



WYONG SHIRE COUNCIL

Draft Climate Change Policy

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Climate Change Policy

CLIMATE CHANGE POLICY

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AIM

Wyong Shire Council will address the potential impacts of climate change as part of achieving the underlying principle of sustainability as outlined in the Wyong Shire Strategic Vision.

POLICY OBJECTIVES

- To address Council's legislative responsibility to apply the precautionary principle in a risk management framework to planning, operational and management decision-making when considering the potential implications associated with climate change projections.
- To acknowledge the uncertainty surrounding the issue of climate change yet be committed to being flexible and adaptive in our approach to both adaptation and mitigation.
- To provide timely information to the community on climate change, focused on vulnerable areas, in order to create a more holistic response and build community resilience to its potential impacts.
- To minimise Council's own greenhouse gas emissions through mitigation measures as part of its role in demonstrating leadership on the issue of climate change.
- To provide a set of Council-endorsed Climate Change Projections and planning guidelines, as part of the accompanying set of Technical Guidelines to inform the decision making process for strategic, infrastructure and operational planning.
- To review climate change research as it becomes available from leading government organisations and to update the Climate Change Projections as required.

PREAMBLE

The projected impacts of climate change will cut across all areas of local government responsibility. For Wyong Shire, climate change impacts will have significant short, medium and long term social, environmental and economic consequences. Due to its low-lying topography, Wyong Shire will be particularly vulnerable to climate change. Some of these vulnerabilities are summarised in Table 1.

Table 1: Climate Change Vulnerability

Climate Change Impact	Vulnerability
Increased temperature	– resulting in increased frequency and intensity of bushfires, adding to operational costs, impacting human health (temperature stress) , increase rate of asset deterioration
Changes in rainfall intensity and patterns	– 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, loss of coastal and estuarine ecosystems
Increase in extreme wind and storm events	– impacts on emergency services, upgrading building standards, stormwater flooding and damage to infrastructure and natural assets

Background information for Policy Requirements

Increased temperature

Current projections suggest that for south-eastern Australia there could be an increase in the frequency of very high and extreme fire danger days and that periods suitable for prescribed burning are likely to be reduced and move toward winter. In light of these projections, expert opinion and analysis by the insurance industry anticipate a likely increase in the risks to human life, property and the environment through an increasing frequency and intensity of bushfire.

Impacts on biodiversity

Climate change will have potentially severe impacts on Wyong Shire's biodiversity already under stress from weed invasion, fragmentation and habitat destruction due to land clearing. Some species and communities may respond to the changing climate by migrating to track environmental conditions to which they are adapted. However, many will not be able to adapt as they will have limited distribution capacity or their migration path is blocked by infrastructure. Many existing threatening processes such as weeds, pests and fragmentation are likely to be exacerbated by climate shifts.

Coastal erosion and shoreline recession, salt water intrusion to ground water, and tidal inundation are not only potential threats to coastline development, infrastructure and agriculture, but to coastal floodplain biodiversity as well. In terms of the latter, this may result in habitat loss, habitat fragmentation, increased competition, and ecosystem health decline.

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. Therefore, maintaining connectivity across the landscape will be a key element of mitigation planning at the regional and state level.

Human health

Climatic conditions also have wide-ranging effects on human health. Currently, approximately 1,100 people are estimated to die each year due to high temperatures in Australian capital cities and heat related deaths are expected to increase due to climate change². Diseases such as dengue fever could be more widespread as the geographic range of disease carrying insects is increased by climate change. The elderly, the very young, and those living in isolated communities will be more vulnerable to heat stress. Extreme weather events will increase exposure to injury and will restrict mobility and community activities.

Temperature implications for sea level rise and rainfall

There is a volume of scientific evidence indicating that temperatures are already increasing and that sea-levels are rising³ and that this will continue well into the next century and beyond with anticipated increases in ocean levels and increased frequency and severity of flood-producing rainfall in many locations.

