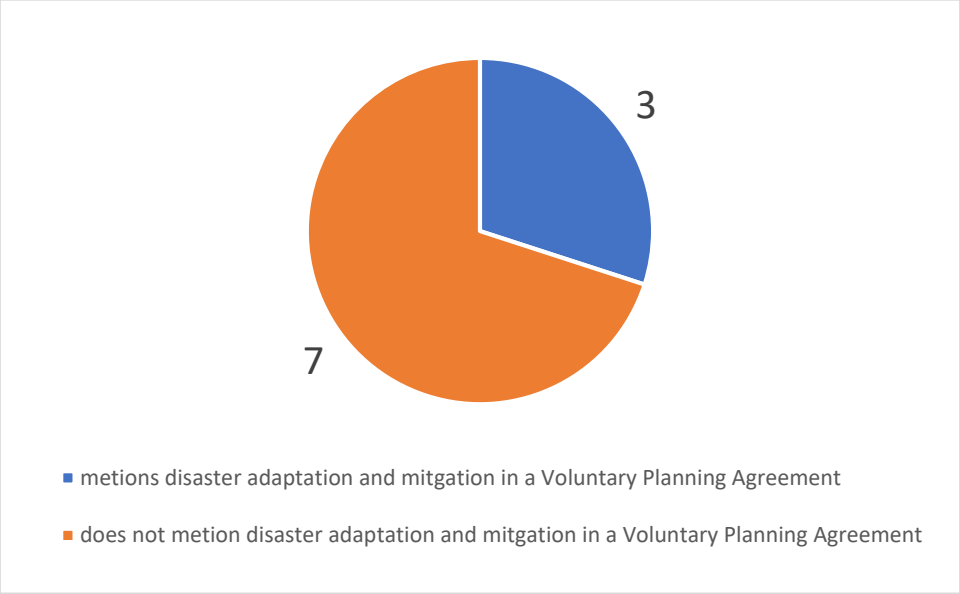

Figure 3: Disaster adaptation and mitigation strategies in Voluntary Planning Agreements.

When analysing local Voluntary Planning Agreements that have been implemented, only three Local Government Areas have had disaster mitigation adaptation and/or resilience mentioned in a respective VPA. In the Wollondilly Local Government Area, one Voluntary Planning Agreement mentions disaster adaptation and mitigation strategies. The developer is responsible for funding a community resilience officer for a two year period. The officer's role is designed to build the community's knowledge of disasters, including education about mitigating disasters at a household level

(Rogers et al. 2016). In the Port Stephens Local Government Area, one Voluntary Planning Agreement mentions disaster adaptation and mitigation strategies. The developer must carry out works to mitigate the sand dune transgression to allow for the site's future development and prevent flooding. Finally, in the Hawkesbury Local Government Area, one Voluntary Planning Agreement requires the developer to fund environmental conservation. While these voluntary planning agreements do not directly provide infrastructure for disaster resilience, they can have the potential for future planning agreements to implement strategies or be required to contribute towards enhancing biodiversity or deliver infrastructure that effectively mitigates the impacts of natural disasters (Buck, 2021).

State Voluntary Planning Agreements are critical if developers pay for infrastructure, including roads and transport. State infrastructure is determined by a number of factors, including regional plans. All regional strategic plans that form part of each Local Government Area are analysed as part of this research question. Disaster resilience was mentioned as part of their respective regions' priorities or directions. The regional plans analysed as part of research question 2 are: Draft Hunter Regional Plan 2041; Southeast and Tablelands Regional Plan 2036; Illawarra Regional Plan 2041; Draft North Coast Regional Plan 2041; and Western City District Plan 2018. At the time of writing this report, no state voluntary planning agreements have been proposed or executed that do not address disaster resilience or disaster mitigation strategies. This could have a potential effect, that is, a lack of leadership within the state government to help provide the infrastructure that is critical to improving disaster resilience. The lack of infrastructure through the use of state voluntary planning agreements may mean areas need to meet their strategic planning frameworks and that natural disasters will continue to have a severe impact (Forino et al. 2017; Macarthur, 2020).

