
Community and Stakeholder Engagement Report

Public exhibition of Narrabeen Lagoon Entrance Management Strategy (Stage 2 of 2)

Consultation period: 6 May 2022 to 19 June 2022

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1. Summary




This report outlines the outcomes of community and stakeholder engagement as part of the public exhibition of the draft Narrabeen Lagoon Entrance Management Strategy (Draft Strategy) conducted between 6 May 2022 and 19 June 2022.

The feedback indicated a strong level of support for investigation of sand pumping alternatives for periodic entrance clearance operations. Feedback also indicated support for trialling of more frequent, smaller scale entrance clearance operations and a preference for the lagoon entrance to be open.








Mechanical opening was supported as a necessary intervention for flood mitigation purposes, however some differing views were expressed with respect to the trigger conditions for action and the pilot channel position to initiate breakout of the lagoon.

Respondents who were not supportive of the Draft Strategy expressed their dissatisfaction with the construction and management of Birdwood Park Dune and raised broader flooding and stormwater management issues throughout the lagoon.

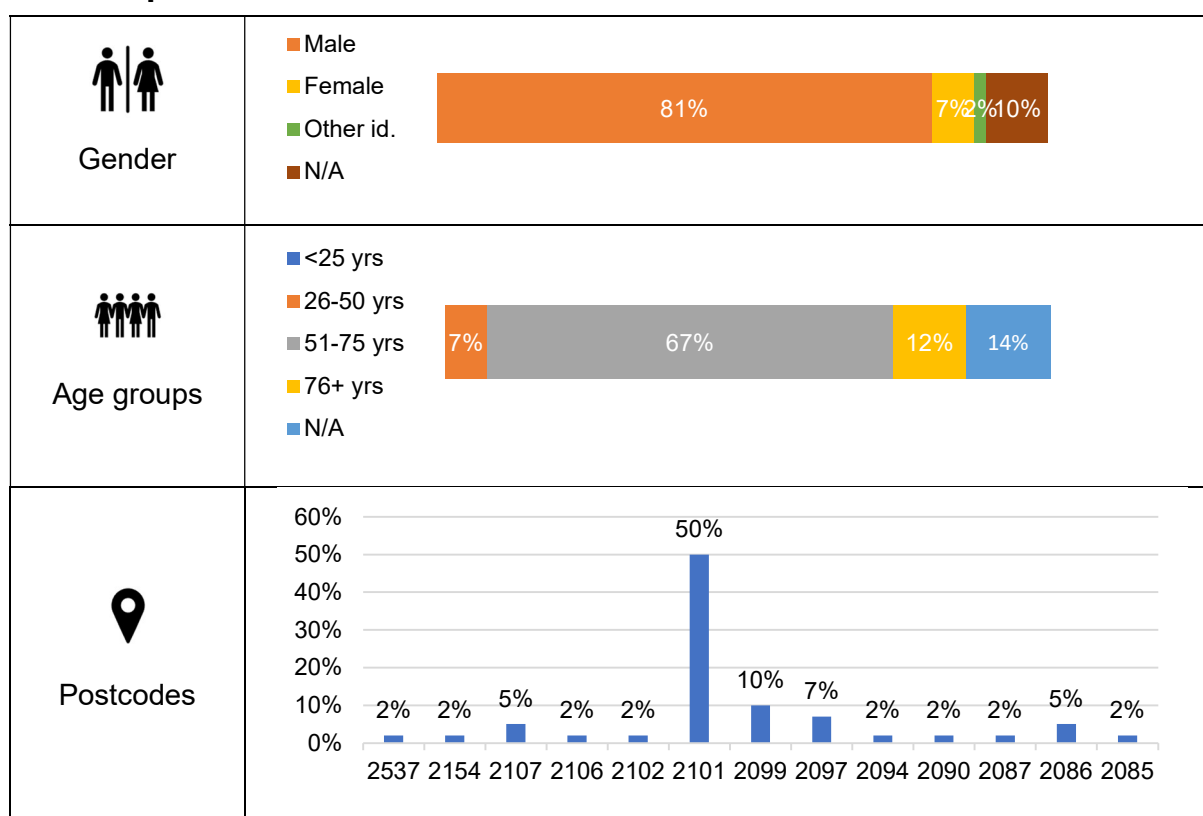
1.1. Key outcomes

 Total unique responses	53	
 How responses were received	Submission form	Completions: 42
	Written responses (email/letter)	Number received: 11
 Feedback themes	Sand Pumping	Entrance Clearance Channel Alignment
	Pilot Channel Alignment and Position	Lagoon Siltation/Dredging
	Breakout Trigger Conditions	Ocean St Bridge Extension
	Birdwood Dune Management	Local Flooding

1.2. How we engaged

 Have Your Say: visitation stats	Visitors: 2,097	Visits: 2,766	Average time onsite: 1min 20secs
 Social media	2 Facebook posts: 24 May, 15 June 2022		Reach: 4,633
 Videos	Video explainer of the current Narrabeen Lagoon entrance management Video explainer of the main options investigated in the draft strategy		Views: 11,046 Views: 88
 Print media and collateral	Letter mailout: residents affected by flooding from Narrabeen Lagoon and beachfront residents within 1,000m of the Narrabeen Lagoon entrance Site signs used: Yes		Distribution: 3,638 Number of signs: 5
 Electronic direct mail (EDM)	Community Engagement (fortnightly) newsletter: 3 editions Council (weekly) e-News: 3 editions Stakeholder email: - Stage 1 distribution list for Narrabeen Lagoon Entrance Management Strategy - Friends of Narrabeen Lagoon - North Narrabeen National Surfing Reserve Committee - Surfrider - Narrabeen Lagoon Sailing Club - Pro Kayak, Narrabeen		Distribution: Approx. 22,000 subscribers Distribution: Approx. 180,000 subscribers Distribution: 95
 Face-to-face or online/telephone sessions	Online information session: 1 Drop-in sessions: 3 Telephone sessions: 3		Attendance: 12 Attendance: 2 Attendance: 3
 Key stakeholder engagement	Meeting: Presentation to North Narrabeen National Surfing Reserve Committee representatives		Attendance: 5

1.3. Who responded¹



2. Background

Narrabeen Lagoon is one of the Northern Beaches' greatest natural and recreational assets. However, it is also prone to flooding and Council has been managing the entrance of the lagoon to reduce the risk of flooding for close to half a century.

An Entrance Management Strategy is being developed to confirm the best long-term management options for managing sand deposition in the entrance. This will enable a best practice and formalised approach.

The project's Community and Stakeholder Engagement Plan (impact level two) was devised on a two-stage approach:

- Stage 1 (February – March 2021): Public consultation on the options paper to gather input from the community regarding the different options under investigation.
- Stage 2 (May – June 2022): Public exhibition of the draft Entrance Management Strategy to ensure it is supported by a broad cross-section of the community.

This report outlines the Stage 2 community and stakeholder engagement.

¹ Demographic data was gathered by request only. The data represented only includes those respondents who provided this detail.

3. Engagement objectives

Community and stakeholder engagement aimed to:

- build community and stakeholder awareness of participation activities
- provide accessible information so community and stakeholders can participate in a meaningful way
- identify community and stakeholder concerns, local knowledge and values.

4. Engagement approach

Community and stakeholder engagement for the public exhibition of the draft Narrabeen Lagoon Entrance Management Strategy was conducted between 6 May 2022 and 19 June 2022. The engagement was planned, implemented and reported in accordance with Council's Community Engagement Matrix (2017).

It was appreciated that there was a lot of technical information contained in the draft strategy and that it would be necessary to provide additional support to the community during the public exhibition to help with their understanding. A variety of ways were offered for people and groups to meet with the project team, ask questions and share feedback.

The project page² from the Stage 1 community consultation was updated on the have your say platform with information provided in an accessible and easy to read format. The Your Say page included an additional 8-minute video outlining the options and a flipbook snapshot document.

The project was promoted through letter notifications with a QR code link to the Your Say webpage to all residents affected by flooding from Narrabeen Lagoon and beachfront residents within 1,000m of the Narrabeen Lagoon entrance (3,638 properties).

There were also 5 corflute signs installed at key locations around the lagoon; media releases via Council's website, e-news and engagement newsletters; focussed social media advertising to raise awareness among users as well as residents; key messaging to all stakeholder, recreational and community user groups surrounding Narrabeen Lagoon; a briefing meeting with key stakeholder groups; an online information session with a presentation by the Consultant; three face to face drop in sessions and telephone consultations by appointment.

The public exhibition was covered by local news outlets including the Northern Beaches Review, Pittwater Online News, Manly Observer, and the Manly Daily online. Each of the local news outlets included a link to the Your Say webpage in their news stories.

A pop-up stall at the Picnic in the Park event at Lakeside Park adjacent to the lagoon on Saturday, 4 June 2022 also shared information about the project and promoted the public exhibition.

Feedback was captured through an online submission form embedded onto the Your Say page. An open-field comments box provided community members a space to share any feedback with an opportunity to upload attachments. Email and written submissions were also invited and contact details for the project manager were provided.

² <https://yoursay.northernbeaches.nsw.gov.au/narrabeen-lagoon-entrance-management-strategy>

4.1. Reaching diverse audiences

A thorough stakeholder mapping exercise was completed to identify and understand the needs of the whole community.

It was determined for this project that it was particularly important to hear from local residents, user groups of Narrabeen Lagoon and other interested local stakeholder groups.

Communication collateral included diverse messaging to reach these different stakeholders.

5. Findings

Review of the submissions indicated general support for the Draft Strategy. A strong level of support was received for investigation of sand pumping alternatives for periodic entrance clearance operations. Feedback also indicated support for trialling of more frequent, smaller scale entrance clearance operations and a preference for the lagoon entrance to be open.

The continuation of the practice of mechanical opening was supported as a necessary intervention for flood mitigation purposes, however some differing views were expressed with respect to the trigger conditions for action and the pilot channel position to initiate breakout of the lagoon.

Suggestions for modification or refinement of particular elements of the strategy were also received and are summarised below in **Table 1**. The matters raised were related to sand pumping, pilot channel alignment and position, breakout trigger conditions, entrance clearance channel alignment, Birdwood Dune management, lagoon siltation/dredging, Ocean St Bridge extension, and local flooding issues.

Amendments incorporated into the final Strategy document include:

- Pilot Channel Alignment and Position – Consideration of the impact on surf quality of scoured sand deposition from an entrance breakout, including anticlockwise rotation of the indicative pilot channel alignment shown on Figure 4-1 of the Strategy Report to align further with the southern side of the ocean pool whilst still avoiding the shallow bedrock at the northern end of the beach.
- Birdwood Dune Management – Consideration of “sightlines” from the North Narrabeen Surf Club to the lagoon entrance, which could potentially assist lifeguards and lifesavers with monitoring beach goers swimming in the lagoon entrance. This is a factor to consider during the recommended re-profiling and revegetation of the dune, noting that there would be opportunity to reduce the dune elevation in some areas as part of any re-profiling and sand redistribution works, and to confirm that only low native ground cover and shrub species are planted during revegetation.

Table 1: Issues, change requests and other considerations

Theme	Issues, change requests and other considerations raised	Council's response
Sand Pumping	<p>The most common theme that came up during community consultation was general support for further investigation of a mobile sand pumping scheme at the entrance to transport sand to Collaroy-Narrabeen Beach. Suggestions included installation of a small permanent dredge, the use of solar powered equipment, and inclusion of discharge of sand further to the north (less pumping distance) to cater for fluctuating alongshore drift directions, namely, to take advantage of times when the alongshore drift could be to the south.</p>	<p>As recommended in the Strategy, it is intended to further investigate the sand pumping option with the assistance of industry (i.e. contractors) to refine the methodology and potentially provide cost savings through a contractor delivered scheme.</p> <p>The process of interacting with industry through issue of an Expression of Interest (EOI) or similar would lend itself to consideration of innovative methodologies and the technical feasibility of alternative power sources (e.g. solar powered electric equipment rather than diesel equipment).</p> <p>Whilst the suggestion to pump a shorter distance to make use of prevailing southerly alongshore littoral drift during the summer period has merit from a coastal processes perspective, the pumping system would likely primarily operate outside of peak swimming season to minimise impacts on beach amenity. Whilst the use of trucks on local roads would be eliminated, the beach area in the vicinity of discharge points would be temporarily occupied by machinery (e.g. excavators and dozers) required to rework the sand material over the beach profile and create sand bunds as necessary to facilitate water quality control from the slurry discharge. As such, affected individual sections of the beach would need to be temporarily closed to public access for the duration of replenishment operations for safety reasons and this is best done in the low season for beach usage.</p>
Pilot Channel Alignment and Position	<p>It has been requested that the pilot channel for mechanical opening of the entrance is positioned as close to the ocean pool and as wide as possible to prevent the nature of the deposition of scoured sand</p>	<p>In principle, the objective of a mechanical opening is to quickly excavate a narrow pilot channel, using an excavator, in a position, and under the most favourable hydraulic conditions (lagoon water level, swell, tide etc.), to initiate a 'violent' entrance breakout. This will result in the maximum channel scour in the quickest</p>

	in the surf zone from degrading surf quality.	<p>possible time so that the rate of water outflow from the lagoon is maximised for flood mitigation and so that the channel is better established and longer lasting. This is generally achieved by positioning the pilot channel away from areas of shallowest bedrock (i.e. not too close to the ocean pool footpath) that would otherwise limit the depth of channel scour.</p> <p>The consideration of the impact on surf quality of scoured sand deposition from an entrance breakout is a valid concern and will be included in the final Strategy document. It is considered that the indicative pilot channel alignment presented in the draft Strategy document could be slightly rotated anticlockwise to align further with the southern side of the ocean pool whilst still avoiding the shallow bedrock at the northern end of the beach. This would direct discharge of scoured sand from the breakout to the northernmost area of any prevailing sand banks to reduce disruption to surf breaks.</p>
Breakout Trigger Conditions	<p>Submissions were received which proposed potential improvements to Council's emergency response procedures including the mechanical opening of the lagoon. The suggestions included opening the lagoon at a lower trigger level than the current practice and at an early stage several days in advance of forecast rainfall events.</p>	<p>As detailed in the Strategy, numerical modelling of the various trigger water level scenarios indicates that mechanical opening at an initial water level of at least 1.3m AHD is the most effective and rapid method to reduce lagoon water levels for flood mitigation purposes. The modelling results showed that mechanical opening at lower initial water levels of 1.0m AHD and 0.8m AHD may be possible, however this results in a much slower build-up of breakout channel discharge which in turn results in a narrower and shallower scour channel and a reduced rate at which the water level in the lagoon falls. In addition, the narrower and shallower scour channel is more susceptible to infilling during this period by sand mobilised by wave action.</p> <p>Even though mechanical opening at lagoon water levels of 0.8-1.0 m AHD may be possible, this should only be considered in extenuating circumstances, e.g. imminent, large rainfall event or a devastating pollution/environmental incident event. This action must also be aligned with favourable ocean conditions</p>

		<p>and when the speed of achieving lowered lagoon water levels or the length of time before the entrance closes again are not critical (i.e. it would be ineffective if the entrance was to close again before the peak flooding occurred).</p> <p>Bespoke flood forecasting software is used to predict lagoon water levels for up to 36 hours into the future. However, suitable conditions for mechanical opening still need to exist for an effective entrance breakout to be implemented ahead of a predicted flood event.</p>
Entrance Clearance Channel Alignment	<p>Suggestions for improvement of the entrance clearance channel alignment including the removal of sand left along the northern seawall, and removal of the 's-bend' alignment of the entrance channel by cutting a straight channel through the middle of Birdwood Park dune.</p>	<p>The footprint for removal of sand is determined for each periodic entrance clearance operation based on the results of a seabed level survey and a marine ecology survey. Past marine ecology surveys have identified both seagrass and macroalgae (e.g. seaweed) along the toe of the northern seawall. To minimise environmental impact, a minimum 10m offset has been applied from any seagrass or macroalgae beds in the development of the sand removal footprint.</p> <p>A straight channel cut through the middle of Birdwood Park dune could not be sustained without permanent engineering works (e.g. rock training walls) since there is a natural tendency for the lagoon entrance channel to migrate northwards and become positioned at the northern end of the beach. This process is evident at other lagoon entrances in the LGA, such as at Dee Why, Curl Curl and Manly Beaches. This is due to the net northerly sand transport along the beach. At the northern end of Narrabeen Beach further migration is restricted by the northern seawall and bedrock outcropping.</p>
Birdwood Dune Management	<p>Several submissions were received regarding management of Birdwood dune, including suggestions to remove the dune completely, lowering of the dune to improve sightlines, and planting with groundcover species only.</p>	<p>The Birdwood Park dune has several important functions including stabilising the position of the lagoon entrance channel, providing protection from wave washover sand deposits into the lagoon, protecting the Ocean Street Bridge and the adjacent foreshore, and limiting wind-blown sand transport into the lagoon. The dune system also acts to retain sand that may otherwise be available for transport</p>

		<p>into the lagoon entrance under the action of waves and tidal currents.</p> <p>The management of Birdwood Dune was included as an issue in the Strategy due to its influence on lagoon entrance conditions, particularly in its current denuded state which allows wind-blown sand to be transported into the lagoon entrance area.</p> <p>As a medium-term management measure in the Strategy, it is recommended that the stability of the dune body is re-established by re-profiling and revegetating the currently denuded area. During this process, consideration is recommended for several factors including public amenity (e.g. beach on western side), public access (e.g. installation of beach accessways and fencing), functional requirements of the dune (e.g. minimum height, appropriate slopes for vegetation establishment) and sightlines from the surf club to the entrance channel.</p> <p>A study undertaken for Council by Water Research Laboratory (2012) determined that, in consideration of any dune lowering, a minimum dune elevation of 7m AHD would be required to maintain dune stability under current and future coastal erosion and overtopping hazards.</p> <p>Appropriate native species should be nominated to quickly establish groundcover (e.g. spinifex grass), along with the planting of shrub species in certain areas as is best practice to mimic the vegetation zoning and species diversity. Low-level shrub species could be planted in those areas considered suitable in the North Narrabeen Beach Reserve and Birdwood Park Masterplan to minimise impacts on sightlines.</p>
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Lagoon Siltation/ Dredging	Submissions were received which requested investigation of dredging of the main waterbody of Narrabeen Lagoon. The submissions outlined a range of potential benefits, including recreational amenity, water quality and flood risk.	<p>Dredging of the main waterbody of Narrabeen Lagoon for recreational purposes has previously been investigated by the former Warringah Council. There are unlikely to be any noticeable flood benefits of dredging the bed of Narrabeen Lagoon in the main waterbody.</p> <p>The management of Narrabeen Lagoon entrance is undertaken primarily as a flood risk reduction action. As dredging of the main waterbody of Narrabeen Lagoon will not significantly impact flood levels it is not recommended for further investigation as part of this strategy.</p>
Ocean St Bridge Extension	Some submissions suggested that the extension of Ocean St Bridge could be a flood mitigation measure.	The extension of the Ocean St Bridge was assessed as part of the Narrabeen Lagoon Floodplain Risk Management Study (Cardno, 2019). This option ranked poorly in the multi criteria analysis used to assess various flood mitigation options as part of that study. However at some stage in the future when the bridge needs to be upgraded or replaced anyway, this option could be further investigated.
Local Flooding	Several submissions raised local flooding issues in lagoon floodplain areas including, Collins St/ Parukala Pl/ Darius Ave, Mactier St, and Narrabeen St.	Whilst the resolution of local flooding matters is outside the scope of the Strategy, these matters were considered within the Narrabeen Lagoon Floodplain Risk Management Study (Cardno, 2019) which developed a ranking of various management options based on the results of a multi criteria analysis.

