

ATTACHMENT D

**Dare County Beaches (Bodie Island Portion) Hurricane
Protection and Beach Erosion Control Project
Dare County, North Carolina**

**PRELIMINARY COMPILATION OF DISPOSAL/NOURISHMENT
ZONES
And
BORROW AREAS IN RECOVERY FROM 5-YEAR RUNNING
TOTAL**

U.S. ARMY CORPS OF ENGINEERS, WILMINGTON DISTRICT

**Prepared: February 2000
Updated: September 2000**

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PRELIMINARY COMPILATION OF DISPOSAL/NOURISHMENT ZONES U.S. ARMY CORPS OF ENGINEERS, WILMINGTON DISTRICT Prepared: February 2000, Updated: September 2000

The information contained within the preliminary compilation has been prepared using available information. The proposed projects, extending to the year 2011, are included; however, the projected information is highly speculative and should not be used as factual data.

NAVIGATION PROJECTS

The Wilmington District performs routine maintenance dredging of navigation channels along the entire 320 miles of shoreline from the Virginia line to the north and the South Carolina to the south.

The beneficial use of dredged material that meets the criteria of greater than or equal to 90% sand (retained by #200 sieve or greater than or equal to 0.074 mm) is an integral part of the navigation program. Where possible, clean, beach quality material, removed from the navigation channels, is placed in the wave uprush zone of nearby beaches or on control-of-effluent islands used by nesting colonial waterbirds. The placement of material in this manner is consistent with Section .1100 of the Coastal Management regulations (TT15A:07M.1100).

The beneficial placement of material removed from the navigation projects back into the littoral system is performed by hydraulic pipeline dredge with the pipeline extending from the area being dredged to the approved beach disposal area. The material is placed within the wave uprush zone at the proper elevation that allows the material to be under tidal influence creating a gentle slope without escarpments. The purpose of placement of material is not to build up the beachfront dune or berm system, only to return the material to the littoral system. This is the difference between what is referred to as disposal versus beach nourishment associated with a Beach Erosion Control and Hurricane Protection Project such as Wrightsville Beach.

NOURISHMENT PROJECTS

The District currently maintains active Beach Erosion Control and Hurricane Wave Protection Projects at Wrightsville Beach, Carolina Beach and Vicinity and Carolina Beach-South (Kure Beach). The Brunswick County Beaches, Ocean Isle Portion, is proposed for construction in FY 2001. Additional studies are currently underway for Beach Erosion Control and Hurricane Wave Protection Projects at Brunswick County Beaches, Oak Island and Caswell Beach Portion and the Holden Beach Portion, and Dare County Beaches. These three projects

are currently proposed for construction, contingent upon approval, for FY 2004 and FY 2005. Nourishment is generally performed by a hydraulic pipeline dredge and includes the construction/maintenance of a dune and berm system. The compatibility of the beachfront material in relationship to the borrow source is evaluated prior to placement of material. Pending studies include the Towns of Topsail Beach, North Topsail Beach, and Surf City; Bogue Banks, and the Hatteras to Ocracoke Portion of Dare County Beaches.

SUMMARY:

The placement of dredged material within the 320 miles of beachfront along the North Carolina coastline is summarized below by mileage and maintenance schedule. The summary is broken down by disposal versus nourishment events. This breakdown is necessary to delineate between material placed in the wave uprush area versus on the upper beach and dune system. The computations are made based on actual mileage used during any given disposal event. For instance, an approved 5-mile of beachfront may be designated for disposal; however, during a given event only 0.4 to 1 mile of beachfront may be impacted. Calculations were made based on a 16-year period and percentage of North Carolina Shoreline (320 miles) impacted.

