GERALDTON

NORTHERN BEACHES

STABILISATION PROGRAMME

(NBSP)

Geraldton Port Authority

Northern Beaches Stabilisation Programme (NBSP)

Document Control

NBSP Document (No. A1150606) **& Map** (No. A1150606b)

Revision	Date	By	Status	Attachment
0	21/06/06	PJD	Approved by CoG and Submitted to DoE	NBSP Map (Sept 2004)
A	~~09/08/06~~ 25/08/06	PJD (Approved by CoG 29/09/06)	Revised and approved by CoG: § Table of Contents - 4.1.3 headings dot pointed as a) – j) § Clauses: § 4.1.3 d) Transport Methods – para 2 amended § 7. Summary of Responsibilities – § GPA § 7.4 amended § 7.5 added § 7.6-12 renumbered § CoG § 7.2 amended § 7.3 amended § 7.5 removed § 7.13 added § 7.5-16 renumbered	NBSP Map ~~(May 2006)~~ Replacement Map (Sept 2006)

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1. BACKGROUND

Geraldton, located some 430 kilometres north of Perth in Western Australia, is a thriving coastal community. The area offers a range of coastal activities and is a major trade facilitating centre with the Port of Geraldton. The foreshore to the north of Batavia Coast Marina in Geraldton is one of the most used and enjoyed by the community. Often referred to as the 'northern beaches' the area offers good walking and cycling paths, beautiful ocean views, and various facilities including barbeques and other sheltered nodes. The protection of this area to ensure ongoing availability is therefore of high importance to the City of Geraldton and its citizens.

The areas can be best summarised as a patchy fringing reef line protecting a thin beach and thin vegetation line in front of man-made areas including path, shelters and grassed areas. Acute erosion in certain areas of this foreshore has become more pronounced and frequent in recent years. Some areas have periodically required barricades to prevent personal injury from falling over vertical erosion faces. Especially during episodic winter storms the area can become quickly degraded rendering it potentially dangerous.

As with all coastal areas, their dynamic nature often interferes with man-made uses and structures. This however, coupled with the minimisation of the natural literal drift of sand along the coast by Port and Marina structures, has warranted the need for some intervention and the generation of this plan.

There have been several investigations into the sediment dynamics of the coast from the Port to Separation Point. MRA (1994 and 1996) indicate that in the period between 1942 and 1992 there has been about 20,000 to 30,000 m^3 per year of sand trapped in the area from the Port to Separation Point. This sand appears to have been transported from the beaches and reefs to the south, as well as some derived from the seagrass meadows and on the reefs in the area. In recent times, the Geraldton Port Authority has extracted some of the accumulated sand at Pages beach for use as reclamation and nourishment of the northern beaches.

Work completed by MRA (2001) provided the hypothesis that prior to the Port construction about 10,000 to 15,000 m^3 per year of sand may have moved along the southern portion of Champion Bay from the Point Moore area. This sand is believed to have been the natural feed of sand to the northern beaches (north of the location of the Batavia Coast Marina). It was estimated that the impact of the Port structures would have been to deprive the beaches north of the Batavia Coast Marina of about 10,000 to 15,000 m^3 of sand feed per year. This would contribute to a deficit of sand on these beaches and the ongoing erosion of these beaches.

It is noted that sand depravation is caused by both Port and BCM structures.

The coastline of Champion Bay can be separated into five sectors on the basis of their recent shoreline dynamics as follows (refer figure2.3 in PER):

- An accreting coastline west of the port at Pages Beach;
- A relatively stable coastline in Town Beach;
- An eroding coastline immediately north of Batavia Coast Marina (BCM);
- A relatively stable coastline from St George's Beach to Bluff point; and
- An eroding shoreline from the Chapman River mouth to Sunset Beach.

Work published as part of the Public Environmental Review (PER) for GPA's 2002/2003 Port Enhancement Project (PEP) determined the effects of deepening and widening the shipping channel and extending the northern breakwater on the current sediment dynamics of the bay to assess the impacts on beach stability north of the BCM. This work was based on wave modelling conducted by CES (2001) and concluded that that the PEP would result in more wave energy striking the coast from the west at two locations; one some 100-200 m north of the BCM, the other, at the beach south of Chapman River.