For the Hunter and Sydney regions overall mean rainfall is expected to range from declining to remaining static although increases in extreme weather events are anticipated including an increase in maximum temperatures with an increase in the annual number of days of extreme high temperatures^{4,5}.

Legal liability

It is important that Council consider the legal implications of the likely consequences of climate change. Councils are currently legally obliged to consider climate change in a number of plans, i.e. the Coastline Management Plan, Estuary Management Plan and Floodplain Management Plans. Assessment of Council's vulnerability, in relation to climate change impacts is necessary for protection of water supply, infrastructure and community assets and future development. It also protects Council from potential liability in the case of personal and property damage.

Keeping ahead of the times

In taking a precautionary approach, Council must plan for climate change impacts, and continue to review data as it becomes available through the release of future international assessment reports issued by the IPCC and through other State and Federal government agencies. This may necessitate to changes in other relevant policies. Council will also have regard for reports and policies prepared to address climate change within adjacent Local Government Areas.

POLICY REQUIREMENTS

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 encompasses 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 Climate Change Projections to assess the implications and to develop the most feasible adaptation measures.

Until major risk assessments, such as the Coastline Management Plan and the Floodplain Management Plans are completed, the policy requires the adoption of interim measures based on current best practice and Government policy such as the State Government's Sea Level Rise Policy under its Coastal Reforms package. These form the basis for the interim measures addressed in this Policy. Once the actions determined under the risk assessments have been adopted by Council, such as the Coastline Management Plan, the interim measures (clauses 1.6 to 2.3 as detailed below) will be superseded and no longer be applicable.

In addition to the above major risk management planning programs, council staff (particularly those involved with asset management) will be required to undertake climate change risk assessments for their activities and projects against the Climate Change Projections and again assess the implications and develop the most feasible adaptation measures to alleviate the risks. Risk assessment will provide key information on the vulnerability of existing Council works and property to the impacts of climate change. From this investigation an Adaptation Plan will be developed (see section 8).

This Policy is supported by **Guidelines for Adaptation to Climate Change** (herein referred to as the **Technical Guidelines**). The Technical Guidelines will provide a consistent framework to planning and management decision-making when considering the risks associated with climate change. The Technical Guidelines will be updated over time to incorporate current global climate change projections as released by the International Panel on Climate Change (IPCC), CSIRO or other relevant government bodies. The Technical Guidelines also provide interim planning guidelines to cover sea level rise and increased rainfall intensity until coastal and floodplain risk management plans are completed that incorporate the Climate Change Projections. The Technical Guidelines include:

- The Climate Change Projections (Table 1)
- How to determine the "asset period" for a particular development, strategy or infrastructure (Graph 1)
- The Sea Level Rise Climate Change Allowance (CCA) (Graph 2)
- The Generic Increased Rainfall Intensity CCA for Catchments affected by Creeks and Rivers (Graph 3A) which indicates the increased rainfall intensity allowance to be used in the Wyong Shire for properties affected by creek and river flooding where a catchment specific flood study incorporating climate change (to year 2070) has not been completed.
- The Porters Creek Increased Rainfall Intensity CCA (Graph 3B) which has been prepared based on the information obtained from the Porters Creek Flood Study (July 2009) and provides an example of how to apply the CCA to a proposal where a catchment specific flood study exists.

It is to be noted that the DECCW guidelines indicate increased rainfall intensities to the year 2070 only¹. This 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 allowance is in addition to the Freeboard (0.50m) prescribed by the NSW Floodplain Development Manual (2005) A methodology is provided on each graph.

Once the relevant flood studies are complete, the planning measures developed within this Policy will assist in providing the CCA for proposals with an asset period beyond 2070.

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

The Adaptation Action Plan will provide planning and operational strategies to prepare Council and the community for the impacts of climate change, now and into the future.

A Mitigation Measures Plan will allow Council to determine its actual greenhouse emissions as a consequence of its activities and implement measures that will abate those emissions into the future.