DISPOSAL ACTIVITIES:

- Average/year – 8.0 miles or 2.5% of total NC Shoreline (320 miles)
- Minimum for any year – 3.5 miles or 1% of total NC Shoreline
- Maximum for any given year is 22.4 miles or 7.0% of total NC Shoreline

EXISTING BEACH NOURISHMENT

- Average of 2.9 miles or 1% of NC Shoreline
- Minimum of 0 (possible that no beach nourishment in any given year)
- Maximum of 9.8 (all occur at same time) which is 3.1% of NC Shoreline

PROPOSED BEACH NOURISHMENT

- Average of 16.9 miles or 5.3% of NC Shoreline
- Minimum would be 0 (possible none occurred)
- Maximum of 85.0 miles which is 26.6% of NC Shoreline

CUMULATIVE (Averaging both disposal and nourishment projects existing and future.)

- Average impact from existing disposal and nourishment $(8.0 + 2.9) = 11.0$ miles, 3.4 % of NC Shoreline.
- Maximum impact (worst case) from existing beach disposal and nourishment activities $(22.4 + 9.8) = 32.2$ miles, 10.1% of NC Shoreline.
- Average impact from existing disposal and nourishment projects and proposed projects $(8.0 + 2.9 + 16.9) = 27.8$ miles, 8.7% of NC Shoreline.
- Maximum impact (worst case) from existing disposal and nourishment and proposed beach nourishment $(22.4 + 9.8 + 85.0) = 117.2$ miles, 36.6% of NC Shoreline.

TABULATION OF BEACH DISPOSAL AND NOURISHMENT PROJECTS
U.S. ARMY CORPS OF ENGINEERS – WILMINGTON DISTRICT
Prepared and Updated September 2000

<u>USGS QUAD #</u>	<u>PROJECT</u>	<u>DISPOSAL LOCATION</u>	<u>APPROVED DISPOSAL LIMITS</u>	<u>ACTUAL DISPOSAL LIMITS</u>	<u>ESTIMATED QUANTITY CU. YDS</u>	<u>COMMENTS</u>
Outer Banks	Avon	Begins at a point 1.15 miles south of Avon Harbor and extends north 3.1 miles	3.1 miles (16,368 lf)	0.4 miles or 2,000 linear feet	<50,000 every 6 yrs	Special Use Permit Required from NPS/CHNS
	Rodanthe	Extends from rd to Rodanthe Harbor south 700' to south end of beach disposal area (straight out from existing dirt road). North end at Wildlife Refuge Boundary (PINWR)	.91 miles or 4,800 linear feet	0.4 miles or 2,000 linear feet	<100,000 every 6 yrs	Special Use Permit Required from NPS/CHNS
	Ocracoke (Ocracoke Island)	Begins at a point 5,000 linear feet south of Hatteras Inlet and extends southward about 3,000 linear feet.	0.6 mile or 3,000 linear feet	0.4 mile or 2,000 linear feet	<100,000 every 2 to 3 years	Special Use Permit Required from NPS/CHNS
	Rollinson (Hatteras)	Begins at a point 0.85 miles south of Hatteras Harbor and extends north 5.85 miles to a point north of Frisco, NC	5.85 miles (30,888 lf)	0.4 miles or 2,000 linear feet	<60,000 every 2 years	Special Use Permit NPS/CHNS

USGS QUAD #	PROJECT	DISPOSAL LOCATION	APPROVED DISPOSAL LIMITS	ACTUAL DISPOSAL LIMITS	ESTIMATED QUANTITY CU. YDS	COMMENTS
Outer Banks	Silver Lake (Teaches Hole/Ocracoke)	From a point 2,000'NE of inlet and extending approximately 2,000 linear feet (0.4 miles) to the NE (Ocracoke Island)	0.4 miles or 2,000 linear ft	0.4 miles or 2,000 linear feet	<50,000 every 2 yrs	Special Use Permit NPS/CHNS
	Oregon Inlet		3 miles or 15,840 linear feet	1.5 miles or 7,920 linear feet	300,000 Annually	Special Use Permit USFWS/PINWR
Outer Banks	Drum Inlet	Core Banks. From a point 2,000 feet on either side of inlet extending for 1 mile in either direction	2 miles 10,560 linear ft	1 mile or 5,280 linear feet	298,000 initial, 100,000 maint. Unscheduled Assume 8 year cycle	SUP from NPS/CLNS (Included in analysis; however, no determination of site being reused can be made at this time.)
Beaufort (22)	Morehead City (Brandt Island)	2,000 ft west of inlet, Fort Macon and Atlantic Beach to Coral Bay Club, Pine Knoll Shores	7.3 miles 38,300 linear ft	5.2 miles or 27,800 linear feet	3.5 million every 8 yrs	Material from Ocean Bar routinely placed in nearshore berm or ODMDS on annual basis

