4.2 Draft Climate Change Policy

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SUMMARY

Adapting to the potential impacts of climate change will be one of the most difficult issues that Council and the community will be faced with in the near future. There is now a clear consensus in the scientific and general community of evidence for human-induced climate change. The International Panel on Climate Change (IPCC) indicates that the increase in atmospheric temperature at the Earth's surface is proceeding within the range of its projections, continuing the long-term trend of increasing global temperature (Richardson et al 2009). Recent data (1993-2007) shows the current global average annual sea level rise to have increased from 1.8mm per year to 3.4mm per year (IPCC, 2007).

To minimise some of the anticipated negative social, environmental and economic impacts of climate change Council has committed to the development of a policy framework to guide development, strategic and operational planning decisions and to develop and implement Adaptation and Mitigation Action Plans.

The following report provides a general outline of the draft Climate Change Policy statements. As it does not attempt to cover all the relevant issues, it is recommended that the full draft Climate Change Policy (attached) be read in conjunction with this report. It is proposed that the Policy be publicly exhibited for a period of 56 days taking into account the Christmas holiday period.

RECOMMENDATION

1 That Council place the draft Climate Change Policy and Technical Guidelines on public exhibition for a period of 56 days for public comment.

2 That the draft policy be reported back to Council with details of submissions received following the close of the exhibition period.

3 That Council acknowledge its legislative responsibility to apply the precautionary principle to planning and management decision – making when considering the risks associated with Climate Change.

4 That Council acknowledge that as a consequence of the requirement to apply the precautionary principle and in recognition of the State Government Policy Statement, the planning benchmarks within the draft Climate Change Policy and Technical Guidelines are currently being applied.

5 That Council lobby the State and Federal Government through its Local Members and the Local Government and Shires Associations for a whole of government approach to address the significant broad implications in adapting to Climate Change.

BACKGROUND

Climate change is a major issue of Sustainability for our organisation and community and Sustainability is one of the essential and underlying principles of our Shire Strategic Vision "Our Shire Our Future". As part of Council's sustainability journey, there is a need to build resilience within the organisation and the community so that future generations can cope more readily with the impacts and are not unnecessarily burdened by decisions we make today. Our legacy should be to create a more Sustainable Shire for the future.

The Bureau of Meteorology (BOM 2008) reports that there is a consistent pattern of warming across Australia with Australia's annual mean temperature for 2008 being 0.41°C above the standard 1961-90 average. Despite the cooling effect of a La Niña event that developed in late 2007, Australia has now recorded a warmer-than-average year for the past seven consecutive years.

With its significant natural and built assets, its diversity of land uses, and low lying coastal topography, Wyong Shire is particularly vulnerable to the impacts of climate change. Some of these vulnerabilities include:

- Increased temperature – resulting in increased frequency and intensity of bushfires, adding to operational costs, impacting human health (temperature stress) and an increased rate of asset deterioration;
- Changes in rainfall – potentially resulting in potential reduced volumes of potable water supply, increased frequency and level of flooding, changed management activities for open space;
- Sea level rise – increased flooding and inundation, increased coastal recession and erosion, increased rate of asset damage in estuarine and coastal areas, and loss of coastal and estuarine ecosystems; and
- Extreme wind and storm events – impacts on emergency services, upgrading building standards, stormwater flooding and damage to infrastructure and natural assets.

Responding to many of these anticipated impacts will fall under the responsibility of local government. Typical functions of council to be affected will include:

- Infrastructure planning and design (including roads, drainage, recreation facilities) and property services
- Developing health services
- Planning and development approvals
- Strategic planning
- Natural resource planning and management (coastline, floodplain, estuary and biodiversity planning and management); and
- Water and sewerage services.

Climate change is identified in Council's Corporate Risk Register as a high corporate risk to the organisation as well as a growing risk to the community. Developing and implementing a clear policy direction in adapting to and mitigating the potential impacts of climate change is a necessary measure to address the risks. The draft Policy is based on current best practice and supported by state government legislation, policy and guidelines. The drivers for a policy within Council include legal liability, concern from insurance underwriters, the requirement to manage public funds and provision of services. It also provides direction for staff involved in the design and assessment of development proposals and infrastructure. The development of a policy has prompted discussion within Council and will influence other policies/strategies such as the Settlement Strategy, the Comprehensive LEP review and the Asset Management Strategy. Attachment 3 provides a flowchart that represents the "key" framework surrounding Council's draft Policy.

Legislative Responsibility

Local Government has a clear responsibility to address the issue of Climate Change in a range of legislative, policy and guideline documents administered by the State and Federal Governments. The quantum of information and legislation associated with Climate Change is rapidly expanding and Council will need to be in a position to respond proactively. The draft Policy provides this opportunity.

Local Government faces potential liabilities if it fails to address the issue of Climate Change. The *Local Government Act 1993 (Sect 7 (e))* requires Councils, Councillors and Council employees to have regard to the principles of ecologically sustainable development in carrying out their responsibilities. This is explained as being achievable through the application of the precautionary principle, namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

Similarly, the Civil Liability Act 2003 has introduced a new test to determine whether a council has breached it's duty of care. Although difficult to establish, councils are advised to protect themselves by adopting clear policies.

A number of other legislation and planning instruments referring to climate change include:

Commonwealth Legislation

- *Environment Protection and Biodiversity Conservation Act 1999*
- *National Greenhouse and Energy Reporting Act 2007*

NSW Acts

- *Threatened Species Conservation Act 1995*
- *Water Management Act 2000*

NSW Regulations

- *Environmental Planning and Assessment Regulation 2000*

NSW Policies

- *NSW Coastal Policy 1997*
- *NSW Coastal Hazards Policy*
- *NSW Coastline Management Manual 1990*
- *NSW Metropolitan Strategy 2006*
- *NSW Biodiversity Strategy*
- *NSW Greenhouse Plan*
- *National Greenhouse Strategy*
- *NSW State Plan*
- *Central Coast Regional Strategy*

(source: Sydney Coastal Councils Group & NSW Environmental Defenders Office)

Australian courts, through interpretation, have made it clear that many planning and environmental laws require consideration of the principles of Ecologically Sustainable Development (ESD).

The principles of ESD are incorporated into Commonwealth legislation (*Environment Protection and Biodiversity Conservation Act* 1999 (sections 3 & 3A)) and NSW legislation such as the *Local Government Act* 1993 (section 7(e)), *Environmental Planning and Assessment Act* 1979 (EP&A Act) (Section 5) and the *Protection of the Environment Operations Act* 1997(Section 6(2)). Section 79C of the EP&A Act places an obligation on a Consent authority to consider the 'Public Interest' and the court has directed that when a consent authority is making a decision regarding the public interest they must include the principles of ESD. ESD requires the consideration of the relevant risks posed by climate change. In some planning merit appeals, courts have assessed the balance of the public interest of addressing climate change against the narrower private interests. Hence consideration of Climate change impacts is a requirement under law, whether or not, Council has in place a policy dealing with the matter.

Recent decisions in the NSW Land and Environment Court have relied upon the application of ESD principles with particular reference to climate change. These decisions fall into two categories:

1. Climate change mitigation where the Court has decided that the contribution of new development e.g. coal power stations, to greenhouse gases and thus climate change, must be considered by decision-makers (*Gray v Minister for Planning*)
2. Climate change impact where the decision-maker must consider the impacts of climate change on proposed development in vulnerable coastal areas, eg – increased flooding (*Walker v Minister for Planning*).

Other jurisdictions in Australia have also considered the direct impacts of Climate change, namely:

- Gippsland Coastal Board v South Gippsland SC&Ors (VCAT, 2008) in which the impact of sea level rise due to the effect of Climate change (coastal inundation) was the principle issue, the result being the refusal of the application for subdivision.

- Northscape Properties Pty Ltd v District Council of Yorke Peninsula (2007) SAERDC 50 in which the adequacy of coastal retreat and sea level rise was considered the principle issue – application refused.

As a general principle the directions provided by decisions of Courts are to be followed by Consent authorities.

It has also been suggested by the Hon. Justice Brian Preston, Chief Judge Land and Environment Court of NSW, that one of the matters that could flow on from the impacts of climate change on developments and land is "*the possibility that Local Government will be held liable for losses arising from climate change, if they are unwilling to take its impacts into account at decision-making stages and integrate their planning decisions*" (refer to paper *The role of courts in relation to adaptation to climate change*). It is only in recent years that climate change has been more widely accepted by the courts as the potential exists for actions in negligence for damage or loss caused by climate change.

In November this year the State Government released a number of policies to provide guidance in specifically addressing the impacts of climate change:

- NSW State Government Sea Level Rise Policy Statement
- Dept of Planning's Draft NSW Coastal Planning Guideline: Adapting to Sea Level Rise
- Draft Coastal Risk Management Guide: Incorporating the sea level rise benchmarks in coastal hazard assessments
- Draft Flood Risk Management Guide: Incorporating the sea level rise benchmarks in flood risk assessments.

Consultation in respect of those documents that are in draft form will end on the 11 December 2009. No advice has yet been provided from either DECCW or DoP as to when the draft documents will be finalised. Whilst Council does have the option of not adopting a policy or placing its draft Policy on exhibition until the draft Government documents have been finalised, the adopted Government policy statement gives clear direction to Councils regarding the actions that should be taken now in response to climate change. Council would also be aware that Lake Macquarie Council has already an adopted Sea Level Rise Policy and Gosford City Council has recently exhibited it's Sea Level Rise Mapping. A number of other Councils in the State are in the process of preparing and adopting policies in response to climate change. For example, the 12 councils within the Sydney Coastal Councils Group have already finalised risk assessments and adaptation plans for each of those local government areas. It is therefore considered timely that Wyong Council place its draft Policy on exhibition and implement the Technical Guidelines contained in the Policy.

Potential Liability

In recent weeks both the State and Federal Governments have called for the issue of liability to be addressed in their Coastal Reforms and House of Representative's Report on "Managing our Coastal Zone in a Changing Climate" respectively. Both levels of Government call for clarification on the issue with research, legal review and legislative changes proposed.

Current legal advice indicates that councils may be liable for future damages if they do not properly consider the impact of sea level rise with other climate induced changes in planning and policy decisions. A position paper prepared by the Environmental Defender's Office for the Sydney Coastal Councils Group in February 2008 concluded that "*councils owe a duty of care to landowners in their consideration of individual development applications in coastal areas that are at most risk from climate change' and that 'as long as councils make a genuine attempt to alleviate the potential risks of climate change, then it is likely that a council's duty of care will be satisfied*". The best way to do that is to utilise the best available information and reflect that information in planning decisions and policies.

