

## COASTAL WETLAND MITIGATION PLAN

THE PURPOSE OF THIS PLAN IS TO MITIGATE UNAVOIDABLE IMPACTS TO WETLANDS ASSOCIATED WITH CONSTRUCTION OF A MARINE TERMINAL AT THE SOUTH QUAY MARINE TERMINAL, 649 WATERFRONT DRIVE, EAST PROVIDENCE, RI.

SOUTH KEY IS CHARACTERIZED BY A LOW TOPOGRAPHIC PROFILE WITH SURFACE ELEVATIONS FROM MEAN SEA LEVEL (-0.22 FT) TO 15 FEET ABOVE NAVD 88 DATUM. BASED ON A REVIEW OF HISTORICAL RECORDS, SOUTH KEY WAS FORMERLY WITHIN THE PROVIDENCE RIVER AND SURROUNDING ENVIRONS. THIS AREA WAS FILLED TO CREATE LAND IN THE 1970'S. THE SITE IS WHOLLY MANMADE, AND BASED ON SUBSURFACE EXPLORATIONS COMPLETED BY RMA AND OTHERS, CONSISTS OF A MIX OF HISTORIC FILL, DREDGED MATERIAL (SILTS AND ORGANIC MUDS) FROM THE RIVER, AND IMPORTED GRANULAR MATERIAL, AND INCLUDES A SMALL ABANDONED ROCK BERM DEWATERING BASIN ON THE NORTH SIDE. THE MAJORITY OF THE SITE IS ENCOMPASSED BY MANMADE HARDENED SHORELINE LINED WITH ROCK RIPRAP. NO CREEKS OR OTHER NATURAL WATER COURSES CROSS THE SOUTH KEY DEVELOPMENT AREA; THE MAJORITY OF WHICH IS COVERED BY EARTH FILL AND GRADED SURFACES.

SHEET WM-1 SHOWS THE LOCATION OF JURISDICTIONAL WETLANDS. THE IMPACTED WETLANDS CONSISTS OF SALT MARSH LOCATED ALONG THE FRINGE OF THE HARDENED SHORELINE AND A MIX OF BRACKISH AND SALT MARSH WETLANDS HYDRAULICALLY AFFECTED BY THE ABANDONED DEWATERING BASIN. THE SALT MARSH WETLANDS ARE SITUATED ON AN ACCRETION SHELF GENERALLY ABOVE MHW AND CONSISTS PREDOMINATELY OF SALT MEADOW GRASS (*SPARTINA PATENS*). THE SHELF IS ACTIVELY ERODING AND THERE IS NO AREA FOR INLAND RETREAT. MIXED BRACKISH AND SALT MARSH ON THE NORTH SIDE OF THE PROPERTY CONSISTS OF INVASIVE NONNATIVE VEGETATION *PHRAGMITES* (*AUSTRALIS*) THAT DOMINATES THE TRANSITION ZONE AND HAVE ENCLOSED INTO THE SALT MARSH DUE TO THE POOR HYDRAULIC CONNECTION CAUSED BY THE DEWATERING BASIN. THESE INVASIVE *PHRAGMITES* HAVE EFFECTIVELY CHOKED OUT MUCH OF THE NATIVE *PHRAGMITES*, AS WELL AS OTHER NATIVE MARSH GRASSES, REDUCING WILDLIFE HABITAT VALUE, PLANT DIVERSITY AND SPECIES ABUNDANCE. THE RESULTING SALT MARSH IS OF POOR QUALITY AND SPORADICALLY VEGETATES PORTIONS OF THE TIDAL ZONE.