This was expected to result in an approximately 20% increase in the theoretical potential for net sediment transport northwards from the beach south of Chapman River, and a doubling of the sediment transport capacity from 7,000m3 to 15,000 m3/yr at the eroding beach just north of the BCM. Experience has shown that erosion of the beach south of Chapman River is much less than theory might suggest. The effect of seagrass wrack protection is a likely explanation of this experience.

To offset this impact of the PEP, the GPA committed in the PER to bypass sand from Pages Beach to the beaches north of BCM in compensation for past and future modifications to regional sediment dynamics as part of their contribution to a Northern Beaches Stabilisation and Enhancement Strategy then being developed by the City Of Geraldton and Department for Planning and Infrastructure in conjunction with the GPA at that time.

2. STABILISATION OPTIONS

Development of a range of options for stabilising the northern beaches was undertaken by MRA (2002). All the options investigated included as a pre-requisite, the large scale initial beach nourishment of some 100,000 to 150,000 m3 using Geraldton Southern Transport Corridor Project (GSTC) sand first, followed either by just annual sand nourishment, or a combination of annual sand nourishment and various beach and offshore structures.

The development of this Northern Beaches Stabilisation Programme (NBSP) document was through agreement from a joint agency working group with representation from the City of Geraldton, Geraldton Port Authority**,** Department for Planning and Infrastructure and the Department of Environment with Technical support from MP Rogers and Associates and URS Australia.

Any proposed management contained in this NBSP contains certain environmental considerations. The Department of Environment was represented on the working group to provide advice on concerns and minimisation of environmental impacts as a result of the programme.

This NBSP outlines the programme for the stabilisation of the northern beaches between the Batavia Coast Marina and south of the Chapman River mouth. It does not include areas to the north of the river mouth.

3. OBJECTIVES AND AIMS

The Northern Beaches Stabilisation Programme (NBSP) focuses on long term dynamic equilibrium. Static equilibrium of beaches on active coast lines is never possible.

The objective of the Northern Beaches Stabilisation Programme is for the Geraldton Port Authority to monitor shoreline movement of beaches between Batavia Coast Marina and Chapman River, and provide beach sand nourishment to maintain long-term shoreline stability. Also to contribute to the City Of Geraldton's Northern Beaches Stabilisation and Enhancement Strategy in association with the City of Geraldton and the Department for Planning and Infrastructure.

The objective of the Strategy includes to provide a long term stable foreshore through the following specific aims:

1. Replace the natural littoral drift of sand blocked by the Port and Batavia Coast Marina structures;
2. Endeavour to maintain existing infrastructure in the short term;
3. Provide a stable foreshore through:
    a. sand replenishment,

b. improved vegetation lines; and
c. possible rationalisation of the location of man-made assets in the longer term.

The NBSP addresses the following key elements

1. beach monitoring locations and frequency;
2. volume of sand by-passing and timing of placement;
3. location and scale of stabilisation works (if any);
4. management of dust, noise and traffic impacts during nourishment; and
5. community consultation and awareness.

4. METHODOLOGY, PROCEDURES AND RESPONSIBILITIES

Following a meeting of the City Of Geraldton – Geraldton Port Authority Liaison Committee held on Thursday 1 July 2004 the following actions have been agreed.

4.1.1 Coastal Structures and Stabilisation Works

No groyne structures by the City of Geraldton, Geraldton Port Authority, or Department for Planning and Infrastructure are currently planned for the beaches between the Batavia Coast Marina and the Chapman River mouth. Any planning, should it occur, at a later date in respect of such matters by any of these parties will be with the full liaison of the other parties, and will incorporate community consultation by the City.

4.1.2 Beach Nourishment

The NBSP does not address the beach nourishment programme for the area north of the Batavia Coast Marina to be under taken for CoG and DPI under the auspices of the Main Roads WA / Public Transport Authority's (MRWA/PTA) Geraldton Southern Transport Corridor Project (GSTC).