Actions to date

Council at it's meeting held on 24 January 2007 resolved unanimously:

"RESOLVED unanimously on the motion of Councillor ROSE and seconded by Councillor WELHAM:

1 That the report be received and noted.

2 That Council endorse the climate change risk assessment and adaptation recommendations outlined in the report and attachments.

3 That Council increase its purchase of GreenPower generally in line with State guidelines as well as other water authority and Council initiatives. As a minimum Council should increase its GreenPower purchase for non water and sewer related energy use from 6% to 25% by 2008 and for water and sewer related energy use from 6% to 10 % by 2008 (all at an additional cost of $134,000 above current costs) Then, for non water and sewer related energy use, a further increase up to 50% by 2020 and for water and sewer, an increase up to 15% by 2020. Total additional cost in 2020 is $308,000 above current expenditure with further potential costs for increased consumption up to an additional 50%.

4 That Council develop a decision making framework to incorporate climate change and energy saving initiatives in all relevant Council business.

5 That Council engage the community in discussion about its role in addressing climate change and advise the community of the positive actions currently being undertaken by Wyong Council in response to climate change.

6 That Council formally congratulate the staff who prepared the report'

Since endorsing the recommendations of the Climate Change Discussion Paper in January 2007, Council has adopted a suite of measures to respond at a local scale to climate change:

- Develop an over-arching Sustainability Decision-Making Framework (to maximise energy and material efficiencies in design, resource recovery)
- Initiate a risk assessment process
- Implement the Energy Savings Action Plan
- Increase proportion of GreenPower purchased
- Participate in GreenFleet program
- Review environmental planning instruments and policies
- Review the Fleet Policy
- Undertake an in-house Education and Training program.

Development of a Climate Change Policy is the next step.

THE CLIMATE CHANGE POLICY

The draft Climate Change Policy provides an overarching policy framework to guide development, strategic and operational planning decisions and to develop and implement Adaptation and Mitigation Action Plans. The policy covers a range of potential impacts of climate change and is not limited to just one aspect such as sea level rise. This is considered essential as the planning/design response to many of the potential impacts, such as sea level rise and increased rainfall intensity, would be cumulative and be best dealt with together rather than incrementally with separate policy statements.

Essentially the policy requires that Council undertake appropriate risk assessments for all vulnerable development, projects or activities against projected climate change scenarios to assess the implications and to develop the most feasible adaptation measures. Broad program risk assessments are currently funded and underway for the Coastline Management Plan (CMP) (coastal hazards) and the various Floodplain Risk Management plans.

Until these current studies are completed, the draft Policy recommends that Council adopt interim measures based on current best practice including the recently released State Government Sea Level Rise Policy Statement and DOP's Draft Coastal Planning Guideline. These form the basis for the interim measures addressed in the Climate Change Policy. Once the actions determined under the risk assessments have been adopted by Council, (such as the CMP), the interim measures will be superseded.

In addition to the major risk management plans, the Sustainability Unit, through an arrangement with Statewide Mutual, (Council's Insurers), and with some assistance from the Hunter Central Coast Regional Environmental Management Strategy (HCCREMS), will roll out over the first half of 2010, structured risk assessment workshops with staff. This process will identify the most significant areas of risk and establish priorities, costs and timeframes for development of an Adaptation Action Plan for Wyong Shire. It will also build the capability of Council to assess and prioritise risks related to climate change and foster leadership to enable a co-ordinated and strategic response.

At this stage it is uncertain as to the extent of detail that the above process will provide both in terms of the level to which it will engage staff and the extent to which it will encompass the issues of major concern to Council. To address any gaps, it is intended that all Council Operational Units undertake climate change awareness and risk assessment training to ensure they are equipped to assess the implications of projected climate change scenarios against their activities and projects and they are able to develop the most feasible adaptation measures to alleviate any risks.

This project is funded within the 2009-10 Management Plan but will require key staff in each Unit to participate particularly those involved in asset design and management. Risk assessment will provide key information on the vulnerability of existing Council works and Council owned property to the impacts of climate change. The Adaptation Plan will be developed from this key information to direct future adaptation measures. Many of these risks may not eventuate for some time and mitigation measures could be built into normal maintenance or replacement programs.

Consultation with staff in the development of this Policy has highlighted the need to differentiate between a private development and those developments undertaken by Council for the purpose of providing an obvious public benefit and their merits of each are considered in the context of future climate change impacts.

Under the Policy the activities undertaken by Council that are associated with new infrastructure (assessed under Part 5 of the EP & A Act) will be required to undertake the necessary risk assessment process and be designed to demonstrate that the risk can be managed with appropriate and relevant mitigating and adaptive measures against the anticipated impacts of climate change for the asset period of the development.

For example, sports fields and jetties can be constructed within areas subject to inundation as long as they meet their performance criteria without being subject to raising the Flood Planning Level (or Climate Change Allowance) as the Policy requires of private development. Similarly, it allows Council to assess the risk to an asset and determine at what stage into the future it may become redundant because the risk of frequent or permanent inundation has become unacceptable. Routine maintenance activities undertaken by Council are exempted from the Policy.

Technical Guidelines

The Inquiry into Climate Change and environmental impacts on coastal communities by the House Standing Committee on Climate Change, Water, Environment and the Arts says in the Report tabled in parliament in November 2009 that climate change raises many complex legal issues with regard to Australia's coastal zone. It says councils are at the forefront of daily coastal management and have major concerns in this area. The committee also said that councils need to develop clearly defined policies to deal with climate change and make the risks of climate change impacts an "explicit part of decision-making criteria to assist in limiting their potential exposure to legal action".

The draft Policy is supported by Technical Guidelines which will provide a consistent framework to planning and management decision-making when considering the risks associated with climate change. The Technical Guidelines also provide interim planning guidelines to address sea level rise and increased rainfall intensity pending completion of coastal and floodplain risk management plans that incorporate the Climate Change Projections. The Guidelines cover both climate change scenarios and a methodology for determining the "asset period" for a particular development, strategy or infrastructure. Council has developed the Cost-Asset Period curve based on examining what is currently being done within the fields of planning and asset management. There are no clearly defined or adopted models to determine "Asset Period" but a range of methods used across both industries. Development of the curve was based on gathering ABS data in relation to costs and anecdotal information relating to asset periods for various developments such residential brick veneer dwellings. The curve was determined by fixing a $300k average new residential brick veneer dwelling cost to 75 year asset period.

The Technical Guidelines also include the methodology to determine (where appropriate), an increase in the Flood Planning Level or Climate Change Allowance. The Technical Guidelines and the Climate Change Projections will likely require amendment (into the future) to reflect the latest scientific information. IPCC will release new information and updated projections about every five years.

The draft Policy also provides a platform from which an Adaptation Action Plan and a Mitigation Measures Plan will be prepared and implemented by Council.

Council should note that the Technical Guidelines are consistent with the following technical notes issued by DECCW as part of the Government's Climate Change response package as follows:

- *Draft Flood Risk Management Guide: Incorporating Sea Level Rise Benchmarks in Flood Risk Assessments*

;

- *Derivation of the NSW Government's Sea Level Rise Planning Benchmarks.*

Wyong Council's draft Technical Guidelines have also been discussed with Mr Phil Watson, DECCW's Senior Coastline Engineer (who was generally responsible for providing the technical input for the Government's climate change response package. He is of the opinion Council's approach is consistent with the State Government's direction. In addition, Council staff are meeting with the Deputy Director General of DECCW on 9 December 2009. A verbal update regarding the outcome of this meeting will be provided to Council when it meets on the night of the 9th December 2009.

The Adaptation Action Plan will provide guidance to staff and community to prepare for the impacts of climate change. It's objective is to reduce Council's exposure to risks associated with climate change and form an important component in demonstrating that Council has adopted a reasonable response to deal with the uncertainty of climate change. The risk assessments undertaken within Council will form a major part of this Plan.

The Mitigation Measures Plan will outline measures that Council can undertake to reduce its own carbon footprint and therefore contribute to global efforts to reduce the future severity of climate change. Council has already resolved that a report be prepared on the prospect of achieving Carbon Neutrality by 2050.

What the Policy doesn't include:

The draft Policy does not address the many problems faced by existing development under a climate change scenario. Measures may in part be developed under current risk management plans, such as the CMP, however, the impacts are far reaching, significant and extensive and often outside the control of Council. The impacts include clarifying liability, insurance to vulnerable properties, the ability of vulnerable properties to obtain bank loans against their land and devaluation of property prices in the vulnerable areas. Another significant issue revolves around who is responsible for deciding between protection or management actions and who will pay for either where very significant costs are involved.
In terms of coastal management, the State Government has recently announced that is it initiating a set of Coastal Reforms. In essence, these reforms, although not fully rolled out, appear to place more of the responsibility for these decisions on Council and landholders whilst the State Government reduces its liability. Council has for some time called for the issue to be addressed through a "whole of Government approach" and this action is reflected in the recommendations of this report.

The Federal Government has also released a House of Representative's Report on 'Managing Our Coastal Zone in a Changing Climate," raising the need for planning reforms as many properties will be affected over time. The Report calls for a whole of Government approach to addressing the impacts of climate change and current coastal erosion issues. The report reiterates the warnings for climate change and calls for immediate action as the fallout will be very significant.

The Federal Government appears to want to take the lead by undertaking research, commissioning reports, preparing planning guidelines and building codes, and providing funds. The Federal Government report also discusses an appropriate response to rising sea levels such as planned retreat and recognises the many problems and issues surrounding that including those of liability and who pays.

LAND USE PLANNING

Typically, strategic planning timeframes do not extend beyond 20-30 years into the future. However, with climate change projections extending up to the year 2100 (and beyond) it is critical that Council begin to consider the potential impacts of climate change in the context of the longer term future.

The draft Policy provides for an adaptive risk assessment approach to ensure a manageable risk for works, activities and future development against the anticipated impacts of climate change, including sea level rise, increased rainfall intensity and flooding, health issues, bush fire risk, etc. The draft Policy recommends that any strategic planning study, rezoning proposal, design, investigation, policy or masterplan for land that may be affected by climate change take into account a minimum 100-year climate change planning period, despite the fact that our general land use planning policies only consider a horizon of 20 to 25 years. The draft Policy will provide effective guidance for developers and staff to implement the precautionary principle and minimise the potential for liability by including an allowance for future climate change scenarios in development applications.

