

# To Nourish or Not to Nourish? Offshore Sand Sources and Coastal Erosion

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**Abstract:** Collaroy and Narrabeen Beaches have experienced a long history of storm damage and coastal erosion, with the beaches ranked nationally as the third area most at risk from coastal processes. To help address these issues, Warringah Council worked with the State Government and local community to develop the *Collaroy/Narrabeen Coastline Management Plan* (the Plan). The Plan is in accordance with the State Government's Coastline Hazards Policy and was formally adopted by Council in 1997. Since adopting the Plan, Council has carried out a number of the recommended actions aimed at preserving and protecting the beach as a national asset for public recreation and amenity; and ensuring that building and development along Collaroy/Narrabeen Beach has regard to the current and future hazards of wave impact and coastal erosion. Some of the actions have not proven to be sustainable in the long term (eg purchase of properties) or popular with the community (eg seawall). More recently council staff have been working with Sutherland Shire Council and the Sydney Coastal Council Group to investigate options for beach nourishment. It is believed that the findings of a proposed feasibility study into beach nourishment with offshore sands will benefit not only Warringah and Sutherland, but also many other coastal councils that are facing similar coastal erosion issues. Warringah Council will continue to work with Sutherland Shire Council, the Sydney Coastal Councils Group, State and Federal Government, and other relevant stakeholders to explore opportunities that may help progress this important issue.

## INTRODUCTION

Warringah Council manages the beaches and Crown land coastal areas in the Warringah Local Government Area (LGA). The Warringah LGA is centrally located on Sydney's northern beaches and is home to an estimated 137,652 residents (ABS 2003). Warringah has 14 km of coastline stretching from Queenscliff Rock Pool north to the entrance of Narrabeen Lagoon. In recent years, particular focus has been given to the coastline along the Collaroy/Narrabeen beachfront, as this is one of the most vulnerable areas in Australia to coastal erosion. Of the 10 beaches in the Warringah LGA, it is Collaroy/Narrabeen Beach that presents Council with its greatest challenges.

### *Collaroy/Narrabeen Beach characteristics*

Collaroy/Narrabeen Beach is located 16 km north of Sydney's Central Business District. Collaroy Beach is bounded by a minor headland with Fishermans Beach to the south. Narrabeen Beach is bounded to the north by North Narrabeen rock pool, Narrabeen

Headland and Turimetta Beach. The beach is approximately 3.6 km in length from Collaroy rock pool to the entrance of Narrabeen Lagoon. Wetherill Street forms the map boundary between the beaches of Collaroy and Narrabeen.

The Collaroy/Narrabeen beach embayment is characterised by having the most intense and highly capitalised shoreline development in Warringah. It has been estimated that the value of the properties along Collaroy/Narrabeen Beach exceeds \$300 million. Development along the beach reserves is further characterised as the third area most at risk nationally from coastal processes, ranking behind only Queensland's Gold Coast and Adelaide's City beaches (WSC 1985).

Collaroy/Narrabeen Beach is backed by dunes which vary in height from 5m AHD<sup>1</sup> at Collaroy to around 10m AHD at North Narrabeen Beach. In the area offshore, there are sandy areas out to the limit of the active beach system, at depths of approximately 20 to 25 m, with bedrock outcrops in depths ranging from 2 m at Collaroy, to 6-8 m at North Narrabeen, out to 20 to 35 m. The state of the beach at any particular time depends on complex interactions between the sand and coastal processes.

#### *History of development, coastal erosion and storm damage at Collaroy/Narrabeen Beach*

The first European settlement of the area dates from the early 1800s, although it was not until the 1880s that a bridge was built over Narrabeen Lagoon. By 1941 the Collaroy/Narrabeen beachfront had been virtually fully developed, with the exception of the strip between Devitt and Albert Streets which has remained largely undeveloped to the present day. In May 1944, a storm washed away outbuildings at Collaroy and homes were undermined. In June 1945, Collaroy Beach was severely eroded with two houses being "lost to the sea" and approximately six to seven others suffering substantial damage. Seven houses were subsequently demolished. The strip of beachfront between the Collaroy Beach Services Club and Jenkins Street was resumed in 1946 and is now a car park and public reserve.