4.1.3 Sand Bypassing

a) Sources of sand

Sand will be obtained from a primary source location at the extreme eastern end of Page's Beach. Access will be via Connell Road at the rear of the Fishing Boat Harbour or via pages Beach access.

In the event that a).insufficient by-pass sand is available from the primary source location, and b).a clear immediate replenishment need exists at the nourishment site; then a secondary source may be established adjacent to the primary source within that section of Pages Beach currently designated for horse use.

In the event that insufficient bypass sand exists at either the primary or secondary source locations GPA also agrees, subject to CoG request and DoE approval to extract natural beach sand from sources no further from the northern beaches than Point Moore.

In such instances GPA shall:-

- Secure each excavation site to protect the Public
- Make each excavation site safe for public access at the end of sand extraction process
- Ensure that the vegetation is not disturbed

Refer to attached drawing.

The availability of sand for by-passing is influenced by beach levels and tides.

However by-passing programs will endeavour to be scheduled to optimise use of sand from the primary source.

b) Nature of extraction

Based on broad evaluation of sand by-passing options it has been agreed by all Agencies that truck sand by-passing should be utilised initially.

Further options for sand by-passing, may be considered in the future subject to DPI and DoE evaluation relating to cost, effectiveness, environmental issues and practicality.

The sand will be excavated by an excavator / front end loader and loaded onto trucks for transport to the beaches north of BCM.

The extraction operation will be one of surface skimming rather than deep excavation.

c) Volumes

The GPA will initially contribute a base annual quantity of 12,500 banked m^3 of sand per year as of right toward the long-term stability of the northern beaches as a replacement for interrupted natural sand flow and to offset any increased erosion potential. Any unused volumes will be carried forward.

Any additional or any variation in volumes will be subject to discussion and agreement between CoG and GPA with consideration being given to monitoring results, budgetary constraints and sand availability.

It is agreed that unless an obvious case for review of the base annual quantity arises sooner, such a review will be made five (5) years after the date of the beach nourishment programme for the area north of the Batavia Coast Marina to be under taken in 2004 for CoG and DPI under the auspices of the Main Roads WA / Public Transport Authority's (MRWA/PTA) Geraldton Southern Transport Corridor Project (GSTC).

The short term aim will be to maintain the foreshore line west of the existing dual use pathway.

It is further agreed that it will not be possible to determine a long term target coast line for a number of years however by 2009/2010 the GSTC nourishment works are likely to have settled to a stable profile and the on going effect of the annual sand by-passing will start to become evident from the monitoring results.

The conversion rate between truck m3 and banked m3 will be calculated by survey measurement to ascertain the volume of material cut from the source beach and loaded in to trucks during a particular period of operation.

The volume for each truck will be determined by striking level two or three loads for each truck on at least one occasion per year to ascertain the loaded truck m3.

The total volume records will be kept by count of number of truck trips x truck volume and details forwarded to the City following each sand by-passing program for each section of coast line.

d) Transport methods

Unless agreed otherwise by the City of Geraldton and Department of Environment, Single tipper trucks (either rigid body or articulated) up to nominal volume of 18m3 will be used for sand cartage.

The transport route will generally use the following roads:

- Willcock Drive
- Connell Road
- John Willcock Link
- North West Coastal Highway
- Phelps St
- Chapman Road
- Wiebbe Hayes Lane
- Stella Maris Drive

Refer to the attached drawing.

e) Timing of operations

It is anticipated that by-passing will be undertaken in late summer (to avoid windy months as much as possible) and early winter each year, prior to the onset of winter storms in order to provide an erosion buffer for the winter. It is likely that the sand will be bypassed in a number of periods of work each of up to 3,000 banked m^3 in volume. The notional target will generally be to have completed 9,000 banked m3 of the 12,500 banked m3 annual volume between 1 March and 31 May. The remaining volume will be carried over into the early parts of winter.

To avoid periods of heavy beach and dual-use-path usage work will generally not be undertaken on weekends or on school or public holidays.

f) Safety, community awareness and beach access

Safety at the extraction site within the Port area will be the responsibility of the GPA. Safety at extraction sites outside the Port and at placement sites shall be through a joint arrangement between the CoG and the GPA. A safety management plan will be drafted by GPA and agreed by both parties**.** CoG will make traffic and pedestrian control devices and signs available for use at the placement locations.