Inundation from the impacts of Climate Change

One of the major foreseeable consequences of climate change will be sea level rise. Due to the low lying topography of the coastal fringe and estuarine areas within Wyong Shire, it is anticipated that rising sea levels will directly threaten many communities. Based on the latest climate change research, Council has developed a draft set of indicative mapping (vulnerability mapping) which will alert staff to properties potentially affected by sea level rise. It is intended that these maps be placed on exhibition as part of the public consultation process. Following adoption of the draft Policy and finalisation of the maps, it is considered that an additional notation should be placed on affected Section 149 Planning Certificates to advise the community of properties potentially at risk from climate change. Council's solicitors are currently reviewing the level of information, appropriate wording and any potential impacts on Council's liability that may result from the updating of Section 149 Planning Certificates. It is anticipated that this legal advice will be available prior to the Council meeting of 9th December 2009.

The current allowance (upon which the mapping relies) is based upon the sea level rise planning benchmarks from the NSW Department of Environment and Climate Change and Water's (DECCW 2009) Sea Level Rise Policy Statement which provides for an increase above 1990 mean sea levels of 40 cm by 2050 and 90 cm by 2100.

The DECCW planning benchmarks are based on the sea level rise projections developed by Australian and international experts and are considered most appropriate for NSW, while acknowledging the uncertainty associated with these projections.

The planning benchmarks should be used for purposes such as:

- Incorporating the projected impacts of sea level rise within predicted flood risks and coastal hazards;

- The designing and upgrading of public assets in low-lying coastal areas where appropriate, taking into account the design life of the asset and the projected sea level rise over this period;

- Assessing the influence of sea level rise and associated impacts on new development;

- Considering the impact of sea level rise on coastal and estuarine habitats, such as salt marshes, and identifying valuable habitats at most risk from sea level rise;

- Assessing the impact of changed salinity levels in estuaries, including implications for access to fresh water (DECCW 2009);

- Strategic planning initiatives.

The Federal Government released its *Climate Change Risks to Australia's Coast* in November 2009. In relation to sea level rise it quotes IPPC data that indicates global sea level rose by about 3.1 millimetres per year, from 1993 to 2003, compared to 1.8 millimetres per year from 1961 to 2003. These rates of increase are an order of magnitude greater than the average rate of sea-level rise over the previous several thousand years.

There is growing consensus in the science community that sea-level rise at the upper end of the IPCC estimates is plausible by the end of this century, and that a rise of more than 1.0 metre and as high as 1.5 metres cannot be ruled out.

CSIRO has developed three simple scenarios for sea-level rise (relative to 1990), at three time-steps across the 21st century:

Year	Scenario 1 (B1)	Scenario 2 (A1FI)	Scenario 3 (High end)
2030	0.132	0.146	0.200
2070	0.333	0.471	0.700
2100	0.496	0.819	1.100

Scenario 1 (B1) considers sea-level rise in the context of a global agreement that brings about dramatic reductions in global emissions. This scenario represents sea-level rise that is likely to be unavoidable.
Scenario 2 (A1FI) represents the upper end of IPCC AR4 'A1FI' projections and is in line with recent global emissions and observations of sea-level rise.
Scenario 3 (High end) considers the possible high-end risk identified in AR4 (4th Assessment Report) and includes some new evidence on icesheet dynamics published since 2006 and after AR4.

The draft Policy is based upon the CSIRO levels as incorporated in the NSW State Government (DECCW's) Sea Level Rise Policy Statement and in particular the DECCW technical note *Incorporating Sea Level Rise Benchmarks in Flood Risk Assessments* but it also provides a means to assign an Asset Period for a particular development, works and/or activity. From this information Climate Change Allowances (CCA) can be determined for properties affected by inundation due to the sea level rise and for properties affected by inundation or flooding due to increases in rainfall intensity along creeks and river floodplains. It is noted that the draft Policy is an interim Policy pending the completion and/or updating of all Council's flood studies and Floodplain Risk Management Plans. The CCA, where appropriate, can be applied to floor levels, building flood protection requirements, flood inundation and existing flood planning levels for applications within vulnerable areas. Note: DECCW guidelines indicate increased rainfall intensities to the year 2070 only. The draft Policy relates to asset periods of greater than 60 years and therefore beyond the year 2070. As such, an allowance is to be incorporated in the Flood Planning Level (FPL) due to increased rainfall intensities which is to match the asset period.

This allowance must be extrapolated beyond the results indicated in the catchment specific flood study to match the asset period. This is required as the levels are only determined for a specific year, being 2070. For developments that have an Asset Period of either less than or greater than that equivalent to 2070, a CCA will need to be determined from the extrapolation, i.e. from 1990 to 2070 and from 2070 to at least 2100. The extrapolation is based on the precautionary principle and is assumed as a straight line. This allowance is in addition to the Freeboard (0.50m) prescribed by the NSW Floodplain Development Manual (2005).

Practical Implications

Attachment 4 provides a number of worked examples to indicate the potential practical implications of the draft Policy.

Council should be aware that the implications of the draft Policy in respect to development currently affected by the 1: 100 year flood planning line means that:

Note: new 1 in 100 year flood levels will be developed as part of all the new flood studies and Floodplain Risk Management Plans that incorporate the potential impacts of climate change.

- Currently the 1 in 100 year flood level is converted to a flood planning level by adding a .0.50m freeboard and is applicable to dwellings and all habitable spaces.

- The draft Policy imposes an additional climate change induced allowance of up to 1.00m subject to the determination of the asset period.

- This means that a new dwelling in Chittaway, for example, must be constructed up to a minimum 1.5m above the flood level.

Over the past few years, Council's Development Assessment Staff have been confronted with the issue of Climate Change and how to incorporate due consideration of such into the assessment of a development application. This consideration is required by legislation in particular, the precautionary principle and Section 79C of the EPA Act. In addition, the State Government Policy Statement and recent case law, (as outlined earlier in this report), support the necessity of applying current climate change bench marks whether or not a Council has a formal adopted policy. Therefore, staff have been applying the precautionary principle to developments which are impacted by sea level rise and lake levels by imposing the new flood planning line which incorporates an additional climate change induced allowance of up to 1.00m. This planning line is in accordance with the draft Policy.

In adopting new Floodplain Risk Management Plans, Council will also need to address the issue of protection measures along the rivers and estuary and how they may complement a process of planned retreat. The State Government Reforms have raised the issue of potential policy or guidelines being developed to enable both residents and Council to implement protection measures in appropriate instances subject to strict guidelines. Such options will be canvassed during the development and exhibition of the Floodplain Risk Management Plans.

Coastline Management

Pending completion of the CMP the proposed draft Policy provides interim measures based on the NSW State Government's Sea Level Rise Policy Statement under its Coastal Reforms package. Once the actions determined under the risk assessments for the CMP have been adopted by Council, the interim measures will be superseded and no longer be applicable. These interim measures include an allowance for sea level rise and inundation within the coastal and estuarine zones as well as a planning guideline for new development, alterations and additions.

The Hazard Assessment process undertaken as part of the development of the CMP forms the risk assessment process for the Wyong coastline and will incorporate the potential impacts of Climate Change as indicated within the Technical Guidelines.

Within this hazard assessment process, potential coastal recession and erosion has traditionally been modelled to determine the hazard and risk within a 50 year time step. Council's current DCP 2005 Chapter 77 Coastal Hazards delineates an *immediate* or *very high* hazard erosion zone for the dunes or bluffs where no development or improvements to dwellings can occur. Further west of this line development can occur in the *high* hazard zone (0-50 years) or *medium* hazard areas (50 -100 years) but is subject to development controls that address the hazard. The hazard lines within DCP 2005 Chapter 77 do not include an allowance for the current IPCC climate change scenario as the work was done in the late 1990s.

With the new hazard lines being developed at present under the CMP the lines will generally move inland. The new hazard line will include a current erosion or *immediate* high hazard line as well as a 50 year and 100 year hazard line that reflects where the current erosion or *immediate* high hazard line will be in approximately 2060 and 2110. The implication is that where the current erosion or *immediate* high hazard line moves inland, the risk to development and the controls over or exclusion of development will also progressively move inland over time. Consequently, managing the planning process in the future will require a far more flexible and adaptive approach.

Accompanying development of the CMP, Council will prepare a new DCP Chapter for Coastal Hazards that will need to be consistent with State Government Draft NSW Coastal Planning Guidelines. The objectives of these guidelines include reducing the intensity of coastal development within the vulnerable areas of the coastal zone as well as advising the public of the risks to ensure informed land use planning.

To ensure an adaptive and flexible approach is maintained, and one that is consistent with the current State Government Coastal Reforms, the following additional interim guideline for development within the coastal zone would apply.

- *Proposed new development, modifications or additions landwards of the current erosion or immediate high hazard line must not be located seawards of a hazard line as determined equivalent to the Asset Period (as determined from the Technical Guidelines) for that new development, modifications or additions, i.e. the new development should be located landwards of the hazard line equivalent to the Asset Period.*

For example, a house with an Asset Period of 70 years should be located outside or beyond the equivalent 70 year hazard line. Similarly, a smaller structure such as a deck, with an Asset Period of 15 years, could be located immediately outside the 15 year hazard line. The 70 and 15 year hazard lines can be interpolated between the current 0, 50 and 100 year hazard lines until additional hazard lines are formulated as part of the CMP process. This has the effect of not sterilising land until it is necessary on the basis of rising sea levels.

Where development is located immediately adjacent or within proximity to a hazard line equivalent to that development's Asset Period then the development could potentially be affected by the impacts of climate change soon after the Asset Period is realised. In such cases, the development consent should be time limited to the Asset Period. When the asset period expires the time limited condition should be reassessed. Consent should be extended in time if the rate of coastal retreat due to climate change is less than originally projected at the time the original development consent was issued. Should the rate of coastal retreat be equal to that predicted then the dwelling should be relocated, repositioned or demolished. In this regard the recently released State Government policies and draft guidelines (as per list under Legislative Requirements) clearly indicate that the responsibility and the cost for activity such as relocation, demolition and abandonment of a property lies clearly with the landholder.

Council should note that time limited consents relating to asset period and the implications of climate change are already being applied by other Councils. HWL has advised that the use of time limited consents is both appropriate and able to withstand legal challenge.

In adopting a CMP, Council will also need to address the issue of protection measures along the coast and how they would complement a process of planned retreat. The State Government Coastal Reforms have raised the issue of potential policy or guidelines being developed to enable both residents and Council to implement protection measures in appropriate instances subject to strict guidelines. Such options will be canvassed during the development and exhibition of the CMP.