Further development and redevelopment occurred in the 1950s and 1960s with the high rise home unit blocks of Flight Deck, Shipmates and Marquesas being constructed in the 1960s. During this period, severe beach erosion occurred in August and September 1967, with Collaroy Beach again most affected. Houses were damaged and a house and Flight Deck undermined by erosion. More severe damage was only prevented by the emergency dumping of thousands of tonnes of fill and rock and the construction of sea walls. Severe beach erosion again occurred in 1974, with the area from Clarke to Devitt Street near the centre of the embayment suffering the worst attack. Several houses and the foundations of the more seaward of the two Marquesas home unit blocks were threatened, resulting in further emergency dumping of large volumes of fill and rock. These works were undertaken by Council and residents. Less severe storms occurred in

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<sup>1</sup> m AHD = Metres expressed in Australian Height Datum. This is a relative level of measurement, where zero on this scale corresponds approximately to mean sea level, with so many metres above or below this zero point.

1978 and 1986, however in 1998 a large storm occurred requiring rocks to be dumped to protect property. The past seven years has been a time of unusually few storms.

## **HISTORY OF GOVERNMENT ACTIONS**

From the 1960s onwards, Warringah Council and the State Government have actively addressed the issues of coastal erosion, wave attack and the threat to properties along Collaroy/Narrabeen Beach. A summary of key actions is provided below.

### *Warringah Shire Council 1985 - 1990*

In 1985 Warringah Shire Council, in conjunction with the Public Works Department of NSW, prepared a *Coastal Management Strategy for Warringah Shire* (WSC 1985). This work identified Collaroy/Narrabeen Beach as the most at risk from coastal processes. This is due to the shoreline containing the most intense and highly capitalised beach development in Warringah, with over 120 single residential or dual occupancy dwellings, 293 residential units (including a number of major multistorey home unit developments) and public and commercial buildings. Much of this development is currently under threat from severe storm erosion; a situation which is expected to deteriorate into the future due to Greenhouse induced climatic changes and predicted rises in sea level.

In view of the substantial risk to development along Collaroy/Narrabeen Beach, Warringah Council undertook a number of studies (listed below) during the period 1987 to 1989. These reports were publicly exhibited, with comments sought on a preferred option.

- *Collaroy/Narrabeen Beaches Coastal Process Hazard Definition Study*, prepared for Council by the Public Works Department (PWD 1987);
- *Collaroy/Narrabeen/Fishermans Beach Coastal Management Strategy - Phase One: Hazard Definition*, prepared for Council by Nielsen Lord Associates (NLA 1988);
- *Collaroy/Narrabeen/Fishermans Beach Coastal Management Strategy - Management Options and Appendices*, prepared for Council by Nielsen Lord Associates and Travers Morgan Pty Ltd (NLA 1989).

Following a period of exhibition and public consultation, the preferred option was determined by the community to be **massive beach nourishment**, in combination with stormwater outlet improvements. On 17 July 1990, this option was formally adopted by Council.

### *NSW State Government 1988 - 1990*

In parallel with these actions, in 1988 the NSW Government adopted its 'Coastline Hazards Policy', with the objective to "reduce the impact of coastal hazards on individual owners and occupiers of coastal lands, thus reducing public and private losses and to ensure that future development is compatible with the hazards" (NSW 1990: 2). In September 1990, the NSW Government released its *Coastline Management Manual*

(NSW 1990) detailing the management system advocated in its Coastline Hazards Policy. The Manual was available to assist local councils in developing balanced Coastline Management Plans and to assist their understanding of the nature of coastline hazards and the options available for management.

#### *Warringah Council 1991 - 1997*

Following adoption of **massive beach nourishment** as the preferred management option in July 1990, Warringah undertook a period of work in accordance with the State Government's Policy. This work sought to enable finalisation and implementation of a Coastline Management Plan for Collaroy/Narrabeen/Fishermans Beach. Council also identified a number of further investigations which would be required. These were to be undertaken in three parts, with Parts A and B undertaken concurrently, and Part C dependent on the outcome of A and B, as follows:

- Part A - investigation of **massive beach nourishment** and stormwater improvements;
- Part B - investigation into suitable sand sources for nourishment;
- Part C - preparation of an Environmental Impact Statement (EIS) for sand extraction.

Pending completion of these studies and finalisation of the Coastline Management Plan for Collaroy/Narrabeen Beach, Council developed a set of *revised Interim Building and Development Guidelines for Collaroy Narrabeen Fishermans Beach, August 1991* (WSC 1991). The objectives of these Guidelines was to “enable assessment of building and development applications prior to finalisation of the management plan; afford protection to proposed building and development along Collaroy/Narrabeen Fishermans Beach; and to maintain the recreational and aesthetic values of Collaroy/Narrabeen/Fishermans Beach.”