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Beaufort (22)	AIWW Section I, Tangent B	Pine Knoll Shores, vicinity of Coral Bay	2 miles (10,500 lf)	0.4 miles or 2,000 linear feet	<50,000 every 5 yrs	This area is included every 8 years as part of pumpout of Brandt Island. Also included in the area under investigation for beach nourishment at Bogue Banks.
Swansboro (25)	AIWW Bogue Inlet Crossing Section I, Tangent-H through F	Approx. 2,000 feet from inlet going east to Emerald Point Villas, Emerald Isle (Bogue Banks)	1 mile or 5,280 linear feet	0.4 miles or 2,000 linear feet	<100,000 annually	
Browns Inlet (27/28)	AIWW Section II, Tangents- F,G,H	Camp Lejeune, 3,000 feet west of Browns Inlet extending westward	1.58 miles or 6,000 linear feet	1 mile or 5,280 linear feet	<200,000 every 2 yrs	
New River Inlet (28)	AIWW, New River Inlet Crossing Section II, Tangents I & J, Channel to Jax. Section III, tangents 1&2	N. Topsail Beach, 3,000 feet west of inlet extending westward to Maritime Way (Galleon Bay area)	1.5 miles or 8,000 linear feet	0.8 miles or 4,000 linear feet	<200,000 annually	Two areas 2,000 linear feet on either side of disposal area are routinely used.

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Hampstead (33)	AIWW, Sect. III	Topsail Island, Queens Grant	0.6 miles or 2,500 lf	0.6 miles or 2,500 lf	<50,000 every 6 yrs	
Hampstead (33)	AIWW, Topsail Inlet Crossing & Topsail Creek	Topsail Beach, from a point 2,000 feet north of Topsail Inlet	1 mile or 5,280 lf	0.4 mi or 2,000 ft	<75,000 annually	
Wrightsville Beach (35)	AIWW Sect. III, Tang 11&12 Mason Inlet Crossing	Shell Island (north end of Wrightsville Beach from a point 2,000 feet from Mason Inlet	0.4 mi. or 2,000 linear feet	0.4 mi. or 2,000 lf	<100,000 NOT SCHEDULED	Not required for past 8 years since inlet crossing closed up. If reopened will be rescheduled if needed. (Not included in analysis.)
Wrightsville Beach (35)	Masonboro Sand Bypassing	At a point 9,000 feet from jetty extending southward midway of island	1.2 miles or 6,000 lf	1 mile 5,280 lf	500,000 every 4 years	Same time as Wrightsville Beach Nourishment
Carolina Beach (36)	AIWW, Section IV, Tangent 1	Southern end of Masonboro Island at a point 2,000 linear feet from Carolina Beach Inlet extending northward to Johns Bay area	1.3 miles (7,000 linear feet)	0.4 miles (2,000 linear feet)	<50,000 annually	This site is used alternately with Carolina Beach Disposal Site on North End of Island

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Beachfront on eastern end of island	4.7 miles or (25,000 linear feet)			4.7 miles or (25,000 linear feet)	1.1 million every 6 years	Disposal of material from Wilmington Harbor Ocean Bar Project
Bald Head	Bald Head	Beach front on eastern and western shoreline	3.0 miles or 16,000 lf	3.0 miles or 16,000 lf	1.1 million every 2 years (Except every 6 th year when it goes to Caswell)	Disposal least costly from Wilmington Harbor Ocean Bar Project