Bushfire Management

The major impact of climate change on bushfire management is expected to be a significant increase in the number of very high or extreme fire days equating to a significant additional risk to life and property. Additionally, fire seasons are expected to be longer overall, and opportunities to carry out hazard reduction works may be reduced.

The management of bushfires interacts with other policy areas including water supply, biodiversity, air pollution, tourism and timber production, as well as the more obvious impacts on human life and property. The draft Climate Change Policy recommends (among other things) the preparation of bushfire management reports for new development (including those considered under Part 4 and Part 5 of the EP&A Act) located on bushfire prone land. The report is to include explicit consideration of the likely impacts of climate change on bushfire hazard, including (if appropriate) the wider locality impacts relating to infrastructure security, transport networks and demand on emergency services.

Resource Implications

The resources required to achieve the necessary integration of bushfire risk management into Council's planning and development assessment processes and to manage the potential impacts of climate change on Council land are programmed to be reconsidered as part of Council's Level of Service deliberations, following completion of the Bushfire Management Plan.

Community Support and Human Health

Educating and engaging effectively with the community on the issue of climate change will be important to ensure our communities are resilient in the face of the projected impacts of climate change. Council, along with state and federal government agencies will be required to deliver educative programs that will assist residents and communities to develop an informed understanding of climate change trends, impacts and implications, in particular the human health implications of climate change.

The long term impacts upon human health may include increases in vector borne diseases, gastro-intestinal diseases and mental health effects such as depression and post traumatic stress disorder. In terms of providing support for communities to respond to and prepare for the impacts of climate change, there is the potential for Council's facilities to become community 'hubs' providing refuge in times of extreme weather such as bushfire, flooding and extended heatwave conditions.

The draft Policy supports community development and implementation of climate change mitigation and adaptation strategies by individuals, households, communities and community organisations. This forms part of Council's responsibility to manage what is identified as one of it's major corporate risks and is in accordance with Council's resolution of 24 January, 2007.

It is not expected that the resources required to deliver this service will be beyond what is already delivered through the current programs undertaken within Council with staff assistance and strategic direction provided through the Sustainability Unit.

Natural Resource Management

Many of the ecosystems identified by the International Panel on Climate Change (IPCC) as vulnerable to the predicted impacts of climate change occur within Wyong Shire and the potential for their loss due to climate change should be considered based not only on their intrinsic value but also the value of services they bring to the community, for example, clean drinking water, shade and shelter, health and lifestyle benefits, tourism.

Integrated biodiversity planning between the local, regional and state levels will be necessary to maintain connectivity across the landscape to maximise opportunities for species and communities to migrate as they adapt to changing climatic conditions. The development of east-west biodiversity corridors is seen as an imperative to address the need for species to migrate away from the coast as the local climate and conditions change. Major impacts are also envisaged for lake shore flora and fauna such as sea grasses and saltmarsh. This should be addressed within the Estuary Management program.

Stormwater management practices will also need to reflect the potential impacts of climate change. New adaptive methodologies will need to be developed following the risk assessments that will be undertaken in Council and from direction being developed within the stormwater industry such as the revisions of Australian Rainfall and Runoff manual.

There are management and planning actions that can be undertaken to assist species and ecosystems to respond and build resilience to climate change. These actions may assist the natural adaptation of species and protect species that are particularly vulnerable to climate change. This issue is also a major thrust of the Federal Government's Report on "Managing Our Coastal Zone in a Changing Climate".

Resource Implications

The development of the Natural Resources (NR) Strategy has been earmarked as a priority for Council under the SSV. It is expected that addressing the impacts of climate change on the natural environment will be an essential part of the Strategy. Council would recall that the review of the Natural Resources Unit Levels of Service recently undertaken recommended an increase in resource. In particular, as outlined earlier in this report, the Flood Planning Level incorporating climate change impacts that is included in the draft Technical Guidelines, is an interim level pending the preparation, completion and updating of all flood studies with in the Shire. All existing flood studies except Porters Creek, will need to be updated to incorporate climate change impacts. However, flood studies which are currently underway or about to commence will include the potential impacts of climate change. Historically, DECCW has not approved funding for the upgrading of flood studies to incorporate climate change, whilst it has provided funding for new studies, on the basis of a one third of the cost being met by Council. Recent advice from DECCW is that its new policy position enables funding to be provided for the review and upgrading of existing flood studies. On this basis, it is intended that the Natural Resources Unit will aim to have all flood studies relevant to the Shire completed with climate change implications incorporated within each, within the next three to five years. Whilst it is likely that DECCW will provide two thirds of the funding for this program, Council will still need to find the remaining one third. In undertaking the current flood studies, Council has voted approximately $100k pa and it is envisaged that a budget in this vicinity, ie, $100k will need to be provided on an annual basis for the period of the program.

CONCLUSION

The issues dealt with in this report and in the draft Policy are not a comprehensive review of all of the anticipated impacts of climate change for Wyong Shire. They are an overview of what are believed to be the most relevant issues. A full review of the climate change risks will be dealt with as a pre-cursor to the development of the Adaptation Action Plan whereby a thorough risk assessment approach will identify and prioritise the most significant areas of risks as they apply to council's planning, operations, infrastructure and open space management. It is intended that Council will engage the community in the risk management process and ensure transparency in communicating decisions on risk treatment options and the implementation of an Action Plan.

The effects of climate change will have direct and indirect implications on local government and its communities. There will be variation in the scale of impacts upon communities between and within each local government area. There will be inequities in the way the impacts are felt. For instance, low-income groups and older residents will be potentially more vulnerable to impacts such heat stress and disease, while those living in vulnerable localities may suffer financial hardship with reduced access to insurance and bank funding.

To be adequately prepared for a future defined by a changing climate Council's response to climate change will be two-fold and should be managed simultaneously:

1 Managing and reducing its own greenhouse emissions (mitigation); and

2 Reducing its vulnerability and preparing its community for the impacts of climate change (adaptation).

This Policy seeks to address the uncertainty that climate change brings through provision of planning guidelines and a direction for future Mitigation and Adaptation Plans.

ATTACHMENTS

1	Technical Guidelines		D02096936
2	Flowchart Climate Change Policy		D02094809
3	Draft Climate Change Policy	Enclosure	D02095596
4	Examples of How Climate Change Policy would be Implemented		D02095375

TECHNICAL GUIDELINES FOR ADAPTATION TO CLIMATE CHANGE

Table 1 CLIMATE CHANGE PROJECTIONS[9]

The following table outlines the anticipated minimum climate change projections and implications of altered frequencies and intensities of extreme weather, climate and sea level events to be used in all Council's strategic, infrastructure and operational planning.

	Present [1]	Projected Change 2030	Projected Change 2070	Impacts upon Built Environment	Impacts upon Natural Environment	Impact upon Human Aspects
Rainfall[9]						
Annual Average	1.094mm	-13 to +7%	-40 to +20%	• Uncertain water quantity and quality for consumption.	• Decreased biodiversity resilience and changes in the distribution of plant and animal species. • Increased risk, severity and incidence of fire. • Increase likelihood and severity of drought. • Decrease in annual surface water run-off.	• Decrease in water supply.
Annual Extreme Rainfall[3] **(Increased flood risk)**		-3 to +12%	-7 to +10%	• Damage to infrastructure. • Stormwater and sewerage systems inundated with frequent sewage overflow. • Power outages, disrupted communication and transport networks.	• Altered river flows and flooding zones. • Increased erosion and sedimentation. • Changes in flood regimes may lead to morphological changes in streams. • Salt gradient and sedimentation will effect catchment and waterway health. • Changes to acid sulphate soil behaviour.	• Changed spread of diseases (such as dengue fever), pests and weeds. • Increased cost of storm damage to property and infrastructure. • Loss of private and public assets.
Rainfall Intensity[7]			+30%			
Evaporation		+1 to +8%	+2 to +24%		• Increased fire risk. • Reduced water availability for ecosystems, potentially leading to increasing eutrophication and algal blooms.	• Decrease in water supply.
Droughts per decade[4]	3	2 to 5	1 to 9			
Extreme Winds	0	-5 to +8%	-16 to +24%			
Fire Days[5]	9	9 t0 11	10 to 15	• Greater impact on urban fringe. • Asset protection zone design. • Greater loss of infrastructure and property. • Landfill destruction. • Power outages, disrupted communication and transport networks.	• Simplification of ecosystems and communities. • Loss of biodiversity. • Air quality impacts.	• Increased asthma from smoke. • Increased risk to personnel. • Increased loss of life. • Reconsider approach to fire management and increased investment in equipment. • Loss or damage to public and private assets.

	Present [1]	Projected Change 2030	Projected Change 2070	Impacts upon Built Environment	Impacts upon Natural Environment	Impact upon Human Aspects
Temperature[9]						
Average	[2] 17 to 26°C	+0.2 to +1.6°C	+0.7 to +4.8°C	• Rise in evaporation rates will reduce moisture balance, increasing vulnerability to water supply shortages • Damage to infrastructure and housing design.	• Degradation of viable habitat. • Limited capacity of some species to disperse to new locations. • Disruption to connectivity reduction/loss of some species. • Shift in distribution of some species – increase in feral distributions. • Reduced ability to adapt and survive. • Reduced resilience of ecosystems. • Changes to fire regimes. • Loss of coastal wetlands.	• Increase in the incidence of asthma (dust, smoke, organisms). • Possible increased cost of agricultural production and/or changed products. • Increase in deaths from heat events. • Increased demand for air conditioning (more energy use). • Energy supply not sufficient as demand increases and supply failures increase. • Interruption to essential services, reduced community accessibility and mobility.
Annual cold days < 0°C	0	0	0			
Days above 35°C	3	4 to 6	4 to 18			
Days above 40°C	0	0 to 1	1 to 4			
Sea Level Rise[8]						
Note: Tuggerah Lakes water surface is between 0.2-0.3m above mean tidal ocean level, therefore although uncertainty exists, it is anticipated that the levels will rise proportionately in line with the projected rise in sea level and this will result in broader areas of inundation around the Lake.		**Projected Change 2050**	**Projected Change 2100**	**Impacts upon Built Environment**	**Impacts upon Natural Environment**	**Impact upon Human Aspects**
		40cm	[6] 93cm	• Increased cost of storm damage to property and infrastructure. • Risk to underground telecommunications systems. • Seafront infrastructure (seawalls, jetties) at risk.	• Increased pressure on dune system – increased saltwater intrusion, coastline erosion and shoreline recession. • Marine inundation of coastal wetlands. • Landward migration of mangrove habitat from tidal inundation. • Loss of saltmarsh. • Changes in habitat due to saltwater intrusion.	• Loss of public space and existing facilities. • Damage to places of cultural significannce. • Interruption to essential services. • Loss of income and tourism by reduction of population growth.

