

**Presentation by The Hon. Justice Brian J Preston
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‘The Judicial Development of the Precautionary Principle’

to the

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Environmental Management of Firefighting Foam Policy
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I. SETTING THE CONTEXT: THE CONCEPT OF ECOLOGICALLY SUSTAINABLE DEVELOPMENT

(A) Introduction

The concept of ecologically sustainable development (ESD) or sustainable development has been around for at least three decades. In the international arena, the concept has appeared, under various names, in multilateral environmental agreements, soft law instruments, and international policies, plans and programs. Nation states have incorporated the concept into domestic legislation and articulated some of its constituent principles. Executive governments have applied the concept and its principles in decision-making concerning the environment. Notwithstanding this recognition, the concept of ESD still remains elusive. Many questions remain unanswered by the actions of nation states, and of their legislatures and executives.

The judiciaries of the world have, through their decisions, cast some light on the concept and have answered to varying degrees some of the questions about the concept of ESD and the principles of ESD and how and when they should be applied. These judicial decisions have explicated the spare skeleton of ESD, filled the interstices, and put flesh on the skeleton. In these ways, judicial decisions are developing a body of jurisprudence on ESD.

The development of a body of ESD jurisprudence is the product of judicial decision-making. It was not its purpose. Courts have neither a policy agenda nor a legislative rule making function. Courts are reactive not proactive institutions. Courts ordinarily do not seek out disputes to resolve. They await and resolve only disputes that parties elect to bring to the court. Their function is adjudication.

This paper’s primary purpose is to explicate the judicial development of the precautionary principle, one of the key principles of ESD. It is important to recognise that the precautionary principle is only one of the principles and that ESD can be achieved through the implementation of the precautionary principle as well as the other principles of ESD. It is, therefore, instructive to first consider the meaning of ESD as a whole before turning to consider the meaning and application of one of its constituent principles, the precautionary principle.

(B) The importance of the language of ESD

(1) The variety of terminology

The meaning of ESD depends on the specific legislation that incorporates it. Judicial interpretation of ESD is, therefore, very dependent on the statutory language in both the provisions defining ESD and in the provisions establishing the strategic rules and liability rules that utilise ESD. It is difficult, therefore, to generalise about the meaning given to ESD by the courts.

Legislation that incorporates ESD typically describes ESD in general terms. Sometimes, the actual concept of ESD is not defined at all, although the principles of ESD may be defined.¹ Some legislation simply refers to the object of “the need to maintain ecologically sustainable development”² or to “promote ecologically sustainable development”³ but leaves unspecified what is it that is to be maintained or promoted.

Alternatively, there may be a definition of ESD but the definition speaks in general terms of what ESD requires or how ESD is to be achieved without actually defining what ESD is. Consider three examples. First, there are legislative and policy instruments that define ESD in the terms used by the World Commission on Environment and Development (WCED) in its report *Our Common Future* as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”.⁴ Second, there is legislation that says that ESD requires the effective integration of economic and environmental considerations in decision-making processes.⁵ Third, there is legislation that says that ESD can be achieved through the implementation of specified principles which may be defined to be principles of ESD. These include the principle of sustainable use; the principle of integration of economic, environmental and social considerations; the precautionary principle; the principle of intergenerational equity; the principle of conservation of biological diversity and ecological integrity; and the promotion of improved valuation, pricing and incentive mechanisms, including the polluter pays principle and the user pays principle.⁶

¹ For example, *Environment Protection and Biodiversity Conservation Act 1999* (Cth) s 3A.

² *Protection of the Environment Administration Act 1991* (NSW) s 6(1)(a).

³ *Threatened Species Conservation Act 1995* (NSW) s 3(a).

⁴ World Commission on Environment and Development, *Our Common Future* (OUP 1987) 44, ch 2 [1]; adopted by the United Nations General Assembly, *Report of the World Commission on Environment and Development* GA Res 42/187, UN GAOR, 2nd Comm, Agenda Item 82e (11 December 1987) A/Res/42/87; included by the UK Department for Communities and Local Government in the *National Planning Policy Framework* (March 2012) 2; cited in *Telstra Corp Ltd v Hornsby Shire Council* [2006] NSWLEC 133; (2006) 67 NSWLR 256, 265 [108]; *MC Mehta v Union of India* [2004] INSC 179; AIR 2004 SC 4016, 4044 [46].

⁵ *Protection of the Environment Administration Act 1991* (NSW) s 6(2); adopted by *Environmental Planning and Assessment Act 1979* (NSW) s 4(1); *Threatened Species Conservation Act 1995* (NSW) s 4(1).

⁶ For example, *Environment Protection and Biodiversity Conservation Act 1999* (Cth) s 3A; *Protection of the Environment Administration Act 1991*(NSW) s 6(2); *Environmental Planning and Assessment Act 1979* (NSW) s 4(1); *Threatened Species Conservation Act 1995* (NSW) s 4(1).

(2) The language of process and outcome

It is suggested that these legislative and policy approaches point to a degree of means-ends fluidity. Legislation is traditionally more concerned with means than ends. Hence, environmental legislation characteristically leaves unspecified what the end or outcome of decision-making under the legislation should be. It will, however, prescribe the process and the methodology that decision-making should follow. The end or outcome becomes clear only as a result of going through the prescribed process.⁷

Notwithstanding this means-ends fluidity, there would appear to be a common thread that the concept of ESD does embody an outcome and this is to be achieved through implementation of the various principles of ESD.⁸ ESD operates in legislation as “a standard of conduct or behaviour, as a standard of methodology of decision-making or as a standard of outcome or result”.⁹ ESD, therefore, involves both a substantive outcome as well as a process to achieve that outcome. Indeed, ESD has been described as being “all about integrating process and substance with a view to achieving a single, unified objective”.¹⁰

But what is the substantive outcome that ESD requires? The WCED definition in *Our Common Future* calls for development that meets the needs of the present without compromising the ability of future generations to meet their own needs. These needs of present and future generations are economic, environmental and social. However, economic and social needs cannot be met continuously in a deteriorating environment. Any further degradation of the earth’s natural capital must be prevented for the sake of future generations. Hence, at the core of ESD is ecological sustainability. This is the outcome that ESD demands. ESD requires living within the planet’s ecological limits.¹¹ ESD involves development that improves the total quality of life both now and in the future, in a way that maintains the ecological processes upon which life depends.¹²

(C) Judicial analysis of the language of ESD as requiring an outcome

The Constitutional Court of South Africa recognised the need to protect the environment in order to achieve economic and social development:

Economic and social development is essential to the well-being of human beings. This Court has recognised that socio-economic rights that are set out in the Constitution are indeed vital to the enjoyment of other human rights guaranteed in the Constitution. But development cannot subsist upon a deteriorating environmental base. Unlimited development is detrimental to the environment and the destruction of the environment is detrimental to development. Promotion of development requires the protection of the environment, yet the environment cannot be protected if development does not pay

⁷ DE Fisher, *Australian Environmental Law: Norms, Principles and Rules* (3rd edn, Lawbook Co 2014) 47.

⁸ Fisher (n 26) 173, 174, 219, 331-332.

⁹ *ibid* 219.

¹⁰ Douglas Fisher, *Legal Reasoning in Environmental Law: A Study of Structure, Form and Language* (Edward Elgar 2013) 64.

¹¹ The UK Government’s Sustainable Development Strategy, *Securing the Future* (The Stationary Office 2005) 17.

¹² *National Strategy for Ecologically Sustainable Development* (Australian Government Publishing Service 1992) 8.

attention to the costs of environmental destruction. The environment and development are thus inexorably linked.¹³

Bosselmann has argued that ESD involves “the obligation to promote long-term economic prosperity and social justice within the limits of ecological sustainability”. The principle of sustainability is defined as “the duty to protect and restore the integrity of the Earth’s ecological systems”.¹⁴ Echoing the land ethic of Aldo Leopold, Bosselmann suggests “development is sustainable if it tends to preserve the integrity and continued existence of ecological systems; it is unsustainable if it tends to do otherwise”.¹⁵

This need for maintenance of “ecological balance” led the High Court of Calcutta to issue an injunction restraining reclamation of wetlands in East Kolkata for development activities. The court recognised that sustainable development requires there to be “a proper balance between the development and the environment so that both can co-exist without affecting the other”.¹⁶ The goal is “maintenance of ecological balance”. If development leads to ecological imbalance, the function of the court is to intervene.¹⁷

Similarly, the Supreme Court of India held that sustainable development ensures that “mitigative steps are and can be taken to preserve the ecological balance. Sustainable development means what type or extent of development can take place which can be sustained by nature/ecology with or without mitigation”.¹⁸ This ecological core of ESD places a first claim on the earth’s natural resources. Only when ecological needs are met should the remaining natural resources be available to supply and meet economic and social needs.¹⁹

The ecological core of ESD also sets an environmental bottom line that needs to be met. The Supreme Court of New Zealand held that the *Resource Management Act 1991* (NZ) (RMA) and the New Zealand Coastal Policy Statement (NZCPS) made under the Act established an environmental bottom line of preservation and protection of the coastal environment as part of the concept of sustainable management.²⁰ The core purpose of the RMA is to promote sustainable management of natural and physical resources.²¹ “Sustainable management” is defined to mean:

¹³ *Fuel Retailers Association of Southern Africa v Director-General Environmental Management, Department of Agriculture, Conservation and Environment, Mpumalanga Province* [2007] ZACC 13; 2007 (6) SA 4 (CC), 21 [44].