To achieve these Plans Council will implement the following strategies in planning, risk management and mitigation, viz:

1 Planning

Council will ensure:

- 1.1 That the adopted Climate Change Projections be used in all Council's strategic, infrastructure, services, maintenance and operations as indicated in the **Technical Guidelines – Table 1**.
- 1.2 That climate change impacts are assessed based on a risk assessment approach in accordance with Australian and New Zealand Standard for Risk Management, AS/NZ 4360:2004 and as amended. This is to determine if protection practices, existing surrounding floor levels/Flood Planning Levels and adopted strategies offer a manageable risk for the works, activities or development and that appropriate and relevant mitigating and adaptive measures against the anticipated impacts of climate change are implemented.
- 1.3 That a minimum strategic land use planning period of 100-years be applied as the preferred period for any Planning and strategic study, rezoning proposal, design, investigation, policy or masterplan for land that may be affected by climate change.
- 1.4 That the planning approach incorporate an Asset Period that is identified and assigned for the particular development, works and/or activity as indicated in the **Technical Guidelines – Graph 1**. An upper Asset Period limit of 140-years will apply for the risk assessment undertaken as part of the planning approach.
- 1.5 That Council's planning and strategic documents and infrastructure policies and guidelines, where their content may be affected by climate change, be reviewed to recognise the Climate Change Projections as indicated in the **Technical Guidelines – Table 1**.

Inundation from the Impacts of Climate Change

- 1.6 A risk assessment is to be prepared for all development and infrastructure vulnerable to potential inundation from climate change impacts to determine and ensure that the floor levels, building flood protection requirements, flood inundation and the existing Flood Planning Level offer a manageable risk for the asset period. Appropriate and relevant mitigating and adaptive measures addressing the anticipated hydrological impacts (including any impacts on groundwater) should also be implemented.
- 1.7 That a sea level rise planning benchmark be incorporated into Council's strategic, infrastructure and operational planning that reflects the relevant advice adopted by various Australian and New South Wales government and research agencies as indicated in the **Technical Guidelines - Table 1**.
- 1.8 That all new flood and coastal studies to be completed within the local government area adopt the Climate Change Projections outlined in the **Technical Guidelines Table 1** as the criteria for preparing the study as part of the risk assessment process.
- 1.9 That for all new land subdivisions and major infrastructure located within the flooding regime of a creek, river, waterway, lake or coastal area and affected by a current Flood Planning Level (FPL) from that water body, an additional Climate Change Allowance (CCA) be applied to the FPL. The CCA is determined by utilising the development's Asset Period and location as indicated in the **Technical Guidelines - Graphs 1 - 3B**. (Note: the cost of works for subdivisions is not an appropriate indicator to determine asset period. In this case the standard planning period should be 100 years.
- 1.10 That all new development, including additions and alterations, be assessed initially against the Climate Change Projections and based on the precautionary principle be modified, relocated or refused if it is demonstrated through the risk assessment process that the development is not sustainable for the defined Asset Period, as indicated in the **Technical Guidelines Graph 1 – 3B**. If the risk is determined to be manageable, the new proposal is to be located and designed with appropriate and relevant mitigating and adaptive measures against the anticipated impacts of climate change for the Asset Period.
- 1.11 Subject to **clause 2.5**, for all new development, including additions and alterations, located within the flood regime of a creek, river, waterway, lake or coastal plain and affected by a current Flood Planning Level (FPL) from that water body, an additional Climate Change Allowance (CCA) will be applied to the FPL. The CCA can be determined by utilising the development's Asset Period and location as indicated in the **Technical Guidelines Graph 1 – 3B**.
- 1.12 Should a proponent seek support for an alternative FPL and CCA for a development or a portion of a development to that stipulated in **clauses 2.4 to 2.6**, a site-specific flood or coastal study shall be prepared at the proponent's cost that incorporates climate change impacts, for Council's consideration of that FPL alternative. The proposal and the study will be evaluated on its merits, including submission of the study to peer review or evaluation by an independent expert at the applicant's expense, if considered necessary.