The Guidelines were based on the report - *Criteria for the Siting and Design of Foundations for Residential Development, February 1991*, (GEO 1991) prepared for Council by Geomarine Pty Ltd and Coffey Partners International Pty Ltd. This report provides a series of Hazard Maps for Collaroy, Narrabeen and Fishermans Beach, delineating hazard zones along each map, namely: the ‘Wave Impact Zone’, the ‘Zone of Slope Adjustment’ and the ‘Reduced Foundation Zone’. The maps do not take account of longer term predicted changes due to Greenhouse, such as sea level rise and long term beach recession. The 1991 Interim Guidelines were used to assess and determine building and development applications during the 1990s for properties along Collaroy/Narrabeen Beach. These Guidelines were later incorporated into the *Collaroy/Narrabeen Coastline Management Plan - Development Guidelines for Collaroy/Narrabeen Beach Policy* and the Warringah LEP (2000).

Completion of *the Collaroy/Narrabeen Beach Nourishment Investigations, July 1993* (PB 1993) estimated that **massive beach nourishment** for the whole of Collaroy/Narrabeen Beach would cost \$28.9 million and require construction of a groyne at the entrance to Narrabeen Lagoon. Following a public meeting and consideration of the issue by the

reconvened Warringah Coastal Management Committee<sup>2</sup>, Council resolved at its meeting of 29 March 1994, to review its decision supporting *massive beach nourishment* as the preferred long term management option. Following recommendations of the Warringah Coastal Management Committee, Council subsequently resolved to prepare a Coastline Management Plan for Collaroy/Narrabeen Beach.

*Warringah Council 1997 - Present*

*(Adoption and implementation of the Collaroy/Narrabeen Coastline Management Plan)*

In August 1997, Council adopted the *Collaroy/Narrabeen Coastline Management Plan* (“the Plan”). The objectives of the Plan include:

- To preserve and protect the beach as a national asset for public recreation and amenity; and
- To ensure that building and development along Collaroy and Narrabeen Beaches has regard to the current and future hazards of wave impact and coastal erosion.

To address the above objectives, and those contained in the NSW Government’s Coastline Management Manual (1990), the Plan includes the following four broad coastal management strategies and thirteen (13) associated actions.

Strategy	Actions
<b>A. Undertake protective works</b>	<ol style="list-style-type: none"> <li>1. Survey and assess existing seawalls.</li> <li>2. Selective reconstruction of existing seawalls and minor construction to infill gaps in existing walls.</li> <li>3. Undertake moderate nourishment of beach in association with reconstruction of seawalls.</li> <li>4. Improvements to stormwater outlets along beachfront.</li> </ol>
<b>B. Implement environmental planning measures</b>	<ol style="list-style-type: none"> <li>5. Amend Section 149 Certificates.</li> <li>6. Selective voluntary purchase/open space acquisition of single residential properties.</li> <li>7. Planned retreat of Collaroy Surf club buildings.</li> </ol>
<b>C. Implement development control conditions</b>	<ol style="list-style-type: none"> <li>8. Maintain/review building and development controls for beachfront.</li> <li>9. Revise coastal emergency management procedure for Collaroy/Narrabeen Beach.</li> <li>10. Review building lines for beachfront.</li> </ol>
<b>D. Undertake Dune Management</b>	<ol style="list-style-type: none"> <li>11. Maintain moderate sand nourishment and extend dune reconstruction and revegetation.</li> <li>12. Continue current dune maintenance.</li> <li>13. Improve beach amenity through ongoing beach reserve improvements and maintenance works.</li> </ol>

<sup>2</sup> This Committee provides advice to Council on coastline management issues and was set up in August 1993 under the NSW Government’s Coastline Hazards Policy.

Since its adoption, Council has made substantial progress in implementing the Plan. To date, of the 13 actions contained in the Plan, only two have not been started (ie. A2 and A3), with actions relating to moderate beach nourishment on hold pending any State Government action. Of all the actions categorised as having a high priority, all are at various stages of implementation, being either complete, ongoing or underway. Some of the actions have not proven to be sustainable in the long term (eg B6 - purchase of properties), or popular with the community (eg. A2 - seawall). A brief overview of Council's progress with some of the Plan's key actions follows:

### *Seawall proposal*

From 1998 until early 2003 Council expended considerable time and effort in developing a detailed proposal to upgrade the 1.1 km of ad-hoc built seawall that exists in front of approximately 55 properties fronting Collaroy/Narrabeen Beach. The project was abandoned by Council when, during the community consultation stages of the project, it became apparent that there was widespread community opposition to the proposal. Over 550 submissions were received with the vast majority objecting to the seawall. Subsequently, at its meeting on 25 February 2003, Council considered Report 6.10 entitled "Response to Public Exhibition – Proposed Collaroy/Narrabeen Seawall Upgrade" and resolved:

- 1. That Council not proceed with the seawall upgrade at this time, given the widespread community opposition to the proposal.*
- 2. That detailed investigation now occur into alternative options for protecting properties against coastal erosion, particularly the sourcing of offshore sand for beach nourishment.*

No further action is therefore under consideration by Council in relation to upgrading the seawall on Collaroy/Narrabeen Beach.

### *Minor beach nourishment*

To provide some additional protection for beachfront development at threat and to maintain and enhance the recreational amenity of the beach, Council periodically undertakes minor beach nourishment of Collaroy/Narrabeen Beach with sand sourced from building sites and the Narrabeen Lagoon entrance. In the past Council has also purchased sand from commercial suppliers, however this practice is now deemed too expensive to continue. A brief explanation of each of these sand sources follows.

By developing a set of development consent conditions, in recent years Council has been able to source sand from a number of building sites in the Collaroy/Narrabeen area. This has ensured that the sand excavated from building sites in this area has been placed on the beach rather than being taken off-site and used elsewhere. To date, the total volume of sand sourced from building sites is approximately 40,000m<sup>3</sup>. While some problems have arisen from this practice due to sand contamination, Council staff have worked closely

with staff from the Department of Environment and Conservation (Environment Protection Authority) and these issues have now been addressed.

Approximately 50,000m<sup>3</sup> of sand is available to nourish Collaroy/Narrabeen Beach every 3-4 years as a result of Council's maintenance of the Narrabeen Lagoon entrance. The practice is undertaken jointly with Pittwater Council to minimize flooding and water quality problems, and is in accordance with the Narrabeen Lagoon Entrance Management Policy. The last entrance clearance operations were conducted in 2002 at a cost of approximately \$600,000 and the next operations are scheduled for Winter 2006. The operations are eligible for 2:1 funding under the NSW Government's Floodplain Management Program.

Another sand source that Council has used to nourish Collaroy/Narrabeen Beach is from commercial suppliers. In 2002 Council received quotes for the supply of sand for minor beach nourishment of Collaroy/Narrabeen Beach. As a result Council purchased a total of 4000 tonnes at a total cost of \$12,000 (ie. \$3.00/tonne). In late 2004 Council again called for quotes for the supply of sand for minor beach nourishment purposes. Council received two quotes (ie. \$28.00/tonne for sand trucked from Stockton Bight and \$18.30/tonne for sand from the Hawkesbury-Nepean system) and, understandably, decided not to purchase sand from either of these suppliers, deeming the sand to be too expensive, with the costs outweighing the benefits.

#### *Voluntary property purchase*

The Collaroy/Narrabeen Coastline Management Plan (1997) includes the action of: "Selective voluntary purchase/open space acquisition of single residential properties." Council therefore maintains a list of properties along Collaroy/Narrabeen beachfront identified as being subject to coastal processes, and thus, considered high priority future land acquisitions, should they come on to the market.

In April and July 2005, Council purchased 1 Waterloo Street, Narrabeen for \$2,180,000 and 1146 Pittwater Road, Collaroy for \$2,970,000. These purchases were made using Section 94 funds and were the first properties purchased by Council for coastal protection/management since adopting the 1997 Plan. Whilst there are a number of other suitable properties that have been identified, Council currently only has funds set aside for the purchase of one other property (ie. 87 Ocean Street, Narrabeen for approximately \$3,000,000). Following the purchase of this property it is doubtful whether there will be sufficient Section 94 funds available to enable any further purchases. In summary, the high costs involved have effectively prevented the successful implementation of this planning measure.

#### *Emergency Management*

In 2001 Council staff prepared a *Draft Coastal Erosion Emergency Sub-Plan for Collaroy/Narrabeen Beach*. This document confirmed that in the case of an emergency caused by coastal storm erosion, the State Emergency Service (SES) is the governing

authority and, as such Council would be directed by the SES to carry out any emergency works required.

