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**HOUSE OF
REPRESENTATIVES**

STANDING COMMITTEE ON CLIMATE CHANGE, WATER,
ENVIRONMENT AND THE ARTS

Reference: Climate change and environmental impacts on coastal communities

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**HOUSE OF REPRESENTATIVES STANDING COMMITTEE
ON CLIMATE CHANGE, WATER, ENVIRONMENT AND THE ARTS**

Thursday, 12 March 2009

Members: Ms George (*Chair*), Dr Washer (*Deputy Chair*), Mr John Cobb, Mrs D’Ath, Mr Dreyfus, Mrs Irwin, Ms Livermore, Ms Marino, Mr Scott, and Mr Zappia

Members in attendance: Mr Dreyfus, Ms George, Mrs Irwin, Ms Livermore, Ms Marino, Dr Washer and Mr Zappia

Terms of reference for the inquiry:

To inquire into and report on:

Climate change and environmental impacts on coastal communities. The committee will inquire into and report on issues related to climate change and environmental pressures experienced by Australian coastal areas, particularly in the context of coastal population growth. The inquiry will have particular regard to:

- existing policies and programs related to coastal zone management, taking in the catchment-coast-ocean continuum
- the environmental impacts of coastal population growth and mechanisms to promote sustainable use of coastal resources
- the impact of climate change on coastal areas and strategies to deal with climate change adaptation, particularly in response to projected sea level rise
- mechanisms to promote sustainable coastal communities
- governance and institutional arrangements for the coastal zone.

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Committee met at 11.04 am

CHAIR (Ms George)—I declare open this public hearing of the House of Representatives Standing Committee on Climate Change, Water, Environment and the Arts. The committee is inquiring into climate change and environmental impacts on coastal communities. The Minister for the Environment, Heritage and the Arts and the Minister for Climate Change and Water have asked the committee to examine the environmental impacts of coastal population growth as well as the impact of climate change on coastal areas and strategies to deal with climate change adaptation, particularly in response to projected sea level rise. The committee will also look at existing policies and programs related to coastal zone management, mechanisms to promote sustainable coastal communities and governments' arrangements for the coastal zone.

[11.04 am]

KASPURA, Mr Andre, Policy Analyst, Engineers Australia

TOWNSEND, Dr Murray Robert, Immediate Past Chair, National Committee on Coastal and Ocean Engineering, Engineers Australia

CHAIR—I welcome representatives from Engineers Australia to this public hearing. Although the committee does not require you to give evidence under oath, I should advise you that the hearings are legal proceedings of the parliament and warrant the same respect as proceedings of the House itself. The giving of false or misleading evidence is a serious matter and may be regarded as a contempt of parliament. The committee has received your submission. We thank you for it. It has been authorised for publication. I would now like to invite you to make a brief opening statement, if you so wish, before we proceed to questions and discussion.

Mr Kaspura—I will make some brief comments, if I may. I think it is important to stress that Engineers Australia is a professional organisation. Our primary role is to do with the professional aspects of engineering. Engineers Australia accredits the engineering degrees awarded by our universities and it actively is involved in the ongoing career education of engineers through a subsidiary company, which provides a variety of training materials, and through its own internal accreditation processes.

As well as being organised geographically, like many national representative bodies, we are also organised along professional grounds. The basis of this organisation is a series of colleges. There are eight colleges. The particular one of interest to the hearing today is the civil engineering college. Under each college, there is a series of national committees that are devoted to particular areas of engineering specialisation and professional interest. The committee that Murray represents, the National Committee on Coastal and Ocean Engineering, is one of these. They are primarily concerned with the furtherance of developments of professional interest to engineers in those areas of specialisation.

As a body, Engineers Australia has been concerned with sustainable development principles for about 20 years. Not long after the old NES policies of the former Keating era were agreed, Engineers Australia promulgated a set of sustainable development principles to guide engineers in their daily practice. Since that time, sustainable development principles have been enshrined in the code of ethics at every one of our members' sites. So we have a very long interest in those kinds of principles.