¹⁴ Klaus Bosselmann, *The Principle of Sustainability: Transforming Law and Governance* (Ashgate 2008) 53, 57.

¹⁵ *ibid* 53.

¹⁶ *People United for Better Living in Calcutta v State of West Bengal* AIR 1993 Cal 215, 217 [2].

¹⁷ *ibid* 227–228 [29]–[30], 231 [40].

¹⁸ *Narmada Bachao Andolan v Union of India* [2000] INSC 518; AIR 2000 SC 3751, 3804 [150]; *MC Mehta v Union of India* [2004] INSC 179; AIR 2004 SC 4016, 4044 [46].

¹⁹ Volker Mauerhofer, Klaus Hubacek and Alastor Coleby, ‘From Polluter Pays to Provider Gets: Distribution of Rights and Costs under Payments for Ecosystem Services (2013) 18(4) *Ecology and Society* 41, 43.

²⁰ *Environmental Defence Society Inc v The New Zealand King Salmon Company Ltd* [2014] NZSC 38; [2014] 1 NZLR 593.

²¹ *Resource Management Act 1991* (NZ) s 5(1).

managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic and cultural well-being and for their health and safety while –

- (a) sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and
- (b) safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and
- (c) avoiding, remedying, or mitigating any adverse effects of activities on the environment.²²

Section 5 is “a carefully formulated statement of principle intended to guide those who make decisions under the RMA”.²³ It is given further elaboration by section 6 of the RMA.

The RMA envisages the formulation and promulgation of planning documents to give effect to the core purpose. One of the documents made to achieve the purpose of the RMA in relation to the coastal environment of New Zealand is the NZCPS.²⁴ One of the principal objectives of the NZCPS is “to preserve the natural character of the coastal environment and protect natural features and landscape values” through specified means, including identifying those areas where various forms of development would be inappropriate and protecting them from such activities.²⁵

This objective and these policies of the NZCPS set an environmental bottom line.²⁶ The NZCPS gives primacy to protecting areas of the coastal environment with outstanding natural features from the adverse effects of development, in order to promote sustainable management.²⁷ Any regional plan is required to “give effect to” the NZCPS²⁸ and any decision to change a regional plan must also give effect to the NZCPS. Hence, it was an error, in considering a plan change, to adopt an “overall judgment” approach - balancing conflicting environmental, economic and social considerations - rather than the “environmental bottom line” approach which means giving effect to the NZCPS policy of preserving the coastal environment and protecting it from inappropriate development.²⁹

(D) Conclusion on ESD

It was suggested earlier in this paper that the concept of ESD involves a substantive outcome that is to be achieved through the implementation of the principles of ESD. The implementation of these principles achieves different aspects of the substantive outcome. Each of the principles should not be viewed in isolation but rather as part of a package. Sometimes the principles reinforce each other and strengthen the case for taking some particular action. At other times they tug in different directions and may need to be weighed

²² *Resource Management Act 1991* (NZ) s 5(2).

²³ *Environmental Defence Society Inc v The New Zealand King Salmon Company Ltd* [2014] NZSC 38; [2014] 1 NZLR 593, 618 [25].

²⁴ See *Resource Management Act 1991* (NZ) ss 56, 57.

²⁵ New Zealand Coastal Policy Statement 2010, objective 2, policies 13, 15.

²⁶ *Environmental Defence Society Inc v The New Zealand King Salmon Company Ltd* [2014] NZSC 38; [2014] 1 NZLR 593, 651 [132].

²⁷ *ibid* 656 [149].

²⁸ *Resource Management Act 1991* (NZ) s 67(3).

²⁹ *Environmental Defence Society Inc v The New Zealand King Salmon Company Ltd* [2014] NZSC 38; [2014] 1 NZLR 593, 657–658 [152]–[154].

against one another to determine the appropriate action to be taken. Courts have emphasised the need to consider all of the principles of ESD that are relevant to the decision to be made.³⁰

II. INTERPRETING THE PRECAUTIONARY PRINCIPLE

(A) The history of precaution

One of the best known principles of ESD is the precautionary principle. This principle has deep historical roots. As Resnik has observed, the precautionary principle has its origins in the “common folk wisdom that ‘it is better to be safe than sorry’ and ‘an ounce of prevention is worth a pound of cure’”.³¹ However, this primitive concept of precaution only began to crystallise as a normative principle to guide decision-making during the 1970s in West Germany.³² The social democratic government of West Germany during this period expressed its intention to conserve and protect the environment by ensuring that foreseeable environmental harm was anticipated and prevented.³³ Boehmer-Christiansen has suggested that the first application of the concept of precaution to West German environmental policy was when the objective of *dem Entstehen schadlicher Umwelteinwirkungen vorzubeugen* (‘to prevent the development of harmful environmental effects’) was included in clean air legislation enacted in the early 1970s.³⁴ By 1976, the *Vorsorgeprinzip* had been expressly introduced into West German environmental law and “had become a cornerstone of German environmental policy”.³⁵ The *Vorsorgeprinzip* was defined to require the “early detection of dangers to health and [the] environment” and, where appropriate, the taking of actions to protect the environment despite scientific uncertainty concerning such dangers.³⁶

Throughout the 1980s, the *Vorsorgeprinzip* became increasingly influential internationally.³⁷ In particular, the precautionary principle started to gain traction throughout Europe and the English-speaking world.³⁸ The first international treaty to be explicitly influenced by the

³⁰ *Northcompass Inc v Hornsby Shire Council* (1996) 130 LGERA 248, 264–265; *Telstra Corp Ltd v Hornsby Shire Council* [2006] NSWLEC 133; (2006) 67 NSWLR 256, 280 [182]–[183]; *Blue Wedges Inc v Minister for Environment, Heritage and the Arts* [2008] FCA 399; (2008) 167 FCR 463, 480–481 [76]–[78].

³¹ David Resnik, ‘Is the precautionary principle unscientific?’ (2003) 34 *Studies in History and Philosophy of Biological and Biomedical Sciences* 329, 329.

³² Sonja Boehmer-Christiansen, ‘The Precautionary Principle in Germany – enabling Government’ in Timothy O’Riordan and James Cameron (eds), *Interpreting the Precautionary Principle* (Earthscan, 2009) 35–36.

³³ Sonja Boehmer-Christiansen, ‘The Precautionary Principle in Germany – enabling Government’ in Timothy O’Riordan and James Cameron (eds), *Interpreting the Precautionary Principle* (Earthscan, 2009) 36–37.

³⁴ Sonja Boehmer-Christiansen, ‘The Precautionary Principle in Germany – enabling Government’ in Timothy O’Riordan and James Cameron (eds), *Interpreting the Precautionary Principle* (Earthscan, 2009) 35.

³⁵ Sonja Boehmer-Christiansen, ‘The Precautionary Principle in Germany – enabling Government’ in Timothy O’Riordan and James Cameron (eds), *Interpreting the Precautionary Principle* (Earthscan, 2009) 36.

³⁶ Sonja Boehmer-Christiansen, ‘The Precautionary Principle in Germany – enabling Government’ in Timothy O’Riordan and James Cameron (eds), *Interpreting the Precautionary Principle* (Earthscan, 2009) 37.

³⁷ Brian J Preston, ‘The Role of the Judiciary in Promoting Sustainable Development: The Experience of Asia and the Pacific’ (2005) 9(2-3) *Asia Pacific Journal of Environmental Law* 134.

³⁸ David Resnik, ‘Is the precautionary principle unscientific?’ (2003) 34 *Studies in History and Philosophy of Biological and Biomedical Sciences* 329, 329–330.

precautionary principle was the 1985 *Vienna Convention of the Protection of the Ozone Layer*,³⁹ “in which the Parties acknowledged the “precautionary measures” which had already been undertaken at both the national and international levels in relation to the protection of the ozone layer”.⁴⁰ Within a decade of this convention, the precautionary principle had become internationally recognised as a legitimate normative principle capable of guiding environmental law and policy both on the domestic and international planes. Internationally, this was confirmed by the inclusion of the precautionary principle in a range of significant environmental declarations and conventions including, amongst many others,⁴¹ the 1987 *Second North Sea Conference Ministerial Declaration*,⁴² the 1990 *Bergen Ministerial Declaration on Sustainable Development in the Economic Commission for Europe Region*,⁴³ the 1991 *Convention on the Ban of Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa*,⁴⁴ the 1992 *Convention on the Protection of the Marine Environment of the North-East Atlantic*,⁴⁵ the 1992 *Helsinki Convention on the Protection and Use of Transboundary Watercourses and International Lakes*,⁴⁶ the 1992 *Convention on Biological Diversity*⁴⁷ and the 1992 *United Nations Framework Convention on Climate Change*.^{48, 49}

Domestically, the precautionary principle also became well-established in the body of environmental legislation of many nation states. For example, by the end of the twentieth century, the precautionary principle was expressly included in many Australian statutes,⁵⁰ often as “objectives of the respective enactments, but there are instances where there is an obligation to take them into account”.⁵¹

³⁹ 26 ILM 1516 (1987) *Preamble*.

⁴⁰ Brian J Preston, ‘The Role of the Judiciary in Promoting Sustainable Development: The Experience of Asia and the Pacific’ (2005) 9(2-3) *Asia Pacific Journal of Environmental Law* 134.