Appendix 1 Verbatim community and stakeholder responses*

A. Online submissions

Number	Submission
1	<p>Dear Sirs</p> <p>I have reviewed the strategy and agree with the primary components of the plan being the continued clearing of the entrance shoals. Prior studies had revealed that pumping to a pipeline back along Narrabeen beach to be economically feasible and preferable over the longer term despite the higher initial cost. I support continued consideration of this option.</p> <p>However one element of the strategy has not been properly examined and that is the vegetation and maintenance of the Birdwood Dune to the north of the surf club. I have observed that the vegetation of the dune results in a rapid accumulation of sand in the dune resulting in its growth in both height and width in both eastwards and westwards directions. This has the consequential effect of growing the sides of the dune which eventually scarp and present a danger to beachgoers on either side. Any management of the dune over the long term must include the periodic reduction in height to 4m to allow for further entrapment of sand in the future. I also note that the entrapment of sand in the dune provides a reservoir of sand that flows to the lagoon in extreme easterly weather events.</p> <p>Before adopting the vegetation of the dune option council should fully study, report and consult on the full impacts of such a proposal.</p>
2	<p>I agree with all of the recommendations in the draft strategy and would support more frequent, smaller scale, strategic removal of sand from the western shoal and the creation of a permanent tidal channel from the lagoon entrance to the boat ramp on the northern shore.</p>
3	<p>Hi Team</p> <p>Thank you for the options provided.</p> <p>Yes, the last ten years have been stressful, sandbagging, depending on the tide and rainfall, I've never monitored the weather so closely.</p> <p>I live in Parukala Place, we have a drain at the entrance to Darius that flood immediately, which over the past year its difficult to park at home not knowing whether you can leave your house in the morning, missed appointments, kids sport or unsure if you can get to work. The drain in Darius, I'm led to believe is dependent on the height of the sand in the lagoon.</p> <p>The lagoon itself is affected by many events that have changed over the years, firstly when I grew up the was a permanent dredge that moved around the lagoon which added depth, improve water sports and there was rarely any flooding. Second, sand was shipped every year to Collaroy rockpool and migrated north protecting houses along South Narrabeen and there was not significant erosion as there is now.</p> <p>Thirdly, the surfrider foundation removed the dune stabilisers which you could see the point of what they were trying to achieve, however, as soon as there is a strong easterly the sand from dunes ends up in the lagoon.</p> <p>Finally, increased overdevelopment in the area has led to more sediment in the lake. Areas of concern are around Cromer Golf course trees are dying and land is eroding, Deep & Middle Creek, Jamieson Park, the boatshed, Wimbledon Reserve, Woolworths Narrabeen area, Lake Park, Malcolm St/Reserve, and Birdwood Park.</p>

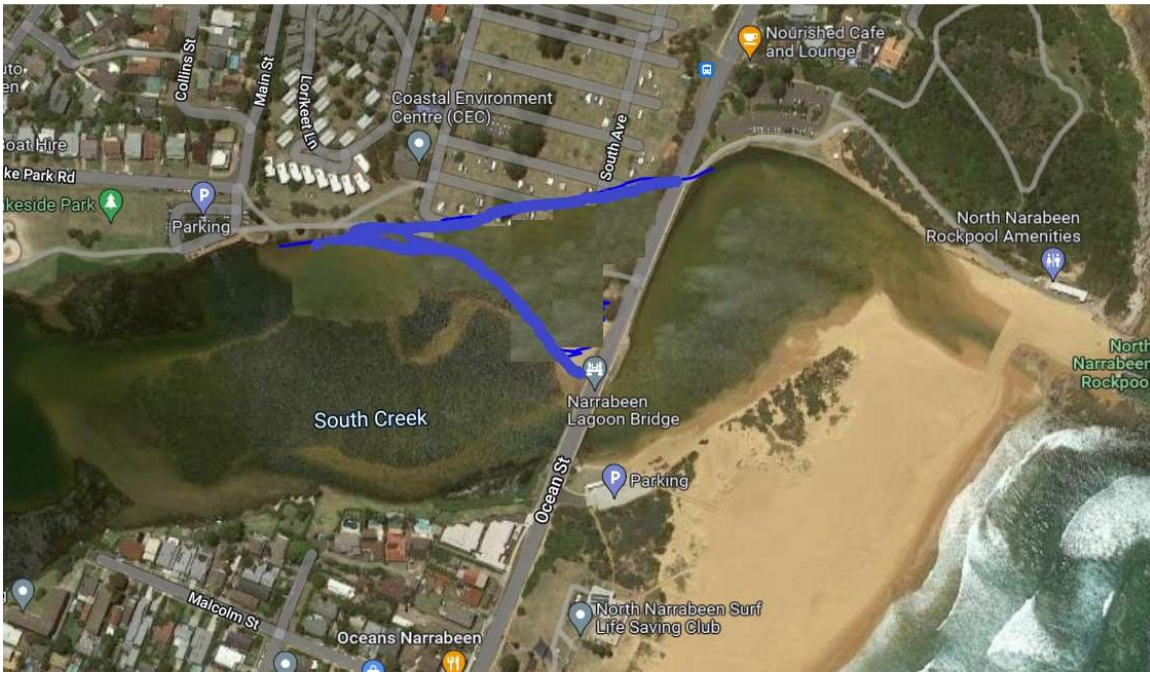
*Personal details and inappropriate language have been redacted where possible. Spelling and grammatical errors have been amended only where misinterpretation or offence may be caused.

	<p>No one would want scenes such as Lismore or Brisbane where lives and properties are lost.</p> <p>In my opinion the only solutions are a permanent dredge or dredging using the truck twice a year every year. The cost may be greater, but, the alternative as I stated above is far greater.</p>
4	<p>NOT the USELESS and UNUSABLE FLIPSNACK.COM software AGAIN!!!!</p> <p>This product makes your documents TOTALLY UNREADABLE!!!</p> <p>Please STOP WASTING TAX MONEY ON THIS JUNK!</p>
5	<p>I am diagnosed with schizoaffective disorder with a mild intellectual. I'm just a kind of person that tends to be integrated in that sense. As I just do what works best in circumstances.</p> <p>CLIMATE RESILIENCE PROJECT</p> <p>RE: The Importance of the Environment</p> <p>The environment is a matter which requires a long-term solution to save our planet. It is inappropriate that powerful industrialist is thinking too much about their own interests and it shows how short-sighted they can be. We all need to be educated about the facts of this issue. The world will be a better place for us all, in the long term to take an interest in the environment and promote the importance of our planet. The Government needs to plan alternative measures to off-set the unemployment resulting from coal-mine closures. The Kyoto Protocol has helped us come to terms with and consider the importance of our planet. I feel that there are alternative ways to provide employees with greener, more sustainable industries. The increase in the amount of ultraviolet sun glare and sea-level rise, plus the increase in bush fires, floods and catastrophic storms are known to be the result of human. Politicians and industrialist plus Business managers need to use common sense and come to terms with the need for activities sustainability practices. We need to live in harmony within the environment. We have to move forward instead of going backwards, to help benefit the environment. It is time to wake up. It is good now that China is getting its act together to reduce their emission. They are one of the big polluters that are having a serious impact. It is choking the air in Beijing and Shanghai. It is serious. Now it is good that they coming to terms to replace clean renewable energy. It is progressing. I am thankful. We have to be more sustainable, especially for the forthcoming generation that needs a better future, especially now that climate change is known to be caused by human activities. Over the years activities such as transport emission and burning coal have harmed the environment. There is no denial of this and it can't be ignored. We need to accept vehicles that operate on electric power are the way to go. It is a disgrace to most nations to pollute the environment. I would appreciate if you as elected US President, would work with other nations in the world plan to save our planet. I'd like to see plans for clean renewable energy which is healthy for the environment. We just can't afford to destroy the planet which is what a lot of industries are doing by encouraging more emissions. I believe we must clean up our practice, and combat global warming especially to help the forth-coming generations. I put in my last submission in 2014 concerning coal seam gas and land clearing to Australia former PM Tony Abbott, a submission of concern to save our planet. I am involved personally in conservation projects such as bush regeneration and sustainable programs plus recycling. I feel very strongly about our bushland, which I love, and clean renewable energy. We don't have planet B. I look forward to your response. Please notify me what action will be taken to handle this.</p>
6	<p>Thankyou for the extensive explanation. I fully support Council efforts to manage the lagoon to ensure the health and well being of anyone living near or associated with the lagoon.</p>
7	<p>restoring the original water course through the caravan park (subterranean or open with loss of some park) might be the only long term solution otherwise the proposed strategy options would have to suffice</p>

8	<p>Hi, as a resident of Narrabeen and a keen surfer at North Narrabeen for the past 35 years, I would like to make known my opposition to the draft proposal for the refurbishment of the ocean side of the Birdwood Park sand due.</p> <p>The reason for such opposition lies in the fact, that a larger, potentially steeper front - oceanside sand dune will increase wave refraction, causing ocean sandbank erosion which destroys the natural beauty of the sand banks and the surfboard riding enjoyment of all members of the community who enjoy this natural wonderland of world famous surfing breaks.</p> <p>Reduce the backside of the sand due to make the lagoon beach more user friendly, sure. No problem there but adding to the frontside is going to destroy the sand bank depth without a doubt. It has been 6 years since North Narrabeen has had any sort of shallow, high quality sand banks for surfing, and this was after the epic storms of June 2016.</p> <p>With the recent return of shallow sand banks and the potential for once again, high quality surfing experiences at the beach, due to the high unusual large east coast swell direction mid/end of April 2022, North Narrabeen finally, after the sand due and the beach were eroded, have now a very shallow slope on the beach front at the far northern end of the beach and thus, a stable and shallow sand bank foundation.</p> <p>Any attempt to build up this sand dune front will not only be detrimental to the preservation of quality surfing at North Narrabeen but a totally avoidable one, when all things are considered.</p>
9	<p>To be honest there is no discussion required as the small amount of dredging on the east side of the ocean street bridge worked 200% with all the unprecedented rain and large seas the entrance remained open and saved hundreds or thousands of homes from flooding.</p> <p>Even when flooding occurred it was short lived as it went down with the out going tide So big congratulations to NBC well done.</p> <p>Now it requires dredging on a regular basis and look at dredging the West side of ocean st.</p> <p>This will keep the flow resulting in open clean and pleasant lake and lagoon.</p>
10	<p>Approach seems to be considered and conscious of the various parameters that can contribute to the issue. Short and medium term strategies appear feasible whilst allowing the long-term strategy to be developed into a plan.</p>
11	<p>Hi</p> <p>We have lived at Mactier st for 40 years and have seen a great deal of the lakes ups and downs.</p> <p>We have read all the information provided by the council and found it very comprehensive - thank you.</p> <p>We agree with the strategy that you are proposing but we think you are missing one important fact. The sand is also coming from inside the lake and eroding the foreshore of the lake. Trees are falling, sand should also be put back to widen the foreshore.</p> <p>Another point that should be considered is making a sand levy along Mactier St to reduce the flooding. This road is a major artery for Collaroy plateau and causes a lot of problems when it is flooded. If sand from the lake entrance was going to be transported to Collaroy why not use it to build levies around the lake. This would also have the benefit of raising the lake level to help scouring and increasing traffic mobility and flooding of houses.</p>
12	<p>the ever-closing Narrabeen lagoon</p> <p>If you can stop the steady wind from the south-east blowing across Long Reef golf course onto Collaroy/Narrabeen beach - then you may stop the lagoon entrance from closing. The wind blows the waves onto the beach at an angle, taking the sand in the swash zone up and along the beach northwards, gravity takes the sand back down. The next wave takes the sand up and</p>

	<p>along the beach northwards, and so on - it's the longshore drift. And yeah, yeah, Queenslanders will like to boast of their gorgeous beaches, yes they are lovely, we can delight to reply, and they come from New South Wales.</p> <p>Though the low tide outpouring from the lagoon even cut into the back of the sand dune and on Tuesday 8th March 2022 by high tide around midnight the lagoon level had gone down, within days, the lagoon entrance was being filled by sand coming along from the south.</p>
13	After reading & watching the video's I fully support the N.B.C. Draft Management on Narrabeen Lagoon entrance.
14	Prior to Council merger to Northern Beaches council, the lagoon entrance was managed so that no flooding of low lying areas had happened since the 1980s. After the merger the management failed to keep the entrance open and flooding occurred to low lying areas resulting in massive increases in flood cover to some of those flooded areas affected. I would like this addressed as well as the now regular lagoon entrance management put into action. Long time residents are well aware of the issues of development along the beachfront and in the wetlands and dumping of sand at Collaroy that have contributed to the build up of sand at the Lagoon entrance. So the entrance is no longer self opening.
15	<p>I own a property in Wimbledon Ave which is often subjected to flooding. I have been a resident for over 60 years and have had the opportunity to witness the degradation of this wonderful waterway. Way back in the 1960's & 70's we used to waterski on the lagoon such was the depth of water. Back then the escarpments that feed into the creeks flowing to the lagoon were being developed with new housing built at a rapid rate. Sediment control was not a priority as it is today therefore it all ended up in the lagoon. For many years A. E. Biggs had a sand dredge permanently working in the lagoon which helped maintain the free flow and quality of water. Flooding of the Wakehurst Parkway (preventing easy access to the only Hospital we have north of Narrabeen) was not the issue it is today.</p> <p>My preference is for Council to adopt Option 2 IE:</p> <p>Mobile Sand Pumping: an alternative to trucking sand down the beach during an entrance clearance, this would see excavated sand fed mechanically into a mobile hopper as a slurry pumped through a permanent pipeline and then a temporary delivery pipeline for beach replenishment along Collaroy-Narrabeen Beach.</p> <p>I understand some would say this option is expensive however, I believe it will prove to be the most efficient and economic option when you extrapolate the current costs to householders, businesses and damage to infrastructure over the longer term.</p>
16	<p>Hi. If the medium term solutions are successful, do we need the long term solution?</p> <p>The recommended long term solution (sheet 4/4) is going to have a visual, aural and environmental impact on the beach and foreshore during both the creation and ongoing implementation.</p> <p>A successful trial of the "little and more often" medium term plan outlined (sheet 1/3) alongside Birdwood Park dune restoration (sheet 2/3). Could spreading out the frequency of sand transportation also reduce the concentration of trucks along the already busy Ocean St that currently happens?</p>
17	<p>I live in Collins Street North Narrabeen where risk of flooding via the Lagoon over filling is quite high. Weather the lagoon entrance is open or closed is a major factor in the risk of flooding in heavy rain events. Council policy is to mechanically open the lagoon when the water height reaches 1.1 - 1.2 m to avert flooding. I have seen many instances where this policy didn't work. Mechanically opening the lagoon doesn't instantly reduce the rainwater build up. It takes (on average) a full day for the mechanically opened entrance to widen and achieve a good rate of flow out rate. The lagoon needs to be opened earlier than the 1.1 or 1.2 m level.</p>

18	<p>As one born and raised by the lagoon and as a founding member of the Narrabeen Lagoon Committee, I am pleased to see the approach Council now takes to the Lagoon and its entrance. It wasn't always the case, with proposals in the mid to late seventies to fill in the lagoon for playing fields with a concrete canal from top to bottom.</p> <p>Chief among the daftest proposals was that the bedrock of the entrance be removed "to help it drain more quickly". It is pleasing to see that such ideas as these are no longer part of management currency. They must never again be seen as part of management.</p> <p>There is however one intriguing notion I'd like to see considered: Back in the 40's and 50's the spans of the old wooden bridge were very much wider than currently is the case and it seems to we locals that the opening and closing of the mouth was much less of a problem than today. Has widening and increasing of the number of the spans of the current bridge been thoroughly investigated ? Could such widening mitigate today's sand build up or would it increase its inflow ? A costly idea perhaps but much less so in the long run.</p>
19	<p>Go to Noosa and see how they keep the mouth of the Noosa River open and move the sand to the southern end of Noosa beach. Solar power could run the whole operation.</p>
20	<p>I have lived in the area for 70 years ...my recollection is the the entrance was opened each month..leaving a much healthier lake than exists today.</p> <p>I have expressed my view previously..you should be re looking at the whole lake...the sedimentation of the western sector...the dredging and sale of this sand...again leading to a healthier lake...and maybe a different flow of water at the entrance...a hydrographer could help there.</p> <p>Stop taking the dredged sand from the entrance and dumping it at Collaroy where the problem just starts again!</p>
21	<p>My concern is since 2015 (NN beach rotation) we have seen 3 significant inundations, of which at least one could have been averted with EARLIER openings of the mouth. Hence my concern is with your criteria of the Short term closed entrance management when ICOL is closed. Your criteria appear to be too strict resulting in a poor outcome for residents and shops. When an East Coast Low is forecast (or even remotely possible!) an early opening is required ie 3 days at least prior to the forecast event as it will take that long to lower the built-up lagoon level.</p> <p>In terms of a longer term closed entrance management, I would endorse the mobile sand pumping (Option 4 in your strategy). As always, the best strategy is to have the lagoon OPEN at all times!</p>
22	<p>An excellent video explaining the lagoon management. My property backs onto the lagoon and a few years ago it was flooded.</p> <p>In the recent storms the lagoon entrance was opened and even though we had a tremendous amount of rain there was no flooding. I think this proves that if the lagoon is opened at the right time there is no problem.</p>
23	<p>I don't know if Council are asking the wrong questions or getting the wrong advice, but this is the same erroneous bump that has been dished out previously leading to the same unsatisfactory conclusions and recommendations. Narrabeen Lagoon (unlike Manly, Dee Why or Curl Curl Lagoons) needs to be kept open to the sea at all times for recreational, environmental and flood-mitigation reasons. The only way to do this is to straighten the channel through the sand dune at Birdwood Park so that the ebb-and-flow channel can remain open by continuous scour. The current sweeping bend in the channel can only continue to deposit sediment as soon as the flow velocity drops. Council is just wasting ratepayer money by the continual, infrequent and inadequate removal of sand at the entrance. Get some proper expert advice and go back to the drawing board.</p>