We are interested in contributing to policy as well as to practical solutions. One example of that is that Engineers Australia is currently receiving funding from the Department of Climate Change to update a publication called *Australian rainfall and run-off*. We know that one of the projections of climate change is that rainfall events will be less frequent but that there will be more of it in each event. This means that the run-off that results will have entirely different characteristics to what was known in the past. This requires engineers to be able to calculate the consequences for structures of different kinds and for the collection of water for water supplies and what have you. *Australian rainfall and run-off* is a set of methodological principles which

allow engineers, even in far-flung local government areas, to use those approaches in conjunction with data which will be provided by the Bureau of Meteorology to calculate the consequences of climate changes in that context.

Engineers Australia is more than happy to consider similar contributions in other areas. I invite Murray to make a few comments from the coastal engineering group.

Dr Townsend—Thanks very much. As Andre mentioned, the National Committee on Coastal and Ocean Engineering is a specialist group within Engineers Australia that oversees those matters. In fact, it has a long history of concerning itself with the impacts of climate change on the coast, most particularly in the adaptation area. For example, the guidelines for responding to the effects of climate change in coastal engineering design were first published in 1991. They were most recently updated in 2004 and are currently under review again following the IPCC's fourth assessment in 2007.

The national committee has also provided assistance to the Australian government through a number of committees over the years. The most recent one is the expert advisory group on coastal vulnerability that was formed by what is now called the Department of Climate Change. The previous name of the agency escapes me for the most part—

CHAIR—They change quite often.

Dr Townsend—so excuse me. And its guidelines were indeed used in that work as well. The major issues that we see complicating the way that Australia is adapting to the coastal impacts of climate change largely revolve around national leadership and the coordination of various activities that are taking place around the country and across all jurisdictions. There is, of course, the National Climate Change Adaptation Framework 2007, which set a firm basis for conducting both adaptation research and activity. But that does not seem to be necessarily guiding all the activities in that area. While the most important fundamental tool arising from that document is probably the national coastal high resolution digital elevation model, we have not actually seen any of that occur. The longer that it takes for something like that to get up and running, the greater the chance that various jurisdictions right down to local governments will try to go their own way. There are a number of implications from that, including the fact that we lose possible economies of scale by conducting it at a national level. There are also risks to the consistency of that data so that it can be used in a number of different frameworks. That is a matter that does concern the committee and Engineers Australia greatly. It would be probably the single most important fundamental tool to drive adaptation on the coast. We support that initiative as far as we can.

Building on from that, of course, requires coastal vulnerability assessments to be undertaken. The capacity for various jurisdictions to deal with that varies widely across the country, not just from state to state, when you delve down deeper from various local government districts from one to the other. Some are extraordinarily well equipped and raring to go to take on these issues whereas others are dealing with large areas of coast, very small ratepayer bases and very small populations. They have almost no ability to take on any additional issues. The cost to some local governments is well above their capacity to deal with these matters.

Another good area that we perceive could be dealt with on a national basis is, of course, what sea level scenarios and other climate change related scenarios we adopt for the coast. States are certainly going it alone at the moment. Some have been doing it for quite some time. Others are still getting on board. Some do not have any guidelines in their state planning policies at all. All of the numbers are different, well beyond what you would expect for regional variations across the country. There seem to be very different risk appetites from a variety of perspectives across the states. I think that is another key area where a national approach would be warranted, taking into account the regional variations that are expected around the country.

There are a variety of activities that we believe would be better undertaken on smaller scale levels rather than at the national level. That would be along the lines of particular vulnerability assessments and adaptation measures. Given that they are so local in nature—every settlement is different, with different properties and different coastline and different wave climates et cetera—I think that a more focused regional or state type approach would be probably better suited to that kind of work. That is probably all I would like to say initially. Thank you.