The SES was involved in the review of the document and recommended that “*no further emergency management planning work be undertaken by Council before a properly constituted planning group led by the SES can be established*”. As such a working group was established with representatives from the SES, Department of Infrastructure Planning and Natural Resources (DIPNR), Council, and consultant engineers Patterson Britton and Partners. The outcome of this working group was a proposed Annex to the Manly-Warringah-Pittwater Local Flood Plan, being *Annex A (October 2001): The Management of Coastal Erosion, Collaroy-Narrabeen Beach*. The Annex was to be the formal response to an emergency event along Collaroy/Narrabeen Beach as a result of coastal erosion caused by a severe coastal storm event.

Unfortunately, there are a number of problems with the Annex. The Annex has not yet been incorporated into an SES emergency response plan and, in its current form, does not adequately address the required response to an emergency situation. For example, according to the Annex, the main response for the protection of properties would be the placement of rock in the affected areas of the beach. While in all practicalities this would probably be the most expedient method for interim protection of the properties, it has ramifications for Council and possibly the SES. When properties need protection, the level of protection that Council is prepared to apply needs to be defined clearly. Residents have an expectation that Council will protect fences, gardens and backyards. However, it may be appropriate that emergency works only be undertaken when there is an imminent threat to the loss of a building or if life is at risk.

Another key problem with the Annex relates to statutory responsibilities. For example, the Annex states that:

*If necessary, the SES Local Controller will authorise protective work using rocks, which will be placed along the beach in front of the threatened properties.*

Legal advice received by Council states that the placement of rock on the beach would require a development application (DA) under the *Environmental Planning and Assessment Act 1979* (EP&A Act), which is not overridden by the *State Emergency and Rescue Management Act 1989* (SERM Act). Therefore Council (and presumably the SES) cannot lawfully carry out such works without prior development consent, as it would constitute a breach under Section 76A of the EP&A Act. The legal and possible subsequent liability issues from the placement of rock have not been addressed in the Annex. From the legal advice it appears that the Minister administering the SERM Act can issue a direction to Council to do an act or exercise a function under Section 36(2) that would prevail over other legislation but this Ministerial approval may be difficult to achieve considering the short timeframe involved.

Council’s legal advice is that the 2002 amendments to the *Coastal Protection Act* do not adequately address this situation. Changes included:



s55 provides that the Minister, where the estimated cost of works is less than \$1m, or the Governor where costs are to exceed \$1m, may direct works to be carried out under the Public Works Act in the coastal zone where the Minister is of the opinion that works should be carried out for preservation, protection, maintenance, restoration or improvement.

The Minister is deemed to be the "constructing authority" within the meaning of the Public Works Act for this purpose.

s55B requires councils with land in the coastal zone to prepare a coastal zone management plan if ordered to do so by the Minister - or Councils may choose to prepare one - these plans are to include provisions for the protection and preservation of beach environments and beach amenity and to detail emergency actions that may be carried out under the State Emergency and Rescue Management Act or otherwise during periods of beach erosion including the carrying out of works for the protection of property. The Act goes on to create offences for breaching a management plan and details mechanisms for dealing with breaches.

Another issue, which has not been addressed, is who will bear the costs to undertake the emergency response. The Local Emergency Controller must direct any action in relation to the emergency response. Under the SERM Act, the Minister and Police are the only authorities able to recover costs for emergency works (as per legal advice). Council does not have the ability to recover any costs for emergency works. This would appear to be unacceptable.

#### *Council's Coastal Emergency Response Protocol*

Given the shortcomings of the Annex, Warringah Council staff have developed a *Coastal Storm Erosion Response Protocol*. The Protocol covers Collaroy/Narrabeen and South Curl Curl Beaches and has been developed as a checklist, based on possible storm event scenarios. The Protocol details the response and actions required from all parties including Council, the SES, the Local Emergency Management Officer, and the Manly Hydraulics Laboratory. The Protocol has recently been updated to reflect the specific instances when Council's General Manager, Administrator/Mayor, the Corporate Lawyer and the Marketing and Communications Manager will be notified.

In summary, it is likely that Council will end up being the organisation providing the advice and action in response to the emergency situation. Currently the placement of rocks is the only option if properties are threatened. This may place Council in an untenable situation in relation to legal, social, financial and environmental issues. Here, it is important to note that there is considerable pressure from surfing and environmental groups not to place rocks on public beach in an emergency response to severe storm erosion. In this regard, at its 10 February 2005 meeting, the Warringah Coastal Management Committee resolved that Council should:

*Not participate in or provide consent to any further emergency rock dumping or ad hoc seawall construction on public beach to protect private property behind the beach from big or storm surf.*

Therefore, while Council has undertaken considerable work in this area, the issue of who is responsible in the case of an emergency caused by coastal storm erosion is still not clear. In September 2005, Council received advice from Professor Thom that he has arranged for state legal advice on the issue of emergency management and the issue of needing a DA for urgent works.