GIVEN THE LAND IS PERMITTED AND DESIGNATED TO BE USED AS MARINE TERMINAL, AND THE MAJORITY OF THE SHORELINE IS EXPOSED TO EXCESSIVE FETCH, SITE RESTRICTIONS LIMIT MITIGATION OPPORTUNITIES. AS SUCH, THE PROTECTED NORTHERN AREA HAS BEEN SELECTED AS THE ONLY FEASIBLE MITIGATION AREA. THE MITIGATION GOALS ARE TO COMPENSATE FOR PERMANENTLY LOST OR ALTERED WETLAND THROUGH RESTORATION, ENHANCEMENT, AND CREATION OF SALT MARSH ZONES IN THE AREA OF THE BASIN.

THIS INCLUDES PROVIDING TIDAL CONNECTION THROUGH THE EXISTING ROCK BERM, PLANTING OF PLUGS OF NATIVE MARSH (APPROPRIATE FOR SALINITY AND SITE CONDITIONS) TO AUGMENT BARE OR SPARSE AREAS IN EXISTING LOW AND HIGH MARSH ZONES, OVEREXCAVATION AND REMOVAL OF INVASIVE BRACKISH VEGETATION, AND REGRADING TO PROVIDE A GENTLY SLOPING AND TIERED MARSH ZONE TO RESTORE A DIVERSE MIX OF NATIVE TIDAL MARSH SPECIES ACROSS THE ELEVATIONAL RANGE SUITABLE FOR TIDAL MARSH, TO ALLOW FOR MARSH RETREAT TOWARD HIGHER ELEVATIONS WITH SEA LEVEL RISE, AND TO MONITOR SHORT AND LONG TERM SUCCESS.

IN ORDER TO CREATE AND RESTORE THE MARSH (WHICH HAS BEEN IMPACTED BY FILL), THE INTERTIDAL ELEVATION MUST BE REESTABLISHED WITH EARTH-MOVING EQUIPMENT. ELEVATION CRITERIA USED IS SIMILAR FOR OTHER GEOMORPHIC AND LANDSCAPE SETTINGS AND IS INTENDED TO ACHIEVE PROPER TIDAL FLOODING CHARACTERISTICS FOR THE DESIRED VEGETATION COMMUNITY TYPE.

TEMPORARY IMPACTS DURING CONSTRUCTION OF THE MARINE TERMINAL HAVE BEEN COMPENSATED FOR; HOWEVER, TEMPORARY IMPACTS TO RESTORE AND ENHANCE THE MARSH ARE UNAVOIDABLE AND ARE CONSIDERED NECESSARY TO RESTORE A SELF-SUSTAINABLE TIDAL MARSH ECOSYSTEM.

PERMANENT AND TEMPORARY IMPACTS DUE TO CONSTRUCTION OF THE MARINE TERMINAL ARE SHOWN AND TABULATED ON SHEET WM-1, AND MITIGATION COMPENSATION AREAS ARE SHOWN AND TABULATED ON SHEET WM-2.

**MITIGATION AREA CONSTRUCTION MONITORING NOTES:**

FUNDING FOR CONSTRUCTION OF THE MITIGATION AREA AS SPECIFIED HEREIN SHALL BE DETERMINED PRIOR TO THE CONSTRUCTION ACTIVITIES. DURING CONSTRUCTION, A PROFESSIONAL WETLAND SCIENTIST (PWS) SHALL MONITOR THE PROPOSED MITIGATION ACTIVITY.

COIR MATTING SHALL HAVE 3/8" OPENINGS OR SIMILAR, AS DIRECTED BY THE WETLAND SCIENTIST MONITOR. NETTING SHALL BE ANCHOR TRENCHED AT THE TOP OF THE SLOPE AND WITHIN EACH TERRACED AREA. ANCHOR TRENCH SHALL BE 12 INCHES DEEP WITH 3 FEET OF OVERLAP. 4' WOODEN STAKES SHALL BE INSTALLED IN COIR NETTING AND SPACED UNDER OVERSIGHT OF WETLAND SCIENTIST AND BIODEGRADABLE ROPE SHALL BE USED BETWEEN STAKES TO FURTHER SECURE NETTING IN PLACE. PLANTINGS AND PLUGS SHALL BE INSTALLED BY CUTTING HOLES IN NETTING. PLUGS SHALL BE INSTALLED WITHIN A FEW INCHES OF AND NOT INSTALLED DIRECTLY INTO COIR LOGS. SOIL ENHANCEMENTS TO BE MADE TO PLANTING LOCATIONS AT WETLAND SCIENTIST DIRECTION.