⁴¹ See Brian J Preston, ‘The Role of the Judiciary in Promoting Sustainable Development: The Experience of Asia and the Pacific’ (2005) 9(2-3) *Asia Pacific Journal of Environmental Law* 135-138; Philippe Sands, *Principles of International Environmental Law* (2nd ed, CUP 2003) 271; Nicolas de Sadeleer, *Environmental Principles, From Political Slogans to Legal Rules* (OUP 2002) 98.

⁴² 27 ILM 835 (1988) Arts VII, XV(i) and XVI(i),

⁴³ UN Doc. A/CONF.151/PC/10 (Bergen, 16 May 1990) par 7.

⁴⁴ 30 ILM 773 (1991).

⁴⁵ 32 ILM 1069 (1993) Art 2(2)(a).

⁴⁶ 31 ILM 1312 (1992) Art 2(5)(a).

⁴⁷ 31 ILM 822 (1992).

⁴⁸ 31 ILM 849 (1992) Art 3(3).

⁴⁹ Brian J Preston, ‘The Role of the Judiciary in Promoting Sustainable Development: The Experience of Asia and the Pacific’ (2005) 9(2-3) *Asia Pacific Journal of Environmental Law* 135-138.

⁵⁰ Paul Stein and Susan Mahoney, ‘Incorporating Sustainability Principles in Legislation’ in Paul Leadbetter, Neil Gunningham and Ben Boer (eds), *Environmental Outlook No 3: Law and Policy* (Federation Press 1999) 73-77.

⁵¹ Brian J Preston, ‘The Role of the Judiciary in Promoting Sustainable Development: The Experience of Asia and the Pacific’ (2005) 9(2-3) *Asia Pacific Journal of Environmental Law* 139.

(B) The concept of precaution

The precautionary principle should be understood as a “culturally framed,”⁵² “normative principle for making practical decisions under conditions of scientific uncertainty”.⁵³ Its purpose is the removal of scientific uncertainty as a reason for postponing or not taking measures to prevent environmental damage.

There are numerous formulations of the precautionary principle but the most widely employed formulation is based on Principle 15 of the Rio Declaration on Environment and Development which states:

In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.⁵⁴

An example of a domestic statutory incorporation of the precautionary principle is section 6(2)(a) of the *Protection of the Environment Administration Act 1991* (NSW):

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.

In the application of the precautionary principle, public and private decisions should be guided by:

- (i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and
- (ii) an assessment of the risk-weighted consequences of various options ...⁵⁵

Another example is s 5 of the *Sustainable Planning Act 2009* (Qld) which provides:

the precautionary principle is the principle that lack of full scientific certainty should not be used as a reason for postponing a measure to prevent degradation of the environment if there are threats of serious or irreversible environmental damage.

The precautionary principle is the principle of ESD that has been the subject of the most judicial consideration by courts throughout the world.⁵⁶ Difficulties in its application flow

⁵² Timothy O’Riordan and James Cameron, ‘The History and Contemporary Significance of the Precautionary Principle’ in Timothy O’Riordan and James Cameron (eds), *Interpreting the Precautionary Principle* (Earthscan, 2009) 11.

⁵³ David Resnik, ‘Is the precautionary principle unscientific?’ (2003) 34 *Studies in History and Philosophy of Biological and Biomedical Sciences* 329, 330.

⁵⁴ *Rio Declaration on Environment and Development* 31 ILM 874 (1992) Principle 15.

⁵⁵ See also *Environment Protection and Biodiversity Conservation Act 1999* (Cth) s 3A(b).

⁵⁶ Lee Godden and Jacqueline Peel, *Environmental Law: Scientific, Policy and Regulatory Dimensions* (OUP 2010) 137; Brian J Preston, ‘The Role of the Judiciary in Promoting Sustainable Development: The Experience of Asia and the Pacific’ (2005) 9 *Asia Pacific Journal of Environmental Law* 109, 133-174; Preston, (n 1) 115-121; Stephen Estcourt, ‘The Precautionary Principle, the Coast and Temwood Holdings’ (2014) 31 *Environmental and Planning Law Journal* 288, 288.

from the “the indifference of the precautionary approach, both in terms of *when* and *what* action is required”.⁵⁷ The courts, by their decisions, have assisted in elucidating the meaning and scope of the precautionary principle in three ways.

First, courts have recognised the precautionary principle to be part of the law of the land. The precautionary principle might not have been expressly incorporated in legislation. Courts have nevertheless found that the precautionary principle is to be implied in the legislation or the common law. The Supreme Court of India has held that “the precautionary principle and the polluter pays principle are part of the environmental law of the country”, notwithstanding that neither was expressly incorporated in constitutional or statutory law.⁵⁸ Similarly, the Land and Environment Court of NSW has held that decision-makers who are required to have regard to the public interest in development decision-making are obliged to have regard to the principles of ESD, including the precautionary principle, where issues relevant to those principles arise.⁵⁹ The State Administrative Tribunal of Western Australia and Supreme Court of Western Australia have held that “the precautionary principle is a consideration of relevance to the assessment of sustainable use and development of land.”⁶⁰

Second, courts have explained when the precautionary principle will apply. Formulations of the precautionary principle based on Principle 15 of the Rio Declaration refer to two matters for the application of the precautionary principle. The first is in the opening phrase “if there are threats of serious or irreversible environmental damage”. The second is in the statement as to what should not be done: namely “lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation”. The Land and Environment Court of NSW has held that satisfaction of these two matters is necessary to trigger the application of the precautionary principle:

The application of the precautionary principle and the concomitant need to take precautionary measures is triggered by the satisfaction of two conditions precedent or thresholds: a threat of serious or irreversible environmental damage and scientific uncertainty as to the environmental damage. These conditions or thresholds are cumulative. Once both of these conditions or thresholds are satisfied, a precautionary measure may be taken to avert the anticipated threat of environmental damage, but it should be proportionate.⁶¹

Third, it is clear that the two conditions interrelate. This is because the degree of scientific uncertainty that needs to be established varies depending upon the magnitude of the environmental damage. Nevertheless, it assists explanation of the application of the

⁵⁷ Klaus Bosselmann, *The Principle of Sustainability: Transforming Law and Governance* (Ashgate 2008) 60.

⁵⁸ *Vellore Citizens Welfare Forum v Union of India* AIR 1996 SC 2715, 2721 [13]; *MC Mehta v Kamal Nath* (1997) 1 SCC 388 [37], [38]; *AP Pollution Control Board v Prof MV Nayudu* AIR 1999 SC 812, 818–821; *MC Mehta v Union of India* [2004] INSC 179; AIR 2004 SC 4016, 4045 [48].

⁵⁹ *BGP Properties v Lake Macquarie City Council* [2004] NSWLEC 399; (2004) 138 LGERA 237, 262 [113]; *Telstra Corp Ltd v Hornsby Shire Council* [2006] NSWLEC 133; (2006) 67 NSWLR 256, 268 [124]; *Minister for Planning v Walker* [2008] NSWCA 224; (2008) 161 LGERA 423, 451 [42]–[43].

⁶⁰ *Wattleup Road Development Co Pty Ltd v State Administrative Tribunal (No 2)* [2016] WASC 279 [53].

⁶¹ *Telstra Corp Ltd v Hornsby Shire Council* [2006] NSWLEC 133; (2006) 67 NSWLR 256, 269 [128]; applied in *Environment East Gippsland Inc v VicForests* [2010] VSC 335 [188]; *MyEnvironment Inc v VicForests* [2012] VSC 91 [272].

precautionary principle to address the two conditions separately.⁶² The following paragraphs address the two conditions separately before considering the application of the principle.

(C) A threat of serious or irreversible environmental damage

The existence of a threat is critical. It is not necessary that serious or irreversible environmental damage has actually occurred. It is the *threat* of such damage that is required.⁶³ The concept of a “threat” has been taken by the Environment, Resources and Development Court of SA to mean “likelihood” or “probability”.⁶⁴ However, the Supreme Court of Victoria has held that, in speaking of a threat of environmental damage, the precautionary principle is not making any statement as to the likelihood or probability of its occurrence, except for asserting that the risk is not one that is far-fetched or fanciful. Instead, a threat of environmental damage refers to the foreseeability of the risk of environmental damage. A risk of environmental damage which is remote, in the sense that it is extremely unlikely to occur, may nevertheless constitute a foreseeable risk. “A risk which is not far-fetched or fanciful is real and therefore foreseeable”.⁶⁵

The threats to the environment that should be considered have been held to include “direct and indirect threats, secondary and long-term threats and the incremental or cumulative impacts of multiple or repeated actions or decisions. Where threats may interact or be interrelated (for example where action against one threat may exacerbate another threat) they should not be addressed in isolation”.⁶⁶

The environmental damage threatened must attain the threshold of being *serious or irreversible*. Assessing the seriousness or irreversibility of environmental damage involves consideration of many factors. These include:

- (a) the spatial scale of the threat - for example, local, regional, statewide, national, international;
- (b) the magnitude of possible impacts on both natural and human systems;
- (c) the perceived value of the threatened environment;
- (d) the temporal scale of possible impacts in terms of both the timing and the longevity - or persistence - of the impacts;
- (e) the complexity and connectivity of the possible impacts;
- (f) the manageability of possible impacts, having regard to the availability of means and the acceptability of means;

⁶² Peel criticises the separation of the threat and uncertainty assessments: Jacqueline Peel, ‘When (Scientific) Rationality Rules: (Mis)Application of the Precautionary Principle in Australian Mobile Phone Tower Cases’ (2007) 19 *Journal of Environmental Law* 103, 103.