CHAIR—Thank you to both of you and to Engineers Australia for your contribution to advancing good public policy. Much of what you said, I think, was met with general head nodding on this side of the table. I want to take up the issue of digital elevation modelling. I know that you express frustration in your submission about the rate of progress. It had been our expectation that that would be finished early this year. There was some indication that there would potentially be a conference of local government authorities organised by the Department of Climate Change. Are you aware of where the work is at the moment?

Dr Townsend—I did read in one of the submissions—I cannot remember if it was the Department of Climate Change or DEWHA submission—about the intention to hold that meeting. Local government and, I think, state representatives were intended to be invited. That was the first I had heard of it, so I presume it has not happened. As far as the digital elevation model goes, the impression, I guess—this is entirely informal—is that it is generally supported that it needs to take place but that the funding arrangements between jurisdictions have not been thrashed out. I understand that the priority has receded somewhat with the onset of the financial crisis as well.

CHAIR—Well, I am not aware of that. When the department made submissions, it seemed like everything was on track, so that is the first I have heard that there could be some problems associated with it. But we do have the department coming back, so we will need to pursue that.

Dr Townsend—It may merely be gossip.

CHAIR—Obviously, it will have its limitations because, as they describe, it will be a first pass assessment.

Dr Townsend—The first pass assessment is another initiative that the Department of Climate Change was running, as opposed to the digital elevation model.

CHAIR—But I thought the first pass assessment would rely on the outcomes of the digital elevation modelling that is being undertaken.

Dr Townsend—No. The first pass assessment was intended to be a set of projects run as case studies prior to the high resolution DEM being captured and used. So a number of areas were selected around the country for specific investigation and the ‘first pass’ studies were being conducted. I believe they have been completed, but—

CHAIR—But it is not your understanding that we will have a map.

Dr Townsend—We will not have the broad-scale, high resolution map. Certainly some of the—

CHAIR—We will for some areas but not for the whole coastline.

Dr Townsend—A couple of studies used very localised digital elevation models that were captured by other people or other agencies for other reasons. They have been provided to those vulnerability assessments.

CHAIR—But it is certainly the impression left with the committee that when the work is completed, we will for the first time have a consistent national database that captures the whole of the Australian coastline at various degrees of—

Dr Townsend—I think we actually might be talking slightly at cross-purposes. There is in fact another program run by DCC relating to a morphological assessment of the Australian coastline based on some work by a bloke in Tasmania called Chris Sharples.

CHAIR—That is right. We met with Mr Sharples.

Dr Townsend—So that might be the first pass. It is a qualitative assessment of the coastline’s vulnerability based on assessing the nearshore, onshore and backshore environments.

CHAIR—Yes. That is the way he described it, yes.

Dr Townsend—Good. I believe most of that work has been completed, but I do not know if anybody has actually seen the results yet. But that is a qualitative rather than a quantitative assessment, such as the digital elevation model could provide.

CHAIR—So the digital elevation modelling, in your understanding, has potentially been put back a bit.

Dr Townsend—It seems to have been, because I am not aware of any—

CHAIR—So I am aware it is not progressing as rapidly as people had expected.

Dr Townsend—Perhaps not as rapidly as we would have liked. I am not quite sure what the broad expectations were.

CHAIR—Our expectations were that we would at least have some good nationally consistent data that could be accessed, particularly by local government authorities, in assisting them to drill down a bit deeper in terms of a lead-up to their own adaptation strategies.

Dr Townsend—It would be extraordinarily welcome. As I have mentioned, it is an absolutely fundamental tool to be able to do that. If you combine that high resolution coastal mapping with agreed sea level rise scenarios, you can then do a proper quantitative vulnerability assessment of whichever areas of the coastline you wish to investigate, from which you can then derive required adaptation programs, be that protect or retreat, for existing settlements and for new development, preferably avoid.

