

FACTS & FIGURES



Beach Sand Nourishment Scoping Study: Maintaining Sydney's Beach Amenity against Climate Change Sea Level Rise

Summary

The *Beach Sand Nourishment Scoping Study: Maintaining Sydney's Beach Amenity against Climate Change Sea Level Rise* found that beach nourishment is an effective strategy to maintain beach amenity against climate change sea level rise for present planning time lines.

Sea level rise estimate

The study allowed for a sea level rise of **0.1 metres per decade**. This is consistent with the estimated sea level rise defined in the *NSW Sea Level Rise Policy Statement*. However, more recent projections indicate that this rate may be an underestimate.

Volume of sand required

Sand nourishment of Sydney's beaches would need to be undertaken over a number of campaigns. The first campaign would require 12 Million cubic metres of sand at a cost of approximately \$300 million. Subsequent campaigns, scheduled at 10 year intervals, would require 4 million cubic metres of sand at a cost of approximately \$120 million each. The first campaign requires more sand than subsequent campaigns as it would accommodate recent past sea level rise of **0.2 metres** and a future sea level rise of **0.1 metres**. The estimated costs and volumes of sand required are summarised in Tables 1 and 2.

First Campaign

Table 1: Summary of cost for first beach nourishment campaign of Sydney's beaches

Activity	Cost
Dredging and nourishment	\$230 million
Unit cost per cubic metre of sand	\$19/m ³
Related project costs (including impact assessment and consultation)	\$70 million
Total	\$300 million
Total unit cost per cubic metre of sand	\$25/m ³

Subsequent Campaigns

Table 2: Summary of cost for subsequent beach nourishment campaigns of Sydney's beaches

Activity	Cost
Dredging and nourishment	\$80 million
Unit cost per cubic metre of sand	\$20/m ³
Related project costs (including impact assessment and consultation)	\$40 million
Total	\$120 million
Total unit cost per cubic metre of sand	\$30/m ³

Method of extraction

Based on the wave climate and depth experienced on the Inner Continental Shelf near Sydney, a Trailing Suction Hopper Dredge (TSHD) would be the most suitable dredging equipment for extracting sand. The TSHD operates very much like a floating vacuum cleaner. It sails slowly (1-2) knots over the area to be dredged, drawing sand up as it proceeds taking sand to a depth of 50cm with each pass.



Figure 1. Trailing Suction Hopper Dredge

For more information: on the *Beach Sand Nourishment Scoping Study: Maintaining Sydney's Beach Amenity Against Climate Change Sea Level Rise* contact Sydney Coastal Councils Group at info@sydneycoastalcouncils.com.au

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Nourishment Techniques

Beach nourishment methods can be a land based operation, an offshore operation or a combination of both. Each method has engineering and operational constraints that influence the duration, cost and effectiveness of the nourishment campaign. Environmental, business and social implications are major considerations also in the selection of a preferred method. Beach nourishment utilising offshore placement (profile nourishment) is the simplest, natural and most cost effective manner to nourish Sydney beaches. Environmental impacts are likely to be kept to a minimum using this method, with volumes of nourishment sand placed being similar to the volume of sand moved offshore and placed in the deeper waters during a severe storm.

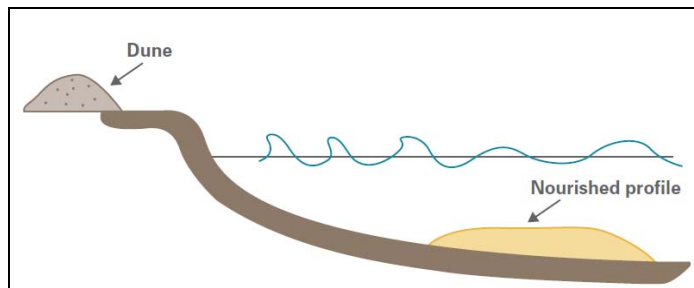


Figure 2. Offshore Sand Nourishment

Cost benefit analysis

The *Beach Sand Nourishment Scoping Study: Maintaining Sydney's Beach Amenity against Climate Change Sea Level Rise* examined three cases to evaluate the costs and benefits of a nourishment program based on engineering, environmental and social considerations. For each of the three case studies a nourishment program was found to be viable economically. Results are summarised in Table 3.

Table 3: Summary of cost benefit evaluation for the three case study sites.

Site	Length and width of beach	Volume of sand	Cost benefit ratio	Rate of return
Collaroy - Narrabeen	3.6km long, 50m wide	1.3 million m ³	1.6	12%
Manly	1.5km long, 50m wide	520,000 m ³	2.4	20%
Cronulla	5.5km long, 40m wide	1.5 million m ³	1.2	8%

What areas require further investigation?

It is the intent of the SCCG that this study provide a basis to inform all spheres of government and coastal communities of the pros and cons of utilising off shore marine sand sources to facilitate immediate and longer term sand nourishment of Sydney's beaches. Social, environmental and planning considerations that require further investigation include:

- The potential environmental impacts of an offshore sand extraction process.
- The potential social and environmental impacts of a near-shore sand nourishment campaign.
- Future environmental studies required to develop an EIS.
- The planning and approval process for a sand nourishment program.
- Further cost benefit analysis of all beaches likely to lose sand and beach amenity.
- Consideration of safety implications from the loss of beach sand.

Community consultation

One of the key factors in the implementation of efficient, cost effective sand nourishment strategies will be stakeholder and resident support. Such a consultation campaign would be delivered through a combination of educational communication material, media releases, stakeholder and community feedback via public information days, website surveys, newsletters, focus groups and/or market research surveys. The cost of the basic tools and methodology for these consultation approaches has been considered in the project budget.

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