CoG will erect permeant signage and necessary fences at the placement sites. CoG will be responsible for beach access and securing any potentially hazardous banks and slopes.

CoG will undertake a community awareness program utilising the following tools:

1) A single sheet hand out / mail out,
2) Permanent signs, and
3) Web site.

GPA will add to this programme twice yearly advice of the commencement of by-passing in the local press and posting the NBSP document on it's web site.

In the event of extraction from other than the primary or secondary sources the CoG will undertake community awareness programmes to install semi permanent vehicle access restriction / warning signs.

g) Placement operations

At the nourishment site, sand will be spread by front-end loader or other plant. The method of placement will generally be by pushing material that has been dumped by truck out over the top the bank. Bank edges to be rounded to avoid sharp unstable bank faces which may create a hazard to the public.

There will generally be four placement locations depending on needs. They are specific designated spots in the following areas:

1) The cove in the southern crook of the bay on the north side of BCM,

2) The eroding zone between 150 Chapman Road (Cramer & Neil) and 160 Chapman Road (Crothers Construction);
3) The eroding zone between Mitchell & Brown and 170 Chapman Road; and
4) Between Adam Street and Trigg Street.

Refer to the attached drawing.

No placement of sand will be undertaken in such a manner as to disturb any established vegetation.

Volumes of placement at each location on each specific event will be by agreement between GPA and CoG.

Actual Volumes placed at each location to be recorded with copy to CoG.

Sweeping of the dual-use-path & roads, and re-erection of fencing will be undertaken by CoG at the end of each day of placement.

CoG will remove any fences required in order to permit placement operations to occur.

h) Turbidity

The by-pass sand will be natural beach sand. Never the less some turbidity of the ocean at the placement location is likely to occur.

i) Dust Management

GPA will attend to dust management during truck cartage and placing. CoG will be responsible for dust management following placement operations.

GPA agree when available to cart a number of truck loads of seagrass wrack from the source beaches for delivery to the placement sites at the end of each days carting and then spread over the newly placed sand.

j) Short term coastal stability

The GPA will by-pass sand as agreed within the NBSP in an endeavour to maintain the coastline's stability. However the GPA will not be solely responsible for responding to erosion events caused by major storms events. The GPA, DPI and CoG will consult after such events to agree to the actions necessary.

5. MAJOR STORM EVENTS

Extensive erosion often occurs at the northern beaches during winter storm events. High water levels, and large seas and swell can pound the active area causing rapid degradation.

A major storm event is one which creates higher than normal winter wave heights and storm surge and causes greater erosion than annual episodic storm events.

In the event of a major storm event, the GPA shall work co-operatively with the CoG, the DPI and the general community to resolve any beach damage which may occur as a result.

The responsibility for co-ordinating a response to major storm events rests with the CoG. The State Government, through DPI, to provide assistance to local government by way of Emergency Protection Funding.

6. MONITORING, RECORDS & REPORTING

To ascertain the suitability and effectiveness of this plan a number of monitoring programs shall be implemented. These range from shoreline surveys, aerial surveys, photographic records and truck bypassing records.

6.1.1 Shoreline Surveys

To develop the required understanding of sediment dynamics, the GPA has established an inital baseline description of the current topography of the near shore waters and beaches at a number of transects along the coast.

Transects are spaced approximately 75 m apart for the first 750 m north of BCM, thence some 250 m apart north to Chapman River. All beach transects will extend from high water mark to –1.9m AHD. The approximate location of the proposed monitoring transects is shown in the attached figure. (All levels to be correlated to AHD)

These transects will be surveyed on a bi-annual basis for the first three years, once at the end of summer, and once at the end of winter. Thereafter, transects will be surveyed on an annual basis at the end of summer and prior to the onset of winter storms.