- 1.13 That all activities associated with new infrastructure and major refurbishment assessed under Part 5 of the EP& A Act be assessed initially against the Climate Change Projections and based on the precautionary principle be redesigned, withdrawn or refused if it is demonstrated through the risk assessment process that the development does not meet the performance criteria for the defined Asset Period, as indicated in the **Technical Guidelines Graph 1 – 3B**. If the risk is determined to be manageable, the proposal is to be designed with appropriate and relevant mitigating and adaptive measures against the anticipated impacts of climate change for the Asset Period.

2 Coastline Management

- 2.1 The Hazard Assessment process undertaken within the development of the Coastline Management Plan forms the risk assessment process and this will incorporate the potential impacts of climate change associated with coastal development as indicated within the **Technical Guidelines**.
- 2.2 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 frame. 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.

- 2.3 With the new hazard lines being developed at present under the Coastline Management Plan 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 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 should 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 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. The Hazard Assessment process undertaken as part of the development of the CMP forms the risk assessment process and will incorporate the potential impacts of Climate Change as indicated within the Technical Guidelines.

- 2.4 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. 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 lies clearly with the landholder.

3 Bushfire Management

Past development practices across the state have resulted in a legacy of settlement patterns that pose potential bushfire risk to life, property and the environment.

- 3.1 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 Policy requires:
- i. Future rezoning of land is to be in accordance with Council's legislative responsibility to apply the precautionary principle;
 - ii. An integrated approach to bushfire risk management that prioritises public safety and explicitly considers ongoing environmental and financial impacts (as well as social impacts) of planning decisions;
 - iii. A requirement to provide sufficient land within new subdivisions to incorporate appropriate buffer requirements, such as an Urban Interface Area;

iv. Enhance Council's existing bushfire management through:

- a commitment to playing a key role on the Wyong Bushfire Management Committee and resourcing this appropriately;
- ongoing development of the Wyong Bushfire Risk Management Plan (BFRMP) to prioritise and treat bush fire hazards across the Shire without regard to ownership (a tenure blind approach); (taking into account that the financial responsibility sits with the property owner)
- ongoing development of a systematic approach to managing bushfire risk on Council managed lands consistent with the adopted BFRMP. This to focus on treatments at the urban/bushland interface that reduce maintenance costs in the long term. For example, Construction of Asset Protection Zones including a fire trail to simplify maintenance. Bushfire Protection Measures should be provided to assets identified on Extreme, Very High or High.
- future iterations of the BFRMP are to explicitly consider current adoptions. Climate Change projections and incorporate specific measures as necessary.

3.2 That for all new development (including those considered under Part 5 of the EP&A Act) located on bushfire prone land a bushfire management report is to be prepared. The report is to include explicit consideration of the likely impacts of climate change on bushfire hazard with reference to material the adopted Climate Change Projections. Generally, an Asset Period should be applied, as indicated in the **Technical Guidelines – Table 1** and detail will be provided as to how bushfire protection measures will be maintained over the life of the development. Wider locality impacts relating to infrastructure security, transport networks and demand on emergency services may need to be considered depending on the characteristics of the proposal.

4 Community Support and Human Health Implications

4.1 The long term impacts upon human health will include likely increases in vector borne diseases, gastro-intestinal diseases and mental health effects such as depression and post traumatic stress disorder following severe events or as the result of being a climate refugee. In terms of providing support for communities to respond to and prepare for the impacts of climate change, this policy requires:

- i) Development and implementation of community engagement programs to significantly improve understanding of climate change impacts to vulnerable communities;
- ii) Working closely with Northern Sydney and Central Coast Area Health to provide local health service programs in local communities to support communities in adapting to the effects of climate change;
- iii) Development and implementation of guidelines to incorporate the provision of natural and/or constructed shade in public areas, wherever practicable.
- iv) Development and implementation of a program to identify, upgrade and provide (as necessary) suitable community facilities to act as disaster refuges in times of bushfires, heatwaves and severe flooding. Such refuges will:
 - provide places of safety in local communities;
 - be well identified and promoted within the local area;
 - have adequate water supplies for fire fighting and drinking;
 - have suitable emergency communications; and

- provide other facilities as necessary.

