APPENDIX H

UMAM ANALYSIS

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SOUTHERN PALM BEACH ISLAND COMPREHENSIVE SHORELINE STABILIZATION PROJECT UMAM ANALYSIS

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1.0 INTRODUCTION

The area of impact determined from the Engineering Analysis and Numerical Modeling Study (provided as Appendix G to the EIS) was used to complete a Uniform Mitigation Assessment Method (UMAM) evaluation (Chapter 62-345, F.A.C.) for the Southern Palm Beach Island Comprehensive Shoreline Stabilization Project. UMAM assesses the functions and services of the hardbottom resources predicted to be impacted, and determines the amount of appropriate mitigation to compensate for these impacts. The UMAM evaluation presented herein was developed to specifically assess the anticipated loss of nearshore hardbottom function attributed to the construction of the Applicants' Preferred Alternative as well as to Alternatives 2-7b evaluated in the EIS. Impacts to hardbottom include two general categories:

- *Direct* = burial resulting from direct placement of sand at time of project construction (within construction toe of fill (CTOF)).
- *Indirect* = impacts resulting from the spreading of sand following project construction (outside CTOF).

While the impacts can be described generally as direct or indirect, more detailed description is necessary to accurately account for anticipated project related impacts to the nearshore intertidal and subtidal hardbottom. The hardbottom habitat adjacent to the Project Area is shown to be highly ephemeral. The constant burial and re-exposure of hardbottom in this area facilitates the development of an opportunistic community dominated by turf and macroalgae species that recruit quickly when substrate is available. Between 2003 and 2014, the amount of exposed hardbottom in the project area ranged between 1.5 ac in 2009 and 36.6 ac in 2006. Because of the variability observed from year to year, the USACE determined that a time-average analysis of the amount of hardbottom exposed over 10 years would best represent the habitat since it smooths out short-term fluctuations and provides longer-term trends by averaging a function over iterations of time. The 2014 dataset was added during updates to the EIS extending the time-average analysis over 11 years. In this case, the average amount of exposed

1

hardbottom (ac) between two surveys is multiplied by the number of days between those two surveys (ac-days). The sum of ac-days is divided by the total number of days between the first survey and the last survey. This provides the time-averaged amount of hardbottom in an area. In order to determine the area of potential impact due to project construction, the amount of exposed hardbottom from each hardbottom delineation (2003 – 2014) that fell within the impact polygons generated by the Delft3D modeling was determined in GIS and these areas were input into the time-average calculation. For each alternative (and each grain size modeled), these impact areas were input into UMAM to determine potential mitigation requirements.

In order to appropriately mitigate for impacts to this highly ephemeral habitat, it is important to distinguish permanent impacts from temporary impacts. Numerical Delft 3D modeling estimated the movement of sand for 3 years following construction of the Project. The Delft 3D modeling results indicate that a portion of the sand placed below mean high water (MHW) will remain within the CTOF for all 3 years following construction, while the remainder of the sand will be transported offshore and/or updrift and downdrift of the placement area as the beach equilibrates. As stated by the applicants, the Town of Palm Beach and the County anticipate maintenance approximately every 3 to 4 years. Therefore, some direct impacts are considered permanent (i.e. buried for all 3 years postconstruction), while some will be temporary (covered less than 3 years). Indirect impacts will be incurred as hardbottom outside the CTOF is buried for a period of time as sand moves offshore and/or updrift and downdrift from the Project Area. Modeling has estimated the locations of sediment accumulation at 1, 2 and 3 years post construction in the form of polygons that were plotted in GIS (Figures 4-1 through 4-3). At 3 years postconstruction, it is assumed that the project may be reconstructed, and the impacts will be repeated. Permanent and temporary impacts are defined as follows.

Permanent = Permanent impacts are those that, following placement of fill, will
result in hardbottom burial for at least 3 years, at which time the project may be
constructed again. Based on modeling results, these are areas which were shown
to have sand accumulation present at 1, 2 and 3 years post-construction and are

not expected to become re-exposed for the duration of the project. These areas are considered to have lost most, but not all, of their ecological function. While these areas will be subject to increased sand cover, this habitat is already ephemeral in nature; therefore, the habitat will continue to provide ecological function to motile species such as fish, sea turtles and crabs. Impacts will be mitigated through construction of an artificial reef. Permanent impacts may be located within the CTOF and in areas beyond the CTOF (offshore and/or updrift and downdrift).

Temporary = Temporary impacts are those that, following placement of fill, are expected to be buried for less than 3 years, which allows these resources to regain ecological function for the period of time when they are re-exposed. These temporary impacts will be repeated following construction of each project, potentially every 3-4 years. Based on previous guidance provided by Florida Department of Environmental Protection (FDEP), temporary impacts can be considered as partially self-mitigating; when conducting UMAM analyses on areas of temporary impact, minimum risk is used and once the total mitigation is initially calculated, then the temporary impact acreage is subtracted from this total in order to determine the additional mitigation required to offset the temporary impact (L. Edwards and V. Kosmynin, pers. comm., 2013).

In addition to the modeling results predicting the movement of sand following project construction, an equilibrium toe of fill (ETOF) analysis was performed. While the Delft3D modeling results include both offshore, updrift, and downdrift movement, a traditionally-used ETOF analysis (profile translation) included an area that encompassed a larger cross-shore area; therefore, in order to conservatively assess potential impacts, it is assumed that temporary impacts may also occur to this area. This area was used to quantify the Indirect Temporary ETOF impact area (Figures 4-1 through 4-3 – each varies based on grain size modeled). These impacts are considered as a degradation of a community, but not a total loss of function, that could result from increased sedimentation (L. Edwards and V. Kosmynin, pers. comm., 2013).

2.0 SEVEN HARDBOTTOM IMPACT TYPES

Based on the modeling and ETOF analyses, seven (7) types of impacts to hardbottom were defined for the purpose of this UMAM evaluation. These seven impact types and the associated mitigation determined by UMAM are summarized below and in Table 2-1:

- 1. Permanent = Permanent impacts include areas where the sand is expected to remain for at least 3 years. This includes areas within the CTOF following direct placement during construction and areas offshore and/or updrift and downdrift which, although outside the CTOF and not directly impacted at the time of fill placement, are expected to become buried by 1-year post-construction and remain buried through 3 years post-construction. These impacts are considered permanent since the project may be reconstructed every 3-4 years. Permanent impacts were calculated by summing the areas shown to have overlapping sediment accumulation polygons at 1, 2 and 3 years post-construction based on the modeling results. These areas are considered to have lost most, but not all, of their ecological function. Based on the UMAM analysis, this type of impact will be mitigated at a ratio of approximately 1 ac impact:1.16 ac of mitigation (1:1.20 ac using FDEP time lag).
- 2. Direct Temporary (<1 Year) = This area will be impacted within the CTOF by direct placement of fill at the time of construction, but is expected to become re-exposed within the first year following construction and will remain exposed until the project is reconstructed. This impact area was calculated by taking the total area of exposed hardbottom within the CTOF and subtracting areas shown to have sediment accumulation polygons at 1, 2 and/or 3 years post-construction based on the modeling results. The difference represented an area where sand was directly placed but did not remain in the project area by 1-year post-construction. This type of impact is partly self-mitigating (i.e. will become re-exposed), and based on the UMAM analysis, will likely require mitigation at a ratio of approximately 1 ac impact:0.03 ac of mitigation (1:0.07 ac using FDEP time lag).</p>

- 3. Direct Temporary (>1 Year) = This area will be impacted within the CTOF by direct placement of fill at the time of construction, but is expected to become re-exposed within the second year following construction and will become re-exposed until the project is reconstructed. This impact area was calculated by summing the area within the CTOF shown to have sediment accumulation polygons at 1, 2 or 3 years post-construction (with no overlap between years) based on the modeling results. This type of impact is partly self-mitigating, and based on the UMAM analysis, will likely require additional mitigation at a ratio of approximately 1 ac impact:0.32 ac of mitigation (1:0.38 ac using FDEP time lag).
- 4. Direct Temporary (>2 Years) = This area will be impacted within the CTOF by direct placement of fill at the time of construction, but is expected to become re-exposed within the third year following construction and will become re-exposed until the project is reconstructed. This impact area was calculated by summing the area within the CTOF shown to have sediment accumulation polygons that overlap for two years based on the modeling results. This type of impact is partly self-mitigating, and based on the UMAM analysis, will likely require additional mitigation at a ratio of approximately 1 ac impact:0.85 ac mitigation (1:0.93 ac using FDEP time lag).
- 5. Indirect Temporary (1 Year) = This area, located outside the CTOF, will be temporarily impacted for 1 year by spreading of sand, but will become re-exposed prior to project reconstruction. This impact area was calculated by summing the area beyond the CTOF shown to have sediment accumulation polygons during 1, 2 or 3 years post-construction (with no overlap between years) based on the modeling results. This type of impact is partly self-mitigating, and based on the UMAM analysis, will likely require additional mitigation at a ratio of approximately 1 ac impact:0.16 ac mitigation (1:0.20 ac using FDEP time lag).
- Indirect Temporary (2 Years) = This area, located outside the CTOF, will be temporarily impacted for 2 years by spreading of sand, but will become re-exposed prior to project reconstruction. This impact area was calculated by summing the

area beyond the CTOF shown to have sediment accumulation polygons that overlap for two years (e.g. overlap of 1- and 2-year, 2- and 3-year, or 1- and 3-year post-construction) based on the modeling results. This type of impact is partly self-mitigating, and based on the UMAM analysis, will likely require additional mitigation at a ratio of approximately 1 ac impact: 0.55 ac mitigation (1:0.61 ac using FDEP time lag).

7. Indirect Temporary (ETOF) = This area represents an impact area associated with the traditional equilibrium toe of fill (ETOF) (profile translation) and was not entirely predicted to be impacted based on modeling results. Although the project was modeled to account for direct and indirect impacts as discussed above, the ETOF was used to quantify the area where impacts may occur due to increased sedimentation. This provides a conservative estimate of total impacts by including both cross-shore (ETOF and modeling results) and updrift/downdrift estimates (modeling results). The areas that were already accounted for from the modeling polygons were subtracted from the area of the ETOF so as not to "double dip". Areas of hardbottom that may experience these impacts are not expected to become buried, but effects may include slightly impaired ecological function. Based on the UMAM analysis, these impacts will likely require mitigation at a ratio of approximately 1 ac impact:0.13 ac mitigation (also 1:0.13 ac using FDEP time lag).

Table 2-1. Summary of seven hardbottom impact types, before and after mitigation UMAM scores, and mitigation required per 1 acre of impact using the USACE and FDEP time lag values. The USACE time lag values will be used for the Project. The FDEP time lag values are presented for reference and comparison.

	Before	e and after mit	tigation	Mitigation required for 1 acre impact (assuming 3 years for artificial reef to function as impact area)					
Impact Type	Without Impact	Vithout With Impact Impact Impact Supervised Stress With Mitigation (artificial re- and/or re- exposure)		Risk Factor	USACE Time Lag = 1.03	FDEP Time Lag = 1.07			
1. Permanent	10	1	10	1.25	1.16	1.20			
2. Direct Temporary (< 1 year)	10	1	9	1.00	0.03	0.07			
3. Direct Temporary (> 1 years)	10	1	7	1.00	0.32	0.38			
4. Direct Temporary (> 2 years)	10	1	5	1.00	0.85	0.93			
5. Indirect Temporary (1 year)	10	1	8	1.00	0.16	0.20			
6. Indirect Temporary (2 years)	10	1	6	1.00	0.55	0.61			
7. Indirect Temporary (ETOF)	10	9	10	1.25	0.13	0.13			

3.0 DETAILS OF INPUT FOR UMAM EVALUATION AND ASSOCIATED MITIGATION REQUIRED FOR EACH IMPACT TYPE

Each of the seven types of hardbottom impact received a separate UMAM evaluation which accounted for the nature of the impact (direct and indirect) and the duration of the impact (permanent and temporary). It is assumed that mitigation for hardbottom impacts will be in the form of an artificial reef comprised of limestone boulders. Based on the ephemeral nature of the nearshore hardbottom in the impact area (low complexity, dominated by turf and macroalgae), it is expected that the artificial reef will completely resemble the hardbottom habitat within 3 years. Therefore, the time lag (t-factor) was set to 1.03 for all evaluations based on USACE time lag guidelines (the FDEP uses a t-factor of 1.07 for 3 years).

The UMAM forms for each impact type and grain size modeled associated with the Applicants' Preferred Alternative are attached. Sub-Appendices H-1a through H-1c provides the UMAM evaluation for the Southern Palm Beach Island Comprehensive Shoreline Stabilization Project using Delft 3D modeling and engineering results for both the Town of Palm Beach and County projects considered together. In order to assist with the permitting of the projects, which must be permitted separately for the Town of Palm Beach and the County, the projects were also modeled as standalone projects. Based on these results, separate UMAM evaluations were conducted and are provided as Sub-Appendices H-2a through H-2c (for Town of Palm Beach project) and H-3 (for County project). It should be noted that the sum of the impacts (and thus the calculated mitigation) from each standalone project (presented in Appendix H-2 and H-3) does not equal the combined impacts (and mitigation) from the combined project (Appendix H-1) since the larger combined project responds differently than two smaller standalone projects. For each of the three attached UMAM evaluations, Part I – Qualitative Descriptions are provided for the impact and mitigation areas, followed by Part II - Qualification of Assessment Areas for the impact and mitigation areas associated with each of the seven impact types. The final page of each evaluation shows the formulas used to calculate the mitigation acreage required for each impact type and the total mitigation required for each project. The parameters used for each UMAM evaluation are summarized below and in

Table 2-1. Figures 4-1 through 4-3 illustrates the seven impact types determined for the Southern Palm Beach Island Comprehensive Shoreline Stabilization Project.

It is important to note that although permanent and temporary impacts to the nearshore hardbottom resources are anticipated, not all functional value will be lost. The expected remaining functional value is represented by the assigned value of one (1) for the "with project" natural hardbottom resources in the (a) Location and Landscape Support and the (c) Benthic Community for impact types 1 through 6. The softbottom habitat and marine water column above this substrate could still provide functions and services to the nearshore environment. The marine water column will continue to serve as a medium of transport for nutrients, migrating organisms and larvae of crustacean and fish species (SAFMC, 1998) and the sand substrate provides habitat for several fish, benthic and infaunal species; therefore, it is not a complete loss.

1. Permanent:

<u>Impact Area</u>: The "without project" natural hardbottom resources were assigned a value of 10 and the "with project" value was reduced to one (1) in the (a) Location and Landscape Support and the (c) Benthic Community to account for the loss of most, but not all, function ((b) Water Environment was unchanged).

<u>Mitigation</u>: To determine the required mitigation, a "without mitigation" value of 0 and "with mitigation" value of 10 were assigned to (a) Location and Landscape Support and (c) Benthic Community ((b) Water Environment was unchanged). The risk factor was set at 1.25, accounting for the slight uncertainty that the artificial reef will successfully mimic the impact area.

<u>Mitigation Required</u>: 1 acre of permanent impact will require 1.16 ac of mitigation based on the federal requirement (1.20 ac using FDEP time lag).

2. Direct Temporary (< 1 Year):

<u>Impact Area</u>: The "without project" natural hardbottom resources were assigned a value of 10 and the "with project" was reduced to one in the (a) Location and Landscape Support and the (c) Benthic Community to account for the loss of most, but not all, function ((b) Water Environment was unchanged).

<u>Mitigation</u>: This area of hardbottom will be directly impacted due to sand placement but will remain buried for less than 1 year, therefore it is designated as a temporary impact and considered partially self-mitigating. The impacted ephemeral hardbottom community will be re-exposed, but may not return to the exact same condition; therefore, the "with mitigation" value was set at 9, indicating that less than 1 year of burial may leave the re-exposed habitat functioning slightly (1 unit) below its preimpact state. Because this area is considered partially self-mitigating, the UMAM output is subtracted from the original impact area and the remaining area represents the acreage of artificial reef required to offset the temporary impact. Unlike the "direct permanent" impact parameters, the risk factor for less than 1 year of temporary impacts is set to 1.00 to account for the re-exposure (temporary impact) that will occur in this area.

<u>Mitigation Required</u>: 1 acre of less than 1 year of direct temporary impact will require 0.03 ac of mitigation based on the federal requirement (0.07 ac using FDEP time lag).

3. Direct Temporary (>1 Year):

<u>Impact Area</u>: The "without project" natural hardbottom resources were assigned a value of 10 and the "with project" was reduced to one in the (a) Location and Landscape Support and the (c) Benthic Community to account for the loss of most, but not all, function ((b) Water Environment was unchanged).

<u>Mitigation</u>: This area of hardbottom will be directly impacted due to sand placement but will remain buried for more than 1 year (but less than 2 years), thus it is designated as a temporary impact and considered partially self-mitigating. The impacted ephemeral hardbottom community will be re-exposed, but may not return to the exact same condition; therefore, the "with mitigation" value was set at 7 to account for more than 1 year of burial. Because this area is considered self-mitigating, the UMAM output is subtracted from the original impact area and the remaining area represents the acreage of artificial reef required to offset the temporary impact. The risk factor for temporary impacts is set to 1.00 to account for the re-exposure that will occur in this area.

<u>Mitigation Required</u>: 1 acre of more than 1 year of direct temporary impact will require 0.32 ac of mitigation based on the federal requirement (0.38 ac using FDEP time lag).

4. Direct Temporary (>2 Years):

<u>Impact Area</u>: The "without project" natural hardbottom resources were assigned a value of 10 and the "with project" was reduced to one in the (a) Location and Landscape Support and the (c) Benthic Community to account for the loss of most, but not all, function ((b) Water Environment was unchanged).

<u>Mitigation</u>: This area of hardbottom will be directly impacted due to sand placement but will remain buried for more than 2 years (but less than 3 years), thus it is designated as a temporary impact and considered partially self-mitigating. The impacted ephemeral hardbottom community will be re-exposed, but may not return to the exact same condition; therefore, the "with mitigation" value was set at 5 to account for more than 2 years of burial. Because this area is considered self-mitigating, the UMAM output is subtracted from the original impact area and the remaining area represents the acreage of artificial reef required to offset the temporary impact. The risk factor for temporary impacts is set to 1.00 to account for the re-exposure that will occur in this area.

<u>Mitigation Required</u>: 1 acre of more than 2 years of direct temporary impact will require 0.85 ac of mitigation based on the federal requirement (0.93 ac using FDEP time lag).

5. Indirect Temporary (1 Year):

<u>Impact Area</u>: The "without project" natural hardbottom resources were assigned a value of 10 and the "with project" was reduced to one in the (a) Location and Landscape Support and the (c) Benthic Community to account for the loss of most, but not all, function ((b) Water Environment was unchanged).

<u>Mitigation</u>: This area of hardbottom will be impacted due to sand spreading after initial placement and it is assumed that this area will remain buried for 1 year, thus it is designated as a temporary impact and considered self-mitigating. The impacted ephemeral hardbottom community will be re-exposed, but may not return to the exact same condition; therefore, the "with mitigation" value was set at 8, indicating that 1 year of burial may leave the habitat functioning two units below its pre-impact state. Because this area is considered partially self-mitigating, the UMAM output is subtracted from the original impact area and the remaining area represents the acreage of artificial reef required to offset the temporary impact. The risk factor for temporary impacts is set to 1.00 to account for the re-exposure that will occur in this area.

<u>Mitigation Required</u>: 1 acre of 1 year of indirect temporary impact will require 0.16 ac of mitigation based on the federal requirement (0.20 ac using FDEP time lag).

6. Indirect Temporary (2 Years):

<u>Impact Area</u>: The "without project" natural hardbottom resources were assigned a value of 10 and the "with project" was reduced to one in the (a) Location and Landscape Support and the (c) Benthic Community to account for the loss of most, but not all, function ((b) Water Environment was unchanged).

<u>Mitigation</u>: This area of hardbottom will be impacted due to sand spreading after initial placement and it is assumed that this area will remain buried for 2 years, thus it is designated as a temporary impact and considered self-mitigating. The impacted ephemeral hardbottom community will be re-exposed, but may not return to the exact

same condition; therefore, the "with mitigation" value was set at 6 to account for 2 years of burial. Because this area is considered partially self-mitigating, the UMAM output is subtracted from the original impact area and the remaining area represents the acreage of artificial reef required to offset the temporary impact. The risk factor for temporary impacts is set to 1.00 to account for the re-exposure that will occur in this area.

<u>Mitigation Required</u>: 1 acre of 2 years of indirect temporary impact will require 0.55 ac of mitigation based on the federal requirement (0.61 ac using FDEP time lag).

7. Indirect Temporary (ETOF):

Impact Area: In UMAM, the "without project" natural hardbottom resources were assigned a value of 10 and the "with project" value was reduced to 9 in the (a) Location and Landscape Support and the (c) Benthic Community to account for the potential reduction in ecological function of the hardbottom which may occur as a result of increased sedimentation over the ephemeral hardbottom ((b) Water Environment was unchanged).

<u>Mitigation</u>: It is anticipated that indirect temporary ETOF impacts will result in a minimal reduction in function to the ephemeral hardbottom; therefore, the "with mitigation" value was set at 10 for (a) Location and Landscape Support and (c) Benthic Community ((b) Water Environment was unchanged). The risk factor was set at 1.25, accounting for the slight uncertainty that the artificial reef will successfully mimic the impact area.

<u>Mitigation Required</u>: 1 acre of indirect temporary ETOF impact will require 0.13 ac of mitigation based on the federal requirement (also 0.13 ac using FDEP time lag).

4.0 SUMMARY

The UMAM methodology described herein was applied to Alternatives 2 through 7b for evaluation within the Southern Palm Beach Island Comprehensive Shoreline Stabilization Project Draft EIS. Impact acreages and associated mitigation required for each impact type for each alternative are presented in Tables 4-1 through 4-3. The sediment accumulation polygons and the ETOF that represent the seven impact types are presented in Figures 4-1 through 4-3.

able 4-1. Summary of anticipated impact acreages and mitigation associated with Alternatives 2-7b using 0.25 mm grain size in the Town of												
'alm Beach and 0.36 mm grain size in the County. Acreages are based on a time-average of exposed hardbottom between 2003 and 2014.												
Anticipated Impacts and	Alt	t 2	Alt 3		Alt 4		Alt 5		Alt 6		Alt 7b	
Associated Mitigation (ac)	Impact	Mitig	Impact	Mitig	Impact	Mitig	Impact	Mitig	Impact	Mitig	Impact	Mitig
1. Permanent	3.86	4.48	2.70	3.13	6.51	7.54	3.45	4.00	6.07	7.04	5.74	6.66
2. Direct Temporary (<1 yr)	0.87	0.03	1.43	0.04	0.38	0.01	0.82	0.02	0.26	0.01	1.75	0.05
3. Direct Temporary (>1 yr)	0.31	0.10	0.37	0.12	0.63	0.20	0.55	0.18	0.70	0.23	1.06	0.34
4. Direct Temporary (>2 yrs)	0.19	0.16	0.06	0.05	0.43	0.37	0.14	0.12	0.87	0.75	0.90	0.77
5. Indirect Temporary (1 yr)	3.35	0.53	3.91	0.62	5.06	0.80	3.89	0.62	5.92	0.94	5.51	0.88
6. Indirect Temporary (2 yrs)	1.42	0.77	1.38	0.75	2.55	1.39	1.47	0.80	2.52	1.37	3.30	1.80
7. Indirect Temporary (ETOF)	3.79	0.49	5.04	0.65	4.12	0.53	8.73	1.12	8.08	1.04	1.80	0.23
Required Mitigation 6.55 5.36 10.84 6.86 11.37 10.7										72		

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Table 4-2. Summary of impact and mitigation acreages associated with Alternatives 2-7b using 0.36 mm grain size in the Town of Palm Beach and the County. Acreages are based on a time-average of exposed hardbottom between 2003 and 2014

and the obtainty. Acreages are based on a time-average of exposed hardbolloin between 2003 and 2014.												
Anticipated Impacts and	Alt 2		Alt	Alt 3		Alt 4		Alt 5		Alt 6		7b
Associated Mitigation (ac)	Impact	Mitig										
1. Permanent	3.97	4.60	2.87	3.32	6.71	7.77	3.97	4.60	6.81	7.89	11.25	13.04
2. Direct Temporary (<1 yr)	0.83	0.03	1.38	0.04	0.34	0.01	0.71	0.02	0.17	0.01	0.53	0.02
3. Direct Temporary (>1 yr)	0.33	0.11	0.39	0.13	0.33	0.11	0.35	0.11	0.61	0.20	0.35	0.11
4. Direct Temporary (>2 yrs)	0.19	0.16	0.07	0.06	0.67	0.57	0.29	0.25	0.53	0.45	0.72	0.61
5. Indirect Temporary (1 yr)	3.24	0.51	3.72	0.59	5.42	0.86	4.14	0.66	6.19	0.98	4.88	0.78
6. Indirect Temporary (2 yrs)	1.44	0.78	1.57	0.85	2.50	1.36	1.52	0.83	2.62	1.43	2.50	1.36
7. Indirect Temporary (ETOF)	3.65	0.47	5.00	0.64	3.94	0.51	7.97	1.03	7.44	0.96	0.47	0.06
Required Mitigation	6.	66	5.	64	11.	19	7.4	49	11.	91	15.	98

Table 4-3. Summary of impact and mitigation acreages associated with Alternatives 2-7b using 0.60 mm grain size in the Town of Palm Beach and the 0.36 mm grain size in the County. Acreages are based on a time-average of exposed hardbottom between 2003 and 2014.

Anticipated Impacts and	Alt 2		Alt 3		Alt 4		Alt 5		Alt 6		Alt 7b	
Associated Mitigation (ac)	Impact	Mitig										
1. Permanent	3.99	4.62	2.87	3.32	6.63	7.68	4.23	4.90	6.92	8.02	8.49	9.83
2. Direct Temporary (<1 yr)	0.79	0.02	1.26	0.04	0.33	0.01	0.56	0.02	0.09	0.00	4.32	0.13
3. Direct Temporary (>1 yr)	0.28	0.09	0.48	0.16	0.31	0.10	0.23	0.07	0.24	0.08	0.21	0.07
4. Direct Temporary (>2 yrs)	0.19	0.16	0.07	0.06	0.66	0.56	0.21	0.18	0.75	0.64	0.62	0.53
5. Indirect Temporary (1 yr)	3.46	0.55	3.92	0.62	5.71	0.91	4.31	0.68	5.98	0.95	4.86	0.77
6. Indirect Temporary (2 yrs)	1.33	0.73	1.54	0.84	2.80	1.52	1.36	0.74	2.90	1.58	2.16	1.17
7. Indirect Temporary (ETOF)	3.47	0.45	5.15	0.66	3.76	0.48	7.68	0.99	7.47	0.96	6.63	0.85
Required Mitigation	6.0	63	5.7	70	11.	27	7.	59	12.	23	13.	36



Figure 4-1. Anticipated nearshore hardbottom impacts from Alternative 2 – Applicants' Preferred Alternative. Impacts based on modeling a grain size of 0.25 mm in the Town of Palm Beach and 0.36 mm in the County.

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Figure 4-1 (cont.). Anticipated impacts to nearshore hardbottom resources from Alternative 2 – Applicants' Preferred Alternative. Impacts based on modeling a grain size of 0.25 mm in the Town of Palm Beach and 0.36 mm in the County.



Figure 4-2. Anticipated impacts to nearshore hardbottom resources from Alternative 2 – Applicants' Preferred Alternative. Impacts based on modeling a grain size of 0.36 mm in the Town of Palm Beach and 0.36 mm in the County.



Figure 4-2 (cont.). Anticipated impacts to nearshore hardbottom resources from Alternative 2 – Applicants' Preferred Alternative. Impacts based on modeling a grain size of 0.36 mm in the Town of Palm Beach and 0.36 mm in the County.



Figure 4-3. Anticipated impacts to nearshore hardbottom resources from Alternative 2 – Applicants' Preferred Alternative. Impacts based on modeling a grain size of 0.60 mm in the Town of Palm Beach and 0.36 mm in the County.



Figure 4-3 (cont.). Anticipated impacts to nearshore hardbottom resources from Alternative 2 – Applicants' Preferred Alternative. Impacts based on modeling a grain size of 0.60 mm in the Town of Palm Beach and 0.36 mm in the County.

5.0 LITERATURE CITED

Edwards, L. and V. Kosmynin. 2013. Personal communication between Lainie Edwards and Vladimir Kosmynin (FDEP) and Stacy Buck (CB&I) regarding temporary and secondary impacts in the UMAM analyses.

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SUB-APPENDIX H-1A

DRAFT UMAM ANALYSIS

TOWN OF PALM BEACH (0.25 MM) & PALM BEACH COUNTY (0.36 MM)

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PART I – Qualitative Description (See Section 62-345.400, F.A.C.)

Site/Project Name		Application Num	bers		Assessment Area Name or Number						
Southern Palm Beach Islar	nd		Town of Pa	Im Beach	SA.I-						
Comprehensive Shore Stal	bilization	Project	2005-07908	3: Palm Be	each	Intertidal and	Nearshore	Subtidal Hardbottom			
(Town of Palm Beach and	Palm Bea	ach	County SA.	J-2008-040	086	Resources					
County combined)											
FLUCCs code		Further clas	sification (optiona)	Impact or M	litigation Site?	Assessment Ar	ea Size			
571			Impact \$	Site	12.16	acres (includes 7 impact types, see Part II forms for each)					
Basin/Watershed Name/Number	Affected Wa	aterbody (Cla	ass)	Special C	assification	(i.e. OFW, AP, other lo	cal/state/federal d	esignation of importance)			
Atlantic Ocean	Class III	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	,	N/A							
Geographic relationship to and hydrolo	gic connectio	on with wetla	nds, other surface	water, upland	s						
Open waters of the Atlantic Ocean. The project area is located approximately 11 miles south of Lake Worth Inlet and approximately 2.5 miles north of South Lake Worth Inlet.											
Assessment area description											
The hardbottom environment adjacent to the project area is highly ephemeral, consisting primarily of low-relief intertidal and subtidal hardbottom habitat, located in less than 15 ft water depth. Surveys have shown a benthic community dominated by turf algae and macroalgae, but also supporting wormrock, tunicates, sponges, bryozoans and small coral colonies. Motile species such as fish, sea turtles and crabs also utitilize this habitat. Species are accustomed to the ephemeral nature of the habitat which is subject to frequent burial and re-exposure.											
Significant nearby features				Uniqueness (o	considering th	ne relative rarity in re	elation to the reg	ional landscape.)			
The outer reef (beyond the im the nearshore natural hardbot depth.	pact area tom habita) is locate at in 40-7	ed east of 0 ft water	Somewhat unique; the intertidal portion of the hardbottom ridge terminates to the north of the project area.							
Functions				Mitigation for	previous pern	nit/other historic use	•				
Provides cover, substrate, reference benthic and motile marine spectrum	uge and fo ecies.	ood resou	irces for	N/A							
Anticipated Wildlife Utilization Based o are representative of the assessment a found)	n Literature F area and reas	Review (List sonably expe	of species that ected to be	Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area)							
Benthic characterization surver revealed the dominant compo- communities to be turf and ma- tunicates, octocorals, bryozoa present. Common macroalgal <i>Hypnea, Dasycladus, Halimed</i> cm) colonies of scleractinian of on the nearshore hardbottom and <i>Solenastrea bournoni</i> . Co <i>Pterogorigia, Muricea</i> , and <i>E</i> fish, sea turtles and crabs also are accustomed to the ephem	ct area tthic ck, sponges, were also Padina, Small (<3 occumented strea spp. are cies such as at. Species nabitat .	Loggerhead (<i>Caretta caretta</i>) (T), Green (<i>Chelonia mydas</i>) (E), and leatherback (<i>Dermochelys coriacea</i>) (E) sea turtles regularly nest in the project area. The project area is also loggerhead critical habitat (terrestrial and marine). The Florida manatee (<i>Trichechus manatus latirostris</i>) (E) is common in Palm Beach County. Smalltooth sawfish (<i>Pristis pectinata</i>) (E) has the potential to occur in the project area. Threatened coral species which have the potential to occur in the project area but which have not been observed during recent benthic survyes include: staghorn coral (<i>Acropora cervicornis</i>), elkhorn coral (<i>A. palmata</i>), boulder star coral (<i>Orbicella annularis</i>), mountainous star coral (<i>O. faveolata</i>), star coral complex (<i>O. franski</i>), pillar coral (<i>Dendrogyra cylindrus</i>), and rough cactus coral (<i>Mycetophyllia ferox</i>).									
Observed Evidence of Wildlife Utilization	on (List spec	ies directly o	bserved, or other	signs such as	tracks, dropp	ings, casings, nests	, etc.):				
Characterization surveys d	ocument	ed the bi	ota listed ab	ove.							
Additional relevant factors: The hardbottom in highly ephemeral. Based on delineation of aerials, there has been a time-average between R-127 and R-141 from January 2003 to July 2013, including a minimum of 2.71 ac in a January 2006. Line intercept data collected on transects immediately offshore of the project are 130 to R-141 revealed this area to have a hardbottom to sand ratio of 24:76 (24% of the area e 76% is sand) (CBI, 2014). HB edge and benthic characterization surveys were conducted in 20								of exposed hardbottom a maximum of 48.78 ac in ore hardbottom adjacent to R- ottom edge is hardbottom and 2011, and 2014.			
Assessment conducted by:				Assessment c	ate(s):						
CB&I Coastal Planning & Eng	jineering,	Inc.		October 20)14						

PART I – Qualitative Description (See Section 62-345.400, F.A.C.)

Site/Project Name		Application Numbe	r		Assessment Area	a Name or Numb	er			
Southern Palm Beach Island	Droiget	Town of Paln	n Beach	SAJ-						
Comprehensive Shore Stabilization	n Project	2005-07908;	Palm Be	each	Mitigation R					
County combined)	ach	County SAJ-	J-2008-04086							
FLUCCs code	Further class	ification (optional)		Impact or N	litigation Site?	Assessment A	rea Size			
							acres (mitigation for 7 impact			
571	N/A			Mitigatio	n Site	6.55	types, see Part II forms for each)			
Basin/Watershed Name/Number Affected W	/aterbody (Cla	ss)	Special C	lassification	(i.e. OFW, AP, other	local/state/federal	designation of importance)			
Atlantic Ocean Class III			N/A							
Coographic relationship to and hydrologic connect	ion with wotlo	da athar aurfaca u	votor unlond	-						
Open waters of the Atlantic Ocean. Th	e project a	rea is located a	ater, upland	s telv 11 mi	iles south of L	ake Worth Inl	et and approximately 2.5 miles			
north of South Lake Worth Inlet.	o projoci u		pprovinie							
Assessment area description										
Subtidal limestone boulder artificial ree	efs are prop	osed to be dep	oloyed in t	he same	general vicinity	y and water d	epth as the impact area in a			
location devoid of hardbottom habitat in	n water de	oths similar to t	he natura	l nearsho	re hardbottom.	. Additional s	urveys will be conducted to			
	e reeis.									
Significant nearby features		U	niqueness (d	considering t	ne relative rarity in	relation to the rec	jional landscape.)			
The outer reef is located east of the ne	earshore n	atural T	he artifici	al reefs w	ill be placed in	similar water	depths as the impacted			
hardbottom habitat in 40-70 ft water de	epth.	h	ardbotton	n in order	to mimic the lo	ost function o	f the habitat.			
Eurotiona		N	litigation for		mit/othor historia us	20				
The artificial reef habitat is intended to	closelv mi	mic the	J/A	previous peri		be				
characteristics of adjacent nearshore h	nabitat, whi	ch is								
typically low relief limestone pavement	. It will prov	vide cover,								
substrate, refuge and food resources in		species.								
Anticipated Wildlife Utilization Based on Literature are representative of the assessment area and rea	Review (List o asonably expe	of species that A cted to be a	nticipated U	ilization by L	isted Species (List assessment area)	species, their leg	al classification (E, T, SSC), type of use,			
The artificial reef is intented to replicate	e the physi	cal L	oggerhea	d (<i>Caretta</i>	a caretta) (T),	Green (Chele	onia mydas) (E), and			
appearance, texture, relief and ecologi	cal function	n of the	eatherbac	k (Dermo	chelys coriace	a) (E) sea tu	rtles regularly nest in the			
habitat it is meant to replace.		p	project area. The project area is also loggerhead critical habitat (terrestrial and marine). The Florida manatee (<i>Trichechus manatus latirostris</i>) (E) is common							
		ir	n Palm Be	ach Cour	ty. Smalltooth	sawfish (Pris	stis pectinata) (E) has the			
		p	otential to	occur in	the project are	a. Threatene	d coral species which have the			
		p	ecent ben	thic survy	es include: sta	ighorn coral (Acropora cervicornis), elkhorn			
		c	oral (A. p	almata), t	oulder star co	ral (Orbicella	annularis), mountainous star			
		c	oral (O. fa vlindrus)	aveolata), and roug	star coral con	nplex (O. fran (Mycetophyl	iski), pillar coral (Dendrogyra lia ferox)			
		Ū	<i>ymaao)</i> ,	ana roug		(myeetepinyn				
Observed Evidence of Wildlife Utilization (List spe	cies directly ol	oserved, or other si	gns such as	tracks, dropp	oings, casings, nest	ts, etc.):				
Characterization surveys documented	the biota li	sted above for	natural ne	arshore h	ardbottom. Uti	ilization of art	ificial reef is expected to be			
similar to that of natural hardbottom.										
Additional relevant factors:			-							
Limestone is a natural material and will reefs have been documented to offset	l provide a	suitable replac	ement for	the impa rishment	cted nearshore	e reef substra utheast Florid	ite. Limestone boulder artificial			
	inipuoto de						u.			
Assessment conducted by:		Δ	ssessment	ate(s):						
CB&I Coastal Planning & Engineering.	Inc.	Ċ	October 20)14						

PART II – Qualification of Assessment Area (impact or mitigation) (See Sections 62-345.500 and .600, F.A.C.)

			Assessment Area Name or Number					
		Town SAJ-2005-0	7908; County					
SPBICSSP - Town of Palm Be	ach and County	SAJ-2008-04086		Permanent Impacts				
Impact or Mitigation		Assessment conducte	d by:					
impact (Fernanent)		CDQI		Alea (a	10105)	5.00		
Scoring Guidance	Optimal (10)	Moderate (7)	Minimal (4)		Ν	ot Present (0)		
The scoring of each indicator is based on what	Condition is optimal and	Condition is less than	Minimal level of su	innort of				
would be suitable for the	fully supports wetlands/surface water	maintain most	wetland /surface	condition is insufficient to provide wetland/surface water functions				
water assessed	functions	functions	Tunctions					
.500(6)(a) Location and Landscape Support w/o pres or	The assessment a and colonized pave components of the tunicates, scleracti <i>Padina, Hypnea, D</i> documented on the octocorals are <i>Pte</i>	rea is a wide exposure ement. Benthic characte epibenthic communitie inian corals, octocorals, Dasycladus, Halimeda, a e nearshore hardbottom rogorigia, Muricea, and	of nearshore hard arization surveys w s to be turf and m bryozoans, and z and <i>Laurencia</i> . Sr n, including <i>Sidera</i> <i>Eunicea</i> . The near	bottom ca within the acroalgae coanthids. mall (<3 c astrea spr arshore h	arbonate rock with project area revea e, and also suppor Common macroa m) colonies of scl o. and <i>Solenastrea</i> ardbottom provide	n primarily low relief areas aled the dominant rting wormrock, sponges, algal taxa are <i>Dictyota,</i> leractinian corals have been a <i>bournoni</i> . Common es an important settlement		
current with	and nursery habita for juvenile green s	It for immigrating larvae sea turtles and the beac	of many important h provides nestine	nt fisheries g habitat f	s species. It is als for loggerhead, gr	o provides foraging habitat een and leatherback sea		
10 1	turtles.			0				
.500(6)(b) Water Environment (n/a for uplands) w/o pres or current with 6 6	The assessment a high wave energy	rea is in the nearshore with generally clear wat	habitat of the Atla er. Water quality v	ntic Ocea vill not be	n with open circul altered.	ation. It is often exposed to		
.500(6)(c) Community structure 1. Vegetation and/or 2. Benthic Community w/o pres or current with 10 1	The community str organisms thriving macroalgae assen scleractinian corals <i>Siderastrea</i> spp. a limits succession a	mmunity structure is a high stress (low relief) to sub-climax (moderate relief) community, with some benthic sms thriving in this habitat for many years (scleractinians, large sponges). It supports a multi-species algae assemblage and a diverse invertebrate community in the form of wormrock, sponges, tunicates, tinian corals, octocorals, bryozoans, and zoanthids. The most abundant scleractinian species are <i>strea</i> spp. and <i>Solenastrea bournoni</i> . Size distribution indicates recruitment, but repeated burial of habitat succession and colony growth.						
Coore our of chouse cooree/20. /if	ı							
uplands, divide by 20)	If preservation a	as mitigation,			For impact as	ssessment areas		
current or w/o pres with	Preservation ad Adjusted mitigat	justment factor = tion delta =	2.317158596					
0.007 0.207	1							
	If mitigation			For mitigation accessment areas				
Delta = [with - current]	Time lag (t-fa	actor) =		r or miligation assessment areas				
0.600	Risk factor =	,		1	RFG=delta/(t-facto	or x risk)=		

PART II – Qualification of Assessment Area (impact or mitigation) (See Sections 62-345.500 and .600, F.A.C.)