The GPA will also continue its current beach monitoring regime at Town Beach and Pages Beach. It will also establish a “one-off” baseline near shore hydrographic survey (out to –4.9m AHD or in line with the offshore breakwater) after placement of STC sands on Town Beach.

It is anticipated that an agreed profile will be nominated in about 2009/2010 for sections of beach and that the beach management programme will aim to maintain that agreed profile over the long term.

The beach monitoring programme will measure deviations from the agreed profile, review the aerial photographic record and historical shoreline location plots, assess the potential implications of the deviations on longer-term coastal stability, and identify appropriate locations for the placement of sand and volumes required.

6.1.2 Aerial Surveys

The GPA shall undertake annual aerial surveys of the northern beaches area to support transect surveys and assessment of the adequacy of this plan.

6.1.3 Photographic Records

The CoG will keep regular (at least annual) photographic records of the Northern Beaches Shoreline, in order to develop a time series record. A procedure will be developed to endeavour to photograph the same sites, from the same location and in the same direction at the same time each year.

6.1.4 Truck Carting

The GPA shall record volumes of sand carted, including the following records for each period of operation:

1) volume by:
    a. source location
    b. dates of volume placements, and
    c. placement location
2) prevailing weather conditions, and
3) before and after photographic records at the placement site.

6.1.5 Records and Reporting

The results of the beach monitoring surveys together with an assessment of volume of sand required to stabilise the eroding beaches for the forthcoming winter will be reported within one month of completion of the end of autumn survey. The report will be sent to the CoG and DPI and agreement reached with GPA on the most appropriate location for nourishment, volume to be emplaced, and timing for nourishment.

All shoreline and truck carting data will be stored by the GPA, but will be available to both the CoG and DPI as requested. Monitoring data shall include the results of bathymetric and beach profile surveys, a record of agreed beach management action (volume of sand and location of placement, a log of sand volumes actually by-passed and to which location, and prevailing weather conditions at time of sand placement).

GPA will compile and provide to CoG and DoE an annual report on outlining:

- Shoreline Surveys
- Aerial Surveys
- Summary of volumes of sand carted, including the following records for each period of operation by:
    a. source location
    b. dates, and
    c. placement location.

The CoG and GPA shall generate a joint annual report to stakeholders which shall detail the action that has been undertaken, the effectiveness of those measures and the proposal for future management.

6.1.6 Review of Data

The NBSP working group will meet to review data and agree actions twice yearly, in early April and early September.

7. SUMMARY OF RESPONSIBILITIES

The following summary of responsibilities shall apply to the NBSP:

Geraldton Port Authority:

1. Bypassing of 12,500 banked m^3 of fill each year; including
    a. Loading,
    b. Carting, and
    c. Pushing.
2. Joint decision with CoG on when and where fill is required;
3. Joint role with CoG in safety management during fill carting and placement;
4. Dust management during transport;
5. Traffic signage;
6. Twice yearly advertising of annual sand by-passing activities;
7. Assistance with emergency response to storm events;
8. Shoreline surveys;
9. Aerial surveys;
10. Truck carting records;
11. Annual data and monitoring report; and
12. Representation at meetings.

City of Geraldton:

1. Management of the northern beaches;
2. Permanent signage (if any) and fencing at sand placement locations;
3. Stabilisation and dust management during and after sand placement;
4. Sweeping of paths and roads following sand placement;
5. Community education and communication;
6. Response to storm events;
7. Joint decision with GPA on when and where fill is required;
8. Vegetation management;
9. Amenities and developments;
10. Photographic records;
11. Public beach access;
12. Joint role with GPA in safety management during fill carting and placement;
13. Road maintenance and access agreements with DPI at Batavia Coast Marina;
14. Annual Stakeholder Reporting;
15. Meeting convening and reporting; and
16. Representation at meetings.

Department of Planning and Infrastructure:

1. Assistance with emergency response to storm events;
2. Technical Coastal advice and assistance as required; and
3. Representation at meetings.

8. RESOLUTION OF ISSUES

Where issues cannot be resolved directly at officer or working group level they shall be brought to the City of Geraldton – Geraldton Port Authority Liaison Committee for discussion and recommendation to City Council and GPA Board for resolution.