5 Natural Resource Management

5.1 Appropriate buffering of natural ecosystems from development is required to be incorporated into strategic plans, land use controls and development proposals to allow room for the migration of communities as impacts of climate change arise. This is to include:

- i. ensuring Council's Natural Resources Strategy and its constituent plans such as the Biodiversity Management Plan, the Estuary Management Plan, Floodplain Management Plans and the Coastline Management Plan address the impacts of climate change on the Shire's biodiversity;
- ii. maintaining the effective connectivity and functionality of remnant habitats to allow for species movement in adapting to climate change impacts;
- iii. retention and protection of the Shire's large corridors; this includes areas in the Valleys, Glenning Valley area, north of Shire – Bushell's Ridge, Porters Creek Wetland;
- iv. supporting the concept of 'range to coast' corridor in the north of the Shire;
- v. identifying and protecting current and potential future wildlife corridors, many of which contain the many floodplain vegetation communities located on the coastal plains.;
- vi. implementing a regional approach to protect biodiversity.

6 Mitigation Measures Plan

6.1 A Mitigation Measures Plan will be developed and implemented to demonstrate Council's commitment to assisting global efforts to slow the rate of climate change, by reducing its own greenhouse gas (GHG) emissions. The Plan will include a corporate emissions reduction target in line with the Local Government Shires Association (LGSA) Mayoral Agreement on climate change (i.e. a 30% reduction by 2030) and will outline cost effective actions that Council will undertake to achieve that target. Council will be required to undertake an inventory of current emissions, and to identify feasible actions in order to set an achievable and appropriate GHG emissions target.

7 Adaptation Action Plan

7.1 An Adaptation Action Plan will be developed and implemented through an adaptive risk management approach. This approach will:

- i. place Council in a position to better manage the economic, environmental and social or community impacts of climate change in our region.
- ii. form an important component in demonstrating that Council has adopted a reasonable response to deal with the uncertainty of climate change.
- iii. aim to reduce Council's exposure to risks associated with climate change
- iv. improve the capability of Council to manage the impacts of climate change in all operations; and
- v. prepare the community to adapt to the consequences of such impacts and increase its resilience.

7.2 To develop its Climate Change Adaptation Action Plan, a comprehensive risk assessment process will be undertaken consistent with Australian and New Zealand Standard for Risk Management, AS/NZ 4360:2004 and as amended and the Australian Greenhouse Office (AGO) risk management framework. The risk assessment process will:

- i. identify the most significant areas of risk and establish priorities, costs and timeframes for development of an Adaptation Action Plan for Wyong Shire;
- ii. build the capability of Council to assess and prioritise risks related to climate change and foster leadership to enable a coordinated and strategic response;
- iii. engage the community in risk management processes and ensure transparency in communicating decisions on risk treatment options and the implementation of an Action Plan.

7.3 The risk assessment process will incorporate an Asset Period as indicated in the **Technical Guidelines Graph 1**. It will engage staff in the meaningful examination of climate-related risk, targeted to the participants' area of responsibility and match with Council's business planning processes and the relevant risk frameworks. It will address the risks in relation to:

- i. Civil Infrastructure (including Council owned assets, transport networks, stormwater drainage, and likely impacts on state owned infrastructure and how this may impact on local service provision, for example utilities, arterial road networks, hospitals)
- ii. Impacts on energy pricing: likely increases in fuel and electricity costs as a result of pricing carbon via the Federal Government's Carbon Pollution Reduction Scheme.
- iii. Recreational facilities (both in terms of design, materials/standards and occupation) and the impacts on usage under predicted changed climate conditions, e.g. on playing surfaces under different groundwater conditions or the inundation of fields.
- iv. Health related services and social vulnerability (i.e potential increase in disease vectors – for example mosquito population- does the Council need to consider suppression activities? Heat stress impacts, particularly given an ageing population). Likely impact on key services (child care, libraries, vacation care, etc)
- v. Planning and development approvals processes
- vi. Natural assets (impacts on biodiversity, habitats, geomorphology)
- vii. Natural hazards planning – changes to emergency readiness for flood, fire, coastal inundation.