## **DISCUSSION**

In February 2003, when Warringah Council decided not to progress with the seawall option, it also resolved, "That detailed investigation now occur into alternative options for protecting properties against coastal erosion, particularly the sourcing of offshore sand for beach nourishment." Council's preliminary investigations on the possible sourcing of offshore sand for beach nourishment have to date proved unsuccessful, largely because neither the State Government nor any other coastal Councils in Sydney have seen beach nourishment as a top priority.

### *Recent initiatives*

In February 2005, in an effort to address the issue of coastal erosion over the longer term, the Warringah Coastal Management Committee put forward a number of recommendations for Council's consideration. Central to the recommendations was that Council should work with the NSW Government and other Councils to pursue the option of beach nourishment with sand from offshore sources.

At its meeting of 12 April 2005, Council adopted the recommendations of the Coastal Management Committee and resolved:

- 1. That Warringah Council write to the Premier seeking the NSW Government's support and assistance for massive sand nourishment of Collaroy/Narrabeen Beach.*
- 2. That Warringah Council form a coalition with other NSW Councils that are in a similar situation in regard to beach erosion and the need for massive sand nourishment.*
- 3. That Warringah Council write to Professor Bruce Thom seeking his support and advice on the issue.*

Warringah Council sees this issue as largely a State responsibility but one in which Council must actively enlist the support of relevant Councils, the Sydney Coastal Councils Group, and the Federal Government. The nature of any future beach nourishment project that involved offshore sand sources will inevitably be large scale, and will only be economically viable if a number of government agencies and coastal managers are involved.

Investigations have revealed that some progress has been made at Byron Bay, and Council has recently been working with Sutherland Shire Council and the Sydney Coastal Councils Group (SCCG) to highlight the need to examine the feasibility of using offshore sand for beach nourishment. Like Warringah, Sutherland Shire Council is keen to examine the feasibility of using offshore sand for beach nourishment. Both Councils believe that this is the most viable source of suitable sand to manage the long-term coastal erosion issues at our beaches. The Councils believe that the findings of a proposed feasibility study will benefit not only Warringah and Sutherland, but also many other coastal councils that are facing similar coastal erosion issues.

#### *Involvement of Sydney Coastal Councils Group (SCCG)*

At the July 2005 meeting of the SCCG, issues in relation to beach nourishment were considered. Sutherland and Warringah Council delegates highlighted the urgent need to consider sand supplies for beach nourishment. The SCCG kindly offered to assist with any regional coordination of this issue including an initial scoping meeting between interested Councils. The SCCG subsequently resolved to assist member councils coordinate a regional response and potential proposals for use of offshore sands for beach nourishment.

The SCCG Secretariat established a Beach Nourishment Working Group, which met on 15 July 2005 to scope and define regional issues and needs in relation to offshore sands. The Group aims to gain a better understanding of offshore sand resources, to define SCCG member council issues and needs, and to scope potential local and regional advocacy strategies and desired outcomes. Since the first meeting of the Beach Nourishment Working Group, and with SCCG Executive Committee support, the SCCG has written to all member councils seeking: formal consideration of their current and potential needs for beach nourishment; if they support investigation of offshore sands to be used for beach nourishment; and requesting details of historic and planned expenditure on beach management and erosion control including nourishment, protection and buy back. A total of 15 responses were received from the SCCG member councils, which have been collated by the SCCG Secretariat. 7 councils identified current or potential needs for beach nourishment, 9 councils expressed support for an open and transparent investigation into possible sources of sand to be used for the purposes of beach nourishment, and 6 councils did not consider this issue relevant to their council.

In late October 2005, the SCCG secretariat wrote a similar letter to every coastal Council in NSW. The responses to this letter will be discussed at the next meeting of the SCCG's Beach Nourishment Working Group, which is scheduled for mid-November 2005. Also likely to be discussed at this meeting is the SCCG's State advocacy role on this important issue.