24	<p>Narrabeen Lagoon entrance has been an expensive problem since the Birdwood Park dune was created after the May 1974 once in 100 year storm. If council is wants to keep the man made dune that serves no purpose apart from helping silt up the entrance, the best strategy is to lay a pipeline that carries pumped sand from the entrance to approximately Ramsay St Collaroy with exit points every second street back to Narrabeen St heading North and using the exit points where the sand is needed. An initial large expense but once in place only a need for dredge hire when required. Thank you for allowing me to offer a solution.</p>
25	<p>My feedback is that I strongly oppose: Retaining wall or low flow pipes.</p> <p>Also, use local contractors that know the lake! The previous job looked half-finished and rushed to open the lake up for summer peak in December.</p> <p>Thanks</p>
26	<p>The important thing is that the lake entrance is kept/forced open when flooding rain. The current practice of digging a channel when flooding is expected works relatively well but relies on council being aware and responsive as the weather conditions can change rapidly.</p> <p>Having said that, the permanent fix to keeping the lake open is to remove the unnatural 'S' bend at the mouth where sand is deposited as the water flow slows. I know this will not be a cheap exercise due to reclaiming some of the caravan park and extending the bridge. See the attached image. But I believe this is the only real solution to the problem.</p> 
27	<p>The Narrabeen Lagoon is a fantastic asset for the community ,which needs to be maintained as a healthy system for everyone to enjoy , from walkers to swimmers and fishing enthusiasts , the major sand dredging operations go on for far too long ,the workmen are rude and abusive if you go any where near the site and act if they own the lagoon , definitely feel more frequent shorter , smaller operations is the way to go for both the health of the lagoon and the least disruption to the local community.</p>
28	<p>I would like to see a permanent open access with appropriate sea walls similar to Narooma NSW. A Marina built East of Ocean street bridge and adjacent to the caravan park would be a massive result.</p>

29	<p>Hi. I'm not sure if this solution has already been evaluated, as I did not hear reference to the term in the video, so my apologies if it has already been tabled and considered.</p> <p>Would a groyne solve the problem of the sand washing into the lagoon? I suspect that some would say that this would simply move the problem further up the coast, but it may be less of a problem than the flooding currently experienced - and it may mean that sand clearance and relocation could be an easier/cheaper recurring task.</p> <p>A suggestion by [REDACTED], in response to my post about the use of groynes on the 2101 Facebook group was to trial a temporary groyne using sand bags instead of a more permanent manmade structure.</p> <p>Human nature tells us that any suggestion is going to meet with objection from 'the people'; but it is a fact that you "can't please all the people, all the time"....</p>
30	<p>My family had lived at Curl Curl for some 40 plus years. During that time we watched the Curl Curl lagoon decline to what it is today. Because the lagoon is higher than the ocean it never gets flushed out by incoming sea water/tides. It desperately needs to be dredged to remove all the silt which has built up over many years. Look at Narrabeen lagoon now and you can see the same thing happening. In time with the silt building up all the time and not being removed it will soon be higher than the ocean with no tidal flush !!!!</p>
31	<p>I have read the information and tried to understand the options. I understand the problems you are confronted with.</p> <p>I love that this area, as so many of us do, because of its natural beautiful- (which is very rare in a city as big as Sydney). Please do not destroy its natural beauty with an ugly break wall as seen in Port Macquarie, Nambucca Heads and Newcastle.</p> <p>The caravan park attracts many visitors to this unique and beautiful location, which we are very lucky to have.</p> <p>What ever your decision, please consider keeping it as natural as you can. The break wall and the sand pumping is not an option if we are to have some beauty left, and natural environment for birds and wildlife.</p>
32	<p>Please see attached document from North Narrabeen National Surfing Reserve committee containing feedback in regards to the Narrabeen Lagoon Entrance strategy</p> <p>Thanks and regards</p>

North Narrabeen National Surfing Reserve Committee
Contact: [REDACTED]

Submission to: Northern Beaches Council

Re: **Draft Narrabeen Lagoon Entrance Management Strategy**

Date: 15th June 2022

North Narrabeen National Surfing Reserve (NN NSR) was established on 17 October 2009 and is one of just 20 NSR's Australia-wide. The NSR status recognizes the world-renown quality of the NN surf breaks, the long association of the Narrabeen and wider community with the beach and surf, the NN SLSC having been established in 1912 and the NN Boardriders Club (NNBC) in 1964, and the desire to maintain the beach and surf breaks for future generations. The NN NSR is a gazetted NSW Crown Lands Reserve, with the reserve extending 500 m seaward of the shoreline and into the lagoon entrance as far as Lakeside Drive, as shown in Figure 1. The reason the reserve extends into the lagoon entrance is because the condition of and outflow from the entrance impacts the nature and quality of the NN surf breaks.



Figure 1. The North Narrabeen National Surfing Reserve boundaries. The reserve is a gazetted NSW Crown Lands Reserve.



Figure 2. North Narrabeen National Surfing Reserve plaque (Mayor Michael Regan)

NN NSR Committee consists of representatives of the NNBC, NNSLSC, Northern Beaches Surfrider, Northern Beaches Council and long term Narrabeen residents. The Committee represents the largest and most regular (daily) users of the lagoon entrance, beach and surf. Combined the committee members have decades of often daily interaction with the NN surf where they have observed firsthand the movement of the sand bars and impact of the entrance on sand movement and surf quality. The committee wishes to make the following submission to council with regard to the 'Draft Narrabeen Lagoon Entrance Management Plan'. The committee also thanks the council for arranging a MS Teams meeting with the lagoon consultant, Greg Britton, which clarified a number of issues with regard to the entrance.

The Committee supports the ongoing management of the lagoon entrance so as to minimize flooding and improve water quality, as well as the management of Birdwood dune. The

Committee members, some of whom have surfed Narrabeen for 50 years, have made the following observations of the entrance and sandbank behaviour. They have provided several constructive comments and suggestions as to how entrance management can be best achieved so as to minimise adverse impacts on the surf quality.

The committee has two key goals and that is to preserve and maintain the world class quality of surf at North Narrabeen and along the Narrabeen embayment and maintain public safety on the beach and in the inlet entrance and surf.

Lagoon entrance clearance:

- For the past 25 years the entrance has been mechanically dredged periodically (3-5 years) and the sand trucked to Collaroy. The Committee is opposed to this form of entrance clearance and sand distribution. It is unsightly, noisy, dangerous and substantially degrades the inlet mouth and community amenity.
- The sand truck movements are equally noisy, unsightly and dangerous and require the Collaroy streets where the sand is disposed to be closed during dumping.
- The lagoon entrance studies by Brad Morris then at WRL (see references below) indicate that the entrance refills with sand within several months of clearance. This results in the entrance being choked with sand the majority of the time, which the clearance is planned to minimize. The Committee believe the best long-term strategy is the use of a small permanent dredge and permanent pipeline as far as Devitt St, for disposal of the dredged sand as far south as Devitt St and beyond using temporary pipes. While the consultant report indicated the dredge-pipeline was a more expensive short-term strategy, we believe it is the most economical long-term solution and the one that has the least impact on the environment and community use of the entrance. It is also the successful strategy used for the long-term sand management on the Gold Coast and Adelaide beaches.
- We would like cost modeling to be performed for the use of electric pumping equipment which could be run on council owned renewable energy infrastructure and batteries. We would like to look at the viability of council deploying a solar array and battery on council land and or a tidal energy generator that can be used to generate electricity and run the pumps. We feel if you change the energy equation the cost of using electric pumps as opposed to diesel pumps or even trucking should come down significantly. Additionally any extra power could be fed back into the grid or used by council further lowering run costs.
- Another option, instead of pricing the entire pipeline from North Narrabeen towards South Narrabeen / Collaroy, look to deliver it in stages starting with the initial pumping outlet going a shorter distance (Emerald to Loftus street), this could be turned on in summer when the swells are predominately North East, longshore drift could move the sand naturally south from the outlet location.
- As part of any future entrance modifications, the committee requests hydrodynamic modeling be performed to show the impacts of the flow through the entrance and its impacts on the surf zone.

- We also recommend Lidar mapping of the current state of the entrance, Birdwood dune and surf zone off of the beach be performed as a baseline, as it will show that the sand banks are too far south. This can be used to document and assess the different entrance alignments and its impacts on the quality of the surf.

Berm management and breakouts:

- The Committee recognizes the need to mechanically breakout the entrance when a berm forms across the mouth and flooding is imminent. The Committee however requests that when this occurs the outflow on the seaward side of the berm be made as close to the rock pool as possible and as wide as possible. The reason for this is that the outflow transports sand into the surf zone and when the flows moves diagonally across the surf the sand bar that forms degrades the surf quality. This occurred during a 2021 World Surf League contest which was televised and streamed worldwide. Regrettably, the bar formed by the diagonally outflow truncated the famous NN left surf break, causing it to closeout, at a time when it was watched by millions worldwide all due to the direction of the entrance outflow– not a good advertisement for NN and an NSR. Both a broad opening and one close to the pool which minimize the risk of diagonal flow.

Birdwood dune:

The Committee recognises the need to maintain a vegetated Birdwood dune at an elevation of 6-7 m AHD to prevent sand being blown into the entrance and to minimize the potential for storm surges to penetrate into the entrance and threaten the Ocean St bridge and causeway. In the past few years the dune has deteriorated with a loss of vegetation and increased in height to between 12-13 m AHD. We feel the excess sand would be better utilised in the active surf zone contributing to sand banks to surf up and down the beach, rather than being trapped in the oversized Birdwood dune.

The Committee recommend the following:

- The dune be lowered to 6-7 m AHD
- The dune be fenced with fenced pathways providing beach access
- The dune be planted with primary stabilisers only. Initially *marram* and *spinifex sericeus* which will stabilize the sand and allow other primary species to establish, such as *cahile maritima* and *Austrofestuca littoralis*. The dune should not be planted with shrubs, such as *Acacia longifolia*, and when shoots of such plants appear they should be removed. The NNBC is available to voluntary assist with dune maintenance.

The reasons for this form of management are as follows:

The dune is a 'managed urban foredune' and requires a different type of management to the natural foredunes that occupy most of Narrabeen beach and elsewhere. People come to North Narrabeen to look at the beach and surf, not trees. Just go there anytime in daylight and you will see people checking and viewing the surf. When the dune gets too high you see them standing on seats and fences to try and see over the vegetation. We require the dune to be as low as possible (6-7 m AHD maximum). This is to allow the public, surfers and surf lifesavers to have a clear view of the lagoon entrance, beach and surf. In particular public safety is put at risk by a high dune for the reasons below listed by the Committee's NN SLSC representative:

- Unable to see the entire lagoon entrance from NN SLSC (as the dune is too high).
- Unable to see active surf zone from lower floor NN SLSC (as the dune is too high).
- Narrow lagoon entrance in storm events concentrates the flow of water making it run faster, which in turn is more dangerous for unwary swimmers, meaning that they very quickly get sucked out to sea.
- Dune height could lead to undermining or children being trapped under sand in the event the dune collapsed or were undermined.
- Dune height could lead to injury and litigation as quite often children are seen riding down them on bodyboards etc. (this is a new recent phenomenon due to the increased heights.)
- During large swells and rain storm events, North Narrabeen SLSC has to send 3 Patrolling members to the lakes entrance with rescue equipment and radios to monitor the situation, leaving the patrol short of numbers when monitoring the public swimming between the flags or even outside the flags. This issue has been more critical over the last few years due to the ferocity of a narrow opening accelerating the speed of the outgoing water from the lake catching many novice beach goers by surprise.

The mechanical lowering of the dune, with the sand returned to the beach and stabilising with primary species will achieve this outcome. It also needs to be pointed out that:

- Primary species are low and minimize visual impact
- They are designed to trap sand and thrive
- They can withstand wave attack, swash inundation and sand burial
- When eroded they quickly regenerate from natural dune and sea sources
- They naturally soften and dune scarps (cliffs) left by wave erosion
- They form an attractive low elevation sand cover which is the most effective sand trapper
- When the dunes have to be lowered mechanically they generate minimum debris

We oppose shrubs for the following reasons:

- They increase the visual height of the dune 1-2 m
- Unlike primary species they die when exposed to wave attack and cannot regenerate
- They trap rubbish and serve as a habitat for rats, hence the local term 'rat bush'
- The greater height blocks views of the beach, surf and public from the surf club
- When the dune is lowered the shrubs have to be separated and disposed of elsewhere.

In summary, the NN NRC Committee welcomes the council's draft lagoon management strategy. Our submission has been made with an aim to communicate the views of those who use the beach and surf daily, who are most familiar with the lagoon entrance and its interactions with the surf, who endeavor to maintain public safety on the beach, and who wish to see the entrance, beach and surf maintained in a way to benefit present and future generations of beach users.



Figure 3. Unveiling of the NN NSR Plaque (left to right Professor Andrew Short OAM, Hon. Michael Regan, Steve Reid, Brad Farmer.

Narrabeen Lagoon Reference List

- Morris, B.D. 2010 Infilling and sedimentation mechanisms at intermittently open-closed coastal lagoons. PhD thesis, The University of New South Wales, 187 pp.
<http://handle.unsw.edu.au/1959.4/45491>
- Morris, B.D., Turner, I.L. 2010. Morphodynamics of intermittently open-closed coastal lagoon entrances: New insights and a conceptual model. *Marine Geology*, 271, 55-66.
- Davidson, M.A., Morris, B.D., Turner, I.L. 2009. A simple numerical model for inlet sedimentation at intermittently open-closed coastal lagoons. *Continental Shelf Research*, 29(16), 1975-1982.
- Morris, B.D., Turner, I.L. 2009. Intermittently open-closed lagoon entrance morphodynamics: Infilling, stability and climate change impacts. *Proceedings of 19th Australasian Coasts & Ports*, Wellington, September 2009, paper 3.

Morris, B.D., Turner, I.L., Davidson, M.A. 2008. Monitoring and modeling of entrance sedimentation at an intermittently open-closed lagoon. Proceedings of 31st International Conference on Coastal Engineering, Hamburg, pp 2173-2181.

Morris, B.D., Turner, I.L. 2007. Rapid infilling of an intermittently open-closed lagoon entrance following mechanical clearance. Proceedings of 18th Australasian Coasts & Ports, Melbourne, July 2007, paper 48.

33	<p>Dear Sir / Madam,</p> <p>Firstly I would like to thank the council for a very thorough and complete analysis of the options relating to the Narrabeen lagoon; as a resident living on its southern shore (The Esplanade) I found it very informative and helpful — clearly a great deal of work has gone into producing this analysis of options.</p> <p>Your study highlights the ongoing impact of climate change and rising sea levels, and these will inevitably lead to greater variability in rainfall and flooding. I am supportive of Option #4 (putting in place an infrastructure so that sand slurry can be piped out of the lagoon entrance to Narrabeen and Collaroy beaches every 2 years). It stands to reason that if climate change over time increases the variability of rainfall levels and creates greater tidal fluctuations, we need to activate options which allow for more frequent (albeit smaller) excavations of sand.</p> <p>It is my belief that Option 4, while it may have a slightly greater up-front cost in terms of building the sand-slurry pipelines ... creates a lower long term “cost per excavation” which will be important if we find ourselves responding to more frequent and more extreme weather and tidal events. The testing phase also allows us to see this and prove it in the next few years before committing to final piping infrastructure.</p> <p>I am highly supportive of the program to vegetate the dunes near the entrance as a way to decrease the movement of sand — we should do this, and as quickly as we possibly can. I don't believe further studies are required here.</p> <p>However, I need more information on the concept of low flow pipes. I have little doubt that they reduce flooding risk (as they have in Manly and some other ICOLLs), but the impact to enjoyment of the lagoon, water levels, and biodiversity are not yet clear: it is my belief we need to implement option #4 and dune vegetation and assess their impacts before adding the substantial extra cost of permanent low flow pipes.</p> <p>Thanks for the opportunity to outline my position in the relation to the council proposal, and feel free to contact me at the below contact details should you wish to discuss this further.</p>
34	<p>The plans look feasible for a very difficult situation.</p> <p>My only additional suggestion which I cannot see in the proposal is that the Normal Level? of the lagoon be lowered a small amount to increase the buffer in heavy and prolonged storm events. This would give all parties a bit more time to react.</p>
35	<p>Excellent summing up of the pros and cons of whatever route the Council eventually goes down, personally I prefer the sand being pumped through the dunes thus avoiding the trucking job, but acknowledge the cost difference, and also keeping the lake open as often as possible. But if the Council promotes a tender for the work then an outside Contractor could feasibly quote a much lower price--maybe the Council could look at installing the pipes through the dunes and the Contractor pumping the sand as necessary.</p>
36	<p>It is obvious that all of the current ideas put forward will generate a continual cost to the Council and rate payers as they are just short term solutions. What is needed is a more longer term approach, that can provide not only cost savings but also better outcome for all. One idea I would suggest is to include control gates inside the low flow pipes idea. This way the council can control when water comes in or out of the lagoon and provides a way to refresh the lagoon at pre-determined time frames consistent with ecological studies. As an example, tides maybe bad due to large differentials on water levels, but if you open the gates before and after the peaks, then you get some flow of water replenishment without the peaks and troughs of the tidal maximums. Obviously during large rainfalls, the gates can ease the pressure and no need to bring in excavators to open up a channel. Only thing that this idea won't address is the collection of sand around the ocean side, but would certainly stop the build up of sand on the lagoon side as it would all be controlled by the pipes and control gates. Note those pipes and gates would need a clever design to capture and remove build up of sand around its exit/entry points.</p>

18 May 2022

Re: North Narrabeen National Surfing Reserve - Surf quality / sandbank alignment.

Council's last opening of Narrabeen Lake created:

- A narrow channel at the lake mouth.
- Result: a strong deep river-like flow which cut a 'hole' through the wave action sand bank. The effect of which moved the 'peak' surfing break some 50 metres south.
- Surf quality / length of ride reduced by up to 50% - Meeting at NN with Council representative (Adam Burrows) noted the effect.