8 DEFINITIONS

Adaptation is increasing society's capacity to cope with the impacts of climate change, so far as possible (Richardson 2009)

Adaptive Capacity is the ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with consequences.

Allotment or Lot means an area of topographical space shown on an approved plan of subdivision and on which it may be intended to undertake a development.

Ecologically Sustainable Development or Sustainable Management means meeting the needs of current and future generations through integration of environment protection, social advancement and economic prosperity or meeting the need of the present without compromising the ability of future generations to meet their own needs.

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.

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.

Community resilience is the community's ability to build and increase its capacity for learning and adaptation, the capacity to use change to better cope with the unknown: it is learning to bounce back ...resilience stresses variability.

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.

Climate refugee is a person who is forced to relocate, either to a new country or to a new location within their home country, due to global related environmental disasters.

Development includes all proposed works and activities that are legislated under both Part 4 and Part 5 of the Environmental Planning and Assessment Act. It also includes all proposed public/community works for infrastructure, services and activities that are required under the Roads Act and Local Government Act, incorporating the duty of care to the community.

Flood Planning Levels (FPL) are the combinations of flood levels (derived from significant historical flood events or floods of specific AEP's) and freeboards selected for floodplain risk management purposes.

Groundwater is the water that enters the ground (in recharge areas) and moves along aquifers, generally below ground but may be connected with lakes, rivers or springs (discharge areas).

Infill Development is development that is undertaken on an allotment in between existing developments, which may be on the same allotment and is permissible under the current zoning of the land. Conditions such as minimum floor levels may be imposed.

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 or system must be considered when dealing with a small or component of a development.

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 and adjacent to a Creek and that have a hydraulic backwater influence from the Lake. 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.

Mitigation Actions are those measures taken to reduce or change the human activities that are driving climate change.

New Development is that development that is not an extension or addition to an existing development. It is normally a detached structure or an isolated activity that is not associated with or attached to any existing structures or activities on an allotment. New developments involve re-zoning and typically require major extensions of existing urban services such as roads, water supply, sewerage and electric power.

Ocean Properties have their FPLs determined by tidal fluctuations, wave run-up and ocean inundation. Climate change influences and estimates rely totally only on sea level rise estimates by government and research agencies.

Road means any way or street open to the public for the passage of vehicles, persons or animals, including community title roads.

Strata Subdivision is the division of land in which at least one boundary between lots in the subdivision is defined by a plane that is not vertical. This boundary may be a horizontal plane or any plane lying between a horizontal plane and an inclined plane which is less than vertical. This includes lots wholly or partially inside buildings, external lots that may be wholly or partially covered or external open space lots.

Subdivision of land means the division of land into two or more lots, portions or parts that after division would obviously be adapted for separate development, use or disposition.

REFERENCES

- (1) Intergovernmental Panel on Climate Change (IPPC) Working Group II Contribution 2007 *Fourth Assessment Report- Climate Change 2007: Climate Change Impacts, Adaptation and Vulnerability*.
- (2) Australian Medical Association (AMA) and Australian Conservation Foundation (ACF) 2005 *Addressing the Public Health Impacts of Climate Change*.
- (3) 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.
- (4) CSIRO and Bureau of Meteorology (BOM) 2009 *Climate Change in Australia Science Update Issue One*.

- (5) HCCREMS, University of Newcastle (2009). *Report 3: Climatic Change Impact for the Hunter, Lower North Coast and Central Coast Region of NSW*. Hunter Councils, NSW.
- (6) NSW Department of Environment and Climate Change 2009 *Draft Sea Level Rise Policy Statement*.
- (7) NSW Department of Environment and Climate Change 2009 *Draft Sea Level Rise Technical Guidelines*.
- (8) NSW Department of Environment and Climate Change 2007 Floodplain Risk Management Guideline entitled *Practical Considerations of Climate Change*.

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