⁶³ *Telstra Corp Ltd v Hornsby Shire Council* [2006] NSWLEC 133; (2006) 67 NSWLR 256, 269 [129].

⁶⁴ *Conservation Council of South Australia v Development Assessment Committee and Tuna Boat Owners Association (No 2)* [1999] SAERDC 86 (16 December 1999) [24].

⁶⁵ *Environment East Gippsland Inc v VicForests* [2010] VSC 335; (2010) 30 VR 1, 47 [191]; citing *Wyong Shire Council v Shirt* (1980) 146 CLR 40, 47–48.

⁶⁶ *Telstra Corp Ltd v Hornsby Shire Council* [2006] NSWLEC 133; (2006) 67 NSWLR 256, 269 [130].

- (g) the level of public concern, and the rationality of and scientific or other evidentiary basis for the public concern; and
- (h) the reversibility of the possible impacts and, if reversible, the time frame for reversing the impacts, and the difficulty and expense of reversing the impacts.⁶⁷

If there is not a threat of serious or irreversible environmental damage, there is no basis upon which the precautionary principle can operate. The precautionary principle does not apply.⁶⁸ This was the conclusion reached by a number of courts in relation to proposed telecommunications developments that, by reason of compliance by a significant margin with relevant standards for the protection of public health and safety, there was no threat of serious or irreversible damage to public health and safety from the developments.⁶⁹ Similarly, courts have held that, by reason of the measures taken to protect threatened species of fauna in native forests, logging would not constitute a real threat of serious or irreversible damage.⁷⁰

(D) The lack of scientific certainty

The second condition necessary to trigger the application of the precautionary principle and the necessity to take precautionary measures is that there be “a lack of full scientific certainty.” Three points arise about this formulation of the precautionary principle.

First, the subject matter about which there is to be a lack of full scientific certainty is the nature and scope of the threat of environmental damage.⁷¹ Assessing the degree of scientific uncertainty about the threat of environmental damage involves a process of analysis of many factors, including:

- (a) the sufficiency of the evidence that there might be serious or irreversible environmental harm caused by the development plan, programme or project;
- (b) the level of uncertainty, including the kind of uncertainty - such as technical, methodological or epistemological uncertainty; and
- (c) the potential to reduce uncertainty having regard to what is possible in principle, economically and within a reasonable time frame.⁷²

⁶⁷ *Telstra Corp Ltd v Hornsby Shire Council* [2006] NSWLEC 133; (2006) 67 NSWLR 256, 269–270 [131]; cited in *Environment East Gippsland Inc v VicForests* [2010] VSC 335; (2010) 30 VR 1, 47 [190]; *MyEnvironment Inc v VicForests* [2012] VSC 91, [274].

⁶⁸ *Telstra Corp Ltd v Hornsby Shire Council* [2006] NSWLEC 133; (2006) 67 NSWLR 256, 271 [138].

⁶⁹ For example, *Hutchinson Telecommunications (Australia) Pty Ltd v Baulkham Hills Shire Council* [2004] NSWLEC 104 [27]; *Telstra Corp Ltd v Hornsby Shire Council* [2006] NSWLEC 133; (2006) 67 NSWLR 256, 280 [184]–[185].

⁷⁰ *MyEnvironment Inc v VicForests* [2012] VSC 91, [277], [341]; upheld on appeal *MyEnvironment Inc v VicForests* [2013] VSCA 356; (2013) 198 LGERA 396.

⁷¹ *Leatch v National Parks and Wildlife Service* (1993) 81 LGERA 270, 282; *Telstra Corp Ltd v Hornsby Shire Council* [2006] NSWLEC 133; (2006) 67 NSWLR 256, 271 [140].

⁷² *Telstra Corp Ltd v Hornsby Shire Council* [2006] NSWLEC 133; (2006) 67 NSWLR 256, 271 [141]; cited in *Environment East Gippsland Inc v VicForests* [2010] VSC 335; (2010) 30 VR 1, 48 [195].

Second, the formulation of the precautionary principle raises the issue of how much scientific uncertainty must exist. On a literal reading, the threshold is crossed whenever there is a lack of “full” scientific certainty. Yet, such a literal interpretation of the precautionary principle would render this condition meaningless. “Full” scientific certainty as to the threat of environmental damage would be an unattainable goal. It is impossible to be completely certain about the threats of environmental damage.⁷³ Hence, there would always be “a lack of full scientific certainty” about the threats of environmental damage. This second condition would be satisfied in every situation. This makes a literal interpretation unworkable.

Once it is accepted that the second condition must be interpreted to mean something less than “full” scientific certainty, the question becomes how much less? Or turning the question around, how much scientific uncertainty need there be as to the threat of environmental damage before the second condition to trigger application of the precautionary principle is fulfilled?

It has been suggested that the degree of scientific uncertainty required for the second condition is inversely proportional to the degree of potential environmental damage required for the first condition of the precautionary principle. Where the degree of potential environmental damage required for the first condition is greater, the degree of scientific uncertainty about that potential environmental damage that will be necessary to activate the precautionary principle will be lower. For the formulation of “serious or irreversible environmental damage”, the correlative degree of uncertainty about the threat of environmental damage has been held to be “highly uncertain of threat” or “considerable scientific uncertainty”⁷⁴ or “substantial uncertainty”.⁷⁵ This would contrast with a formulation of the precautionary principle that sets a lower degree of potential environmental damage in the first condition, such as “potential adverse effects”, where the correlative degree of certainty about the threat would be higher, such as “highly certain of threat”.⁷⁶

The rationale for the inverse relationship between environmental damage and uncertainty about that damage is that if the potential environmental damage or consequence is greater there should be a lower or more easily crossed threshold for the uncertainty about that potential environmental damage so as to trigger the need to take precautionary measures to prevent that environmental damage. Conversely, if the potential environmental damage or consequence is less serious, there can be a higher threshold for the uncertainty about that potential environmental damage before precautionary measures need to be taken.

Third, the formulation speaks of lack of “scientific” certainty. The adjective “scientific” implies a grounding in the methods and procedures of science.⁷⁷ There needs to be “reasonable scientific plausibility” about the assessment of the uncertainty of the threat of environmental damage. The Land and Environment Court of NSW explained:

⁷³ *Telstra Corp Ltd v Hornsby Shire Council* [2006] NSWLEC 133; (2006) 67 NSWLR 256, 271-272 [142]-[144] and *Nicholls v Director-General of National Parks and Wildlife* (1994) 84 LGERA 397, 419.

⁷⁴ *Telstra Corp Ltd v Hornsby Shire Council* [2006] NSWLEC 133; (2006) 67 NSWLR 256, 272 [146]-[147].

⁷⁵ *Environment East Gippsland Inc v VicForests* [2010] VSC 335; (2010) 30 VR 1, 48 [197].

⁷⁶ *Telstra Corp Ltd v Hornsby Shire Council* [2006] NSWLEC 133; (2006) 67 NSWLR 256, 272 [146].

⁷⁷ *Daubert v Merrell Dow Pharmaceuticals Inc* 509 US 579, 589-590 (1993); *Telstra Corp Ltd v Hornsby Shire Council* [2006] NSWLEC 133; (2006) 67 NSWLR 256, 272 [135].

N de Sadeleer posits a threshold test of “reasonable scientific plausibility,” or where a threat or risk of environmental damage is considered scientifically likely. N de Sadeleer explains his test of reasonable scientific plausibility as follows (*Environmental Principles: From Political Slogans to Legal Rules*, at 160:

“...That condition would be fulfilled when empirical scientific data (as opposed to simple hypothesis, speculation, or intuition) make it reasonable to envisage a scenario, even if it does not enjoy unanimous scientific support.

When is there ‘reasonable scientific plausibility’? When risk begins to represent a minimum degree of certainty, supported by repeated experience. But a purely theoretical risk may also satisfy this condition, as soon as it becomes scientifically credible: that is, it arises from a hypothesis formulated with methodological rigour and wins the support of part of the scientific community, albeit a minority.

The principle may consequently apply to all post-industrial risks for which a cause-and-effect relationship is not clearly established but where there is a ‘reasonable scientific plausibility’ that this relationship exists. This would be particularly appropriate for delayed pollution, which does not become apparent for some time and for which full scientific proof is difficult to assemble” (footnotes omitted).

See also *Applying the Precautionary Principle* at 33.⁷⁸

These three interpretative points may result in the second condition not being satisfied. The second condition might not be satisfied where there is not the required degree of uncertainty or the required scientific plausibility of uncertainty.

In relation to the former, there may not be considerable or substantial uncertainty about the threat of serious or irreversible damage. Instead, it may be relatively certain that serious or irreversible environmental damage will occur because it is possible to establish a causal link between the action or event and any environmental damage, to calculate the probability of the occurrence and to insure against them. In those circumstances, the precautionary principle does not need to be applied. Measures will still need to be taken but these will need to be preventative measures to control the relatively certain threat of serious or irreversible damage rather than precautionary measures which are appropriate in relation to uncertain threats of environmental damage.⁷⁹

In relation to the latter, there will not be reasonable scientific plausibility about the uncertainty if it is pure speculation or unsupported opinion not grounded in the methods and procedures of science. Whatever the uncertainty about the threat of serious or irreversible environmental damage, it is not “scientific” uncertainty. The second condition would not be satisfied and the precautionary principle would not apply. Although precautionary measures would not be taken, the reason for not taking them would not be any lack of full “scientific” certainty.