CHAIR—I just want to pick up on one other issue that you raised. This is what we are finding too. You said that the level of understanding varies significantly across jurisdictions—state governments to local government authorities. You have said that we need a national approach. We keep hearing that we need a consistent national approach on these issues. Could you just elaborate a little more on how you would see that being given effect, particularly because, of course, constitutionally the federal government has limited powers in terms of planning and development regimes that operate at the local level. What do you think constructively we could and should be doing to get greater coherence and consistency across the states and LGOs?

Dr Townsend—Primarily, I think, in providing the economies of scale on the fundamental tools and, I guess, fundamental scenarios that could then be used across all jurisdictions. For example—and I am harking back to the DEM again—I think the DEM is the perfect example of where a national approach is key to the success of such a program. When it comes to drilling down further into each state's development control systems, I agree. I do not see that with the current constitution you can enforce anything. However, with appropriate consultation they might actually be able to come to an agreed negotiated position across jurisdictions.

CHAIR—So you might be able to advance it through COAG processes?

Dr Townsend—I believe that this is where these are intended to be progressed.

Mr Kaspura—There is a direct parallel in the water supply area. The states have the constitutional authority over water supplies, but the task of measuring and monitoring Australia's water supplies has been given to the Bureau of Meteorology, who will make that information available to the various organisations responsible for water policy and operations within the states. What this means is that, for example, in a multistate system like the Murray-Darling there will be one common set of information instead of each agency that has some connection with the Murray-Darling generating its own and then having enormous debates about which data is in fact correct. You will have one set of national data which then becomes the subject of a myriad of operational approaches. I think what Murray has been outlining is directly parallel to that in the sense that we should have one national set of data about the process.

CHAIR—And how would that take into account regional variation, one set of nationally consistent data? How do we then make provision for drilling down at the local level, where the outcomes could be quite different to some kind of blanket view that we might have of what the IPCC projections, say, on sea level rise?

Dr Townsend—Well, the IPCC projections, for example, are about global average sea level rise. There has been downscaling we have done to assess around the country the variations in different regions around that mean. I do not believe that that would compromise a national approach on that as long as there is appropriate recognition of those regional variations. Of

course, that is only one aspect of the risk from climate change and even sea level rise. Where you really need the localised investigations is on the very local issues, such as storm surge, wave climate and the particular characteristics of each section of the coastline.

Mr Kaspura—Where the water is going to go.

CHAIR—And how do we do that, bearing in mind your point earlier that a lot of the local government authorities do not have either the resources or the expertise to be able to manage areas on their own?

Dr Townsend—In some jurisdictions, these are being managed either at state or regional levels rather than relying on each council to do this work. I realise that, once again, that is not even consistent in each state. I think there has to be a recognition that for some councils it is very unlikely that they are ever going to be sufficiently resourced to be able to take this on themselves without assistance from another level of government. Once again, some states provide more assistance than others. But more and more, I think, state governments are relying on grant schemes provided by the Commonwealth.

CHAIR—Do you have a view about which states policies and practices might be described as best practice that the committee might look at in greater detail?

Dr Townsend—This is getting close to my other hat. My paid work is with the South Australian government in coastal management.

CHAIR—That is where, yes.

Dr Townsend—I have to be a little careful.

CHAIR—Or a couple of jurisdictions.

Dr Townsend—Well, certainly the framework is in place in South Australia for state assistance to local government for these activities. That has been in operation for some years. Indeed, in South Australia they have been accounting for climate change in coastal planning for 15 years now.

CHAIR—We were in South Australia. My recollection is that they were revising their coastal policy at the time. Has that been completed?

Dr Townsend—It is nearing completion. The next meeting of the advisory committee reviewing that policy is actually Monday. It is expected to be the last meeting.

CHAIR—And we are looking forward to meeting with the Victorian government because they—

Dr Townsend—They recently released their coastal strategy in December last year, where they have included an explicit allowance for sea level rise to be incorporated into the planning system. New South Wales have recently released some guidelines, but they are very much guidelines. They do not—

CHAIR—There is no statutory or regulatory effect?

Dr Townsend—No, which I see as being of limited use to the planning authorities that have to deal with this on a daily basis. It is certainly of little use to people proposing to develop on the coast. It does not give them much useful guidance on what their risks are.