EXISTING BEACH NOURISHMENT PROJECTS

Wrightsville Beach (35)	Wrightsville Beach Nourishment Project	From South side of Water Tower to Sand Dollar Lane to the north	3 miles of beach or 14,000 lf	3 mi 14,000 lf	1 million every 4 years	3 miles includes 2,000 lf transition area
Carolina Beach (36/37)	Carolina Beach North	500 feet north of Carolina Beach pier extending southward to town limits of Hanby Beach	3 miles or 14,000 linear feet	3 miles or 14,000 linear feet	1 million every 3 years	Renourished concurrent with Carolina Beach South. 3 mi. includes natural transition area.
Carolina Beach (36/37)	Carolina Beach South (Kure Beach)	Town Limits of Hanby Beach extending southward to a point just north of the Riggings	3.8 miles or 18,000 linear feet	3.8 miles or 18,000 linear feet	1 million every 3 years (3.3 million initial placement 97/98)	Renourished concurrent with Carolina Beach North Project. 3 mi. includes natural transition area.

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SCHEDULED BEACH NOURISHMENT/933/1135 PROJECTS AND PROPOSED STUDIES						
FY 2001 Brunswick Co. Bches	Ocean Isle Portion	Beachfront of Ocean Isle Beach	5.3 miles (28,000 lf)	5.3 miles (28,000 lf)	TBD	Pending Funding
FY 2001/2/4 Brunswick Co. Bch	Oak Island and Caswell Beach Portion	Beachfront of Oak Island and Caswell Beach	10.3 miles (54,384 lf)	10.3 miles (54,384 lf)	TBD	933 (Wilmington Harbor Project), year 2001/2; 1135 Sea Turtle Habitat Restoration Project, year 2001, both funded and approved. Brunswick County Beaches Portion, Pending approval of GRR and NEPA, 2004 Pending Completion and approval of GRR/NEPA
FY 2005 Brunswick Co. Bches	Holden Beach Portion	Beachfront of Holden Beach	7.6 miles (40,120 lf)	7.6 miles (40,120 lf)	TBD	Recon Requested; no study underway. Study area will not include approx. 7 miles of beachfront within Coastal Barrier Resources Zone
FY 2013 North Topsail Beach	N. Topsail Beach, area outside CBRAo	Beachfront of Town of North Topsail Beach	12 mile study area (63,360 linear feet)	5 miles (26,400)	TBD	Recon level Feasibility Study requested; no study underway. Project to be completed in 3 5.7 mile phases
FY 2006 Bogue Banks	Bogue Banks	Beachfront of Bogue Banks from Beaufort Inlet to Bogue Inlet	17.1 miles total miles (90,288 linear feet)	17.1 miles (90,288 lf) , 3 phases, 5.7 mi. ea. phase	TBD	

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FY 2008 Topsail Beach	Town of Topsail Beach	Beachfront of Topsail Island within Town limits of Topsail Beach	10 miles (52,800 lf)	10 miles (52,800 lf)	TBD	Pending funding of GRR/NEPA
FY 2011 Surf City	Town of Surf City	Beachfront of Topsail Island within Town limits of Surf City	5.5 miles (29,040 linear feet)	5.5 miles (29,040 linear feet)	TBD	Recon Requested; no study underway
FY 2004 Dare County Beaches	Dare County Bodie Island Portion	Beachfront of Kitty Hawk and Nags Head	14.2 miles (74,976 lf)	14.2 miles (74,976 lf)	Initial 12.3 million; Nourishment 3.9 every 3 years	Pending approval of Feasibility Study and EIS
FY 2004 Kitty Hawk North	Kitty Hawk	Beachfront of Kitty Hawk	2.2 miles (11,616 lf)	2.2 miles (11,616 lf)	TBD	Request for additional study. Not included in analysis
FY 2008 Dare County Beaches	Hatteras to Ocracoke Portion	Beachfront of Hatteras and Ocracoke Islands (HOT SPOTS)	10 miles (52,800 lf)	10 miles (52,800 lf)	TBD	Pending completion of Feasibility Study and EIS