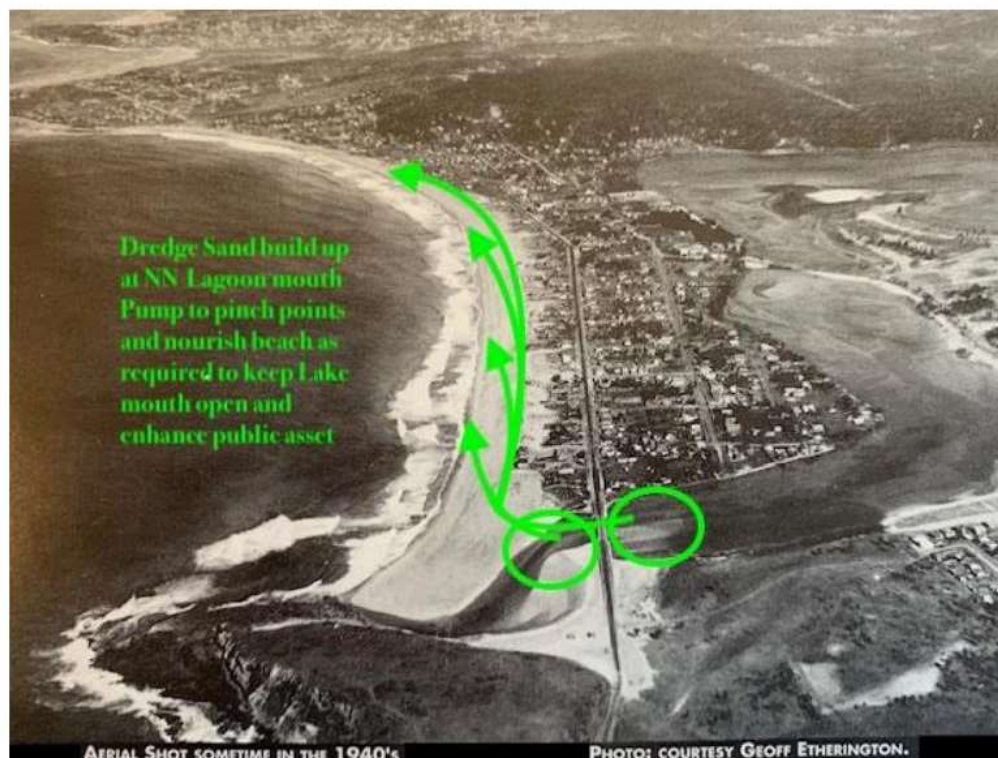
Storms and flooding during April eroded 30-40 metres off the northern end of the Birdwood Park dune. Increased water flow from the lake, returning the mouth to a more delta like wide/flat opening.

- The channel, cut in the outside surfing sandbank by Council's opening, was filled.
- Added sand in the wave action zone was sculpted by multiple swells.
- The peak of the NN surf-break moved northwards to align with the Point.
- Surf quality increased to the best surfing conditions for many many years.



Conclusion:

- i) A narrow-cut outlet heavily affects the wave action sand bank positioning and shape reducing surf quality
- ii) Reduction of Birdwood Park dune puts more sand into the wave action zone
- iii) A wide flat lake mouth, enable positioning of sandbanks for best surf quality
 - A wide flat outlet is historically the better outlet for optimal sand bank formation and surf quality.
- iv) Reduction of the Birdwood Dune and nourishment of the Collaroy/Narrabeen embayment creates sand slugs, subsequently providing multiple surf breaks.
 - Multiple, shifting sandbanks, create quality surf in the North Narrabeen Surfing Reserve as well as along the whole of the Collaroy-Narrabeen public asset.
 - Sand nourishment is key to not only maintaining the outstanding quality of surf and surfing in the Narrabeen North Narrabeen Surfing Reserve, but in the whole embayment.
 - A dredge / pump system would ensure Lake mouth opening and sand nourishment as required in the whole embayment.



- v) A singular point of contact to be created at Council ensuring direct and substantive discussion and communication at the planning stage of works.

38	<p>I have photos of the lakes entrance from the 1940's and there was no vegetation on a sand dune on the south side of the entrance of the lagoon. Standing in garden st, back then You could clearly see the surf breaking from the point toward the beach. Looking at the aerial photos now, shows clearly that the sand dune north of the surf club with it stabilising veg is stoping the natural sand movement and stopping the lake from emptying into the ocean! Nature knows best and by trying to hold sand with planted vegetation seems to cause more damage than it helps.</p> <p>Anyone who has lived around the lake also knows that dredging at the lake at the back part of the lake is needed after 50 years or more of silt from the area's development and its run off filling the lake in, so some parts are now barely knee height in depth.</p> <p>Hopefully this can help to solve the lakes problems !</p>
39	<p>As a long time (30 years) user of Narrabeen Lagoon, representation on the Narrabeen Lagoon Flood Study, a member of the Narrabeen Lakes Sailing Club and having presented a submission to Warringah Council on dredging of the Lagoon in about 2012 on behalf of the sailing Club I wish to lodge my recommendation for the maintenance of the Lagoon Entrance.</p> <p>As with the majority of submissions during the previous community consultation I support Option 4, the Mobile Sand Pumping once every 2 years.</p> <p>I believe this would be the best use of resources to both keep the Lagoon entrance relatively clear and the sand levels of Collaroy and Narrabeen beaches at a reasonable state.</p>
40	<p>Hello Council my question is without talking about cost what would be the best solution to this problem.</p>

Comments about the Draft Narrabeen Lagoon Entrance Management Strategy

Part A

Section 6 of the draft report states that the installation of a set of **low flow pipes** will not be pursued any further. The reason for this decision include a series of predicted problems, namely:

1. The accumulation of sand near the intake structure, blocking the pipes (Page 95)
2. The potential for sand being deposited inside the pipes (Page 95 & 105)
3. High maintenance cost of keeping the pipes free of debris (Page 95)
4. Loss of seagrass and reduced recreational value due to low lagoon water level (Pages 84, 96 & 113)

There are technical solutions addressing these shortcomings.

Item 1. The accumulation of sand near the intake structure, blocking the pipes

To prevent the sand settling too close to the pipe intake structure, one could install a set of strategically placed eductors (Fig. 1) and manifold with directional floor-sweeping nozzles (Fig.2). These would be activated on occasions when sand has accumulated and the free flow of water is being interfered with. The nozzles should aim towards the entrance of the pipes, generating adequate turbulence that flushes the sand towards the pipes (Attachment 1). From here the sand is forwarded further as described under Item 2.

Next to the intake structure, where sand of the berm builds up, an air activated fluidisation pipe would loosen the sand. Eductors would catch the sand and flush it towards the inlet of the pipes.

To avoid the fluidisation pipe being blocked by sand during down times, the air outlet openings should be pointing downwards and the pipe being filled with water immediately after the fluidisation has ceased. That would ease the start-up of the fluidisation air.

Item 1a

A considerably cheaper and simpler **alternative** to clear the sand from the intake structure would be an electricity-operating, remote controlled submersible robot, see Attachment 3. The robot can be operated by a radio hand controller. The sediment is pumped through a hose to a designated point of discharge. The technical data of such robots vary largely with different brands. Some robots work on deep sediments with pump capacities of up to 100m³/h. Such a robot could keep the natural flow channel open as long as it is not fully blocked.

Item 2. The potential sand being deposited inside the low flow pipes

Whilst sweeping the sand from the shoal bed towards the intake structure (Item 1), the moving sand needs to be flushed out to sea. To get the sand moving inside the low flow pipes, a smaller pipe, equipped with flow enhancing eductors is placed near the bottom, thus keeping the sand in motion and flushing it out to sea. To keep the motive water pump for the eductors as small as possible, the low flow pipes should be flushed one at a time while the remaining two pipes remain closed.

Item 3. High maintenance cost keeping the pipes free of debris

The maintenance cost of cleaning out the pipes, and the risk of debris blocking the pipe system could be mitigated by installing a self-cleaning, debris removing rake at the intake structure, (Fig.3). The rake system would be activated as required or at regular intervals.

Page 1 of 3

Item 4. Loss of seagrass and reduced recreational value due to low lagoon water level

To ensure that the lagoon level does not drop too low at periods of reduced inflow, an in-line valve could hold back or control the outflow, thus keeping the seagrass submerged and maintain the recreational value of the lagoon. At flood tides the valve could be closed to prevent additional sea water entering the lagoon.

The operation of the valves could be programmed, accounting for Sydney tide times, the actual lagoon water level and rain predictions.

Part B

When reading about the 3 low flow pipes and the expensive drilling work required, I thought that a large channel would be a simpler option. The cross section of the channel could be sized to suit the desired outflow requirements. The location of the channel should best be at the natural flow path, being parallel to the seawall.

To keep the channel free of sand, the bottom has to be swept clear of sand by flow inducing eductors. They should be activated when the sand accumulation in the channel is critical or when heavy seas are flushing sand into the channel. To optimise the sand flushing action the shape of the channel could be as sketched, see Attachment 2. The risk of losing too much lagoon water could be overcome by providing an adjustable sliding or hinged gate, somewhere along the stretch of the channel.

In order to reduce the pump size, the motive water pipe which is feeding the eductors would best be in a split flow configuration. A rough calculation of the sand flushing system resulted in following technical data:

- Water flow: 760 m³/h for 60 off, 6.3mm orifice eductors with a 7m plume
- Pump power: 162 kW
- Pump discharge pressure 520 kPag
- Two directional motive water pipes of DN 200, reducing in steps to DN 80

I think that the technical problems and high maintenance cost of the low flow pipe option can be improved by the subjects discussed above. However, besides the economics of the above suggestions, open questions remain:

- From which area to take the water for the motive water pump?
- Where to best place the debris removing rake within the intake structure?
- Will the evaluation of the Low Flow Option be re-opened?

I will follow further developments of the project with great interest.

Any feedback would be appreciated.

Note: I could not upload the attachments. Please email a forwarding adress. Thanks

Page 2 of 3



Fig.1 Eductor



Fig.2 Floor Sweeping nozzle arrangement

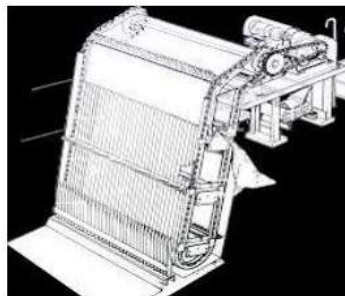
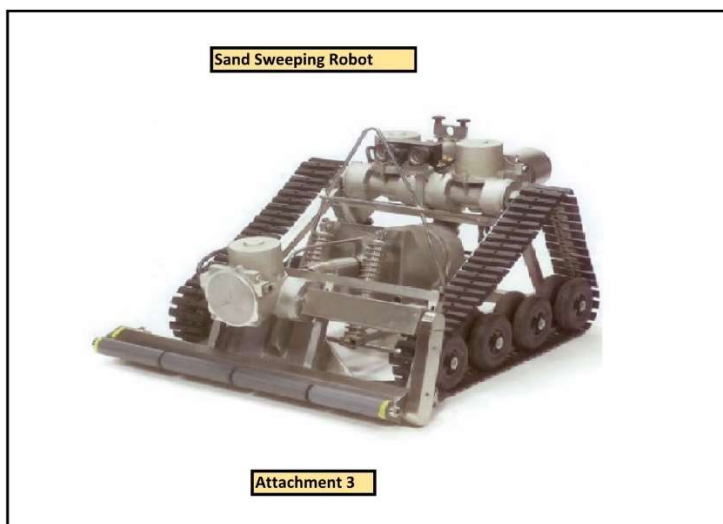
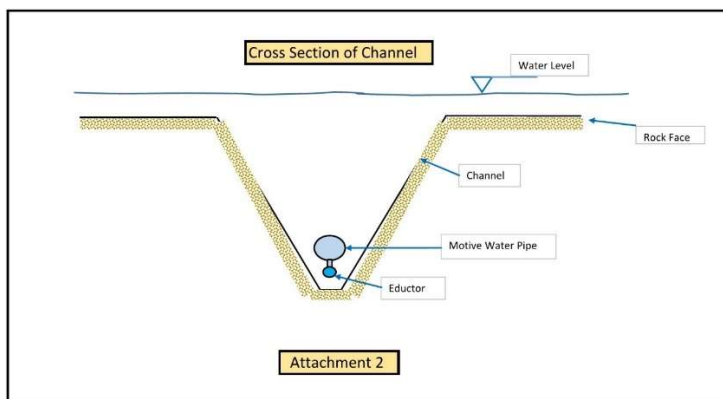
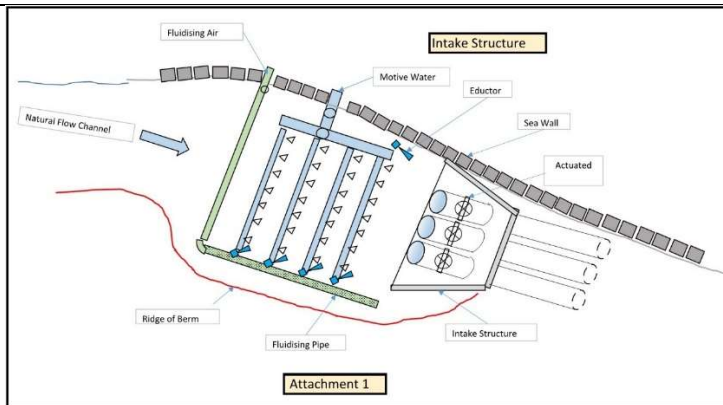


Fig.3 Debris Removing Rake



I want to add something to my comments of Part B:

The proposed channel will probably remain open for most of the time. For this, it may just stretch closer to the Ocean Street bridge where the berm building is less prominent. The intake structure would be simpler and the floor cleaning arrangement may be superfluous. The debris cleaning rack however would be required.

Submission to Narrabeen Lagoon Entrance Management Strategy

From [REDACTED] 19/06/2022

While your draft strategy is extensive and relies on many studies and observations it needs vision, big ideas and a better overview of how the entrance interacts with the total lake.

An aerial photo of the lake shows two major squeeze points caused by poor planning over many decades. The two bridges at Ocean St and Pittwater Rd. We know much of the lakes foreshores from the caravan park, Rat Park Pittwater Rd, Nareen Parade, Warriewood Square, Wimbledon Avenue, Wakehurst Parkway all the way to The Academy of Sport and the Cromer Golf Club are primarily fill, sometimes clean fill, sometimes garbage tips, all unnatural, man made shaping of our Lake. So to say it's a natural waterway is a stretch and to let it manage itself is denial of reality.

Attached to this submission is a photo taken by my father in the 1950's showing the vast sand banks stretching from the entrance, past Woolies Island, Big Island, Wimbledon Ave and the Central Basin. They landed planes on the sand banks.

So everyone, step back and look and think bigger.

The entrance flushing. The Ocean St Bridge, adjacent caravan park, beach and sand dunes force the entrance into an "S" shape, slowing water flow, allowing incoming sand to settle into and along the first one km of the entrance down to the football oval.

Solution: The Ocean St Bridge is due for renewal in the next 10-15 years. When it is renewed it should be substantially lengthened so the water flow area under the bridge is widened dramatically. This will reduce or eliminate the "S" shape of the flow channel, allow the water to flow in and out more efficiently reducing the sand banks at the entrance.

Costs: the Bridge needs replacing anyway so it will be budgeted. No land needs to be resumed as there is substantial land owned by governments/council on the northern side of the bridge all the way up to the caravan pedestrian crossing.

The Central and Western Basins: Again a brief look at the aerial photographs shows the lake has been substantially narrowed at the Pittwater Rd Bridge. This again reduces the flushing of the Central and Western Basins during tidal changes.

Solution: Pity you just spent 2.4 million on the Pedestrian Bridge. The Pittwater Rd Bridge is slated for replacement in the next 10-15 years. Again there is

substantial land on the northern side of the bridge to allow the new bridge to be longer and with considerable more widening of the gap under the bridge to allow better flushing under the bridge. All without resuming land or impacting on the Wimbledon Rd housing area. Budget wise it should be in the Roads budget to replace the bridge. The Wakehurst Parkway/Pittwater Rd Intersection can be upgraded at the same time.

Both these measures give back to the lake a more natural flow.

Vertical Walls: One of the unseen problems that is growing around the lake is the building of vertical walls at the waterline. A number of properties along the Wimbledon Ave interface have replaced their previous walls with vertical walls. The problem is vertical walls do not absorb the impact of wind waves they bounce them back. This results in a washing machine effect on the water with wind waves bouncing in various unintended directions. This greatly affects the amenity of the lake when paddling or sailing on the lake causing beginners and inexperienced paddlers to fall in in dangerous situations. This is similar to Lake Burley Griffin where it is almost impossible to paddle in the southern basin in high winds. Also the wave action undermines the unprotected banks on the opposite shoreline resulting in trees and rock barriers falling into the lake. Any changes to the lake at the entrance or elsewhere need proper-engineered wave absorbing construction. Any walls being built now need to be stopped.

Kayaking and lake Depth: I make this note because I don't think your engineers know about the required minimum depth for competitive kayaking on the lake. By way of background the lake has the following kayaking clubs Manly Warringah Kayak Club, Sydney Northern Beaches Kayak Club, Academy of Sport Kayakers. Plus at least two commercial operators hiring and training kayakers and ski paddlers. 15 local Olympians have been trained on Narrabeen Lake to compete for Australia since 1984. The recent Olympics had two Olympians from Narrabeen lake clubs competing. The minimum depth of water required to paddle a sprint or marathon K1/K2 or K4 Kayak without drag created by the underwater wave is 2 metres to the top of the weed. Each week, 52 weeks a year competitive kayakers paddle daily and train for World Championships and the Olympics on Narrabeen Lake. Water depth is gradually deteriorating as more silt fills the lake. This needs to be taken into consideration with any planning for the lake.

NOTE: The Narrabeen Lake has been called a LAKE a long as I can remember and at least back to the 1950's when my father built a house on Collaroy Plateau. Some latte sipping historians sought to change the name to Lagoon because it was "geographically" a correct description back in the 90's. However any TRUE local calls it Narrabeen Lake and all the historical photos and maps show it as Narrabeen Lake. Time to rewind history back to Narrabeen Lake.