Dr WASHER—I am interested in your laser airborne depth sounders. That is a new technology that would demonstrate the bathymetry which is so important on the coastline to determine what sort of damages we would have. How far advanced is that and how much has been done?

Dr Townsend—The technology or the mapping?

Dr WASHER—The mapping.

Dr Townsend—The mapping?

Dr WASHER—Yes.

Dr Townsend—My knowledge of the Tenix LADS—laser airborne depth sounder—company is that they spend most of their time working overseas, which is where most of the demand is, doing bathymetric surveys internationally. I think they have done some opportunistic and small-scale work off the Australian coast. Of course, that technology would on the surface—probably deeper than just on the surface—be eminently suitable for acquiring the bathymetric data for this coastal DEM. But I do not think there has been any move to engage any contractors to do these measurements for that project at all, whether it is on land or at sea.

Dr WASHER—So Tenix is doing this at the moment?

Dr Townsend—Well, it was developed by the Australian military as the laser airborne depth sounder originally and then the technology was privatised. So Tenix is the company that I am aware of that runs this technology actually based out of Adelaide, I think.

Dr WASHER—I believe the technology is well-proven and very accurate. That is the level of accuracy you feel we would need to—

Dr Townsend—It would be sufficiently accurate for the bathymetry. Because it is airborne sensing, you can cover large areas in a very short time. It is much quicker than you can survey by any vessel. As long as the water is sufficiently clear, you can get very high quality data.

Dr WASHER—That is fine. Thanks, Chair.

Mr ZAPPIA—Thanks for the presentations. Dr Townsend, just from a personal interest point of view, who are the other members of the committee in South Australia?

Dr Townsend—The expert advisory committee has Professor Barry Brooke.

Mr ZAPPIA—Yes. I know Barry.

Dr Townsend—There is the South Australian Chief Scientist. The name escapes me at the moment. It is embarrassing.

Mr Kaspura—I should know it as well.

Dr Townsend—There is Professor Nick Harvey from Adelaide university as well. There is Bill Mitchell, who is the manager of the National Tidal Centre. They are actually concerned with accurately measuring sea level. There is myself. There is the chair of the Coast Protection Board in South Australia, Graham Foreman. Another member of the Coast Protection Board is Peri Coleman.

Mr ZAPPIA—I know Peri.

Dr Townsend—Yes. I thought you might. And a representative from the Department of Transport, Energy and Infrastructure in South Australia and a representative from the development industry, from Connor Holmes consultants.

Mr ZAPPIA—Is there anyone from local government on the committee?

Dr Townsend—No, because there is local representation from local government on the Coast Protection Board, which is overseeing the process. Every time there is a meeting, there is a report back to the board, so local government is closely involved through that mechanism.

Mr ZAPPIA—I have just one other question. Either of you might want to answer this. In reading your report, it is all based on advice that internists presented to you from other expert scientists. I know that you have commented or quoted the fourth report of the IPCC in this. Last night you might have noticed Professor Will Steffen on *Lateline* saying that some of their estimates were in fact quite conservative, in his view, and in fact things might be worse than what they had originally predicted. I assume that much of your advice is in turn reliant on the advice of others so that you can then do your own projections based on that. In a sense, we are depending not only on your expertise. It in turn depends on the expertise of someone else providing you with the information.

Mr Kaspura—Yes, it does. Engineers Australia, with our current review of our guidelines, has engaged an expert in particularly cyclone modelling and the impacts of climate change in that area as well to conduct our review. He is, of course, liaising with the committee members in collating the best, most current advice. Certainly since the IPCC's fourth assessment, I am personally convinced that there is enough evidence out there that the IPCC's work is quite conservative. In their own reports from 2007, they pretty much admitted as much in the way they expressed the uncertainties around sea level rise. Certainly I think it is prudent to take into account this research that has been published since the fourth assessment, where you have some estimates for, say, a probable sea level rise by the end of the century of between one and two metres. Some fairly straightforward extrapolations indicate upper levels of 1.4 metres. Given the way that emissions are tracking, I also think it would be prudent to assume that sea level rise is going to track along those upper limits as well in response to those real emissions, which are exceeding what used to be considered the worst case scenarios.