Research Question 3 - what are the implication of the research of how developer contributions and disaster resilience and how can it be implemented in local contribution plans across the new South Wales planning system?

To address research question 3 of “what are the implication of the research of how developer contributions and disaster resilience and how can it be implemented in local contribution plans across the New South Wales Planning system
and is based on the review of the evidence gathered from research question 1 and research question 2. The key recommendations are summarised below for both the state level and local level.

The implications of the research to improve the New South Wales planning system can be addressed with the following recommendations at the state level:

1. Proactive leadership from the New South Wales state government to adopt existing global frameworks of disaster resilience into current legislation.

At the time of writing, the current government is aware that net-zero carbon emissions must be achieved by 2050. The New South Government has introduced strategies to meet this target, including the ban on single-use plastic, and mentions sustainability targets and resilience in strategic planning documents as climate change will contribute further to intense and frequent natural disasters. (New South Wales Government, 2022) However, there are still very legislative requirements that the state government and local government are required to comply with, and changes will need to occur to legislation in New South Wales. This can include changes to the environmental planning and assessment act 1979, including changes to section 7 of the Act, which includes developer contributions. Some of these changes include mandatory legislation that all risks involved with natural disasters be effectively mitigated and are mentioned explicitly in local contribution plans, voluntary planning agreements, Special Infrastructure Contributions and Works In Kind Agreements. There is also an opportunity to amend the Emergency Funding Services Fund Act 2017. This is where developers are required to fund towards emergency services as part of their development if their development is increasing population density to an area. Overseas studies show that by adequately funding

resources to address disaster adaptation and mitigation strategies in the upstream. In the long term, it will allow full disaster resilience to achieve as the risk of natural disasters affecting population groups will be significantly reduced (Hein et al. 2019; Bouwer et al. 2014).

2. To create a framework of what is required in each local contribution plan for local governments to adopt.

When conducting this planning report, every Local Government Area's local contribution plans analysed very different sets of catchment areas, different types of infrastructure that need to be levied and different rates for the same and/or different development types. This needs to be revised among local councils regarding what infrastructure needs to be funded by developers and what infrastructure needs to be funded through other means. Creating a framework with consistent language, development types being levied, e.g., secondary dwellings, subdivisions, employment land and what type of infrastructure contributions should be levied. By doing this, it can hold local councils responsible for developing local contribution plans that are not only consistent with other local contribution plans. It also addresses disaster resilience by adding infrastructure for which developers are responsible through monetary contributions or delivering and maintaining adequate adaptations and mitigating natural disasters. However, complete consistency across different Local Government Areas may still need to be achieved. Every Local Government Area has different challenges for funding, delivering and maintaining infrastructure. The state government should also hold more responsibility to levy infrastructure of a higher cost, which can provide councils with more opportunities to direct contributions to infrastructure that adapts to and mitigates natural disasters (Moore and Hockings, 2013).

3. The Independent Pricing and Regulatory Tribunal needs to support local councils in allowing upstream disaster adaptation strategies to be added in local contributions plans and removing the price cap.

The Independent Pricing and Regulatory Tribunal or also known as IPART forms part of the New South Wales state government. They are responsible for a number

of items, including regulating pricing at a reasonable level, including energy rates, council rates and developer contributions. For example, when a local council wants to create and adopt a new contributions plan in New South Wales before the plan is sent to the Minister for Planning for approval, IPART reviews if monetary contributions don't reach the price cap of $20,000 or $30,000 in greenfield areas, approve price cap increases for monetary contributions and if monetary contributions are being directed to proper public infrastructure. However, delivering long term infrastructures, such as infrastructure that allows for the upstream implementation of disaster mitigation and adaptation strategies, may be higher than the price cap. Therefore, IPART must allow developers to pay contributions towards embellishing, delivering and maintaining infrastructure that effectively mitigates natural disasters and increases the overall disaster resilience of an area through the removal or increasing the price cap (Kim et al. 2022).

The implications of the research to improve the New South Wales planning system can be addressed with the following recommendations at the local council level:

1. That local contribution plans must clearly identify catchment areas and infrastructure beyond grey infrastructure such as schools and hospitals.