PLUGS SHALL COME FROM A CERTIFIED GROWER OF COASTAL WETLANDS VEGETATION CHARACTERISTIC OF THE RHODE ISLAND SHORELINE. ALL PLANTINGS (INCLUDING ANY REQUIRED SUBSTITUTE SPECIES) SHALL BE APPROVED BY THE PWS PRIOR TO INSTALLATION. A PLANTING LIST IS PROVIDED ON SHEET WM-1. SPACING DENOTED IS TO PROVIDE ACCURATE GUIDELINES FOR PLANT INSTALLATION. FINAL LOCATIONS OF ALL PLANTINGS SHALL BE ADJUSTED AS NECESSARY TO MEET ACTUAL AS-BUILT CONDITION OF MITIGATION AREA AND AS DIRECTED ON SITE BY THE PWS. PLANT MATERIALS SHALL CONFORM TO THE MINIMUM GUIDELINES ESTABLISHED BY THE AMERICAN STANDARD FOR NURSERY STOCK PUBLISHED BY THE AMERICAN ASSOCIATION OF NURSERYMEN, INC.

BUTTERFLY HOLE THE SIZE OF ROOTBALL (NO GREATER) IN COIR MAT, SPACED AS INDICATED ABOVE, AND INSTALL PLANTINGS FULLY INTO PLANTING MEDIUM. ENSURE ALL ROOTS OF PLANTINGS ARE BURIED AND PLANT IS AT DEPTH SIMILAR TO THAT WHICH IT WAS GROWN. KEEP ROOTBALLS INTACT PRIOR TO AND DURING PLANTING OPERATIONS. PLANTS WITH BROKEN OR DAMAGED ROOTBALLS SHALL BE REJECTED AND IMMEDIATELY REMOVED FROM THE SITE. KEEP ROOTBALLS DAMP AND PROTECTED FROM DAMAGE DUE TO SUN AND WIND. ALL PLANTED AREAS WITHIN OR OUTSIDE THE LIMIT OF WORK WHICH ARE DISTURBED DURING CONSTRUCTION (INCLUDING PLANTING OPERATIONS) SHALL BE RETURNED TO ORIGINAL GRADE, LOAMED, AND SEEDED (AS APPROPRIATE) BY THE CONTRACTOR AT NO ADDITIONAL EXPENSE TO THE OWNER.

ALL DISTURBED AREAS SHALL BE OVERSEED WITH NEW ENGLAND WETLAND "NEW ENGLAND COASTAL SALT TOLERANT GRASS MIX", OR APPROVED EQUAL PLANTS. THE REPLANTING SHALL BE REQUIRED TO ESTABLISH A "SATISFACTORY HABITAT", WHICH IS DEFINED AS THE REPLANTED SALT MARSH VEGETATION HAVING A MINIMUM TARGET SURVIVAL RATE OF 85-PERCENT AND BE IN A VIGOROUS GROWING CONDITION 1 YEAR AFTER PLANTING. MONITORING OF THE REPLANTED VEGETATION SHALL OCCUR.

**POST-CONSTRUCTION MONITORING NOTES:**

A PWS SHALL MONITOR THE SALT MARSH RESTORATION AREA FOR AT LEAST TWO (AND/OR UP TO FIVE OR AS SPECIFIED BY THE CRMC) FULL GROWING SEASONS TO ENSURE THAT AT LEAST 85 PERCENT OF THE SALT MARSH RESTORATION AREA IS ESTABLISHED WITH INDIGENOUS WETLAND PLANT SPECIES WITHIN TWO COMPLETE GROWING SEASONS OR AS SPECIFIED BY THE CRMC.