Site/Project Na	me			Application Number		Assessment Area Name or Number			
SPBICSSP	- Town	of Palm Bea	ach and Countv	Town SAJ-2005-0	7908;	Mitigation for Permanent Impacts			
				County SAJ-2008	-04086				
Impact or Mitiga	ation			Assessment conducted	d by:		sment date:		
wiiliyali011				UBAI UCT. 2014					
Scoring Guid	dance		Optimal (10)	Modorato (7) Minimal (4) Not Present (0)					
The scoring of	of each			Condition is less than	Minimal				
indicator is base	d on what		fully supports	optimal, but sufficient to	support of	wetland	Condition is insufficient to provide		
type of wetland of	or surface		wetlands/surface water	wetland/surface water	/surface	water	wetland/surface water functions		
water asses	ssed		Turicuons	functions	Turicut	5115			
.500(6)(a) Lo	cation and Support	d Landscape	The mitigation area similar water depth area to facilitate rec	is shallow water nearsh as the impact area. Nea ruitment to the propose	nore habita arshore har d mitigative	t of unco dbottom	onsolidated sandy substrate in n resources exist in the adjacent al reef.		
w/o pres or									
current	ĺ	with							
0		10							
.500(6)(b) War fo w/o pres or current 6	ter Enviro or uplands	nment (n/a) with 6	The assessment are often exposed to hig	ea is in the nearshore h gh wave energy with gei	abitat of th nerally clea	e Atlanti Ir water.	c Ocean with open circulation. It is Water quality will not be not altered.		
.500(6)(c) C 1. Veg 2. Ben w/o pres or current 0	Communit getation a thic Comr	y structure nd/or nunity with 10	An artificial reef will invertebrates and w foraging resource fo artificial reefs in the	provide substrate for be ill create a refuge for fis or sea turtles since prefe nearshore habitat of Sc	enthic recru h and othe erred macro putheast Fl	uitment o r motile balgae h brida.	of macroalgae and sessile marine organisms. It will create a have been documented to grow on		
Score = sum	of above s	cores/30 (if							
upland	ds, divide b	y 20)	If preservation as	s mitigation,		ļ	For impact assessment areas		
current or w/o pres		with	Preservation adjusted mitigati	djustment factor = FL=delta x acres=					
0.200		0.007							
			If mitigation	ation For mitigation assessment a					
Delta =	[with - c	current]	Time lag (t-fa	ctor) =	1.03		0.52		

0.667

Risk factor =

RFG=delta/(t-factor x risk)=

Mitigation Determination Formulas (See Section 62-345.600(3), F.A.C.)

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk)))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank

To determine the acres of mitigation needed to offset impacts when not using a bank or a regional offsite mitigation area as mitigation, divide functional loss (FL) by relative functional gain (RFG). If there are more than one impact assessment area or more than one mitigation assessment area, the total functional loss and the total relative functional gain is determined by summation of the functional loss (FL) and relative functional gain (RFG) for each assessment area.



Form 62-345.900(3), F.A.C. [effective date]

PART II – Qualification of Assessment Area (impact or mitigation) (See Sections 62-345.500 and .600, F.A.C.)



PART II – Qualification of Assessment Area (impact or mitigation) (See Sections 62-345.500 and .600, F.A.C.)

01 (D				a 11 /1 51 5		Accesses to Area Name or Number				
Site/Project Nam	ne			Application Number		Assessment Area Name or Number				
SPBICSSP -	Town	of Palm Rea	ach and County	1 own SAJ-2005-0	7908; County	Mitigation for Direct Temp				
				SAJ-2008-04086		Impacts (<1 yr)				
Impact or Mitigat	tion			Assessment conducted	d by:	Assessment date:				
Mitigation				CB&I		Oct. 2	2014			
Scoring Guida	ince		Optimal (10)	Moderate (7)	Minimal (4)		Not Present (0)			
The scoring of	each		Condition is optimal and	Condition is less than	Minimal Investor					
would be suitable	on what		fully supports	optimal, but sufficient to maintain most	wetland /surface	pport of water	Condition is insufficient to provide			
type of wetland or	surface		wetlands/surface water	wetland/surface water	functions		wetland/surface water functions			
water assess	ed		TUTICUUTIS	functions						
r										
.500(6)(a) Loca S	ation and Support	l Landscape	The mitigation area water depth as the recruitment to the p	a is shallow water nearsl impact area. Nearshore proposed mitigative artif	hore habitat of un hardbottom reso icial reef.	consolid urces ex	lated sandy substrate in similar kist in the adjacent area to facilitate			
w/o pres or										
current	-	with								
0		9								
-		-								
.500(6)(b) Wate for w/o pres or current 6	r Enviro uplandsj	with	The assessment ar exposed to high wa	rea is in the nearshore h ave energy with generall	nabitat of the Atlar y clear water. Wa	ntic Oce ter quali	an with open circulation. It is often ity will not be not altered.			
.500(6)(c) Cc 1. Vege 2. Benth w/o pres or current 0	ommunity etation ar	y structure nd/or nunity with 9	An artificial reef wil and will create a re sea turtles since pr nearshore habitat c	al reef will provide substrate for benthic recruitment of macroalgae and sessile invertebrates reate a refuge for fish and other motile marine organisms. It will create a foraging resource for s since preferred macroalgae have been documented to grow on artificial reefs in the e habitat of Southeast Florida.						
Score = sum o uplands	f above s , divide by	cores/30 (if y 20)	If preservation a	s mitigation,			For impact assessment areas			
ourrent			Preservation adj	ustment factor -						
or w/o pres		with	Freservation adj		———————————————————————————————————————	FL=de	elta x acres=			
5 pico	I	vvilli	Adjusted mitigat	ion delta =						
0.200		0.800								
			If mitigation			For mitigation concernent and				
		-		For mitigation assessm						
Delta = [with - c	urrent]	Time lag (t-fa	(t-factor) = 1.03						
(0.600		Risk factor =		1.00		· · · · · · · · · · · · · · · · · · ·			

Mitigation Determination Formulas (See Section 62-345.600(3), F.A.C.)

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk)))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank

To determine the acres of mitigation needed to offset impacts when not using a bank or a regional offsite mitigation area as mitigation, divide functional loss (FL) by relative functional gain (RFG). If there are more than one impact assessment area or more than one mitigation assessment area, the total functional loss and the total relative functional gain is determined by summation of the functional loss (FL) and relative functional gain (RFG) for each assessment area.



Form 62-345.900(3), F.A.C. [effective date]


Site/Project N	ame			Application Number Assessment Area Name or Number							
	-	(D -		Town SAJ-2005-07908; County Mitigation for Direct Temp							
SPBICSSP	- Town (ot Palm Bea	ach and County	SAJ-2008-04086	, 	Impa	cts (>1 yr)				
Impact or Mitig	gation			Assessment conducted	sment date:						
Mitigation				CB&I Oct. 2014							
Searing C	idanas	1	Optimal (10)		Minimal (4)		Not Procent (0)				
The scoring	of each		Optimal (10)	Condition is less than	iviinimai (4)	'	NOT Present (U)				
indicator is bas	ed on what		fully supports	optimal, but sufficient to	pport of	Condition is insufficient to provide					
type of wetland	l or surface		wetlands/surface water	wetland/surface water	functions	walei	wetland/surface water functions				
water ass	essed	l		functions							
.500(6)(a) L	ocation and	l Landscape									
	Support		The mitigation area is shallow water nearshore habitat of unconsolidated sandy substrate in similar water depth as the impact area. Nearshore hardbottom resources exist in the adjacent area to facilitate recruitment to the proposed mitigative artificial reef.								
w/o pres or		•		-							
current		with									
0 7											
500(0)(1))	. = .										
.500(6)(b) W	ater Enviro	nment (n/a)	The assessment area is in the nearshore habitat of the Atlantic Ocean with open circulation. It is often exposed to high wave energy with generally clear water. Water guality will not be not altered								
w/o proc or			exposed to high wa	ve energy with generally	y ciear water. Wat	er quali	ty will not be not altered.				
current		with									
6		6	1								
Ļ		ÿ									
.500(6)(c)	Communit	y structure	An ortificial sector "	provido exterte fe t	onthio recently and	of					
1 \/	enetation a	nd/or	and will create a ref	uge for fish and other m	notile marine orga	nisms. I	t will create a foraging resource for				
2. Be	nthic Com	nunity	sea turtles since pre	eferred macroalgae hav	e been document	ed to gr	ow on artificial reefs in the				
		-	nearsnore nabitat o	i Southeast Florida.							
w/o pres or current		with									
0		7	1								
0		1									
Score - su	n of above s	cores/30 (if	1 [<u>-</u> 1						
upla	nds, divide b	y 20)	If preservation as	s mitigation,			For impact assessment areas				
current			Preservation adj	ustment factor –							
or w/o pres		with	i reservation duj			FL=de	elta x acres=				
0.200		0.667	Adjusted mitigati	on delta =							
0.200		0.007	J								
			If mitigation			7 []					
—							or mitigation assessment areas				
Delta =	= [with - c	current]	Time lag (t-fa	ictor) =	1.03	REG-	delta/(t-factor x risk)-				
	0.467		Risk factor =		1.00						

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



Form 62-345.900(3), F.A.C. [effective date]



Site/Project N	ame	of Dolm Doo	ash and County	Application Number Town SAJ-2005-0	7908; County	Assess Mitiga	sment Area Name or Number ation for Direct Temp	
SPBICSSP	- Town (u Palm Bea	ach and County	SAJ-2008-04086	•	Impa	cts (>2 yr)	
Impact or Mitig	gation			Assessment conducted	d by:	Assessment date:		
wiitiyation						001. 2	2014	
Scoring Gu	uidance		Optimal (10)	Moderate (7)	Minimal (4)	Not Present (0)	
The scoring indicator is bas would be suita type of wetland water ass	of each ed on what ble for the l or surface essed		Condition is optimal and fully supports wetlands/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface water functions	dition is less than al, but sufficient to maintain most and/surface water functions functions functions functions functions functions functions			
.500(6)(a) Li w/o pres or current 0	ocation and Support	d Landscape with 5	The mitigation area water depth as the recruitment to the p	is shallow water nearsl impact area. Nearshore proposed mitigative artifi	hore habitat of un hardbottom resc icial reef.	consolid ources ex	lated sandy substrate in similar xist in the adjacent area to facilitate	
.500(6)(b) Wa t w/o pres or current 6	ater Enviro for uplands	nment (n/a) with 6	The assessment ar exposed to high wa	ea is in the nearshore h we energy with generall	abitat of the Atlan y clear water. Wa	ntic Ocea ater qual	an with open circulation. It is often ity will not be not altered.	
.500(6)(c) 1. Ve 2. Be w/o pres or current 0	Communit egetation a nthic Comr	y structure nd/or nunity with 5	An artificial reef will and will create a rei sea turtles since pro nearshore habitat o	provide substrate for b fuge for fish and other n eferred macroalgae hav of Southeast Florida.	enthic recruitmen notile marine orga re been documen	t of mac anisms. I ted to gr	roalgae and sessile invertebrates It will create a foraging resource for row on artificial reefs in the	
Score = sur	n of above s	cores/30 (if	י ר					
uplar	nds, divide b	y 20)	If preservation a	s mitigation,		L	For impact assessment areas	
current or w/o pres]	with	Preservation adj Adjusted mitigat	iustment factor =		FL=de	elta x acres=	
0.200		0.000	1					
			If mitigation	۱			For mitigation assessment areas	
Delta -	= [with - c	current	Time lag (t-fa	uctor) =	1.03	<u> </u>	0.32	
20114	0.333		Risk factor =		1.00	RFG=0	delta/(t-factor x risk)=	

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk)))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



Form 62-345.900(3), F.A.C. [effective date]



Site/Project N	ame			Application Number		Assess	sment Area Name or Number	
SPBICSSP	- Town d	of Palm Bea	ach and County	Town SAJ-2005-0	7908; County	Mitigation for Indirect Temp		
er Breeer				SAJ-2008-04086		Impacts (1 yr)		
Impact or Miti	gation			Assessment conducted	d by:	Assessment date:		
Mitigation				CB&I		Oct. 2	2014	
Scoring Gu	uidance		Optimal (10)	Moderate (7)	Minimal (4)		Not Present (0)	
The scoring	of each		Condition is optimal and	Condition is less than				
would be suita	ed on what		fully supports	optimal, but sufficient to maintain most	wetland /surface	pport of water	Condition is insufficient to provide	
type of wetland	or surface		wetlands/surface water	wetland/surface water	functions	mator	wetland/surface water functions	
water ass	essed		TUNCUONS	functions				
			-					
.500(6)(a) L	ocation and Support	d Landscape	The mitigation area	is shallow water nears	hore habitat of un	consolid	lated sandy substrate in similar	
			recruitment to the p	roposed mitigative artif	icial reef.			
w/o pres or								
current		with						
0		8						
Ű		Ũ						
.500(6)(b) W w/o pres or current 6	ater Enviro for uplands	nment (n/a) with 6	The assessment ar exposed to high wa	ea is in the nearshore h ve energy with general	nabitat of the Atlar ly clear water. Wa	itic Ocea ter qual	an with open circulation. It is often ity will not be not altered.	
.500(6)(c) Community structure 1. Vegetation and/or 2. Benthic Community w/o pres or current with 0 8				provide substrate for b fuge for fish and other n eferred macroalgae hav f Southeast Florida.	enthic recruitment notile marine orga re been document	of mac nisms. I ed to gr	roalgae and sessile invertebrates It will create a foraging resource for row on artificial reefs in the	
Coord out	a of ohours o		r					
score = sur upla	nds, divide b	y 20)	If preservation a	s mitigation,			For impact assessment areas	
	,	- ,		- · ·				
current			Preservation adj	ustment factor =		FI -de	elta x acres-	
or w/o pres	_	with		· · · ·		1 2-00		
0 200		0 733	Adjusted mitigat	ion delta =				
0.200		0.700	l					
			If mitigation	0			or mitigation assessment areas	
				For mitigation assessment are			or mugation assessment areas	
Delta =	= [with - c	current]	Time lag (t-fa	(t-factor) = 1.03			0.52	
	0 522		Pick factor		1.00	RFG=0	delta/(t-factor x risk)=	
	0.000		RISK TACLOF =		1.00			

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk)))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



Form 62-345.900(3), F.A.C. [effective date]



						_			
Site/Project N	ame			Application Number		Assessment Area Name or Number			
	Taur	of Dolm Doo	ab and County	Town SAJ-2005-0	7908; County	Mitigation for Indirect Temp			
SPBICSSP	- Town (DI Paim Bea	ach and County	SAJ-2008-04086	-	Impacts (2 yr)			
Impact or Miti	gation			Assessment conducted	d by:	Assessment date:			
Mitigation	~			CB&I	2014				
Scoring Gu	uidance		Optimal (10)	Moderate (7)	Minimal (4)		Not Present (0)		
The scoring	of each		Condition is optimal and	Condition is less than					
indicator is bas	ed on what		fully supports	optimal, but sufficient to	Minimal level of su	pport of	Condition is insufficient to provide		
type of wetland	or surface		wetlands/surface water	maintain most wetland/surface water	functions	water	wetland/surface water functions		
water ass	essed		functions	functions					
		_							
.500(6)(a) L	ocation and	Landscape							
	Support		The mitigation area	is shallow water nears	hore habitat of un	consolid	lated sandy substrate in similar		
			water depth as the	impact area. Nearshore	hardbottom reso	urces ex	xist in the adjacent area to facilitate		
w/o pres or			recruitment to the p	roposed mitigative artif	icial reef.				
current		with							
	1		ł						
0		6							
.500(6)(b) W	ater Enviro	nment (n/a							
1	for uplands)	_	The accompany area is in the nearshare behitst of the Atlantic Occas with one straulation. It is after					
			The assessment an	ea is in the nearshore h	abitat of the Atlar	tic Ocea	an with open circulation. It is often		
			exposed to high wa	we energy with general	iy clear water. Wa	lier qual	ity will not be not altered.		
w/o pres or									
current		with	Į.						
6		6							
.500(6)(c)	Communit	v structure							
		,	An artificial reef will	provide substrate for b	enthic recruitmen	t of mac	roalgae and sessile invertebrates		
1. Ve	egetation a	nd/or	and will create a ref	and will create a refuge for fish and other motile marine organisms. It will create a foraging resource for					
2. Be	nthic Com	nunity	sea turtles since pro	sea turtles since preferred macroalgae have been documented to grow on artificial reefs in the					
2. 30			nearshore habitat o	t Southeast Florida.					
w/o pres or									
current	_	with							
0		6	I						
		J							
C			7						
Score = sur	nds, divide h	v 20)	If preservation a	s mitigation.			For impact assessment areas		
apia		,,							
current			Preservation adj	ustment factor =			alta y aeroe-		
or w/o pres		with				r∟=de	ena x acres=		
0 200		0.600	Adjusted mitigat	ion delta =					
0.200		0.000	l						
			If mitigation			F	or mitigation assessment areas		
D. 11	Les del		Time 1 // f		For mugation assessment are				
Delta	= [with - c	currentj	i ime iag (t-fa	ictor) =	1.03	RFG-	delta/(t-factor x risk)-		
	0.400		Risk factor =		1.00				

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk)))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



Form 62-345.900(3), F.A.C. [effective date]

Site/Droject N	000			Application Number		A	amont Aroo Namo or	Numbor	
Sile/Project N	ame			Town SAJ-2005-0	7908 County	Assessment Area Name of Number			
SPBICSSF	P - Town o	of Palm Bea	ach and County	SAJ-2008-04086	rooo, oounry	Indirect Temporary (ETOF) Impacts			
Impact or Miti	gation			Assessment conducted	d by:				
Impact (Inc	lirect Ten	nporary (ET	OF))	CB&I		Area	3.79		
Scoring G	uidance		Optimal (10)	Moderate (7)	Minimal (4)		No	ot Present (0)	
The scoring	of each		Condition is optimal and	Condition is less than	,			.,	
indicator is bas would be suita	ed on what able for the		fully supports	optimal, but sufficient to maintain most	Minimal level of sup wetland /surface	oport of water	Condition is insufficient	t to provide wetland/surface water	
type of wetland	d or surface		functions	wetland/surface water	functions			functions	
water ass	esseu			Tunctions					
.500(6)(a) L	ocation and Support	I Landscape	The assessment ar colonized pavemer the epibenthic com scleractinian corals Dasycladus, Halim the nearshore hard	rea is a wide exposure of nt. Benthic characterizat munities to be turf and r s, octocorals, bryozoans eda , and <i>Laurencia</i> . Sr lbottom, including <i>Sider</i>	of nearshore hardl ion surveys within macroalgae, and a , and zoanthids. C nall (<3 cm) colon astrea spp. and S	the pro also sup common ies of s colenas	carbonate rock with p oject area revealed th oporting wormrock, s n macroalgal taxa are cleractinian corals ha trea bournoni. Comm	primarily low relief areas and ne dominant components of ponges, tunicates, e <i>Dictyota, Padina, Hypnea,</i> ave been documented on non octocorals are	
w/o pres or current		with	Pterogorigia, Muric	ea, and <i>Eunicea</i> . The r	nearshore hardbot	tom pro	ovides an important s	settlement and nursery	
10	1	witti	green sea turtles a	nd the beach provides r	nesting habitat for	loggerh	nead, green and leath	nerback sea turtles.	
.500(6)(b) Water Environment for uplands) (n/a for uplands) W/o pres or current with 6 6 6									
.500(6)(c) 1. V 2. Be w/o pres or current 10	Communit egetation ar nthic Comn	y structure nd/or nunity with 9	The community stru organisms thriving macroalgae assem scleractinian corals <i>Siderastrea</i> spp. a limits succession a	ucture is a high stress (I in this habitat for many iblage and a diverse inv s, octocorals, bryozoans nd <i>Solenastrea bournor</i> nd colony growth.	ow relief) to sub-o years (scleractinia ertebrate commur , and zoanthids. T ni. Size distribution	limax (i ans, larg hity in th he mos n indica	moderate relief) com ge sponges). It suppo ne form of wormrock, st abundant scleractii ttes recruitment, but i	munity, with some benthic orts a multi-species , sponges, tunicates, nian species are repeated burial of habitat	
Score = sum of	above scores	s/30 (if uplands.	1						
	divide by 20)		If preservation a	s mitigation,			For impact as	sessment areas	
current or w/o pres 0.867	1	with 0.800	Preservation adj Adjusted mitigat	iustment factor = ion delta =		FL=d	elta x acres=	0.252468	
l			1						
			If mitigation				For mitigation a	ssessment areas	
Delta	= [with - c	urrent]	Time lag (t-fa	actor) =					
	0.067		Risk factor =				RFG=delta/(t-facto	r x risk)=	
L	0.007								

Site/Project Na	ame			Application Number Assessment Area Name or Number				
SPBICSSP	- Town o	of Palm Bea	ach and County	1 own SAJ-2005-0 SAJ-2008-04086	7908; County	Mitig	ation for Indirect Temporary (ETOF) Impacts	
Impact or Mitig	ation			Assessment conducted	d by:		ment date:	
willigation				CDAI		001. 2	-014	
Scoring Gui	dance		Optimal (10)	Moderate (7)	Minimal (4)	Not Present (0)	
The scoring of indicator is base would be suitab type of wetland water asse	of each ed on what ole for the or surface essed		Condition is optimal and fully supports wetlands/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface water functions	Minimal level of su wetland /surface functions	pport of water	Condition is insufficient to provide wetland/surface water functions	
.500(6)(a) Lo w/o pres or	cation and Support	I Landscape	The mitigation area water depth as the recruitment to the p	is shallow water nears impact area. Nearshore roposed mitigative artif	hore habitat of ur hardbottom reso icial reef.	consolic burces ex	lated sandy substrate in similar kist in the adjacent area to facilitate	
current		with						
0		10						
.500(6)(b) Wa fc w/o pres or current 6	an with open circulation. It is often ity will not be not altered.							
.500(6)(c) 0 1. Ve 2. Ben w/o pres or current 0	Communit getation ar thic Comn	y structure nd/or nunity with 10	An artificial reef will and will create a ref sea turtles since pro nearshore habitat o	provide substrate for b fuge for fish and other n eferred macroalgae hav f Southeast Florida.	enthic recruitmer notile marine org re been documer	t of mac anisms. ted to gr	roalgae and sessile invertebrates It will create a foraging resource for row on artificial reefs in the	
0	- f - h - · · ·		ı ———					
Score = sum uplan	ds, divide b	y 20)	If preservation a	s mitigation,			For impact assessment areas	
current or w/o pres Preservation adjustment factor = FL=de Adjusted mitigation delta = Adjusted mitigation delta = FL=de							elta x acres=	
0.200		0.007	l					
r			If mitigation			F	or mitigation assessment areas	
Delta =	[with - c	current]	Time lag (t-fa	actor) =	1.03	DEC.	0.52	
	0.667		Risk factor =		1.25	NPG=0	101 μ-1αυίοι Α 113KJ=	

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk)))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



Form 62-345.900(3), F.A.C. [effective date]

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk))

(a) Mitigation Bank Credit Determination

(b) Mitigation needed to offset impacts, when using a mitigation bank

(c) Mitigation needed to offset impacts, when not using a bank

To determine the acres of mitigation needed to offset impacts when not using a bank or a regional offsite mitigation area as mitigation, divide functional loss (FL) by relative functional gain (RFG). If there are more than one impact assessment area or more than one mitigation assessment area, the total functional loss and the total relative functional gain is determined by summation of the functional loss (FL) and relative functional gain (RFG) for each assessment area.

FL	/	RFG	=	Acres of Mitigation	*Note: for temporary impacts, <i>Mitigation</i> = (<i>FL/RFG</i>) - <i>Impact Area</i>
2.317159		0.52		4.48]
0.523914		0.58		0.03	
0.188642		0.45		0.10	
0.111689		0.32		0.16	
					1
2.010373		0.52		0.53	
0.850105		0.39		0.77	
0.252468		0.52		0.49	
				6.55	
	FL 2.317159 0.523914 0.188642 0.111689 2.010373 0.850105 0.252468	FL / 2.317159 / 0.523914 / 0.188642 ////////////////////////////////////	FL / RFG 2.317159 0.52 0.523914 0.58 0.188642 0.45 0.111689 0.32 2.010373 0.52 0.850105 0.39 0.252468 0.52	FL / RFG = 2.317159 0.52 0.523914 0.58 0.188642 0.45 0.111689 0.32 2.010373 0.52 0.850105 0.39 0.252468 0.52	FL / RFG = Acres of Mitigation 2.317159 0.52 4.48 0.523914 0.58 0.03 0.188642 0.45 0.10 0.111689 0.32 0.16 2.010373 0.52 0.53 0.850105 0.39 0.77 0.252468 0.52 0.49

Form 62-345.900(3), F.A.C. [effective date]

SUB-APPENDIX H-1B

DRAFT UMAM ANALYSIS

TOWN OF PALM BEACH (0.36 MM) & PALM BEACH COUNTY (0.36 MM)

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PART I – Qualitative Description (See Section 62-345.400, F.A.C.)

Site/Project Name			Application Num	mbers Assessment Area Name or Number				r	
Southern Palm Beach Islar	nd		Town of Pa	Im Beach SAJ-			a d Na anala ang Orik Gilal Llandha (tana		
Comprehensive Shore Stal	bilization	Project	2005-07908	B: Palm Be	each	Intertidal and	Nearshore	Subtidal Hardbottom	
(Town of Palm Beach and	Palm Bea	ach	County SA.	J-2008-040	086	Resources			
County combined)									
FLUCCs code		Further clas	sification (optiona) Impact or Mitigation Site? Assessment			Assessment Ar	ea Size	
571		N/A			Impact Site 12.16 types, so each)			acres (includes 7 impact types, see Part II forms for each)	
Basin/Watershed Name/Number	Affected Wa	aterbody (Cla	ass)	Special C	assification	(i.e. OFW, AP, other lo	cal/state/federal d	esignation of importance)	
Atlantic Ocean	Class III	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	,	N/A					
Geographic relationship to and hydrolo	gic connectio	on with wetla	nds, other surface	water, upland	s				
Open waters of the Atlantic O north of South Lake Worth Inl	cean. The et.	e project a	irea is located	approxima	tely 11 mi	les south of Lal	ke Worth Inle	et and approximately 2.5 miles	
Assessment area description									
The hardbottom environment adjacent to the project area is highly ephemeral, consisting primarily of low-relief intertidal and subtidal hardbottom habitat, located in less than 15 ft water depth. Surveys have shown a benthic community dominated by turf algae and macroalgae, but also supporting wormrock, tunicates, sponges, bryozoans and small coral colonies. Motile species such as fish, sea turtles and crabs also utitilize this habitat. Species are accustomed to the ephemeral nature of the habitat which is subject to frequent burial and re-exposure.									
Significant nearby features				Uniqueness (o	considering th	ne relative rarity in re	elation to the reg	ional landscape.)	
The outer reef (beyond the im the nearshore natural hardbot depth.	pact area tom habita) is locate at in 40-7	ed east of 0 ft water	Somewhat unique; the intertidal portion of the hardbottom ridge terminates to the north of the project area.					
Functions				Mitigation for	previous pern	nit/other historic use	•		
Provides cover, substrate, reference benthic and motile marine spectrum	uge and fo ecies.	ood resou	irces for	N/A					
Anticipated Wildlife Utilization Based o are representative of the assessment a found)	n Literature F area and reas	Review (List sonably expe	of species that ected to be	Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area)					
Benthic characterization surver revealed the dominant compo- communities to be turf and ma- tunicates, octocorals, bryozoa present. Common macroalgal <i>Hypnea, Dasycladus, Halimed</i> cm) colonies of scleractinian of on the nearshore hardbottom and <i>Solenastrea bournoni</i> . Co <i>Pterogorigia, Muricea</i> , and <i>E</i> fish, sea turtles and crabs also are accustomed to the ephem	ct area tthic ck, sponges, were also Padina, Small (<3 occumented strea spp. are cies such as at. Species nabitat .	Loggerhea leatherbac project are marine) . T in Palm Be potential to recent ben coral (A. p. coral (O. fa cylindrus),	d (Caretta k (Dermoo a. The pro- he Florida ach Coun o occur in t o occur in t thic survye almata), b aveolata), and rough	a caretta) (T), G chelys coriacea, ject area is also a manatee (<i>Tric</i> ty. Smalltooth s the project area es include: stag oulder star cora star coral comp h cactus coral (Green (Cheld) (E) sea tur o loggerhead hechus man sawfish (Pris a. Threatened a but which h horn coral (, al (Orbicella olex (O. fran. Mycetophylli	nia mydas) (E), and tles regularly nest in the d critical habitat (terrestrial and <i>atus latirostris</i>) (E) is common <i>tis pectinata</i>) (E) has the d coral species which have the ave not been observed during Acropora cervicornis), elkhorn <i>annularis</i>), mountainous star <i>ski</i>), pillar coral (<i>Dendrogyra</i> <i>ia ferox</i>).			
Observed Evidence of Wildlife Utilization	on (List spec	ies directly o	bserved, or other	signs such as	tracks, dropp	ings, casings, nests	, etc.):		
Characterization surveys d	ocument	ed the bi	ota listed ab	ove.					
The hardbottom in highly ephe between R-127 and R-141 fro January 2006. Line intercept of 130 to R-141 revealed this are 76% is sand) (CBI, 2014). HB	ased on d y 2003 to cted on tra a hardbo I benthic o	lelineation of a July 2013, inc ansects imme ottom to sand characterizatio	e has bee inimum of hore of the 76 (24% o were cond	n a time-averag 2.71 ac in Janu project area o f the area east lucted in 2005,	ged 23.85 ac uary 2009 an n the nearsh of the hardbo 2006, 2007,	of exposed hardbottom a maximum of 48.78 ac in ore hardbottom adjacent to R- ottom edge is hardbottom and 2011, and 2014.			
Assessment conducted by:				sessment date(s):					
CB&I Coastal Planning & Eng	jineering,	Inc.		Assessment date(s): October 2014					

PART I – Qualitative Description (See Section 62-345.400, F.A.C.)

Site/Project Name			Application Num	ber			Assessment Area	Name or Numb	or.	
Southern Dalm Boach Island	4		, ipplication null				A SSESSINGHLAIRS	rame or Numbe	<i>a</i>	
Comprehensive Shore Stab	u ilization	Project	Town of Pa	alm I	Beach	SAJ-				
(Town of Palm Beach and P	alm Re	ach	2005-0790	8; P	alm Be	ach	Mitigation R	eef		
County combined)			County SA	J-20	008-040	86				
FLUCCs code		Further clas	sification (optiona	al)		Impact or N	litigation Site?	Assessment A	rea Size	
							0	o cores (mitigation f		
571		N/A				Mitigatio	n Site	6 66	types see Part II forms for	
511		1.077				miligatio		0.00	each)	
Basin/Watershed Name/Number	Affected W	aterbody (Cl	ass)		Special C	lassification	(i.e. OFW, AP, other	local/state/federal of	lesignation of importance)	
Atlantic Ocean	Class III	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			N/A		, , , , , , , , , , , , , , , , , , ,			
Geographic relationship to and hydrologi	ic connecti	on with wetla	nds, other surface	e wat	er, uplands	6				
Open waters of the Atlantic Oc	ean. The	e project a	rea is located	d apr	oroximat	tely 11 mi	les south of La	ke Worth Inl	et and approximately 2.5 miles	
north of South Lake Worth Inle	t.	. ,				,				
Assessment area description										
Subtidal limestone boulder artif	ficial ree	fs are pro	posed to be d	leplo	oved in t	he same	general vicinity	and water d	epth as the impact area in a	
location devoid of hardbottom h	nabitat ir	n water de	pths similar to	o the	e natura	nearsho	re hardbottom.	Additional su	urveys will be conducted to	
determine the location of the m	itigative	reefs.								
Significant nearby features				Unic	queness (c	onsidering th	ne relative rarity in	elation to the reg	ional landscape.)	
The outer reef is located east	of the ne	earshore r	atural	The	e artificia	al reefs wi	ill be placed in	similar water	depths as the impacted	
hardbottom habitat in 40-70 ft v	water de	pth.		har	dbottom	i in order	to mimic the lo	ist function of	the habitat.	
E-matiana				N 4141 -	Mitigation for previous permit/other historic use					
The artificial reaf hebitat is into	ndad ta		imia tha		jation for p	revious perr	nit/other historic us	e		
characteristics of adjacent near	nded to rshore h	abitat wh	inic the	IN/F	•					
typically low relief limestone pa	vement.	. It will pro	vide cover,							
substrate, refuge and food reso	ources fo	or marine	species.							
Anticipated Wildlife Utilization Based on	Literature	Review (List	of species that	Antio	cipated Uti	lization by Li	isted Species (List	species, their leg	al classification (E, T, SSC), type of use,	
found)				anu	intensity 0		assessment area)			
The artificial reef is intented to	replicate	e the phys	ical	Log	gerhea	d (Caretta	a caretta) (T),	Green (Chelo	onia mydas) (E), and	
appearance, texture, relief and	ecologi	cal functio	n of the	lea	therback	(Dermoo	chelys coriacea	a) (E) sea tu	rtles regularly nest in the	
nabitat it is meant to replace.				marine). The Florida manatee (<i>Trichechus manatus latirostris</i>) (E) is com-						
				in F	Palm Be	ach Coun	itv. Smalltooth	sawfish (Pris	tis pectinata) (E) has the	
				pot	ential to	occur in	the project are	a. Threatene	d coral species which have the	
				pot	ential to	occur in	the project are	a but which h	ave not been observed during	
				rec	ent bent	thic survy	es include: sta	ghorn coral (.	Acropora cervicornis), elkhorn	
				cor	al (A. pa al (O. fa	almata), t iveolata)	star coral com	nlex (<i>Orbicella</i>	ski) pillar coral (Dendrogyra	
				cyl	indrus),	and roug	h cactus coral	(Mycetophyll	ia ferox).	
						•				
Observed Evidence of Wildlife Utilization	n (List spec	cies directly c	bserved, or other	r signs	s such as t	racks, dropp	pings, casings, nest	s, etc.):		
Characterization surveys docur	mented	the biota li	isted above fo	or na	atural ne	arshore h	ardbottom. Uti	lization of art	ificial reef is expected to be	
similar to that of natural hardbo	ottom.									
Additional relevant factors:										
Limestone is a natural material	and will	l provide a	suitable repl	acer	ment for	the impa	cted nearshore	e reef substra	te. Limestone boulder artificial	
reefs have been documented to	o offset	impacts a	ssociated with	h bea	ach nou	rishment	projects in sou	theast Florid	a.	
Assessment conducted by:				Asse	essment d	ate(s):				
CB&I Coastal Planning & Engir	neerina.	Inc.		Oct	tober 20	14				
5 5	J,			1	-					
				1						
Form 62-345.900(1), F.A.C. [effective da	ate]									

Site/Project Name			Application Number	r Number				
			Town SAJ-2005-07908; County			Dormonant Impacto		
SPBICSSP - Towr	f of Palm Bea	ach and County	SAJ-2008-04086	-	Perm	r ennanent impacts		
Impact or Mitigation	.+)		Assessment conducted by:					
Impact (Fermanen	it)		CDAI		Alea	(acres)	5.97	
Scoring Guidance	7	Optimal (10)	Moderate (7)	Minimal (4))	No	ot Present (0)	
The scoring of each indicator is based on wha would be suitable for the type of wetland or surface water assessed	it e	Condition is optimal and fully supports wetlands/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface water functions	Minimal level of su wetland /surface functions	pport of water	Condition is insufficient to provide wetland/surface water functions		
P			<u></u>					
.500(6)(a) Location a Suppor w/o pres or current 10	nd Landscape t with	The assessment and and colonized pave components of the tunicates, scleracti <i>Padina, Hypnea, D</i> documented on the octocorals are <i>Pter</i> and nursery habitar for juvenile green s turtles.	rea is a wide exposure ement. Benthic characte epibenthic communitie nian corals, octocorals, <i>Dasycladus, Halimeda</i> , i e nearshore hardbottom <i>rogorigia, Muricea</i> , and t for immigrating larvae sea turtles and the beac	of nearshore hard erization surveys y s to be turf and m bryozoans, and z and <i>Laurencia</i> . Si a, including <i>Sidera</i> <i>Eunicea</i> . The ne of many importar th provides nestin	lbottom within th acroalg coanthid mall (<3 astrea s arshore arshore t fisheri g habita	carbonate rock with le project area revea ae, and also suppor s. Common macroa cm) colonies of sclu pp. and Solenastrea hardbottom provide ies species. It is also tt for loggerhead, gre	primarily low relief areas aled the dominant ting wormrock, sponges, Igal taxa are <i>Dictyota</i> , eractinian corals have been a <i>bournoni</i> . Common is an important settlement o provides foraging habitat een and leatherback sea	
.500(6)(b) Water Envir for upland w/o pres or current 6	ronment (n/a ts) with 6	The assessment al high wave energy v	rea is in the nearshore with generally clear wat	habitat of the Atla er. Water quality v	ntic Oce will not b	ean with open circula e altered.	ation. It is often exposed to	
.500(6)(c) Commur 1. Vegetation 2. Benthic Con w/o pres or current 10	nity structure and/or nmunity with 1	The community str organisms thriving macroalgae assem scleractinian corals <i>Siderastrea</i> spp. a limits succession a	ucture is a high stress (in this habitat for many ablage and a diverse inv s, octocorals, bryozoans nd <i>Solenastrea bourno</i> and colony growth.	low relief) to sub- years (scleractini vertebrate commu s, and zoanthids. ni. Size distributio	climax (ans, larg inity in tl The mos on indica	moderate relief) con ge sponges). It supp he form of wormroch st abundant scleract ates recruitment, but	nmunity, with some benthic orts a multi-species <, sponges, tunicates, inian species are repeated burial of habitat	
					-			
Score = sum of above uplands, divide	scores/30 (if by 20)	If preservation a	s mitigation,			For impact as	ssessment areas	
current or w/o pres	with	Preservation adj Adjusted mitigat	justment factor = ion delta =		FL=de	elta x acres=	2.381221171	
		1						
		If mitigation			For mitigation assessment areas			
Delta = [with -	current]	Time lag (t-fa	g (t-factor) =				Junon assessment aleas	
0.600	-	Risk factor =				RFG=delta/(t-facto	or x risk)=	

Site/Project Na	me			Application Number		Assess	sment Area Name or Number	
SPBICSSP	- Town	of Palm Bea	ach and Countv	Town SAJ-2005-0	7908;	Mitia	ation for Permanent Impacts	
				County SAJ-2008	-04086			
Impact or Mitiga	ation			Assessment conducted by: Assessment date:			sment date:	
wiiliyali011				UCI. 2014				
Scoring Guid	dance		Optimal (10)	Moderate (7)	Minima	al (4)	Not Present (0)	
The scoring of	of each			Condition is less than	Minimal			
indicator is base	d on what		fully supports	optimal, but sufficient to	support of	wetland	Condition is insufficient to provide	
type of wetland of	or surface		wetlands/surface water	wetland/surface water	/surface	water	wetland/surface water functions	
water asses	ssed		Turicuons	functions	Turicut	5115		
.500(6)(a) Lo	cation and Support	d Landscape	The mitigation area similar water depth area to facilitate rec	is shallow water nearsh as the impact area. Nea ruitment to the propose	nore habita arshore har d mitigative	t of unco dbottom	onsolidated sandy substrate in n resources exist in the adjacent al reef.	
w/o pres or								
current	ĺ	with						
0		10						
.500(6)(b) War fo w/o pres or current 6	ter Enviro or uplands	nment (n/a) with 6	The assessment are often exposed to hig	ea is in the nearshore h gh wave energy with gei	abitat of th nerally clea	e Atlanti Ir water.	c Ocean with open circulation. It is Water quality will not be not altered.	
.500(6)(c) C 1. Veg 2. Ben w/o pres or current 0	Communit getation a thic Comr	y structure nd/or nunity with 10	An artificial reef will invertebrates and w foraging resource fo artificial reefs in the	provide substrate for be ill create a refuge for fis or sea turtles since prefe nearshore habitat of Sc	enthic recru h and othe erred macro putheast Fl	uitment o r motile balgae h brida.	of macroalgae and sessile marine organisms. It will create a have been documented to grow on	
Score = sum	of above s	cores/30 (if						
upland	ds, divide b	y 20)	If preservation as	s mitigation,		ļ	For impact assessment areas	
current or w/o pres		with	Preservation adjusted mitigati	ustment factor = on delta =		FL=de	elta x acres=	
0.200		0.007						
			If mitigation			F	or mitigation assessment areas	
Delta =	[with - c	current]	Time lag (t-fa	ctor) =	1.03		0.52	

0.667

Risk factor =

RFG=delta/(t-factor x risk)=

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk)))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



Form 62-345.900(3), F.A.C. [effective date]



01 (D				a 11 /1 51 5				
Site/Project Nam	ne			Application Number		Assessment Area Name or Number		
SPBICSSP -	Town	of Palm Rea	ach and County	1 own SAJ-2005-0	7908; County	Mitigation for Direct Temp		
				SAJ-2008-04086		Impa	cts (<1 yr)	
Impact or Mitigat	tion			Assessment conducted	d by:	Assessment date:		
Mitigation				CB&I		Oct. 2	Oct. 2014	
Scoring Guida	ince		Optimal (10)	Moderate (7)	Minimal (4)		Not Present (0)	
The scoring of	each		Condition is optimal and	Condition is less than	Minimal Investor			
would be suitable	on what		fully supports	optimal, but sufficient to maintain most	wetland /surface	pport of water	Condition is insufficient to provide	
type of wetland or	surface		wetlands/surface water	wetland/surface water	functions		wetland/surface water functions	
water assess	ed		TUTICUUTIS	functions				
r								
.500(6)(a) Loca S	ation and Support	l Landscape	The mitigation area water depth as the recruitment to the p	a is shallow water nearsl impact area. Nearshore proposed mitigative artif	hore habitat of un hardbottom reso icial reef.	consolid urces ex	lated sandy substrate in similar kist in the adjacent area to facilitate	
w/o pres or								
current	-	with						
0		9						
-		-						
.500(6)(b) Wate for w/o pres or current 6	r Enviro uplandsj	with	The assessment ar exposed to high wa	rea is in the nearshore h ave energy with generall	nabitat of the Atlar y clear water. Wa	ntic Oce ter quali	an with open circulation. It is often ity will not be not altered.	
0 0 .500(6)(c) Community structure An artificial real and will create 1. Vegetation and/or and will create 2. Benthic Community sea turtles similar w/o pres or with 0 9				l provide substrate for b fuge for fish and other n eferred macroalgae hav of Southeast Florida.	enthic recruitmen notile marine orga re been documen	t of mac inisms. I ted to gr	croalgae and sessile invertebrates It will create a foraging resource for row on artificial reefs in the	
Score = sum o uplands	f above s , divide by	cores/30 (if y 20)	If preservation a	s mitigation,			For impact assessment areas	
ourrent			Preservation adj	ustment factor -				
or w/o pres		with	Freservation adj		———————————————————————————————————————	FL=de	elta x acres=	
5 pico	I	vvilli	Adjusted mitigat	ion delta =				
0.200		0.800						
			If mitigation			_	or mitigation appagement areas	
	i magatori			For mitigation assessment a			or mugation assessment areas	
Delta = [with - c	urrent]	Time lag (t-fa	ictor) =	1.03 (BEG=delta//t-factor x risk)=			
(0.600		Risk factor =		1.00		· · · · · · · · · · · · · · · · · · ·	

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk)))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



Form 62-345.900(3), F.A.C. [effective date]