Background: [REDACTED] is a Northern Beaches local having lived here since his father built a house on Collaroy Plateau in the 1950's. [REDACTED] is a resident of

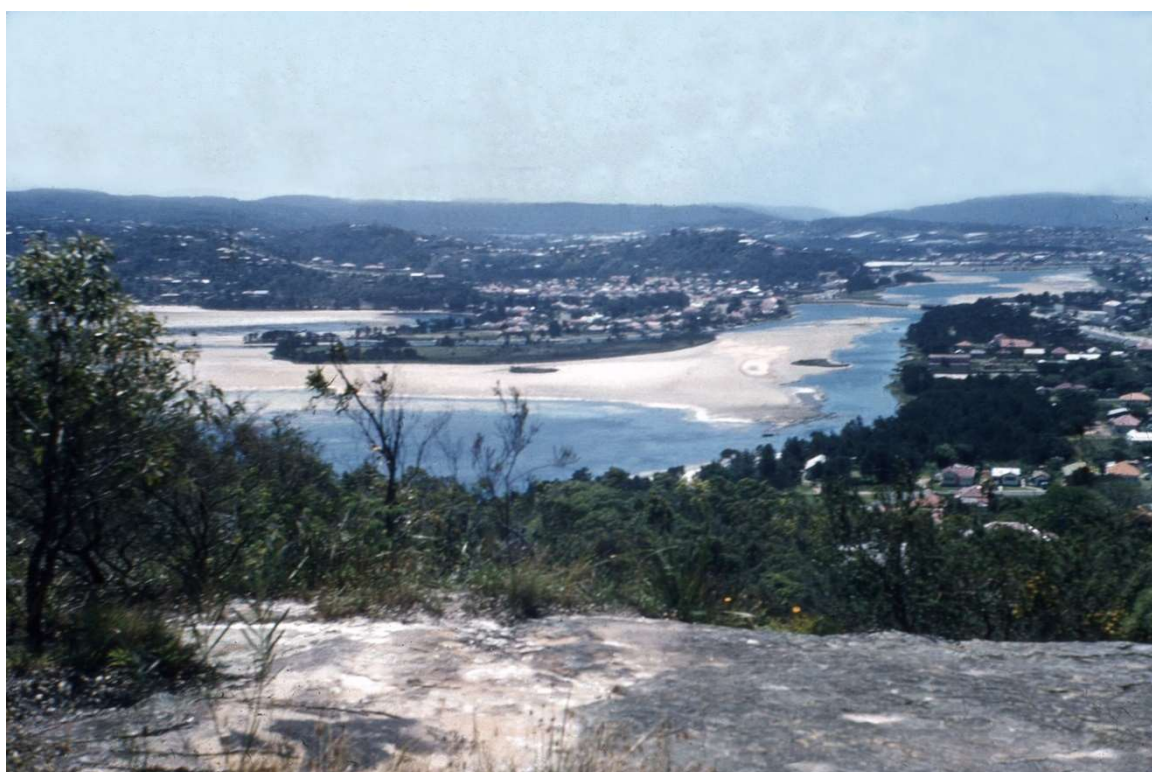
Newport and has sailed, kayaked and swum on Narrabeen Lake since a youngster (despite some of the pollution in those early years). He paddles regularly on the lake and competes at Masters level at State, National and International kayak events. [REDACTED] is a member of Manly Warringah kayak Club and the immediate past President of the club.
This submission is presented as a private submission.

Attached copyright photo of Narrabeen Lake. Permission is supplied to include the photo in NBC reports. Photo by [REDACTED].




[REDACTED]



4 pages including photo


[REDACTED]



B. Written/mailed submissions

Number	Submission
1	Short and sweet: The draft strategy makes perfect sense to me!
2	<p>Firstly, thank you for your open approach by engaging with the local community.</p> <p>It seems to me the essence of the problem lies with the reduced head of water due to lake siltation. Is sand harvest off the table? Can the lake be dredged? Could flood effected areas in the Narrabeen Basin be built up by the lake sand? Marine life must also be effected because the lake is now so shallow and therefore warmer and lower in oxygen.</p> <p>I know these are obvious questions that would have been asked before.</p>
3	<p>It seems incredibly obvious to me that the outlet from under the bridge to the ocean should be directly in line with the outflow under said bridge and not turning to the left and then out! I do believe the outlet used to run along the left of the surf club in years gone by. In the photos below you can see that the water is trying to exit on a natural path directly in front of the bridge.</p> <p>Please seriously consider this.</p> <p>You will constantly be fighting the sand if you don't follow the direction it naturally flows in.</p> <div style="display: flex; justify-content: space-around;">   </div> 

4	<p>I am a resident of the very north end of Collins St. The level of the lagoon affects us because we have an open stormwater drain at the rear of our house that flows directly to the lagoon. During the 2016 flood when the lagoon level reached around 2.2 m, water pushed back up this drain and flooded the rear of our property. This was understandable and more a consequence of the storm surge than high lagoon level from rainfall. In the recent floods of 2022, the lagoon seems to have peaked at below 2 metres yet our property flooded to about 2.4 metres on 3 occasions. We had water almost over our entire block. This has never happened before. The highest levels prior to 2022 were about to 2.15 which meant that only the very rear of the property flooded. I believe the drainage system around rat park and the Collins St, Caravan park area need to be increased to deal with the increased rainfall events we will experience with the effects of climate change. Will added drainage or improved drainage of the flood plain be a consideration for this draft plan. If not, can council address this issue?</p> <p>I have sent numerous reports to council with pictures of the floods and the drain. The drain in question either cannot cope with the amount of water or has some blockage that results in flooding. Below is a picture of the rear of 61 Collins St. In the distance, on the fence line is the blocked stormwater drain. Another image shows the drain on a fine day. The drain 'upriver' in the car park also blocks regularly. So the issue may be inadequate pipe size or numbers of pipes that allow water to drain to the lagoon. I believe this should be addressed as part of the bigger part of the lagoon management process.</p> <div data-bbox="300 831 681 1335">  </div> <div data-bbox="715 831 1090 1335">  </div>
5	<p>I have read with great interest Council's publication regarding proposals for management of the lagoon's entrance.</p> <p>With regard to the Short Term Proposals it appears that these have been restricted to matters relative to alleviating potential flooding problems only with little consideration given to the health and environmental problems associated with lengthy closure periods.</p> <p>In seeking comments and submissions in February last year Council commented on this matter and referred to the situation where the health of the Lagoon was severely adversely affected by this circumstance and mentioned that at one stage the entrance was closed for a period of four years. Many submissions were made to Council in regard to this situation.</p> <p>It would appear however that solving this problem has been overlooked and not considered in Council's Short Term Proposals. Once again "praying for rain" seems to be the only manner in which Council intends to address extensive closure periods problems. I consider that alternate remedies are available and made submissions in this regard last year in response to Council's invitation.</p> <p>If a sand berm was created adjacent to the Ocean Street Bridge utilising built-up sand in the location it would isolate the area downstream between the bridge and the closed entrance. Water could then be pumped from either the ocean or the upstream lagoon to raise the level in</p>

	<p>this isolated area. The volume of water in this location could be increased by raising the level to well above that of R.L. 1.3 currently required to effect flood control opening. R.L. 2.6 is the lowest level of the adjacent roadway and parking area. A water level approaching this height would therefore have no flooding effect on surrounding lands in this location. The level of sand across the entrance would also need to be raised to achieve this result. Once filled, the normal pilot channel method of achieving opening could be employed.</p> <p>Should it be determined (by either calculation or trial and error) that this will provide an insufficient volume of water for the purpose, consideration could be given to constructing the sand berm further upstream (and extended along the banks to prevent property and caravan park flooding) to a location where the desired result can be achieved. Following successful entrance opening the upstream barrier would be removed to allow tidal flows to the whole lagoon.</p> <p>I feel that some resolution to this aspect of the lagoon's entrance management should be incorporated in Council's current deliberations.</p> <p>Following my previous submissions I had a meeting with Council's officer ■■■ who indicated some interest in the concept however I understand that he is no longer in Council's employ.</p>
6	<p>This is a copy of part of a comment by ■■■ regarding the destruction of Nth Narrabeen. I agree with everything he has to say as I remember the flat entrance to the beach before the sand dune was put in place and started all the problems. His comments I have not included are about the curb & guttering of out iconic beaches. I believe if you remove the sand dune that was manmade lots of the problems will be solved.</p> <p>While the wall's appearance has been sudden, it's the latest chapter in a decades-old saga. Beach erosion along the Collaroy-Narrabeen stretch isn't a new problem, but what to do about it has been argued back and forth for years.</p> <p>So how did we get here? How long have you got? Maybe the place to start is at the other end of the beach at North Narrabeen, back in the 1970s, with another construction. Not a concrete wall this time, but a humble sand dune.</p>  <p>■■■, early morning session. The dune on which he's standing – that's where all the sand's locked up. It once was flat, now it's a little mountain. Photo: ■■■</p> <p>"The first alert was the '74 storm that took out a number of houses north of Collaroy at the pinch point where the open beach starts," recalls ■■■. The more pressing problem at the time wasn't beach erosion, but the storm surge that flooded Narrabeen Lagoon.</p> <p>"That night, you couldn't even get across the Ocean Street Bridge," recalls ■■■. "The surge from the storm travelled up the lake and flooded all the houses around Wimbledon Avenue, which is a good one-and-a-half to two k's up the lake."</p>

	<p>The entrance to Narrabeen Lagoon in 1974 looked very different to how it does today. The seawall on the north side of the lagoon entrance had only just been built.</p> <p>The original sand-flow of the beach and lagoon, however, was largely still in place. The mouth of the lagoon was a flat, wide sandbar. "We used to play touch footy on there," remembers [REDACTED] "It was dead flat... so flat they used to land bi-planes and do joy fights there in the '20s and '30s."</p> <p>The '74 flood prompted the local council to build a head-high sand berm at the lagoon mouth to protect the lagoon from another storm surge. It was a modest bit of coastal engineering, but, as [REDACTED] puts it, "that was the beginning of the problem."</p> <p>"Prior to that, the sand was moving quite freely along the beach with the longshore drift. The southerly storms in the winter and then northerly swells in the summer moved it from one end to the other and everybody was reasonably happy. That was also when the surf was the best, through the '60s and '70s."</p> <p>Erosion remained an ever-present problem down the southern end of the beach at Collaroy and South Narrabeen, but the volume of natural sandflow along Narrabeen beach afforded fairly reliable protection.</p> <p>The problem arose, offers [REDACTED], as "dune stabilisation became de rigueur at the northern end of the beach. The planting of bitou bush and pathways and walkways and poles in the sand every 50 metres. The bushes grew and they trapped more sand. Onshore winds pushed sand into the bushes, but of course the westerlies through winter weren't strong enough to blow it back out."</p>
7	<p>Hi [REDACTED], Hope your well and all is good. In the last major flooding event we almost got flooded again (pics attached) This even with the entrance open and previously dredged. If the tide had been coming in we would have been flooded hence my passion about this subject. We remain fairly frustrated that simple, fundamental strategy keeps getting overlooked. While the dredging was a sound move, a lot sand was left along the northern wall (even a little beach) and at the bend of the wall it was shoaled and shallow with little velocity of flow so that even through the big Christmas tides the lagoon never really properly flushed. We know this simply because we would swim every day out the front of our house near Narrabeen St prior to the onset of excess rain & the water never really cleared. When the rain patterns established culminating with the major flooding event the levels were already high and the surrounding water table saturated. Since the flooding event the lagoon has eventually and continually scoured down to the rock along the northern wall. This is the channel as dictated by the natural path of least resistance. Please for any future dredging which seems most effective (& cost effective ?) it would seem reckless given the weather extremities now becoming almost normal not to maintain and maximize from North to South this natural channel along the wall. Factoring in a worst case scenario due to climate unpredictability we'd say Council now has little choice but to maintain the entrance as open and as deep and fast flowing as can be achieved. This at least will enable the constantly saturated water table that is mostly the whole of Narrabeen to reduce. Again we reiterate from previous correspondence we are not at Windsor. If our water table is not saturated when have another major weather event a well opened entrance should allow the lagoon to clear and greatly mitigate flood risk. We have just become a members of the surfrider Association and were asked by friends who are in decision making positions with surfrider our thoughts on entrance management. This was something they hadn't yet given concerted thought to. I directed them to read the Narrabeen Lagoon Entrance Management Strategy. We have supplied them with all our correspondence with you and council over the years for their consideration and contribution. We know we are not the only voices that are now asking that some simplicity be applied first by council to the Narrabeen lagoon entrance management plan. Having read all the options and deliberations covered in the Narrabeen Lagoon Entrance Management Strategy which is very thorough, it may be worth trying the simplest and cheapest option first. What do you reckon ?</p>



8

I support the exhibited Management Draft and in particular these following aspects which proposes a variation to the long standing practice of periodic removal and southward relocation of infill marine sediment, for the dual purpose of enhancing Flood Mitigation and Lagoon Water Quality.

I note the success of the recent operation which utilised a diesel driven waterborne dredge pump. I make the following observations/suggestions for consideration.

* I support the process of pumping dredged sand back onto the beach to a point at least southwards of North Narrabeen southern car park and thereby eliminating the various costs involved in winning, transferring and trucking the material.

* I note and support the proposed method would in future conduct by replacing what was previously a four/five year cycle, into smaller but more frequent clearance cycles to occur over shortened time frames in a quickened response to the variable rates of infill.

* The cost/benefit of direct pumping will, if endorsed by Council, in part be governed by the elapsed time involved in each clearance operation as it occurs.

* Energy cost (ultimately to be borne by NB Council) of running the dredge pump could optimally be reduced by employing a more efficient implementation of best dredge practice. i.e. in terms of ratio of sediment / transport water in the delivery pipe, usually assumed to 75% sediment to 25% water. Also dredge pipe hydraulic efficiency is also factored by pipe diameter (the larger optimally the better) and length (the shorter the better), pipe bore roughness, avoidance of unnecessary bends and kinks; all of which should be considerations within any subsequent tendering process. (vide Darcy-Weisbach Formula).

* These contentions may be worth the investigation as also the installation at about 2.5m AHD through the sand dune to form a transition piece for ongoing (almost) yearly infill sand removal operations.



9	<p>The report was informative and but after reading the Comment by [REDACTED] there seems that there is a "TIME DELAY" in achieving some of the "Improved Beach /Surf Break Solutions".</p> <p>This COST is SIGNIFICANT ? BUT its cost may be Part Funded by NSW STATE GOVT.</p> <p>Within the Northern Beaches Entrance Strategy the detail solution could include a series of Technological Change and innovation.</p> <p>So the Report is SUBMITTED "in-Confidence".</p> <p>The Statement that Northern Beaches Council is facing a "CLIMATE EXTINCTION" in 2019 seems to imply that a MORE SIGNIFICANT "FIX" should be already be "COSTED" into the "STRATEGY".</p> <p>The example of the GOLD COAST having funded a Superbank by circa 2010, seems to imply that the NORTHERN BEACHES is perhaps 10 years plus BEHIND.</p> <p>The Lismore Area FLOODS have Created a 500 year flood EVENT. This is a "Challenge" that may have been not fully understood "before the event". So this is a "Challenge" to find a solution that can "Flush out the Lagoon" and "protect it from Ocean Storm Attack" and help recover the Marine Life in the Coast and in the Lagoon.</p> <p>The "Solution" may take "Product" from the range of SVC or Similar Supplier worldwide. This could include an innovative solution to increasing the Marine Greenery and Seaweed. See separate sheet for attachment to submission.</p>
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Narrabeen Lagoon Entrance Management Strategy -

- **Email:** council@northernbeaches.nsw.gov.au

As outlined in these FAQs, Council opens the entrance of Narrabeen Lagoon when it is at or above 1.0m AHD (equivalent to mean sea level). At this level there is sufficient flow of water as it drains to scour the sand in the entrance and overcome the level of the next high tide.



Monday, 5 March 2018

Council often receives enquiries about how we manage Narrabeen Lagoon. It is the largest lagoon in metropolitan Sydney with a catchment bounded by Warringah Road, Forest Way and Mona Vale Road. The lower part of the catchment, particularly around the lagoon, can flood whether the entrance is open or closed. Below are some brief questions outlining why and how Council manages the entrance of the lagoon.

Why does Council open the entrance at Narrabeen Lagoon?

Lagoon entrances will open and close naturally depending on how much rainfall has occurred and how much sand has accumulated in the mouth. Council opens the entrance of the lagoon when water levels rise and reach specific levels, this allows water to drain from the lagoon and helps maintain an open lagoon entrance. The two separate ways that Council open the entrance are described further below.

When and how does Council open Narrabeen lagoon?

Council opens the lagoon in one of two ways:

1. **Sand Clearance:** When there are very large accumulations of sand both in front of Ocean St bridge and in front the Caravan Park, the entrance will often close and stay closed until the sand is removed and placed on Collaroy-Narrabeen Beach. This process happens every 4-5 years, with the last one being completed at the end of 2016. The timing of the works is based on the amount of sand in those two locations and if it accumulates more or less than anticipated, Council will change the timing of the works.
2. **Channel Opening:** In between these big projects, the entrance will usually stay open as long as there is regular rainfall and/or no build-up of sand into the mouth of the entrance. If it closes and doesn't need a sand clearance, Council can dig a short channel at the entrance when the water level in the lagoon gets above 1.3 metres above sea level. While it can be opened slightly lower (between 1m and 1.3m), this will only work with significant outflow from the lagoon (eg with a lot of rainfall). If the water level is not high enough, it won't flow down to the ocean fast enough to clear sand and stay open beyond the next tide.

How does Council monitor rainfall and water levels?

Council monitors the water level and lagoon entrance conditions through site inspections and digital water level recorders, which are publicly available at [Northern Beaches Flood Information Network](#). We also monitor rainfall through that website along with advice from the Bureau of Meteorology, and Manly Hydraulics Laboratory at Manly Vale.

- ❖ *Council manages the entrances of the lagoons to reduce the risk of flooding to surrounding properties. Once the water in each lagoon reaches a specific level, Council mechanically opens the entrance to let the water drain into the sea.*

The opening levels for each lagoon are:

- *Narrabeen Lagoon 1.3m AHD*
- *Dee Why Lagoon 2.2m AHD*
- *Curl Curl Lagoon 2.2m AHD*
- *Manly Lagoon 1.4m AHD*

RESPONSE :: The Report is Good , but considering that NBC has claimed a “CLIMATE EMERGENCY” there is SCOPE for increasing the OPTION to use SAND PUMPING from the existing lagoon.

The report is done with the assistance of a Consultant Group that has expertise in Gold Coast, Queensland.