(E) A shift of the burden of proof

If each of the conditions is satisfied – there is a threat of serious or irreversible damage and there is the requisite degree of scientific uncertainty about that environmental damage – the precautionary principle will be activated. Courts have held that, at this point of activation of

⁷⁸ *Telstra Corp Ltd v Hornsby Shire Council* [2006] NSWLEC 133; (2006) 67 NSWLR 256, 272 [148].

⁷⁹ *Telstra Corp Ltd v Hornsby Shire Council* [2006] NSWLEC 133; (2006) 67 NSWLR 256, 273 [149].

the precautionary principle, there is a shifting of the burden of proof. A decision-maker must assume that the threat of serious or irreversible environmental damage is no longer uncertain but is instead certain and real. The burden of showing that the threat does not in fact exist or is negligible effectively reverts to the proponent of the development plan, program or project.⁸⁰ The Land and Environment Court of NSW explained:

The rationale for requiring this shift of the burden of proof is to ensure preventative anticipation; to act before scientific certainty of cause and effect is established. It may be too late, or too difficult and costly, to change a course of action once it is proven to be harmful. The preference is to prevent environmental damage, rather than remediate it. The benefit of the doubt is given to environmental protection when there is scientific uncertainty. To avoid environmental harm, it is better to err on the side of caution.

The function of the precautionary principle is, therefore, to require the decision-maker to assume that there is, or will be, a serious or irreversible threat of environmental damage and to take this into account, notwithstanding that there is a degree of scientific uncertainty about whether the threat really exists ...⁸¹

Similarly, the ERD Court of South Australia has held that “[o]nce an appellant has established a likelihood or possibility that serious or irreversible environmental harm might occur, then ‘... the proponent would have to satisfy the burden of proof by evidence as to the likely consequences of the proposal, including scientific evidence (with its limitations), evidence as to the proposed management regime and measures, and evidence to assist the Court in the assessment of the risk-weighted consequences of the proposal’”.⁸²

Importantly, however, the significance of this reversal of the burden of proof must be viewed in the context that “the precautionary principle is but one factor to which a decision-maker must have regard. Legislation does not require the principle to be the determinative factor in decision-making.”⁸³ As the Land and Environment Court of NSW has said:

It should be recognised that the shifting of the evidentiary burden of proof operates in relation to only one input of the decision-making process – the question of environmental damage. If a proponent of a plan, programme or project fails to discharge the burden to prove that there is no threat of serious or irreversible environmental damage, this does not necessarily mean that the plan, programme or project must be refused. It simply means that, in making the final decision, the decision-maker must assume that there will be serious or irreversible environmental damage. This assumed factor must be taken into account in the calculus which decision-makers are instructed to apply under environmental

⁸⁰ *Telstra Corp Ltd v Hornsby Shire Council* [2006] NSWLEC 133; (2006) 67 NSWLR 256, 273 [150].

⁸¹ *Telstra Corp Ltd v Hornsby Shire Council* [2006] NSWLEC 133; (2006) 67 NSWLR 256, 273 [151]–[152]; *Conservation Council of South Australia v Development Assessment Committee and Tuna Boat Owners Association (No 2)* [1999] SAERDC 86 (16 December 1999) [24]–[25]; *Tuna Boat Owners Association of SA Inc v Development Assessment Commission* [2000] SASC 238; (2000) 77 SASR 369, 373–374 [27]–[30]; *Vellore Citizens Welfare Forum v Union of India* AIR 1996 SC 2715, 2720–2721 [11]; *AP Pollution Control Board v Prof MV Nayudu* AIR 1999 SC 812, 821 [37]–[39]; *Narmada Bachao Andolan v Union of India* [2000] INSC 518; AIR 2000 SC 3751, 3803–3804 [150].

⁸² Gerry Bates, *Environmental Law in Australia* (9th ed, LexisNexis 2016) 312 quoting *Conservation Council of South Australia v Development Assessment Committee and Tuna Boat Owners Association (No 2)* [1999] SAERDC 86 (16 December 1999) [24]–[25].

⁸³ Gerry Bates, *Environmental Law in Australia* (9th ed, LexisNexis 2016) 313.

legislation (such as s 79C(1) of the *Environmental Planning and Assessment Act*). There is nothing in the formulation of the precautionary principle which requires decision-makers to give the assumed factor (the serious or irreversible environmental damage) overriding weight compared to the other factors required to be considered, such as social and economic factors, when deciding how to proceed: D Farrier, “Factoring biodiversity conservation into decision-making processes: The role of the precautionary principle” at 108.⁸⁴

III. CRITICISM OF THE INTERPRETATION OF THE PRECAUTIONARY PRINCIPLE BY THE COURTS

The precautionary principle has been the cause of much public policy consternation and academic debate over the past four decades. As Resnik observes:

Proponents of the precautionary principle argue that it should play a role in public policy because we often need to make important decisions even though we lack scientific certainty. Failing to take precautionary measures in a timely manner could result in devastating and irreversible consequences.

Opponents argue, on the other hand, that the precautionary principle is a highly conservative, risk averse rule that can stifle progress, change and growth. Taking precautionary measures when we have no good reason to do so can waste time and resources and deprive us of important benefits. The principle is not only anti-science but it is unscientific.⁸⁵

As this extract indicates, much of the debate concerning the precautionary principle has focussed on the merits and effectiveness of the precautionary principle as “a normative principle for making practical decisions under conditions of scientific uncertainty”.⁸⁶ In contrast, there has been less debate and critical examination of the interpretation and application of the precautionary principle by the courts. Nevertheless, whilst the statutory interpretation of the precautionary principle by the courts - as requiring the triggering of two conditions precedent - is well-established, this so-called “two-step, threshold analysis”⁸⁷ has been challenged for inappropriately limiting the scope of the precautionary principle:

“Rather than facilitating ‘rational’ application of the precautionary principle in appropriate cases, the approach would appear to leave little room to respond in situations of scientific uncertainty and serious threats, thus potentially replicating many of the shortfalls of conventional, science-based

⁸⁴ *Telstra Corp Ltd v Hornsby Shire Council* [2006] NSWLEC 133; (2006) 67 NSWLR 256, 274 [154] and see *Wattleup Road Development Co Pty Ltd v State Administrative Tribunal (No 2)* [2016] WASC 279 [57]-[59].

⁸⁵ David Resnik, ‘Is the precautionary principle unscientific?’ (2003) 34 *Studies in History and Philosophy of Biological and Biomedical Sciences* 329, 330.

⁸⁶ David Resnik, ‘Is the precautionary principle unscientific?’ (2003) 34 *Studies in History and Philosophy of Biological and Biomedical Sciences* 329, 330.

⁸⁷ Jacqueline Peel, ‘When (Scientific) Rationality Rules: (Mis)Application of the Precautionary Principle in Australian Mobile Phone Tower Cases: *Telstra Corporation Limited v Hornsby Shire Council*’ (2007) 19(1) *Journal of Environmental Law* 103, 113.

decision-making on risks that have failed to anticipate ‘unexpected’ effects and so prompted the emergence of the precautionary principle in first place” (sic).⁸⁸

In particular, three criticisms have been levelled at the interpretation of the precautionary principle by the courts.

First, it has been argued that the conceptualisation of each of the two conditions precedent to the operation of the precautionary principle “as a threshold, which if not met, invalidates the application of the precautionary principle” artificially separates out the assessment of the threat and the uncertainty of the threat and “assumes that both factors are measurable and quantifiable”.⁸⁹ This is challenged because the assessment of the threat and the uncertainty relating to the threat should be “intimately connected” and because those aspects of the threat and uncertainty of the threat that are not scientifically quantifiable are marginalised.⁹⁰

Second, it has been contended that the courts should not require a threat of damage to be reasonably scientifically plausible to activate the precautionary principle. This limitation has the consequence of potentially “severely restrict[ing] the scope of possible application of the precautionary principle”.⁹¹ Furthermore, the inability of such risks to activate the precautionary principle means that “the possibility of these harms must be borne ‘regardless of the nature of the risk-generating activity and the social worth attaching to it’”.⁹² Instead, it has been suggested that the judgment of a community that precautionary action is warranted, for risks that have not been shown to be scientifically plausible, may “have an equal claim to rationality”.⁹³

Third, the consequence of the successful activation of the precautionary principle – the reversal of the burden of proof – has been criticised. It has been claimed that the reversal of proof is divisive because it suggests that the affected proponent must prove the absence of

⁸⁸ Jacqueline Peel, ‘When (Scientific) Rationality Rules: (Mis)Application of the Precautionary Principle in Australian Mobile Phone Tower Cases: *Telstra Corporation Limited v Hornsby Shire Council*’ (2007) 19(1) *Journal of Environmental Law* 103, 113.

⁸⁹ Jacqueline Peel, ‘When (Scientific) Rationality Rules: (Mis)Application of the Precautionary Principle in Australian Mobile Phone Tower Cases: *Telstra Corporation Limited v Hornsby Shire Council*’ (2007) 19(1) *Journal of Environmental Law* 103, 113-114.