Site/Project Name				Application Number Assessment Area Name or Number					
				Town SAJ-2005-07908: County			Mitigation for Direct Temp		
SPBICSSP - Town of Palm Beach and County				SAJ-2008-04086			Impacts (>1 yr)		
Impact or Mitigation				Assessment conducted by:			Assessment date:		
Mitigation				CB&I Oct. 2014					
Scoring G	iidance	l	Optimal (10)	Moderata (7)	Minimal (4)		Not Present (0)		
The scoring of each			Condition is optimal and	Condition is less than	iviini111ai (4)				
indicator is bas would be suite	ed on what		fully supports	optimal, but sufficient to maintain most	Minimal level of su wetland /surface	pport of water	Condition is insufficient to provide		
type of wetland	l or surface		wetlands/surface water functions	wetland/surface water function			wetland/surface water functions		
water ass	essed	l							
.500(6)(a) Location and Landscape Support			The mitigation area is shallow water nearshore habitat of unconsolidated sandy substrate in similar water depth as the impact area. Nearshore hardbottom resources exist in the adjacent area to facilitate recruitment to the proposed mitigative artificial reef						
w/o pres or									
current		with							
0		7							
.500(6)(b) Water Environment (n/a for uplands) w/o pres or current with 6 6			The assessment area is in the nearshore habitat of the Atlantic Ocean with open circulation. It is often exposed to high wave energy with generally clear water. Water quality will not be not altered.						
.500(6)(c) Community structure 1. Vegetation and/or 2. Benthic Community w/o pres or current with 0 7			An artificial reef will provide substrate for benthic recruitment of macroalgae and sessile invertebrates and will create a refuge for fish and other motile marine organisms. It will create a foraging resource for sea turtles since preferred macroalgae have been documented to grow on artificial reefs in the nearshore habitat of Southeast Florida.						
Score = sur	n of above s	cores/30 (if							
uplands, divide by 20)		If preservation as	s mitigation,		For impact assessment areas				
current			Preservation adj	ustment factor =					
or w/o pres with		FL=delta x acres=				eita x acres=			
0.200		0.667	Adjusted mitigati	on delta =					
<u>.</u>									
			If mitigation			For mitigation assessment areas			
Delta = [with - current]			Time lag (t-fa	g (t-factor) = 1.03					
0.467			Risk factor = 1.00						

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



Form 62-345.900(3), F.A.C. [effective date]



Site/Project Name				Application Number Town SAJ-2005-07908; County			Assessment Area Name or Number Mitigation for Direct Temp	
SPBICSSP - LOWN OF PAIM Beach and County				SAJ-2008-04086		Impacts (>2 yr)		
Impact or Mitigation				Assessment conducted	d by:	Assessment date:		
willigation				UDAI UCT. 2014				
Scoring Gu	iidance		Optimal (10)	Moderate (7)	Minimal (4)	Not Present (0)	
The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed			Condition is optimal and fully supports wetlands/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface water functions	Minimal level of support of wetland /surface water functions		Condition is insufficient to provide wetland/surface water functions	
.500(6)(a) Location and Landscape Support w/o pres or current with 0 5			The mitigation area is shallow water nearshore habitat of unconsolidated sandy substrate in similar water depth as the impact area. Nearshore hardbottom resources exist in the adjacent area to facilitate recruitment to the proposed mitigative artificial reef.					
.500(6)(b) Water Environment (n/a for uplands) w/o pres or current with 6 6			The assessment ar exposed to high wa	ea is in the nearshore h we energy with generall	abitat of the Atlan y clear water. Wa	ntic Ocea ater qual	an with open circulation. It is often ity will not be not altered.	
.500(6)(c) Community structure 1. Vegetation and/or 2. Benthic Community w/o pres or current with 0 5			An artificial reef will and will create a rei sea turtles since pro nearshore habitat o	eef will provide substrate for benthic recruitment of macroalgae and sessile invertebrates te a refuge for fish and other motile marine organisms. It will create a foraging resource for nce preferred macroalgae have been documented to grow on artificial reefs in the abitat of Southeast Florida.				
Score = sur	n of above s	cores/30 (if	י ר					
uplands, divide by 20)			If preservation as mitigation, For impact asset			For impact assessment areas		
current or w/o pres		with	Preservation adj Adjusted mitigat	iustment factor =		FL=de	elta x acres=	
0.200		0.000	1					
			If mitigation			F	or mitigation assessment areas	
Delta = [with - current]			Time lag (t-fa	actor) =	1.03	<u> </u>	0.32	
0.333			Risk factor =		1.00	RFG=0	delta/(t-factor x risk)=	

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk)))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



Form 62-345.900(3), F.A.C. [effective date]



Site/Project Name				Application Number			Assessment Area Name or Number			
SPBICSSP - Town of Palm Beach and County				Town SAJ-2005-0	7908; County	Mitigation for Indirect Temp				
er Breeer				SAJ-2008-04086		Impacts (1 yr)				
Impact or Mitigation				Assessment conducted	d by:	Assessment date:				
Mitigation				CB&I		Oct. 2	2014			
Scoring Gu	uidance		Optimal (10)	Moderate (7)	Minimal (4)		Not Present (0)			
The scoring of each			Condition is optimal and	Condition is less than	ndition is less than					
would be suita	ed on what		fully supports optimal, but sufficient to Minimal level of su		pport of water	Condition is insufficient to provide				
type of wetland	or surface		wetlands/surface water	wetland/surface water	wetland/surface water functions					
water ass	essed		TUNCUONS	functions						
			-							
.500(6)(a) L	ocation and Support	d Landscape	The mitigation area is shallow water nearshore habitat of unconsolidated sandy substrate in similar water depth as the impact area. Nearshore hardbottom resources exist in the adjacent area to facilitate recruitment to the proposed mitigative artificial reef.							
w/o pres or										
current		with								
0		8								
Ű		Ũ								
.500(6)(b) Water Environment (n/a for uplands) w/o pres or current with 6 6			The assessment ar exposed to high wa	ea is in the nearshore h ve energy with general	nabitat of the Atlar ly clear water. Wa	itic Ocea ter qual	an with open circulation. It is often ity will not be not altered.			
.500(6)(c) Community structure 1. Vegetation and/or 2. Benthic Community w/o pres or current with 0 8			An artificial reef will and will create a ref sea turtles since pro nearshore habitat o	An artificial reef will provide substrate for benthic recruitment of macroalgae and sessile invertebrates and will create a refuge for fish and other motile marine organisms. It will create a foraging resource for sea turtles since preferred macroalgae have been documented to grow on artificial reefs in the nearshore habitat of Southeast Florida.						
Coord out	a of ohours o		r –							
score = sur upla	nds, divide b	y 20)	If preservation a	s mitigation,			For impact assessment areas			
	,	- ,		- · ·						
current			Preservation adj	ustment factor =		FI -de	alta x acres-			
or w/o pres	_	with		· · · ·		1 2-00				
0 200		0 733	Adjusted mitigat	ion delta =						
0.200		0.700	l							
If mitiga							or mitigation assessment areas			
				For mitigation assessment area			or mingation assessment areas			
Delta =	= [with - c	current]	Time lag (t-fa	ictor) =	1.03		0.52			
	0 522		RFG=delta/(t-factor x risk)=				delta/(t-factor x risk)=			
0.533			RISK TACLOF =		1.00					

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



Form 62-345.900(3), F.A.C. [effective date]

Site/Droject Nome								
Site/Project Name		Application Number A Town SAJ-2005-07908: County		Assess	Assessment Area Name or Number			
SPBICSSP - Town	of Palm Bea	SAJ-2008-04086		Indire	irect Temporary Impacts (2 years)			
Impact or Mitigation	mporary 2 y	Assessment conducted by:		Aroa				
impact (indirect re	mporary 2 y	ears	CDal Alea (acles)			(deres)	1.77	
Scoring Guidance		Optimal (10)	Moderate (7)	Minimal (4)			Not Present (0)	
The scoring of each indicator is based on what		Condition is optimal and	Condition is less than	Minimal level of sur	oport of			
would be suitable for the		fully supports wetlands/surface water	maintain most	wetland /surface	water	Condition is insuffic	ient to provide wetland/surface water functions	
type of wetland or surface water assessed		functions	wetland/surface water functions	functions				
.500(6)(a) Location ar Support w/o pres or current 10	d Landscape with	The assessment area is a wide exposure of nearshore hardbottom carbonate rock with primarily low relief areas and colonized pavement. Benthic characterization surveys within the project area revealed the dominant components of the epibenthic communities to be turf and macroalgae, and also supporting wormrock, sponges, tunicates, scleractinian corals, octocorals, bryozoans, and zoanthids. Common macroalgal taxa are <i>Dictyota, Padina, Hypnea, Dasycladus, Halimeda</i> , and <i>Laurencia</i> . Small (<3 cm) colonies of scleractinian corals have been documented on the nearshore hardbottom, including <i>Siderastrea</i> spp. and <i>Solenastrea bournoni</i> . Common octocorals are <i>Pterogorigia, Muricea</i> , and <i>Eunicea</i> . The nearshore hardbottom provides an important settlement and nursery habitat for immigrating larvae of many important fisheries species. It is also provides foraging habitat for juvenile green sea turtles and the beach provides nesting habitat for loggerhead, green and leatherback sea turtles.						
.500(6)(b) Water Envir for upland w/o pres or current 6	onment (n/a s) with 6	The assessment area is in the nearshore habitat of the Atlantic Ocean with open circulation. It is often exposed to high wave energy with generally clear water. Water quality will not be altered.						
.500(6)(c) Communi 1. Vegetation a 2. Benthic Com w/o pres or current 10	ty structure and/or munity with 1	The community stru organisms thriving macroalgae assem scleractinian corals <i>Siderastrea</i> spp. ar limits succession a	nity structure is a high stress (low relief) to sub-climax (moderate relief) community, with some benthic hriving in this habitat for many years (scleractinians, large sponges). It supports a multi-species assemblage and a diverse invertebrate community in the form of wormrock, sponges, tunicates, n corals, octocorals, bryozoans, and zoanthids. The most abundant scleractinian species are spp. and <i>Solenastrea bournoni</i> . Size distribution indicates recruitment, but repeated burial of habitat ssion and colony growth.					
Score = sum of above score	es/30 (if uplands	If preservation as mitigation						
uivide by 20	<i>'</i>)	ii pieseivaiioli a	o magaaon,			гот штрас	נ מספססוווכווג מוסמס	
current or w/o pres	with	Preservation adj Adjusted mitigat	ustment factor = ion delta =		FL=de	elta x acres=	0.86146998	
		If mitigation	If mitigation				n 000000000000000000000000000000000000	
Delta = [with -	currentl	Time lag (t-fa	ctor) =		L	For mitigatio	ni assessment areas	
0 600		Risk factor -)		RFG=delta/(t-factor x risk)=			
0.000								
						_		
------------------	---------------	-------------	--------------------------	--	---------------------	--------------------------------	---	--
Site/Project N	ame			Application Number		Assessment Area Name or Number		
	Taur	of Dolm Doo	ab and County	Town SAJ-2005-0	7908; County	Mitigation for Indirect Temp		
SPBICSSP	- Town (DI Paim Bea	ach and County	SAJ-2008-04086	-	Impacts (2 yr)		
Impact or Miti	gation			Assessment conducted	d by:	Assess	sment date:	
Mitigation	~			CB&I	2014			
Scoring Gu	uidance		Optimal (10)	Moderate (7)	Minimal (4)		Not Present (0)	
The scoring	of each		Condition is optimal and	Condition is less than				
indicator is bas	ed on what		fully supports	fully supports optimal, but sufficient to Minimal level of support of Condition is				
type of wetland	or surface		wetlands/surface water	maintain most wetland/surface water	functions	water	wetland/surface water functions	
water ass	essed		functions	functions				
		_						
.500(6)(a) L	ocation and	Landscape						
	Support		The mitigation area	is shallow water nears	hore habitat of un	consolid	lated sandy substrate in similar	
			water depth as the	impact area. Nearshore	hardbottom reso	urces ex	xist in the adjacent area to facilitate	
w/o pres or			recruitment to the p	roposed mitigative artif	icial reef.			
current		with						
	1		ł					
0		6						
.500(6)(b) W	ater Enviro	nment (n/a						
1	for uplands)	_					
			The assessment an	ea is in the nearshore h	abitat of the Atlar	tic Ocea	an with open circulation. It is often	
			exposed to high wa	we energy with general	iy clear water. Wa	lier qual	ity will not be not altered.	
w/o pres or								
current		with	Į.					
6		6						
.500(6)(c)	Communit	v structure						
		,	An artificial reef will	provide substrate for b	enthic recruitmen	t of mac	roalgae and sessile invertebrates	
1. Ve	egetation a	nd/or	and will create a ref	fuge for fish and other n	notile marine orga	inisms.	It will create a foraging resource for	
2. Be	nthic Com	nunity	sea turtles since pro	eferred macroalgae hav	e been documen	ted to gr	row on artificial reefs in the	
2. 30			nearshore habitat o	t Southeast Florida.				
w/o pres or								
current	_	with						
0		6	I					
		J						
C			7					
Score = sur	nds, divide h	v 20)	If preservation a	s mitigation.			For impact assessment areas	
apia		,,						
current			Preservation adj	ustment factor =			alta y aeroe-	
or w/o pres with						r∟=de	ena x acres=	
0 200		0.600	Adjusted mitigat	ion delta =				
0.200		0.000	l					
			If mitigation				For mitigation assessment areas	
D. 11	Les de la		Time 1 // f		4.00			
Delta	= [with - c	currentj	i ime iag (t-fa	ictor) =	1.03	RFG-	delta/(t-factor x risk)-	
	0.400		Risk factor =		1.00			

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk)))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



Form 62-345.900(3), F.A.C. [effective date]



Site/Project Na	ame			Application Number Town SA L 2005 07008: County Mitigation for Indirect Townsory					
SPBICSSP	- Town o	of Palm Bea	ach and County	1 own SAJ-2005-0 SAJ-2008-04086	7908; County	Mitig	Mitigation for Indirect Temporary (ETOF) Impacts		
Impact or Mitig	ation			Assessment conducted by:			Assessment date:		
willigation				CDAI		001. 2	-014		
Scoring Gui	dance		Optimal (10)	Moderate (7)	Minimal (4)	Not Present (0)		
The scoring of indicator is base would be suitab type of wetland water asse	of each ed on what ole for the or surface essed		Condition is optimal and fully supports wetlands/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface water functions			Condition is insufficient to provide wetland/surface water functions		
.500(6)(a) Lo w/o pres or	cation and Support	I Landscape	The mitigation area water depth as the recruitment to the p	is shallow water nears impact area. Nearshore roposed mitigative artif	hore habitat of ur hardbottom reso icial reef.	consolic burces ex	lated sandy substrate in similar kist in the adjacent area to facilitate		
current with									
0		10							
.500(6)(b) Water Environment (n/a for uplands) The assessment area is in the nearshore habitat of the Atlantic Ocean with open circulation. It is often exposed to high wave energy with generally clear water. Water quality will not be not altered. w/o pres or current with 6 6									
.500(6)(c) 0 1. Ve 2. Ben w/o pres or current 0	Communit getation ar thic Comn	y structure nd/or nunity with 10	An artificial reef will and will create a ref sea turtles since pro nearshore habitat o	provide substrate for b fuge for fish and other n eferred macroalgae hav f Southeast Florida.	enthic recruitmer notile marine org re been documer	t of mac anisms. ted to gr	roalgae and sessile invertebrates It will create a foraging resource for row on artificial reefs in the		
0	- f - h - · · ·		ı ———						
Score = sum uplan	ds, divide b	y 20)	If preservation a	s mitigation,			For impact assessment areas		
current or w/o pres		with	Preservation adjustment factor = FL=delta x acres= Adjusted mitigation delta = FL=delta x acres=						
0.200		0.007	l						
r			If mitigation				For mitigation assessment areas		
Delta =	[with - c	current]	Time lag (t-fa	actor) =	1.03	DEC.	0.52		
	0.667		Risk factor =		1.25	NPG=0	101 μ-1αυίοι Α 113KJ=		

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



Form 62-345.900(3), F.A.C. [effective date]

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk))

(a) Mitigation Bank Credit Determination

(b) Mitigation needed to offset impacts, when using a mitigation bank

(c) Mitigation needed to offset impacts, when not using a bank

To determine the acres of mitigation needed to offset impacts when not using a bank or a regional offsite mitigation area as mitigation, divide functional loss (FL) by relative functional gain (RFG). If there are more than one impact assessment area or more than one mitigation assessment area, the total functional loss and the total relative functional gain is determined by summation of the functional loss (FL) and relative functional gain (RFG) for each assessment area.

	Impact Types	FL	/	RFG	=	Acres of Mitigation	*Note: for temporary impacts, <i>Mitigation</i> = (<i>FL/RFG</i>) - <i>Impact Area</i>
1	Permanent	2.381221		0.52]	4.60]
	Direct Temporary						
2	(< 1 Year)	0.500789		0.58		0.03	
	Direct Temporary						
3	(>1 year)	0.195552		0.45		0.11	
	Direct Temporary						
4	(>2 year)	0.111651		0.32		0.16	
	Indirect Temporary						1
5	(1 year)	1.946013		0.52		0.51	
	Indirect Temporary						1
6	(2 years)	0.86147		0.39		0.78	
	Indirect Temporary						
7	(ETOF)	0.243492		0.52		0.47	
	total					6 66	
	L'ULUI					0.00	

Form 62-345.900(3), F.A.C. [effective date]

SUB-APPENDIX H-1C

DRAFT UMAM ANALYSIS

TOWN OF PALM BEACH (0.60 MM) & PALM BEACH COUNTY (0.36 MM)

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PART I – Qualitative Description (See Section 62-345.400, F.A.C.)

Site/Project Name	Application Num	mbers Assessment Area Name or Number			r				
Southern Palm Beach Islar	nd		Town of Pa	alm Beach SAJ-			and Namashana Quikti dal Handhattana		
Comprehensive Shore Stal	bilization	Project	2005-07908	B: Palm Be	each	Intertidal and	nd Nearshore Subtidal Hardbottom		
(Town of Palm Beach and	Palm Bea	ach	County SA.	J-2008-040	086	Resources			
County combined)									
FLUCCs code		Further clas	sification (optiona	I) Impact or Mitigation Site? Assessment A			Assessment Ar	ea Size	
571		N/A		Impact Site		Site	12.16	acres (includes 7 impact types, see Part II forms for each)	
Basin/Watershed Name/Number	Affected Wa	aterbody (Cla	ass)	Special C	lassification	(i.e. OFW, AP, other lo	cal/state/federal d	esignation of importance)	
Atlantic Ocean	Class III	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	,	N/A					
Geographic relationship to and hydrolo	gic connectio	on with wetla	nds, other surface	water, upland	s				
Open waters of the Atlantic O north of South Lake Worth Inl	cean. The et.	e project a	irea is located	approxima	tely 11 mi	les south of Lal	ke Worth Inle	et and approximately 2.5 miles	
Assessment area description									
The hardbottom environment adjacent to the project area is highly ephemeral, consisting primarily of low-relief intertidal and subtidal hardbottom habitat, located in less than 15 ft water depth. Surveys have shown a benthic community dominated by turf algae and macroalgae, but also supporting wormrock, tunicates, sponges, bryozoans and small coral colonies. Motile species such as fish, sea turtle and crabs also utitilize this habitat. Species are accustomed to the ephemeral nature of the habitat which is subject to frequent burial and exposure.									
Significant nearby features				Uniqueness (o	considering th	ne relative rarity in re	elation to the reg	ional landscape.)	
The outer reef (beyond the im the nearshore natural hardbot depth.	ed east of 0 ft water	Somewhat unique; the intertidal portion of the hardbottom ridge terminates to the north of the project area.							
Functions				Mitigation for	previous pern	nit/other historic use	•		
Provides cover, substrate, reference benthic and motile marine spectrum	irces for	N/A							
Anticipated Wildlife Utilization Based o are representative of the assessment a found)	n Literature F area and reas	Review (List sonably expe	of species that ected to be	Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area)					
Benthic characterization surver revealed the dominant compo- communities to be turf and ma- tunicates, octocorals, bryozoa present. Common macroalgal <i>Hypnea, Dasycladus, Halimed</i> cm) colonies of scleractinian of on the nearshore hardbottom and <i>Solenastrea bournoni</i> . Co <i>Pterogorigia, Muricea</i> , and <i>E</i> fish, sea turtles and crabs also are accustomed to the ephem	ct area tthic ck, sponges, were also Padina, Small (<3 occumented strea spp. are cies such as at. Species nabitat .	Loggerhea leatherbac project are marine) . T in Palm Be potential to recent ben coral (A. p. coral (O. fa cylindrus),	d (Caretta k (Dermoo a. The pro- he Florida ach Coun o occur in t o occur in t thic survye almata), b aveolata), and rougl	a caretta) (T), G chelys coriacea, ject area is also a manatee (<i>Tric</i> ty. Smalltooth s the project area es include: stag oulder star cora star coral comp h cactus coral (Green (Cheld) (E) sea tur o loggerhead hechus man sawfish (Pris a. Threatened a but which h horn coral (, al (Orbicella olex (O. fran. Mycetophylli	nia mydas) (E), and tles regularly nest in the d critical habitat (terrestrial and <i>atus latirostris</i>) (E) is common <i>tis pectinata</i>) (E) has the d coral species which have the ave not been observed during Acropora cervicornis), elkhorn <i>annularis</i>), mountainous star <i>ski</i>), pillar coral (<i>Dendrogyra</i> <i>ia ferox</i>).			
Observed Evidence of Wildlife Utilization	on (List spec	ies directly o	bserved, or other	signs such as	tracks, dropp	ings, casings, nests	, etc.):		
Characterization surveys d	ocument	ed the bi	ota listed ab	ove.					
The hardbottom in highly ephe between R-127 and R-141 fro January 2006. Line intercept of 130 to R-141 revealed this are 76% is sand) (CBI, 2014). HB	lelineation of a July 2013, inc ansects imme ottom to sand characterizatio	aerials, ther cluding a m diately offs ratio of 24: on surveys	e has bee inimum of hore of the 76 (24% o were cond	n a time-averag 2.71 ac in Janu project area o f the area east lucted in 2005,	ged 23.85 ac uary 2009 an n the nearsh of the hardbo 2006, 2007,	of exposed hardbottom a maximum of 48.78 ac in ore hardbottom adjacent to R- ottom edge is hardbottom and 2011, and 2014.			
Assessment conducted by:				Assessment c	ate(s):				
CB&I Coastal Planning & Eng	jineering,	Inc.		Assessment date(s): October 2014					

PART I – Qualitative Description (See Section 62-345.400, F.A.C.)

Site/Project Name		Application Number			Assessment Area	Name or Numbe	r		
Southern Palm Beach Island	n Draigat	Town of Palm	Palm Beach SAJ-						
(Town of Palm Beach and Palm B	each	2005-07908;	Palm Be	each	Mitigation R	eef			
County combined)	cucii	County SAJ-2	2008-040						
FLUCCs code	Further class	sification (optional)		Impact or N	litigation Site?	Assessment Ar	rea Size		
571	N/A	Mitigat			n Site	acres (mitigation for 7 impact types, see Part II forms for each)			
Basin/Watershed Name/Number Affected V	Vaterbody (Cla	ass)	Special C	lassification	(i.e. OFW, AP, other	local/state/federal d	lesignation of importance)		
Atlantic Ocean Class II	I		N/A						
Geographic relationship to and hydrologic connect	tion with wetla	nds, other surface w	ater, upland	s					
Open waters of the Atlantic Ocean. Th north of South Lake Worth Inlet.	ne project a	rea is located a	pproxima	tely 11 m	iles south of La	ake Worth Inle	et and approximately 2.5 miles		
Assessment area description									
Subtidal limestone boulder artificial re location devoid of hardbottom habitat determine the location of the mitigativ	efs are prop in water de e reefs.	posed to be dep pths similar to tl	loyed in t ne natura	he same I nearsho	general vicinity re hardbottom.	/ and water do Additional su	epth as the impact area in a irveys will be conducted to		
Significant nearby features		Ur	niqueness (d	considering t	he relative rarity in	relation to the reg	ional landscape.)		
The outer reef is located east of the r hardbottom habitat in 40-70 ft water d	earshore n epth.	atural Ti ha	The artificial reefs will be placed in similar water depths as the impacted hardbottom in order to mimic the lost function of the habitat.						
Functions		Mi	tigation for	previous peri	mit/other historic us	e			
The artificial reef habitat is intended to characteristics of adjacent nearshore typically low relief limestone pavemen substrate, refuge and food resources	o closely mi habitat, whi t. It will pro for marine s	mic the N ch is vide cover, species.	/A						
Anticipated Wildlife Utilization Based on Literature are representative of the assessment area and re found)	e Review (List asonably expe	of species that Ar ected to be an	nticipated Ut d intensity c	ilization by L of use of the	isted Species (List assessment area)	species, their leg	al classification (E, T, SSC), type of use,		
The artificial reef is intented to replica appearance, texture, relief and ecolog habitat it is meant to replace.	ical Lo n of the le m in po re co co co co co	oggerhea atherbac oject are arine). Ti Palm Be otential to otential to contential to contential to contential to contential to c	d (Caretta k (Dermou a. The pro- ne Florida each Cour o occur in o occur in thic survy almata), the aveolata), and roug	a caretta) (T), chelys coriacea bject area is als manatee (<i>Tric</i> ity. Smalltooth the project are es include: sta boulder star co star coral com h cactus coral	Green (Chelc a) (E) sea tui so loggerhead shechus mana sawfish (Pris a. Threatened a but which h ghorn coral (, ral (Orbicella oplex (O. fran. (Mycetophyll	bria mydas) (E), and ttles regularly nest in the d critical habitat (terrestrial and <i>atus latirostris</i>) (E) is common <i>tis pectinata</i>) (E) has the d coral species which have the ave not been observed during <i>Acropora cervicornis</i>), elkhorn <i>annularis</i>), mountainous star <i>ski</i>), pillar coral (<i>Dendrogyra</i> <i>ia ferox</i>).			
Observed Evidence of Wildlife Utilization (List spe	ecies directly o	bserved, or other sig	ns such as	tracks, dropp	oings, casings, nest	s, etc.):			
Characterization surveys documented similar to that of natural hardbottom.	the biota li	sted above for r	natural ne	arshore h	ardbottom. Uti	lization of art	ificial reef is expected to be		
Additional relevant factors:									
Limestone is a natural material and wind reefs have been documented to offset	II provide a impacts as	suitable replace ssociated with b	ement for each nou	[·] the impa irishment	cted nearshore projects in sou	e reef substra itheast Florida	te. Limestone boulder artificial a.		
Assessment conducted by:		As	sessment c	ate(s):					
CB&I Coastal Planning & Engineering	, Inc.	0	ctober 20)14					
Form 62-345.900(1), F.A.C. [effective date]									

Site/Project Name		Application Number	Application Number Assessment Area Name or Number					
		Town SAJ-2005-0	7908; County					
SPBICSSP - Town of Palm Bea	ach and County	SAJ-2008-04086						
Impact or Mitigation		Assessment conducte	d by:	Aroa	(acros) 3.00			
impaci (Fernaneni)		CDQI		(deles) 5.55				
Scoring Guidance	Optimal (10)	Moderate (7)	Minimal (4)) Not Present (0)				
The scoring of each indicator is based on what	Condition is optimal and	Condition is less than	Minimal level of sur	oport of				
would be suitable for the	fully supports wetlands/surface water	maintain most	wetland /surface	water	Condition is insufficie wat	ent to provide wetland/surface er functions		
water assessed	functions	functions	functions					
	The assessment a and colonized pave	rea is a wide exposure ement. Benthic characte	of nearshore hard erization surveys v	bottom within th	carbonate rock with e project area reveal	primarily low relief areas ed the dominant		
.500(6)(a) Location and Landscape	components of the	epibenthic communitie	s to be turf and m	acroalg	ae, and also supporti	ng wormrock, sponges,		
Support	Padina, Hypnea, D	Dasycladus, Halimeda , a	and <i>Laurencia</i> . Sr	nall (<3	cm) colonies of scle	ractinian corals have been		
w/o prog or	documented on the octocorals are Pter	e nearshore hardbottom rogorigia, Muricea, and	i, including <i>Sidera</i> <i>Eunicea</i> . The nea	a <i>strea</i> s arshore	pp. and <i>Solenastrea</i> hardbottom provides	<i>bournoni</i> . Common an important settlement		
current with	and nursery habita	t for immigrating larvae	of many important	t fisheri	es species. It is also	provides foraging habitat		
10 1	turtles.	sea turties and the beac	n provides nesting	g nabita	t for loggernead, gre	en and leatherback sea		
.500(6)(b) Water Environment (n/a								
for uplands)	The assessment a	rea is in the nearshore	habitat of the Atla	ntic Oce	an with open circulat	tion. It is often exposed to		
	high wave energy	with generally clear wat	er. Water quality v	vill not b	e altered.			
w/o pres or								
	1							
0 0								
.500(6)(c) Community structure	The community str	ucture is a high stress (low relief) to sub-	climax (i	moderate relief) com	munity, with some benthic		
1. Vegetation and/or	macroalgae assem	blage and a diverse inv	vertebrate commu	nity in th	ne form of wormrock,	sponges, tunicates,		
2. Benthic Community	scleractinian corals	s, octocorals, bryozoans	s, and zoanthids.	The mos	st abundant scleraction	nian species are		
w/o pros or	limits succession a	and colony growth.				opeated bunar of habitat		
current with								
10 1								
Score = sum of above scores/30 (if	If procenuction a				Eor import	ecoment erece		
uplands, divide by 20)	ii preservation a	is miliyalion,			For impact ass	essment areas		
current	Preservation ad	justment factor =		FL=de	elta x acres= 2	.394770134		
with	Adjusted mitigat	tion delta =						
0.867 0.267]							
	If mitigation			,,				
Dolto Inith anno 1	Time les (1.6				For mitigation assessment areas			
Deita = [with - current]	i ime lag (t-fa	actor) =			RFG=delta/(t-factor	x risk)=		
0.600	Risk factor =					x 100/-		

Site/Project Na	me			Application Number		Assessment Area Name or Number			
SPBICSSP	- Town	of Palm Bea	ach and Countv	Town SAJ-2005-0	7908;	Mitia	ation for Permanent Impacts		
				County SAJ-2008	-04086				
Impact or Mitiga	ation			Assessment conducted	sment date:				
wiiliyali011				UDAI UCT. 2014					
Scoring Guid	dance		Optimal (10)	Moderate (7) Minimal (4) Not Present (0)					
The scoring of	of each			Condition is less than	Minimal				
indicator is base	d on what		fully supports	optimal, but sufficient to	support of	wetland	Condition is insufficient to provide		
type of wetland of	or surface		wetlands/surface water	wetland/surface water	/surface	water	wetland/surface water functions		
water asses	ssed		Turicuons	functions	Turicut	5115			
.500(6)(a) Lo	cation and Support	d Landscape	The mitigation area similar water depth area to facilitate rec	is shallow water nearsh as the impact area. Nea ruitment to the propose	nore habita arshore har d mitigative	t of unco dbottom	onsolidated sandy substrate in n resources exist in the adjacent al reef.		
w/o pres or									
current	ĺ	with							
0		10							
.500(6)(b) War fo w/o pres or current 6	ter Enviro or uplands	nment (n/a) with 6	The assessment are often exposed to hig	ea is in the nearshore h gh wave energy with gei	abitat of th nerally clea	e Atlanti Ir water.	c Ocean with open circulation. It is Water quality will not be not altered.		
.500(6)(c) C 1. Veg 2. Ben w/o pres or current 0	Communit getation a thic Comr	y structure nd/or nunity with 10	An artificial reef will invertebrates and w foraging resource fo artificial reefs in the	provide substrate for be ill create a refuge for fis or sea turtles since prefe nearshore habitat of Sc	enthic recru h and othe erred macro putheast Fl	uitment o r motile balgae h brida.	of macroalgae and sessile marine organisms. It will create a have been documented to grow on		
Score = sum	of above s	cores/30 (if							
upland	ds, divide b	y 20)	If preservation as	s mitigation,		ļ	For impact assessment areas		
current or w/o pres		with	Preservation adjusted mitigati	ustment factor = on delta =		FL=de	elta x acres=		
0.200		0.007							
			If mitigation			F	or mitigation assessment areas		
Delta =	[with - c	current]	Time lag (t-fa	ctor) =	1.03		0.52		

0.667

Risk factor =

RFG=delta/(t-factor x risk)=

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



Form 62-345.900(3), F.A.C. [effective date]



01 (D				a 11 /1 51 5					
Site/Project Nam	ne			Application Number		Assessment Area Name or Number			
SPBICSSP -	Town	of Palm Rea	ach and County	1 own SAJ-2005-0	7908; County	Mitigation for Direct Temp			
				SAJ-2008-04086		Impacts (<1 yr)			
Impact or Mitigat	tion			Assessment conducted	d by:	Assessment date:			
Mitigation				CB&I		Oct. 2	2014		
Scoring Guida	ince		Optimal (10)	Moderate (7)	Minimal (4)		Not Present (0)		
The scoring of	each		Condition is optimal and	Condition is less than	Minimal Investor				
would be suitable	on what		fully supports	optimal, but sufficient to maintain most	wetland /surface	pport of water	Condition is insufficient to provide		
type of wetland or	surface		wetlands/surface water	wetland/surface water	functions		wetland/surface water functions		
water assess	ed		TUTICUUTIS	functions					
r									
.500(6)(a) Loca S	ation and Support	l Landscape	The mitigation area water depth as the recruitment to the p	a is shallow water nearsl impact area. Nearshore proposed mitigative artif	hore habitat of un hardbottom reso icial reef.	consolid urces ex	lated sandy substrate in similar kist in the adjacent area to facilitate		
w/o pres or									
current	-	with							
0		9							
-		-							
.500(6)(b) Wate for w/o pres or current 6	r Enviro uplandsj	with	The assessment ar exposed to high wa	rea is in the nearshore h ave energy with generall	nabitat of the Atlar y clear water. Wa	ntic Oce ter quali	an with open circulation. It is often ity will not be not altered.		
.500(6)(c) Community structure 1. Vegetation and/or 2. Benthic Community w/o pres or current with 0 9				l provide substrate for b fuge for fish and other n eferred macroalgae hav of Southeast Florida.	enthic recruitmen notile marine orga re been documen	t of mac inisms. I ted to gr	croalgae and sessile invertebrates It will create a foraging resource for row on artificial reefs in the		
Score = sum o uplands	f above s , divide by	cores/30 (if y 20)	If preservation a	s mitigation,			For impact assessment areas		
ourrent			Preservation adj	ustment factor -					
or w/o pres		with	Freservation adj		———————————————————————————————————————	FL=de	elta x acres=		
5 pico	I	vvilli	Adjusted mitigat	ion delta =					
0.200		0.800							
			If mitigation			_	or mitigation appagement areas		
		-		For mitigation assessment			or mugation assessment areas		
Delta = [with - c	urrent]	Time lag (t-fa	ictor) =	1.03	RFG=0	0.58 delta/(t-factor x risk)=		
(0.600		Risk factor =	= 1.00 RFG=delta/(t-factor x risk)=					

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk)))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



Form 62-345.900(3), F.A.C. [effective date]



Site/Project N	ame			Application Number Assessment Area Name or Number						
	-	(D -		Town SAJ-2005-0	7908; Countv	Mitigation for Direct Temp				
SPBICSSP	- Town (ot Palm Bea	ach and County	SAJ-2008-04086	, 	Impa	cts (>1 yr)			
Impact or Mitig	gation			Assessment conducted	sment date:					
Mitigation				CB&I		Oct. 2	2014			
Searing C	idanas	1	Optimal (10)		Minimal (4)		Not Procent (0)			
The scoring	of each		Optimal (10)	Condition is less than	iviinimai (4)	'	NOT Present (U)			
indicator is bas	ed on what		fully supports	optimal, but sufficient to	Minimal level of su	pport of	Condition is insufficient to provide			
type of wetland	l or surface		wetlands/surface water	wetland/surface water	functions	tions wetland/surface water functions				
water ass	essed	l		functions						
.500(6)(a) L	ocation and	l Landscape								
	Support		The mitigation area is shallow water nearshore habitat of unconsolidated sandy substrate in similar water depth as the impact area. Nearshore hardhotter area with in the adjacent events for the second seco							
			recruitment to the p	roposed mitigative artifi	cial reef.	nces ex	ist in the aujacent area to facilitate			
w/o pres or		•		-						
current		with								
0		7								
500(0)(1))	. = .									
.500(6)(b) W	ater Enviro	nment (n/a)								
			The assessment an	ea is in the nearshore h	abitat of the Atlan	tic Ocea	an with open circulation. It is often			
w/o proc or			exposed to high wa	ve energy with generally	y ciear water. Wat	er quali	ty will not be not altered.			
current		with								
6		6	1							
Ļ		ÿ								
.500(6)(c)	Community	y structure	An ortificial sector "	provido exterte fe t	onthio recently and	of				
1 \/	enetation a	nd/or	and will create a ref	uge for fish and other m	notile marine orga	nisms. I	t will create a foraging resource for			
2. Be	nthic Com	nunity	sea turtles since pre	eferred macroalgae hav	e been document	ed to gr	ow on artificial reefs in the			
		-	nearsnore nabitat o	i Southeast Florida.						
w/o pres or current		with								
0		7	1							
0		1								
Score - su	n of above s	cores/30 (if	1 [<u>-</u> 1	I				
upla	nds, divide b	y 20)	If preservation as	s mitigation,			For impact assessment areas			
current			Preservation adj	ustment factor –						
or w/o pres		with	i reservation duj			FL=de	elta x acres=			
0.200		0.667	Adjusted mitigati	on delta =						
0.200		0.007	J							
If mitigati										
ii mitgaton				For mitigation a			or mitigation assessment areas			
Delta =	= [with - c	current]	Time lag (t-fa	ictor) =	1.03	REG-	delta/(t-factor x risk)-			
	0.467		Risk factor =		1.00					

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



Form 62-345.900(3), F.A.C. [effective date]



Site/Project N	ame	of Dolm Doo	ash and County	Application Number Town SAJ-2005-0	7908; County	Assess Mitiga	Assessment Area Name or Number Mitigation for Direct Temp		
SPBICSSP	- Town (u Palm Bea	ach and County	SAJ-2008-04086	•	Impa	cts (>2 yr)		
Impact or Mitig	gation			Assessment conducted by:			Assessment date:		
wiitiyation						001. 2	2014		
Scoring Gu	uidance		Optimal (10)	Moderate (7)	Minimal (4)	Not Present (0)		
The scoring indicator is bas would be suita type of wetland water ass	of each ed on what ble for the l or surface essed		Condition is optimal and fully supports wetlands/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions				
.500(6)(a) Li w/o pres or current 0	ocation and Support	d Landscape with 5	The mitigation area water depth as the recruitment to the p	is shallow water nearsl impact area. Nearshore proposed mitigative artifi	hore habitat of un hardbottom resc icial reef.	consolid ources ex	lated sandy substrate in similar xist in the adjacent area to facilitate		
.500(6)(b) Wa t w/o pres or current 6	ater Enviro for uplands	nment (n/a) with 6	The assessment ar exposed to high wa	ea is in the nearshore h we energy with generall	abitat of the Atlan y clear water. Wa	ntic Ocea ater qual	an with open circulation. It is often ity will not be not altered.		
.500(6)(c) 1. Ve 2. Be w/o pres or current 0	Communit egetation a nthic Comr	y structure nd/or nunity with 5	An artificial reef will and will create a rei sea turtles since pro nearshore habitat o	provide substrate for b fuge for fish and other n eferred macroalgae hav of Southeast Florida.	enthic recruitmen notile marine orga re been documen	t of mac anisms. I ted to gr	roalgae and sessile invertebrates It will create a foraging resource for row on artificial reefs in the		
Score = sur	n of above s	cores/30 (if	י ר						
uplar	nds, divide b	y 20)	If preservation a	s mitigation,		L	For impact assessment areas		
current or w/o pres with 0.200 0.522				iustment factor =		FL=de	elta x acres=		
0.200		0.000	1						
			If mitigation			For mitigation assessment areas			
Delta -	= [with - c	current	Time lag (t-fa	uctor) =	1.03	<u> </u>	0.32		
20114	0.333		Risk factor =		1.00	RFG=0	delta/(t-factor x risk)=		

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk)))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



Form 62-345.900(3), F.A.C. [effective date]



Site/Project N	ame			Application Number	sment Area Name or Number			
SPBICSSP	- Town o	of Palm Bea	ach and County	Town SAJ-2005-0	7908; County	Mitigation for Indirect Temp		
er Breeer				SAJ-2008-04086		Impacts (1 yr)		
Impact or Miti	gation			Assessment conducted	d by:	Assess	sment date:	
Mitigation				CB&I		Oct. 2	2014	
Scoring Gu	uidance		Optimal (10)	Moderate (7)	Minimal (4)		Not Present (0)	
The scoring	of each		Condition is optimal and	Condition is less than				
would be suita	ed on what		fully supports	optimal, but sufficient to maintain most	wetland /surface	pport of water	Condition is insufficient to provide	
type of wetland	or surface		wetlands/surface water	wetland/surface water	functions	mator	wetland/surface water functions	
water ass	essed		TUNCUONS	functions				
			-					
.500(6)(a) L	ocation and Support	d Landscape	The mitigation area	is shallow water nears	hore habitat of un	consolid	lated sandy substrate in similar	
			recruitment to the p	roposed mitigative artif	icial reef.			
w/o pres or								
current		with						
0		8						
Ű		Ũ						
.500(6)(b) W w/o pres or current 6	ater Enviro for uplands	nment (n/a) with 6	The assessment ar exposed to high wa	ea is in the nearshore h ve energy with general	nabitat of the Atlar ly clear water. Wa	itic Ocea ter qual	an with open circulation. It is often ity will not be not altered.	
.500(6)(c) Community structure 1. Vegetation and/or 2. Benthic Community w/o pres or current with 0 8				provide substrate for b fuge for fish and other n eferred macroalgae hav f Southeast Florida.	enthic recruitment notile marine orga re been document	of mac nisms. I ed to gr	roalgae and sessile invertebrates It will create a foraging resource for row on artificial reefs in the	
Coord out	a of ohours o		r					
score = sur upla	nds, divide b	y 20)	If preservation a	s mitigation,			For impact assessment areas	
		- ,		- · ·				
current			Preservation adj	ustment factor =		FI -de	elta x acres-	
or w/o pres with				· · · ·		1 2-00		
0 200		0 733	Adjusted mitigat	ion delta =				
0.200		0.700	l					
			If mitigation				For mitigation accomment areas	
				For mitigation assessment a			or mugation assessment areas	
Delta =	= [with - c	current]	Time lag (t-fa	ictor) =	1.03		0.52	
	0 522		Pick factor		1.00	RFG=0	delta/(t-factor x risk)=	
	0.000		RISK TACLOF =		1.00			