I have only Scanned the document, and found that septic tank overflow had affected “Water quality” in past.

So the Effect on Native Fauna could have been “Significant” along with the “DEFECTIVE URBAN PLANNING” that “FAILED to protect adequate Wildlife Corridors thru a largely Urban Landscape”.

The area has an increase in URBAN DENSITY with single story HOLIDAY HOUSES changing to 3 storey high apartment buildings, with “LESS SPACE” per resident. So clearly the “VALUE GROWTH” thru Urban Density, could have also “increased the Coastal Erosion, and Lagoon Ecological Functions”.

The Gold Coast Area was affected by a series of Cyclones eroding its Beaches, and reducing the length of Surfboard rides, thus “ threatening the Tourist Economy”.

Claiming in 2019 that the LGA has a “Climate Emergency” seems to imply “Greater and Faster Action” but the Gold Coast example seems to provide an example of “Studying the Sand filling the Entrance to the Tweed River, then “Funding the Sand Extraction of the River Mouth” using a Slurry sand PIPE (like a Concrete pump tube?) to OUTLET POINTS on the Southern Gold Coast). The result is now the Site is a FEATURE in the Surfing World Tour. The Snapper Rocks to Greenmount Wave was just 200 m verse the SUPERBANK (Maximum of circa 1800 m)

The last appendix item features a Large Wave location that is circa 800 m off-coast of Oregon, West Coast USA. The impact of LARGE WAVES on the COASTLINE seems to be able to be “Reduced” by REEFS. I think I have seen large 10 m high waves off Long Reef in a Southerly Storm.

THE TERRY FITZGERALD comments

The North Narrabeen Beach is now a National Surfing Reserve, but Terry claimed the length of the Surf Board ride had decreased, perhaps by 50%.

But the Kirra Beach now has the Super-bank and a “Surf Contest Site”. (Compare the before / after Superbank and the length of the

So the importance of creating a high quality point break at North Narrabeen may be justified by “SURF ECONOMICS” supported by the WSL Tour.

The old North Narrabeen Beach had a CLOSED entry to the Lagoon, and periodic releases. This is shown in the photos by Pittwater Online.

So the “By-pass” at the Point may be “Defectively positioned outlet to ocean” (for best beach break solution?).

Terry Fitzgerald and other expert surfers may be able to “Critique” the topic.

Comment by TF.

There’s a reason it’s half of what it used to be and that’s because the beach has been stabilised to the point where the dune now controls the amount of sand that’s actually in the wave action zone.

SO HOW TO FIX the SURF BREAK ZONES and still have a functioning opening, and “adapting to forecast Sea-Level Rise of circa 100 mm to 900 mm. (so the opening of the Lagoon will have a height of 2.30 m above sea level (2018 era ?)

COMMENT – not by TF

The non-Truck Movement of Sand for Beach Nourishment method mentions the potential problem of PUMP LINES in the front dune, so the alternative is a permanent PUMP LINE of circa 1700 m., and relay PUMP POINTS to exceed the 1700 m limit. And use the Nature Strip in OCEAN STREET.

In a decarbonized world where the Local Govt says there is a Climate Emergency, the PUMP OPTION should be considered in greater detail, and HOW surf breaks can be “maintained”.

Historically the Georges River entrance was excavated with the sand dumped off Cronulla Beach but it was possibly “dispersed”. (But the increased off-shore sand bank improved the Wave Conditions within Cronulla).



Perfect Fiji: “Think That Was The Best Wave Of My Life”

COMMENT - Terry Fitzgerald – 2013 -era

Aboriginal middens are scattered in the lee of the headlands. The lake provided shellfish and easy fishing at its mouth, the marshes provided birdlife and marsupial tucker. Folklore has it that a young native girl swam the lake neck to save white settlers from a cabin fire. In her honor the area is named -- Narrabeen.

The Northern Beaches of Sydney were once a single community stretching from Manly to Palm Beach. A focal point since the '60s for an innocent surfing fraternity spread over more than 30 beaches, reefs and points that, at any given time in those formative years, had more magazines, filmmakers, photographers, shapers, factories, pro surfers and surf journalists than any 30k stretch on the planet -- including the North Shore of Oahu.

Comment - TF – 2021- era



The 1974 STORM EVENT caused a storm surge that flooded Narrabeen Lagoon.

“That night, you couldn’t even get across the Ocean Street Bridge,” recalls TF. “The surge from the storm travelled up the lake and flooded all the houses around Wimbledon Avenue, which is a good one-and-a-half to two k’s up the lake.”

The entrance to Narrabeen Lagoon in 1974 looked very different to how it does today.

The seawall on the north side of the lagoon entrance had only just been built.

The entrance to Narrabeen Lagoon in 1974 looked very different to how it does today.

The original sand-flow of the beach and lagoon, however, was largely still in place. The mouth of the lagoon was a flat, wide sandbar. “We used to play touch

footy on there,” remembers Terry. “It was dead flat... so flat they used to land bi-planes and do joy fights there in the ‘20s and ‘30s.”

The result of this over two decades? “The North Narrabeen dune went from a metre high to something like eight or nine metres. In setting up the North Narrabeen Surfing Reserve, then Council assisted calling for public input, ‘this is fantastic, we’ll turn it into a proper reserve’. They hired landscape architects and consultants to look at the beach. The next thing we know we have a proposal for a beach promenade through the dunes so people can enjoy the foreshore and look at the lake opening from the safety of the boardwalk on a sand dune that shouldn’t be there.”

The reduced sand-flow into the bay would in time create a problem down the beach with erosion, but there was also a concern for surfers at North Narrabeen.

“The wave today is actually half of what it used to be,” says Terry. “The Alley Right is 50 yards shorter... The lefts don’t break from next to the point down to the other side of the carpark, another 100 metres. I think the last time I saw it like that was 30 years ago. There’s a reason it’s half of what it used to be and that’s because the beach has been stabilised to the point where the dune now controls the amount of sand that’s actually in the wave action zone.

“You’ve got a situation where all the beach is stabilised. All of the sand that used to be out in the bay in the wave action zone is now locked up in the dunes, with a subsequent deterioration of not only the surf at North Narrabeen, but the

movement of sand slugs up and down the beach, creating waves and 'protecting' properties."

RESPONSE :: (not by TF)

- ❖ So what is the "SOLUTION" to fixing the "Shorter Breaks"?
- ❖ BUILDING a "Sea Wall" on the Southern Side is not supported.
- ❖ Is the Water flow thru the Northern Bi-pass needing a "review"?
- ❖ What can be "adapted" from the Gold Coast SUPERBANK?
- ❖ The boast the solar stage-lit, ruler-edged lines of the Superbank
- ❖ *Beach nourishment was the next option.*
- ❖ *"One proposal was to put a dredge at the mouth of Narrabeen lake and run a pipe under the dunes all the way down to South Narrabeen and Collaroy with four outlets along the way. Every time the lake was blocked or South Narrabeen needed sand you just flicked the switch and pumped sand down the beach.... look what that did for the Superbank!"*
- ❖ ***SO this Sand Dredging and Pumping OPTION NEEDS to be "reviewed" and put it in North Narrabeen FUTURE WORKS as it has helped in Gold Coast.?***

- ❖ **Sydney Surf Pro set for world class waves of North Narrabeen in 2023**
- ❖ This provides a "Reason to improve the SURF SPORT LOCATION in North Narrabeen" perhaps using "Sand Pumping"?



L-R Surfing NSW CEO Luke Madden, local up and comer Kyla Whitfield, Surfing NSW Board member Harry Hodge, 2x World Surfing Champion and North Narrabeen Boardriders President Damien Hardman at North Narrabeen for the announcement

We're excited to the partnering with the World Surf League (WSL) and Destination NSW to host the popular Sydney Surf Pro Challenger Series (CS) competition through 2024.

The partnership will see the return of one of professional surfing's most iconic locations in North Narrabeen. Home to legends such as Simon Anderson, Nathan Hedge, Laura Enever, Terry Fitzgerald, and Damien Hardman to name a few, the high-performance left-handers of North Narrabeen have hosted dozens of professional events over the last four decades. This new partnership will see it sit as an annual fixture on the WSL calendar for the first time in over 10 years.

- ❖ *The SYDNEY SURF PRO does not form a SIGNIFICANT MENTION within the North Narrabeen Lake Entrance Study.*
- ❖ *The "AFFORDABLE ACCOMODATION" for surfers within the Northern Beaches area may now require "URBAN PLANNING ATTENTION" from the Local Council.*

What makes Narrabeen different?

Narrabeen might not have the totemic cliffs and atmospheric bowl of Bells at Easter. Nor does it boast the solar stage-lit, ruler-edged lines of the Superbank. But what it does boast is history, an ingrained competitive edge, and a passion for professional surfing that few locations can match.

[Rip Curl Narrabeen Classic presented by Corona](#)

Why North Narrabeen Remains An Important Piece In The Pro Surfing Puzzle

Share

Ben Mondy

Monday, February 22, 2021

When North Narrabeen was [announced as a new Championship Tour venue](#) it was as if a well-worn jigsaw piece had been dropped back into the professional surfing puzzle. Narrabeen might not have the totemic cliffs and atmospheric bowl of Bells at Easter. Nor does it boast the solar stage-lit, ruler-edged lines of the Superbank. But what it does boast is history, an ingrained competitive edge, and a passion for professional surfing that few locations can match.

It was at Narrabeen that that 1974 Coca Cola Surfabout competition provided a significant spark that ignited the nascent world of professional surfing. With its \$7,000 in prize money the event was labelled as "The World's Richest Board Contest."

It generated unprecedented media coverage, and with a multi-round format and a still-new "objective" scoring system, introduced competitive ideals that remain today. Michael Peterson, then the best surfer on the planet, won riding a 6'9" self-shaped, single-fin known as the Moonrocket, Fangtail, or, because of its multi-flyered pintail, the Christmas Tree.



Two-time World Champ Damien Hardman, aka The Ice Man, right at home at North Narrabeen. - WSL / MATT DUNBAR

Back then, as of now, it was no surprise that Narrabeen was chosen for the location for a new era in surfing. It has remained Sydney's most dynamic and consistent beachbreak. The rivermouth lefts offer the best quality waves, but the rip bowl Alley Rights and slabbing shorebreak at Carpark Rights offer variety in different swells. It was a combination that created a hot-bed for talented, aggressive, creative and insanely competitive surfers. That hasn't changed.

The event ran continuously from 1974 to 1999 and throughout the '70s remained the world's richest surf competition. Even during the '80s and '90s, while it lost that title, it was still embedded in the professional surfing psyche.

This was helped by it often being broadcast live on national Australian TV. In an era long before live webcasts, the effect this had on a generation of Australian surfers cannot be understated. Surf fans then were forced to sup on rare, tiny morsels of surfing that came at the end of a news bulletin sports segment. Then, suddenly the roping, left-handers of Narrabeen were beamed into the living rooms all over the country for an entire Saturday afternoon.



One of Narrabeen's more recent stars, Laura Enever, who won the 2010 World Junior Championships on her home beach. - WSL / ETHAN SMITH

The sight of Damien Hardman, Tom Carroll and Tom Curren flashing across the idiot box in a blur of neon neoprene will be forever lodged in the generation of surf fans who had their eyeballs glued to the action. As their dads asked furiously why their normal footy match wasn't on, Narrabeen was further being etched into the DNA as a fundamental pillar of professional surfing.

And it wasn't just the Coke Classic that anchored that platform. The beach hosted the Pro Junior from 1977, a groundbreaking event that acted as the pre-eminent crystal ball into the future of surfing for 15 years. That was best illustrated by the 1992 Final between Kelly Slater and Shane Dorian. The return of the ASP World Junior Championships in the 2000s therefore made perfect sense, as did Narrabeen's elevation to a National Surfing Reserve in 2009.

Away from competition Narrabeen's local surfers kept the beach firmly in the spotlight. CT surfers Greg Day, Greg Anderson and Damien Hardman had grown up under the tutelage of 1970s stars like Col Smith, Mark Warren, Terry Fitzgerald and Simon Anderson. That crop in turn oversaw the rise of the Bannister brothers, Nathan Webster, Nathan Hedge (see below at home) and Chris Davidson. More recently Davey Cathels, Laura Enever, Cooper Chapman and Jordy Lawler have been flying the Narra flag.

"WSL is extremely proud to be returning to North Narrabeen and continuing this location's strong lineage with professional surfing," said WSL APAC General Manager, Andrew Stark. "Having held a one-off CT event at North Narrabeen earlier this year and seeing the incredibly positive response from the local community, not to mention from the world's best surfers, it made total sense to put this location back on the schedule as an annual fixture and back on the world stage where it belongs. Locking this event in for the next three years is a massive achievement and we'd like to thank our hugely supportive partners at Destination NSW and The Northern Beaches Council. Without their support, important events like the Sydney Surf Pro wouldn't happen."

❖ Terry Fitzgerald - HOT BUTTERED Surfboards

Never anything but individual, Terry Fitzgerald emerged at the start of surfing's true pro era -- the '70s -- and played a key role in finally pushing high performance way clear of the sport's longboarding roots and into the realm of the power carve. In his prime, he's represented the peak example of the "total surfer" -- a man who could ride any wave, anywhere, on his own equipment, without compromise.

Born in Sydney, Fitzgerald grew up playing rugby football and learning to surf at Maroubra Beach. Later, his family moved to Sydney's northern beaches, near Narrabeen, where he quickly made a reputation as a brilliant, flamboyant surfer who played by his own rules -- willing to try anything if he felt it might advance his skills. Late in 1969, he moved to Queensland briefly to join the Kirra Boardriders -- where the action was in Aussie surfing at the time. Kirra's unofficial HQ was Joe Larkin's surfboard factory, where the likes of Bob McTavish, Peter Drouyn, Peter Townend and Michael Peterson worked or got boards.

After learning some of the surfboard craft under Larkin, Fitzgerald moved back to Sydney and created his own label. In 1970, he started Hot Buttered in a dilapidated wooden house in the industrial suburb of Brookvale.

That same season, he went to Hawaii, and his surfing at Rocky Point and Sunset blew minds. Footage from the movie Morning of the Earth shows a creative, super-fit Fitzgerald drawing lines all over the place with amazing speed and flair. He met Dick Brewer and started a great design collaboration that included Reno Abellira, Sam Hawk and Owl Chapman. This resulted in modern mainstays like the spiral vee (a basic double concave) and wings.

Back in Australia, Fitzgerald carried his design thoughts into Hot Buttered, working with the super-hot performance school at North Narrabeen. Surfers and shapers who passed through his factory over the years include Simon Anderson, Col Smith, Derek Hynd, Steve Wilson, Greg Day, Greg Webber and many more. Along with their unique design twists, his boards became famous for the airbrush spray work of Martin Worthington, who drew anything from leaping dolphins to psychedelic sunsets.

Fitzgerald's competitive surfing hit a peak in 1975 with his Australian Open title win and a victory at the Lightning Bolt pro event at Velzyland. He also won the first major pro event in Indonesia, the OM-Bali Pro at perfect, big Uluwatu in 1980 and was ranked ninth in the world in 1977. But his involvement in surfing has gone far beyond competition. Always a pioneer, Fitzgerald became one of the first big-name surfers to explore Indonesia. He went to Grajagan in 1973 with Gerry Lopez and Sumbawa the '80s before most surfers had even heard the names. His outrageous body-torqued surfing at Jeffrey's Bay, South Africa, in 1977 led the sharp-witted Australian surf journalist Phil Jarratt to nickname him "the Sultan of Speed." Fitzgerald publicly shunned the moniker but privately loved it, using the name on a late '80s Hot Buttered video series. He also surfed many spots in Tahiti, sponsoring kids like Vetea "Poto" David -- who later went on to a successful pro career -- and numerous other local Tahitian gremmies.

By the early '80s, Fitzgerald had set up Hot Buttered in places as far-flung as England, the United States, Japan and Papeete -- well ahead of today's trend toward multi-national surf corporations. He was a founding member of Australia's original pro surfing organization, the Australian Professional Surfers Association and took a strong hand in reviving his country's flagging competitive fortunes in the mid-'90s. He helped pull together an industry-wide effort to step up junior competition.

Today, Fitzgerald runs Hot Buttered from Sydney with continuing international distribution. Terry is shaping, surfing and living closely to the surf pulse of Narrabeen.

❖ LAGOON WATER QUALITY

The Lagoon has been used for sailing small craft, and in past with Paddle Boats in the Eastern Part of the LAKE.

To improve the Sailing the Warringah Administrator may have organised some DREDGING of the Lake.

*But with the more recent Heavy Rain events in Northern Rivers and South East Queensland, there is a **POTENTIAL RISK** of “Excess Water in Narrabeen Lakes area”. **So this could be included in “CLIMATE EXTINCTION” emergency***



Within the **Narrabeen** Lagoon catchment flooding can occur from either short duration rainfall bursts, typically along the tributary creeks, or longer duration rainfall events that result in flooding of the low-lying areas of the lagoon floodplain. A combination of these effects can accentuate flooding in the downstream parts of the tributary creeks.

Narrabeen Lagoon Floodplain Risk Management Plan - Flood Proje...

floodata.ses.nsw.gov.au/flood-projects/narrabeen-lagoon-floodplain-risk-mana...



Aerial Stock Image - Narrabeen Lagoon





This is a Main Picture in NBC page on Coast and Waterways – So it has a small FLOW to the OCEAN. And a LARGE SAND “ISLAND” east of OCEAN STREET BRIDGE.

NBC says ::

Narrabeen Lagoon naturally opens and closes to the ocean depending on how much sand has accumulated in the entrance and how much rain we’ve had. During the last 3-5 years the volume of sand at the northern end of Collaroy-Narrabeen Beach has significantly increased to the point where North Narrabeen is the widest it has been for decades. The sand drift cycles (long-shore drift) have pushed more sand in front of the entrance and there hasn’t been sufficient rainfall to clear it.

The second management action is an entrance clearance where a large amount of sand is excavated from the entrance area; from west of Ocean Street Bridge to the ocean, and transported back to Collaroy-Narrabeen beach. This ensures the entrance is not constricted with sand for a number of years and tends to keep the lagoon open (depending again on ocean and rainfall conditions). This occurs every few years and takes a few months to complete. This is a long term management option and requires significant planning and funding. It was last completed in December 2018 and prior to that in November 2016.

❖ THIS OPTION NEEDS A “REVIEW” to improve the SAND BANKS in the surf zone of North Narrabeen Beach???