1 Present day conditions for temperature and rainfall represent long-term averages from the Bureau of Meteorology. For extreme temperatures, the present average is based on 1964-2003. For fire danger, the present average is based on 1974-2003. For drought, the present average is for a period centred on 1990.
2 Range represents average July and January maximum temperature.
3 Defined as 1 in 40 year 1-day rainfall total. Values represent the range in seasonal projections from a limited set of climate models for central eastern NSW. However, given strong spatial gradients in extreme rainfall projections (see Hennessy et al., 2004b), these regional results may not be applicable for Sydney.
4 The values for drought represent average monthly drought frequencies, based upon the Bureau of Meteorology's criteria for serious rainfall deficiency (see also Burke et al., 2006).
5 Number of days annually with a "very high" or "extreme" fire danger index. Changes are for 2020 and 2050, respectively, as in Hennessy et al. (2005).
6 Sea level rise projection for 2100 has had the rounding of 3cm removed from the reported 90cm (DECC 2009).
7 NSW Department of Environment and Climate Change 2007 Floodplain Risk Management Guideline entitled *Practical Considerations of Climate Change*.
8 NSW Department of Environment and Climate Change 2009 *Draft Sea Level Rise Technical Guidelines*.
9 Commonwealth Scientific and Industrial Research Organisation (CSIRO) 2006 *Climate Change in Sydney Metropolitan Catchments* Australian Greenhouse Office Councils Group and the Australian Department of Climate Change.

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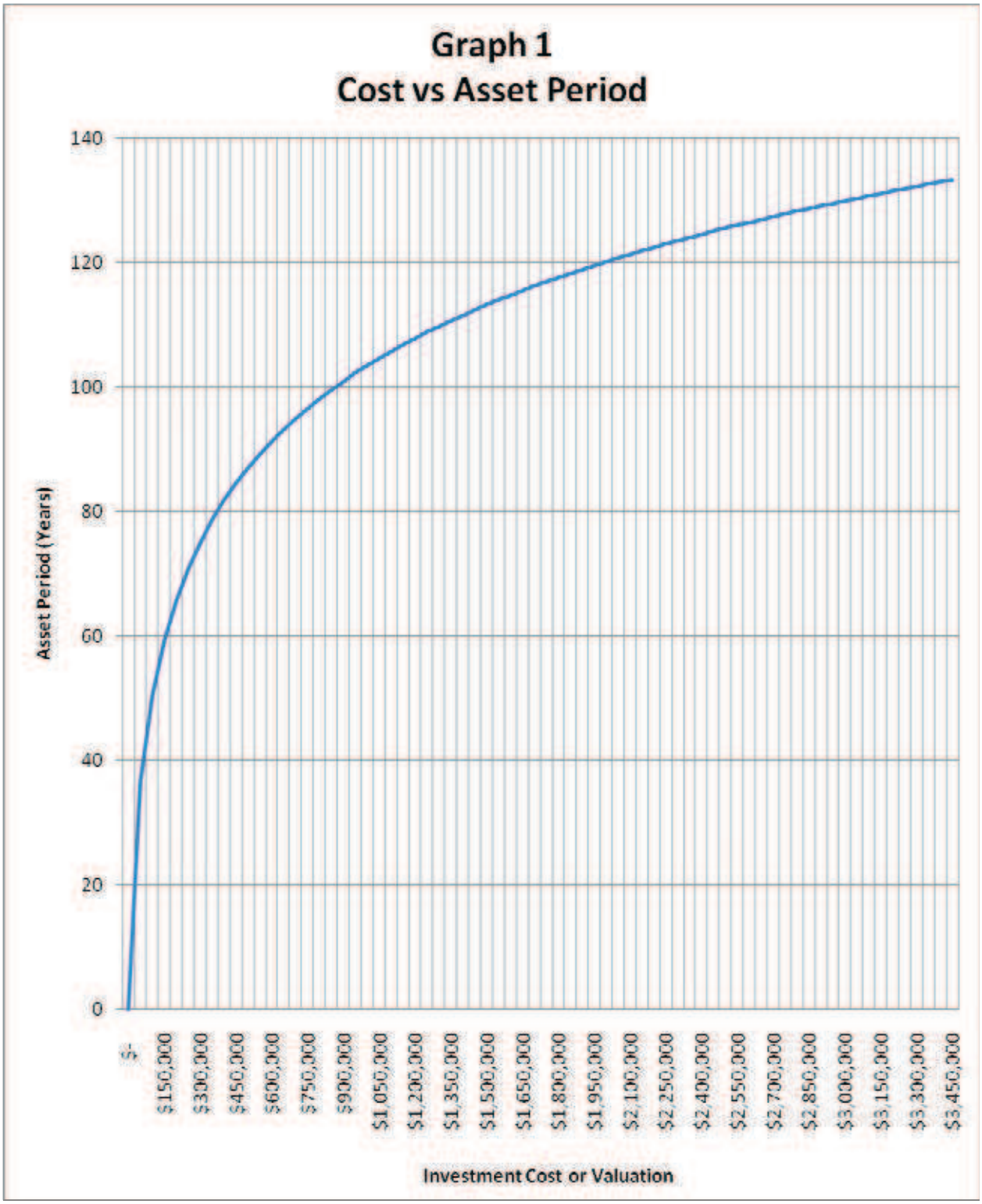
TECHNICAL GUIDELINES FOR ADAPTATION TO CLIMATE CHANGE



Cost Vs Asset Period

An Asset Period is the time that a development, infrastructure, works or activity maintains a specified level of service and condition, based on community and client expectations. It does not consider the development's commencement or completion date.

Examples
a) An addition or extension with a construction cost of about $50k would equate to approximately a 35-year asset period, while a $100k addition equate to a 50-year asset period.

b) A subdivision with a construction cost of about $1.5m would equate to approximately 115-year asset period.

(Note: the cost of works for subdivisions is not always an appropriate indicator to determine asset period. In this case the standard planning period should be 100 years.

c) An industrial or commercial development with a construction cost estimated at $1.0m would equate to approximately 102-year asset period.

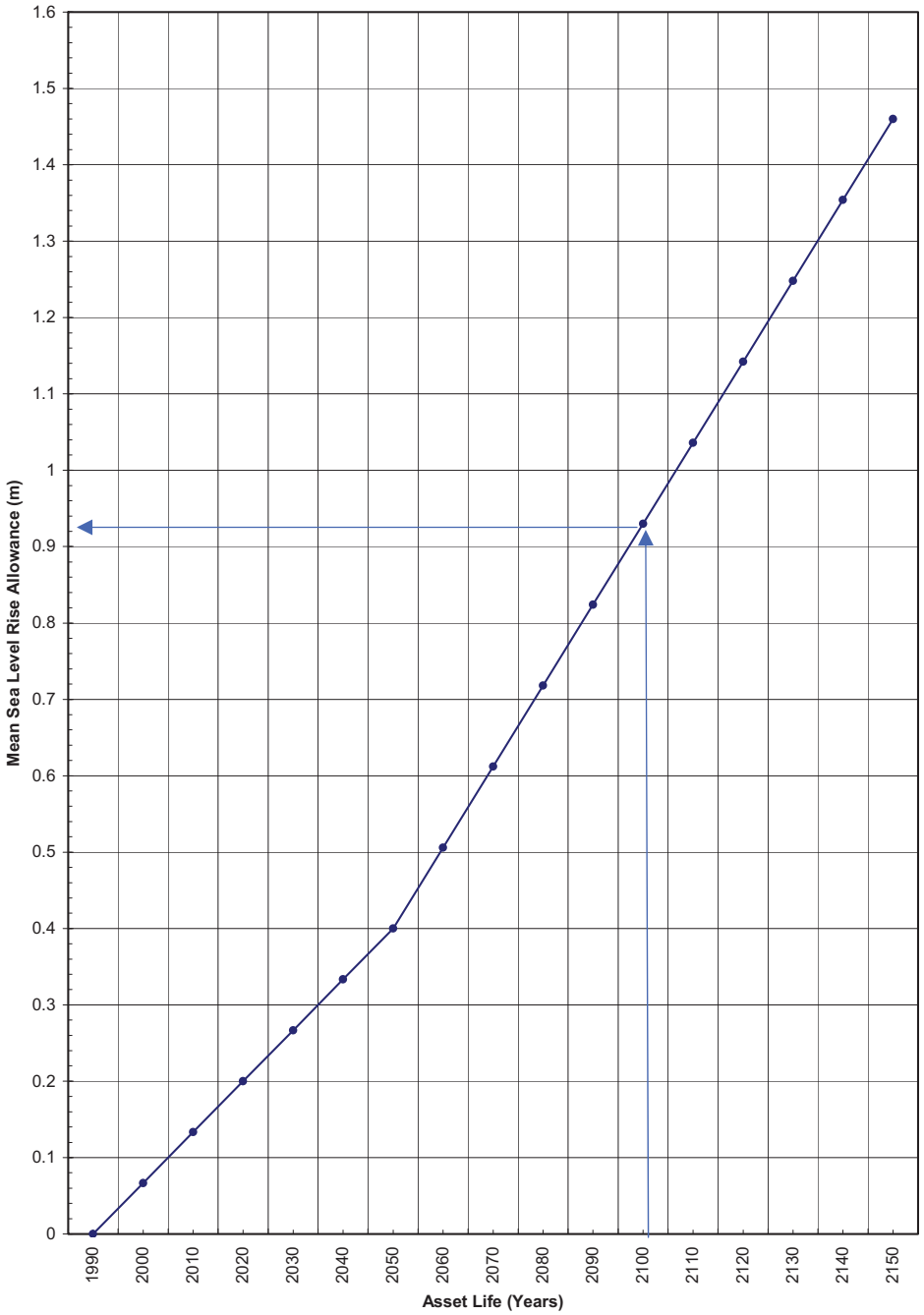
d) A small new dwelling timber framed and hardiplank with an estimated cost $200k would equate to approximately 65-year asset period.

e) A large new dwelling full masonry with an estimated cost $600k would equate to approximately 90-year asset period.