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk)))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



Form 62-345.900(3), F.A.C. [effective date]

Cite (Decident Mare				Annlingting Number				Norsel
Site/Project Nam	ne			Application Number Town SAJ-2005-0	7908: Countv	Asses	sment Area Nam	e or Number
SPBICSSP -	Town o	of Palm Bea	ach and County	SAJ-2008-04086	, ,	Indire	ect Temporary	Impacts (2 years)
Impact or Mitigat	tion	norany 2 v		Assessment conducted by:			(acroc)	1 22
impact (inuite		ipolaly 2 ye	ears)				(acres)	1.55
Scoring Guida	ance		Optimal (10)	Moderate (7)	Minimal (4)	Not Present (0)		
The scoring of each			Condition is optimal and	Condition is less than	Minimal loval of our	aport of		
would be suitable	e for the		fully supports	optimal, but sufficient to maintain most	wetland /surface	water	Condition is insuffi	cient to provide wetland/surface water
type of wetland or water assess	surface		functions	wetland/surface water functions	functions			
.500(6)(a) Loca S w/o pres or current 10	ation and Support	Landscape with	The assessment ar colonized pavemen the epibenthic com scleractinian corals <i>Dasycladus, Halim</i> the nearshore hard <i>Pterogorigia, Muric</i> habitat for immigrat green sea turtles ar	rea is a wide exposure of it. Benthic characterizat munities to be turf and r s, octocorals, bryozoans <i>eda</i> , and <i>Laurencia</i> . Sr bottom, including <i>Sider</i> , <i>ea</i> , and <i>Eunicea</i> . The r ting larvae of many imp nd the beach provides r	of nearshore hardt ion surveys within nacroalgae, and a , and zoanthids. C nall (<3 cm) colon <i>astrea</i> spp. and S earshore hardbot ortant fisheries sp nesting habitat for	bottom the pro- also sup Common ies of s Colenasi ttom pro- ecies. It loggerh	carbonate rock w oject area revealed oporting wormroc n macroalgal taxa cleractinian cora trea bournoni. Co ovides an importa t is also provides nead, green and l	ith primarily low relief areas and ad the dominant components of k, sponges, tunicates, a are <i>Dictyota, Padina, Hypnea</i> , ls have been documented on ommon octocorals are ant settlement and nursery foraging habitat for juvenile leatherback sea turtles.
.500(6)(b) Wate for w/o pres or current 6	er Enviror uplands)	with	The assessment ar high wave energy v	ea is in the nearshore h with generally clear wate	nabitat of the Atlan er. Water quality w	itic Oce vill not b	an with open circ be altered.	ulation. It is often exposed to
.500(6)(c) Co 1. Vege 2. Benth w/o pres or current 10	ommunity etation ar nic Comm	/ structure nd/or nunity with 1	The community stru organisms thriving macroalgae assem scleractinian corals <i>Siderastrea</i> spp. ar limits succession a	ucture is a high stress (I in this habitat for many blage and a diverse inv s, octocorals, bryozoans nd <i>Solenastrea bournor</i> nd colony growth.	ow relief) to sub-c years (scleractinia ertebrate commur , and zoanthids. T ni. Size distribution	elimax (i ans, larg hity in th The mos n indica	moderate relief) o ge sponges). It su ne form of wormrr st abundant scler tes recruitment, l	community, with some benthic upports a multi-species ock, sponges, tunicates, actinian species are but repeated burial of habitat
Score = sum of abo	ove scores	s/30 (if uplands,	If procentation of	a mitigation			Forimpo	
div	nue by 20)		ii preservation a	s miliyalion,			For impac	A assessment areas
current or w/o pres	ſ	with	Preservation adj Adjusted mitigati	ustment factor = ion delta =		FL=d	elta x acres=	0.798282747
0.007		0.201	I					
			If mitigation	F			For mitiactiv	on assessment aroas
Delta = [with - c	urrent]	Time lag (t-fa	ictor) =		For mitigation assessment areas		
(0.600	- 1	Risk factor =	,			RFG=delta/(t-fa	actor x risk)=
Ľ`	2.000							

Site/Project N	ame			Application Number		Assessment Area Name or Number				
	T	of Delmo Di	ab and Courts	Town SAJ-2005-0	7908; County	Mitigation for Indirect Temp				
SPBICSSP	- Town (DI Paim Bea	ach and County	SAJ-2008-04086	-	Impac	cts (2 yr)			
Impact or Miti	gation			Assessment conducted	d by:	Assess	sment date:			
Mitigation	-			CB&I		Oct. 2	2014			
Scoring Gu	uidance		Optimal (10)	Moderate (7)	Minimal (4))	Not Present (0)			
The scoring	of each		Condition is optimal and	Condition is less than			x-7			
indicator is bas	ed on what		fully supports	optimal, but sufficient to	Minimal level of su	pport of	Condition is insufficient to provide			
type of wetland	or surface		wetlands/surface water	wetland/surface water	functions	walei	wetland/surface water functions			
water ass	essed		tunctions	functions						
.500(6)(a) L	ocation and	l Landscape								
	Support		The mitigation area is shallow water nearshore habitat of unconsolidated sandy substrate in similar							
			water depth as the	water depth as the impact area. Nearshore hardbottom resources exist in the adjacent area to facilitate						
w/o pres or			recruitment to the proposed mitigative artificial reef.							
current		with								
		~	t							
0		6				<u> </u>				
.500(6)(b) W	ater Enviro	nment (n/a								
1	or uplands)	The assessment area is in the nearshore habitat of the Atlantic Ocean with open circulation. It is often exposed to high wave energy with generally clear water. Water guality will not be not altered							
w/a ar			exposed to high wa	we energy with general	iy olear water. Wa	uər quai	ity win not be not altered.			
w/o pres or current		with								
Sunent		with	ł							
6		6								
.500(6)(c)	Communit	y structure	An artificial reef will provide substrate for benthic recruitment of macroalgae and sessile invertebrates and will create a refuge for fish and other motile marine organisms. It will create a foraging resource for sea turtles since preferred macroalgae have been documented to grow on artificial reefs in the pearshore habitat of Southeast Elorida							
1. Ve	egetation a	nd/or								
2. Be	nthic Comr	nunity								
,										
w/o pres or		14/ ¹⁴ h								
Sunent		with	ł							
0		6								
P		-	-							
Score = sur	n of above s	cores/30 (if								
upla	nds, divide b	y 20)	If preservation a	s mitigation,			For impact assessment areas			
current			Preservation adj	ustment factor –						
or w/o pres with			Freservation adjustment factor = FL=delta x acres=				elta x acres=			
Adju:			Adjusted mitigat	ion delta =						
0.200		0.600				-				
			•							
			If mitigation			For mitigation assessment areas				
						For mitigation assessment areas				
Delta = [with - current]			Time lag (t-fa	ime lag (t-factor) = 1.03						
	0 400		Risk factor -	deita/(t-tactor x risk)=						
1	000									

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk)))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



Form 62-345.900(3), F.A.C. [effective date]



Site/Project Na	ime			Application Number Assessment Area Name or Number					
SPBICSSP	- Town d	of Palm Bea	ach and County	Town SAJ-2005-07908; County SAJ-2008-04086			Mitigation for Indirect Temporary (ETOF) Impacts		
Impact or Mitig	ation			Assessment conducted by:			Assessment date:		
miliyalion				CBai			001. 2014		
Scoring Gui	dance		Optimal (10)	Moderate (7)	Minimal (4	A) Not Present (0)			
The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed			Condition is optimal and fully supports wetlands/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface water functions		upport of water	Condition is insufficient to provide wetland/surface water functions		
.500(6)(a) Lo w/o pres or current	cation and Support	I Landscape with	The mitigation area is shallow water nearshore habitat of unconsolidated sandy substrate in similar water depth as the impact area. Nearshore hardbottom resources exist in the adjacent area to facilitate recruitment to the proposed mitigative artificial reef.						
0		10							
.500(6)(b) Wa fo w/o pres or current 6	ter Enviroi or uplands	with	The assessment area is in the nearshore habitat of the Atlantic Ocean with open circulation. It is often exposed to high wave energy with generally clear water. Water quality will not be not altered.						
.500(6)(c) 0 1. Veg 2. Ben w/o pres or current 0	Community getation ar thic Comn	y structure nd/or nunity with 10	An artificial reef will provide substrate for benthic recruitment of macroalgae and sessile invertebrates and will create a refuge for fish and other motile marine organisms. It will create a foraging resource for sea turtles since preferred macroalgae have been documented to grow on artificial reefs in the nearshore habitat of Southeast Florida.						
Score - cum	of above of	coroc/20 (if	7						
Score = sum of above scores/30 (if uplands, divide by 20)			If preservation as mitigation, For impact assessment				For impact assessment areas		
current or w/o pres with 0 200 0 867			Preservation adj Adjusted mitigat	justment factor = tion delta =			FL=delta x acres=		
0.200		0.001	l						
			If mitigation			F	or mitigation assessment areas		
Delta =	[with - c	urrent]	Time lag (t-fa	(t-factor) = 1.03					
	0.667		Risk factor =		1.25	1.1 0-0			

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



Form 62-345.900(3), F.A.C. [effective date]

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk))

(a) Mitigation Bank Credit Determination

(b) Mitigation needed to offset impacts, when using a mitigation bank

(c) Mitigation needed to offset impacts, when not using a bank

To determine the acres of mitigation needed to offset impacts when not using a bank or a regional offsite mitigation area as mitigation, divide functional loss (FL) by relative functional gain (RFG). If there are more than one impact assessment area or more than one mitigation assessment area, the total functional loss and the total relative functional gain is determined by summation of the functional loss (FL) and relative functional gain (RFG) for each assessment area.

FL	/	RFG	=	Acres of Mitigation	*Note: for temporary impacts, <i>Mitigation</i> = (<i>FL/RFG</i>) - <i>Impact Area</i>
2.39477		0.52]	4.62]
0.473761		0.58		0.02	
0.169542		0.45		0.09	
0.115714		0.32		0.16	
2.077238		0.52		0.55	
					1
0.798283		0.39		0.73	
0.231422		0.52		0.45	
				6.63	
	FL 2.39477 0.473761 0.169542 0.115714 2.077238 0.798283 0.231422	FL / 2.39477 0.473761 0.169542 0.115714 2.077238 0.798283 0.231422	FL / RFG 2.39477 0.52 0.473761 0.58 0.169542 0.45 0.115714 0.32 2.077238 0.52 0.798283 0.39 0.231422 0.52	FL / RFG = 2.39477 0.52 0.473761 0.58 0.169542 0.45 0.115714 0.32 2.077238 0.52 0.798283 0.39 0.231422 0.52	FL / RFG = Acres of Mitigation 2.39477 0.52 4.62 0.473761 0.58 0.02 0.169542 0.45 0.09 0.115714 0.32 0.16 2.077238 0.52 0.55 0.798283 0.39 0.73 0.231422 0.52 0.45

Form 62-345.900(3), F.A.C. [effective date]

SUB-APPENDIX H-2A DRAFT UMAM ANALYSIS TOWN OF PALM BEACH (0.25 MM) This page intentionally left blank.

PART I – Qualitative Description (See Section 62-345.400, F.A.C.)

Site/Project Name	Application Num	bers		Assessment Area Name or Number				
Southern Palm Beach Island Comprehensive Shore Stabilization (Town of Palm Beach portion)	Project SAJ-2005-(SAJ-2005-07908			Intertidal and Nearshore Subtidal Hardbottom Resources			
FLUCCs code	l)	Impact or M	itigation Site?	Assessment A	rea Size			
571	N/A		Impact Site		2.99	acres (includes 7 impact types, see Part II forms for each)		
Basin/Watershed Name/Number Affected Wa Atlantic Ocean Class III	Special Classification (i.e. OFW, AP, other local/state/federal designation of importance) N/A							
Geographic relationship to and hydrologic connectio Open waters of the Atlantic Ocean. The north of South Lake Worth Inlet.	n with wetlands, other surface project area is located	e water, uplands J approximately 11 miles south of Lake Worth Inlet and approximately 2.5 miles						
Assessment area description The hardbottom environment adjacent thardbottom habitat, located in less than macroalgae, but also supporting wormro and crabs also utitilize this habitat. Spece exposure.	o the project area is hi 15 ft water depth. Sur ock, tunicates, sponges cies are accustomed to	ghly ephem veys have s s, bryozoan o the ephem	eral, consi shown a be s and sma neral natur	isting primarily enthic communi Il coral colonies e of the habitat	of low-relief ity dominate s. Motile spe which is sul	intertidal and subtidal d by turf algae and ccies such as fish, sea turtles oject to frequent burial and re-		
Significant nearby features The outer reef (beyond the impact area) the nearshore natural hardbottom habita depth.	Uniqueness (considering the relative rarity in relation to the regional landscape.) Somewhat unique; the intertidal portion of the hardbottom ridge terminates to the north of the project area.							
Functions Provides cover, substrate, refuge and for benthic and motile marine species.	ood resources for	Mitigation for previous permit/other historic use N/A						
Anticipated Wildlife Utilization Based on Literature F are representative of the assessment area and reas found)	Review (List of species that sonably expected to be	Anticipated Ut and intensity c	ilization by Li of use of the a	sted Species (List s assessment area)	pecies, their leg	al classification (E, T, SSC), type of use,		
Benthic characterization surveys within revealed the dominant components of th communities to be turf and macroalgae. tunicates, octocorals, bryozoans, and zc present. Common macroalgal taxa are <i>Hypnea</i> , <i>Dasycladus</i> , <i>Halimeda</i> , and <i>La</i> cm) colonies of scleractinian corals hav on the nearshore hardbottom and includ and <i>Solenastrea bournoni</i> . Common oc <i>Pterogorigia</i> , <i>Muricea</i> , and <i>Eunicea</i> . M fish, sea turtles and crabs also utitilize t are accustomed to the ephemeral natur	Loggerhead (<i>Caretta caretta</i>) (T), Green (<i>Chelonia mydas</i>) (E), and leatherback (<i>Dermochelys coriacea</i>) (E) sea turtles regularly nest in the project area. The project area is also loggerhead critical habitat (terrestrial and marine). The Florida manatee (<i>Trichechus manatus latirostris</i>) (E) is common in Palm Beach County. Smalltooth sawfish (<i>Pristis pectinata</i>) (E) has the potential to occur in the project area. Threatened coral species which have the potential to occur in the project area but which have not been observed during recent benthic survyes include: staghorn coral (<i>Acropora cervicornis</i>), elkhorn coral (<i>A. palmata</i>), boulder star coral (<i>Orbicella annularis</i>), mountainous star coral (<i>O. faveolata</i>), star coral complex (<i>O. franski</i>), pillar coral (<i>Dendrogyra cylindrus</i>), and rough cactus coral (<i>Mycetophyllia ferox</i>).							
Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.):								
Additional relevant factors:	ed the diota listed ab	ove.						
The hardbottom in highly ephemeral. Babetween R-127 and R-141 from January January 2006. Line intercept data collect 130 to R-141 revealed this area to have 76% is sand) (CBI, 2014). HB edge and	ased on delineation of a y 2003 to July 2013, ind ted on transects imme a hardbottom to sand benthic characterization	aerials, ther cluding a mi ediately offsl ratio of 24:7 on surveys	e has bee inimum of hore of the 76 (24% of were cond	n a time-averag 2.71 ac in Janu project area o f the area east ucted in 2005,	ged 23.85 ac uary 2009 ar n the nearsh of the hardb 2006, 2007,	of exposed hardbottom ad a maximum of 48.78 ac in hore hardbottom adjacent to R- ottom edge is hardbottom and 2011, and 2014.		
Assessment conducted by: CB&I Coastal Planning & Engineering, I	Assessment d October 20	Assessment date(s): October 2014						

PART I – Qualitative Description (See Section 62-345.400, F.A.C.)

Site/Project Name		Application Number			Assessment Area Name or Number					
Southern Palm Beach Island										
Comprehensive Shore Stabi	Project	SAJ-2005-0	07908		Mitigation Reef					
(Town of Paim Beach portio										
FLUCCs code Further cla			lassification (optional) Impact of			itigation Site?	Assessment A	rea Size		
571 N/A					Mitigation Site		0.53	acres (mitigation for 7 impact types, see Part II forms for each)		
Basin/Watershed Name/Number A	Affected W	aterbody (Cla	ass)	Special C	Classification	(i.e. OFW, AP, other	local/state/federal	designation of importance)		
Atlantic Ocean Class III				N/A						
Geographic relationship to and hydrologi	ic connection	on with wetla	nds, other surface	e water, upland	s toly 11 mi	os south of L	ako Worth Inl	at and approximately 2.5 miles		
north of South Lake Worth Inle	t.	e project a		аррголіпа				et and approximately 2.5 miles		
Assessment area description	(f						anth as the impact and in a		
location devoid of hardbottom h determine the location of the m	habitat ir hitigative	n water de reefs.	pths similar to	b the natura	l nearshor	e hardbottom.	Additional s	urveys will be conducted to		
Significant nearby features				Uniqueness (d	considering th	e relative rarity in	relation to the reg	jional landscape.)		
The outer reef is located east of hardbottom habitat in 40-70 ft v	atural	The artificial reefs will be placed in similar water depths as the impacted hardbottom in order to mimic the lost function of the habitat.								
Functions				Mitigation for previous permit/other historic use						
The artificial reef habitat is inter characteristics of adjacent near typically low relief limestone pa substrate, refuge and food resc	mic the ich is vide cover, species.	N/A								
Anticipated Wildlife Utilization Based on are representative of the assessment are	Literature ea and rea	Review (List sonably expe	of species that ected to be	Anticipated Ut and intensity of	ilization by Li	sted Species (List assessment area)	species, their leg	al classification (E, T, SSC), type of use,		
found)	ropligate	the phys	iool	Loggarboo	d (Carotta	(\mathbf{T})	Croop (Chok	p_{ini} m_{ini} d_{ini} $(E) and d_{ini}$		
The artificial reef is intented to appearance, texture, relief and habitat it is meant to replace.	ical n of the	leatherback (<i>Dermochelys coriacea</i>) (E) sea turtles regularly nest in the project area. The project area is also loggerhead critical habitat (terrestrial and marine). The Florida manatee (<i>Trichechus manatus latirostris</i>) (E) is common in Palm Beach County. Smalltooth sawfish (<i>Pristis pectinata</i>) (E) has the potential to occur in the project area. Threatened coral species which have the potential to occur in the project area but which have not been observed during recent benthic survyes include: staghorn coral (<i>Acropora cervicornis</i>), elkhorn coral (<i>A. palmata</i>), boulder star coral (<i>Orbicella annularis</i>), mountainous star coral (<i>O. faveolata</i>), star coral complex (<i>O. franski</i>), pillar coral (<i>Dendrogyra cylindrus</i>), and rough cactus coral (<i>Mycetophyllia ferox</i>).								
Observed Evidence of Wildlife Utilization	n (List spec	cies directly o	bserved, or other	signs such as	tracks, dropp	ings, casings, nest	ts, etc.):	Malal man file and the literature		
Characterization surveys docur similar to that of natural hardbo	mented tottom.	the biota li	sted above fo	or natural ne	arshore h	ardbottom. Ut	lization of art	ificial reef is expected to be		
Additional relevant factors:										
Limestone is a natural material and will provide a suitable replacement for the impacted nearshore reef substrate. Limestone boulder artificial reefs have been documented to offset impacts associated with beach nourishment projects in southeast Florida.										
Assessment conducted by:				Assessment date(s):						
CB&I Coastal Planning & Engir	neering,	Inc.		October 2014						

Form 62-345.900(1), F.A.C. [effective date]


Site/Project Na	ime			Application Number			Assessment Area Name or Number		
Southern Pa	alm Bea	ch Island C	omprehensive	SA 1 2005 07009		Mitia	ation for Dormonant Importa		
Beach porti	nization on)			SAJ-2005-07906		wiitiga	ation for Permanent impacts		
Impact or Mitig	ation			Assessment conducted by:		Assess	sment date:		
Mitigation				CB&I		Oct. 2014			
Scoring Gui The scoring of	dance of each		Optimal (10)	Moderate (7) Condition is less than	Minima	ll (4)	Not Present (0)		
indicator is base	ed on what		fully supports	optimal, but sufficient to	support of	evel of wetland	Condition is insufficient to provide		
type of wetland	or surface		wetlands/surface water functions	wetland/surface water /surface w		water	wetland/surface water functions		
water asse	essed			functions					
.500(6)(a) Lo w/o pres or current 0	ocation and Support	d Landscape with 10	The mitigation area similar water depth area to facilitate rec	is shallow water nearsh as the impact area. Nea ruitment to the propose	nore habitat arshore har d mitigative	t of unco dbottom artificia	onsolidated sandy substrate in n resources exist in the adjacent al reef.		
.500(6)(b) Wa fo w/o pres or current 6	ater Enviro or uplands	nment (n/a) with 6	The assessment ar often exposed to hig	ea is in the nearshore h gh wave energy with gei	abitat of the	e Atlanti r water.	c Ocean with open circulation. It is Water quality will not be not altered.		
.500(6)(c) (1. Ve 2. Ben w/o pres or current 0	Communit getation a hthic Comr	y structure nd/or nunity with 10	An artificial reef will invertebrates and w foraging resource fo artificial reefs in the	provide substrate for be vill create a refuge for fis or sea turtles since prefe nearshore habitat of Sc	enthic recru h and othe erred macro putheast Flo	iitment o r motile balgae r brida.	of macroalgae and sessile marine organisms. It will create a nave been documented to grow on		
Score = sum	of above s	cores/30 (if							
uplan	ds, divide b	y 20)	If preservation as	s mitigation,			For impact assessment areas		
current			Preservation adj	ustment factor =		FI	elta x acres-		
or w/o pres	I	with	Adjusted mitigati	ion delta –		1 L-U			
0.200		0.867	, lajusted mitigati			L			
									
			If mitigation			F	or mitigation assessment areas		
Delta = [with - current] Time lag (Time lag (t-fa	actor) =	1.03		 0 ج۲		
RFG=delta/(t-factor x risk)=				delta/(t-factor x risk)=					
1	0.667		Risk factor =		1.25				

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk)))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



Form 62-345.900(3), F.A.C. [effective date]

				_			
Site/Project Name		Application Number		Assess	sment Area Na	ame or Number	
Southern Palm Beach Island Co		SA 1 2005 07000		Direct Temperary (Impacts (1 year)			
Shore Stabilization Project (Tov	vn of Palm Beach	SAJ-2005-07908		Direc	t Temporar	y impacts (<1 year)	
portion)		A					
Impact or Mitigation		Assessment conducted	d by:	A = 0.0	(00000)	0.20	
Impact (Direct Temporary <1 ye	ar)	CB&I		Area	(acres)	0.30	
				1			
Scoring Guidance	Optimal (10)	Moderate (7)	Minimal (4)			Not Present (0)	
The scoring of each	Condition is optimal and	Condition is less than	Minimal level of sur	if support of			
would be suitable for the	fully supports	maintain most	wetland /surface	water	Condition is ins	ufficient to provide wetland/surface water	
type of wetland or surface	functions	wetland/surface water	functions			Tuncuons	
water assessed		functions					
.500(6)(a) Location and Landscape Support w/o pres or current with 10 1	The assessment ar colonized pavemer the epibenthic com scleractinian corals <i>Dasycladus, Halim</i> the nearshore hard <i>Pterogorigia, Muric</i> habitat for immigral green sea turtles ar	rea is a wide exposure of t. Benthic characterizat munities to be turf and i s, octocorals, bryozoans reda, and Laurencia. Sr Ibottom, including Sider rea, and Eunicea. The in ting larvae of many impi- nd the beach provides r	of nearshore hard tion surveys within macroalgae, and a s, and zoanthids. C mall (<3 cm) colon <i>astrea</i> spp. and S nearshore hardbot ortant fisheries sp nesting habitat for	cottom of the pro- also sup Commor ies of s Colenast tom pro- ecies. It loggerh	carbonate rocl oject area rever porting wormin n macroalgal ta cleractinian co trea bournoni. ovides an impo t is also provid nead, green an	k with primarily low relief areas and caled the dominant components of rock, sponges, tunicates, axa are <i>Dictyota, Padina, Hypnea</i> , orals have been documented on Common octocorals are ortant settlement and nursery les foraging habitat for juvenile ad leatherback sea turtles.	
.500(6)(b) Water Environment (n/a for uplands) w/o pres or current with 6 6	The assessment ar high wave energy v	nabitat of the Atlan er. Water quality w	itic Oce vill not b	an with open o e altered.	circulation. It is often exposed to		
.500(6)(c) Community structure 1. Vegetation and/or 2. Benthic Community w/o pres or current with 10 1	The community stru organisms thriving macroalgae assem scleractinian corals <i>Siderastrea</i> spp. a limits succession a	ucture is a high stress (l in this habitat for many iblage and a diverse inv s, octocorals, bryozoans nd <i>Solenastrea bournor</i> nd colony growth.	low relief) to sub-c years (scleractinia rertebrate commur a, and zoanthids. T ni. Size distribution	ilimax (r ans, larg nity in th The mos n indica	noderate relie ge sponges). It he form of worr st abundant sc tes recruitmer	f) community, with some benthic i supports a multi-species mrock, sponges, tunicates, leractinian species are tt, but repeated burial of habitat	
Score = sum of above scores/30 (if uplands,							
divide by 20)	If preservation a	is mitigation,			For im	pact assessment areas	
current or w/o pres with 0.867 0.267	Preservation adj Adjusted mitigat	justment factor =		FL=de	elta x acres=	0.182620234	
	If mitigation				Eor mitia	ation assessment areas	
Delta – [with - current]	Time lag (t fo	ector) –			i or mitty	anon assessment aleas	
	Time lag (t-fa	i(0) =	 		RFG-delta//	(t-factor x risk)-	
0.600	Risk factor =						
	-						

Site/Project Na Southern P Shore Stab	^{ame} alm Bea ilization	ich Island C Project (Tov	omprehensive wn of Palm Beach	Application Number SAJ-2005-07908		Assess Mitiga Impac	Assessment Area Name or Number Mitigation for Direct Temp Impacts (<1 yr)	
Impact or Mitig	gation			Assessment conducted by: A CB&I C			ment date: 2014	
Scoring Gu	idance	1	Optimal (10)	Moderate (7)	Minimal (4)	Not Present (0)	
The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed			Condition is optimal and fully supports wetlands/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface water functions	Minimal level of s wetland /surfac functions	upport of e water	Condition is insufficient to provide wetland/surface water functions	
			-					
.500(6)(a) Lo w/o pres or current 0	ocation an Support	d Landscape with 9	The mitigation area water depth as the recruitment to the p	i is shallow water nearsl impact area. Nearshore roposed mitigative artif	hore habitat of u hardbottom res icial reef.	nconsolid ources ex	ated sandy substrate in similar kist in the adjacent area to facilitate	
.500(6)(b) Wa f w/o pres or current 6	ater Envirc or uplands	with	The assessment ar exposed to high wa	ea is in the nearshore h ve energy with generall	nabitat of the Atk y clear water. W	antic Oce ater quali	an with open circulation. It is often ty will not be not altered.	
.500(6)(c) 1. Ve 2. Ber w/o pres or current 0	Communit	ty structure nd/or munity with 9	An artificial reef will and will create a ref sea turtles since pr nearshore habitat c	provide substrate for b fuge for fish and other n eferred macroalgae hav f Southeast Florida.	enthic recruitme notile marine orç re been docume	nt of mac janisms. I nted to gr	roalgae and sessile invertebrates It will create a foraging resource for ow on artificial reefs in the	
Score - sur	n of above s	cores/30 (if	1					
uplar	nds, divide b	by 20)	If preservation as	s mitigation,		1	For impact assessment areas	
l ·				-				
current or w/o pres	I	with	Preservation adj Adjusted mitigati	ustment factor =		FL=de	elta x acres=	
0.200		0.800						
			If mitigation				ar mitigation accomment areas	
			1		1	F	or mugation assessment areas	
Delta = [with - current]			Time lag (t-fa	ctor) =	1.03	REG-0	0.58 delta/(t-factor x risk)=	
0.600 Risk factor =				1.00	NFG=0	μοιια/(ι-ιαυίυι ∧ ποκ <i>)</i> =		

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk)))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



Form 62-345.900(3), F.A.C. [effective date]



Site/Project N	2000			Application Number		Accocc	mont Aroa Namo or Numbor		
Southern P	alm Bea	ch Island C	omprehensive	Application Number		Mitiga	tion for Direct Temp		
Shore Stab portion)	oilization	Project (Tov	wn of Palm Beach	SAJ-2005-07908		Impac	cts (>1 yr)		
Impact or Mitig	gation			Assessment conducted	d by:	Assess	ment date:		
witigation				CB&I		Oct. 2	014		
Scoring Gu	idance		Optimal (10)	Moderate (7)	Minimal (4)	Not Present (0)		
The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed			Condition is optimal and fully supports wetlands/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface water functions	Minimal level of s wetland /surfac functions	support of e water	Condition is insufficient to provide wetland/surface water functions		
.500(6)(a) Lo w/o pres or current 0	ocation and Support	d Landscape with 7	The mitigation area water depth as the recruitment to the p	is shallow water nearsl impact area. Nearshore roposed mitigative artifi	nore habitat of un hardbottom reso cial reef.	nconsolida burces exi	ated sandy substrate in similar st in the adjacent area to facilitate		
.500(6)(b) W t w/o pres or current 6	ater Enviro for uplands	nment (n/a) with 6	The assessment ar exposed to high wa	ea is in the nearshore h ve energy with generall	abitat of the Atla y clear water. W	ntic Ocea ater qualit	n with open circulation. It is often y will not be not altered.		
.500(6)(c) 1. Ve 2. Be w/o pres or current 0	Communit egetation a nthic Comr	y structure nd/or nunity with 7	An artificial reef will and will create a ref sea turtles since pro nearshore habitat o	provide substrate for b uge for fish and other n eferred macroalgae hav f Southeast Florida.	enthic recruitme notile marine org e been documer	nt of macro anisms. It nted to gro	oalgae and sessile invertebrates will create a foraging resource for w on artificial reefs in the		
Score - sur	n of above e	cores/30 (if	ı ———						
uplai	nds, divide b	y 20)	If preservation as	s mitigation,			For impact assessment areas		
current or w/o pres	I	with	Preservation adj Adjusted mitigati	ustment factor = on delta =		FL=de	lta x acres=		
0.200		0.667]						
			If mitigation			Fo	or mitigation assessment areas		
Delta =	= [with - c	current]	Time lag (t-fa	ictor) =	1.03		0.45		
0.467			Risk factor =	,	1.00	RFG=delta/(t-factor x risk)=			

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



Form 62-345.900(3), F.A.C. [effective date]

Site/Project Name		Application Number		Asses	sment Area N	ame or Number	
Southern Palm Beach Island Co	omprehensive	Ppiloation Number					
Shore Stabilization Project (Tow	vn of Palm Beach	SAJ-2005-07908		Direct Temporary Impacts (> 2 years)			
portion)							
Impact or Mitigation	```	Assessment conducted by:			<i>,</i> , ,		
Impact (Direct Temporary > 2 ye	ears)	CB&I		Area	(acres)	0.03	
Scoring Guidance	Optimal (10)	Moderate (7)	Minimal (4)			Not Present (0)	
The scoring of each	Condition is optimal and	Condition is less than					
would be suitable for the	fully supports	optimal, but sufficient to maintain most	wetland /surface v	port of water	Condition is in:	sufficient to provide wetland/surface water	
type of wetland or surface	functions	wetland/surface water	functions			runctions	
water assessed		tunctions					
.500(6)(a) Location and Landscape SupportThe assessment area is a wide exposure of nearshore hardbottom carbonate rock with primarily low colonized pavement. Benthic characterization surveys within the project area revealed the dominan the epibenthic communities to be turf and macroalgae, and also supporting wormrock, sponges, tur scleractinian corals, octocorals, bryozoans, and zoanthids. Common macroalgal taxa are <i>Dictyota</i> , <i>Dasycladus, Halimeda</i> , and <i>Laurencia</i> . Small (<3 cm) colonies of scleractinian corals have been do the nearshore hardbottom, including <i>Siderastrea</i> spp. and <i>Solenastrea bournoni</i> . Common octocor 						k with primarily low relief areas and ealed the dominant components of prock, sponges, tunicates, taxa are <i>Dictyota, Padina, Hypnea,</i> orals have been documented on . Common octocorals are ortant settlement and nursery des foraging habitat for juvenile nd leatherback sea turtles.	
.500(6)(b) Water Environment (n/a for uplands) w/o pres or current with 6 6	The assessment ar high wave energy v	rea is in the nearshore h with generally clear wate	nabitat of the Atlan er. Water quality w	tic Oce vill not b	an with open be altered.	circulation. It is often exposed to	
.500(6)(c) Community structure 1. Vegetation and/or 2. Benthic Community w/o pres or current with 10 1	The community stru organisms thriving macroalgae assem scleractinian corals <i>Siderastrea</i> spp. ar limits succession a	ucture is a high stress (l in this habitat for many blage and a diverse inv s, octocorals, bryozoans nd <i>Solenastrea bournor</i> nd colony growth.	low relief) to sub-c years (scleractinia rertebrate commur a, and zoanthids. T ni. Size distributior	limax (i ins, larg hity in th he mos n indica	moderate relii ge sponges). ne form of wo st abundant si tes recruitme	ef) community, with some benthic It supports a multi-species rmrock, sponges, tunicates, cleractinian species are nt, but repeated burial of habitat	
Score = sum of above scores/30 (if uplands,							
divide by 20)	If preservation a	s mitigation,			For in	npact assessment areas	
current or w/o pres with	Preservation adj Adjusted mitigati	iustment factor =		FL=d	elta x acres=	0.017878362	
0.201							
	If mitigation				For mitir	nation assessment areas	
Delta = [with - current]	Time lag (t-fa	(ctor) =				Janon 400000mont 61660	
0.600	Diok fe star	- /			RFG=delta/	/(t-factor x risk)=	
0.000	Risk factor =						

Site/Proiect Name			Application Number		Assess	ment Area Name or Number	
Southern Palm Be Shore Stabilizatio portion)	each Island Co n Project (Tov	omprehensive wn of Palm Beach	SAJ-2005-07908		Mitiga Impac	tion for Direct Temp ts (>2 yr)	
Impact or Mitigation Mitigation			Assessment conducted	d by:	Assess Oct. 2	Assessment date: Oct. 2014	
Scoring Guidance	7	Optimal (10)	Moderate (7)	Minimal (4)	Not Present (0)	
The scoring of each indicator is based on wh would be suitable for th type of wetland or surfac water assessed	e ce	Condition is optimal and fully supports wetlands/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface water functions	Minimal level of su wetland /surface functions	upport of water	Condition is insufficient to provide wetland/surface water functions	
.500(6)(a) Location : Suppo w/o pres or current 0	and Landscape ort with 5	The mitigation area water depth as the recruitment to the p	i is shallow water nears impact area. Nearshore roposed mitigative artif	hore habitat of ur hardbottom reso cial reef.	nconsolida purces ex	ated sandy substrate in similar ist in the adjacent area to facilitate	
.500(6)(b) Water Env for uplar w/o pres or current 6	vironment (n/a nds) with	The assessment ar exposed to high wa	rea is in the nearshore h ave energy with general	abitat of the Atla y clear water. Wa	ntic Ocea ater qualit	n with open circulation. It is often ty will not be not altered.	
.500(6)(c) Commu 1. Vegetation 2. Benthic Co w/o pres or current 0	unity structure n and/or mmunity with 5	An artificial reef will and will create a re sea turtles since pr nearshore habitat c	l provide substrate for b fuge for fish and other n eferred macroalgae hav of Southeast Florida.	enthic recruitmer notile marine orga re been documer	at of macr anisms. It	oalgae and sessile invertebrates t will create a foraging resource for ow on artificial reefs in the	
Score = sum of abov uplands, divid current or w/o pres 0.200	ve scores/30 (if le by 20) with 0.533	If preservation a Preservation adj Adjusted mitigat	s mitigation, justment factor = ion delta =		FL=de	For impact assessment areas	
Delta = [with	- current]	If mitigation Time lag (t-fa	actor) =	1.03	Fo RFG=d	or mitigation assessment areas 0.32 elta/(t-factor x risk)=	

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



Form 62-345.900(3), F.A.C. [effective date]