The willingness of the SCCG to become involved in this issue is not surprising. In 2003, the SCCG gave its in-principle support for the investigative proposal submitted by Sydney Marine Sands Pty Ltd under the *Commonwealth Offshore Minerals Act 1994*. The SCCG gave this support as it provided a two year feasibility study that may have

better defined the potential for sustainable utilisation of these offshore resources (pers.comm, Withycombe 2005). Since its formation, the SCCG has been supportive of further research particularly in relation to distribution and abundance of sand resources, appropriateness for use for beach nourishment and other ecological and logistical issues in relation to more specific assessment of potential benefits, limitations and impacts associated with direct beach nourishment activities.

### *Past offshore sand proposals*

There have been a number of proposals relating to offshore sand extraction that have been considered by current and previous NSW State Governments. These proposals include the 'Goldfields' proposal in the early 1980s, the 'Metromix' proposal in 1993, and the 'Sydney Marine Sands' proposal in 2003. Generally speaking, these proposals received a torrent of criticism from some ill-informed sections of the community, including media organizations, politicians, government, and non-government organizations. It is the authors' opinion that much of this criticism was unsubstantiated and unwarranted, and based on irrational fears that Sydney's beautiful and iconic beaches would somehow disappear by slipping down into perceived huge dredge holes created by offshore sand extraction. In summary, the unfair criticism and condemnation that previous offshore proposals have been subjected to has meant that the current and previous State Governments have effectively been 'spooked', resulting in the NSW Government's current reluctance to look seriously at the offshore sand option.

### *Offshore sand sources*

More than a few 'grains of truth' on offshore sands is provided in Dr Peter Roy's report to the NSW Coastal Council (Roy 2001). This report provides technical information on the nature of marine sand deposits on the inner continental shelf and documents the existence of "virtually unlimited quantities of sand on the NSW inner shelf in water depths ranging from 20 to 60 m." In regard to the proximity and suitability of the sand sources, the report notes that:

*Every coastal site in NSW is within 20 km of virtually unlimited quantities of marine sand. Much of the sand is suitable for beach nourishment.*

### *Environmental impacts of extracting offshore sand*

The environmental impact studies for the Metromix proposal (1993) were undertaken by some of Australia's leading marine researchers and the dataset prepared was considered at the time to be unparalleled anywhere in the world for this type of investigation. The studies showed that the sea bed in 20-70 m water depth is naturally bare of vegetation and contains a benthic infauna that is adapted to episodic storm disturbance. In this regard, Roy (2001) has noted that:

*The surface of the inner shelf is episodically disturbed by large storm and swell waves to a depth of about 0.5 m. Because of this and the low light levels, the bed is*

*unvegetated. Benthic animals are well adapted to the unstable conditions and would be little affected by well planned dredging.*

To avoid impacts on the beach environment Nielsen (2005) has noted that extraction should only be undertaken beyond the limit of nearshore beach fluctuation and wave-induced onshore sand transport. In this regard, Roy (2001) has noted that natural rates of sand supply to the coast will be virtually unaffected by well planned dredging in water depths greater than 25 m, and, in summary:

*Inner shelf sand deposits off the NSW coast can be used for beach nourishment without causing significant environmental damage.*

It is clear however that additional studies will need to be undertaken prior to any new proposal. As Cox (2005) has noted:

*Not enough information is available to be able to predict the impacts of offshore dredging for beach nourishment, or to highlight areas requiring conservation.*

#### *Future proposals – points for consideration*

Any future proposals for offshore sand extraction will need to reflect on and learn from the mistakes made by the proponents of past proposals. For example, for any future proposal to be successful, more work will need to be undertaken on building support for the proposal amongst relevant stakeholders prior to presenting the proposal to the approval authorities. Similarly, approval authorities, during the initial consultation and pre-lodgment stages of such proposals should think ‘outside the box’ in regard to possible opportunities of achieving mutual benefits and multiple objectives. For example, it is widely understood that, largely due to environmental impacts, access to land-based (onshore) sources of sand in the Sydney Region are diminishing. It is also widely accepted that Sydney’s construction industry needs additional sources of suitable building sand, and that only a portion of this demand can be met by the currently approved sources.

Approval authorities, in considering future proposals, will need to closely analyse the ecological, social and economic costs and benefits of ‘onshore’ versus ‘offshore’ operations. The authors tend to agree with Roy (2001), who has stated that,

*Carefully planned marine dredging is less disruptive than land-based sand quarrying.*

Approval authorities, in providing consent to any future offshore sand extraction proposal, must ensure that the consent conditions incorporate a requirement to provide appropriate quantities of sand to beaches impacted by coastal erosion for beach nourishment purposes. It is also important that a cooperative and collaborative approach is taken and that industry is encouraged to develop proposals in close consultation with relevant stakeholders. A well-designed monitoring program is also important to ensure

sufficient information is available to verify predictions and, where appropriate, modify extraction procedures.