⁹⁰ Jacqueline Peel, ‘When (Scientific) Rationality Rules: (Mis)Application of the Precautionary Principle in Australian Mobile Phone Tower Cases: *Telstra Corporation Limited v Hornsby Shire Council*’ (2007) 19(1) *Journal of Environmental Law* 103, 114-115.

⁹¹ Jacqueline Peel, ‘When (Scientific) Rationality Rules: (Mis)Application of the Precautionary Principle in Australian Mobile Phone Tower Cases: *Telstra Corporation Limited v Hornsby Shire Council*’ (2007) 19(1) *Journal of Environmental Law* 103, 116.

⁹² Jacqueline Peel, ‘When (Scientific) Rationality Rules: (Mis)Application of the Precautionary Principle in Australian Mobile Phone Tower Cases: *Telstra Corporation Limited v Hornsby Shire Council*’ (2007) 19(1) *Journal of Environmental Law* 103, 115.

⁹³ Jacqueline Peel, ‘When (Scientific) Rationality Rules: (Mis)Application of the Precautionary Principle in Australian Mobile Phone Tower Cases: *Telstra Corporation Limited v Hornsby Shire Council*’ (2007) 19(1) *Journal of Environmental Law* 103, 117.

risk.⁹⁴ Moreover, it is argued that the assumption that the particular threat is real, “represents an overly stark understanding of the effect of the precautionary principle”.⁹⁵ Instead of assuming harm, the decision-maker should only be required to assess “the risk-weighted consequences of various, alternative options”.⁹⁶

IV. REBUTTAL TO CRITICISM OF THE INTERPRETATION OF THE PRECAUTIONARY PRINCIPLE BY THE COURTS

In response to the first criticism, the claim that the assessment of the threat and the uncertainty of the threat are “intimately connected” is indisputable. As has been stated above, the two conditions interrelate because the degree of uncertainty that needs to be established varies depending upon the magnitude of the environmental damage.⁹⁷ Yet, the criticism of interpreting the precautionary principle to have two separate (albeit interrelated) conditions precedent is difficult to reconcile with the statutory language of the precautionary principle. The necessary implication of such criticism is that the precautionary principle can operate if a threat of serious or irreversible environmental damage has not been demonstrated or if there is no, or not considerable, scientific uncertainty as to that threat. Yet, the precautionary principle is phrased so that “if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not ...”. For the precautionary principle not to have the two identified conditions precedent, it would have to be drafted differently.

First, the principle operates “**if** there are threats of serious or irreversible damage”. Therefore, it is contrary to the explicit terms of the legislation to claim that a threat of serious or irreversible environmental damage is not a condition precedent. Second, the principle is not phrased such that “**if** there are threats of serious or irreversible environmental damage **or there is a** lack of full scientific certainty”. Again, a lack of full scientific certainty must be a condition precedent. This form of drafting is unlikely to be accidental. As the World Commission on the Ethics of Scientific Knowledge and Technology noted some time ago, “[c]onsiderable scientific uncertainty **must** exist” for the precautionary principle to operate.⁹⁸ The only question is “how much scientific uncertainty need there be as to the threat of environmental damage before the second condition precedent of the precautionary principle is fulfilled?”

⁹⁴ Jacqueline Peel, ‘When (Scientific) Rationality Rules: (Mis)Application of the Precautionary Principle in Australian Mobile Phone Tower Cases: *Telstra Corporation Limited v Hornsby Shire Council*’ (2007) 19(1) *Journal of Environmental Law* 103, 117.

⁹⁵ Jacqueline Peel, ‘When (Scientific) Rationality Rules: (Mis)Application of the Precautionary Principle in Australian Mobile Phone Tower Cases: *Telstra Corporation Limited v Hornsby Shire Council*’ (2007) 19(1) *Journal of Environmental Law* 103, 118.

⁹⁶ Jacqueline Peel, ‘When (Scientific) Rationality Rules: (Mis)Application of the Precautionary Principle in Australian Mobile Phone Tower Cases: *Telstra Corporation Limited v Hornsby Shire Council*’ (2007) 19(1) *Journal of Environmental Law* 103, 118.

⁹⁷ See, *Telstra Corp Ltd v Hornsby Shire Council* [2006] NSWLEC 133; (2006) 67 NSWLR 256, 272 [146]-[148].

⁹⁸ World Commission on the Ethics of Scientific Knowledge and Technology, *The Precautionary Principle* (UNESCO 2005) 31 (emphasis added).

Accepting that the precautionary principle has these two conditions precedent means that an assessment must be made that a serious threat exists and that there is considerable scientific uncertainty about that threat for the principle to operate. Hence, if a development does not pose threats of serious or irreversible environmental damage, or if there is not a lack of scientific uncertainty concerning the threats of serious or irreversible environmental damage, there is no necessity to impose precautionary measures. Such threats are not dealt with by the precautionary principle. Why should precautionary measures be imposed on a development where a threat cannot be shown to pose any serious risk of environmental damage? Why should precautionary measures (as opposed to preventative measures) be imposed when the science is relatively settled as to a threat of serious environmental damage?

These same questions apply to the second ground of criticism outlined above, namely, that the courts should not restrict the operation of the precautionary principle to threats of environmental damage that are scientifically plausible. This may well restrict the application of the precautionary principle, however that is justifiable. First, the terms of the precautionary principle explicitly state the lack of “scientific” uncertainty should not be used as a reason for postponing cost effective measures to prevent environmental damage. As noted earlier, the scientific uncertainty relates to the nature and scope of the threat of environmental damage. It is not any uncertainty to the threat; it is “scientific uncertainty”. This leads to the conclusion that the principle applies to threats of environmental damage that are scientifically plausible.

Second, adopting the position that scientifically implausible (or scientifically unknown) threats of environmental damage should be able to activate the precautionary principle would be unworkable and produce unintended results. What does it mean to say that lack of full scientific certainty should not be used to postpone measure to prevent scientifically implausible or scientifically unknown threats of environmental damage? What precautions could ever be taken to deal with scientifically implausible threats of environmental damage aside from a blanket prohibition of development whenever a threat of serious environmental damage is alleged?

Third, widening the scope of the precautionary principle to operate in circumstances where there is no reliable evidence to support an alleged threat of environmental damage might have adverse consequences. As Cross has written, “[t]he truly fatal flaw of the precautionary principle, ignored by almost all the commentators, is the unsupported presumption that an action aimed at public health protection cannot possibly have negative effects on public health. Yet these unanticipated adverse effects are demonstrably common”⁹⁹ For this reason, de Sadeleer observes that the precautionary principle’s “field of application must exclude those risks characterised as residual, that is, hypothetical risks resting on purely

⁹⁹ Frank Cross, ‘Paradoxical Perils of the Precautionary Principle’ (1996) 53 *Washington and Lee Law Review* 851, 859-860.

speculative considerations without any scientific foundation”.¹⁰⁰ If not, the precautionary principle risks becoming “the application of junk science to phantom risks to make them seem plausible”.¹⁰¹

In relation to the third ground of criticism, the challenge to the reversal of the burden of proof, it is incorrect that such a reversal of the burden of proof suggests that the affected proponent must prove the absence of risk. The proponent only needs to show that the risk is negligible to escape the operation of the precautionary principle. More importantly, as will be demonstrated below, the reversal of the burden of proof is not “overly stark” for three reasons.

First, if the conditions precedent are satisfied, there will be a justifiable basis for the taking of precautionary measures. The precautionary principle operates to assume that there will be serious or irreversible environmental damage, so that precautionary measures should be taken to prevent that damage, unless the proponent can show otherwise. Of course, the imposition of precautionary measures would certainly be stark if the precautionary approach could be applied regardless of the triggering of the conditions precedent. This only emphasises why the first and second criticisms are misguided.

Second, precautionary measures need not have stark consequences for the proponent. The proponent may be able to successfully adopt proportionate precautionary measures that allow the development to occur whilst minimising the risk of serious environmental damage. Certainly a “zero risk precautionary standard is inappropriate”.¹⁰² Measures based on the precautionary principle should be proportionate to the threat of environmental damage. A reasonable balance must be struck between the stringency of the precautionary measures, which may have associated costs such as financial, livelihood and opportunity costs, and the seriousness and irreversibility of the threat.¹⁰³ Considerations of practicality, including cost, need to be taken into account in the selection of the precautionary measures. The cost consequences of increasing levels of precaution must be evaluated.¹⁰⁴

Third, “[t]here is nothing in the formulation of the precautionary principle which requires decision-makers to give the assumed factor (the serious or irreversible environmental damage) overriding weight compared to the other factors required to be considered ...”.¹⁰⁵ The assumed factor (which might support pursuing one option, including not allowing the development) may be overridden by other factors (which support pursuing other options, including allowing the development). However, in contrast, if damage is not assumed, why

¹⁰⁰ N de Sadeleer, *Environmental Principles: From Political Slogans to Legal Rules* (2005 OUP) 158 quoted in *Telstra Corp Ltd v Hornsby Shire Council* [2006] NSWLEC 133; (2006) 67 NSWLR 256, 272 [160].

¹⁰¹ US EPA’s Office of Water scientist P Wise quoted in B Cohen, ‘The safety Nazis’ (2001) 34(6) *The American Spectator* 16.