Description Project value Project va	Site /Droje et Nome		Application Number		A	ment Area Nom	o or Number	
Shore Stabilization Project (Town of Palm Beach portion) SAJ-2005-07908 Indirect Impacts (1 year) Impact of Mitigation Impact of Mitigation Impact of Mitigation Assessment conducted by: CPE Area (acres) 0.59 Secting Gutterson Work to subset of the control is insufficient on the work to sessented Impact of Mitigation Indirect Impacts (1 year) Notes and Miting Gutterson Work to subset of the sectorson Miting Gutterson Work to subset of the sectorson Miting Gutterson Miting Gutterson Mit	Southern Palm Beach Island Co	omprehensive	Application Number		Assessment Area Name of Number			
portion) Assessment conducted by: mpact (infinites Temporary 1 year) Assessment conducted by: The source of setting buildings Note setting buildings The source of setting buildings CPE Assessment area is a wide exposure of subtractions are revealed the dominant composites of buildings with the protections Condition is used and subtractions area and subtractions Source (S)((a) Location and Landscepe Support The assessment area is a wide exposure of nacetobre hardbottom cathonate rock with primarily low relief areas and the cleaning subtractions area revealed the dominant components of the exploration control area revealed the dominant components of the exploration control area revealed the dominant components of the exploration control area revealed the dominant components of the exploration control area revealed the dominant components of the exploration control area revealed the dominant components of the exploration control area are revealed the dominant components of the exploration control area revealed the dominant components of the exploration control area area area wide the dominant components of the exploration control area area area area area area area are	Shore Stabilization Project (Tow	vn of Palm Beach	SAJ-2005-07908		Indire	ct Impacts (1	vear)	
Impact (Indirect Temporary 1 year) Assessment conducted by: CPE Area (acres) 0.59 Scong Gudanos Optmal (10) Moderate (7) Minnal (4) Not Present (0) The scong dualnos Condition is continue and finitual building to the building of the spoons Minnal evel of apport at moderate (7) Minnal (4) Not Present (0) The scong dualnos Condition is outfore water research Condition is outfore water research Minnal evel of apport at moderate (7) Minnal evel of apport at moderate (7) Condition is insufficient to provide wetlend/surface weter functions .500(6)(a) Location and south of the spoons Condition is avoid expoons Minnal evel of apport at functions Minnal evel of apport functions Minnal evel of apport functio	portion)							
Impact (Indirect Temporary 1 year) CPE Area (acres) 0.59 Expering Guidance Indirect Set on small void to subtain for the void to subtain the subtaint to the subtaint to the void to subtain the subtaint to the subtaint to the subtaint to the subtaint to the subtaint the subtaint the void to subtain the subtaint to the subtaint to the subtaint to the subtaint to the subtaint the subtaint to the void to subtain the subtaint to the subtaint to the subtaint to the subtaint to the subtaint the subtaint to the subtaint to the subtain the subtaint to the subtaint tore subtain subtaint to the subtaint to the subtaint to	Impact or Mitigation		Assessment conducted	d by:				
Score Guidance The society of sech indicator is based in the autable for the year of veshift or the year of the opheterial and nuclear year of the opheterial and nuclear year of the veshift or the year of the hear of the veshift or the year of the period veshift or the	Impact (Indirect Temporary 1 ye	ear)	CPE	-	Area ((acres)	0.59	
Booting Guidance Inflations Guidance work seasons Contraint (10) (10) Moderate (7) (10) Minimal (4) (10) Not Present (0) Control is located or what work seasons Control is located or what well-advantage water functions Minimal (4) Not Present (0) Control is located or what work seasons Control is located advantage water functions Minimal (4) Not Present (0) Source 1 Control is located advantage well-advantage water functions Minimal (4) Not Present (0) Source 2 Control is located advantage functions Minimal (4) Not Present (0) Source 2 Control is located functions Control is located functions Not Present (0) Source 2 Control is located functions Minimal (4) Not Present (0) Source 2 Control is located functions Minimal (4) Not Present (0) Support The assessment area is a wide exposure of nearshore harbotom matcrologia has and provide sample advantage functions Support White present (0) 1 1 Note Present (0) Note Present (0) Source (1) Minimal (1) 1 Note Present (0) Note Present (0) Source (1) Minimal (
The control of each inductor is based in an inductor is an ind	Scoring Guidance	Optimal (10)	Moderate (7)	Minimal (4)			Not Present (0)	
wood to existing or offer type of version or surface water assessed with supports with supports with supports with supports Condition is insufficient to provide withindisurface water functions Condition is insufficient to provide withindisurface water functions .500(6)(a) Location and Landscorp Support The assessment area is a wide exposure of nearshore hardbottom carbonate rock with primarily low relief areas and concrete the option of the analytic communities to be furth of macroscore and composition of the option of the analytic communities to be furth of macroscore and composition of the option of the analytic communities of the option of the analytic communities of the concrete the analytic communities of the option of the analytic communities of the concrete the analytic communities of the option of the analytic communities of the concrete the analytic communities of the option of the analytic communities of the percepting of the analytic communities of the option of the analytic communities of the percepting of the analytic communities of the option of the analytic communities of the percepting of the analytic communities of the analytic communities of the percepting of the analytic communities of the analytic communities of the percepting of the analytic communities of the analytic community with some beating to analytic community with analytic community and the beach provides an inspirate and the beach provides an inspirate and the analytic communities of the percepting of the analytic community and the beach provides and the beach provides and the perception of the analytic community and the analytic community with analytic community with analytic community with analytic community and the analytic community with analytic community with analytic community with analytic community and the beach provides analyticommunity analytic community and the analytic communi	The scoring of each	Condition is optimal and	Condition is less than	Minimal level of sun	port of			
bpe of valtace wetland of sufface wetland wetlan	would be suitable for the	fully supports wetlands/surface water	maintain most	wetland /surface w	vater	Condition is insuffi	cient to provide wetland/surface water functions	
.500(6)(a) Location and Landscape Support The assessment area is a wide exposure of nearshore hardbottom carbonate rock with primatily low relief areas and colonized pavement. Benthic characterization surveys within the project area revealed the dominant components of the epiberhic communities. Common microtalges, and also supporting wormork, spronges, functiese, and continued on the epiberhic communities. Common microtalges and also supporting wormork, spronges, tuncters, subject of the epiberhic communities. Common microtalges and also supporting wormork, spronges, functiese, and continued. Car on coloning of sclerastree bornori. Common outcorals are <i>Directory of the epiberhic communities</i> . Common microtalges and also the proportional control harbottom including Siderastree bornori. Common microtalges and also provides foraging habitator for loggerhead, green and beathetback set utries. 10 1 .600(6)(b) Water Environment (nia for uplands) The assessment area is in the nearshore habitat of the Atlantic Ocean with open circulation. It is often exposed to high wave energy with generally clear water. Water quality will not be altered. .500(6)(c) Community structure is a high stress (low relief) to sub-climax (moderate relief) community, with some benthic organisms thriving in this habitat for many years (scleractinian, large sponge). It supports a multi-spocies are solver and diverse invertentate community in the form down of sponges. Includes, and alteres is a clearactinian corals, cococaris, by zocaras, and zoanthids. The most abundant scleractinian species are solved to habitat function. It is succession and colony growth. .500(6)(c) Community structure is a high stress (low relief) to sub-climax (moderate relief) community, with some benthic organis thriving in this habitat for many years (scleractini	type of wetland or surface water assessed	functions	wetland/surface water functions	functions				
.500(6)(a) Location and Landscape Support The assessment area is a wide exposure of nearshore hardbottom carbonate rock with primarily low relief areas and colonized payment. Benthic characterization surveys within the project area revealed the dominant components of the explending comparised of the anarcalage, and allo supporting on a low supporting on the nearshore hardbottom. Including Stderastrea spp. and Scienastrea burnoni. Common actocarals have been downmented on the nearshore hardbottom. Including Stderastrea spp. and Scienastrea burnoni. Comparise of the nearshore hardbottom provides an important settlement an unserv habitat for immigrating larvae of many important fisheriae species. It is also provides forsiging habitat for juvenile green sea turtles and the beach provides nearshore habitat of the Atlantic Ocean with open circulation. It is often exposed to high wave energy with generally clear water. Water quality will not be altered. .500(6)(c) Community structure 1. Vegetation and/or 2. Benthic Community structure is of pres or current with 10 1 The community structure is a high stress (low relief) to sub-climax (moderate relief) community, with some benthic organisms thriving in this habitat for many years (scienactinans, large sponges). It supports a multi-species scienastion and close area diverse interbetrate community in the form of womorks, sponges, in unclease, scienastion and close area diverse interbetrate community in the form of womorks, sponges, in unclease, scienastiona corals, octoorals, potocorals, and zenambia. The most abundant sciencithan species are subread and diverse interbetrate community in the form of womorks, sponges, in unclease, scienastiona corals, octoorals, potocorals, and zenambia. The most abundant sciencithan species are scienastrea sp. and 30 contensity potocom. Score = sum of above scores/s0. (If uplanes, or with or severy with on afor								
.500(6)(b) Water Environment (n/a for uplands) The assessment area is in the nearshore habitat of the Atlantic Ocean with open circulation. It is often exposed to high wave energy with generally clear water. Water quality will not be altered. w/o pres or current with 6 6 .500(6)(c) Community structure The community structure is a high stress (low relief) to sub-climax (moderate relief) community, with some benthic organisms thriving in this habitat for many years (scleractinians, large sponges). It supports a multi-species macroalgae assemblage and a diverse burnerebrate community in the form of wormock, sponges, tunicates, scleractinian corals, octocorals, bryozoans, and zoanthids. The most abundant scleractinian species are <i>Siderastrea bournoni</i> . Size distribution indicates recruitment, but repeated burial of habitat limits succession and colony growth. Score = sum of above scores/30 (f uplands, divide by 20) If preservation as mitigation, Preservation adjustment factor = Adjusted mitigation delta = 0.3667 0.267 If mitigation For mitigation assessment areas Pleta = [with - current] If mitigation Delta = [with - current] If mitigation	The assessment area is a wide exposure of nearshore hardbottom carbonate rock with primarily low colonized pavement. Benthic characterization surveys within the project area revealed the dominant the epibenthic communities to be turf and macroalgae, and also supporting wormrock, sponges, tun scleractinian corals, octocorals, bryozoans, and zoanthids. Common macroalgal taxa are Dictyota, I Dasycladus, Halimeda, and Laurencia. Small (<3 cm) colonies of scleractinian corals have been do the nearshore hardbottom, including Siderastrea spp. and Solenastrea bournoni. Common octocor Pterogorigia, Muricea, and Eunicea. The nearshore hardbottom provides an important settlement a habitat for immigrating larvae of many important fisheries species. It is also provides foraging habita green sea turtles and the beach provides nesting habitat for loggerhead, green and leatherback sea							
.500(6)(c) Community structure 1. Vegetation and/or 1. Vegetation and/or 2. Benthic Community 2. Benthic Community with 10 1 Score = sum of above scores/30 (if uplands, divide by 20) If preservation adjustment factor = 0.867 0.267 Delta = [with - current] If mitigation If mitigation If mitigation Time lag (t-factor) = Econdata//Lifetator v rink)	.500(6)(b) Water Environment (n/a for uplands) w/o pres or current with 6 6	an with open circ e altered.	culation. It is often exposed to					
Score = sum of above scores/30 (if uplands, divide by 20) If preservation as mitigation, For impact assessment areas current or w/o pres with Preservation adjustment factor = Adjusted mitigation delta = 0.867 0.267 If mitigation FL=delta x acres= 0.351845036 Delta = [with - current] If mitigation For mitigation assessment areas Time lag (t-factor) = REC-delta/(t-factor x rick)-	.500(6)(c) Community structure The community structure is a high stress (low relief) to sub-climax (moderate relief) organisms thriving in this habitat for many years (scleractinians, large sponges). It macroalgae assemblage and a diverse invertebrate community in the form of worm scleractinian corals, octocorals, bryozoans, and zoanthids. The most abundant scl sciderastrea spp. and Solenastrea bournoni. Size distribution indicates recruitment limits succession and colony growth. 10 1						community, with some benthic upports a multi-species ock, sponges, tunicates, actinian species are but repeated burial of habitat	
divide by 20) If preservation as mitigation, For impact assessment areas current or w/o pres with Preservation adjustment factor = Adjusted mitigation delta = 0.867 0.267 If mitigation FL=delta x acres= 0.351845036 If mitigation Time lag (t-factor) = For mitigation assessment areas Delta = [with - current] Time lag (t-factor) = REG-delta/(t-factor x rick)=	Score = sum of above scores/30 (if uplands,	I I						
current or w/o pres with 0.867 0.267 If mitigation FL=delta x acres= 0.11 If mitigation Time lag (t-factor) = For mitigation assessment areas REC-delta/(t-factor x rick)=	divide by 20)	If preservation a	s mitigation,]		For impa	ct assessment areas	
If mitigation For mitigation assessment areas Delta = [with - current] Time lag (t-factor) = REG-delta/(t-factor x rick)=	current or w/o pres with 0.867 0.267	Preservation adj Adjusted mitigat	iustment factor =		FL=de	elta x acres=	0.351845036	
Delta = [with - current] If mitigation For mitigation assessment areas Time lag (t-factor) = BEC_delta/(t_factor x_rick)=		·						
Delta = [with - current] Time lag (t-factor) =		If mitigation		[For mitigati	on assessment areas	
RFC-dalta//t.factor v rick)-	Delta = [with - current]	Time lag (t-fa	ictor) =					
0.600 Risk factor =	0.600	Risk factor =				RFG=delta/(t-fa	actor x risk)=	

Site/Project N	ame			Application Number		Assess	sment Area Name or Number	
Southern P	alm Bea	ch Island C	omprehensive			Mitiga	ation for Indirect Temp	
Shore Stab	ilization	Project (Tov	wn of Palm Beach	SAJ-2005-07908		Impa	cts (1 vr)	
portion)							, , , , ,	
Impact or Mitig	gation			Assessment conducte	d by:	Assess	sment date:	
Mitigation				CB&I Oct. 2014			2014	
Scoring G	lidance	1	Optimal (10)	Modorato (7)	Minim	al (4)	Not Present (0)	
The scoring	of each			Condition is less than	IVIIIIIII	ai (4)	Not Flesent (0)	
indicator is bas	ed on what		fully supports	optimal, but sufficient to	Minimal level	of support of	Condition is insufficient to provide	
type of wetland	lole for the		wetlands/surface water	maintain most wetland/surface water	wetland /sur functi	ions	wetland/surface water functions	
water ass	essed		functions	functions				
7			T					
.500(6)(a) L	ocation and	d Landscape						
	Support		The mitigation area	is shallow water nears	hore habitat o	of unconsolid	lated sandy substrate in similar	
			recruitment to the p	proposed mitigative artif	icial reef.	resources ex	kist in the adjacent area to facilitate	
w/o pres or								
current	-	with	<u>]</u>					
0		8						
		-						
.500(6)(b) W	ater Enviro	nment (n/a						
1	for uplands	5)						
			The assessment ar	ea is in the nearshore h	abitat of the /	Atlantic Ocea	an with open circulation. It is often	
,			exposed to high wa	we energy with general	ly clear water.	. water quar	ity will not be not altered.	
w/o pres or current		with						
ourion	1	with	4					
6		6						
500(0)()	o :-							
.500(6)(C)	Communit	y structure	An artificial reef will	nrovide substrate for b	enthic recruitr	ment of mac	roalgae and sessile invertebrates	
1 Ve	enetation a	nd/or	and will create a re-	fuge for fish and other r	notile marine	organisms.	It will create a foraging resource for	
2. Be	nthic Comr	nunity	sea turtles since pr	eferred macroalgae hav	e been docur	mented to gr	row on artificial reefs in the	
		· J	nearshore habitat c	of Southeast Florida.				
w/o pres or								
current	1	with	4					
0		8						
8	-	=						
Score = sur	m of above s	cores/30 (if						
uplar	nds, divide b	y 20)	If preservation a	s mitigation,			For impact assessment areas	
current			Preservation adi	iustment factor =				
or w/o pres		with				FL=de	elta x acres=	
0.200	1	0 722	Adjusted mitigat	ion delta =				
0.200		0.733	1					
ſ			If mitigation			F	or mitigation assessment areas	
Delta = [with - current] Time I			Time lag (t-fa	actor) =	1.03		0.52	
_ 0.14	0 = = = =			- /	4.00	RFG=0	delta/(t-factor x risk)=	
1	0.533		Risk factor =		1.00			

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk)))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



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Site/Project Name			Application Number		Δςερεσ	sment Area N	lame or Number	
Southern Palm Beac	h Island Co	omprehensive			Assessment Area Name of Number			
Shore Stabilization F	Project (Tov	n of Palm Beach	SAJ-2005-07908		Indirect Temporary Impacts (2 years)			
portion)								
Impact or Mitigation			Assessment conducte	d by:				
Impact (Indirect Tem	porary 2 ye	ears)	CB&I		Area	(acres)	0.03	
				-				
Scoring Guidance		Optimal (10)	Moderate (7)	Minimal (4)			Not Present (0)	
The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed		Condition is optimal and fully supports wetlands/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface water functions		oport of water	Condition is in	sufficient to provide wetland/surface water functions	
.500(6)(a) Location and Support w/o pres or current 10	Landscape with 1	The assessment ar colonized pavemen the epibenthic comu- scleractinian corals <i>Dasycladus, Halimu</i> the nearshore hard <i>Pterogorigia, Muric</i> habitat for immigrat green sea turtles ar	rea is a wide exposure of t. Benthic characterizat munities to be turf and i s, octocorals, bryozoans eda, and Laurencia. St bottom, including Sider ea, and Eunicea. The i ting larvae of many imp nd the beach provides i	of nearshore hardt ion surveys within macroalgae, and a , and zoanthids. C nall (<3 cm) colon <i>astrea</i> spp. and S earshore hardbot ortant fisheries sp nesting habitat for	cottom of the pro- also sup Commor ies of s colenasi tom pro- ecies. It loggerh	carbonate roo oject area rev oporting worm n macroalgal cleractinian o trea <i>bournoni</i> ovides an imp t is also provi nead, green a	ck with primarily low relief areas and ealed the dominant components of prock, sponges, tunicates, taxa are <i>Dictyota, Padina, Hypnea</i> , corals have been documented on Common octocorals are oortant settlement and nursery des foraging habitat for juvenile nd leatherback sea turtles.	
.500(6)(b) Water Enviror for uplands) w/o pres or current 6	ument (n/a with 6	The assessment ar high wave energy v	rea is in the nearshore f vith generally clear wate	nabitat of the Atlan er. Water quality w	tic Oce vill not b	an with open e altered.	circulation. It is often exposed to	
.500(6)(c) Community 1. Vegetation an 2. Benthic Comm w/o pres or current 10	r structure d/or nunity with 1	The community stru organisms thriving macroalgae assem scleractinian corals <i>Siderastrea</i> spp. ar limits succession ar	ucture is a high stress (in this habitat for many blage and a diverse inv s, octocorals, bryozoans nd <i>Solenastrea bournol</i> nd colony growth.	ow relief) to sub-c years (scleractinia ertebrate commur , and zoanthids. T ni. Size distribution	limax (r ans, larg hity in th he mos n indica	moderate reli je sponges). te form of wo st abundant s tes recruitme	ef) community, with some benthic It supports a multi-species rmrock, sponges, tunicates, cleractinian species are nt, but repeated burial of habitat	
Score = sum of above scores	/30 (if uplands,							
divide by 20)		If preservation as	s mitigation,			For in	npact assessment areas	
current or w/o pres 0.867	with 0.267	Preservation adj Adjusted mitigati	ustment factor =		FL=de	elta x acres=	0.017159131	
		If mitigation				For mitig	gation assessment areas	
Delta = [with - c	urrent]	Time lag (t-fa	ictor) =			DE0 11		
0.600		Risk factor =				RFG=delta	/(t-tactor x risk)=	

Cite/Drainet	lama			Application Number		A	ment Area Nome er Number
Southern F	ame Palm Beau	ch Island C	omprehensive	Application Number		Assess	
Shore Stat	oilization F	Project (Tov	wn of Palm Beach	SAJ-2005-07908		Mitiga	ation for Indirect Temp
portion)						impa	
Impact or Miti	gation			Assessment conducte	d by:	Assess	sment date:
Mitigation				CB&I			2014
Scoring G	uidance	1	Optimal (10)	Moderate (7)	Minimal (4)	Not Present (0)
The scoring	g of each		Condition is optimal and	Condition is less than	i i i i i i i i i i i i i i i i i i i	7	
indicator is bas would be suita	sed on what able for the		fully supports	optimal, but sufficient to maintain most	Minimal level of su wetland /surface	upport of water	Condition is insufficient to provide
type of wetland	d or surface		wetlands/surface water functions	wetland/surface water	functions		wetland/surface water functions
water ass	sessed			functions			
.500(6)(a) L	ocation and	Landscape					
	Support		The mitigation area	is shallow water nears	hore habitat of ur	nconsolio	dated sandy substrate in similar
			water depth as the recruitment to the p	impact area. Nearshore	e hardbottom reso icial reef	ources e	xist in the adjacent area to facilitate
w/o pres or				nopoood magaavo ara			
current		with	1				
0		6					
.500(6)(b) W	ater Enviro	nment (n/a					
	for uplands)	The assessment ar	ea is in the nearshore h	abitat of the Atla	ntic Oce	an with open circulation. It is often
			exposed to high wa	ive energy with general	y clear water. Wa	ater qual	lity will not be not altered.
w/o pres or							
current	· ·	with	1				
6		6					
500(6)(0)	Communit	v otructuro					
.500(6)(6)	Community	y structure	An artificial reef will	provide substrate for b	enthic recruitmer	nt of mac	croalgae and sessile invertebrates
1. V	egetation a	nd/or	and will create a ret	fuge for fish and other r	notile marine orga	anisms.	It will create a foraging resource for
2. Be	nthic Comn	nunity	sea turtles since pro	eferred macroalgae hav of Southeast Florida.	e been documer	ited to g	row on artificial reefs in the
w/o pres or							
current		with					
0	1	6	1				
U		U					
Score - cu	m of above o	cores/30 (if	т I			I	
upla	nds, divide b	y 20)	If preservation a	s mitigation,			For impact assessment areas
current			Preservation ad	ustment factor -		1	
or w/o pres		with	Freservation adj			FL=d	elta x acres=
0.200]	0 600	Adjusted mitigat	ion delta =			
0.200		0.000	1				
			If mitication				
			in mitigation			F	or mitigation assessment areas
Delta = [with - current] Time lag (t-			Time lag (t-fa	actor) =	1.03	 	0.39
	0.400	-	Risk factor -		1.00	RFG=0	delta/(t-factor x risk)=
L	0.400				1.00	[

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



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Site/Project Name		Application Number	۵	Assessment Area	Name or Number		
Southern Palm Beach Island Co	omprehensive		ŕ	Assessment Area Name of Number			
Shore Stabilization Project (Tow	vn of Palm Beach	SAJ-2005-07908	l.	Indirect Temporary (ETOF) Impacts			
portion)							
Impact or Mitigation		Assessment conducted	d by:				
Impact (Indirect Temporary (ET	OF))	CB&I	ŀ	Area (acres)	2.80		
Scoring Guidance	Optimal (10)	Moderate (7)	Minimai (4)		Not Present (0)		
indicator is based on what	Condition is optimal and	optimal, but sufficient to	Minimal level of supp	port of	asufficient to provide wetland/surface water		
would be suitable for the	wetlands/surface water	maintain most	wetland /surface wa	ater	functions		
water assessed	functions	functions	Tunctions				
.500(6)(a) Location and Landscape Support w/o pres or current with 10 9	The assessment ar colonized pavemen the epibenthic com scleractinian corals <i>Dasycladus, Halim</i> the nearshore hard <i>Pterogorigia, Muric</i> habitat for immigrat green sea turtles ar	rea is a wide exposure of t. Benthic characterizat munities to be turf and i s, octocorals, bryozoans eda, and Laurencia. Sr bottom, including Sider ea, and Eunicea. The r ting larvae of many impi- nd the beach provides r	of nearshore hardbo ion surveys within t macroalgae, and als a and zoanthids. Co nall (<3 cm) colonie astrea spp. and So astrea spp. and So hearshore hardbottc ortant fisheries spec hesting habitat for lo	ottom carbonate ro he project area re- so supporting worr ommon macroalga es of scleractinian <i>idenastrea bournor</i> om provides an im cies. It is also prov oggerhead, green a	ick with primarily low relief areas and vealed the dominant components of mrock, sponges, tunicates, I taxa are <i>Dictyota, Padina, Hypnea,</i> corals have been documented on <i>ii</i> . Common octocorals are portant settlement and nursery ides foraging habitat for juvenile and leatherback sea turtles.		
.500(6)(b) Water Environment (n/a for uplands) w/o pres or current with 6 6	The assessment ar high wave energy v	ea is in the nearshore h with generally clear wate	nabitat of the Atlanti er. Water quality wil	c Ocean with oper I not be altered.	n circulation. It is often exposed to		
.500(6)(c) Community structure 1. Vegetation and/or 2. Benthic Community w/o pres or current with 10 9	The community stru organisms thriving macroalgae assem scleractinian corals <i>Siderastrea</i> spp. au limits succession a	ucture is a high stress (l in this habitat for many blage and a diverse inv s, octocorals, bryozoans nd <i>Solenastrea bournor</i> nd colony growth.	ow relief) to sub-clir years (scleractinian ertebrate communit , and zoanthids. Th ni. Size distribution	max (moderate rel is, large sponges). ty in the form of wo ie most abundant s indicates recruitmo	ief) community, with some benthic It supports a multi-species prmrock, sponges, tunicates, scleractinian species are ent, but repeated burial of habitat		
Score = sum of above scores/30 (if uplands.			——————————————————————————————————————				
divide by 20)	If preservation a	s mitigation,		For	impact assessment areas		
current or w/o pres with 0.867 0.800	Preservation adj	ustment factor =		FL=delta x acres=	0.186946403		
	·						
	If mitigation] [For mit	igation assessment areas		
Delta = [with - current]	Time lag (t-fa	ictor) =] ŀ				
0.067	Risk factor =	RFG=delta/(t-factor x risk)=			a/(t-factor x risk)=		

Site/Project N	lame			Application Number		Assass	sment Area Name or Number	
Southern F	alm Bea	ch Island C	omprehensive	ישמווטטר זימווטטו		100000		
Shore Stab	oilization l	Project (Tov	wn of Palm Beach	SAJ-2005-07908		Mitig	ation for Indirect Temporary	
portion)		-) ((ETOF) Impacts	
Impact or Miti	gation			Assessment conducted	d by:	Assess	sment date:	
Mitigation				CB&I			Oct. 2014	
Scoring G	uidance		Ontime! (10)	Moderata (7)	Minimal (4)	Not Present (0)	
The scoring	g of each			Condition is less than	winnina (+)	Not Flesent (0)	
indicator is bas	sed on what		fully supports	optimal, but sufficient to	Minimal level of s	support of	Condition is insufficient to provide	
type of wetland	d or surface		wetlands/surface water	wetland/surface water	functions	e water	wetland/surface water functions	
water ass	sessed		Turctions	functions				
.500(6)(a) L	ocation and	d Landscape						
	Support		The mitigation area	is shallow water nears	hore habitat of u	nconsolid	lated sandy substrate in similar	
			water depth as the	impact area. Nearshore	hardbottom res	ources ex	xist in the adjacent area to facilitate	
w/o pres or			recruitment to the p	roposed mitigative artif	cial reef.			
current		with						
0	1	10	1					
		10						
500(6)(b) W	ater Enviro	nment (n/a						
.500(0)(0) W	for uplands							
			The assessment ar	ea is in the nearshore h	abitat of the Atla	antic Ocea	an with open circulation. It is often	
			exposed to high wa	we energy with general	y clear water. w	ater quar	ity will not be not altered.	
w/o pres or current		with						
6	1	C C	1					
6		6						
.500(6)(c)	Communit	y structure						
			An artificial reef will	provide substrate for b	enthic recruitme	nt of mac	roalgae and sessile invertebrates	
1. Ve	egetation a	nd/or	and will create a ref	fuge for fish and other n	notile marine org	janisms. I	It will create a foraging resource for	
2. Be	nthic Comr	nunity	nearshore habitat o	f Southeast Florida.		nieu io gi		
w/o pres or								
current		with						
0]	10	1					
Ļ								
Score = su	m of above s	cores/30 (if	ד ד					
upla	nds, divide b	ý 20)	If preservation a	s mitigation,			For impact assessment areas	
current			Preservation adi	ustment factor –				
or w/o pres		with	receivation auj			FL=de	elta x acres=	
0.200	1	0 867	Adjusted mitigat	ion delta =				
0.200		0.007	1					
			If mitigation					
						Fo	or mitigation assessment areas	
Delta = [with - current] Time			Time lag (t-fa	ictor) =	1.03		0.52	
0.667 Risk factor = 1.25					Jeita/(t-tactor x fisk)=			

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk)))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



Form 62-345.900(3), F.A.C. [effective date]

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk))

(a) Mitigation Bank Credit Determination

(b) Mitigation needed to offset impacts, when using a mitigation bank

(c) Mitigation needed to offset impacts, when not using a bank

To determine the acres of mitigation needed to offset impacts when not using a bank or a regional offsite mitigation area as mitigation, divide functional loss (FL) by relative functional gain (RFG). If there are more than one impact assessment area or more than one mitigation assessment area, the total functional loss and the total relative functional gain is determined by summation of the functional loss (FL) and relative functional gain (RFG) for each assessment area.

	Impact Types	FL	/	RFG	=	Acres of Mitigation	*Note: for temporary impacts, <i>Mitigation</i> = (FL/RFG) - Impact Area
1	Permanent	0.005654	1	0.52	1	0.01	1
	Direct Temporary						
2	(< 1 Year)	0.18262		0.58		0.01	
	Direct Temporary						
3	(>1 year)	0.030669		0.45		0.02	
	Direct Temporary						
4	(>2 year)	0.017878		0.32		0.03	
	Indirect Temporary						
5	(1 year)	0.351845		0.52		0.09	
	Indirect Temporary						
6	(2 years)	0.017159		0.39		0.02	
	Indirect Temporary		1				
7	(ETOF)	0.186946		0.52		0.36	
	total					0.53	

Form 62-345.900(3), F.A.C. [effective date]

SUB-APPENDIX H-2B DRAFT UMAM ANALYSIS TOWN OF PALM BEACH (0.36 MM) This page intentionally left blank.

PART I – Qualitative Description (See Section 62-345.400, F.A.C.)

Site/Project Name	Application Num	bers		Assessment Area Name or Number				
Southern Palm Beach Island Comprehensive Shore Stabilization (Town of Palm Beach portion)	Project SAJ-2005-(07908		Intertidal and Nearshore Subtidal Hardbottom Resources				
FLUCCs code	Further classification (optiona	l)	Impact or M	itigation Site?	Assessment A	rea Size		
571	N/A		Impact S	Site	2.99	acres (includes 7 impact types, see Part II forms for each)		
Basin/Watershed Name/Number Affected Wa Atlantic Ocean Class III	aterbody (Class)	Special C N/A	Classification	(i.e. OFW, AP, other Ic	ocal/state/federal o	lesignation of importance)		
Geographic relationship to and hydrologic connectio Open waters of the Atlantic Ocean. The north of South Lake Worth Inlet.	n with wetlands, other surface project area is located	e water, upland approxima	^s tely 11 mil	es south of La	ke Worth Inle	et and approximately 2.5 miles		
Assessment area description The hardbottom environment adjacent to the project area is highly ephemeral, consisting primarily of low-relief intertidal and subtidal hardbottom habitat, located in less than 15 ft water depth. Surveys have shown a benthic community dominated by turf algae and macroalgae, but also supporting wormrock, tunicates, sponges, bryozoans and small coral colonies. Motile species such as fish, sea turt and crabs also utitilize this habitat. Species are accustomed to the ephemeral nature of the habitat which is subject to frequent burial and exposure.								
Significant nearby features The outer reef (beyond the impact area) the nearshore natural hardbottom habita depth.	Uniqueness (considering the relative rarity in relation to the regional landscape.) Somewhat unique; the intertidal portion of the hardbottom ridge terminates to the north of the project area.							
Functions Provides cover, substrate, refuge and for benthic and motile marine species.	ood resources for	Mitigation for previous permit/other historic use N/A						
Anticipated Wildlife Utilization Based on Literature F are representative of the assessment area and reas found)	Review (List of species that sonably expected to be	Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area)						
Benthic characterization surveys within revealed the dominant components of th communities to be turf and macroalgae. tunicates, octocorals, bryozoans, and zc present. Common macroalgal taxa are <i>Hypnea, Dasycladus, Halimeda,</i> and <i>La</i> cm) colonies of scleractinian corals hav on the nearshore hardbottom and includ and <i>Solenastrea bournoni</i> . Common oc <i>Pterogorigia, Muricea</i> , and <i>Eunicea</i> . M fish, sea turtles and crabs also utitilize t are accustomed to the ephemeral natur	Loggerhead (<i>Caretta caretta</i>) (T), Green (<i>Chelonia mydas</i>) (E), and leatherback (<i>Dermochelys coriacea</i>) (E) sea turtles regularly nest in the project area. The project area is also loggerhead critical habitat (terrestrial and marine). The Florida manatee (<i>Trichechus manatus latirostris</i>) (E) is common in Palm Beach County. Smalltooth sawfish (<i>Pristis pectinata</i>) (E) has the potential to occur in the project area. Threatened coral species which have the potential to occur in the project area but which have not been observed during recent benthic survyes include: staghorn coral (<i>Acropora cervicornis</i>), elkhorn coral (<i>A. palmata</i>), boulder star coral (<i>Orbicella annularis</i>), mountainous star coral (<i>O. faveolata</i>), star coral complex (<i>O. franski</i>), pillar coral (<i>Dendrogyra cylindrus</i>), and rough cactus coral (<i>Mycetophyllia ferox</i>).							
Observed Evidence of Wildlife Utilization (List speci	es directly observed, or other	signs such as	tracks, dropp	ings, casings, nests	, etc.):			
Additional relevant factors:	ed the diota listed ab	ove.						
The hardbottom in highly ephemeral. Based on delineation of aerials, there has been a time-averaged 23.85 ac of exposed hardbottom between R-127 and R-141 from January 2003 to July 2013, including a minimum of 2.71 ac in January 2009 and a maximum of 48.78 ac in January 2006. Line intercept data collected on transects immediately offshore of the project area on the nearshore hardbottom adjacent to R-130 to R-141 revealed this area to have a hardbottom to sand ratio of 24:76 (24% of the area east of the hardbottom edge is hardbottom and 76% is sand) (CBI, 2014). HB edge and benthic characterization surveys were conducted in 2005, 2006, 2007, 2011, and 2014.								
Assessment conducted by: CB&I Coastal Planning & Engineering, I	nc.	Assessment date(s): October 2014						

PART I – Qualitative Description (See Section 62-345.400, F.A.C.)

Site/Project Name		Application Number			Assessment Area Name or Number					
Southern Palm Beach Island	d									
Comprehensive Shore Stab	ilization	Project	SAJ-2005-0	07908		Mitigation Reef				
(Town of Palm Beach portio	n)									
FLUCCs code		Further clas	sification (optiona	I)	Impact or M	itigation Site?	Assessment A	rea Size		
571		N/A	N			Mitigation Site		acres (mitigation for 7 impact types, see Part II forms for each)		
Basin/Watershed Name/Number A	Affected W	aterbody (Cla	ass)	Special C	lassification	(i.e. OFW, AP, other	local/state/federal	designation of importance)		
Atlantic Ocean	Class III			N/A						
Geographic relationship to and hydrologi	ic connection	on with wetla	nds, other surface	e water, upland	S tob: 11 mi	lee eeuth of l	alia Marth Inl	at and approximately 2 E miles		
north of South Lake Worth Inle	t.	e project a	rea is localed	арргохітіа	liely 11 mi	les south of La	ake worth ini	et and approximately 2.5 miles		
Assessment area description		<i>.</i>		and a second frame				and the large states in a		
location devoid of hardbottom h determine the location of the m	nabitat ir nabitat ir nitigative	n water de reefs.	pths similar to	b the natura	ine same (I nearshor	e hardbottom.	Additional s	epth as the impact area in a urveys will be conducted to		
Significant nearby features				Uniqueness (d	considering th	e relative rarity in	relation to the rec	jional landscape.)		
The outer reef is located east of hardbottom habitat in 40-70 ft v	of the ne water de	earshore n pth.	atural	The artificial reefs will be placed in similar water depths as the impacted hardbottom in order to mimic the lost function of the habitat.						
Functions				Mitigation for	previous pern	nit/other historic us	e			
The artificial reef habitat is inter characteristics of adjacent near typically low relief limestone pa substrate, refuge and food reso	mic the ich is vide cover, species.	N/A								
Anticipated Wildlife Utilization Based on are representative of the assessment are	Literature ea and rea	Review (List sonably expe	of species that ected to be	Anticipated Ut and intensity of	ilization by Li	sted Species (List assessment area)	species, their leg	al classification (E, T, SSC), type of use,		
found) The entificial react is intersted to				Lennerhand (Countie countre) (T) Orecen (Chalania musica) (E) and						
The artificial reef is intented to appearance, texture, relief and habitat it is meant to replace.	leatherback (<i>Dermochelys coriacea</i>) (E) sea turtles regularly nest in the project area. The project area is also loggerhead critical habitat (terrestrial and marine). The Florida manatee (<i>Trichechus manatus latirostris</i>) (E) is common in Palm Beach County. Smalltooth sawfish (<i>Pristis pectinata</i>) (E) has the potential to occur in the project area. Threatened coral species which have the potential to occur in the project area but which have not been observed during recent benthic survyes include: staghorn coral (<i>Ac palmata</i>), boulder star coral (<i>Orbicella annularis</i>), mountainous star coral (<i>O. faveolata</i>), star coral complex (<i>O. franski</i>), pillar coral (<i>Dendrogyra cylindrus</i>), and rough cactus coral (<i>Mycetophyllia ferox</i>).									
Observed Evidence of Wildlife Utilization	n (List spec	cies directly o	bserved, or other	signs such as	tracks, dropp	ings, casings, nest	ts, etc.):	Malal man file and the literature		
Characterization surveys docur similar to that of natural hardbo	Characterization surveys documented the biota listed above for natural nearshore hardbottom. Utilization of artificial reef is expected to be similar to that of natural hardbottom.									
Additional relevant factors:										
Limestone is a natural material reefs have been documented to	imestone is a natural material and will provide a suitable replacement for the impacted nearshore reef substrate. Limestone boulder artificial reefs have been documented to offset impacts associated with beach nourishment projects in southeast Florida.									
Assessment conducted by:				Assessment of	late(s):					
CB&I Coastal Planning & Engir	neering,	Inc.		October 2014						

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Site/Project Na	ame			Application Number			Assessment Area Name or Number		
Southern P	alm Bea	ch Island C	omprehensive	SA 1 2005 07009		Nitigation for Dermonant Impacts			
Beach porti	ion)			SAJ-2005-07906		Willigation for Fernanent Impacts			
Impact or Mitig	gation			Assessment conducted	l by:	Assess	sment date:		
Mitigation				CB&I		Oct. 2	2014		
Scoring Gu The scoring	idance of each		Optimal (10)	Moderate (7) Condition is less than	Minima	1 (4)	Not Present (0)		
indicator is base	ed on what		fully supports	optimal, but sufficient to	support of	evel of wetland	Condition is insufficient to provide		
type of wetland	or surface		wetlands/surface water functions	wetland/surface water /surface v		water wetland/surface water functions			
water asse	essed			functions					
.500(6)(a) Lo w/o pres or current 0	ocation and Support	d Landscape with 10	The mitigation area similar water depth area to facilitate rec	is shallow water nearsh as the impact area. Nea ruitment to the propose	ore habitat arshore har d mitigative	of unco dbottom artificia	onsolidated sandy substrate in n resources exist in the adjacent al reef.		
.500(6)(b) Wa f w/o pres or current 6	ater Enviro or uplands	nment (n/a) with 6	The assessment ar often exposed to hig	ea is in the nearshore h gh wave energy with gei	abitat of the	e Atlanti r water.	c Ocean with open circulation. It is Water quality will not be not altered.		
.500(6)(c) 1. Ve 2. Ber w/o pres or current 0	Communit egetation a hthic Comr	y structure nd/or nunity with 10	An artificial reef will invertebrates and w foraging resource fo artificial reefs in the	provide substrate for be rill create a refuge for fis or sea turtles since prefe nearshore habitat of Sc	enthic recru h and othe erred macro butheast Flo	itment o r motile palgae r prida.	of macroalgae and sessile marine organisms. It will create a nave been documented to grow on		
Score = sun	n of above s	cores/30 (if							
uplar	nds, divide b	y 20)	If preservation as	s mitigation,		For impact assessment areas			
current			Preservation adj	ustment factor =		El -delta y acros-			
or w/o pres with			Adjusted mitigati	Adjusted mitigation delta =					
0.200		0.867	.,						
			• 						
-			If mitigation			F	or mitigation assessment areas		
Delta =	= [with - c	currentl	Time lag (t-fa	(ctor) =	1.03		0.52		
20114	0.007	1		,	4.05	RFG=0	delta/(t-factor x risk)=		
	0.667		KISK TACTOR =		1.25				

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



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Site/Brojact Nama		Application Number		Acces	mont Area N	a ar Numbar	
Southern Palm Reach Island Co	omprehensive	Application Number	Assessment Area Name or Number				
Shore Stabilization Project (Tow	vn of Palm Beach	SAJ-2005-07908	Direc	t Temporary	Impacts (<1 year)		
portion)			2.00	emporary			
Impact or Mitigation		Assessment conducted	d bv:				
Impact (Direct Temporary <1 ve	ar)	CB&I	a 29.	Area	(acres)	0.28	
	/						
Scoring Guidance	Optimal (10)	Moderate (7)	Minimal (4)			Not Present (0)	
The scoring of each	Condition is ontimal and	Condition is less than					
indicator is based on what	fully supports	optimal, but sufficient to	Minimal level of sup	oport of	Condition is insuff	icient to provide wetland/surface water	
type of wetland or surface	wetlands/surface water	maintain most wetland/surface water	functions	water		functions	
water assessed	functions	functions					
.500(6)(a) Location and Landscape Support w/o pres or current with 10 1	The assessment ar colonized pavement the epibenthic com scleractinian corals <i>Dasycladus, Halim</i> the nearshore hard <i>Pterogorigia, Muric</i> habitat for immigral green sea turtles ar	rea is a wide exposure of tt. Benthic characterizat munities to be turf and i s, octocorals, bryozoans <i>eda</i> , and <i>Laurencia</i> . Sr Ibottom, including <i>Sider</i> <i>ea</i> , and <i>Eunicea</i> . The r ting larvae of many impi nd the beach provides r	of nearshore hard tion surveys within macroalgae, and a s, and zoanthids. C mall (<3 cm) colon <i>astrea</i> spp. and S nearshore hardboo ortant fisheries sp nesting habitat for	bottom (a the pro also sup Commor ies of s Colenasi tom pro ecies. It loggerh	carbonate rock o oject area reveal oporting wormroo n macroalgal tax cleractinian cora trea bournoni. C ovides an import t is also provides nead, green and	with primarily low relief areas and led the dominant components of ck, sponges, tunicates, as are <i>Dictyota, Padina, Hypnea</i> , als have been documented on common octocorals are ant settlement and nursery s foraging habitat for juvenile leatherback sea turtles.	
.500(6)(b) Water Environment (n/a for uplands) w/o pres or current with 6 6	The assessment ar high wave energy v	rea is in the nearshore h with generally clear wate	nabitat of the Atlan er. Water quality w	itic Oce vill not b	an with open cir ie altered.	culation. It is often exposed to	
.500(6)(c) Community structure 1. Vegetation and/or 2. Benthic Community w/o pres or current with 10 1	The community stru organisms thriving macroalgae assem scleractinian corals <i>Siderastrea</i> spp. at limits succession a	The community structure is a high stress (low relief) to sub-climax (moderate relief) community, with some benthic organisms thriving in this habitat for many years (scleractinians, large sponges). It supports a multi-species macroalgae assemblage and a diverse invertebrate community in the form of wormrock, sponges, tunicates, scleractinian corals, octocorals, bryozoans, and zoanthids. The most abundant scleractinian species are <i>Siderastrea</i> spp. and <i>Solenastrea bournoni</i> . Size distribution indicates recruitment, but repeated burial of habitat limits succession and colony growth.					
Score = sum of above scores/30 (if uplands,							
divide by 20)	It preservation a	s mitigation,			For impa	act assessment areas	
current or w/o pres with 0.867 0.267	Preservation adj Adjusted mitigat	justment factor = ion delta =	FL=delta x acres= 0.168895505				
	If mitigation				E Maria		
Dolto - [with overcost]		votor) -	For mitigation assessment a				
Dena = [with - current]	time lag (t-fa	((()) =	 	REG-delta//t factor v rick)-			
0.600	Risk factor =	+G=deita/(t-ractor x risk)=					

Site/Project N Southern P Shore Stab	^{ame} alm Bea ilization	ich Island C Project (Tov	omprehensive wn of Palm Beach	Application Number SAJ-2005-07908		Assess Mitiga Impac	Assessment Area Name or Number Mitigation for Direct Temp Impacts (<1 yr)	
Impact or Mitig	gation			Assessment conducted by: CB&I			Assessment date: Oct. 2014	
Scoring Gu	idance	1	Optimal (10)	Moderate (7)	Minimal (4)	Not Present (0)	
The scoring indicator is bas would be suita type of wetland water ass	of each ed on what ble for the or surface essed		Condition is optimal and fully supports wetlands/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface water functions		upport of e water	Condition is insufficient to provide wetland/surface water functions	
.500(6)(a) Lo w/o pres or current 0	ocation an Support	d Landscape with 9	The mitigation area water depth as the recruitment to the p	a is shallow water nears impact area. Nearshore proposed mitigative artif	hore habitat of u e hardbottom res icial reef.	nconsolid ources e>	lated sandy substrate in similar kist in the adjacent area to facilitate	
.500(6)(b) Wa f w/o pres or current 6	ater Envirc or uplands	with	The assessment ar exposed to high wa	ea is in the nearshore h we energy with general	nabitat of the Atla y clear water. W	antic Oce ater quali	an with open circulation. It is often ty will not be not altered.	
.500(6)(c) 1. Ve 2. Ber w/o pres or current 0	Communit	ty structure nd/or munity with 9	An artificial reef wil and will create a re sea turtles since pr nearshore habitat c	l provide substrate for b fuge for fish and other r eferred macroalgae hav of Southeast Florida.	enthic recruitme notile marine orç re been docume	nt of mac lanisms. I nted to gr	roalgae and sessile invertebrates It will create a foraging resource for ow on artificial reefs in the	
Sooro - our	n of obovio c	200r00/20 /if	ı ———					
score = sur uplar	nds, divide b	oy 20)	If preservation a	s mitigation,			For impact assessment areas	
current or w/o pres with			Preservation adj Adjusted mitigati	Preservation adjustment factor = FL=delta x acres=				
0.200		0.000	J					
			If mitigation			For mitigation assessment areas		
Delta =	= [with - o	current]	Time lag (t-fa	ictor) =	1.03	RFG-	0.58	
	0.600		Risk factor =		1.00			