Ms MARINO—Thank you very much for coming in. Being a Western Australian, I would just like to ask a particular Western Australian question. Are there any parts of the Western Australian coastline that could be considered vulnerable that have not been mapped?

Dr Townsend—Not having seen the qualitative assessment conducted by Sharples, I do not know whether that vulnerability has been mapped in a qualitative sense or not. The Western Australian government has a coastal group that has been doing its own work. I know that they are involved in the assessment of vulnerability and protection, where necessary, along that Western Australian coastline. I do not know what work the Western Australian government might have done to get high resolution mapping of its own. I am just not aware of that.

CHAIR—So your worry is that there is all this ad hoc, fragmented work happening without it all being drawn together. That would be the role of the national body.

Dr Townsend—Fragmentation is a serious concern. We are seeing overlap in tasks that are being conducted. We are also seeing a non-strategic approach being taken in some levels. There are probably at least, as far as I am aware, three different grant schemes coming from the Australian government that can be used for work on climate change adaptation or vulnerability assessment. There is the local adaptation pathways. There is the Natural Disaster Mitigation Program and possibly even federation grants. Councils are picking up on them, not unnaturally, and wanting to get the work done on their patch.

CHAIR—What are the federation grants?

Dr Townsend—They are a scheme that was announced a while back, the details of which I am relatively unclear. But certainly I know the local adaptation pathways are running now and the Natural Disaster Mitigation Program has been running for some years.

CHAIR—Yes. I am aware of those two, yes.

Dr Townsend—In extremely high vulnerability areas, it is a very good idea to get on to it sooner rather than later. But certainly we are seeing this work undertaken in areas where it is not an immediate priority, so we are seeing a non-strategic approach. There are these ad hoc projects taking place which have enormous potential to waste funds. You are doing this now here and on a national approach you might do it all over again. Even if you do patch together these individually collected datasets, you might not have the consistency or the same standards applied to them to make them as useful as they otherwise might be. So that is of concern to Engineers Australia.

CHAIR—Have you had the opportunity as an organisation to voice these concerns on the committee that you are represented on?

Dr Townsend—Not for some time. The committee met in, I think, March 2007. I do not believe that there was consensus around the table at that committee meeting about some of the proposals that were on the table. We note that some of those have gone ahead. But certainly the committee has not been recalled.

CHAIR—Is that the advisory group on Australia's coastal vulnerability?

Dr Townsend—That is the one, yes. One of the concerns that Engineers Australia has with that is that now that these first pass coastal vulnerability assessment case studies are being conducted, the committee and those representative bodies on that committee, such as Engineers Australia, might be seen to be giving their imprimatur to those studies without any real involvement in how they were conducted and any oversight of what results might have been achieved.

CHAIR—That is of concern.

Mr Kaspura—Related to that is a point that we should make, and that concerns the way engineers require data. A lot of what Murray has been talking about is the need for consistent Australia-wide data. When you look at what has to happen in respect of climate change, adaptation and, for that matter, mitigation work, engineers are going to have to be involved in practically anything you can think of. What that means is engineering data is what we are talking about, not just airy fairy scientific data. One of the issues that we would like to stress is the importance of having some engineering involvement in the governance arrangements for any data collection arrangements to make sure that the perspective that is applied to the data is a practical one, that Joe Bloggs, local engineer for the Woop Woop shire, can in fact use. The methodologies that they apply are the mainstream methodologies taught in engineering schools, not in the scientific literature, necessarily.

Dr WASHER—In your submission, you really point categorically to the fact that a lot of the data that is already there is not accurate enough to be of commercial value in reality. It waves a red flag, but you cannot address that with any level of accuracy from an engineering point of view. Is that what you are saying?

