CHAPTER 7
BENSON BEACH DISPOSAL SITE EVALUATION

Benson Beach is located between the MCR north jetty and North Head, a rocky promontory approximately 7,500 ft north of the north jetty. The shoreline of Benson Beach has been eroding since the 1940's. The 1990-1997 shoreline recession rate averaged about 100 ft/yr. The volume of sediment loss associated with that rate is estimated to be 300,000 to 400,000 cy/yr. Several parties have suggested direct disposal of dredged material onto Benson Beach could offset erosion and reduce the need for ocean disposal. For those reasons, it was evaluated and presented in this report.

7.2 DISPOSAL OPTIONS

Disposal options at Benson Beach involve how to place dredged material on and/or offshore of the active beach. No material would be placed upland, away from the shoreline. The options range from annually placing enough sand on the beach to offset shoreline erosion, to filling the beach and offshore area back to the 1940 configuration.

It would require 300,000 to 400,000 cy/yr of disposal to counterbalance the recent erosion rate. The material could be placed along the entire beach, extending over 300 ft seaward of the high water line, or on shorter lengths with greater widths. Higher disposal rates could extend the shoreline seaward. It would require approximately 8 mcy to return the beach the 1940 shoreline, assuming a top of fill elevation of 10 ft MLLW. Sand placement would begin just above the high tide level and extend offshore about 2,000 ft. It would take two years of normal MCR maintenance dredging to get the 8 mcy needed for this fill.

7.3 DREDGING AND DISPOSAL ALTERNATIVES

Direct placement of dredged material from either the MCR or the Columbia River channels onto the beach is not feasible using current dredging practices and equipment at the projects. Beach placement would require a dredged material source, a transfer station, a connection (shorepipe) between the transfer station and beach, and heavy equipment to distribute material along the beach face. Possible methods to pump material to the beach include direct pump-out from a hopper dredge, depositing material into a sump and re-dredging with a pipeline dredge, and pumping to the beach with a system such as the Punaise submerged pump. Each if these methods are described below.

7.31 <u>Hopper Dredge Pump-ashore.</u> A hopper dredge pump-ashore operation would involve dredging material from the MCR channel, transporting it to a nearshore location and then using onboard pumps to pump the material to the beach. None of the hopper dredges working at the MCR or the Columbia River projects in recent years is currently

set up for direct pump ashore operations. The dredge ESSAYONS has the pump capability but would require modifications to utilize the system. It is estimated that around 0.5 mcy could be placed on Benson Beach each year using this method.

A mooring buoy would be required for the dredge to connect to a pipeline to shore. It would be necessary for the mooring location to be fairly protected from waves and currents. It may be possible to develop a location up inside Baker Bay that affords protection from larger waves and swell conditions. The area would still experience some wave activity and tidal currents. It would be necessary to dredge a deeper channel (35 foot) into the bay and a mooring location and turning basin for the dredge because Baker Bay is very shallow. The dredge ESSAYONS is 350 feet long, so the turning basin would need to be at least 500 feet across. This would involve dredging in shallow water habitat that has been identified as critical habitat for endangered salmon species and important rearing habitat for young Dungeness crabs and likely other estuarine species.

The dredging requirements to create the access channel and turning basin in Baker Bay are estimated to be 1.5 mcy and 0.5 mcy, respectively. This material is assumed to be primarily silty sand based on the surrounding environment, and would likely have to be placed at an ocean site since it is not suitable for beach nourishment. The most likely method to accomplish this dredging is with a clamshell dredge and barge. Sediment quality evaluations would need to be conducted to verify the character of the material and determine whether it is acceptable for unconfined in-water disposal. Explorations may also be required to ensure there are no rock outcroppings in the possible area, given the close proximity to the rocky headlands of Cape Disappointment.

There would be large initial costs to prepare for a pump-ashore operation. The dredge ESSAYONS would require $400,000 to $600,000 in modifications to be used for pump-ashore disposal. The cost of the access channel and turning basin is estimated to be between 5- and 9-million dollars and the mooring buoy cost would be in the 1 million dollar range. The total initial costs could be in the 6- to 11-million dollar range.

Typically, it takes 2 to 3 times as long to pump material out of the hopper as it does to load it, or 1 ½ to 3 hours, as opposed to bottom dumping a load in 5-20 minutes. Therefore, costs for direct pump ashore are estimated to be two to three times higher than the current practice, or about $2.60 to $3.90 per cubic yard. To pump sand to the far ends of the beach a booster is required, adding another $0.70 to $0.90 per cubic yard.

The increased time to offload the sand would cut into the available time for dredging (roughly triple the time required to dredge a given quantity), resulting in either the need for an additional dredge to complete the necessary maintenance dredging, or the project not being fully maintained. Considering the availability of dredging plant and other workloads along the West Coast, it is not realistic to expect another dredge would be available to work at the project.