Notes
1) Median cost of new house 07-08 is $272,000 based on ABS sources.
2) Anecdotal evidence indicates that a residential brick veneer dwelling has a 60 to 75 year asset period.
3) 10-year average interest rate is 7.28% and CPI is 3.08% based on RBA sources.
4) Nett rate of growth on investment based on 10-year averages is 4.20%.
5) Curve determined by fixing $300,000 average new residential brick veneer dwelling cost to 75-year asset period.
6) Investment Cost is the capital cost, implementation cost, development cost or valuation of a proposed development, infrastructure or works to construct, enact or activate on a parcel of land, whether private or public. The accumulative Investment Cost of a larger network, community facility or system must be considered when dealing with a small or component of a development.

TECHNICAL GUIDELINES FOR ADAPTATION TO CLIMATE CHANGE

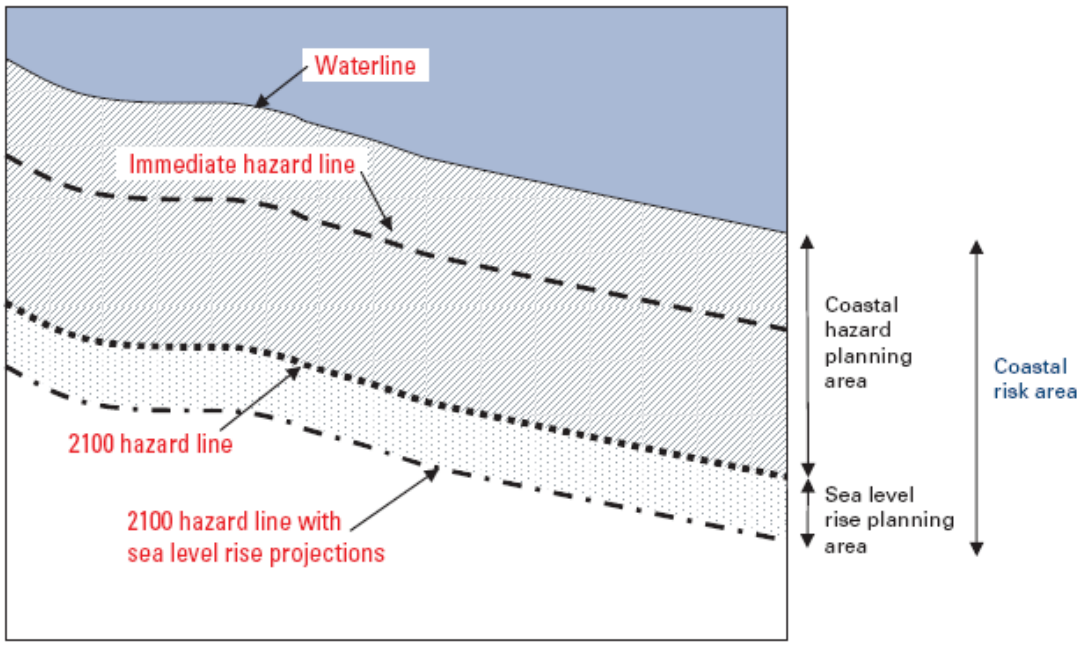
Graph 2: Mean Sea Level Rise Allowance for Asset Life



Climate Change Allowance for Asset Life – based on Mean Sea Level Rise

To allow Council to meet its legislative responsibility and reduce the impacts of climate change on residents, an additional Climate Change Allowance (CCA) is determined, (based on the asset period), to be applied to the current FPL for a development that meets the appropriate criteria.

Figure 1 – Coastal risk areas relating to coastal hazards



Nb: Coastal hazard planning areas and **sea level rise planning areas** are identified in coastal hazard studies undertaken in accordance with the *Coastline Management Manual* and the *draft Coastal Risk Management Guide* (DECCW, 2009a). **Coastal risk area** is the term used in this Guideline to identify the land covered by both the coastal hazard planning area and sea level rise planning area.

Source: Dept of Planning 2009

Examples

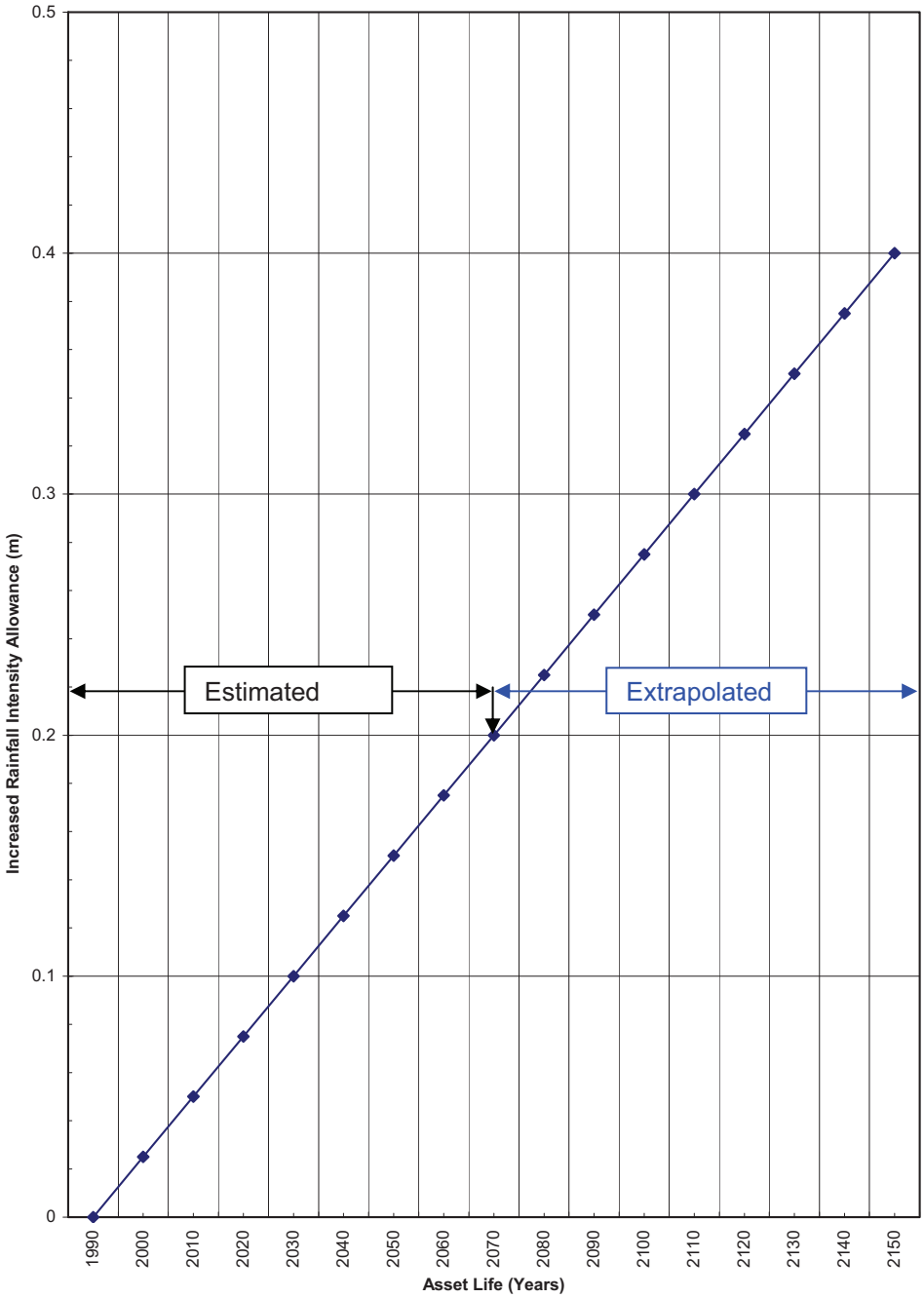
a) An industrial or commercial development in Lake's hydraulic influence with 102-year Asset Period (AP) activated in 2025; Climate Change Allowance (CCA) would be applied at 1.21m.
b) A new dwelling full masonry adjacent to creek but within hydraulic influence of Lake with 90-year AP activated in 2015; CCA would be applied at 0.98m (Graph-2) plus 0.28m (Graph-3A or 3B)
c) An addition or extensions on coast with 35-year AP but activated in 2040; CCA would be applied at at 0.65m
d) New dwelling timber framed and hardiplank on coast with 65-year AP activated in 2060; CCA @ 1.20m

Note:

1) Sea level rise rates are based on DECCW's Draft Technical Note February 2009, 40cm by 2050 and 93cm by 2100
2) Climate change influences and estimates rely predominantly on sea level rise and rainfall intensity estimates by government and research agencies as it is assumed that the beach berm at The Entrance will permanently fail in the medium term.
3) Asset Life is the time frame within which the Asset Period coincides from a specific start date to its completion date, beyond the Asset Period.
4) Ocean Properties have their FPLs determined by tidal fluctuations, wave run-up and ocean inundation. Mean Sea Level Rise Allowance relies totally only on sea level rise estimates by government and research agencies.
5) Lake Properties are generally located immediately adjacent to the lakes and their FPLs are determined by the ponding influences from the lake system. It can also include those properties well upstream of Lakes and adjacent to a Creek and that have a hydraulic backwater influence from the Lake.

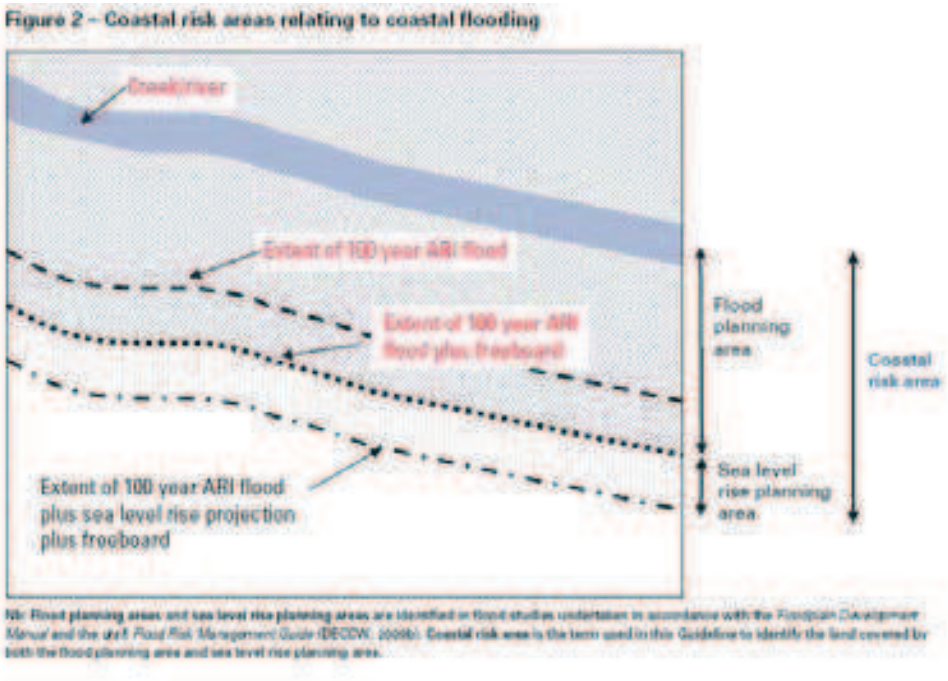
TECHNICAL GUIDELINES FOR ADAPTATION TO CLIMATE CHANGE

Graph 3A: Increased Rainfall Intensity Allowance for Asset Life (Generic)



Increased Rainfall Intensity (Climate Change) Allowance for Asset Life for Creeks and Rivers Generic (the Porters Creek Flood Study data is used where no specific study has been completed)

Creek Properties have their FPLs determined directly from channel and floodplain hydraulics and are located immediately adjacent to an overland flowpath, floodway, creek or river that does not have a hydraulic influence from the lakes.