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



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Site/Project N	2000			Application Number		Accocc	mont Aroa Namo or Numbor	
Southern P	alm Bea	ch Island C	omprehensive	Application Number		Assessment Area Name or Number		
Shore Stab portion)	oilization	Project (Tov	wn of Palm Beach	SAJ-2005-07908		Impacts (>1 yr)		
Impact or Mitig	gation			Assessment conducted	d by:	Assess	ment date:	
witigation				CBAI		Oct. 2	014	
Scoring Gu	idance		Optimal (10)	Moderate (7)	Minimal (4)	Not Present (0)	
The scoring indicator is bas would be suita type of wetland water ass	of each ed on what ble for the or surface essed		Condition is optimal and fully supports wetlands/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface water functions	Minimal level of s wetland /surfac functions	support of e water	Condition is insufficient to provide wetland/surface water functions	
.500(6)(a) Lo w/o pres or current 0	ocation and Support	d Landscape with 7	The mitigation area water depth as the i recruitment to the p	is shallow water nearsh impact area. Nearshore roposed mitigative artifi	nore habitat of un hardbottom reso cial reef.	nconsolida burces exi	ated sandy substrate in similar st in the adjacent area to facilitate	
.500(6)(b) W t w/o pres or current 6	ater Enviro for uplands	nment (n/a) with 6	The assessment an exposed to high wa	ea is in the nearshore h ve energy with generall	abitat of the Atla y clear water. W	ntic Ocea ater qualit	n with open circulation. It is often y will not be not altered.	
.500(6)(c) 1. Ve 2. Be w/o pres or current 0	Communit egetation a nthic Comr	y structure nd/or nunity with 7	An artificial reef will and will create a ref sea turtles since pre nearshore habitat o	provide substrate for br uge for fish and other m eferred macroalgae hav f Southeast Florida.	enthic recruitme notile marine org e been documer	nt of macro anisms. It tted to gro	oalgae and sessile invertebrates will create a foraging resource for w on artificial reefs in the	
Score - sur	n of above s	cores/30 (if	ı ———					
score = sum or above scores/30 (if uplands, divide by 20) If preservation				s mitigation,			For impact assessment areas	
current or w/o pres	1	with	Preservation adj	ustment factor = on delta =		FL=de	lta x acres=	
0.200		0.667]					
			If mitigation			Fo	or mitigation assessment areas	
Delta =	= [with - c	current]	Time lag (t-fa	ictor) =	1.03		0.45	
	0.467		Risk factor =	,	1.00	RFG=d	elta/(t-factor x risk)=	

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



Form 62-345.900(3), F.A.C. [effective date]

Site/Project Name		Application Number		Asses	sment Area Na	ame or Number		
Southern Palm Beach Island Co	omprehensive	Application Number			Assessment Area Name of Number			
Shore Stabilization Project (Tow	vn of Palm Beach	SAJ-2005-07908			Direct Temporary Impacts (> 2 years)			
portion)								
Impact or Mitigation		Assessment conducte	d by:					
Impact (Direct Temporary > 2 y	ears)	CB&I		Area	(acres)	0.03		
Scoring Guidance	Optimal (10)	Moderate (7)	Minimal (4)			Not Present (0)		
The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed	Condition is optimal and fully supports wetlands/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface water functions	Minimal level of sup wetland /surface v functions	oport of water	Condition is insu	ufficient to provide wetland/surface water functions		
.500(6)(a) Location and Landscape Support w/o pres or current with 10 1	The assessment ar colonized pavemer the epibenthic com scleractinian corals <i>Dasycladus, Halim</i> the nearshore hard <i>Pterogorigia, Muric</i> habitat for immigrat green sea turtles ar	rea is a wide exposure of t. Benthic characterizat munities to be turf and if s, octocorals, bryozoans eda, and Laurencia. Sr bottom, including Sider ea, and Eunicea. The if ting larvae of many imp nd the beach provides r	of nearshore hardb tion surveys within macroalgae, and a s, and zoanthids. C nall (<3 cm) colon <i>astrea</i> spp. and S nearshore hardbot ortant fisheries spo nesting habitat for	oottom the pro- liso sup common ies of s colenas tom pro- ecies. If loggerh	carbonate rock operting wormr n macroalgal ta cleractinian co trea bournoni . ovides an impo t is also provid nead, green an	with primarily low relief areas and aled the dominant components of ock, sponges, tunicates, axa are <i>Dictyota, Padina, Hypnea,</i> orals have been documented on Common octocorals are ortant settlement and nursery es foraging habitat for juvenile d leatherback sea turtles.		
.500(6)(b) Water Environment (n/a for uplands) w/o pres or current with 6 6	The assessment ar high wave energy v	rea is in the nearshore h vith generally clear wate	nabitat of the Atlan er. Water quality w	tic Oce rill not b	an with open c e altered.	circulation. It is often exposed to		
.500(6)(c) Community structure 1. Vegetation and/or 2. Benthic Community w/o pres or current with 10 1	The community stru organisms thriving macroalgae assem scleractinian corals <i>Siderastrea</i> spp. a limits succession a	The community structure is a high stress (low relief) to sub-climax (moderate relief) community, with some benthic organisms thriving in this habitat for many years (scleractinians, large sponges). It supports a multi-species macroalgae assemblage and a diverse invertebrate community in the form of wormrock, sponges, tunicates, scleractinian corals, octocorals, bryozoans, and zoanthids. The most abundant scleractinian species are <i>Siderastrea</i> spp. and <i>Solenastrea bournoni</i> . Size distribution indicates recruitment, but repeated burial of habitat limits succession and colony growth.						
Score = sum of above scores/30 (if uplands.								
divide by 20)	If preservation a	s mitigation,			For im	pact assessment areas		
current or w/o pres with 0.867 0.267	Preservation adj Adjusted mitigat	iustment factor =	FL=delta x acres= 0.016704295					
	If mitigation				For mitig	ation assessment areas		
Delta = [with - current]	Time lag (t-fa	actor) =			For mugation assessment areas			
		·····			RFG=delta/(t-factor x risk)=		
0.600	Risk factor =							
Site/Proiect Name			Application Number			Assessment Area Name or Number		
--	---	--	---	--	---	--	--	--
Southern Palm Be Shore Stabilizatio portion)	each Island Co n Project (Tov	omprehensive wn of Palm Beach	SAJ-2005-07908		Mitigation for Direct Temp Impacts (>2 yr)			
Impact or Mitigation Mitigation			Assessment conducted	d by:	Assess Oct. 2	ment date: 014		
Scoring Guidance	7	Optimal (10)	Moderate (7)	Minimal (4)	Not Present (0)		
The scoring of each indicator is based on wh would be suitable for th type of wetland or surfac water assessed	e ce	Condition is optimal and fully supports wetlands/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface water functions	Minimal level of su wetland /surface functions	upport of water	Condition is insufficient to provide wetland/surface water functions		
.500(6)(a) Location : Suppo w/o pres or current 0	and Landscape ort with 5	The mitigation area water depth as the recruitment to the p	i is shallow water nears impact area. Nearshore roposed mitigative artif	hore habitat of ur hardbottom reso cial reef.	nconsolida burces ex	ated sandy substrate in similar ist in the adjacent area to facilitate		
.500(6)(b) Water Env for uplar w/o pres or current 6	vironment (n/a nds) with	The assessment ar exposed to high wa	rea is in the nearshore h ave energy with general	abitat of the Atla y clear water. Wa	ntic Ocea ater qualit	n with open circulation. It is often ty will not be not altered.		
.500(6)(c) Commu 1. Vegetation 2. Benthic Co w/o pres or current 0	unity structure n and/or mmunity with 5	An artificial reef will and will create a re sea turtles since pr nearshore habitat c	l provide substrate for b fuge for fish and other n eferred macroalgae hav of Southeast Florida.	enthic recruitmer notile marine orga re been documer	at of macr anisms. It	oalgae and sessile invertebrates t will create a foraging resource for ow on artificial reefs in the		
Score = sum of abov uplands, divid current or w/o pres 0.200	ve scores/30 (if le by 20) with 0.533	If preservation a Preservation adj Adjusted mitigat	s mitigation, justment factor = ion delta =		FL=de	For impact assessment areas		
Delta = [with	- current]	If mitigation Time lag (t-fa	actor) =	1.03	Fo RFG=d	or mitigation assessment areas 0.32 elta/(t-factor x risk)=		

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk)))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



Form 62-345.900(3), F.A.C. [effective date]

Site/Project Name		Application Number		Assessment Area Name or Number				
Southern Palm Beach Island C	omprehensive	Application Number	Assessment Area Name of Number					
Shore Stabilization Project (Toy	wn of Palm Beach	SAJ-2005-07908	Indirect Impacts (1 year)					
portion)								
Impact or Mitigation		Assessment conducted	d by:					
Impact (Indirect Temporary 1 ye	ear)	CPE		Area ((acres)	0.14		
Scoring Guidance	Optimal (10)	Moderate (7)	Minimal (4)			Not Present (0)		
The scoring of each	Condition is optimal and	Condition is less than						
would be suitable for the	fully supports	optimal, but sufficient to maintain most	wetland /surface w	port of vater	Condition is insuffic	cient to provide wetland/surface water		
type of wetland or surface	functions	wetland/surface water	functions			functions		
water assessed		functions						
.500(6)(a) Location and Landscape Support w/o pres or current with 10 1	The assessment ar colonized pavemen the epibenthic com scleractinian corals <i>Dasycladus, Halim</i> the nearshore hard <i>Pterogorigia, Muric</i> habitat for immigrat green sea turtles ar	rea is a wide exposure of tt. Benthic characterizat munities to be turf and r s, octocorals, bryozoans eda, and Laurencia. Sr bottom, including Sider ea, and Eunicea. The r ting larvae of many imp nd the beach provides r	of nearshore hardb ion surveys within macroalgae, and a , and zoanthids. C mall (<3 cm) coloni <i>astrea</i> spp. and Sc nearshore hardbott ortant fisheries spe nesting habitat for l	bottom c the proj lso supp ommon ies of sc olenastri tom pro- ecies. It loggerhe	arbonate rock w ject area reveale porting wormroci macroalgal taxa cleractinian coral rea bournoni. Co vides an importa is also provides ead, green and l	ith primarily low relief areas and dd the dominant components of k, sponges, tunicates, a are <i>Dictyota, Padina, Hypnea</i> , is have been documented on mmon octocorals are ant settlement and nursery foraging habitat for juvenile eatherback sea turtles.		
.500(6)(b) Water Environment (n/a for uplands) w/o pres or current with 6 6	The assessment ar high wave energy v	ea is in the nearshore h vith generally clear wate	nabitat of the Atlant er. Water quality wi	tic Ocea ill not be	an with open circ e altered.	ulation. It is often exposed to		
.500(6)(c) Community structure 1. Vegetation and/or 2. Benthic Community w/o pres or current with 10 1	The community stru organisms thriving macroalgae assem scleractinian corals <i>Siderastrea</i> spp. ar limits succession a	ucture is a high stress (l in this habitat for many blage and a diverse inv s, octocorals, bryozoans nd <i>Solenastrea bournor</i> nd colony growth.	ow relief) to sub-cl years (scleractinia ertebrate commun , and zoanthids. TI ni. Size distribution	limax (m ns, larg iity in the he most n indicat	noderate relief) c e sponges). It su e form of wormro t abundant sclera es recruitment, b	community, with some benthic ipports a multi-species ock, sponges, tunicates, actinian species are but repeated burial of habitat		
Score = sum of above scores/30 (if uplands	1		I					
divide by 20)	If preservation a	s mitigation,			For impac	et assessment areas		
current or w/o pres with 0.867 0.267	Preservation adj	ustment factor =		FL=de	lta x acres=	0.086554914		
	-							
	If mitigation		[For mitigation	on assessment areas		
Delta = [with - current]	Time lag (t-fa	ictor) =						
0.600	Risk factor –			RFG=delta/(t-factor x risk)=				
0.000								

Site/Project N	ame			Application Number		Assess	Assessment Area Name or Number		
Southern P	alm Bea	ch Island C	omprehensive			Mitiga	ation for Indirect Temp		
Shore Stab	ilization	Project (Tov	wn of Palm Beach	SAJ-2005-07908		Impa	Impacts (1 vr)		
portion)									
Impact or Mitigation				Assessment conducte	d by:	Assess	sment date:		
Mitigation				CB&I		Oct. 2	2014		
Scoring G	lidance	1	Optimal (10)	Modorato (7)	Minim	al (4)	Not Present (0)		
The scoring	of each			Condition is less than	IVIIIIIII	ai (4)	Not Flesent (0)		
indicator is bas	ed on what		fully supports	optimal, but sufficient to Minimal level of support of					
type of wetland	lole for the		wetlands/surface water	er maintain most wetland /surface water wetland/surface water functions wetland/surface water					
water ass	essed		functions	functions					
7			T						
.500(6)(a) L	ocation and	d Landscape							
	Support		The mitigation area	is shallow water nears	hore habitat o	of unconsolid	lated sandy substrate in similar		
			recruitment to the p	proposed mitigative artif	icial reef.	resources ex	kist in the adjacent area to facilitate		
w/o pres or									
current	with								
0		8							
		-							
.500(6)(b) W	ater Enviro	nment (n/a							
1	for uplands	5)							
			The assessment ar	ea is in the nearshore h	abitat of the /	Atlantic Ocea	an with open circulation. It is often		
,			exposed to high wa	we energy with general	ly clear water.	. water quar	ity will not be not altered.		
w/o pres or current		with							
ourion	1	with	4						
6		6							
500(0)()	o :-								
.500(6)(C)	Communit	y structure	An artificial reef will	nrovide substrate for b	enthic recruitr	ment of mac	roalgae and sessile invertebrates		
1 Ve	enetation a	nd/or	and will create a re-	fuge for fish and other r	notile marine	organisms.	It will create a foraging resource for		
2. Be	nthic Comr	nunitv	sea turtles since pr	eferred macroalgae hav	e been docur	mented to gr	row on artificial reefs in the		
		· J	nearshore habitat c	of Southeast Florida.					
w/o pres or									
current	1	with	4						
0		8							
8	-	=							
Score = sur	m of above s	cores/30 (if							
uplar	nds, divide b	y 20)	If preservation a	s mitigation,			For impact assessment areas		
current			Preservation adi	iustment factor =					
or w/o pres		with				FL=de	elta x acres=		
0.200	1	0 722	Adjusted mitigat	ion delta =					
0.200		0.733	1						
ſ			If mitigation			F	or mitigation assessment areas		
Delta -	= [with - c	currentl	Time lag (t-fa	actor) =	1.03		0.52		
_ 0.14	0 = = = =			- /	4.00	RFG=0	delta/(t-factor x risk)=		
1	0.533				1.00				

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



Form 62-345.900(3), F.A.C. [effective date]

Site/Project Name		Application Number	Assessment Area Name or Number			
Southern Palm Reach Island Co	omprehensive		Assessment Area Name or Number			
Shore Stabilization Project (Toy	wn of Palm Beach	SAJ-2005-07908	Indirect Temporary Impacts (2 years)			
portion)			indirect remporary impacts (2 years)			
Impact or Mitigation		Assessment conducted	d by:			
Impact (Indirect Temporary 2 ye	ears)	CB&I		Area	(acres)	0.05
Scoring Guidance	Optimal (10)	Moderate (7)	Minimal (4)			Not Present (0)
The scoring of each	Condition is optimal and	Condition is less than	Minimali			
would be suitable for the	fully supports	optimal, but sufficient to maintain most	wetland /surface v	oport of water	Condition is ins	ufficient to provide wetland/surface water
type of wetland or surface	functions	wetland/surface water	functions			TUNCTIONS
water assessed		tunctions				
.500(6)(a) Location and Landscape Support w/o pres or current with 10 1	The assessment ar colonized pavemer the epibenthic com scleractinian corals <i>Dasycladus, Halim</i> the nearshore hard <i>Pterogorigia, Muric</i> habitat for immigral green sea turtles ar	rea is a wide exposure of the transformation of the transformation of the transformation of the transformation of the transformation of the transformation of the transformation of the transformation of the transformation of transformation of transformation of transformation of the transformation of transformation of transformation of transformation of the transformation of transformation of transformation of transformation of transformation of transformation of	of nearshore hardb ion surveys within macroalgae, and a , and zoanthids. C nall (<3 cm) colon astrea spp. and S nearshore hardbot ortant fisheries spo nesting habitat for	bottom of the pro- also sup Commor ies of s colenase tom pro- ecies. It loggerh	carbonate rocl operting wormin macroalgal t cleractinian co trea bournoni. ovides an impo t is also provid nead, green ar	k with primarily low relief areas and ealed the dominant components of rock, sponges, tunicates, axa are <i>Dictyota, Padina, Hypnea</i> , orals have been documented on Common octocorals are ortant settlement and nursery les foraging habitat for juvenile ad leatherback sea turtles.
.500(6)(b) Water Environment (n/a for uplands) w/o pres or current with 6 6	The assessment ar high wave energy v	rea is in the nearshore h with generally clear wate	nabitat of the Atlan er. Water quality w	tic Oce vill not b	an with open o e altered.	circulation. It is often exposed to
.500(6)(c) Community structure 1. Vegetation and/or 2. Benthic Community w/o pres or current with 10 1	The community stru organisms thriving macroalgae assem scleractinian corals <i>Siderastrea</i> spp. ar limits succession a	ucture is a high stress (l in this habitat for many blage and a diverse inv s, octocorals, bryozoans nd <i>Solenastrea bournor</i> nd colony growth.	ow relief) to sub-c years (scleractinia ertebrate commur , and zoanthids. T ni. Size distributior	limax (r ans, larg hity in th he mos n indica	noderate relie je sponges). li ie form of wor st abundant sc tes recruitmer	f) community, with some benthic i supports a multi-species mrock, sponges, tunicates, leractinian species are it, but repeated burial of habitat
Score = sum of above scores/30 (if uplands	1 [
divide by 20)	If preservation a	s mitigation,			For im	pact assessment areas
current or w/o pres with 0.867 0.267	Preservation adj Adjusted mitigat	iustment factor =		FL=de	elta x acres=	0.030236986
	If mitigation				For mitig	ation assessment areas
Delta = [with - current]	Time lag (t-fa	ictor) =				
0,600	Risk factor -			RFG=delta/(t-factor x risk)=		
0.000						

Cite/Drainet	lama			Application Number		A	ment Area Nome er Number			
Southern F	ame Palm Beau	ch Island C	omprehensive	Application Number		Assess	Assessment Area Name or Number			
Shore Stat	oilization F	Project (Tov	wn of Palm Beach	SAJ-2005-07908		Mitigation for Indirect Temp				
portion)						impa	Impacts (2 yr)			
Impact or Mitigation			Assessment conducte	d by:	Assess	sment date:				
Mitigation				CB&I		Oct. 2	2014			
Scoring G	uidance		Optimal (10)	Moderate (7)	Minimal (4)	Not Present (0)			
The scoring	g of each		Condition is optimal and	Condition is less than	i i i i i i i i i i i i i i i i i i i	7				
indicator is bas would be suita	sed on what able for the		fully supports	optimal, but sufficient to maintain most	Minimal level of su wetland /surface	upport of water	Condition is insufficient to provide			
type of wetland	d or surface		wetlands/surface water functions	wetland/surface water	functions		wetland/surface water functions			
water ass	sessed			functions						
.500(6)(a) L	ocation and	Landscape								
	Support		The mitigation area	is shallow water nears	hore habitat of ur	nconsolio	dated sandy substrate in similar			
			water depth as the recruitment to the p	impact area. Nearshore	e hardbottom reso icial reef	ources e	xist in the adjacent area to facilitate			
w/o pres or				nopoood miligalivo anii						
current		with								
0		6								
.500(6)(b) W	ater Enviro	nment (n/a								
	for uplands)	The assessment ar	ea is in the nearshore h	abitat of the Atla	ntic Oce	an with open circulation. It is often			
			exposed to high wa	we energy with general	y clear water. Wa	ater qual	lity will not be not altered.			
w/o pres or										
current	· ·	with	1							
6		6								
500(6)(0)	Communit	v otructuro								
.500(6)(6)	Community	y structure	An artificial reef will	artificial reef will provide substrate for benthic recruitment of macroalgae and sessile invertebrates I will create a refuge for fish and other motile marine organisms. It will create a foraging resource for						
1. V	egetation a	nd/or	and will create a ret							
2. Be	nthic Comn	nunity	sea turtles since pro	eferred macroalgae hav of Southeast Florida.	e been documer	ited to g	row on artificial reefs in the			
w/o pres or										
current		with								
0	1	6	1							
0		U								
Score - cu	m of above o	cores/30 (if	т I			I				
upla	nds, divide b	y 20)	If preservation a	s mitigation,			For impact assessment areas			
current			Preservation ad	ustment factor -		1				
or w/o pres		with	Freservation adj			FL=d	elta x acres=			
0.200]	0 600	Adjusted mitigat	ion delta =						
0.200		0.000	1							
			If mitication							
If mitigation				For mitigation assessmen			or mitigation assessment areas			
Delta	= [with - c	current]	Time lag (t-fa	actor) =	1.03	 	0.39			
	0.400	-	Risk factor -		1.00	RFG=0	delta/(t-factor x risk)=			
L	0.400				1.00					

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk)))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



Form 62-345.900(3), F.A.C. [effective date]

Southern Palm Beach Island Comprehensive Shore Stabilization Project (Town of Palm Beach portion) SAJ-2005-07908 Indirect Temporary (ETOF) Impacts Impact of Miligation Impact of Miligation Impact of Miligation Impact of Miligation souther work assessment conducted by: CB&I Area (acres) 2.79 Southern Palm Beach Island Comprehensive Support Optimal (10) Moderate (7) Minimal (4) Not Present (0) The sooring Guidance water assessed Optimal (10) Moderate (7) Minimal (4) Not Present (0) Sooring Guidance water assessed Optimal (10) Moderate (7) Minimal (4) Not Present (0) Sooring Guidance water assessed The assessment area is a wide exposure of nearshore hardbottom carbonate rock with primarily low relief areas a colonized pavement. Benthic characterization surveys within the project area revealed the dominant components the epibenthic communities to be turf and macroalgae, and also supporting wormock, sponges, funicates, sclaractinian corals, acclacorals, hypozoans, and zoanthids. Common macroalgal taxa are Dicytora, Padina, Hypon Dasycladus, Hailmeed, and Laurdscep Support .500(6)(b) Water Environment (nref) 9 .500(6)(b) Water Environment (nref) The assessment area is in the nearshore habitat of the Atlantic Ocean with open circulation. It is often exposed to high wave energy with generally clear water. Water quality will not be attered. .500(6)(b) Water Environment (nref) 6 6
Shore Stabilization Project (Town of Palm Beach portion) SAJ-2005-07908 Indirect Temporary (ETOF) Impacts Impact of Mitigation Impact of Mitigation Assessment conducted by: CB&I Area (acres) 2.79 Scoring Guidance The scoring of each indicatic is based on what would be suitable for the type of wetland or surface water assessed Optimal (10) Moderate (7) Minimal (4) Not Present (0)
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Impact (Indirect Temporary (ETOF)) CB&I Area (acres) 2.79 Scoring Guidance The scoring of each indicator is based on what would be suble for the type of wetland or surface water assessed Optimal (10) Moderate (7) Minimal (4) Not Present (0) Condition is optimal and fully supports water assessed Condition is plantal and fully supports wetland/surface water functions Minimal level of support of wetland/surface water functions Condition is insufficient to provide wetland/surface water functions .500(6)(a) Location and Landscape Support The assessment area is a wide exposure of nearshore hardbottom carbonate rock with primarily low relief areas a colonized pavement. Benthic characterization surveys with a the project area revealed the dominant components the ophenthic communities to be turf and macroalgale, and atom are to a macroalgale tax are Dictyote, sponge, tunicates, scleractinian corals, octocorals, bryozoans, and zoanthids. Common macroalgal tax are Dictyote, Padina, Hypno Dasycladus, Halimeda, and Laurencia. Small (<3 cm) colonises of scleractinian corals have been documented on the nearshore hardbottom, including: Siderastres bourmon. Common octocals are Pterogorigia, Muricea, and Euricea. The nearshore harbottom provides an important settlement and nursery habitat for immigrating larvae of many important fisheries species. It is also provides foraign habitat for jungenian due to private and the beach provides nesting habitat for loggerhead, green and leatherback sea turtles. .500(6)(b) Water Environment (n'a for uplands) The assessment area is in the nearshore habitat of the Atlantic Ocean with open cinculation. It is often exposed to high
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.500(6)(a) Location and Landscape Support The assessment area is a wide exposure of nearshore hardbottom carbonate rock with primarily low relief areas a colonized pavement. Benthic characterization surveys within the project area revealed the dominant components the epibenthic communities to be turf and marcolaga, and also supporting wormcock, sponges, tunicates, scleractinian corals, octoocrals, bryozoans, and zoanthids. Common macroalgal taxa are <i>Dictyota, Padina, Hypne Dasycladus, Halimeda</i> , and <i>Laurencia</i> . Small (<3 cm) colonise of scleractinian corals have been documented on the nearshore hardbottom, including <i>Siderastrea</i> spp. and <i>Solenastrea bournoni</i> . Common octocorals are <i>Prerogoriga, Muricae</i> . The nearshore hardbottom provides an important settlement and nursery habitat for immigrating larvae of many important fisheries species. It is also provides foraging habitat for juvenile green sea turtles and the beach provides nesting habitat for loggerhead, green and leatherback sea turtles. .500(6)(b) Water Environment (n/a for uplands) The assessment area is in the nearshore habitat of the Atlantic Ocean with open circulation. It is often exposed to high wave energy with generally clear water. Water quality will not be altered. .500(6)(c) Community structure The community structure is a high stress (low relief) to sub-climax (moderate relief) community, with some benthic coreaning in the indicate for generating in the prevision is the babiting for generating between the relief.
.500(6)(a) Location and Landscape Support The assessment area is a wide exposure of nearshore hardbottom carbonate rock with primarily low relief areas a colonized pavement. Benthic characterization surveys within the project area revealed the dominant components the epibenthic communities to be turf and macroalgae, and also supporting wormrock, sponges, tunicates, scleractinian corals, bycocans, and zoanthids. Common macroalgal taxa are <i>Dictyota, Padina, Hypm Dasycladus, Halimeda, and Laurecia</i> . Small (-3 cm) colonies of scleractinian corals have been documented on the nearshore hardbottom, including <i>Siderastrea spp.</i> and <i>Solenastrea bournoni</i> . Common octocarls are <i>Ptergorigla, Muricea</i> , and <i>Euricea</i> . The nearshore hardbottom provides an important settlement and nursery habitat for immigrating larvae of many important fisheries species. It is also provides foraging habitat for juvenile green sea turtles and the beach provides nesting habitat for loggerhead, green and leatherback sea turtles. .500(6)(b) Water Environment (n/a for uplands) The assessment area is in the nearshore habitat of the Atlantic Ocean with open circulation. It is often exposed to high wave energy with generally clear water. Water quality will not be altered. .500(6)(c) Community structure The community structure is a high stress (low relief) to sub-climax (moderate relief) community, with some benthic community, structure is a bigh stress (low relief) to sub-climax (moderate relief) community, with some benthic community structure
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.500(6)(c) Community structure The community structure is a high stress (low relief) to sub-climax (moderate relief) community, with some benthic
1. Vegetation and/or 2. Benthic Community w/o pres or current 10 9
Score = sum of above scores/30 (if uplands.
divide by 20) If preservation as mitigation, For impact assessment areas
current or w/o pres with Preservation adjustment factor = FL=delta x acres= 0.185700156 0.867 0.800
If mitigation For mitigation assessment areas
Delta = [with - current] Time lag (t-factor) =
0.067 Risk factor = RFG=delta/(t-factor x risk)=

Site/Project Name				Application Number			Assessment Area Name or Number			
Southern Palm Beach Island Comprehensive			ישמווטעו ואמווטפו		100000					
Shore Stab	oilization l	Project (Tov	wn of Palm Beach	SAJ-2005-07908		Mitig	ation for Indirect Temporary			
portion)		-) ((ETOF) Impacts			
Impact or Miti	gation			Assessment conducted	d by:	Assess	sment date:			
Mitigation			CB&I		Oct. 2	2014				
Scoring G	uidance		Ontime! (10)	Moderata (7)	Minimal (4)	Not Present (0)			
The scoring	g of each			Condition is less than	winnina (+)	Not Flesent (0)			
indicator is bas	sed on what		fully supports	optimal, but sufficient to	Minimal level of s	support of	Condition is insufficient to provide			
type of wetland	d or surface		wetlands/surface water	wetland/surface water	functions	e water	wetland/surface water functions			
water ass	sessed		Turctions	functions						
.500(6)(a) L	ocation and	d Landscape								
	Support		The mitigation area	is shallow water nears	hore habitat of u	nconsolid	lated sandy substrate in similar			
			water depth as the	impact area. Nearshore	hardbottom res	ources ex	xist in the adjacent area to facilitate			
w/o pres or			recruitment to the p	roposed mitigative artif	cial reef.					
current		with								
0	1	10								
		10								
500(6)(b) W	ater Enviro	nment (n/a								
.500(0)(0) W	for uplands									
			The assessment ar	ea is in the nearshore h	abitat of the Atla	antic Ocea	an with open circulation. It is often			
			exposed to high wa	we energy with general	y clear water. w	ater quar	ity will not be not altered.			
w/o pres or current		with								
6	1	C C	1							
6		6								
.500(6)(c)	Communit	y structure								
			An artificial reef will	provide substrate for b	enthic recruitme	nt of mac	roalgae and sessile invertebrates			
1. Ve	egetation a	nd/or	and will create a ref	fuge for fish and other n	notile marine org	janisms. I	It will create a foraging resource for			
2. Be	nthic Comr	nunity	nearshore habitat o	f Southeast Florida.		nieu io gi				
w/o pres or										
current		with								
0]	10	1							
Ļ										
Score = su	m of above s	cores/30 (if	ד ד							
upla	nds, divide b	ý 20)	If preservation a	s mitigation,			For impact assessment areas			
current			Preservation adi	ustment factor –						
or w/o pres		with	receivation auj			FL=de	elta x acres=			
0.200	1	0 867	Adjusted mitigat	ion delta =						
0.200		0.007	1							
			If mitigation							
If mitigation						Fo	or mitigation assessment areas			
Delta :	= [with - c	current]	Time lag (t-fa	ictor) =	1.03		0.52			
0.667 Risk fac					1.25	KFG=0	Jeita/(t-tactor x fisk)=			

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk)))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



Form 62-345.900(3), F.A.C. [effective date]

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk))

(a) Mitigation Bank Credit Determination

(b) Mitigation needed to offset impacts, when using a mitigation bank

(c) Mitigation needed to offset impacts, when not using a bank

To determine the acres of mitigation needed to offset impacts when not using a bank or a regional offsite mitigation area as mitigation, divide functional loss (FL) by relative functional gain (RFG). If there are more than one impact assessment area or more than one mitigation assessment area, the total functional loss and the total relative functional gain is determined by summation of the functional loss (FL) and relative functional gain (RFG) for each assessment area.

Impact Types	FL	/	RFG	=	Acres of Mitigation	*Note: for temporary impacts, <i>Mitigation</i> = (FL/RFG) - Impact Area
Permanent	0.016529		0.52	1	0.03	1
Direct Temporary						
(< 1 Year)	0.168896		0.58		0.01	
Direct Temporary						
(>1 year)	0.038754		0.45		0.02	
Direct Temporary						
(>2 year)	0.016704		0.32		0.02	
Indirect Temporary						
(1 year)	0.086555		0.52		0.02	
Indirect Temporary						
(2 years)	0.030237		0.39		0.03	
Indirect Temporary						
(ETOF)	0.1857		0.52		0.36	1
total					0.49	
	Impact Types Permanent Direct Temporary (< 1 Year) Direct Temporary (>1 year) Indirect Temporary (1 year) Indirect Temporary (2 years) Indirect Temporary (2 years) Indirect Temporary (ETOF)	Impact TypesFLPermanent0.016529Direct Temporary0.168896Direct Temporary0.038754Direct Temporary0.038754Direct Temporary0.016704Indirect Temporary0.086555Indirect Temporary0.030237Indirect Temporary0.030237Indirect Temporary0.1857total0.1857	Impact Types FL / Permanent Direct Temporary (< 1 Year)	Impact Types FL / RFG Permanent Direct Temporary (< 1 Year)	Impact Types FL / RFG = Permanent 0.016529 0.52 0.52 Direct Temporary 0.168896 0.58 0.58 Direct Temporary 0.038754 0.45 0.45 Direct Temporary 0.016704 0.32 0.32 Indirect Temporary 0.086555 0.52 0.52 Indirect Temporary 0.030237 0.39 0.39 Indirect Temporary 0.1857 0.52 0.52	Impact Types FL / RFG = Acres of Mitigation Permanent Direct Temporary (< 1 Year)

Form 62-345.900(3), F.A.C. [effective date]

SUB-APPENDIX H-2C DRAFT UMAM ANALYSIS TOWN OF PALM BEACH (0.60 MM) This page intentionally left blank.

PART I – Qualitative Description (See Section 62-345.400, F.A.C.)

Southern Paim Beach Island Comprehensive Store Stabilization Project (row of Paim Beach portion) SAJ-2005-07908 Intertidal and Nearshore Sublidal Hardbottom Resources PLOCE tools	Site/Project Name	Application Number	nbers Assessment Area Name or Number			er				
PLUCE code Putter destidation (grown) Impact or Miligaton Sae? Assessment Avea Sace 571 N/A Impact Site 2.99 types, see Part II forms for each) Biost Winement Avea Survey Allenter Ocean Allenter Ocean N/A Grographic existence for the Allentic Ocean. The project area is located approximately 11 miles south of Lake Worth Inlet and approximately 2.5 miles not of South Lake Worth Inlet. Allenter Ocean and synthesize connection with welfands, other sarburs water, spanda Copen values of the Allentic Ocean. The project area is located approximately 11 miles south of Lake Worth Inlet and approximately 2.5 miles not of South Lake Worth Inlet. Allential Approximately 2.5 miles not of South Lake Worth Inlet and approximately 2.5 miles not ab south of the Allentic Ocean. The project area is highly explorement, consisting primarily of low-relief intentidal and subidal hardbottom habitat, located in lass than 15 it water depth. Surveys have shown a benthic community dominated by turid appa and macroaliga, but also supporting worrow. Surveys have shown a benthic community dominated by turid appa and records also utilize this habitat. Species are accustomed to the ephemeral nature of the habitat which is subject to frequent burial and re- exposure. Surveys have shown a benthic community dominated by turid appa and the nearbore nature hared the project area. N/A Beaption temperative of the substate, relarge and food resources for provides acover, substate, relarge and food resources for provides cover, substate, relarge and acod resources for provides covere, substate, relarge a	Southern Palm Beach Island Comprehensive Shore Stabilization Project SAJ-2005 (Town of Palm Beach portion)			07908 Intertidal and I Resources			Nearshore	Nearshore Subtidal Hardbottom		
S71 N/A Impact Site 2.99 acres (includes 7 impact types, see Part II forms for each states) Bain/Watertiel NameNumber Class III N/A N/A N/A Bain/Watertiel NameNumber Class III N/A N/A N/A Classpite: Indicating to and hydrogic correction with welfands, other surface water, spinod N/A N/A Classpite: Indicating to and hydrogic correction with welfands, other surface water, spinod N/A N/A Classpite: Indicating to and hydrogic correction with welfands, other surface water, spinod Open values of the Affantic Ocean. The project area is highly ephemeral, consisting primarity of low-relef intertidal and subtidal hardropin habitat. Iocated in ites is table to the project area is highly ephemeral, consisting primarity of low-relef intertidal and subtidal hardropin habitat. Iocated in ites is table to the project area is highly ephemeral, consisting primarity of low-relef intertidal and subtidal hardropin habitat. Species are accustomed to the ephemeral nature of the habitat which is subject to frequent burial and re-exposure. Significant nettry feature Class III Openerating the relevand to the project area. Functions Migden for previous permitsher habitat. which is subject to frequent burial and re-exposure. Provides cover, substrate, refuge and food resources for benthic and common macrological substrate (List opecies area. N/A Antinenshy due to t	FLUCCs code	Further clas	sification (optional)		Impact or M	itigation Site?	Assessment A	rea Size		
Selective Allantic Occan Allantic Occan Special Classification (s.c. 01%, AP, other localizate/science assignation of impartance) Allantic Occan NVA NVA Celegraphic relationship to and hydrologic connection with wetlands, other surface water, uplands NVA Open waters of the Allantic Occan. The project area is located approximately 11 miles south of Lake Worth Inlet. Assessment area description Assessment area description The hardbottom abilisti, located in less than 15 ft water depth. Surveys have shown a benthic community dominated by turf algae and macroaligae, buy ommores, turicidaes, sponges, turicidae provides permitted within the subject to frequent burial and receptors. Septiation matching and mapped and food resources for the nearshore natural hardbottom habitat in 40-70 ft water Misgation tor previous permit/orber habitoric use Provides cover, substrate, refuge and food resources for our depth. Misgation tor previous permit/orber habitoric use Provides cover, substrate, refuge and food resources for the assessment as and transmition were assessment and transmit of the epheteritic orbit as matterized in the project area. Misgation tor previous permit/orber habitoric use NVA Misgation tor previous permit/orber fraiterin the project area. Misgation tor previ	571	N/A			Impact S	Site	2.99	acres (includes 7 impact types, see Part II forms for each)		
Geographic relationship to and hydrologic connection with wethands, other sufface wetter, uplands Open waters of the Atlantic Ocean. The project area is located approximately 11 miles south of Lake Worth Inlet. Assessment area decorption The hardbottom methodital, located in less than 15 ft water depth. Surveys have shown a benthic community dominated by turf agae and macroadigae, but also supporting wormrock, turicates, spronges, bryozoans and small coral colonies. Model species such as fish, see turtles and crabs also cultize this habitat. Species are accustomed to the ephemeral nature of the habitat which is subject to frequent burial and re-exposure. Significant nature feed (beyond the impact area) is located east of the nearbore natural hardbottom habitat in 40-70 ft water depth. Unqueress (considering the relative rainty in relation to the regional landscape.) Somewhat unique; the interindial portion of the hardbottom midge terminates to the north of the project area. Mitgeinen for previous permitted wetwetwetwetwetwetwetwetwetwetwetwetwetw	Basin/Watershed Name/Number Atlantic Ocean	Affected Waterbody (CI Class III	ass)	Special C N/A	lassification ((i.e. OFW, AP, other lo	ocal/state/federal o	lesignation of importance)		
Assessment area description Assessment area description Assessment area description Areadoption environment adjacent to the project area is highly ephemeral, consisting primarily of low-relief intertidal and subtidal hardbottom habitat, located in less than 15 ft water depth. Surveys have shown a benthic community dominated by turi algae and macroalgae, but also supporting wormcock, functicates, sponges, bycozonas and small coral colonies. Motile species such as fits, sea turtles and crabs also utilize this habitat. Species are accustomed to the ephemeral nature of the habitat which is subject to frequent burial and re- exposure. Sufficient reading wormcock, transception Fractions Provides cover, substrate, refuge and food resources for benthic and motile marine species. Articipated Wildiff Utilization fisse on Literature Review (Lit of species that are representative of the assessment area and reasonably expected to be funciates, octoorals, bryozoans, and zoanthids were also funciates, octoorals, half media, adaptive, Padina, Hyprea, Dasycledus, Halimeda, and Laurencia: Spanific, Hyprea, Dasycledus, Halimeda, and Laurencia: Spanific, Hyprea bottmin and solenastic contrask were abcomment Artific species and contrastics species species and the project area. For oclonies of soleractinian corals have been documented for he nearshore hardbottom and include Siderastrea species. Artificated Utilization field were also for oclonies of soleractinian corals have been documented for he nearshore hardbottom and include Siderastrea species. Artificated Utilization field were also for oclonies of soleractinian corals have been documented for he hardbottom and include Siderastrea species. Articipated Villization field were also for oclonies of soleractinian corals have been documented for he nearshore hardbottom and include Siderastrea species. Articipate and crassissis to be turing and crassis species species and correst area for oclonies of soleractinian and docensates approximation. Stars Articipated Villization fi	Geographic relationship to and hydrolog Open waters of the Atlantic Open waters of the Atlantic Open north of South Lake Worth Inle	Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands Open waters of the Atlantic Ocean. The project area is located approximately 11 miles south of Lake Worth Inlet and approximately 2.5 miles north of South Lake Worth Inlet.								
Significant nearby features Uniqueness (considering the relative antry in relation to the regional landscape.) Significant nearby features Uniqueness (considering the relative antry in relation to the regional landscape.) The outer reef (beyond the impact area) is located east of the nearshore natural hardbottom habitat in 40-70 ft water depth. Somewhat unique; the intertidal portion of the hardbottom ridge terminates to the north of the project area. Functions Functions Provides cover, substrate, refuge and food resources for benthic and molile marine species. Miligation for previous permit/other historic use Antiopated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area) Antiopated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area) Benthic characterization surveys within the project area is also loggerhead critical habitat (terrestrial and marine). The Florida manate (Trichechus manatus latrostris) (E) is common present. Common macroalgat tax are Dictrota, Padina, Hypnea, Dasycladus, Halimeda, and Laurencia. Small (-3) endities of scleractinicata) (E) has the project area. The project area. Threatened coral species which have the sen document. Small (-3) endities and crabe also utilize this habitat. Species are attributes and crabe also utilize this habitat. Species are attributes and crabe also utilize this habitat. Species are as tracks, droppings, casings, nests, etc.): Characterization surveys documented the biota listed above. Additional re	Assessment area description The hardbottom environment adjacent to the project area is highly ephemeral, consisting primarily of low-relief intertidal and subtidal hardbottom habitat, located in less than 15 ft water depth. Surveys have shown a benthic community dominated by turf algae and macroalgae, but also supporting wormrock, tunicates, sponges, bryozoans and small coral colonies. Motile species such as fish, sea turtle and crabs also utitilize this habitat. Species are accustomed to the ephemeral nature of the habitat which is subject to frequent burial and exposure.									
Functions Miligation for previous permit/other historic use Provides cover, substrate, refuge and food resources for benthic and motile marine species. N/A Anticipated Wildite Utilization Based on Literature Review (List of species that are presentative of the assessment area and reasonably expected to be found) Anticipated Utilization by Listed Species (List species, their legal classification (E.T. SSC), type of use, and intensity of use of the assessment area) Benthic characterization surveys within the project area revealed the dominant components of the epibenthic communities to be fur and macroalgae. Womrock, sponges, present. Common macroalgal tax are <i>Dictyota</i> , <i>Padina</i> , <i>Hypnea</i> , <i>Dasycladus</i> , <i>Halimeda</i> , and <i>Laurencia</i> . Small (<3 on the nearshore hardbottom and include Siderastrea spp. and Solenastrea bournon). Common octocorals are spo- ical (<i>A. padmats</i>), boulder star coral (<i>Orticela annuLaris</i>), enhorts the sea turties and crabs also utilize this habitat. Species are accustomed to the ephemeral nature of the habitat. Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.): Characterization surveys documented the biota listed above. Additional relevant factors: The hardbottom in highly ephemeral. Based on delineation of aerials, there has been a time-averaged 23.85 ac of exposed hardbottom between R-127 and R-141 from January 2003 to July 2013, including a minimum of 2.71 a cin January 2009 and a maximum of 48.78 ac in January 2006. Line intercept data collected on transects immediately offshore of the project area as of the hardbottom edge is hardbottom and 76% is sand) (CBI, 2014). HB edge and benthic characterization surveys were conduc	Significant nearby features The outer reef (beyond the im the nearshore natural hardbot depth.	ed east of S 0 ft water th	Somewhat unique; the intertidal portion of the hardbottom ridge terminates to the north of the project area.							
Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to be found) Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area) Benthic characterization surveys within the project area revealed the dominant components of the epibenthic communities to be turf and macroalgale. Wormrock, sponges, present. Common macroalgal taxa are <i>Dictyota</i> , <i>Padina</i> , <i>Hypnea, Dasycladus</i> , <i>Halimeda</i> , and <i>Laurencia</i> . Small (<3)	Functions Provides cover, substrate, refu benthic and motile marine spe	M N	itigation for p I/A	previous perm	nit/other historic use					
Berthic characterization surveys within the project area Loggerhead (<i>Caretta caretta</i>) (T), Green (<i>Chelonia mydas</i>) (E), and Berthic characterization surveys within the project area Loggerhead (<i>Caretta caretta</i>) (T), Green (<i>Chelonia mydas</i>) (E), and Communities to be turf and macroalgae. Wormrock, sponges Wormrock, sponges present. Common macroalgal taxa are <i>Dictyota</i> , Padina, Project area is also loggerhead critical habitat (terrestrial and marine). The Florida manatee (<i>Trichechus manatus latirostris</i>) (E) is common In the project area. The project area is also loggerhead critical habitat (terrestrial and marine). The Florida manatee (<i>Trichechus manatus latirostris</i>) (E) is common In the project area. The project area marine). The Florida manatee (<i>Trichechus manatus latirostris</i>) (E) is common In the project area. marine). The Florida manatee (<i>Trichechus manatus latirostris</i>) (E) is common In the project area. marine). The Florida manatee (<i>Trichechus manatus latirostris</i>) (E) is common In the project area. marine). The project area is also loggerhead critical habitat (terrestrial and marine). The project area. The project area. marine). The project area is also loggerhead critical habitat (terrestrial and marine). The project area. The project area. marine). The project area is also loggerhead critical habitat. Exception coral (<i>Acropar cervicornis</i>), elkhom oral (<i>A. palmata</i>), boulder star c	Anticipated Wildlife Utilization Based of are representative of the assessment a found)	of species that Ar ected to be ar	nticipated Ut nd intensity c	ilization by Lis of use of the a	sted Species (List s assessment area)	pecies, their leg	al classification (E, T, SSC), type of use,			
Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.): Characterization surveys documented the biota listed above. Additional relevant factors: The hardbottom in highly ephemeral. Based on delineation of aerials, there has been a time-averaged 23.85 ac of exposed hardbottom between R-127 and R-141 from January 2003 to July 2013, including a minimum of 2.71 ac in January 2009 and a maximum of 48.78 ac in January 2006. Line intercept data collected on transects immediately offshore of the project area on the nearshore hardbottom adjacent to R-130 to R-141 revealed this area to have a hardbottom to sand ratio of 24:76 (24% of the area east of the hardbottom edge is hardbottom and 76% is sand) (CBI, 2014). HB edge and benthic characterization surveys were conducted in 2005, 2006, 2007, 2011, and 2014. Assessment conducted by: Assessment date(s): CB&I Coastal Planning & Engineering, Inc. Assessment date(s):	Benthic characterization surve revealed the dominant compo communities to be turf and ma tunicates, octocorals, bryozoa present. Common macroalgal <i>Hypnea, Dasycladus, Halimed</i> cm) colonies of scleractinian c on the nearshore hardbottom and <i>Solenastrea bournoni</i> . Co <i>Pterogorigia, Muricea</i> , and <i>E</i> fish, sea turtles and crabs also are accustomed to the ephem	ct area Lu hthic le lock, sponges, pr were also m Padina, in Small (<3 pr ocumented pr strea spp. re are ca cies such as ca at. Species cj habitat .	Loggerhead (<i>Caretta caretta</i>) (T), Green (<i>Chelonia mydas</i>) (E), and leatherback (<i>Dermochelys coriacea</i>) (E) sea turtles regularly nest in the project area. The project area is also loggerhead critical habitat (terrestrial and marine). The Florida manatee (<i>Trichechus manatus latirostris</i>) (E) is common in Palm Beach County. Smalltooth sawfish (<i>Pristis pectinata</i>) (E) has the potential to occur in the project area. Threatened coral species which have the potential to occur in the project area but which have not been observed during recent benthic survyes include: staghorn coral (<i>Acropora cervicornis</i>), elkhorn coral (<i>A. palmata</i>), boulder star coral (<i>Orbicella annularis</i>), mountainous star coral (<i>O. faveolata</i>), star coral complex (<i>O. franski</i>), pillar coral (<i>Dendrogyra cylindrus</i>), and rough cactus coral (<i>Mycetophyllia ferox</i>).							
Additional relevant factors: The hardbottom in highly ephemeral. Based on delineation of aerials, there has been a time-averaged 23.85 ac of exposed hardbottom between R-127 and R-141 from January 2003 to July 2013, including a minimum of 2.71 ac in January 2009 and a maximum of 48.78 ac in January 2006. Line intercept data collected on transects immediately offshore of the project area on the nearshore hardbottom adjacent to R-130 to R-141 revealed this area to have a hardbottom to sand ratio of 24:76 (24% of the area east of the hardbottom edge is hardbottom and 76% is sand) (CBI, 2014). HB edge and benthic characterization surveys were conducted in 2005, 2006, 2007, 2011, and 2014. Assessment conducted by: Assessment date(s): CB&I Coastal Planning & Engineering, Inc. Assessment date(s):	Observed Evidence of Wildlife Utilization	on (List species directly o	bbserved, or other sig	gns such as t	tracks, droppi	ings, casings, nests	, etc.):			
The hardbottom in highly ephemeral. Based on delineation of aerials, there has been a time-averaged 23.85 ac of exposed hardbottom between R-127 and R-141 from January 2003 to July 2013, including a minimum of 2.71 ac in January 2009 and a maximum of 48.78 ac in January 2006. Line intercept data collected on transects immediately offshore of the project area on the nearshore hardbottom adjacent to R-130 to R-141 revealed this area to have a hardbottom to sand ratio of 24:76 (24% of the area east of the hardbottom edge is hardbottom and 76% is sand) (CBI, 2014). HB edge and benthic characterization surveys were conducted in 2005, 2006, 2007, 2011, and 2014. Assessment conducted by: Assessment date(s): CB&I Coastal Planning & Engineering, Inc. Action of 2014	Additional relevant factors:	ocumented the b	IOTA IISTED ADOV	/e.						
Assessment conducted by: Assessment date(s): CB&I Coastal Planning & Engineering, Inc. October 2014	The hardbottom in highly ephemeral. Based on delineation of aerials, there has been a time-averaged 23.85 ac of exposed hardbottom between R-127 and R-141 from January 2003 to July 2013, including a minimum of 2.71 ac in January 2009 and a maximum of 48.78 ac in January 2006. Line intercept data collected on transects immediately offshore of the project area on the nearshore hardbottom adjacent to R-130 to R-141 revealed this area to have a hardbottom to sand ratio of 24:76 (24% of the area east of the hardbottom edge is hardbottom and 76% is sand) (CBI, 2014). HB edge and benthic characterization surveys were conducted in 2005, 2006, 2007, 2011, and 2014.									
	Assessment conducted by: CB&I Coastal Planning & Eng	ineering, Inc.	As O	ssessment d October 20	ate(s):)14					