#### *Institution of Engineers Australia seminar on Offshore Sand Extraction*

On the 8 August 2005, Warringah Council was invited to provide its perspective at a half-day seminar organized by the 'Maritime Panel' of the Institution of Engineers Australia. The title of the seminar was "*Offshore Sand Extraction in NSW - Legitimate response to a real demand for sand or environmental vandalism?*". The information presented at this seminar was very interesting and clearly showed that offshore sand extraction for beach nourishment is being successfully practiced by a number of countries around the world (eg. UK, Denmark, Netherlands, France, Japan, USA). While no formal recommendations were made at the conclusion of the seminar, based on the discussion that ensued during the panel discussion, it was clear that the vast majority of seminar participants were in agreement that beach nourishment with sand from offshore sources is a valid option that warrants further investigation. In regard to potential environmental impacts, Lincoln-Smith (2005) highlighted the need and importance of conducting rigorous environmental studies well in advance of any offshore sand extraction and beach nourishment works. To answer the question posed in the seminar's title, Lincoln-Smith (2005) stated that:

*Proper planning, monitoring and management can prevent the potential for environmental vandalism.*

#### *Beach Nourishment – Not Sand Mining*

It must be emphasised that the current push to examine the feasibility of using offshore sand for beach nourishment should not be defined as 'sand mining' or an 'extractive industry'. From Warringah Council's perspective, the primary objective for using offshore sand sources is for beach nourishment to protect and enhance the beach environment.

Earlier this year the then NSW Minister for Infrastructure and Planning, and Minister for Natural Resources, the Hon Craig Knowles MP, reiterated the NSW Government's position on offshore sand extraction, stating that the NSW Government would not support any proposal for offshore sand extraction (ABC Television 'Stateline' interview). This stance seems to be at odds with the Government's own NSW Coastal Policy (1997), which makes provision for offshore sand extraction and beach nourishment. With the resignation of the NSW Premier the Hon Bob Carr in July 2005 and the subsequent resignation of the Hon Craig Knowles in August 2005, it is unclear whether the new leadership will persist with its anti-offshore sand extraction position.

#### *The future*

Warringah Council is currently talking with other Sydney councils and the Sydney Coastal Councils Group regarding the development of a joint (multi-council) application under the Natural Disaster Mitigation Programme (NDMP) for a Feasibility Study into using offshore sand for nourishment and protection of Sydney's beaches. The Natural

Disaster Mitigation Programme is a national programme aimed at identifying and addressing natural disaster risk priorities across the nation. Through the programme, the Australian Government, in partnership with State and Territory governments and local agencies, work towards reducing the immense toll that natural disasters wreak on Australia's communities. All three spheres of government provide funding under the Programme. Generally, the Australian Government contributes up to one third of approved project costs. State and Territory government are required to match this funding, but may contribute more, with local agencies and in some cases private sector contributors making up the balance. For the sake of Sydney's eroding beaches, it is hoped that all relevant stakeholders will work together in the preparation and support of this application.

Council staff are maintaining close contact with staff from State Government Departments such as the Department of Planning and the Department of Natural Resources. In September 2005, Professor Thom advised Council that he has arranged for state legal advice on the issue of emergency management and the issue of needing a DA for urgent works. Professor Thom also advised that he will convene a forum later in the year on beach erosion and sand nourishment and will be inviting all councils affected, including Byron, Lake Macquarie, Gosford, Pittwater, Warringah, and Sutherland.

## **CONCLUSION**

From the 1960s onwards, Warringah Council and the State Government have actively addressed the issues of coastal erosion, wave attack and the threat to properties along Collaroy/Narrabeen Beach. Since adopting the *Collaroy/Narrabeen Coastline Management Plan* Council has made substantial progress in implementing the Plan's actions. Some of the actions have not proven to be sustainable in the long term (eg purchase of properties) or popular with the community (eg seawall). It must now be acknowledged that other long-term management options for coastal erosion should now be considered. Beach nourishment with offshore sand is one such option that Warringah Council believes will complement its existing suite of actions and initiatives. As stated in Roy (2001),

*Coastal erosion in SE Australia is caused by a combination of natural and anthropogenic phenomenon. Beach nourishment is a solution in most cases.*

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