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DISPOSAL MILES PER YEARS

Existing O&M	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Average Miles per year	Percent of total NC Beaches	Total Miles of Beach Affected	Percent of total NC Beaches
Disposal Cycle 1yr	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	1.1%	3.5	1.1%
Disposal Cycle 2yr		5.2		5.2		5.2		5.2		5.2		5.2		5.2		5.2	2.6	0.8%	5.2	1.6%
Disposal Cycle 4yr				1.0				1.0				1.0				1.0	0.3	0.1%	1.0	0.3%
Disposal Cycle 5yr					0.4					0.4					0.4		0.1	0.0%	0.4	0.1%
Disposal Cycle 6yr						6.1						6.1					0.8	0.2%	6.1	1.9%
Disposal Cycle 8yr								6.2								6.2	0.8	0.2%	6.2	1.9%
Subtotal	3.5	8.7	3.5	9.7	3.9	14.8	3.5	15.9	3.5	9.1	3.5	15.8	3.5	8.7	3.9	15.9	8.0	2.5%	22.4	7.0%

DISPOSAL MILES PER YEARS

Existing Beach Nourishment	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Average Miles per year	Percent of total NC Beaches	Total Miles of Beach Affected	Percent of total NC Beaches
Carolina Beach		6.8			6.8			6.8			6.8			6.8			2.1	0.7%	6.8	2.1%
Wrightsville Beach			3.0				3.0				3.0				3.0		0.8	0.2%	3.0	0.9%
Subtotal	0.0	6.8	3.0	0.0	6.8	0.0	3.0	6.8	0.0	0.0	9.8	0.0	0.0	6.8	3.0	0.0	2.9	0.9%	9.8	3.1%

DISPOSAL MILES PER YEARS

All existing Projects	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Average Miles per year	Percent of total NC Beaches	Total Miles of Beach Affected	Percent of total NC Beaches
Beach Disposal	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	2.5%	22.4	7.0%
Carolina -Kure Beach		6.8			6.8			6.8			6.8			6.8			2.1	0.7%	6.8	2.1%
Wrightsville Beach			3.0				3.0				3.0				3.0		0.8	0.2%	3.0	0.9%
Total	8.0	14.8	11.0	8.0	14.8	8.0	11.0	14.8	8.0	8.0	17.8	8.0	8.0	14.8	11.0	8.0	11.0	3.4%	32.2	10.1%

DISPOSAL MILES PER YEARS

Proposed Beach Nourishment	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Average Miles per year	Percent of total NC Beaches	Total Miles of Beach Affected	Percent of total NC Beaches
Ocean Isle		5.3			5.3			5.3			5.3			5.3			1.7	0.5%	5.3	1.7%
Oak Island-Caswell					10.3			10.3			10.3			10.3			2.6	0.8%	10.3	3.2%
Holden Beach						7.6			7.6			7.6			7.6		1.9	0.6%	7.6	2.4%
Topsail Beach								10.0			10.0			10.0			1.9	0.6%	10.0	3.1%
Bogue Banks											5.7	5.7	5.7	5.7	5.7	5.7	2.1	0.7%	17.1	5.3%
Surf City										5.5			5.5			5.5	1.0	0.3%	5.5	1.7%
North Topsail														5.0			0.3	0.1%	5.0	1.6%
Dare County (Hatteras to Ocracoke)									10.0			10.0			10.0		1.9	0.6%	10.0	3.1%
Dare County (Bodie Island)					7.5	3.4	3.3	5.3	5.5	3.4	5.3	5.5	3.4	5.3	5.5	3.4	3.6	1.1%	14.2	4.4%
Subtotal	0.0	5.3	0.0	0.0	23.1	11.0	3.3	30.9	23.1	8.9	36.6	28.8	14.6	41.6	28.8	14.6	16.9	5.3%	85.0	26.6%