PART I – Qualitative Description (See Section 62-345.400, F.A.C.)

Site/Project Name	Application Numb	blication Number			Assessment Area Name or Number				
Southern Palm Beach Island									
Comprehensive Shore Stabilization	on Project	SAJ-2005-0	7908		Mitigation R	eef			
(Town of Palm Beach portion)									
FLUCCs code	Further clas	sification (optional)		Impact or N	litigation Site?	Assessment A	rea Size		
							acres (mitigation for 7		
571	N/A			Mitigatio	on Site	0.57	impact types, see Part II		
							forms for each)		
Basin/Watershed Name/Number Affected	Waterbody (Cla	ass)	Special C	Classification	(i.e. OFW, AP, other	local/state/federal	designation of importance)		
Atlantic Ocean Class	111		N/A						
Geographic relationship to and hydrologic conne	ction with woth	nds other surface	water upland	c					
Geographic relationship to and hydrologic connection with wellahos, other surface water, uplatities Open waters of the Atlantic Ocean. The project area is located approximately 11 miles south of Lake Worth Inlat and approximately 2.5 miles									
north of South Lake Worth Inlet.				,					
Assessment area description									
Subtidal limestone boulder artificial re	eefs are pro	posed to be de	ployed in t	the same	general vicinity	and water d	epth as the impact area in a		
location devoid of hardbottom habitat	: in water de ve reefs.	pths similar to	the natura	II nearshoi	e hardbottom.	Additional s	urveys will be conducted to		
Significant nearby features		I	Uniqueness (d	considering th	ne relative rarity in	relation to the reg	jional landscape.)		
The outer reef is located east of the	atural	The artificial reefs will be placed in similar water depths as the impacted							
nardbottom nabitat in 40-70 ft water o	deptn.		narodottom in order to mimic the lost function of the habitat.						
Functions		1	Vitigation for	previous pern	nit/other historic us	e			
The artificial reef habitat is intended t	o closely mi	mic the	N/A						
characteristics of adjacent nearshore	habitat, wh	ich is vido covor							
substrate, refuge and food resources	for marine	species.							
_									
Anticipated Wildlife Utilization Based on Literatu are representative of the assessment area and r	re Review (List easonably expe	of species that	Anticipated Ut and intensity of	tilization by Li	sted Species (List	species, their leg	al classification (E, T, SSC), type of use,		
found)									
The artificial reef is intented to replicate appearance, texture, relief and ecolor	ate the phys dical functio	ical n of the	Loggernead (<i>Caretta caretta)</i> (1), Green (<i>Chelonia mydas</i>) (E), and leatherback (<i>Dermochelvs coriacea</i>) (E) sea turtles regularly nest in the						
habitat it is meant to replace.	gioarianodo		project area. The project area is also loggerhead critical habitat (terrestrial and						
		1	marine). The Florida manatee (<i>Trichechus manatus latirostris</i>) (E) is common						
		1	potential to occur in the project area. Threatened coral species which have the						
			potential to	occur in	the project are	a but which h	nave not been observed during		
		1	recent ben	thic survy	es include: sta	ghorn coral (ral <i>(Orbicella</i>	Acropora cervicornis), elkhorn		
			coral (O. fa	aveolata), b	star coral cor	plex (O. fran	ski), pillar coral (Dendrogyra		
		1	cylindrus),	and roug	h cactus coral	(Mycetophyl	lia ferox).		
Observed Evidence of Wildlife Utilization (Liston	aciae directive -	beenved or other	iane queb e-	tracka draz-	inge oppinge set	s oto);			
Characterization surveys documenter	d the hiota li	sted above for	natural ne	arehore b	ardbottom Liti	is, etc.). lization of art	ificial reaf is expected to be		
similar to that of natural hardbottom.									
Additional relevant factors:									
Limestone is a natural material and w	vill provide a	suitable repla	cement for	r the impa	cted nearshore	e reef substra	te. Limestone boulder artificial		
reefs have been documented to offse	et impacts a	ssociated with	beach nou	urishment	projects in sou	theast Florid	a.		
Assessment conducted by:			Assessment o	late(s):					
CB&I Coastal Planning & Engineering	y, inc.	(October 2014						

Form 62-345.900(1), F.A.C. [effective date]



Site/Project Na	ime			Application Number		Assessment Area Name or Number		
Southern Pa	alm Bea	ch Island C	omprehensive	SA 1 2005 07009				
Beach porti	nization on)			SAJ-2005-07906		Willigation for Fernanent Impacts		
Impact or Mitig	ation			Assessment conducted	d by:	Assess	sment date:	
Mitigation				CB&I		Oct.	2014	
Scoring Gui The scoring of	dance of each		Optimal (10)	Moderate (7) Condition is less than	Minima	ll (4)	Not Present (0)	
indicator is base	ed on what		fully supports	optimal, but sufficient to	support of	evel of wetland	Condition is insufficient to provide	
type of wetland	or surface		wetlands/surface water functions	wetland/surface water	/surface functio	water	wetland/surface water functions	
water asse	essed			functions				
.500(6)(a) Lo w/o pres or current 0	ocation and Support	d Landscape with 10	The mitigation area similar water depth area to facilitate rec	is shallow water nearsh as the impact area. Nea ruitment to the propose	nore habitat arshore har d mitigative	t of unco dbottom artificia	onsolidated sandy substrate in n resources exist in the adjacent al reef.	
.500(6)(b) Wa fo w/o pres or current 6	ater Enviro or uplands	nment (n/a) with 6	The assessment ar often exposed to hig	ea is in the nearshore h gh wave energy with gei	abitat of the	e Atlanti r water.	c Ocean with open circulation. It is Water quality will not be not altered.	
.500(6)(c) (1. Ve 2. Ben w/o pres or current 0	Communit getation a hthic Comr	y structure nd/or nunity with 10	An artificial reef will invertebrates and w foraging resource fo artificial reefs in the	provide substrate for be vill create a refuge for fis or sea turtles since prefe nearshore habitat of Sc	enthic recru h and othe erred macro putheast Flo	iitment o r motile balgae r brida.	of macroalgae and sessile marine organisms. It will create a nave been documented to grow on	
Score = sum	of above s	cores/30 (if						
uplan	ds, divide b	y 20)	If preservation as	s mitigation,			For impact assessment areas	
current			Preservation adj	ustment factor =		FI	elta x acres-	
or w/o pres	I	with	Adjusted mitigati	ion delta –		1 L-U		
0.200		0.867	, lajusted mitigati			L		
								
If mitigation						F	or mitigation assessment areas	
			Time lag (t-fa	actor) =	1.03		 ۵ ۶۵	
		Janong			1.00	RFG=	delta/(t-factor x risk)=	
1	0.667		Risk factor =		1.25			

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk)))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



Form 62-345.900(3), F.A.C. [effective date]

Site/Droject Name		Application Number		Assessment Area Name or Number			
Southern Palm Reach Island Co	omprehensive	Application Number	Assessment Area Name or Number				
Shore Stabilization Project (Tow	vn of Palm Beach	SAJ-2005-07908	Direct Temporary Impacts (<1 year)				
portion)							
Impact or Mitigation		Assessment conducted	d bv:				
Impact (Direct Temporary <1 ve	ear)	CB&I		Area	(acres)	0.26	
	/	-			<u>, /</u>		
Scoring Guidance	Optimal (10)	Moderate (7)	Minimal (4)			Not Present (0)	
The scoring of each	Condition is optimal and	Condition is less than					
indicator is based on what	fully supports	optimal, but sufficient to	Minimal level of sup	oport of	Condition is insuff	icient to provide wetland/surface water	
type of wetland or surface	wetlands/surface water	maintain most wetland/surface water	functions	water		functions	
water assessed	functions	functions					
.500(6)(a) Location and Landscape Support w/o pres or current with 10 1	The assessment ar colonized pavement the epibenthic com scleractinian corals <i>Dasycladus, Halim</i> the nearshore hard <i>Pterogorigia, Muric</i> habitat for immigrat green sea turtles ar	rea is a wide exposure of tt. Benthic characterizat munities to be turf and i s, octocorals, bryozoans <i>eda</i> , and <i>Laurencia</i> . Sr Ibottom, including <i>Sider</i> <i>ea</i> , and <i>Eunicea</i> . The r ting larvae of many impi nd the beach provides r	of nearshore hard ion surveys within macroalgae, and a , and zoanthids. C nall (<3 cm) colon astrea spp. and S astrea spp. and S nearshore hardboo ortant fisheries sp nesting habitat for	bottom of the pro- also sup Commor ies of s colenast tom pro- ecies. It loggerh	carbonate rock o oject area reveal oporting wormroo n macroalgal tax cleractinian cora trea bournoni. C ovides an import t is also provides nead, green and	with primarily low relief areas and led the dominant components of ck, sponges, tunicates, as are <i>Dictyota, Padina, Hypnea</i> , als have been documented on common octocorals are ant settlement and nursery s foraging habitat for juvenile leatherback sea turtles.	
.500(6)(b) Water Environment (n/a for uplands) w/o pres or current with 6 6	The assessment ar high wave energy v	rea is in the nearshore h with generally clear wate	nabitat of the Atlan er. Water quality w	tic Oce vill not b	an with open cir ie altered.	culation. It is often exposed to	
.500(6)(c) Community structure 1. Vegetation and/or 2. Benthic Community w/o pres or current with 10 1	The community stru organisms thriving macroalgae assem scleractinian corals <i>Siderastrea</i> spp. at limits succession a	ucture is a high stress (l in this habitat for many blage and a diverse inv s, octocorals, bryozoans nd <i>Solenastrea bournor</i> nd colony growth.	ow relief) to sub-c years (scleractinia ertebrate commur , and zoanthids. T ni. Size distribution	limax (r ans, larg nity in th he mos n indica	noderate relief) ge sponges). It s he form of worm st abundant scle tes recruitment,	community, with some benthic upports a multi-species rock, sponges, tunicates, ractinian species are but repeated burial of habitat	
Score = sum of above scores/30 (if uplands,							
divide by 20)	if preservation a	s mitigation,			⊢or impa	act assessment areas	
current or w/o pres with 0.867 0.267	Preservation adj Adjusted mitigat	iustment factor = ion delta =		FL=de	elta x acres=	0.153462536	
	If mitigation					ion accompant cross	
Delta - [with - ourront]	Time log (t fo	uctor) –	I		For milligat	1011 assessment dieds	
	Time lag (t-la		-	REG=delta/(t-factor x risk)=			
0.600	Risk factor =						

Site/Project Name Southern Palm Beach Island Comprehensive Shore Stabilization Project (Town of Palm Beach portion)				Application Number SAJ-2005-07908		Assess Mitiga Impac	Assessment Area Name or Number Mitigation for Direct Temp Impacts (<1 yr)		
Impact or Mitig	gation			Assessment conducted by: A CB&I C			ment date: 2014		
Scoring Gu	idance	1	Optimal (10)	Moderate (7)	Minimal (4)	Not Present (0)		
The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed			Condition is optimal and fully supports wetlands/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface water functions	Minimal level of s wetland /surfac functions	upport of e water	Condition is insufficient to provide wetland/surface water functions		
.500(6)(a) Lo w/o pres or current 0	ocation an Support	d Landscape with 9	The mitigation area water depth as the recruitment to the p	a is shallow water nears impact area. Nearshore proposed mitigative artif	hore habitat of u e hardbottom res icial reef.	nconsolid ources e>	lated sandy substrate in similar kist in the adjacent area to facilitate		
.500(6)(b) Water Environment (n/a for uplands) w/o pres or current with				ea is in the nearshore h we energy with general	nabitat of the Atla y clear water. W	antic Oce ater quali	an with open circulation. It is often ty will not be not altered.		
.500(6)(c) 1. Ve 2. Ber w/o pres or current 0	Communit	ty structure nd/or munity with 9	An artificial reef wil and will create a re sea turtles since pr nearshore habitat c	l provide substrate for b fuge for fish and other r eferred macroalgae hav of Southeast Florida.	enthic recruitme notile marine orç re been docume	nt of mac lanisms. I nted to gr	roalgae and sessile invertebrates It will create a foraging resource for ow on artificial reefs in the		
Sooro - our	n of obovo c	200r00/20 /if	ı ———						
score = sur uplar	nds, divide b	oy 20)	If preservation a	s mitigation,			For impact assessment areas		
current or w/o pres	current Preservation adj or w/o pres with Adjusted mitigati			ustment factor =		FL=de	elta x acres=		
0.200		0.000	J						
			If mitigation			F	or mitigation assessment areas		
Delta =	= [with - o	current]	Time lag (t-fa	ictor) =	1.03	RFG-	0.58		
0.600			Risk factor =		1.00				

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



Form 62-345.900(3), F.A.C. [effective date]



Site/Project N	2000			Application Number		Accocc	mont Aroa Namo or Numbor
Southern Palm Beach Island Comprehensive					Mitigation for Direct Temp		
Shore Stab portion)	oilization	Project (Tov	wn of Palm Beach	SAJ-2005-07908		Impacts (>1 yr)	
Impact or Mitigation				Assessment conducted	d by:	Assess	ment date:
witigation				CBAI		Oct. 2	014
Scoring Gu	idance		Optimal (10)	Moderate (7)	Minimal (4)	Not Present (0)
The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed			Condition is optimal and fully supports wetlands/surface water functions	Condition is optimal and fully supports wetlands/surface water functions Condition is less than optimal, but sufficient to maintain most wetland/surface water functions Condition is less than optimal, but sufficient to maintain most functions Condition is less than optimal, but sufficient to maintain most functions			Condition is insufficient to provide wetland/surface water functions
.500(6)(a) Lo w/o pres or current 0	ocation and Support	d Landscape with 7	The mitigation area water depth as the i recruitment to the p	is shallow water nearsh impact area. Nearshore roposed mitigative artifi	nore habitat of un hardbottom reso cial reef.	nconsolida burces exi	ated sandy substrate in similar st in the adjacent area to facilitate
.500(6)(b) W t w/o pres or current 6	ater Enviro for uplands	nment (n/a) with 6	The assessment an exposed to high wa	ea is in the nearshore h ve energy with generall	abitat of the Atla y clear water. W	ntic Ocea ater qualit	n with open circulation. It is often y will not be not altered.
.500(6)(c) 1. Ve 2. Be w/o pres or current 0	Communit egetation a nthic Comr	y structure nd/or nunity with 7	An artificial reef will and will create a ref sea turtles since pre nearshore habitat o	provide substrate for br uge for fish and other m eferred macroalgae hav f Southeast Florida.	enthic recruitme notile marine org e been documer	nt of macro anisms. It tted to gro	oalgae and sessile invertebrates will create a foraging resource for w on artificial reefs in the
Score - sur	n of above s	cores/30 (if	ı ———				
uplai	nds, divide b	y 20)	If preservation as	s mitigation,			For impact assessment areas
current or w/o pres	1	with	Preservation adj	ustment factor = on delta =		FL=de	lta x acres=
0.200		0.667]				
			If mitigation			Fo	or mitigation assessment areas
Delta =	= [with - c	current]	Time lag (t-fa	ictor) =	1.03		0.45
0.467			Risk factor =	,	1.00	RFG=d	elta/(t-factor x risk)=

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



Form 62-345.900(3), F.A.C. [effective date]

Site/Project Name		Application Number		Δςερει	sment Area Na	me or Number	
Southern Palm Beach Island Co	Application Number	Assessment Area Name of Number					
Shore Stabilization Project (Tov	SAJ-2005-07908	Direct Temporary Impacts (> 2 years)					
portion)							
Impact or Mitigation		Assessment conducted	d by:				
Impact (Direct Temporary > 2 ye	ears)	CB&I		Area	(acres)	0.03	
Section Children	Optimal (10)		Minimal (4)			Not Present (0)	
The scoring of each	Optimar (10)	Moderate (7)	Winimai (4)			Not Present (0)	
indicator is based on what would be suitable for the type of wetland or surface water assessed	Condition is optimal and fully supports wetlands/surface water functions	optimal, but sufficient to maintain most wetland/surface water functions	Minimal level of sup wetland /surface of functions	oport of water	Condition is insu	ufficient to provide wetland/surface water functions	
.500(6)(a) Location and Landscape Support w/o pres or current with 10 1	The assessment ar colonized pavemer the epibenthic com scleractinian corals <i>Dasycladus, Halim</i> the nearshore hard <i>Pterogorigia, Muric</i> habitat for immigrat green sea turtles ar	rea is a wide exposure of it. Benthic characterizat munities to be turf and it is, octocorals, bryozoans eda, and Laurencia. Sr bottom, including Sider ea, and Eunicea. The r ting larvae of many imp ind the beach provides r	of nearshore hardt ion surveys within macroalgae, and a , and zoanthids. C mall (<3 cm) colon <i>astrea</i> spp. and S nearshore hardbot ortant fisheries spo nesting habitat for	bottom the pro- also sup Common ies of s Colenase tom pro- ecies. In loggerh	carbonate rock opject area reve opporting wormmen n macroalgal ta cleractinian co trea bournoni. ovides an impo t is also provide nead, green an	with primarily low relief areas and aled the dominant components of ock, sponges, tunicates, axa are <i>Dictyota, Padina, Hypnea,</i> rals have been documented on Common octocorals are rtant settlement and nursery es foraging habitat for juvenile d leatherback sea turtles.	
.500(6)(b) Water Environment (n/a for uplands) w/o pres or current with 6 6	The assessment ar high wave energy v	rea is in the nearshore h with generally clear wate	nabitat of the Atlan er. Water quality w	tic Oce rill not b	an with open c be altered.	irculation. It is often exposed to	
.500(6)(c) Community structure 1. Vegetation and/or 2. Benthic Community w/o pres or current with 10 1	The community stru organisms thriving macroalgae assem scleractinian corals <i>Siderastrea</i> spp. ar limits succession a	ucture is a high stress (l in this habitat for many blage and a diverse inv s, octocorals, bryozoans nd <i>Solenastrea bournor</i> nd colony growth.	ow relief) to sub-c years (scleractinia ertebrate commur , and zoanthids. T ni. Size distributior	limax (i ans, larg hity in th he mos n indica	moderate relief ge sponges). It he form of worr st abundant scl tes recruitmen	i) community, with some benthic supports a multi-species nrock, sponges, tunicates, eractinian species are t, but repeated burial of habitat	
Score = sum of above scores/30 (if uplands,							
divide by 20)	If preservation a	s mitigation,			For imp	pact assessment areas	
current or w/o pres with 0.867 0.267	Preservation adj	iustment factor =		FL=d	elta x acres=	0.01978519	
	If mitigation				For mitiga	ation assessment areas	
Delta = [with - current]	Time lag (t-fa	ictor) =					
0.600	Risk factor =				RFG=delta/(t	t-factor x risk)=	

Site/Proiect Name			Application Number		Assess	ment Area Name or Number	
Southern Palm Beach Island Comprehensive Shore Stabilization Project (Town of Palm Beach portion) Impact or Mitigation Mitigation			SAJ-2005-07908		Mitigation for Direct Temp Impacts (>2 yr)		
			Assessment conducted	d by:	Assessi Oct. 2	ment date: 014	
Scoring Guidance		Optimal (10)	Moderate (7)	Minimal (4	·)	Not Present (0)	
The scoring of each indicator is based on w would be suitable for the type of wetland or surfative water assessed	hat he ace	Condition is optimal and fully supports wetlands/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface water functions	Minimal level of su wetland /surface functions	upport of water	Condition is insufficient to provide wetland/surface water functions	
.500(6)(a) Location Supp w/o pres or current 0	and Landscape ort with 5	The mitigation area water depth as the recruitment to the p	i is shallow water nears impact area. Nearshore roposed mitigative artif	hore habitat of ur hardbottom reso icial reef.	nconsolida burces ex	ated sandy substrate in similar ist in the adjacent area to facilitate	
.500(6)(b) Water En for upla w/o pres or current 6	vironment (n/a nds) with	The assessment ar exposed to high wa	rea is in the nearshore h ave energy with general	abitat of the Atla y clear water. Wa	ntic Ocea ater qualit	n with open circulation. It is often ty will not be not altered.	
.500(6)(c) Comm 1. Vegetatic 2. Benthic Co w/o pres or current 0	unity structure on and/or ommunity with 5	An artificial reef will and will create a re sea turtles since pr nearshore habitat c	l provide substrate for b fuge for fish and other n eferred macroalgae hav of Southeast Florida.	enthic recruitmer notile marine orga re been documer	at of macr anisms. It ted to gro	oalgae and sessile invertebrates t will create a foraging resource for ow on artificial reefs in the	
Score = sum of abo uplands, divi current or w/o pres 0.200	we scores/30 (if de by 20) with 0.533	If preservation a Preservation adj Adjusted mitigat	s mitigation, justment factor = ion delta =		FL=de	For impact assessment areas	
Delta = [with	a - current]	If mitigation Time lag (t-fa Risk factor =	actor) =	1.03	Fo RFG=d	or mitigation assessment areas 0.32 elta/(t-factor x risk)=	

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk)))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



Form 62-345.900(3), F.A.C. [effective date]

		Application Number		A		
Site/Project Name	Application Number	ļ	Assessment Area Name or NUMDER			
Shore Stabilization Project (Tow portion)	vn of Palm Beach	SAJ-2005-07908	1	Indirect Impacts (1 year)		
Impact or Mitigation		Assessment conducted	d by:			
Impact (Indirect Temporary 1 ye	ear)	CPE		Area (a	acres) 0.39	
				-		
Scoring Guidance	Optimal (10)	Moderate (7)	Minimal (4)		Not Present (0)	
The scoring of each	Condition is optimal and	Condition is less than	Minimal level of supr	port of		
would be suitable for the	fully supports wetlands/surface water	maintain most	wetland /surface w	vater	Condition is insufficient to provide wetland/surface water	
type of wetland or surface water assessed	functions	wetland/surface water	functions		lanouono	
		Turiotiono				
.500(6)(a) Location and Landscape Support w/o pres or current with 10 1	The assessment ar colonized pavemen the epibenthic com scleractinian corals <i>Dasycladus, Halim</i> the nearshore hard <i>Pterogorigia, Muric</i> habitat for immigrat green sea turtles ar	rea is a wide exposure of it. Benthic characterizat munities to be turf and i s, octocorals, bryozoans eda, and Laurencia. ST bottom, including Sider ea, and Eunicea. The r ting larvae of many impind the beach provides r	of nearshore hardbo tion surveys within t macroalgae, and als a and zoanthids. Co mall (<3 cm) colonic astrea spp. and So nearshore hardbotto ortant fisheries spe- nesting habitat for lo	ottom ca the proje so supp common es of scl colenastro om provecies. It i oggerhe	arbonate rock with primarily low relief areas and ect area revealed the dominant components of porting wormrock, sponges, tunicates, macroalgal taxa are <i>Dictyota, Padina, Hypnea</i> , leractinian corals have been documented on <i>ea bournoni</i> . Common octocorals are rides an important settlement and nursery s also provides foraging habitat for juvenile ead, green and leatherback sea turtles.	
.500(6)(b) Water Environment (n/a for uplands) w/o pres or current with 6 6	The assessment ar high wave energy v	ea is in the nearshore h with generally clear wate	nabitat of the Atlanti er. Water quality wil	ic Ocea Il not be	n with open circulation. It is often exposed to altered.	
.500(6)(c) Community structure 1. Vegetation and/or 2. Benthic Community w/o pres or current with 10 1	The community stru organisms thriving macroalgae assem scleractinian corals <i>Siderastrea</i> spp. ar limits succession a	ucture is a high stress (l in this habitat for many blage and a diverse inv s, octocorals, bryozoans nd <i>Solenastrea bournor</i> nd colony growth.	low relief) to sub-cli years (scleractiniar rertebrate communi s, and zoanthids. Th ni. Size distribution	imax (m ns, large ity in the ne most indicate	oderate relief) community, with some benthic e sponges). It supports a multi-species e form of wormrock, sponges, tunicates, abundant scleractinian species are as recruitment, but repeated burial of habitat	
Score = sum of above scores/30 (if uplands.	ı ———		r			
divide by 20)	If preservation a	s mitigation,			For impact assessment areas	
current or w/o pres with 0.867 0.267	Preservation adj Adjusted mitigati	iustment factor = ion delta =		FL=del	ta x acres= 0.234192263	
	4					
	If mitigation				For mitigation assessment areas	
Delta = [with - current]	Time lag (t-fa	ictor) =			· · · · · · · · · · · · · · · · · · ·	
0.000		/			RFG=delta/(t-factor x risk)=	
0.600	KISK factor =					

Site/Project Name			Application Number		Assess	Assessment Area Name or Number			
Southern Palm Beach Island Comprehensive					Mitiga	Mitigation for Indirect Temp			
Shore Stab	ilization	Project (Tov	wn of Palm Beach	SAJ-2005-07908		Impac	Impacts (1 vr)		
portion)									
Impact or Miti	gation			Assessment conducte	d by:	Assess	sment date:		
Mitigation				CB&I		Oct. 2	2014		
Scoring G	lidance	1	Optimal (10)	Modorato (7)	Minim	al (4)	Not Present (0)		
The scoring	of each			Condition is less than	IVIIIIIII	ai (4)	Not Flesent (0)		
indicator is bas	ed on what		fully supports	optimal, but sufficient to	Minimal level	of support of	Condition is insufficient to provide		
type of wetland	lole for the		wetlands/surface water	maintain most wetland/surface water	wetland /sur functi	tace water	wetland/surface water functions		
water ass	essed		functions	functions					
7			T						
.500(6)(a) L	ocation and	d Landscape							
	Support		The mitigation area	is shallow water nears	hore habitat o	of unconsolid	lated sandy substrate in similar		
			recruitment to the p	proposed mitigative artif	icial reef.	resources ex	rist in the adjacent area to facilitate		
w/o pres or									
current		with	1						
0		8							
		-							
.500(6)(b) W	ater Enviro	nment (n/a							
1	for uplands	5)							
			The assessment ar	ea is in the nearshore h	abitat of the /	Atlantic Ocea	an with open circulation. It is often		
,			exposed to high wa	we energy with general	ly clear water.	. water quar	ity will not be not altered.		
w/o pres or current		with							
ourion	1	with	4						
6		6							
500(0)()	o :-								
.500(6)(C)	Communit	y structure	An artificial reef will	l provide substrate for b	enthic recruitr	ment of mac	roalgae and sessile invertebrates		
1 Ve	enetation a	nd/or	and will create a re-	fuge for fish and other r	notile marine	organisms. I	It will create a foraging resource for		
2. Be	nthic Comr	nunitv	sea turtles since pr	eferred macroalgae hav	e been docur	mented to gr	ow on artificial reefs in the		
		5	nearshore habitat c	or Southeast Florida.					
w/o pres or									
current	1	with	4						
0		8							
8	-	=							
Score = sur	m of above s	cores/30 (if							
uplar	nds, divide b	y 20)	If preservation a	s mitigation,			For impact assessment areas		
current			Preservation adi	iustment factor =					
or w/o pres	pres with			FL=de	elta x acres=				
0.200	1	0 722	Adjusted mitigat	ion delta =					
0.200		0.733	1						
ſ			If mitigation			Fo	or mitigation assessment areas		
Delta -	= [with - c	currentl	Time lag (t-fa	actor) =	1.03		0.52		
_ 0.14	0 = = = =			- /	4.00	RFG=c	delta/(t-factor x risk)=		
0.533			Risk factor =		1.00				

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk)))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



Form 62-345.900(3), F.A.C. [effective date]

Site/Project Name		Application Number	1	Assessm	nent Area Na	ame or Number	
Southern Palm Beach Islan	d Comprehensive						
Shore Stabilization Project	Town of Palm Beach	SAJ-2005-07908		Indirect Temporary Impacts (2 years)			
portion)							
Impact or Mitigation		Assessment conducte	d by:				
Impact (Indirect Temporary	2 years)	CB&I	/	Area (a	acres)	0.08	
				-			
Scoring Guidance	Optimal (10)	Moderate (7)	Minimal (4)			Not Present (0)	
The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed	Condition is optimal and fully supports wetlands/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface water functions	Minimal level of supp wetland /surface w functions	port of vater C	Condition is ins	ufficient to provide wetland/surface water functions	
.500(6)(a) Location and Landsca Support w/o pres or current with 10 1	The assessment a colonized paveme the epibenthic con scleractinian coral <i>Dasycladus, Halin</i> the nearshore har <i>Pterogorigia, Muri</i> habitat for immigra green sea turtles a	area is a wide exposure of int. Benthic characterization munities to be turf and s, octocorals, bryozoans <i>neda</i> , and <i>Laurencia</i> . Si dbottom, including <i>Sider</i> <i>cea</i> , and <i>Eunicea</i> . The atting larvae of many imp and the beach provides i	of nearshore hardbo tion surveys within t macroalgae, and als s, and zoanthids. Co mall (<3 cm) colonie rastrea spp. and So nearshore hardbott ortant fisheries spe- nesting habitat for lo	ottom ca the proje so suppo ommon r es of scle oblenastre om provi ccies. It is oggerhea	arbonate rocl act area reve orting worm macroalgal tr eractinian cc <i>a bournoni</i> . ides an impo s also provid ad, green an	k with primarily low relief areas and baled the dominant components of rock, sponges, tunicates, axa are <i>Dictyota, Padina, Hypnea</i> , orals have been documented on Common octocorals are ortant settlement and nursery les foraging habitat for juvenile ad leatherback sea turtles.	
.500(6)(b) Water Environment for uplands) w/o pres or current with 6 6	n/a The assessment a high wave energy	area is in the nearshore I with generally clear wat	habitat of the Atlanti er. Water quality wil	ic Ocear Il not be	n with open o altered.	circulation. It is often exposed to	
.500(6)(c) Community structur 1. Vegetation and/or 2. Benthic Community w/o pres or current with 10 1	The community stu organisms thriving macroalgae asser scleractinian coral <i>Siderastrea</i> spp. a limits succession a	ructure is a high stress (i in this habitat for many nblage and a diverse inv s, octocorals, bryozoans and <i>Solenastrea bournol</i> and colony growth.	low relief) to sub-cli years (scleractiniar rertebrate communi s, and zoanthids. Th ni. Size distribution	imax (mo ns, large ity in the ne most a indicate:	oderate relie sponges). It form of wori abundant sc is recruitmer	f) community, with some benthic t supports a multi-species mrock, sponges, tunicates, leractinian species are t, but repeated burial of habitat	
Score = sum of above scores/30 (if up)	ands		——————————————————————————————————————				
divide by 20)	If preservation a	as mitigation,			For im	pact assessment areas	
current or w/o pres with 0.867 0.26	Preservation ac Adjusted mitiga	ljustment factor =		FL=delt	ta x acres=	0.049950337	
	If mitigation				For mitig	ation assessment areas	
Delta = [with - current]	Time lag (t-fa	actor) =	ŀ				
0.600	Risk factor =				RFG=delta/(t-tactor x risk)=	

Cite/Drainet	lama			Application Number		1.0000	ment Area Nome er Number	
Southern Palm Beach Island Comprehensive			Application Number		Assessment Area Name of Number			
Shore Stat	oilization F	Project (Tov	wn of Palm Beach	SAJ-2005-07908		Mitigation for Indirect Temp		
portion)						impacts (2 yr)		
Impact or Miti	gation			Assessment conducte	d by:	Assess	sment date:	
Mitigation				CB&I		Oct. 2	2014	
Scoring G	uidance		Optimal (10)	Moderate (7)	Minimal (4)	Not Present (0)	
The scoring	g of each		Condition is optimal and	Condition is less than	i i i i i i i i i i i i i i i i i i i	/		
indicator is bas would be suita	sed on what able for the		fully supports	optimal, but sufficient to maintain most	Minimal level of su wetland /surface	pport of water	Condition is insufficient to provide	
type of wetland	d or surface		wetlands/surface water functions	wetland/surface water	functions		wetland/surface water functions	
water ass	sessed			functions				
.500(6)(a) L	ocation and	Landscape						
	Support		The mitigation area	is shallow water nears	hore habitat of ur	consolic	lated sandy substrate in similar	
			water depth as the recruitment to the p	impact area. Nearshore	e hardbottom reso icial reef	ources e	xist in the adjacent area to facilitate	
w/o pres or				gaire ani				
current		with	1					
0		6						
.500(6)(b) W	ater Enviro	nment (n/a						
	for uplands)	The assessment ar	ea is in the nearshore h	abitat of the Atla	ntic Oce	an with open circulation. It is often	
			exposed to high wa	we energy with general	y clear water. Wa	ater qual	ity will not be not altered.	
w/o pres or								
current	· ·	with	1					
6		6						
500(6)(0)	Communit	(of ruoturo						
.500(6)(6)	Community	ystructure	An artificial reef will	provide substrate for b	enthic recruitmer	t of mac	roalgae and sessile invertebrates	
1. V	egetation a	nd/or	and will create a ret	fuge for fish and other r	notile marine orga	anisms.	It will create a foraging resource for	
2. Be	nthic Comn	nunity	sea turtles since pro	eferred macroalgae hav of Southeast Florida	e been documer	ited to g	row on artificial reefs in the	
w/o proc or			noaronoro nabitat u					
current		with						
0	1	6	1					
0		U						
Score - cu	m of above o	cores/30 /if	т I					
upla	nds, divide b	y 20)	If preservation a	s mitigation,			For impact assessment areas	
ourroot			Proponiction ad	ustmont factor				
or w/o pres		with	Freservation adj			FL=d	elta x acres=	
0.200]	0.600	Adjusted mitigat	ion delta =				
0.200		0.000	1					
			If mitication					
			in mitigation			F	or mitigation assessment areas	
Delta	<u>= [with</u> - c	urrent]	Time lag (t-fa	actor) =	1.03		0.39	
	0.400	-	Risk factor -		1.00	RFG=0	delta/(t-factor x risk)=	
L	0.400		INISK IDULUI =		1.00	L		

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk)))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



Form 62-345.900(3), F.A.C. [effective date]

Site/Project Name		Application Number		Accord	mont Aroa Na	mo or Numbor	
Southern Palm Beach Island C	Application Number			Assessment Area Name or Number			
Shore Stabilization Project (Toy	wn of Palm Beach	SAJ-2005-07908		Indirect Temporary (ETOF) Impacts			
portion)		0,10 2000 0,000		indirect relipoidiy (Eror) inpacts			
Impact or Mitigation		Assessment conducted	d by:				
Impact (Indirect Temporary (ET	OF))	CB&I	,	Area	(acres)	2.70	
Scoring Guidance	Optimal (10)	Moderate (7)	Minimal (4)			Not Present (0)	
The scoring of each	Condition is optimal and	Condition is less than					
indicator is based on what would be suitable for the	fully supports	optimal, but sufficient to maintain most	Minimal level of sup wetland /surface v	port of water	Condition is insu	fficient to provide wetland/surface water	
type of wetland or surface	wetlands/surface water functions	wetland/surface water	functions			functions	
water assessed		functions					
.500(6)(a) Location and Landscape Support w/o pres or current with	The assessment ar colonized pavemer the epibenthic com scleractinian corals <i>Dasycladus, Halim</i> the nearshore hard <i>Pterogorigia, Muric</i> habitat for immigrat	tea is a wide exposure of t. Benthic characterizat munities to be turf and ri , octocorals, bryozoans eda, and <i>Laurencia</i> . Sr bottom, including <i>Sider</i> ea, and <i>Eunicea</i> . The ri ing larvae of many imp	of nearshore hardb ion surveys within macroalgae, and a , and zoanthids. C nall (<3 cm) coloni <i>astrea</i> spp. and S nearshore hardbott ortant fisheries spe	oottom o the pro llso sup commor ies of s olenasi tom pro ecies. If	carbonate rock oporting wormron n macroalgal ta cleractinian cor trea bournoni. (ovides an impor t is also provide	with primarily low relief areas and aled the dominant components of ock, sponges, tunicates, xa are <i>Dictyota, Padina, Hypnea,</i> als have been documented on Common octocorals are tant settlement and nursery as foraging habitat for juvenile	
10 9	green sea turtles ar	nd the beach provides r	nesting habitat for I	loggerh	lead, green and	l leatherback sea turtles.	
.500(6)(b) Water Environment (n/a for uplands) w/o pres or current with 6 6	The assessment ar high wave energy v	ea is in the nearshore h vith generally clear wate	nabitat of the Atlan er. Water quality w	tic Oce ill not b	an with open ci e altered.	rculation. It is often exposed to	
.500(6)(c) Community structure 1. Vegetation and/or 2. Benthic Community w/o pres or current with 10 9	The community stru organisms thriving macroalgae assem scleractinian corals <i>Siderastrea</i> spp. ar limits succession a	ucture is a high stress (l in this habitat for many blage and a diverse inv octocorals, bryozoans nd Solenastrea bournor nd colony growth.	ow relief) to sub-cl years (scleractinia ertebrate commun , and zoanthids. T ni. Size distribution	limax (r ns, larg nity in th he mos n indica	noderate relief) ge sponges). It : le form of worm st abundant scle tes recruitment	community, with some benthic supports a multi-species nrock, sponges, tunicates, eractinian species are , but repeated burial of habitat	
Score = sum of above scores/30 (if uplands,							
divide by 20)	If preservation a	s mitigation,			For imp	act assessment areas	
current or w/o pres with 0.867 0.800	Preservation adj Adjusted mitigati	ustment factor =		FL=de	elta x acres=	0.179740288	
	ا						
	If mitigation				For mitiga	tion assessment areas	
Delta = [with - current]	Time lag (t-fa	ctor) =			. 9-		
0.007	Diok factor	/			RFG=delta/(t-	-factor x risk)=	
0.067	KISK factor =	<u> </u>					

Site/Project N	lame			Application Number		Assass	sment Area Name or Number		
Southern Palm Beach Island Comprehensive									
Shore Stab	oilization	Project (Tov	wn of Palm Beach	SAJ-2005-07908		Mitig	ation for Indirect Temporary		
portion)		-) ((ETOF) Impacts			
Impact or Mitigation				Assessment conducted	d by:	Assess	sment date:		
Mitigation				CB&I		Oct. 2	2014		
Scoring G	uidance		Ontime! (10)	Moderata (7)	Minimal (4)	Not Present (0)		
The scoring	g of each			Condition is less than	winnina (+)	Not Flesent (0)		
indicator is bas	sed on what		fully supports	optimal, but sufficient to	Minimal level of s	support of	Condition is insufficient to provide		
type of wetland	d or surface		wetlands/surface water	wetland/surface water	function	e water	wetland/surface water functions		
water ass	sessed		Tunctions	functions					
.500(6)(a) L	ocation and	d Landscape							
	Support		The mitigation area	is shallow water nears	hore habitat of u	nconsolid	lated sandy substrate in similar		
			water depth as the	impact area. Nearshore	hardbottom res	ources ex	xist in the adjacent area to facilitate		
w/o pres or			recruitment to the p	roposed mitigative artif	cial reef.				
current		with							
0]	10	1						
		10							
500(6)(b) W	ater Enviro	nment (n/a							
	for uplands)							
			The assessment ar	ea is in the nearshore h	abitat of the Atla	antic Ocea	an with open circulation. It is often		
w/o proc or			exposed to high wa	we energy with general	y clear water. W	ater qual	ity will not be not allered.		
current		with							
e	1	Ê	1						
0		Ö	ļ						
.500(6)(c)	Communit	y structure							
			An artificial reef will	provide substrate for b	enthic recruitme	nt of mac	roalgae and sessile invertebrates		
1. Ve	egetation a	nd/or	and will create a ref	tuge for fish and other n	notile marine org	panisms. I nted to ar	It will create a foraging resource for row on artificial reefs in the		
2. Be	nthic Comr	nunity	nearshore habitat o	f Southeast Florida.		nica io gi			
w/o pres or									
current		with							
0		10	1						
	<u>I</u>		I						
Score = su	m of above s	cores/30 (if	י ר						
upla	nds, divide b	y 20)	If preservation a	s mitigation,			For impact assessment areas		
current			Preservation adi	ustment factor =					
or w/o pres	or w/o pres with					FL=de	elta x acres=		
0.200]	0 867	Adjusted mitigat	ion delta =					
0.200		0.007	1						
			If mitigation						
						Fo	or mitigation assessment areas		
Delta :	= [with - c	current]	Time lag (t-fa	ictor) =	1.03		0.52		
0.667			Risk factor =		1.25	RFG=delta/(t-factor x fisk)=			
For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk)))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



Form 62-345.900(3), F.A.C. [effective date]

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk))

(a) Mitigation Bank Credit Determination

(b) Mitigation needed to offset impacts, when using a mitigation bank

(c) Mitigation needed to offset impacts, when not using a bank

To determine the acres of mitigation needed to offset impacts when not using a bank or a regional offsite mitigation area as mitigation, divide functional loss (FL) by relative functional gain (RFG). If there are more than one impact assessment area or more than one mitigation assessment area, the total functional loss and the total relative functional gain is determined by summation of the functional loss (FL) and relative functional gain (RFG) for each assessment area.