Dr Townsend—Yes. The Spot5 data is what we referred to in the submission. It is accurate to within a couple of metres. Certainly if we are talking about a sea level rise of less than a metre but even a metre or even a metre and a half, a two metre resolution is not sufficiently accurate so that we can really define where the vulnerabilities are going to be on the coast. So much higher accuracy, such as proposed for the high resolution DEM, we believe is where the resources should be placed.

Ms LIVERMORE—You have made some really great points in your submission. It has been really useful so thank you very much for that. Page 3 talks about what coastal development policies should be based on. It seems there that you are making the point that, yes, on the one hand we need to get moving and get that national consistent database in place but in the meantime, running parallel with that, we need to be starting work on adaptation responses. However, you were saying in some earlier comments that at the same time we cannot rush into those so we have to go over and do them all again. Can you expand on your comment in the submission about what can be expedited while we wait for the best possible data? What can we be doing in terms of that adaptation right now?

Dr Townsend—I think it would be a reasonably straightforward matter to approach, for example, some state agencies, who would have a fair idea of where there are high vulnerability areas now that would benefit from more urgent approaches than we might otherwise do if we waited for the whole of coastline digital elevation model. For example, there are some of the lakes on the New South Wales coast where there is a lot of development barely above sea level

now. That is where a more urgent set of adaptation measures might be appropriate. There are certainly places like that in South Australia, such as Port Adelaide, which of course has gone and conducted, with various assistance, particularly from the National Disaster Mitigation Program, its own vulnerability assessment because the risks are apparent, real and urgent. So where it is quite apparent to do that, I do not see why it is necessary to wait in those areas where short-term action is required.

Mr Kaspura—In relation to the example in the New South Wales lakes that Murray mentioned, I have seen a study concerning Lake Macquarie, which has a very narrow choke inlet and is fed by three creeks. The paper was able to articulate very clearly the record of floods which resulted from those creeks, the impact of those floods on the mean level of the lake and how this interacted with the normal tidal fluctuation. That is a lot of information. You can do considerable what-if work on the basis of the information that is known from both IPCC and subsequent research on sea level rises to investigate the interaction of sea level rises of X in conjunction with the history of floods. We are talking about an area where settlement is, on average, around 0.9 metre above high tide level and the flood levels regularly get up to half a metre above that without any sea level rise whatsoever. So there is considerable vulnerability there. That is just one example.

In the particular paper I saw, there were a number of New South Wales lakes described in a similar vein because they had similar characteristics—being fed by well-defined streams with very narrow choke inlets and surrounded by development, both residential and in some cases commercial, on the foreshores. So that work could go along very quickly. We do that regularly anyway. Think of northern New South Wales country towns. Many of them are located on streams that regularly flood. It is standard practice for protection in the form of levy bank construction to be engaged. It is a very simple, cheap technology which people regard as part of their everyday lives in those circumstances. It does not need an enormous amount of research.

CHAIR—To know what the problems are?

Mr Kaspura—Exactly.

CHAIR—We visited the Central Coast. There was an example there too. I forget the name of the lake. The outlet to the ocean had closed.

Mr Kaspura—Wallace.

CHAIR—And flooding. There was settlement right around the lake to the caravan parks.

Mr Kaspura—Wallace Lake, I think, yes.

CHAIR—I cannot remember the name of the lake. Is the report you refer to, Andre, a New South Wales government report or a CSIRO report? Do you think you might be able to track it down for us?

Mr Kaspura—I will have to check. I have not got it downloaded. I could easily get it.

CHAIR—Could you email the secretariat?

Mr Kaspura—Yes. I could do that.

CHAIR—Kirsten, is there anything else that you want to ask?

Ms LIVERMORE—No.