7.32 Pipeline Dredge. The use of a pipeline dredge would require construction of a large sump to place MCR material in before the pipeline could pump it to Benson Beach. There

is some question that a safe and environmentally acceptable location for such a sump could be found in the vicinity of the project. Even inside of Baker Bay, the pipeline dredge used during the deepening of the Federal navigation channel in 1985 experienced difficulties with tidal currents and waves. Two possible locations for the sump were identified inside of Baker Bay and both would require considerable dredging within the bay. An onshore booster pump would also be required for pumping distances greater than about 2 miles.

One location would be near the entrance to Baker Bay, on the east side of jetty A. This would reduce the length of the access channel required for the hopper dredge and could provide a larger area for the sump. A 1 mcy capacity sump would require a basin 2,000 by 2,000 feet and 40 feet. Approximately 5 mcy would have to be dredge to create a sump this size.

Another alternative would be to locate the sump near the low area at the entrance to Fort Canby State Park. A smaller sump would be used here due to limited space. For estimation purposes, a 1,000 by 1,000 foot sump with a 500,000 cy per year capacity was evaluated. Approximately 1.5 mcy would have to be dredge to create an access channel for the hopper dredge to provide sand to the pipeline dredge. Another 2mcy would have to be dredged to create the sump.

The initial costs for the sump and turning basin for a pipeline dredge could range from 7.5 million dollars to as much as 23 million dollars, depending on the location. It would cost about 0.5 million dollars each year to mobilize the pipeline dredge and then between $3.50 and $4.40 per cubic yard to dredge the sump. Transporting material to the sump could cost $0.25 to $0.50 per cubic yard and a booster, where needed, would add another $0.70 to $0.90 per cubic yard.

7.33 Punaise: The Punaise has been used for beach nourishment projects in the Netherlands and it appears to have potential here. It involves use of a submerged, self-contained pump connected to shore by an umbilical cord that provides power and controls, and is run out to the pump inside of the pipeline. The system is designed to dig itself into the bottom and is therefore more protected from waves than floating plant on the surface. It is reported to be capable of pumping up to 6,000 feet without a booster in suitable conditions. The pipeline for discharge still must run up onto the beach, so it is somewhat vulnerable to waves and current. In the Netherlands, the system is used only during the summer when safe operation on the beach is possible. This system has not been used in the United States and would be considered experimental.

Because it is more protected from wave impacts, it may be possible to use this system near the north jetty or from a location offshore on peacock Spit. It would be necessary to transport additional sand to it using a hopper dredge to provide a sufficient supply for the beach. This is being done in the Netherlands. Additional evaluation and coordination with the company would be necessary to determine whether the system could be used at this location.

Preliminary cost estimates for this system are $550,000 for mobilization, $2.50 to 3.50 per cubic yard to pump material, and $.70 to $.90 per cubic yard for use of a booster. Production is estimated at 5,000 to 10,000 cubic yards per day or 0.5 to 1.0 mcy per year. These costs assume the location and material are suitable for the system and are subject to change if conditions warrant.

7.4 PLACEMENT OPTIONS

A specific plan for placement on the beach, including the quantity required and extent of coverage, has not been proposed. One method would be to place the discharge pipe as near as possible to the north jetty, and the fill would be extended to the north for up to 10,000 feet. Extending the fill to the north could be accomplished either by extending the pipeline, which may require the use of additional booster pumps, or by transporting material with earth moving equipment. In either case, the operation would require the use of heavy equipment on the beach to move the discharge pipe and redistribute sand. Typically, dredging operations would occur 24 hours a day and this type of work would be conducted during the summer months when wave conditions are lower, allowing safe operation on the beach. This operation would directly conflict with public access and recreational use of the beach and Fort Canby State Park.

7.5 CONCLUSIONS

The dredging and disposal alternatives discussed above have annual capacities of between 0.5 and 1.0 mcy per year. That is not enough capacity to handle the approximately 4 mcy dredged each year from the MCR project. The lower rate is only 0.2 mcy per year above the estimated erosion rate and it could take 40 years to refill the beach to the 1940 configuration. At the higher rate the beach could be rebuilt in about 12 years.

The Corps cannot incur the significantly greater costs and environmental impacts associated with any of these alternatives under its normal dredging authorities. There are some specific authorities for beach nourishment or beneficial uses of dredged material that would allow the Corps to pursue these alternatives. These authorities require a local sponsor to cost share in the planning and implementation of the project to place sand onto the beach, a study to determine that there is a Federal interest, and approval by Corps Headquarters. While various parties have expressed an interest in placing dredged material onto Benson beach, to date, no willing local sponsor has been identified. The Portland District would be able to spend more effort on evaluating and developing alternatives for direct placement onto the beach if a potential local sponsor is identified and is interested in evaluating any possible beneficial use alternatives.