An entrance clearance is a project that Council undertakes every few years where a large amount of sand is excavated from the entrance area; from west of Ocean Street Bridge to the ocean, and transported back to Collaroy-Narrabeen beach. This ensures the entrance is not constricted with sand for up to a few years (depending again on ocean and rainfall conditions). This normally occurs every few years and takes a few months to complete. It was last completed in December 2018 and prior to that in November 2016.

Depending on future rainfall and when the lagoon entrance naturally closes following accumulation of sand in the mouth, a renewed entrance clearance will be planned to occur in 2021.



This image indicates a retaining wall adjacent to the LAGOON east of OCEAN STREET BRIDGE.

RECOMMENDATIONS :: or the Draft Strategy

The main recommendations from the draft strategy are that Council:

- continue periodic large scale sand clearance operations
- trial more frequent sand clearances but with smaller volumes at a time, in targeted areas
- continue intermittent mechanical breakouts if the lagoon entrance closes between major clearances and in response to forecast high rain and swells
- revegetate and maintain Birdwood Park dune to assist sand stabilisation
- review mobile sand pumping (as an alternative to trucking) if lower cost pricing becomes available.

RECOMMENDATION – CLIMATE EMERGENCY – take more action and find a way to increase the Surf Breaks and protect the entrance to Narrabeen Lakes by PUMPING the sand from the Lake to the Beach??

RECOMMENDATION :: WHY NARRABEEN LAKES is NOT a RAMSAR WETLAND (east of Narrabeen Bridge ?) as DEE WHY LAGOON is a RAMSAR WETLAND.



What's in a Lagoon?

A lagoon is a complex ecosystem in a delicate state of balance. There is a balance between the microorganisms, plants and animals living in the lagoon. The weather and the characteristics of the water in the lagoon also affect this delicate balance and help make it a functional environment.

Our lagoons and waterways are home to many animals including a wide variety of native and introduced ducks and it is crucial that everything within the ecosystem is in balance.

What happens when the lagoon ecosystem is unbalanced?

When the delicate balance between people, animals, plants and nutrients are disturbed it can have a major effect on one or all species. One effect can be the sudden increase in the number of duck deaths seen in lagoons and creeks. This occurs

mainly in summer and is likely to be as a result of avian (bird) botulism.

What is Avian Botulism?

Avian botulism is a form of bacterial poisoning. It is not an infection. It is caused by the chemical toxin produced by the bacteria *Clostridium botulinum* (known as *C. botulinum*). It causes progressive weakness, paralysis and death in birds.

This disease is very common in waterbirds all over the world including USA, Canada, and Russia where outbreaks with over one million waterbird deaths reported. While the number of deaths locally is nowhere near the numbers experienced elsewhere, Northern Beaches Council takes the death of ducks and other animals very seriously.



Project related

In 2008 Haines considered a number of different features of the lagoon and determined that Narrabeen Lagoon represents a relatively unique instance of an ICOLL (refer **Figure 3-2**). Over the long term Narrabeen Lagoon:

- is mostly open;
- has potential for tidal water exchange under the right conditions, which sees the exchanging of ocean and lagoon waters (note this predominantly occurs in the entrance);
- can maintain water quality even with pollution entering from the catchment; and,
- usually maintains a similar water level.

In combination, these factors demonstrate that Narrabeen Lagoon has relatively stable and favourable conditions with respect to public amenity (i.e. visual and recreational).

In summary, in the context of NSW, Narrabeen Lagoon represents a large estuary (more specifically ICOLL), in terms of both estuary surface area and catchment area, that is on average over the long term open to the ocean. The Lagoon exhibits both stable water quality and quantity that provides favourable conditions for the community in both visual and recreation amenity.

The Lagoon is situated in a highly urbanised area, and as a result of the favourable stable conditions, the local community has become accustomed to certain level of 'service' provided by the Lagoon (e.g. acceptable water quality and water level). When this level of 'service' is no longer provided Council receives a significant amount of public feedback; distinguishing management of Narrabeen Lagoon as having a relatively high sensitivity to community awareness and feedback when compared to other ICOLLs on the NSW coastline.

3.2.2 ICOLL Entrance Management at other NSW Councils

and nature (e.g. oysters, shellfish) driven in respect to the reasons that impacted either the trigger water level or when artificial intervention was allowed. Some of these differences are summarised below:

- Greater Taree Council had salinity and water quality indicators impacting the trigger levels due to the oyster and shellfish production requirements.
- Port Macquarie-Hastings Council had triggers impacted by salinity levels.
- In Bega Valley Council and Shoalhaven City Council, while there were still triggers to open entrances to avoid flooding, this was impacted by endangered shorebird nesting. The mechanical opening of the entrance could only be operated during months where shorebirds did not nest and after surveying that the mechanical openings would not impact their nesting. The Shoalhaven River had similar reasons for trigger levels being set as Narrabeen, as they were based on the water level in the river (head difference) to ensure scouring of the pilot channel.

Individual trigger levels were set for all ICOLLs (refer **Table 3-1**) and carefully considered based on a number environmental, social and economic factors. Example entrance management decision trees for Bega, Port Macquarie and Shoalhaven City Councils are provided in **Figure 3-3**.

4. Low flow pipes.

Council commonly receives requests to consider a permanent opening at Narrabeen Lagoon entrance. The only method to permanently open the lagoon entrance is to build a training wall (or breakwater) with consideration given to removal of the bedrock platform and/or rock sill that act to control natural scour levels and form a hydraulic control for lagoon water levels. Training walls have been built at a small number of coastal lagoons in NSW including Lake Illawarra, Lake Macquarie, and Wallis Lakes. An example rock training wall at Tallebudgera Creek in QLD is shown in **Figure 6-1** below.



Figure 6-1: Example rock training wall at Tallebudgera Creek entrance

The option of constructing a training wall at the lagoon entrance was discussed in detail by the expert technical panel. Preliminary investigation of a training wall identified a range of significant environmental, recreational, public safety and aesthetic impacts associated with this option which would need justification by an extensive environmental assessment process, and would be unlikely to be supported by the community. These impacts included:

6.3.2 Ebb tide channel option

When the Narrabeen Lagoon entrance is open, it is subject to tidal influences. The ebb tide is the tidal phase during which the tidal current is flowing seaward out of the lagoon, and the flood tide is the tidal phase during which the tidal current is flowing inland into the lagoon.

An ebb tide channel is the naturally formed underwater channel which forms as the tide flows out of the lagoon. Depending on various factors such as water velocity, direction and sand grain size, a submerged wall structure may be able to deflect and focus the energy of the ebb tide to enhance natural channel scour and potentially keep the entrance open longer if ebb tide currents are able to transport sand out of the lagoon and into the ocean.

The ebb tide channel option involves the enhancement of an ebb tide dominant channel by installing submerged control structures downstream of Ocean Street perpendicular to the left hand bank (looking downstream) (refer to **Figure 6-2** for conceptual arrangement).

6.3.4 Low flow pipes option

The low flow pipe option involves the installation of a series of large underwater pipes at the lagoon entrance to provide some release of rainfall runoff into the lagoon (mitigation of build-up in lagoon water level and thus benefit to lagoon flooding), and to allow tidal exchange between the lagoon and the ocean when the entrance is otherwise closed for prolonged periods by sand ingress (refer to **Figure 6-7** for conceptual arrangement). A similar scheme has been implemented at the entrance to Manly Lagoon (refer **Figure 6-8**).



RECOMMENDATION :: ebb tide channel (and flat sand bank of Beach) or LOW FLOW PIPES

This needs to be CHECKED for FLOW CAPACITY needs, and if the sand west of the 3 large pipes can be reduced, but the area can then have a "Safe Water Area". The FLOW PIPE CHANNEL could be built with a "Panel to STOP ENTRY of OCEAN STORM SWELL".

The "IDEAL POINT BREAK from North Narrabeen Headland" has decreased in length since about 30 years ago (says Terry Fitzgerald) . So "Fixing the SURF BREAK of North Narrabeen could "evaluate" how it can protect the entrance from a MAJOR EROSION EVENT (Wide opening of the Entrance to Narrabeen Lakes).

- ❖ The “concrete specification” for the small retaining wall on the Caravan Park side of the Lagoon claims it can last 40 years plus, but the Sandstone Sea Walls in Farm Cove or MORT BAY area,
- ❖ Balmain have a longer life than 100 years, so there may be an alternative product that can also provide Habitat for Marine Plants.
- ❖ Consider the MERIT of the PIPE going thru Near the Headland area? (Refer to the thick blue line).

This is JUST a VARIATION on the EBB Tide Channel and may require “detail design” to provide a solution to SAND exiting the Lagoon periodically (As the wide opening periodically is reduced ?).

APPENDIX 1 :: SUPERBANK - KIRRA to Greenmount to Snapper Rocks

HOW TO BUILD A SUPERBANK



Matt Rode

In the beginning, there was Kirra. There was Snapper Rocks and Rainbow Bay and Greenmount too, but Kirra was where the magic happened—where azure barrels drained endlessly between the groynes, warm and clean and grinding below sea level for luminaries such as Rabbit Bartholomew, Michael Peterson, Mick Fanning, Joel Parkinson, and pretty much the entire world tour until the mid-1990s.

Then something happened. In 1995, the Queensland government decided they needed to do something about the coastal erosion that was threatening multi-million dollar beach front homes, while also keeping the Tweed Rivermouth clear for shipping.

So they came up with a scheme to pump sand out of Tweed River, in the hopes that the sand would be redistributed by the prevailing currents and build up the northern beaches that had been receding at an alarming rate.

As it turned out, their plan worked—really well. Too well, in fact, if you were a fan of Kirra. Within a few seasons, so much sand had drifted between the fabled groynes that Kirra Beach extended past where the lineup had once been. There was literally dry sand where the wave used to break—and just like that the legendary Kirra was gone.

Fortunately, a couple kilometres down the coast—or up the point, depending on your perspective—the complete opposite was happening. Instead of a wave being destroyed, one was being created—and when the sand had finally settled in 2007, filling in the gaps between the various points, that new wave was one of the longest and best on the planet. One single, continuous sandbar now ran from the top of Snapper Rocks, all the way through Rainbow Bay and [Greenmount](#) and down to the Big Groyne at the top of Kirra, creating a 2000-metre wave that quickly became known as the [Superbank](#).

Of course, the [Superbank](#) wasn't always super, and it certainly wasn't always possible to connect a wave from behind the rocks to the bottom of the bar. In fact, that feat has only been accomplished a handful of times in the past 15 years. But more often than not it produces world-class waves ranging from playful, seemingly endless runners to dredging, backless barrels.



Parko shooting through the masses.

© 2022 - Juan Medina.

Located in the Aussie surf mecca of Coolangatta, the [Superbank](#) quickly became the world's most crowded and competitive lineup, and the Snapper Rocks section soon began playing host to the first event of the annual world tour schedule.



Surfline Forecast Team

2nd, Apr 2019. Updated about 3 years ago.

Shifting Sands – Making the SUPERBANK

Every great surf spot is created by some sort of special geology and Snapper

Rocks is no exception. Queensland's Gold Coast is located on the easternmost side

of the Australian continent and was on the northeastern edge of an ancient volcano that eventually collapsed nearly 20 million years ago. Periodic lava flows extended out to the east to create headlands along the coast, and rivers flowed through the lower elevations between the lava flows that moved sand and debris to the coast. Rivers are the secret to many great surf spots around the world, as they help to provide the sand and other fine debris that gathers around the edges of the points and headlands to smooth the underwater bottom contours (bathymetry). These smooth bottom contours produce groomed perfect lines of swell wrapping (refracting) around the points. The Tweed River feeds sand to Snapper, Greenmount, and Kirra, which today is known as the Superbank.

Above: The Superbank in full glory during Tropical Cyclone Oma via [Cam Rewind](#). |

Top Photo: Shield

The Tweed River jetties were built in 1962-1965 in an attempt to stabilize the rivermouth channel for safe marine access. Unfortunately, the jetties also trapped the natural northerly flow of sand along the coast and the shallow sandbars returned to create hazards at the Tweed River entrance. Significant cyclone activity in the late '60s and '70s also created a large amount of beach erosion in Coolangatta Bay and the Gold Coast to the north, and the natural replenishment from the littoral northerly flow of sand along the coast was greatly impeded by the Tweed River jetties. The beach erosion along the Gold Coast severely threatened the local tourism economy due to the shortened beaches.

Watch: [Superbank Live from Snapper to Kirra](#)

After a significant amount of research, the Tweed River Entrance Sand Bypassing Project (TRESBP) commenced in the late '90s, with full sand-pumping capabilities by

May 2001. The sand bypass system was intended to mimic the natural transport of sand along the coast as it was prior to the installation of the Tweed River jetties.

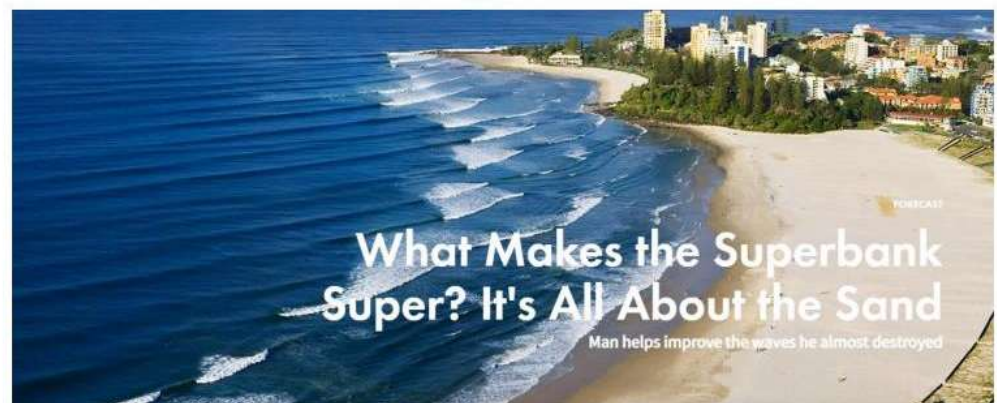
Pumps were mounted to a jetty south of the Tweed River entrance and scoured out the trapped sand before pumping it to multiple locations north of the entrance.

Learn: *What Makes Snapper Rocks the Jewel of the Superbank*

The primary pump outlet was at Point Danger, just seaward of Snapper Rocks so the sand would naturally flow around the point and fill in the beaches to the north along Coolangatta Bay and the Gold Coast.

The Superbank is Born

By 2002, after millions of cubic yards of sand had been pumped through the TRESBP system, the wave at Snapper Rocks returned better than ever and the Superbank was created with mile-long rides possible between Snapper Rocks and Kirra during the right conditions





In September through November periods of strong northerly winds and short-period NNE swells will scour the beaches and currents will create deep holes next to the points where trapped water needs to escape. January through June, the predominant east and southeasterly swells will push sand north to fill in the holes and groom the points once again.

Superbank Forecast: *Snapper — Greenmount — Rainbow Bay — Kirra*

According to long-time local Wayne "Rabbit" Bartholomew, the best sand is in April and May after the south-southeast swells have a chance to do their work.

This balanced equilibrium between the natural and man-made flow of sand work together to create the ideal bathymetry for perfect, sand-bottom barrels.

The Superbank: a joint venture between Man and Nature

SURFING



The Superbank is a man-made surf break located in the Coolangatta, Gold Coast, Australia. It offers one of the longest wave rides in the world.

On special days, the Superbank allows you to take off at Snapper Rocks and touch the sand at Kirra in a 1.97-kilometer (1.22 miles) surfing experience.

Despite the crowded waters, the Superbank offers a complete adventure into the wave riding portfolio: fast barrels, mushy sections, aerial ramps, and classic wave faces.

There have been plans to change the geomorphology of the region, which include cruise ship terminals, sand injections, and casinos.

But the Superbank is sensitive to subtle changes, and if the surf break shuts down, so will the tourism in Coolangatta.

The Gold Coast Superbank is a lucid dream.

The sand pumped to the northern side of the Tweed River allows you to get barreled in the early section into Greenmount, and then if you're lucky and good enough, the wave machine will send you through Coolangatta into Kirra.

According to the Tweed Sand Bypassing, between April 1st, 2000, and October 20th, 2002, the quantity of sand dredged reached 1,062,618 square meters.

So, how did surfing evolve before and after the dredging?



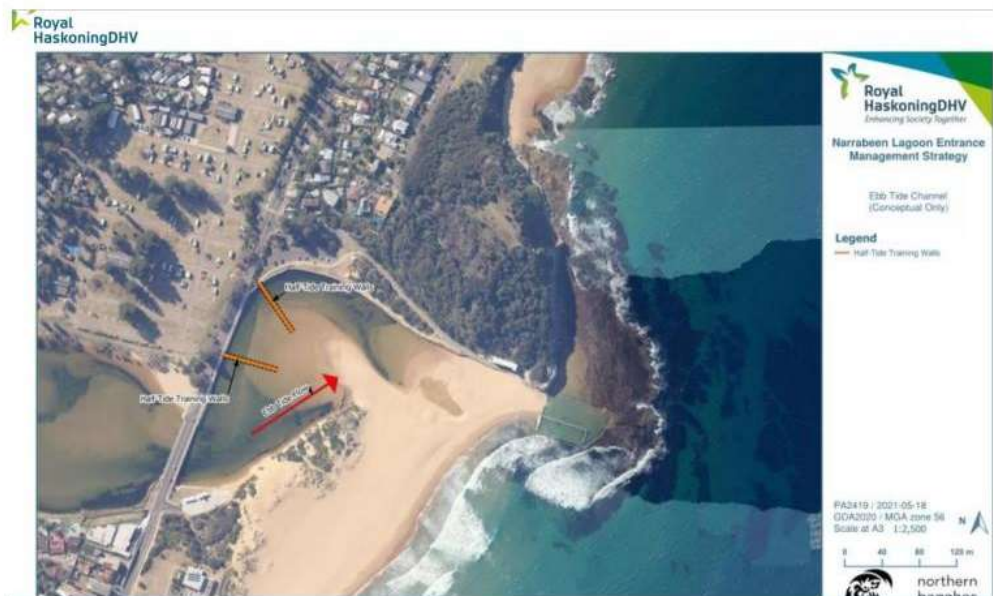
Before 2001

1. Burleigh Heads was the best and most popular surf spot in the region;
2. Snapper Rocks was an average, fairly consistent right-hander, with occasional lefts;
3. The longest ride would only connect Snapper to the rocks at Greenmount, i.e., 200 meters;

After 2001

1. The Gold Coast City Council decides to keep the mouth of the Tweed River free from sand and safe for boats. The sand dredging process begins;

2. Surfing changes in Coolangatta. Rides of up to 20 seconds are now possible;
3. As the Superbank takes shape, ten-second tube rides become frequent;
4. In 2002, Joel Parkinson wins the first-ever Quiksilver Pro Gold Coast as part of the World Championship Tour;
5. Surf movie "**3 Degrees**" (2003) features Jarrah Tutton's 20-second barrel at the Superbank;



APPENDIX 2::

BIG WAVES over 800 m from COAST

Nelscott Reef: the ultimate big wave of the Oregon coast

JUNE 14, 2022 | SURFING



Nelscott Reef is a surf break located half a mile (800 meters) off the coast of Lincoln City, Oregon, United States.