DISPOSAL MILES PER YEARS

All existing and Proposed Projects	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Average Miles per year	Percent of total NC Beaches	Total Miles of Beach Affected	Percent of total NC Beaches
Beach Disposal	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	2.5%	22.4	7.0%
Carolina -Kure Beach		6.8			6.8			6.8			6.8			6.8			2.1	0.7%	6.8	2.1%
Wrightsville Beach			3.0				3.0				3.0			3.0			0.8	0.2%	3.0	0.9%
Ocean Isle		5.3			5.3			5.3			5.3			5.3			1.7	0.5%	5.3	1.7%
Oak Island-Caswell					10.3			10.3			10.3			10.3			2.6	0.8%	10.3	3.2%
Holden Beach						7.6			7.6			7.6			7.6		1.9	0.6%	7.6	2.4%
Topsail Beach								10.0			10.0			10.0			1.9	0.6%	10.0	3.1%
Bogue Banks											5.7	5.7	5.7	5.7	5.7	5.7	2.1	0.7%	17.1	5.3%
Surf City										5.5			5.5			5.5	1.0	0.3%	5.5	1.7%
North Topsail														5.0			0.3	0.1%	5.0	1.6%
Dare County Beaches (Hatteras to Ocracoke)									10.0			10.0			10.0		1.9	0.6%	10.0	3.1%
Dare County Beaches (Bodie island)					7.5	3.4	3.3	5.3	5.5	3.4	5.3	5.5	3.4	5.3	5.5	3.4	3.6	1.1%	14.2	4.4%
Subtotal	8.0	20.1	11.0	8.0	37.9	19.0	14.3	45.7	31.1	16.9	54.4	36.8	22.6	56.4	39.8	22.6	27.8	8.7%	117.2	36.6%

BORROW AREAS IN RECOVERY FROM 5-YEAR RUNNING TOTAL
Site Specific Impacts S1

Year	Segment	Initial/ Periodic	Borrow Area	Area Required Acres	Running 5- year Total Acres	Area Required Miles	Running 5- year Total Miles
2004	North Proj	initial	N1				
	South Ph 1	initial	S1	130	130	0.2	0.2
2005	South Ph 2	initial	S1	150	280	0.2	0.4
2006	South Ph 3	initial	S1	150	430	0.2	0.7
2007	North Proj	periodic	S1	55		0.1	
	South Ph 1	periodic	S1	45	530	0.1	0.8
2008	South Ph 2	periodic	S1	55	585	0.1	0.9
2009	South Ph 3	periodic	S1	55	510	0.1	0.8
2010	North Proj	periodic	S1	55		0.1	
	South Ph 1	periodic	S1	45	460	0.1	0.7
2011	South Ph 2	periodic	S1	55	365	0.1	0.6
2012	South Ph 3	periodic	S1	55	320	0.1	0.5
2013	North Proj	periodic	S1	55		0.1	
	South Ph 1	periodic	S1	45	365	0.1	0.6
2014	South Ph 2	periodic	S1	55	365	0.1	0.6
2015	South Ph 3	periodic	S1	55	320	0.1	0.5
2016	North Proj	periodic	S1	55		0.1	
	South Ph 1	periodic	S1	45	365	0.1	0.6
2017	South Ph 2	periodic	S1	55	365	0.1	0.6
2018	South Ph 3	periodic	S1	55	320	0.1	0.5
2019	North Proj	periodic	S1	55		0.1	
	South Ph 1	periodic	S1	45	365	0.1	0.6
2020	South Ph 2	periodic	S1	55	365	0.1	0.6
2021	South Ph 3	periodic	S1	55	320	0.1	0.5
2022	North Proj	periodic	S1	55		0.1	
	South Ph 1	periodic	S1	45	365	0.1	0.6
2023	South Ph 2	periodic	S1	55	365	0.1	0.6
2024	South Ph 3	periodic	S1	55	320	0.1	0.5
2025	North Proj	periodic	S1	55		0.1	
	South Ph 1	periodic	S1	45	365	0.1	0.6
2026	South Ph 2	periodic	S1	55	365	0.1	0.6
2027	South Ph 3	periodic	S1	55	320	0.1	0.5
2028	North Proj	periodic	S1	55		0.1	
	South Ph 1	periodic	S1	45	365	0.1	0.6
2029	South Ph 2	periodic	S1	55	365	0.1	0.6
2030	South Ph 3	periodic	S1	55	320	0.1	0.5
2031	North Proj	periodic	S1	55		0.1	
	South Ph 1	periodic	S1	45	365	0.1	0.6
2032	South Ph 2	periodic	S1	55	365	0.1	0.6
2033	South Ph 3	periodic	S1	55	320	0.1	0.5
2034	North Proj	periodic	S1	55		0.1	
	South Ph 1	periodic	S1	45	365	0.1	0.6
2035	South Ph 2	periodic	S1	55	365	0.1	0.6
2036	South Ph 3	periodic	S1	55	320	0.1	0.5
2037	North Proj	periodic	S1	55		0.1	