¹⁰² *Telstra Corp Ltd v Hornsby Shire Council* [2006] NSWLEC 133; (2006) 67 NSWLR 256, 272 [158].

¹⁰³ *Telstra Corp Ltd v Hornsby Shire Council* [2006] NSWLEC 133; (2006) 67 NSWLR 256, 277 [166]-[168].

¹⁰⁴ *Telstra Corp Ltd v Hornsby Shire Council* [2006] NSWLEC 133; (2006) 67 NSWLR 256, 277 [169]-[171].

¹⁰⁵ *Telstra Corp Ltd v Hornsby Shire Council* [2006] NSWLEC 133; (2006) 67 NSWLR 256, 272 [154].

would (and how does) a decision-maker seriously or credibly consider and weigh “the risk-weighted consequences of various, alternative options”? As the legislation mandates, risk-weighted consequences of various options are to guide “the application of the precautionary principle”. What is the effect and purpose of the precautionary principle if, once activated, nothing flows from its operation? For the precautionary principle to be more than an aspirational goal, it must have weight in the decision-making calculus once activated.

V. THE APPLICATION OF THE PRECAUTIONARY PRINCIPLE BY THE COURTS

(A) Types of precautionary measures

Courts have explained what actions are required when the precautionary principle does apply. The Land and Environment Court of NSW has said:

The type and level of precautionary measures that will be appropriate will depend on the combined effect of the degree of seriousness and irreversibility of the threat and the degree of uncertainty. This involves assessment of risk in its usual formulation, namely the probability of the event occurring and the seriousness of the consequences should it occur. The more significant and the more uncertain the threat, the greater the degree of precaution required.¹⁰⁶

For example, it has been said that for substances that are persistent and have a tendency to build-up in the environment, “it is necessary to adopt a more precautionary approach and constrain the amounts permitted to be discharged by means of emissions standards”.¹⁰⁷ Similarly, greater precautionary measures need to be taken for firefighting foams that are persistent in the environment than those that are non-persistent. All firefighting foams can have adverse impacts on the environment, but fluorinated foams that are persistent in the environment have far greater impacts than fluorine-free foams that are non-persistent. This tiered approach is adopted in the Queensland Department of Environment and Heritage Protection’s Operational Policy: Environmental Management of Firefighting Foam (2016). The Policy recommends a far stricter approach to the use of persistent (fluorinated) foams than non-persistent (fluorine-free) foams. For example, for persistent firefighting foams, the Policy recommends the non-use and the replacement of foams containing fluorinated organic compounds,¹⁰⁸ the use of foams containing short-chain fluorotelomers only if there are not other viable options and then only if certain strict procedures are followed, including no releases directly to the environment.¹⁰⁹ For non-persistent firefighting foams, the Policy recommends the taking of all reasonable and practical measures to proactively manage,

¹⁰⁶ *Telstra Corp Ltd v Hornsby Shire Council* [2006] NSWLEC 133; (2006) 67 NSWLR 256, 276 [161].

¹⁰⁷ Lord Crickhowell, ‘Foreword’ in Timothy O’Riordan and James Cameron (eds), *Interpreting the Precautionary Principle* (Earthscan, 2009) 6.

¹⁰⁸ Such as PFOS (perfluoro octane sulphonic acid) and PFOA (perfluoro-octanoic acid).

¹⁰⁹ Operational Policy – Environmental Management of Firefighting Foam, s 6.2.

contain, treat and properly dispose of the foam, firewater, wastewater and runoff and regulates the conditions for direct releases to land and to waterways.¹¹⁰

In considering how to implement and operate the precautionary principle, once the conditions precedent are present, “a number of general principles or measures of risk management must not be deviated from. These principles of risk management include:

- (i) *Proportionality*: the action must be proportionate to the desired level of protection. It is unrealistic to have a goal of zero risk, and in some cases, a total ban of development may not be a proportional response to a potential risk.
- (ii) *Non-discrimination*: the action taken should not be discriminatory in its application such that comparable situations should not be treated differently.
- (iii) *Consistency*: the action taken should be consistent with the measures already adopted in similar circumstances or using similar approaches.
- (iv) *Examination of benefits and costs of action and lack of action*: a comparison of the likely short-term and long-term consequences of the action and inaction should be made, and the proposed action must produce an overall advantage in terms of reducing risks to an acceptable level. While an economic cost/benefit analysis is one way to undertake this comparison, other analysis methods, such as an examination of the socio-economic impacts, may also be relevant.
- (v) *Examination of scientific developments*: action taken and measures based on the precautionary principle should be subject to review in the light of new scientific data and if necessary modified depending on results of subsequent scientific research.
- (vi) *The burden of proof*: measures based on the precautionary principle may assign responsibility for producing the scientific evidence necessary for a comprehensive risk assessment.”¹¹¹

(B) Obtaining further information to reduce uncertainty

Where there is still considerable scientific uncertainty, prudence may require that the development plan, program or project not proceed until further information is obtained in order to reduce the uncertainty. For example, in the pioneering case of *Leatch v National Parks and Wildlife Service*, the Land and Environment Court of NSW applied the precautionary principle to refuse to grant a statutory licence to take or kill endangered fauna, the Giant Burrowing Frog, which was necessary for a proposed link road development.¹¹² However, the Court emphasised that “refusal of this licence application should not necessarily be assumed to be an end of the proposal. Further information on endangered fauna and advances in scientific knowledge may mean that a licence could be granted in the future”.¹¹³ The State Administrative Tribunal of Western Australia refused proposed residential subdivisions exposed to fugitive dust from bauxite stockpiles at an aluminium smelter and from a sand quarry until adequate air quality monitoring of the site was undertaken

¹¹⁰ Operational Policy – Environmental Management of Firefighting Foam, s 6.1.

¹¹¹ Brian J Preston, ‘The Role of the Judiciary in Promoting Sustainable Development: The Experience of Asia and the Pacific’ (2005) 9(2-3) *Asia Pacific Journal of Environmental Law* 134, 141-142 citing Commission of the European Communities, *Communication from the Commission on the Precautionary Principle*, 2 February 2000 <<http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52000DC0001>> (accessed 22 December 2016).

¹¹² (1993) 81 LGERA 270.

¹¹³ (1993) 81 LGERA 270 at 286-287.

demonstrating that the proposed subdivisions would be acceptable in relation to dust health and amenity impacts.¹¹⁴ Subsequently, further site quality monitoring did not satisfactorily demonstrate that the proposed subdivisions were acceptable in relation to the health and amenity impacts of dust. One of the reasons was that climatic conditions relevant to dust generation affecting the site were likely to be different because of climate change and result in increased dust levels during future dust seasons in comparison with the monitoring year.¹¹⁵

Courts have also proactively sought further information to reduce scientific uncertainty. Thus, the Supreme Court of Pakistan appointed an expert commissioner to examine and study the scheme and the planning used by a government agency for an electricity grid station and to report whether there was any likelihood that the electromagnetic fields that radiated from the grid station might cause a hazard to the health of residents in the locality.¹¹⁶

(C) Allowing margin for error

Prudence would also suggest that some margin for error should be retained until all the consequences of the decision to proceed with the development plan, program or project are known. This allows for potential errors in risk assessment and cost benefit analysis. Potential errors are weighted in favour of environmental protection. Weighting the risk of error in favour of the environment safeguards ecological space or environmental room for manoeuvre.¹¹⁷

Illustrations of weighting the risk of error in favour of the environment can be found in decisions of the Land and Environment Court of NSW directed at the avoidance of a risk of serious or irreversible environmental damage to endangered species and ecological communities. This is achieved, first, by resolving scientific uncertainty as to whether an endangered ecological community was widely distributed over a development site by assuming the existence of the wide distribution of the endangered ecological community¹¹⁸ and, second, by determining that proposed developments were likely to significantly affect endangered species and ecological communities so as to trigger the statutory requirement to prepare a detailed environmental assessment in the form of a species impact statement.¹¹⁹

(D) An adaptive management approach

One means of retaining a margin for error is to implement a step-wise or adaptive management approach, whereby uncertainties are acknowledged and the area affected by the

¹¹⁴ *Wattleup Road Development Company Pty Ltd and Western Australian Planning Commission* [2011] WASAT 160 [66], [71].

¹¹⁵ *Wattleup Road Development Company Pty Ltd and Western Australian Planning Commission* [2014] WASAT 159 [59].

¹¹⁶ *Zia v WAPDA* PLD 1994 SC 693 [10], [16].

¹¹⁷ *Telstra Corp Ltd v Hornsby Shire Council* [2006] NSWLEC 133; (2006) 67 NSWLR 256, 276 [162].

¹¹⁸ *Providence Projects Pty Ltd v Gosford City Council* [2006] NSWLEC 52; (2006) 147 LGERA 274, 289 [76]–[81].