This recommendation is an extension of the second recommendation on the state level. At the same time, the state government is responsible for developing the framework of what should be included in local contribution plans. For example, when local contributions clearly identify catchment areas, it may indicate if an area is prone to natural disasters. This can then identify different contributions that developers are required to make and that more contributions can be dedicated towards infrastructure needs for specific areas within local contribution plans. This is already in place across multiple contribution plans, especially in growth areas, where developers willing to construct new developments are required to make additional contributions to support a growth area with little public infrastructure to support the new development (Forino et al. 2017). There is also an opportunity to extend infrastructure from “grey’ infrastructure that forms part of local contribution plans. These can be monetary contributions towards infrastructure, such as environmental conservation, to adequately mitigate the impacts of natural disasters (Buck, 2021).

2. Accessibility for developers to access information regarding developer contributions and disaster mitigation strategies to understand what the developer’s roles are in addressing disaster resilience.

Each Local Government Area within New South Wales has different local contribution plans. This is a result of each Local Government Area having a different set of challenges aligned with a different set of infrastructures that needs to be delivered and/or maintained, which leads to different rates and catchment areas. Developers must be clearly informed of their obligations and how much infrastructure they must contribute via monetary contributions or other means. This can include the use of easy to access planning instruments and tools such as the use of mapping or a list of items developers are expected to contribute as part of their development, such as drainage works or funding for emergency services (Biggar and Siemiatycki, 2020). The state government and local councils should also endorse any developments that address disaster adaptation and mitigation strategies that impact the wider environment. This was already being completed as part of planning agreements where developers usually constructed and maintained public infrastructure such as parks for contribution offsets. It also recommended that it be extended to infrastructure that increases an area's resilience to natural disasters. However, there needs to be effective measures adopted from global frameworks to allow for development to be encouraged to develop infrastructure that adequately adapts and mitigates natural disasters and increases the overall disaster resilience of an area (Qian and Chan, 2016; New South Wales Department of Planning and Environment, 2021).

Conclusion

Overall, the research objective of “understanding how developer contributions can be used in New South Wales to fund disaster mitigation and adaptation strategies to increase resilience” has been met through the literature review and by answering all three research questions. Research question 1 looked at “how can developer contributions be used to address disaster resilience.” This was answered through the research method of analysis of peer reviewed journal articles. The analysed peer reviewed journal articles were divided into two categories : the need for upstream inventions for disaster adaptation and mitigation and the use of developer contributions as an upstream strategy to adapt and mitigate natural disasters effectively and to allow disaster prone areas to become more resilient.

Research question 2 examined “to what extent climate change adaptation and mitigation is implemented in contributions plans across local governments to allow development to occur in at-risk lands.” This was answered through the desktop review and analysis of local contributions plans and local voluntary planning agreements across ten Local Government Areas in New South Wales and regional strategic plans. This is to determine if councils are addressing disaster adaptation and mitigation strategies in their local contributions plans and the New South Wales planning system.

Research question 3 looked at “what does the research findings tell us about the need for developer contributions to fund disaster mitigation and adaptation in the NSW planning system.” This was done by collecting the information that was gathered from research questions 1 and 2 and providing recommendations at both the state and local levels to implement disaster adaptation and mitigation strategies to improve disaster resilience in the developer contributions planning framework and the New South Wales planning system.

The major findings for research question 1 are that there is currently evidence from overseas studies from peer reviewed journal articles that demonstrate the importance and the urgent need for developer contributions to fund for critical public infrastructure. This includes allocating funding from developer contributions towards

infrastructure that can successfully adapt and mitigate impacts from natural disasters such as floods and bushfires. In addition, case studies from overseas demonstrate that adopting global frameworks can allow developers and governments to adequately implement strategies to adapt and mitigate natural disasters and improve disaster resilience in at-risk lands. Similarly, evidence demonstrates that cost effective upstream interventions contribute to the overall disaster resilience of an area long term. Therefore, decision makers, including governments, should invest in upstream disaster adaptation and mitigation strategies.