BORROW AREAS IN RECOVERY FROM 5-YEAR RUNNING TOTAL

Site Specific Impacts S1

	South Ph 1	periodic	S1	45	365	0.1	0.6
2038	South Ph 2	periodic	S1	55	365	0.1	0.6
2039	South Ph 3	periodic	S1	55	320	0.1	0.5
2040	North Proj	periodic	S1	55		0.1	
	South Ph 1	periodic	S1	45	365	0.1	0.6
2041	South Ph 2	periodic	S1	55	365	0.1	0.6
2042	South Ph 3	periodic	S1	55	320	0.1	0.5
2043	North Proj	periodic	S1	55		0.1	
	South Ph 1	periodic	S1	45	365	0.1	0.6
2044	South Ph 2	periodic	S1	55	365	0.1	0.6
2045	South Ph 3	periodic	S1	55	320	0.1	0.5
2046	North Proj	periodic	S1	55		0.1	
	South Ph 1	periodic	S1	45	365	0.1	0.6
2047	South Ph 2	periodic	S1	55	365	0.1	0.6
2048	South Ph 3	periodic	S1	55	320	0.1	0.5
2049	North Proj	periodic	S1	55		0.1	
	South Ph 1	periodic	S1	45	365	0.1	0.6
2050	South Ph 2	periodic	S1	55	365	0.1	0.6
2051	South Ph 3	periodic	S1	55	320	0.1	0.5
2052	North Proj	periodic	S1	55		0.1	
	South Ph 1	periodic	S1	45	365	0.1	0.6
2053	South Ph 2	periodic	S1	55	365	0.1	0.6
2054	South Ph 3	periodic	S1	55	320	0.1	0.5
2055					265		0.4
2056					210		0.3
2057					110		0.2
2058					55		0.1
2059					0		0.0
AVERAGE IMPACT AREA/YEAR				76		0.1	
AVERAGE AREA IN RECOVERY FROM 5-YEAR RUNNING TOTAL					345		0.5