Source: Dept of Planning 2009

Examples

a) A subdivision adjacent to creek system with 115-year AP but activated immediately; would apply a CCA of 0.34m.

b) An industrial or commercial development in creek's hydraulic influence with 100-year AP activated in 2015; 0.32m.

c) A new dwelling full masonry adjacent to creek but within hydraulic influence of Lake with 90-year AP activated in 2015; would apply a CCA of 0.98m (Graph-2) plus 0.28m (Graph-3A or 3B)

Note:

1) Rainfall intensity increases of 30% by 2070 based on DECCW's Practical Consideration of Climate Change - October 2007

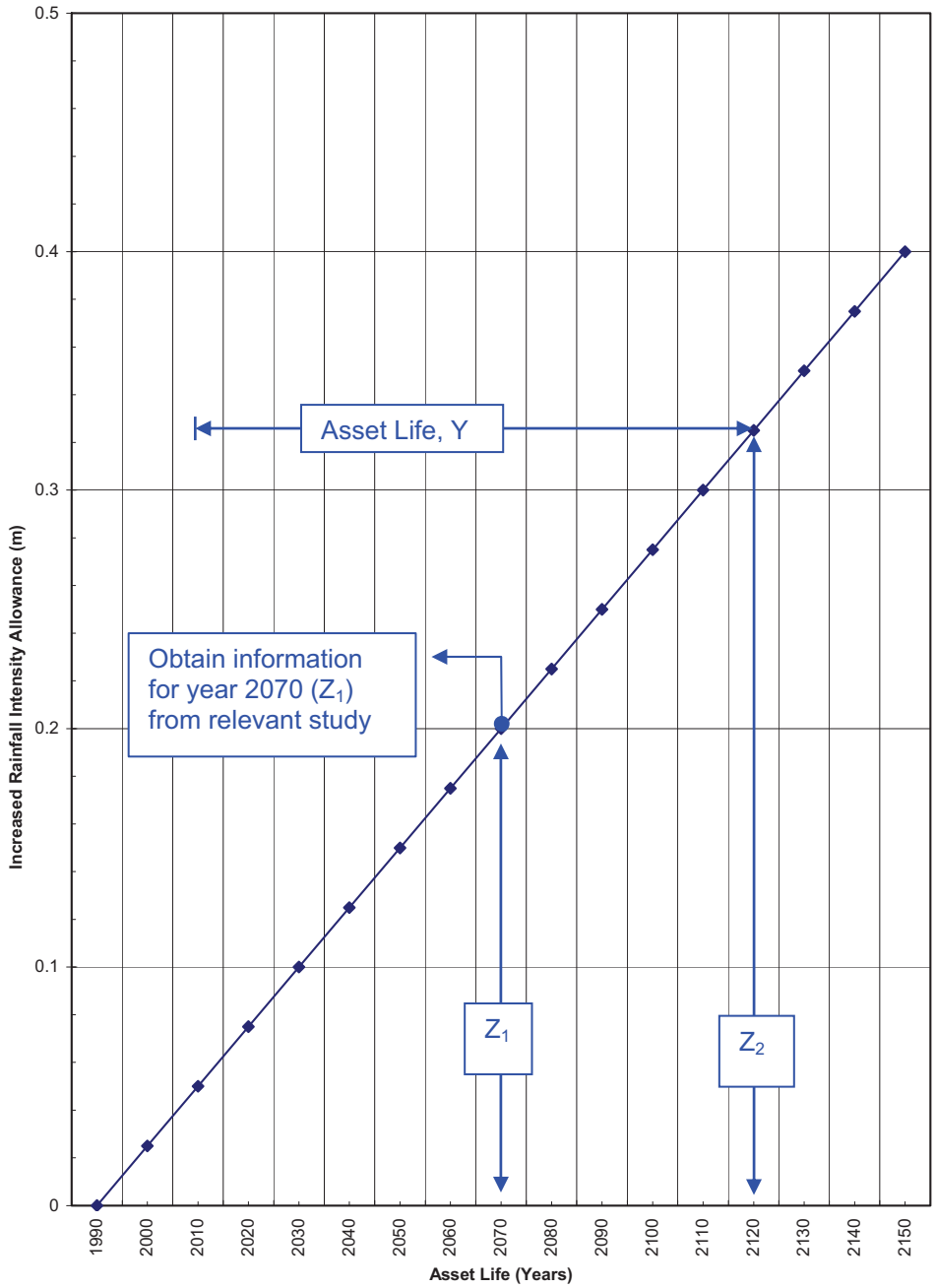
2) Climate change influences and estimates rely predominantly on sea level rise and rainfall intensity estimates by government and research agencies as it is assumed that the beach berm at The Entrance will permanently fail in the medium term.

3) Creek flood level rise average of 200mm by 2070 based on 30% increase in 1% AEP design rainfall intensity from Porters Creek Flood Study

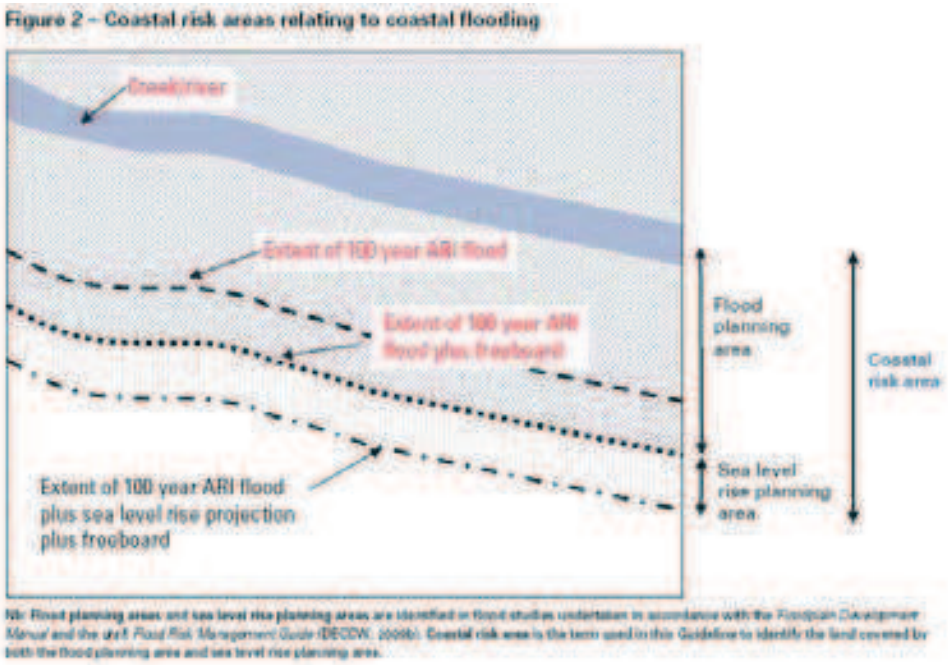
4) Asset Life is the time frame within which the Asset Period coincides from a specific start date to its completion date, beyond the Asset Period.

TECHNICAL GUIDELINES FOR ADAPTATION TO CLIMATE CHANGE

Graph 3B: Increased Rainfall Intensity Allowance for Asset Life (Flood Study Available with Climate Change information)



Increased Rainfall Intensity (Climate Change) Allowance for Asset Life for Creeks and Rivers (where a specific Flood Study provides climate change information)