OBSERVATIONS SHALL OCCUR AT LEAST TWICE DURING THE GROWING SEASON, IN SPRING/EARLY SUMMER AND AGAIN IN LATE SUMMER/EARLY FALL.

MONITORING OBSERVATIONS (INCLUDING THE HEALTH OF THE INSTALLED PLANTINGS, SLOPE STABILIZATION AND INVASIVE SPECIES COLONIZATION) SHALL BE DOCUMENTED IN ANNUAL MONITORING REPORTS TO BE DISTRIBUTED TO THE REGULATORY AGENCIES PRIOR TO DECEMBER 15TH OF THE MONITORING YEAR, AS REQUIRED.

ANY IMPLEMENTED CORRECTIVE ACTIONS (I.E. REPLACEMENT OF DEAD PLANTINGS, SLOPE STABILIZATION, INVASIVE SPECIES MANAGEMENT, ETC.) SHALL BE INCLUDED IN THE ANNUAL REPORTS.

IF INVASIVE SPECIES ARE DOCUMENTED DURING MONITORING (I.E. PHRAGMITES AUSTALIS, TYPHA SPP. LYTHRUM SALICARIA, ETC.) TREATMENT MAY CONSIST OF HAND REMOVAL AND/OR A COMBINATION OF HERBICIDE SPOT-TREATMENT AND HAND REMOVAL DURING LOW-TIDE.

FUNDING FOR POST-CONSTRUCTION CORRECTIVE ACTIONS (I.E. REPLACEMENT PLANTINGS, INVASIVE SPECIES MANAGEMENT, ETC.) SHALL BE DETERMINED PRIOR TO THE CONSTRUCTION ACTIVITIES.

**SCHEDULE OF ESTIMATED IMPACTS TO EXISTING WETLANDS DUE TO CONSTRUCTION ACTIVITIES**

TYPE	ESTIMATED PERMANENT IMPACT	ESTIMATED TEMPORARY IMPACTS	NOTES
SALT MARSH	21278	0	TYPICALLY HIGH MARSH VEGETATION (SPARTINA PATENS), ACTIVELY ERODING.
BRACKISH   SALT MARSH	5549	31418	INVASION OF PHRAGMITES AUSTRALIS HAS CHOKED OUT NATIVE, MARSH IS OF POOR QUALITY
REQUIRED MITIGATION	2:1	1:1	IN ACCORDANCE WITH THE STANDARDS SET FORTH IN § 1.3.1(L)(5)
REQUIRED MITIGATION AREA	53654	31418	SEE SHEET WM - 1 FOR AREAS
TOTAL REQUIRED MITIGATION AREA		85073	SEE SHEET WM - 2 FOR MITIGATION
MITIGATION TYPE PROVIDED	RESTORATION, CREATION, HYDROLOGIC CONNECTION		THREE PRONGED APPROACH DUE TO SITE LIMITATIONS
MITIGATION AREA PROVIDED		101074	SEE SHEET WM - 2 FOR MITIGATION
STANDARD MET?		YES	

**SALT MARSH PLANTING LIST**

LOCATION	ELEVATION	PLANT SPECIES	SPACING	TYPE
LOW MARSH	UP TO MHW	SMOOTH CORDGRASS <i>(spartina alterniflora)</i>	1.5 FT ON CENTER	PLUGS
		SALTMEADOW CORDGRASS <i>(spartina patens)</i>		
HIGH MARSH	ABOVE MHW & SLR RETREAT	SPIKEGRASS <i>(distichlis spicata)</i>	1 FT ON CENTER	PLUGS
		BLACKGRASS <i>(juncus gerardii)</i>		
TRANSITION / UPLAND	ABOVE SPRING HIGH WATER & SLR RETREAT	MARSH ELDER <i>(iva frutescens)</i>	3 TO 6 FT ON CENTER	3 GAL.
		OR AS SPECIFIED BY CRMC	VARIES	VARIES