¹¹⁹ *BT Goldsmith Planning Services Pty Ltd v Blacktown City Council* [2005] NSWLEC 210 [73], [88]; *Gales Holdings Pty Ltd v Tweed Shire Council* [2006] NSWLEC 85; (2006) 146 LGERA 236, 246–248 [56], [60], [66]–[69]; *Gales Holdings Pty Ltd v Tweed Shire Council* [2006] NSWLEC 212 [44]–[47].

development plan, program or project is expanded as the extent of uncertainty is reduced.¹²⁰ The Land and Environment Court of NSW has held that an adaptive management approach might involve the following core elements:

- monitoring of impacts of management or decisions based on agreed indicators;
- promoting research, to reduce key uncertainties;
- ensuring periodic evaluation of the outcomes of implementation, drawing of lessons, and review and adjustment, as necessary of the measures or decisions adopted; and
- establishing an efficient and effective compliance system.¹²¹

The court found that the appropriate and proportionate response to the threat of environmental damage to stygofauna within a limestone formation proposed to be quarried was to implement a step-wise or adaptive management approach. This involved the imposition of conditions of development consent requiring monitoring linked to adaptive management.¹²² The court stated:

Adaptive management is a concept which is frequently invoked but less often implemented in practice. Adaptive management is not a “suck it and see”, trial and error approach to management, but it is an iterative approach involving explicit testing of the achievement of defined goals. Through feedback to the management process, the management procedures are changed in steps until monitoring shows that the desired outcome is obtained. The monitoring program has to be designed so that there is statistical confidence in the outcome. In adaptive management the goal to be achieved is set, so there is no uncertainty as to the outcome and conditions requiring adaptive management do not lack certainty, but rather they establish a regime which would permit changes, within defined parameters, to the way the outcome is achieved ...

The conditions of consent requiring monitoring and adaptive management would operate over the life of a project (and, in the case of rehabilitation, beyond it). Over this period there are likely to be changes in technology, understanding of issues and the environment (for example in 30 years time climatic conditions might be different from those currently prevailing). An adaptive management regime provides the potential for addressing changes without creating a requirement to seek formal amendment of conditions.¹²³

The Supreme Court of New Zealand has held that such an adaptive management approach was available and consistent with a proper precautionary approach for managing salmon farms in coastal marine areas.¹²⁴ Three adaptive management approaches had been proposed:

¹²⁰ *Telstra Corp Ltd v Hornsby Shire Council* [2006] NSWLEC 133; (2006) 67 NSWLR 256, 726 [163]; *Environment East Gippsland Inc v VicForests* [2010] VSC 335; (2010) 30 VR 1, 49 [205].

¹²¹ *Telstra Corp Ltd v Hornsby Shire Council* [2006] NSWLEC 133; (2006) 67 NSWLR 256, 276 [164]; see also *Sustain Our Sounds Inc v The New Zealand King Salmon Company Ltd* [2014] NZSC 40; [2014] 1 NZLR 673, 703 [109].

¹²² *Newcastle and Hunter Valley Speleological Society Inc v Upper Hunter Shire Council and Stoneco Pty Ltd* [2010] NSWLEC 48 [183].

¹²³ *Newcastle and Hunter Valley Speleological Society Inc v Upper Hunter Shire Council and Stoneco Pty Ltd* [2010] NSWLEC 48 [184], [187].

¹²⁴ *Sustain Our Sounds Inc v The New Zealand King Salmon Company Ltd* [2014] NZSC 40; [2014] 1 NZLR 673, 716 [158].

staged development, tiered approach to monitoring and ongoing adaptive management.¹²⁵ The court considered the threshold question of what must be present before an adaptive management approach can even be considered and responded:

there must be an adequate evidential foundation to have reasonable assurance that the adaptive management approach will achieve its goals of sufficiently reducing uncertainty and adequately managing any remaining risk. The threshold question is an important step and must always be considered. As Preston CJ said in *Newcastle*, adaptive management is not a “suck it and see” approach.¹²⁶

The court considered the secondary question of what an adaptive management regime must contain in any particular case before it is legitimate to use such an approach rather than prohibiting the development until further information becomes available. The court stated that this will depend on an assessment of a combination of factors:

- (a) the extent of the environmental risk (including the gravity of the consequences if the risk is realised);
- (b) the importance of the activity (which could in some circumstances be an activity it is hoped will protect the environment);
- (c) the degree of uncertainty; and
- (d) the extent to which an adaptive management approach will sufficiently diminish the risk and the uncertainty.¹²⁷

The Land and Environment Court of NSW has found on a number of occasions that, consistent with the precautionary principle, an adaptive management approach could be implemented for proposed developments. These included a pearl farm in the waters of Port Stephens;¹²⁸ open cut and underground coal mines that might have insufficient water supply for operations;¹²⁹ longwall coal mining that might affect hydrological regimes and dependent ecosystems;¹³⁰ and a limestone quarry that might affect stygofauna.¹³¹

(E) Prohibiting the development or action

Where precautionary measures cannot reduce the threat of serious or irreversible environmental damage to acceptable levels, the appropriate action may be to prohibit the carrying out of the environmentally damaging activity. The Supreme Court of New Zealand has noted that this may be the case “where urgent measures are needed to avert imminent

¹²⁵ *Sustain Our Sounds Inc v The New Zealand King Salmon Company Ltd* [2014] NZSC 40; [2014] 1 NZLR 673, 702 [104].

¹²⁶ *Sustain Our Sounds Inc v The New Zealand King Salmon Company Ltd* [2014] NZSC 40; [2014] 1 NZLR 673, 708 [125].

¹²⁷ *Sustain Our Sounds Inc v The New Zealand King Salmon Company Ltd* [2014] NZSC 40; [2014] 1 NZLR 673, 709 [129].

¹²⁸ *Port Stephens Pearls Pty Ltd v Minister for Infrastructure and Planning* [2005] NSWLEC 426 [56]–[58].

¹²⁹ *Ulan Coal Mines Ltd v Minister for Planning* [2008] NSWLEC 185; (2008) 160 LGERA 20, 40 [98], [99].

¹³⁰ *Rivers SOS Inc v Minister for Planning* [2009] NSWLEC 213; (2009) 178 LGERA 347, 379 [131].

¹³¹ *Newcastle and Hunter Valley Speleological Society Inc v Upper Hunter Shire Council and Stoneco Pty Ltd* [2010] NSWLEC 48 [187]–[189].

potential threats, where the potential damage is likely to be irreversible and where particularly vulnerable species or ecosystems are concerned”.¹³²

The Environment, Resources and Development Court of SA has found that a proposed tuna farm would be ecologically sustainable only if an adaptive management regime could be implemented but, because a regime could not be implemented, consent for the development should be refused.¹³³

The Land and Environment Court of NSW has held that the scarcity of scientific knowledge about the population, habitat and behavioural patterns of two threatened fauna species and about the impacts of a proposed road on the species justified the refusal of a licence to take or kill the species.¹³⁴ Similarly, the Land and Environment Court has refused development consent to an open cut coal mine, finding that the precautionary measures proposed, including compensatory biodiversity offsets, were unlikely to prevent serious and irreversible harm to an endangered ecological community.¹³⁵

The Victorian Civil and Administrative Tribunal has held, applying the precautionary principle, that because of, first, the uncertainties associated with the potential effects on aquifers from changes in rainfall and associated recharge by reason of climate change, second, the potential seriousness of permanently depleting the groundwater storage and, third, the risk of irreversible damage to the environment, it was inappropriate to grant water extraction licences.¹³⁶

The Queensland Planning and Environment Court adopted a precautionary approach in refusing approval to a seaside resort development. The court found that changes in sea levels and storm surges due to climate change would subject a greater proportion of the future development site to inundation to what was modelled, making approval of the development unacceptable.¹³⁷

VI. CONCLUSION

ESD and its principles have been criticised as vague and for being framed appropriately for the purpose of political aspirations but not for implementation as legal standards.¹³⁸ This impedes the achievement of ESD. As courts have recognised, in order to achieve sustainability ‘hortatory statements of principle and aspirational goals are insufficient; the grand strategy must be translated into action’. This involves institutionalising ESD and its

¹³² *Sustain Our Sounds v The New Zealand King Salmon Company* [2014] NZSC 40; [2014] 1 NZLR 673, 704 [111].

¹³³ *Conservation Council of South Australia v Development Assessment Committee and Tuna Boat Owners Association (No 2)* [1999] SAERDC 86 (16 December 1999); affirmed on appeal *Tuna Boat Owners Association of SA Inc v Development Assessment Commission* [2000] SASC 238; (2000) 77 SASR 369.

¹³⁴ *Leatch v National Parks and Wildlife Service* (1993) 81 LGERA 270, 284, 286–287.

¹³⁵ *Bulga Milbrodale Progress Association Inc v Minister for Planning and Infrastructure and Warkworth Mining Ltd* [2013] NSWLEC 48; (2013) 194 LGERA 347.

¹³⁶ *Alanvale Pty Ltd v Southern Rural Water* [2010] VCAT 480 [154]–[159], [200].

¹³⁷ *Rainbow Shores Pty Ltd v Gympie Regional Council* [2013] QPEC 26.

¹³⁸ *Nicholls v Director-General of National Parks and Wildlife* (1994) 84 LGERA 397, 419.

principles in policies and laws as well as ensuring that functions under those policies and laws are performed in a way that promotes and implements ESD and its principles.¹³⁹ It also involves articulating clearly when, how and what action needs to be taken to achieve ESD.

The Operational Policy: Environmental Management of Firefighting Foam is an illustration of institutionalising the precautionary principle into regulatory policy and articulates when, how and what action needs to be taken to allow for the use of firefighting foams whilst safeguarding the environment.

¹³⁹ *Hub Action Group Inc v Minister for Planning* [2008] NSWLEC 116; (2008) 161 LGERA 136, 141 [2].