BORROW AREAS IN RECOVERY FROM 5-YEAR RUNNING TOTAL
Site Specific Impacts S1 + N1

year	Segment	Initial/ Periodic	Borrow Area	Area Required Acres	Running 5- year Total Acres	Area Required Miles	Running 5- year Total Miles
2004	North Proj	initial	N1	300		0.5	0.0
	South Ph 1	initial	S1	130	430	0.2	0.7
2005	South Ph 2	initial	S1	150	580	0.2	0.9
2006	South Ph 3	initial	S1	150	730	0.2	1.1
2007	North Proj	periodic	S1	55		0.1	
	South Ph 1	periodic	S1	45	830	0.1	1.3
2008	South Ph 2	periodic	S1	55	885	0.1	1.4
2009	South Ph 3	periodic	S1	55	510	0.1	0.8
2010	North Proj	periodic	S1	55		0.1	
	South Ph 1	periodic	S1	45	460	0.1	0.7
2011	South Ph 2	periodic	S1	55	365	0.1	0.6
2012	South Ph 3	periodic	S1	55	320	0.1	0.5
2013	North Proj	periodic	S1	55		0.1	
	South Ph 1	periodic	S1	45	365	0.1	0.6
2014	South Ph 2	periodic	S1	55	365	0.1	0.6
2015	South Ph 3	periodic	S1	55	320	0.1	0.5
2016	North Proj	periodic	S1	55		0.1	
	South Ph 1	periodic	S1	45	365	0.1	0.6
2017	South Ph 2	periodic	S1	55	365	0.1	0.6
2018	South Ph 3	periodic	S1	55	320	0.1	0.5
2019	North Proj	periodic	S1	55		0.1	
	South Ph 1	periodic	S1	45	365	0.1	0.6
2020	South Ph 2	periodic	S1	55	365	0.1	0.6
2021	South Ph 3	periodic	S1	55	320	0.1	0.5
2022	North Proj	periodic	S1	55		0.1	
	South Ph 1	periodic	S1	45	365	0.1	0.6
2023	South Ph 2	periodic	S1	55	365	0.1	0.6
2024	South Ph 3	periodic	S1	55	320	0.1	0.5
2025	North Proj	periodic	S1	55		0.1	
	South Ph 1	periodic	S1	45	365	0.1	0.6
2026	South Ph 2	periodic	S1	55	365	0.1	0.6
2027	South Ph 3	periodic	S1	55	320	0.1	0.5
2028	North Proj	periodic	S1	55		0.1	
	South Ph 1	periodic	S1	45	365	0.1	0.6
2029	South Ph 2	periodic	S1	55	365	0.1	0.6
2030	South Ph 3	periodic	S1	55	320	0.1	0.5
2031	North Proj	periodic	S1	55		0.1	
	South Ph 1	periodic	S1	45	365	0.1	0.6
2032	South Ph 2	periodic	S1	55	365	0.1	0.6
2033	South Ph 3	periodic	S1	55	320	0.1	0.5
2034	North Proj	periodic	S1	55		0.1	
	South Ph 1	periodic	S1	45	365	0.1	0.6
2035	South Ph 2	periodic	S1	55	365	0.1	0.6
2036	South Ph 3	periodic	S1	55	320	0.1	0.5
2037	North Proj	periodic	S1	55		0.1	

BORROW AREAS IN RECOVERY FROM 5-YEAR RUNNING TOTAL
Site Specific Impacts S1 + N1

	South Ph 1	periodic	S1	45	365	0.1	0.6
2038	South Ph 2	periodic	S1	55	365	0.1	0.6
2039	South Ph 3	periodic	S1	55	320	0.1	0.5
2040	North Proj	periodic	S1	55		0.1	
	South Ph 1	periodic	S1	45	365	0.1	0.6
2041	South Ph 2	periodic	S1	55	365	0.1	0.6
2042	South Ph 3	periodic	S1	55	320	0.1	0.5
2043	North Proj	periodic	S1	55		0.1	
	South Ph 1	periodic	S1	45	365	0.1	0.6
2044	South Ph 2	periodic	S1	55	365	0.1	0.6
2045	South Ph 3	periodic	S1	55	320	0.1	0.5
2046	North Proj	periodic	S1	55		0.1	
	South Ph 1	periodic	S1	45	365	0.1	0.6
2047	South Ph 2	periodic	S1	55	365	0.1	0.6
2048	South Ph 3	periodic	S1	55	320	0.1	0.5
2049	North Proj	periodic	S1	55		0.1	
	South Ph 1	periodic	S1	45	365	0.1	0.6
2050	South Ph 2	periodic	S1	55	365	0.1	0.6
2051	South Ph 3	periodic	S1	55	320	0.1	0.5
2052	North Proj	periodic	S1	55		0.1	
	South Ph 1	periodic	S1	45	365	0.1	0.6
2053	South Ph 2	periodic	S1	55	365	0.1	0.6
2054	South Ph 3	periodic	S1	55	320	0.1	0.5
2055					265		0.4
2056					210		0.3
2057					110		0.2
2058					55		0.1
2059					0		0.0
AVERAGE IMPACT AREA/YEAR				82		0.1	
AVERAGE AREA IN RECOVERY FROM 5-YEAR RUNNING TOTAL					372		0.6