Oregon's ultimate big wave was named after the town's fourth district, and it is one of the most accessible extreme surfing arenas in the world.

Surfers launch right from Canyon Drive Park, and spectators can watch from the beach or on top of the cliffs in Lincoln City.

The Nelscott Reef structure can be observed at a depth of about 18 feet.

With the right east wind and west swell, the waves will jack up to between 25 and 50 feet, thanks to the magical power of the local underwater rock shelf.

Welcome to one of the most unpredictable waves on America's West Coast.



History of the Surf Break

The Killamook - or Tillamook - Coast waves were first ridden in the 1960s.

Art Spencer was one of its pioneers. He and a tight crew of surf explorers initially welcomed outsiders with warmth and respect.

However, when the original variables changed around the early 1970s, they realized the precious treasure in their hands and made sure they would hold on to what they've got.

"The guys that were really causing a lot of the problems, bad vibes and vandalism, were the guys who were surfing," noted Spencer.

John Forse was one of the first outside surfers to adventure into Nelscott Reef.

After spending his early surfing years in Steamer Lane, Northern California, Forse moved to Oregon and found uncrowded spots with quality waves.

"I really didn't expect to find the good surf that I've found since I've moved here," recalls Forse.

"The surfers here are different from Northern California, where you have a lot of competition. The surfers here are kind of naive."

In 1989, the California ex-pat spotted a 30-40-foot natural wonder breaking in the distance, but the first take on the wave only occurred in 1995.

After recovering from a traumatic shark attack at Gleneden Beach, the intrepid surfer and a friend got in a zodiac.

They explored the Siletz River and the Killamook Coast through the infamous reef in search of something special.

The ocean conditions were uninviting, with a 20-second period, 17-foot swell producing 35-foot-plus waves.

Moreover, the offshore winds were so strong that the surfers could not get down the face of the wave.

After taking off on a big wave, Forse was blown out the back and realized he was about to get pounded by another colossal mountain of water.

The duo survived the ordeal, returned to the zodiac, and rode home.

In 2002, John Forse invited Peter Mel and Adam Replogle to witness the wave's power in person.

"He came into my shop, and he was telling me about a wave that was, as he said, as gnarly and big as Mavericks," reveals Mel.

"And I was like, 'this guy's a kook. There's not another wave like that.' Then he brought in a video and showed me, and it was legit."

"Unfortunately, it took me ten years to get out there, but once I finally realized our first experience was unbelievable."

When the Santa Cruz duo arrived at the crime scene, they were mesmerized by Nelscott Reef's power and riding potential.

The waves were rising in the 40-50-foot range.

So, it was indeed a real big wave surf break, despite the cold winters, snowy mornings, and quietness of Lincoln City.



Getting the Nelscott Reef Tow In Classic Underway

Forse realized he had to put Oregon's gem on the surf radar. So the inaugural Nelscott Reef Tow In Classic took place in 2005.

The historical big wave surfing event was made possible thanks to Forse, Mel, Repogle, and technical inputs from Garrett McNamara, Mike Parsons, and Chris Bertish.

At the time, there were many controversies - and localism - around the decision to run the contest on the Pacific Northwest surf break.

The event's first four years are documented in "The Find: Claiming Nelscott Reef," a movie directed by Erich Lyttle.

"I spent ten years trying to get locals involved, trying to get them to go out on a Wave Runner with me and towing into these waves, but nobody would have anything to do with it," explained Forse.

"Now, all of a sudden, there's people claiming because they happen to live in some kind of proximity to this wave, and it's theirs."

The first-ever contest had a three-month waiting period and 48-hour notice. Forse sold properties in Mexico to fund the event.

Zach and Jack Wormhoudt won the 2005 Nelscott Reef Tow In Classic.

By 2008, it was the only tow-in contest on the North American continent and Oregon's only professional surf event.

After conferring with big wave contest guru Gary Linden, and based on competitors' feedback and spectator enthusiasm, John Forse decided to integrate the paddle-in into future events.

Kealii Mamala went home with the win for the first-ever paddle-in contest at Nelscott Reef.

The contest unofficially marked the opening of the North Pacific big wave season.

Predicting a day in which the surf is large enough to hold the event with weather and wind conditions coinciding with that swell is extremely difficult.

However, operating in a three-month holding period, John Forse proved his local knowledge of the reef he pioneered with four years of perfect calls.



Pioneering Changes in Big Wave Surfing

In 2009, in addition to the tow-in contest, the organizers also crowned the first Kingfish title to the individual scoring highest in both tow-in and paddle-in events.

"It's part of what makes Nelscott Reef such a unique wave," said John Forse.

"There are just not that many places on the planet that can accommodate paddle in and tow in at the same time."

In 2010, the Nelscott Reef Tow In Classic became a paddle-in-only event and crowned Kohl Christenson champion.

Keala Kennelly took the top honors in the inaugural women's exhibition competition.

The year 2013 featured the first physically challenged competitor and, one year later, the organization debuted the Nelscott Reef Uninvitational Pro-Am to showcase young guns and emerging talents.

In 2017, the competition became the first big wave event to include women, which helped pave the way for other big wave events to open their doors as well, including the World Surf League's Big Wave Tour.

"One of the biggest challenges we have is simply getting everyone out to the reef in a timely and safe manner," noted Eric Akiskalian, former big wave surfer and ocean safety expert.

"On big days, you can't paddle out through the pounding beach break. You need a PWC assist, and even then, it takes a lot of jockeying around on a ski to punch through a 20-foot beach break."

"Once out there, we operated on a man-on-man basis - one ski for each surfer in the water."

"We had some of the best watermen in the world operating the skis while constantly focusing on risk management and keeping everyone safe throughout the event."



Weather and Surroundings

Oregon is a cold, wet, wild coast defined by prominent headlands, river mouths, vast coastal dunes, mighty spits, and expansive beaches.

The water is cold, ranging from 46-52 °F (8-11 °C) in January to 55-64 °F (13-18 °C) in August.

The region is also home to great white sharks.

"The wind and rain are intense, and storms often generate swells so near to shore that it's hard to make it out through the short-period waves," notes Antony Colas, editor of "The World Stormrider Surf Guide."

Still, on a good day, surfing in Oregon can be as fun and rewarding as surfing anywhere in the world.

Near the mouth of the Columbia River, Highway 101 connects the historic town of Astoria with the broad, sandy beaches of North Oregon.

US Highway 101 stays close to the coast leading into the surf hub of Lincoln City, with its surrounding beach breaks and reefs, including big wave spot Nelscott Reef.

Then, it winds down through lovely coastal geography past Boiler Bay, Otter Rock, and the extensive beaches at Agate, both great learning spots.



The Wave

Nelscott Reef is a challenging wave offering plenty of opportunities.

When arriving at the beach, surfers are presented with a monstrous A-frame, offering both left and rights and occasional barrels.

The lineup is often infested with kelp, and the take-off zone requires previous study and careful analysis.

Great white sharks are also frequent swimmers, so surfing alone is incredibly dangerous.

The wave is fast and seldom reminds us of its neighbor, [Mavericks](#), and its Hawaiian counterpart, [Jaws/Peahi](#).

Depending on the speed, offshore wind can be a surfer's ally or enemy.

Light easterly winds combined with westerly groundswells will ensure optimal conditions, especially in January.

Nelscott Reef has several take-off zones - outside and inside - then a southern peak and the shore break.

Getting out can be extremely tricky. Jet skis and boats have to face mountains of whitewater, tacking back and forth.

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EMS NARRABEEN LAGOON Strategy Objectives –**Introduction**

Narrabeen Lagoon is an environment in crisis! This is not a random claim, nor should it be viewed as an unsubstantiated statement. The recommendations contained within this response offer alternative options to improve the current and proposed Draft Narrabeen Lagoon Entrance Management Strategy and are based on many years of research and observation.

The Draft Entrance Management strategy document is in itself is a valuable compilation of data and recommendations. However, the evaluation contained within the document fails to adequately address or encompass key issues related the primary objective identified in the Draft Strategy. That is,

- **to reduce the risk of flooding on Narrabeen Lagoon floodplain.**

Ancillary key objectives include: the environmental management of an outstanding natural resource, and the recreational values of Narrabeen Lagoon.

Urban development and land use modification in the upper to middle catchment have generated significant impacts within the middle-lower catchment, where Narrabeen Lagoon interacts with the ocean at North Narrabeen Beach. As such, a holistic or catchment based approach needs to be adopted.

This response is based on the premise that issues related to the Narrabeen Lagoon Entrance Management Strategy cannot be evaluated in isolation of issues and development within the Upper and Middle catchment. That is, the sub-catchments associated with the five main creeks that flow into the lagoon delivering floodwaters during high rainfall events.

Narrabeen Lagoon Catchment

The physical environment of Narrabeen Lagoon catchment is fully described in SECTION 2 of the NARRABEEN LAGOON EMS (30 March 2022 pp.5-13). The catchment can be separated into several major sub-catchments associated with five main creeks (Nareen, Mullet, Deep, Middle and South Creeks) that feed into the lagoon.

Extensive research and observation over the past 20 to 40 years suggests the increase in flood events around the foreshore of Narrabeen Lagoon can be primarily attributed to the urban development and modification of the natural landscape in the catchment above Narrabeen Lagoon.

Dredging for sand mining during the 1920's to late 1980's combined with increased inflows attributed to urban development within the upper-middle catchment are today deemed major contributing factor to the collapse of the primary sandbanks (off Wimbledon and Wakehurst) and loss of large areas of seagrass and reedbed communities.

The formerly dominant sandbanks has historically acted as an important natural barrier to Wimbledon Avenue's western foreshore, the adjacent islands and the southern foreshore of Billarong Reserve. A number of smaller islands have already succumbed to the impact of increased wind and water erosion.

The loss of reed communities and native foreshore vegetation is substantial and foreshore properties round the lagoon are experiencing property damage i

The formerly extensive areas of sand banks, which were covered in seagrass beds, are now actively collapsing into the deep dredge holes off Wakehurst Parkway and another west of Wimbledon Reserve. These seagrass beds, which were/are vital breeding ground for fish species and foraging habitat for bird species are rapidly disappearing within this area of the lagoon.

The depth of the large open body of water bounded by Wimbledon Avenue, the two remaining islands off Wimbledon Reserve, Wakehurst Parkway to Deep Creek is estimated to be on average between 3 to 5 meters.

What is the Trigger Point?

The opening point for Narrabeen Lagoon is 1.3 AHD.

At 0.958 the smaller of the two islands off Wimbledon Reserve is fully submerged. The impact of which results in further loss of mature trees and wildlife habitat on both islands.

Enquiries to Council regarding the change of the trigger point from 0.7 AHD to 1.3 AHD failed to provide an adequate explanation other than "it was in a consultants report".

The logical explanation would be that to support the opening the lagoon due to flooding or forecast high rainfall events the body of water within the lagoon needs to have to capacity to create velocity of water to create adequate scour to allow lagoon water to break free to the ocean.

This point is vital to the following recommendations.

Conflict Between User Groups and Natural Environment

From an environmental and natural resource management perspective there needs to be a universal acceptance that the lagoon cannot be all things to all people. Key to this premise is:

- active recreation vs passive recreation = HIGH CONFLICT (Danger)
- active recreation vs wildlife protection = HIGH CONFLICT (Danger)
- active recreation vs seagrass protection = HIGH CONFLICT (Danger)
- active recreation vs protection from foreshore erosion = HIGH CONFLICT
- passive recreation vs wildlife protection = LOW CONFLICT*
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Active recreation - all outboard/inboard boats with the capacity to travel at speeds over 4 knots. Currently the majority of the lagoon has a speed limit of all confirmed on numerous occasions they have inadequate resources to monitor and control speeding vessels on the lagoon.

On any given day speeding vessels can be witnessed plain and therefor exceeding the current 8 knot limit.

canoeing, kayak fishing.

TOPLINE RECOMMENDATIONS

Consider alternative options to improve efficiency, based on the primary objective of the Strategy to reduce the risk of flooding on the Narrabeen Lagoon floodplain.

- Continue intermittent mechanical breakouts if the lagoon entrance closes between major clearances and in response to forecast high rain and swells, while strategically implementing catchment wide initiative briefly described within this document.

- **Reduce Trigger Point**

While allowing hole catchment management options to be evaluated and strategically implemented reduce the trigger point from 1.3 AHD to 0.7 AHD, ensuring 0.7 AHD. However, the water level is not to be held for prolonged periods at a greater 0.7 AHD water level than that which could be applied to a Black Swans and native Pacific Duck dabble depth. That is the depth required for native bird species to feed on seagrass beds within the lagoon.

NOTE: at 9.58 AHD the landmass of the small island off Wimbleton Reserve is fully submerged.

- **Long Term Solution**

Refer to diagram on page 88 EMS

Extend the red arrow, as if it were a stormwater pipe, through the headland to the rock platform.

At the alternate end, an adjustable inlet valve attached to a pipe will be located in the clear open water, away from seagrass beds, adjacent to the 7 Eleven Service Station. This pipe feeds on the floor of the lagoon under the Ocean street bridge to connect with the red arrow channel which feeds into the pipe through the cliff and rock platform.

- **Wildlife Sanctuaries and Seagrass Beds**

Declare the remaining islands within the lagoon as wildlife reserve. Prohibit landing by members of the public.

Reduce speed of outboard vessels to a maximum of 4 knots within the entire lagoon and prohibit all recreationalists and fishermen from approaching within 3 meters of seagrass beds and 7 meters of wetlands.

Hydrological Monitoring

Water quality and waterflows should be introduced and monitored throughout the greater catchment above Narrabeen Lagoon.

South Creek sub-catchment:

- investigate potential to divert medium to high flow stormwater, inground through playing fields, to flush Dee Why Lagoon.
- South Creek diversion to Dee Why Creek to lagoon. Maintaining environmental flows below the diversion point to Narrabeen Lagoon.
- Retention ponds and pollution traps should be introduced to the Dee Why Creek corridor and monitoring of flows and pollutant load from upstream industrial area.

Middle Creek sub-catchment:

Upper Catchment: Introduction of strategically located sediment traps, pollution control ponds and wetlands should educational facilities and community groups should be encouraged to take ownership in conjunction with Council and State government through NSW Department of Planning and (builder and designer Wakehurst Parkway).

Middle Catchment (below Oxford falls to Narrabeen Lagoon): Primary concern at this point is the stretch of road referred to as the Bends, which floods during storm events.

Introduction of stormwater management as described above will reduce the volume of water flowing from Middle Creeks upper catchment. However, it is not only the stormwater from Oxford Falls that contributes to Wakehurst Parkway flooding in The Bends area.

A significant amount of stormwater is generated above the wetlands in the vicinity of The Bends. That is, from the bushland escarpment in the Dee Why West Regional Reserve. Storm water is delivered to the creek that comes off the cliff face directly into the wetland, as well as over the rock face between the eastern end of the wetland to the Sport and Rec.

As the Wakehurst Parkway was historically responsible aligned through the Middle Creek valley by State Government (NSW DMR), the State Government should now accept responsibility for upgrade of this section of Wakehurst Parkway for flood mitigation.

Additionally, while recent intentions were good in lobbying to fence The Bends wetlands to prevent wildlife from being killed by automobiles in this section of road, no one evaluated why such a diversity of wildlife was attempting to access The Bends Wetlands. Clearly there is some dietary requirement to be found in the wetlands. Fencing has now prohibited access.

Recommendation for Middle Creek sub-catchment management:

Short Term - investigate how to “capture and contain” runoff in the Dee Why West Regional Reserve to reduce the volume of water during high rainfall events. Environmental flows need to be monitored to ensure the seasonal health of The Bends Wetlands is maintained.

Long Term - this section of Wakehurst Parkway needs to be elevated for vehicular traffic to avoid flood conditions and to allow an underpass sufficient for wildlife to access the wetlands.

Deep Creek sub-catchment

Create a wetland bounded by Deep Creek, Wakehurst Parkway and Slippery Dip Trail as far as practical. The wetland should be contained by the construction of a vegetated earthen mound having weir gates and control valve to control the depth and flow into Narrabeen Lagoon.

The shallow area of lagoon adjacent to the foreshore area and walking trail running parallel with Wakehurst Parkway should be planted with native aquatic species to encourage wetland species growth that will uptake pollution and heavy metals generated from Wakehurst Parkway traffic.

A hydrological engineer should be consulted to investigate the geomorphology within the upper Deep Creek valley to build a storage pond. The storage pondage could be evaluated to be of a size that has the capacity to support Rural Fire Fighters, tank refill and helicopter water bucket. Apart from providing support for RFS the pondage would primarily be used in heavy rain periods as a retention pond with slow release valve into the Deep Creek wetland post the flood risk has passed.

Mullet Creek sub-catchment

(Similar to above)

Nareen Creek sub-catchment

(Similar to above)

Pollution Control and Nutrient Monitoring

Pollution control and flow meters are required throughout the catchment, as is nutrient and pollution monitoring specifically for Kimbriki Landfill, Elanora, Monash and Cromer Golf courses. Pollution controls and sediment traps should be introduced as required.

Introduction of Wetlands

stormwater management; nutrient control;

→ urban development in upper catchment

Wakehurst parkway Flooding → the Bends Wetlands (history)

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→ loss of seagrass beds → loss of native aquatic bird species (black Swans, Pacific Black Duck → dabbling depth → competition feral species (health

→ Loss of breeding grounds for juvenile fish species

→ Increased erosion (wind /water) → loss of islands → Wimbledon Reserve → native vegetation including valuable aquatic reed communities (Council → walking track and black swan nesting site

Recommendation

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Document administration	
Version	1.0
Date	28 July 2022
Approval	Content provided and approved by Floodplain, Planning and Response Team. Responsible manager: Sadiya King
Status	Final
Notes	Community and stakeholder views contained in this report do not necessarily reflect the views of the Northern Beaches Council or indicate a commitment to a particular course of action.