Source: Dept of Planning 2009

Example

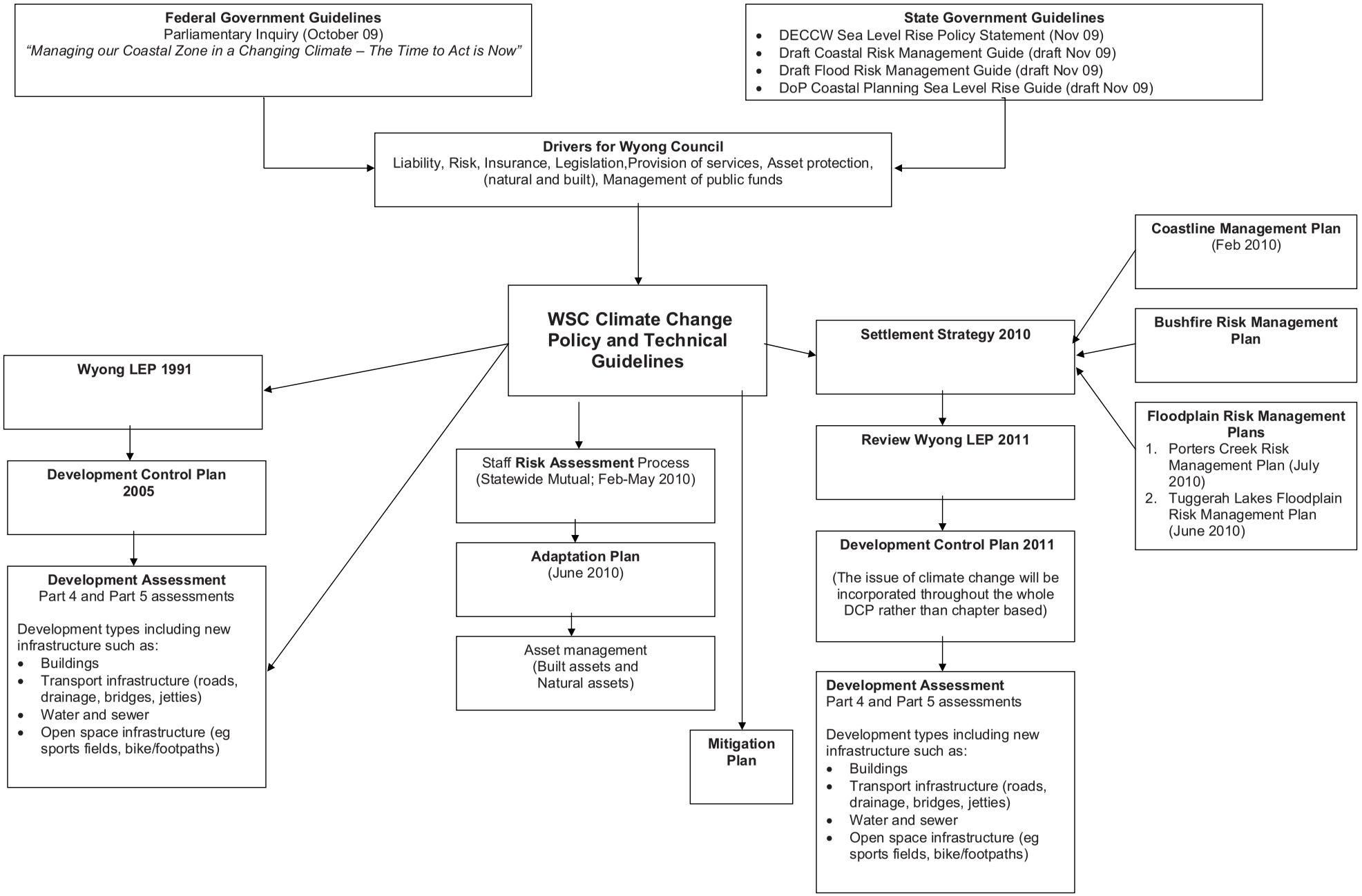
A development with an estimated cost of $900,000 will be built in 2010. Graph 1 indicates an equivalent asset period as 105 years. The length of time between year 1990 and 2010 (year application made) is 20. At year 2070, the increased rainfall intensity allowance based on the flood study is 0.20 metres. The climate change allowance due to increased rainfall intensities to the end of the asset life is calculated by:

$$= \frac{0.2 \text{ metres}}{(2070 - 1990) \text{ years}} \times (105 + 20) \text{ years} = 0.3125 \text{ metres}$$

Note:

1) Rainfall intensity increases of 30% by 2070 based on DECCW's Practical Consideration of Climate Change October 2007
2) Climate change influences and estimates rely predominantly on sea level rise and rainfall intensity estimates by government and research agencies as it is assumed that the beach berm at The Entrance will permanently fail in the medium term.
3) Creek Properties have their FPLs determined directly from channel and floodplain hydraulics and are located immediately adjacent to an overland flowpath, floodway, creek or river that does not have a hydraulic influence from the lakes.
4) In absence of increase in rainfall intensity information beyond 2070, increased rainfall intensity allowance obtained from flood study is to be linearly extrapolated to the year to which the asset life has been determined

Attachment 3 - Flowchart representing the key "framework" surrounding Council's Climate Change Policy



CLIMATE CHANGE POLICY

Attachment 4

Examples of how the Climate Change Policy would be implemented.

Projected climate change impacts will increase flood levels and flood extents in coastal waterways, with this effect generally diminishing with distance upstream from the coast. Climate change will potentially add both a level for sea level rise as well as increases in flood volume and changes to flood frequency from increased rainfall intensity and changes to rainfall patterns.

Figure 2 below is an extract from State Government's recently released Draft Flood Risk Management Guide: Incorporating sea level rise benchmarks in flood risk assessments. It should be noted that, in addition to the current risk associated with development within the Flood Planning Level (which incorporates the 1 in 100 year ARI flood plain level plus a freeboard of usually 0.5 metres), a new area, termed the "sea level rise planning area" will emerge. Proposed development within this area will also come under this policy.

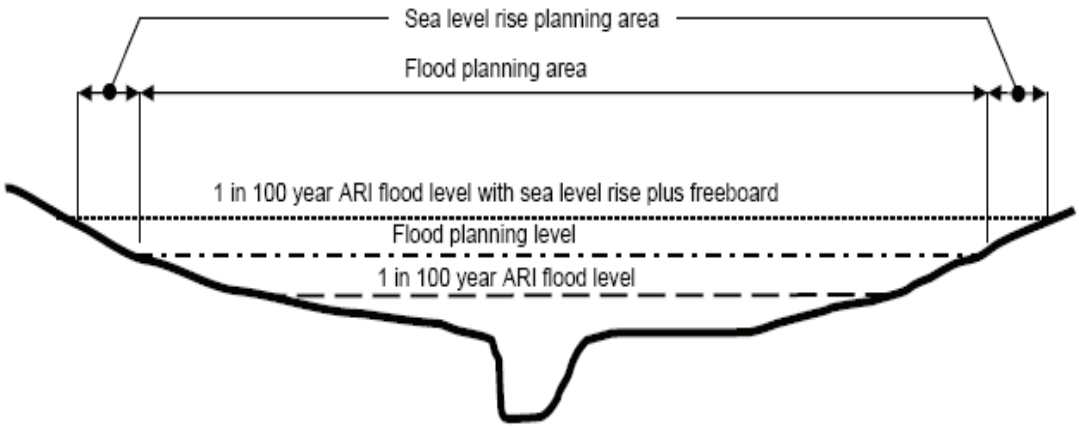


Figure 2 Flood levels and planning areas (cross-section view)

Worked Examples

Planning

Under the Policy, strategies, masterplans and rezonings, etc. are required to use a minimum 100 year time frame when considering the potential impacts of Climate Change. In this instance, any proposed strategy, masterplan or rezoning or part thereof within the "sea level rise planning area" would be affected.

The implication for any new proposals within the "sea level rise planning area" is that an additional Climate Change allowance (CCA) will need to be added to the flood planning level (Section 1.3 and 1.4 of the Policy).

In low lying areas surrounding the lake, such as those areas within the Toukley Strategy, adaptive measures will need to be considered to address future climate change flood planning levels. These measures will include applying alternate land use zones, additional zone objectives, principle development standards (e.g. minimum subdivision size), additional LEP provisions (e.g. use of foreshore building line), specific development provisions within a DCP, public resumption of land or protection options.

Inundation

Example 1

A private commercial or industrial development proposal lodged today that lies within the "sea level rise planning area" around the lake as determined under the risk assessment procedure will require a new flood planning level that includes a CCA to account for sea level rise over time. Note: the sea level rise for the Tuggerah Lakes is considered to be approximately the same as for open seas and will usually remain some 0.2 metres above the mean sea level.

The CCA allowance is determined by assessing the asset period from the approximate cost of the proposal (see Graph 1 Cost vs Asset Period in the **Technical Guidelines**). A $900 000 proposed development would have a 100 year asset period. This asset period equates to a CCA of 1.04 metres (Graph 2 of the **Technical Guidelines**). Consequently, for the proposed development to address the potential impacts of climate change it would need to be raised to allow for a new Flood Planning Level 1.04 metres above that stipulated for the current 1 in 100 year AEP flood level plus freeboard for the site.

Example 2

A private development proposal for a new dwelling lodged to day that lies within the floodplain of a river and above the influence of sea level rise as determined under the risk assessment procedure will require a new flood planning level that includes a CCA to address the potential increase in flood levels due to increased rainfall intensity over time. Porters Creek catchment would be such an area.

The CCA allowance is determined by assessing the asset period from the approximate cost of the proposal (see Graph 1 Cost vs Asset Period in the **Technical Guidelines**). A $150 000 proposed dwelling development would have a 60 year asset period. This asset period equates to a CCA of 0.2 metres (Graph 3A of the **Technical Guidelines**). Consequently, for the proposed development to address the potential impacts of climate change the subject land would need to be raised to provide a new Flood Planning Level 0.2 metres above that stipulated for the current 1 in 100 year AEP flood level plus freeboard for the site.

Example 3
Should a risk assessment indicate that the subject land comes within an area vulnerable to both sea level rise and increased flooding from increased rainfall intensity, then the CCA should include an allowance for both sea level rise (as determined from Graph 2 of the **Technical Guidelines**) and increased rainfall intensity (as determined from Graph 3A of the **Technical Guidelines**). For example, development proposals adjacent to both Tuggerah Lake and the Wyong River or Ourimbah Creek would fall into this category.

Coastline

Council's current DCP 2005 Chapter 77 Coastal Hazards delineates an immediate or very high hazard erosion zone for the dunes, beaches or bluffs where no development or improvements to dwellings can occur. Further west of this line development can occur in the high hazard zone (0-50 years) or the medium hazard zone (50 – 100 years) but is subject to development controls that address the hazard.

The Policy requires that proposed new development, modifications or additions landwards of the current erosion or immediate high hazard line should not be located seawards of a hazard line as determined equivalent to the Asses Period (see Graph 1 Cost vs Asset Period in the **Technical Guidelines**) for that new development, modification or addition, i.e. the new development should be located landwards of the hazard line equivalent to the Asset Period.

In essence, this precludes development commensurate with the current DCP 2005 Chapter 77 but allows development outside the area affected by the current erosion or high hazard lines to be commensurate with the risk posed by climate change over time, i.e. it does not sterilise land before it is necessary should coastal retreat occur as predicted.

For example, a house with an Asset Period of 70 years should be located outside the 70 year hazard line. Similarly, a smaller structure such as a deck, with an Asset Period of 15 years, could be located immediately outside the 15 year hazard line. The 70 and 15 year hazard lines can be interpolated between the current 0, 50 and 100 year hazard lines until additional hazard lines are formulated as part of the CMP process. This has the effect of not sterilising land until it is necessary on the basis of rising sea levels.

Where development is located immediately adjacent or within proximity to a hazard line equivalent to the development's Asset Period then the development could potentially be affected by the impacts of climate change soon after the Asset Period is realised. In such cases, the consent should be time limited to the Asset Period. This is also a departure from current practice.

When the asset period expires the time limited condition should be reassessed. Consent should be extended in time if the rate of coastal retreat due to climate change is less than projected at the time of the original consent. Should the rate of coastal retreat be equal to that predicted then the dwelling should be relocated, repositioned or demolished. In this regard the recently released State Government policies and draft guidelines (as per list under Legislative Requirements) clearly indicate that the responsibility and the cost for activity such as relocation, demolition and abandonment of a property lie clearly with the landholder