Dr Townsend—I think there is another possible use for the national data as well, and the sooner that it is acquired and used, the better off everyone will be as well. That is to help identify land that is not currently developed that probably should not be developed. So avoidance can be used as a strategy for new development rather than having to adapt in the future. It can guide zoning principles within the planning system if this data is acquired as well. So there is a number of issues. There is the protecting of existing at-risk development and the prevention of new development becoming at risk. That is aside from any environmental issues caused by sea level rise as well.

CHAIR—And the potential legal ramifications and indemnity issues—

Dr Townsend—Yes.

CHAIR—which I guess we do not have time to explore today. But that is another vexed issue.

Ms LIVERMORE—Is there any research going on as to the tolerance of existing assets, existing infrastructure, to the likely impacts of climate change?

Mr Kaspura—There is some work done in Victoria for the Victorian government, which commissioned a report by a major engineering company whose name escapes me—I think it was Fox, CSIRO and some others—on climate change impacts on infrastructure. They looked at the full range of climate change impacts. They looked at the full range of economic infrastructure from roads right through to power stations and everything in between. They identified, using a risk based vulnerability analysis, the possible impacts. One of the things that was particularly startling in that report was that at the beginning they did an assessment of legal precedent and the basis on which judgements had been made. Their view was that there is sufficiently widely known information on climate change and climate change impacts for the legal system to hold the owners, operators and maintainers of infrastructure legally liable for problems if adaptation measures have not been put in place.

I understand that work is continuing in Victoria beyond the preliminary research stage. I understand that the Department of Climate Change has commissioned research, which is more Australia-wide, of a similar vein. It is a critical issue. We only have to think back to the bushfires, not just the recent ones in Victoria but two or three years ago, where one of the main interconnectors on the national electricity grid came down as a result of fire and blacked out large parts of Victoria, which was a very costly business.

CHAIR—Andre, are you aware of the report by the Australian Academy of Technological Sciences and Engineering assessing the impacts of climate change on Australia's physical infrastructure?

Mr Kaspura—Yes. I know what that is.

CHAIR—Is that a different report?

Mr Kaspura—It is a different report.

CHAIR—It is?

Mr Kaspura—It is a different report, yes.

CHAIR—Would you mind also emailing the secretariat the Victorian references and the previous one about the New South Wales lakes report? That would be very useful.

Mr Kaspura—Yes. Shall do.

CHAIR—I know that the secretariat, Dr Townsend, has more recently been in touch with the South Australian group that we met over there. They have done a flowchart of their government structures.

Dr Townsend—Yes. The panel did send through a supplementary submission with the information requested at that hearing.

CHAIR—When do you think your revised coastal policy will be public? In the next month or so before we start writing?

Dr Townsend—I will put my other hat on. How long is a piece of string? No. I really do not know. Once the Coast Protection Board has adopted that policy, there is still a fair bit of work to do within government prior to that.

CHAIR—So it is not imminent?

Dr Townsend—No. I would not be expecting it in a hurry particularly. Could I just make one other point if I may?

CHAIR—Of course.

Dr Townsend—We got talking about models about where the national approach could be useful and where you might diverge from that. I did notice in one of the other submissions to this inquiry by Professor Andrew Short from the University of Sydney—a very brief submission; I think it is submission No. 4, or something like that—that he proposed a model towards the end of his submission which, to me, seemed reasonably simple.

CHAIR—He appeared and gave evidence last week to the committee, so you will probably find the *Hansard* transcript of that. Yes, he had good practical suggestions to make.

Dr Townsend—Yes. That is how it appeared to me.

CHAIR—He was a very hands-on type of person. On behalf of the committee, I thank Engineers Australia very much for your contribution, both in written and oral forms. I thank you

most sincerely for attending the hearing today and assisting the committee with its deliberations. The secretariat will send you a copy of the transcript for any corrections that need to be made. I would be grateful if you could also send on to the secretariat any additional material that we have discussed at today's hearing. Thank you again very much for your efforts.

Resolved (on motion by **Dr Washer**, seconded by **Ms Livermore**):

That this committee authorises publication of the transcript of the evidence given before it at public hearing this day.

Committee adjourned at 11.51 am