Major findings from research question 2 found that five out of the ten local contribution plans that were analysed had specifically mentioned disaster mitigation and adaptation strategy implemented in their local contribution plan. These Local Government Areas were Port Stephens, Eurobodalla, Camden, Lismore, and Shoalhaven. Two out of ten local contribution plans analysed disaster adaptation and mitigation strategies, in other words, in their local contribution plans. These Local Government Areas were Wollondilly and Clarence Valley. However, three out of the ten Local Government Areas that were analysed did not mention any disaster mitigation and adaptation strategies. These Local Governments were Maitland, Bega Valley, and Hawkesbury. Out of all the voluntary planning agreements that were analysed as part of each Local Government Area, only three had plans to implement disaster adaptation and mitigation strategies in their agreements; this was one from Wollondilly, which focused on funding towards a community resilience officer. In the Port Stephens Local Government Area where developers must carry out works toward sand dune stabilisation and transgression to prevent flooding. In the Hawkesbury Local Government Area, where a developer has to make monetary contributions towards environmental conservation. All regional strategic plans form part of each Local Government Area. All mentioned the need for disaster resilience. This is to suggest that planning agreements and local contributions plans in the future will need to implement disaster adaptation and mitigation strategies to meet goals highlighted in regional strategic plans.

There are three recommendations for the New South Wales state government to adopt and 2 recommendations for local governments to adopt for disaster adaptation

and mitigation strategies within the contributions planning framework and the New South Wales planning system. The recommendations include:

- Proactive leadership from the New South Wales state government to adopt existing global frameworks of disaster resilience into current legislation.
- To create a framework of what is required in each local contribution plan for local governments to adopt.
- The Independent Pricing and Regulatory Tribunal needs to support local councils in allowing upstream disaster adaptation strategies to be added in local contributions plans and removing the price cap.
- That local contribution plans must also clearly identify catchment areas and infrastructure beyond grey infrastructure such as schools and hospitals.
- Accessibility for developers to access information regarding developer contributions and disaster mitigation strategies to understand what the developer's roles are in addressing disaster resilience.

The biggest limitation of this research was that the report had to be completed. Only having 15 weeks to complete the report meant that the way research was conducted had to be changed. If the research time had been longer, the results of this report could be vastly different. In addition, more time to conduct this research would have allowed the opportunity to read and analyse more peer-reviewed journal articles to understand better how developer contributions are being used overseas and funding strategies for disaster mitigation and adaptation strategies. Timing also affected the number of Local Government Areas analysed as there was a missed opportunity to understand if Local Government Areas in other parts of New South Wales are implementing disaster mitigation and adaptation strategies in their local contributions plan.

If recommendations that were highlighted in research question 3 are adopted, then there will be a change in the way that the current planning system is enforced, and reforms in the New South Wales contributions planning framework will occur. It will mean additional clauses will need to be added to section 7 Environmental and Planning Act 1979. This will mean that the state government, especially local governments, will have more power to hold developers accountable to deliver public infrastructure. Frameworks of what can be included in local contribution plans and

voluntary planning agreements will also affect developers as they are held responsible for paying monetary funds, embellish and maintain infrastructure, and adequately adapting and mitigating natural disasters in at-risk land to allow areas to become more disaster resilient.

With the policy and practice implications, further research is needed to be undertaken to assess the effectiveness of disaster mitigation and adaptation strategies within the New South Wales contributions planning framework and the New South Wales planning system. This can include progress and monitoring of the state government and local council's progress to see if they have implemented the infrastructure needed for disaster adaptation and mitigation strategies in local contribution plans and voluntary planning agreements. Further research will also need to be conducted to see if the disaster adaptation and mitigation strategies have been implemented on local contributions making areas prone to natural disasters more disaster resilient. Should this planning report be conducted again, analyse local contribution plans in Local Government Areas that were not chosen in this study. This can include Local Government Areas within greater Sydney that have already been developed. However, the results of this strategy may be skewed due to the built up nature of the majority of Local Government Areas in greater Sydney. Alternatively, Local Government Areas are located in Western New South Wales, the Riverina and the New England Tablelands, where natural disasters can also be present. Further research can also be conducted to analyse the different planning systems and developer contributions frameworks across different states and territories across Australia. This is to understand better if developers are contributing to infrastructure that supports disaster mitigation and adaptation strategies to allow disaster-prone areas to become disaster resilient.

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