	Impact Types	FL	/	RFG	=	Acres of Mitigation	*Note: for temporary impacts, <i>Mitigation</i> = (FL/RFG) - Impact Area
1	Permanent	0.029744		0.52]	0.06]
	Direct Temporary						
2	(< 1 Year)	0.153463		0.58		0.01	
	Direct Temporary						
3	(>1 year)	0.047822		0.45		0.03	
	Direct Temporary						
4	(>2 year)	0.019785		0.32		0.03	
	Indirect Temporary						
5	(1 year)	0.234192		0.52		0.06	
	Indirect Temporary						
6	(2 years)	0.04995		0.39		0.05	
	Indirect Temporary				1		1
7	(ETOF)	0.17974		0.52		0.35	1
	total					0.57	

Form 62-345.900(3), F.A.C. [effective date]

SUB-APPENDIX H-3 DRAFT UMAM ANALYSIS PALM BEACH COUNTY (0.36 MM) This page intentionally left blank.

PART I – Qualitative Description (See Section 62-345.400, F.A.C.)

Site/Project Name			Application Numbers				Assessment Area Name or Number				
Southern Palm Beach Islan Comprehensive Shore Stat (Palm Beach County portion	d bilization n)	Project	SAJ-2008-04086				Intertidal and Nearshore Subtidal Hardbottom Resources				
FLUCCs code Further classificatio			sification (optional	I)		Impact or M	litigation Site?	Assessment A	rea Size		
571		N/A				Impact S	Site	7.14	acres (includes 7 impact types, see Part II forms for		
Basin/Watershed Name/Number Atlantic Ocean	Affected Wa Class III	aterbody (Cla	ass)	S	pecial CI N/A	assification	tion (i.e. OFW, AP, other local/state/federal designation of importance)				
Geographic relationship to and hydrolog Open waters of the Atlantic Oc north of South Lake Worth Inle	gic connectic cean. The et.	on with wetla project a	nds, other surface irea is located	e water l appr	, uplands oximat	ely 11 mil	les south of Lal	ke Worth Inl	et and approximately 2.5 miles		
Assessment area description The hardbottom environment adjacent to the project area is highly ephemeral, consisting primarily of low-relief i hardbottom habitat, located in less than 15 ft water depth. Surveys have shown a benthic community dominated macroalgae, but also supporting wormrock, tunicates, sponges, bryozoans and small coral colonies. Motile sper and crabs also utitilize this habitat. Species are accustomed to the ephemeral nature of the habitat which is sub exposure.							intertidal and subtidal ed by turf algae and ecies such as fish, sea turtles bject to frequent burial and re-				
Significant nearby features				Unique	eness (co	onsidering th	e relative rarity in re	elation to the reg	gional landscape.)		
The outer reef (beyond the impact area) is located east of the nearshore natural hardbottom habitat in 40-70 ft water depth.					Somewhat unique; the intertidal portion of the hardbottom ridge terminates to the north of the project area.						
Functions				Mitigat	tion for p	revious pern	nit/other historic use	•			
Provides cover, substrate, refu benthic and motile marine spe	uge and fo cies.	ood resou	rces for	N/A							
Anticipated Wildlife Utilization Based or are representative of the assessment a found)	Literature F rea and reas	Review (List sonably expe	of species that ected to be	Anticip and in	oated Util tensity of	lization by Lis use of the a	sted Species (List s assessment area)	pecies, their leg	al classification (E, T, SSC), type of use,		
found) Benthic characterization surveys within the project area revealed the dominant components of the epibenthic communities to be turf and macroalgae. Wormrock, sponges, tunicates, octocorals, bryozoans, and zoanthids were also present. Common macroalgal taxa are <i>Dictyota</i> , Padina, <i>Hypnea, Dasycladus, Halimeda,</i> and <i>Laurencia</i> . Small (<3 cm) colonies of scleractinian corals have been documented on the nearshore hardbottom and include <i>Siderastrea</i> spp. and <i>Solenastrea bournoni</i> . Common octocorals are <i>Pterogorigia, Muricea</i> , and <i>Eunicea</i> . Motile species such as fish, sea turtles and crabs also utitilize this habitat. Species are accustomed to the ephemeral nature of the habitat .					Loggerhead (<i>Caretta caretta</i>) (T), Green (<i>Chelonia mydas</i>) (E), and leatherback (<i>Dermochelys coriacea</i>) (E) sea turtles regularly nest in the project area. The project area is also loggerhead critical habitat (terrestrial and marine). The Florida manatee (<i>Trichechus manatus latirostris</i>) (E) is common in Palm Beach County. Smalltooth sawfish (<i>Pristis pectinata</i>) (E) has the potential to occur in the project area. Threatened coral species which have the potential to occur in the project area but which have not been observed during recent benthic survyes include: staghorn coral (<i>Acropora cervicornis</i>), elkhorn coral (<i>A. palmata</i>), boulder star coral (<i>Orbicella annularis</i>), mountainous star coral (<i>O. faveolata</i>), star coral complex (<i>O. franski</i>), pillar coral (<i>Dendrogyra cylindrus</i>), and rough cactus coral (<i>Mycetophyllia ferox</i>).						
Observed Evidence of Wildlife Utilizatio	n (List spec	es directly o	bserved, or other	signs s	such as ti	racks, dropp	ings, casings, nests	, etc.):			
Cnaracterization surveys do	ocument	ea the bi	ota listed ab	ove.							
Additional relevant factors: The hardbottom in highly ephemeral. Based on delineation of a between R-127 and R-141 from January 2003 to July 2013, inc January 2006. Line intercept data collected on transects immed 130 to R-141 revealed this area to have a hardbottom to sand r 76% is sand) (CBI, 2014). HB edge and benthic characterizatio					s, there ng a min ly offsh of 24:7 rveys v	e has bee nimum of lore of the 6 (24% of vere cond	n a time-averag 2.71 ac in Janu project area o f the area east lucted in 2005,	ged 23.85 a uary 2009 a n the nearsl of the hardb 2006, 2007,	c of exposed hardbottom nd a maximum of 48.78 ac in hore hardbottom adjacent to R- bottom edge is hardbottom and 2011, and 2014.		
Assessment conducted by:				Asses	sment da	ate(s):					
CB&I Coastal Planning & Engi	October 2014										

PART I – Qualitative Description (See Section 62-345.400, F.A.C.)

Site/Project Name		Application Number			Assessment Area Name or Number			
Southern Palm Beach Island	Project	SA 1-2008-04086			Mitigation D	oof		
(Palm Beach County portion)	rFiojeci	3AJ-2000-04	4000		willigation R	eei		
FLUCCs code	Further clas	sification (optional)		Impact or N	litigation Site?	Assessment A	area Size	
571	N/A			Mitigation Site		6.15	acres (mitigation for 7 impact types, see Part II forms for each)	
Basin/Watershed Name/Number Affected W Atlantic Ocean Class III	/aterbody (Cla	ass)	Special C N/A	Classification	(i.e. OFW, AP, other	local/state/federal	designation of importance)	
Geographic relationship to and hydrologic connection	ion with wetla	nds, other surface	water, upland	s				
Open waters of the Atlantic Ocean. The north of South Lake Worth Inlet.	e project a	rea is located	approxima	tely 11 mi	les south of La	ake Worth Inl	let and approximately 2.5 miles	
Assessment area description								
Subtidal limestone boulder artificial ree location devoid of hardbottom habitat in determine the location of the mitigative	efs are prop n water de e reefs.	posed to be de pths similar to	ployed in t the natura	the same g Il nearshoi	general vicinity re hardbottom.	/ and water c Additional s	lepth as the impact area in a urveys will be conducted to	
Significant nearby features		l	Jniqueness (d	considering th	ne relative rarity in	relation to the re	gional landscape.)	
The outer reef is located east of the ne hardbottom habitat in 40-70 ft water de	atural ⁻ ł	The artificial reefs will be placed in similar water depths as the impacted hardbottom in order to mimic the lost function of the habitat.						
Functions		Ν	Nitigation for	previous perr	nit/other historic us	e		
The artificial reef habitat is intended to characteristics of adjacent nearshore h typically low relief limestone pavement substrate, refuge and food resources for	mic the I ich is vide cover, species.	N/A						
Anticipated Wildlife Utilization Based on Literature are representative of the assessment area and rea found)	Review (List asonably expe	of species that A ected to be a	Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area)					
The artificial reef is intented to replicate appearance, texture, relief and ecologic habitat it is meant to replace.	ical I n of the I i i i i i i i i i i i i i i i i i i i	Loggerhead (<i>Caretta caretta</i>) (T), Green (<i>Chelonia mydas</i>) (E), and leatherback (<i>Dermochelys coriacea</i>) (E) sea turtles regularly nest in the project area. The project area is also loggerhead critical habitat (terrestrial and marine). The Florida manatee (<i>Trichechus manatus latirostris</i>) (E) is common in Palm Beach County. Smalltooth sawfish (<i>Pristis pectinata</i>) (E) has the potential to occur in the project area. Threatened coral species which have the potential to occur in the project area but which have not been observed during recent benthic survyes include: staghorn coral (<i>Acropora cervicornis</i>), elkhorn coral (<i>A. palmata</i>), boulder star coral (<i>Orbicella annularis</i>), mountainous star coral (<i>O. faveolata</i>), star coral complex (<i>O. franski</i>), pillar coral (<i>Dendrogyra cylindrus</i>), and rough cactus coral (<i>Mycetophyllia ferox</i>).						
Observed Evidence of Wildlife Utilization (List spec	cies directly o	bserved, or other s	igns such as	tracks, dropp	ings, casings, nest	s, etc.):		
Characterization surveys documented similar to that of natural hardbottom.	the biota li	sted above for	natural ne	earshore h	ardbottom. Uti	lization of an	tificial reef is expected to be	
Additional relevant factors: Limestone is a natural material and wil reefs have been documented to offset	l provide a impacts as	suitable replaces	cement for beach nou	r the impao urishment	cted nearshore projects in sou	e reef substra theast Florid	ate. Limestone boulder artificial a.	
Assessment conducted by:		ļ	Assessment o	late(s):				
CB&I Coastal Planning & Engineering,	Inc.	(October 20	014				
Form 62-345.900(1), F.A.C. [effective date]								



Site/Project Name			Application Number			sment Area Name or Number		
Southern Palm Be	each Island C	omprehensive	SA 1-2008-04086		Mitia	ation for Pormanant Impacts		
portion)	IT FTUJECI (Fal	in beach County	SAJ-2000-04000		winga	alion for Permanent impacts		
Impact or Mitigation			Assessment conducted	d by:	Assessment date:			
Mitigation			CB&I		Oct. 2014			
Scoring Guidance		Optimal (10)	Moderate (7)	Minima	l (4)	Not Present (0)		
indicator is based on what	at	Condition is optimal and	optimal, but sufficient to	Minimal le	evel of	Condition is insufficient to provide		
would be suitable for the	•	wetlands/surface water	maintain most	/surface	water wetland/surface water functions			
water assessed	e	functions	functions	functio	ns			
		•						
.500(6)(a) Location a	and Landscape							
Suppor	t	The mitigation area	is shallow water nearsh	ore habitat	of unco	onsolidated sandy substrate in		
		area to facilitate rec	ruitment to the propose	d mitigative	artificia	al reef.		
w/o pres or								
current	with							
0	10							
.500(6)(b) Water Envi	ronment (n/a							
for uplan	ds)	The assessment ar	ea is in the nearshore h	abitat of the	e Atlanti	c Ocean with open circulation. It is		
		often exposed to his	gh wave energy with ger	nerally clea	r water.	Water quality will not be not altered.		
w/o pres or								
current	with							
6	6							
.500(6)(c) Commu	nity structure							
		An artificial reef will invertebrates and w	provide substrate for benthic recruitment of macroalgae and sessile					
1. Vegetation	and/or	foraging resource for	or sea turtles since prefe	erred macro	algae h	have been documented to grow on		
2. Benunic Cor	mnumity	artificial reefs in the	nearshore habitat of Sc	outheast Flo	orida.			
w/o pres or								
current	with							
0	10							
······································								
Score = sum of above	e scores/30 (if							
uplands, divide	e by 20)	IT preservation a	s mitigation,			For impact assessment areas		
current		Preservation adj	ustment factor =		티ᅳ서	olto x poros-		
or w/o pres	with	المعالمة والمعالية المراجع	ion delte		FL=0			
0.200	0.867	Aujusted mitigat	on della =					
	1	1						
		If mitigation			_			
					F	or mitigation assessment areas		
Delta = [with	- current]	Time lag (t-fa	ictor) =	1.03		0.52		
0.667		1.25	KFG=	ueita/(t-tactor x fisk)=				

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk)))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



Form 62-345.900(3), F.A.C. [effective date]

Site /Droje et Nome		Application Number		A	mant Area N	ama ar Numbar		
Site/Project Name	omprehensive	Application Number		Asses	sment Area N	ame or Number		
Shore Stabilization Project (Pal	m Beach County	SAJ-2008-04086		Direc	t Temporai	v Impacts (<1 vear)		
portion)				2		jpaolo (11 joa.)		
Impact or Mitigation		Assessment conducted by:						
Impact (Direct Temporary <1 ye	ear)	CB&I	-	Area	(acres)	0.57		
Scoring Guidance	Optimal (10)	Moderate (7)	Minimal (4)			Not Present (0)		
The scoring of each	Condition is optimal and	Condition is less than						
would be suitable for the	fully supports	optimal, but sufficient to maintain most	wetland /surface	oport of water	Condition is ins	sufficient to provide wetland	surface water	
type of wetland or surface	functions	wetland/surface water	functions			functions		
water assessed	functions							
· · · · · · · · · · · · · · · · · · ·								
.500(6)(a) Location and Landscape Support w/o pres or current with 10 1	The assessment an colonized pavemer the epibenthic com scleractinian corals <i>Dasycladus, Halim</i> the nearshore hard <i>Pterogorigia, Muric</i> habitat for immigra green sea turtles a	rea is a wide exposure of nt. Benthic characterizal munities to be turf and i s, octocorals, bryozoans eda, and <i>Laurencia</i> . Sr Ibottom, including <i>Sider</i> rea, and <i>Eunicea</i> . The i ting larvae of many imp nd the beach provides r	of nearshore hard tion surveys within macroalgae, and a s, and zoanthids. C mall (<3 cm) colon astrea spp. and S nearshore hardbod ortant fisheries sp nesting habitat for	oottom a the pro- also sup Common ies of s Colenas ttom pro- ecies. I loggerh	carbonate roc oject area rev oporting worm n macroalgal cleractinian c trea bournoni ovides an imp t is also provid nead, green al	k with primarily low relie ealed the dominant com rock, sponges, tunicates taxa are <i>Dictyota, Padin</i> orals have been docum . Common octocorals ar ortant settlement and nu des foraging habitat for j nd leatherback sea turtle	of areas and ponents of s, <i>a, Hypnea,</i> ented on e ursery uvenile es.	
.500(6)(b) Water Environment (n/a for uplands) w/o pres or current with 6 6	The assessment a high wave energy v	rea is in the nearshore f with generally clear wat	nabitat of the Atlan er. Water quality w	itic Oce vill not b	an with open be altered.	circulation. It is often ex	posed to	
.500(6)(c) Community structure 1. Vegetation and/or 2. Benthic Community w/o pres or current with 10 1	The community stru organisms thriving macroalgae assem scleractinian corals <i>Siderastrea</i> spp. a limits succession a	ucture is a high stress (in this habitat for many iblage and a diverse inv s, octocorals, bryozoans nd <i>Solenastrea bournor</i> nd colony growth.	low relief) to sub-c years (scleractinia rertebrate commur a, and zoanthids. T ní. Size distribution	elimax (i ans, larg hity in th The mos n indica	moderate relie ge sponges). he form of wor st abundant so tes recruitme	of) community, with som It supports a multi-speci rmrock, sponges, tunica cleractinian species are nt, but repeated burial o	e benthic es tes, f habitat	
Score = sum of above scores/30 (if uplands,	1							
divide by 20)	If preservation a	is mitigation,			For in	npact assessment areas		
current	Preservation ad	justment factor =		_, .		0 34170478		
or w/o pres with				FL=delta x acres=				
0.867 0.267	Adjusted mitigat	ion delta =						
0.207	J							
	If motionation			· · · · · · · · · · · · · · · · · · ·				
	ii mitigation				For mitigation assessment areas			
Delta = [with - current]	Time lag (t-fa	actor) =						
0.600	Risk factor =	RFG=delta/(t-factor x risk)=						

Site/Project Name		Application Number		Assess	ment Area Name or Number			
Southern Pain Beach Island Shore Stabilization Project (portion)	Palm Beach County	SAJ-2008-04086		Mitiga Impac	Mitigation for Direct Temp Impacts (<1 yr)			
Impact or Mitigation		Assessment conducted	d by:	Assess	Assessment date:			
Mitigation		CB&I			Oct. 2014			
Scoring Guidance	Optimal (10)	Madarata (7) Minimal (4))	Not Present (0)			
The scoring of each	Condition is optimal and	Condition is less than	Winning (4	/	Not Proson (0)			
indicator is based on what would be suitable for the	fully supports wetlands/surface water	optimal, but sufficient to maintain most	Minimal level of su wetland /surface	upport of water	Condition is insufficient to provide wetland/surface water functions			
type of wetland or surface water assessed	functions	wetland/surface water functions	functions					
.500(6)(a) Location and Landscap	be							
Support	The mitigation are water depth as the	The mitigation area is shallow water nearshore habitat of unconsolidated sandy substrate in similar water depth as the impact area. Nearshore hardbottom resources exist in the adjacent area to facilitate						
w/o pres or	recruitment to the	recruitment to the proposed mitigative artificial reef.						
current with								
0 9								
500(6)(b) Water Environment (n/a							
for uplands)	The appearant of	The assessment area is in the nearshore babitat of the Atlantic Ocean with open circulation. It is often						
	exposed to high w	ave energy with general	ly clear water. Wa	ater quali	ity will not be not altered.			
w/o pres or								
current with								
6 6								
.500(6)(c) Community structure	An artificial reef wi	An artificial reaf will provide substrate for bothis requirement of managing and exactly investations						
1. Vegetation and/or	and will create a re	fuge for fish and other r	notile marine org	anisms. I	It will create a foraging resource for			
2. Benthic Community	sea turtles since p nearshore habitat	referred macroalgae hav of Southeast Florida.	e been documer	ited to gr	ow on artificial reefs in the			
w/o pres or								
current with								
0 9								
				-				
Score = sum of above scores/30 (if uplands, divide by 20)	If preservation a	as mitigation,			For impact assessment areas			
current	Preservation ad	justment factor =		FI -de	alta y acres-			
or w/o pres with	Adjusted mitigat	tion delta =		- L-U				
0.200 0.800)			<u>.</u>				
	If mitigation				or mitigation appagement areas			
Delta = [with - current]	Time lag (t-fa	actor) =	1.03		0.58			
0.600	Risk factor =	,	1.00	RFG=0	delta/(t-factor x risk)=			

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank





Site/Project Name		Application Number		A	mont Aroo N	ama ar Numbar	
Southern Palm Beach Island Co	omprehensive	Application Number		A35635	Sment Area No		
Shore Stabilization Project (Pal	m Beach County	SAJ-2008-04086		Direct Temporary Impacts (>1 year)			
portion)	,					, ,	
Impact or Mitigation		Assessment conducted	d by:				_
Impact (Direct Temporary > 1 yr	r)	CB&I			(acres)	0.25	
Scoring Guidanco	Optimal (10)	Modorata (7)	Minimal (4)			Not Prospet (0)	
The scoring of each	Optimal (10)	Condition is less than	Winninda (4)			Not Present (0)	
indicator is based on what	Condition is optimal and fully supports	optimal, but sufficient to	Minimal level of sup	oport of	Condition is ins	ufficient to provide wetland	surface water
would be suitable for the type of wetland or surface	wetlands/surface water	maintain most wetland /surface w				functions	
water assessed	functions	functions					
.500(6)(a) Location and Landscape Support w/o pres or current with 10 1	The assessment and colonized pavement the epibenthic come scleractinian corals <i>Dasycladus, Halim</i> the nearshore hard <i>Pterogorigia, Muric</i> habitat for immigrang green sea turtles a	rea is a wide exposure of nt. Benthic characterizat munities to be turf and i s, octocorals, bryozoans eda, and <i>Laurencia</i> . Sr bottom, including <i>Sider</i> tea, and <i>Eunicea</i> . The ting larvae of many import nd the beach provides r	of nearshore hardt tion surveys within macroalgae, and a s, and zoanthids. C mall (<3 cm) colon astrea spp. and S nearshore hardbot ortant fisheries spo- nesting habitat for	bottom of the pro- also sup commor ies of se colenast tom pro- ecies. It loggerh	carbonate roc oject area reve porting worm n macroalgal t cleractinian cu rea bournoni ovides an impu s is also provic lead, green ar	k with primarily low relie ealed the dominant comp rock, sponges, tunicates axa are <i>Dictyota, Padin</i> orals have been docume . Common octocorals are ortant settlement and nu les foraging habitat for jund leatherback sea turtle	f areas and ponents of s, <i>a, Hypnea,</i> <i>ented</i> on <i>e</i> rsery uvenile ss.
.500(6)(b) Water Environment (n/a for uplands) w/o pres or current with 6 6	The assessment and high wave energy to	rea is in the nearshore h with generally clear wate	nabitat of the Atlan er. Water quality w	tic Ocea rill not b	an with open o e altered.	circulation. It is often exp	posed to
.500(6)(c) Community structure 1. Vegetation and/or 2. Benthic Community w/o pres or current with 10 1	The community stru organisms thriving macroalgae assem scleractinian corals <i>Siderastrea</i> spp. a limits succession a	The community structure is a high stress (low relief) to sub-climax (moderate relief) community, with some benthic organisms thriving in this habitat for many years (scleractinians, large sponges). It supports a multi-species macroalgae assemblage and a diverse invertebrate community in the form of wormrock, sponges, tunicates, scleractinian corals, octocorals, bryozoans, and zoanthids. The most abundant scleractinian species are <i>Siderastrea</i> spp. and <i>Solenastrea bournoni</i> . Size distribution indicates recruitment, but repeated burial of habitat limits succession and colony growth.					
Score - sum of above scores/30 (if uplands							
divide by 20)	If preservation a	s mitigation,			For im	pact assessment areas	
current or w/o pres with	Preservation ad	justment factor = ion delta =		FL=de	elta x acres=	0.149267671	
0.867 0.267				-			
	If mitigation		For mitigation assessment a				;
Delta = [with - current]	Time lag (t-fa	-factor) =					
0.600	Risk factor =				RFG=delta/	(t-factor x risk)=	
			-				

Mitigation for Direct Tomp				
or Direct Temp 1 yr)				
date:				
Not Present (0)				
dition is insufficient to provide				
andy substrate in similar ne adjacent area to facilitate				
open circulation. It is often ot be not altered.				
I provide substrate for benthic recruitment of macroalgae and sessile invertebrates fuge for fish and other motile marine organisms. It will create a foraging resource for eferred macroalgae have been documented to grow on artificial reefs in the of Southeast Florida.				
npact assessment areas				
icres=				
nation assessment areas				
0.45				
factor x risk)=				

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



Form 62-345.900(3), F.A.C. [effective date]



Site/Project N	ame			Application Number			Assessment Area Name or Number		
Southern F Shore Stab portion)	alm Bea ilization I	ch Island Co Project (Pal	omprehensive m Beach County	SAJ-2008-04086		Mitiga Impac	Mitigation for Direct Temp Impacts (>2 yr)		
Impact or Miti Mitigation	gation			Assessment conducted	d by:	Assess Oct. 2	ment date: 2014		
Scoring G	uidance		Optimal (10)	Moderate (7)	Minimal (4	1)	Not Present (0)		
The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed			Condition is optimal and fully supports wetlands/surface water functions	ndition is optimal and fully supports tlands/surface water functions Condition is less than optimal, but sufficient to maintain most wetland/surface water functions Minimal level of support wetland/surface water functions			Condition is insufficient to provide wetland/surface water functions		
.500(6)(a) L w/o pres or current 0	ocation and Support	d Landscape with 5	The mitigation area water depth as the recruitment to the p	is shallow water nearsl impact area. Nearshore roposed mitigative artifi	nore habitat of un hardbottom reso cial reef.	nconsolid ources ex	ated sandy substrate in similar dist in the adjacent area to facilitate		
.500(6)(b) W w/o pres or current 6	ater Enviro for uplands	nment (n/a) with 6	The assessment ar exposed to high wa	ea is in the nearshore h ve energy with generall	abitat of the Atla y clear water. W	ntic Ocea ater quali	an with open circulation. It is often ity will not be not altered.		
.500(6)(c) 1. Vo 2. Be w/o pres or current 0	Communit egetation a nthic Comr	y structure nd/or nunity with 5	An artificial reef will and will create a rei sea turtles since pro nearshore habitat o	provide substrate for b fuge for fish and other n eferred macroalgae hav f Southeast Florida.	enthic recruitmen notile marine org e been documen	nt of mac anisms. I nted to gr	roalgae and sessile invertebrates t will create a foraging resource for ow on artificial reefs in the		
Score – cu	m of above a	coroc/20 (if	1						
upla	nds, divide b	y 20)	If preservation a	s mitigation,			For impact assessment areas		
current or w/o pres	1	with	Preservation adj Adjusted mitigat	ustment factor = ion delta =		FL=de	elta x acres=		
0.200		0.000	l						
			If mitigation			Fo	or mitigation assessment areas		
Delta	= [with - c	current]	Time lag (t-fa	ictor) =	1.03		0.32		
	0.333		Risk factor =		1.00	KFG=c	ieita/(t-factor x risk)=		

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk)))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



Form 62-345.900(3), F.A.C. [effective date]

		Annlingting Number			lama an Number		
Site/Project Name	omprehensive	Application Number	ļ	Assessment Area Name of Number			
Shore Stabilization Project (Pal	m Beach County	SAJ-2008-04086	1	ndirect Impacts	s (1 year)		
Impact or Mitigation		Assessment conducted	d by:				
Impact (Indirect Temporary 1 ye	ear)	CPE	a by. /	Area (acres) 3.03			
Scoring Guidance	Optimal (10)	al (10) Moderate (7) Minimal (4		Not Present (0)			
The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed	Condition is optimal and fully supports wetlands/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface water functions	Minimal level of supp wetland /surface w functions	port of ater Condition is in	nsufficient to provide wetland/surface water functions		
.500(6)(a) Location and Landscape Support w/o pres or current with 10 1	The assessment ar colonized pavemer the epibenthic com scleractinian corals <i>Dasycladus, Halim</i> the nearshore hard <i>Pterogorigia, Muric</i> habitat for immigrat green sea turtles ar	rea is a wide exposure of nt. Benthic characterizat munities to be turf and ri s, octocorals, bryozoans <i>eda</i> , and <i>Laurencia</i> . Sr Ibottom, including <i>Sider</i> rea, and <i>Eunicea</i> . The ri ting larvae of many import nd the beach provides r	of nearshore hardbo tion surveys within t macroalgae, and ale s, and zoanthids. Cc mall (<3 cm) colonie rastrea spp. and So nearshore hardbotto ortant fisheries spe- nesting habitat for lo	bttom carbonate ro the project area rev so supporting worn ommon macroalgal so of scleractinian <i>clenastrea bournon</i> om provides an imp cies. It is also prov oggerhead, green a	ck with primarily low relief areas and vealed the dominant components of nrock, sponges, tunicates, taxa are <i>Dictyota, Padina, Hypnea,</i> corals have been documented on <i>i</i> . Common octocorals are portant settlement and nursery ides foraging habitat for juvenile and leatherback sea turtles.		
.500(6)(b) Water Environment (n/a for uplands) w/o pres or current with 6 6	The assessment ar high wave energy v	rea is in the nearshore h with generally clear wate	nabitat of the Atlanti er. Water quality wil	c Ocean with oper Il not be altered.	i circulation. It is often exposed to		
.500(6)(c) Community structure 1. Vegetation and/or 2. Benthic Community w/o pres or current with 10 1	The community stru organisms thriving macroalgae assem scleractinian corals <i>Siderastrea</i> spp. a limits succession a	ucture is a high stress (I in this habitat for many blage and a diverse inv s, octocorals, bryozoans nd Solenastrea bournor nd colony growth.	low relief) to sub-cli years (scleractiniar vertebrate communi s, and zoanthids. Th ni. Size distribution	max (moderate reli is, large sponges). ty in the form of wo ie most abundant s indicates recruitme	ief) community, with some benthic It supports a multi-species ormrock, sponges, tunicates, ccleractinian species are ent, but repeated burial of habitat		
Score = sum of above scores/30 (if uplands, divide by 20)	If preservation a	s mitigation,		For i	mpact assessment areas		
current or w/o pres with 0.867 0.267	Preservation adj Adjusted mitigat	iustment factor = ion delta =		FL=delta x acres=	1.816490243		
Delta – [with - current]	If mitigation	ector) –		For miti	gation assessment areas		
	Risk factor =			RFG=delta/(t-factor x risk)=			
0.000							

Site/Project Name			Application Number		Assess	sment Area Name or Number		
Southern Palm Bea	ch Island C Project (Pal	omprehensive m Beach County	SA.I-2008-04086		Mitiga	ation for Indirect Temp		
portion)		In Deach County	373-2000-04000		Impa	cts (1 yr)		
Impact or Mitigation			Assessment conducted	d by:	Assess	Assessment date:		
Milligation			ODAI		001. 2	2014		
Scoring Guidance]	Optimal (10)	Moderate (7)	Minimal (4) Not Present (0)			
indicator is based on what would be suitable for the type of wetland or surface water assessed		Condition is optimal and fully supports wetlands/surface water functions	optimal, but sufficient to maintain most wetland/surface water functions	Minimal level of support o wetland /surface water functions		Condition is insufficient to provide wetland/surface water functions		
.500(6)(a) Location an Support w/o pres or current	d Landscape with	The mitigation area water depth as the recruitment to the p	a is shallow water nears impact area. Nearshore proposed mitigative artif	hore habitat of u hardbottom res icial reef.	nconsolic ources e	dated sandy substrate in similar xist in the adjacent area to facilitate		
0	8	8						
.500(6)(b) Water Enviro for uplands w/o pres or current 6	with	The assessment ar exposed to high wa	rea is in the nearshore h ave energy with general	abitat of the Atla y clear water. W	antic Oce ater qual	an with open circulation. It is often lity will not be not altered.		
.500(6)(c) Communit 1. Vegetation a 2. Benthic Comm w/o pres or current 0	ty structure and/or munity with 8	An artificial reef will and will create a re sea turtles since pr nearshore habitat c	l provide substrate for b fuge for fish and other n eferred macroalgae hav of Southeast Florida.	enthic recruitme notile marine org e been docume	nt of mac janisms. nted to g	croalgae and sessile invertebrates It will create a foraging resource for row on artificial reefs in the		
Score = sum of above s	scores/30 (if	1 [
uplands, divide b	by 20)	If preservation a	is mitigation,			For impact assessment areas		
current or w/o pres	with	Preservation adj	justment factor =		FL=d	elta x acres=		
0.200	0.733	Adjusted mitigat	tion delta =					
		If mitigation						
Dolta - Iwith	current	Time log (t fo	actor) -	1.02		or mitigation assessment areas		
0.533	ouneng	Risk factor =		1.00	RFG=0	0.52 delta/(t-factor x risk)=		

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk)))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



Form 62-345.900(3), F.A.C. [effective date]

Site/Project Name			Application Number		Assoc	ment Area Ma	ame or Number	
Southern Palm R	each Island C	omprehensive	Application Number	ASSESS	sment Area Na			
Shore Stabilization	on Project (Pal	m Beach County	SAJ-2008-04086		Indirect Temporary Impacts (2 years)			
portion)								
Impact or Mitigation			Assessment conducted	d by:				
Impact (Indirect T	emporary 2 ye	ears)	CB&I	-	Area	(acres)	1.42	
Scoring Guidance		Optimal (10)	Moderate (7)	Minimal (4)			Not Present (0)	
The scoring of each		Condition is optimal and	Condition is less than					
would be suitable for th	nat Ie	fully supports	optimal, but sufficient to maintain most	Minimal level of sup wetland /surface	oport of water	Condition is ins	ufficient to provide wetland/surface water	
type of wetland or surfa	ce	functions	wetland/surface water	functions	functions			
water assessed			functions					
· · · · · · · · · · · · · · · · · · ·								
.500(6)(a) Location Suppo w/o pres or current 10	and Landscape ort with 1	The assessment ar colonized pavemer the epibenthic com scleractinian corals <i>Dasycladus, Halim</i> the nearshore hard <i>Pterogorigia, Muric</i> habitat for immigral green sea turtles ar	rea is a wide exposure of nt. Benthic characterizal munities to be turf and i s, octocorals, bryozoans eda, and <i>Laurencia</i> . Su lbottom, including <i>Sider</i> tea, and <i>Eunicea</i> . The i ting larvae of many imp nd the beach provides r	of nearshore hardt tion surveys within macroalgae, and a s, and zoanthids. C mall (<3 cm) colon <i>astrea</i> spp. and S nearshore hardbot ortant fisheries spn nesting habitat for	bottom of the pro- also sup Commor ies of s colenast tom pro- ecies. It loggerh	carbonate rock operting wormr n macroalgal ta cleractinian cc trea bournoni. ovides an impo t is also provid nead, green an	k with primarily low relief areas and baled the dominant components of rock, sponges, tunicates, axa are <i>Dictyota, Padina, Hypnea</i> , orals have been documented on Common octocorals are brtant settlement and nursery es foraging habitat for juvenile id leatherback sea turtles.	
.500(6)(b) Water En for upla w/o pres or current 6	vironment (n/a nds) with 6	The assessment ar high wave energy v	ne assessment area is in the nearshore habitat of the Atlantic Ocean with open circulation. It is often exposed to gh wave energy with generally clear water. Water quality will not be altered.					
.500(6)(c) Comm 1. Vegetatio 2. Benthic Co w/o pres or current 10	unity structure n and/or ommunity with 1	The community stru organisms thriving macroalgae assem scleractinian corals <i>Siderastrea</i> spp. ar limits succession a	ucture is a high stress (in this habitat for many iblage and a diverse inv s, octocorals, bryozoans nd <i>Solenastrea bournor</i> nd colony growth.	low relief) to sub-c years (scleractinia rertebrate commur s, and zoanthids. T ní. Size distributior	limax (r ans, larg hity in th he mos n indica	moderate relie ge sponges). It ie form of worn st abundant sc tes recruitmen	f) community, with some benthic s supports a multi-species mrock, sponges, tunicates, leractinian species are t, but repeated burial of habitat	
Score - sum of chours of	oroc/30 (if unlondo	ı —						
divide by	20) (if uplands,	If preservation a	s mitigation,			For im	pact assessment areas	
current or w/o pres	with	Preservation adj Adjusted mitigat	justment factor = ion delta =		FL=de	elta x acres=	0.849542557	
	0.207	J						
		If mitigation		I				
				 	For mitigation assessment areas			
Delta = [with	- current]	Time lag (t-fa	actor) =				t fa star u siel.)	
0.60	0	Risk factor =				RFG=delta/(t-tactor x risk)=	
-								

Site/Project Name		Application Number		Assessment Area Name or Number			
Southern Palm Bea Shore Stabilization portion)	ch Island C Project (Pal	SAJ-2008-04086		Mitiga Impac	ation for Indirect Temp sts (2 yr)		
Impact or Mitigation Mitigation			Assessment conducted	d by:	Assess Oct. 2	ment date: 2014	
Searing Cuidanaa	1	Optimal (10)	Madarata (7)	Minimal (1)	\ \	Not Propert (0)	
The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed		Condition is optimal and fully supports wetlands/surface water functions	Moderate (7) Minimal (4) Not Present (0) Condition is less than optimal, but sufficient to maintain most Minimal level of support of wetland /surface water functions Condition is insufficient to wetland/surface water functions				
.500(6)(a) Location an Support w/o pres or current 0	d Landscape with 6	The mitigation area water depth as the recruitment to the p	is shallow water nearsl impact area. Nearshore roposed mitigative artifi	hore habitat of un hardbottom resc icial reef.	consolid ources ex	ated sandy substrate in similar tist in the adjacent area to facilitate	
.500(6)(b) Water Enviro for uplands w/o pres or current 6	with	The assessment ar exposed to high wa	rea is in the nearshore h we energy with generall	abitat of the Atlar ly clear water. Wa	ntic Ocea ater quali	an with open circulation. It is often ty will not be not altered.	
.500(6)(c) Communi 1. Vegetation a 2. Benthic Com w/o pres or current 0	ty structure and/or munity with 6	An artificial reef will provide substrate for benthic recruitment of macroalgae and sessile invertebrates and will create a refuge for fish and other motile marine organisms. It will create a foraging resource for sea turtles since preferred macroalgae have been documented to grow on artificial reefs in the nearshore habitat of Southeast Florida.					
O and a second of a basis		л г 			 		
Score = sum of above s uplands, divide l	scores/30 (if by 20)	If preservation a	s mitigation,			For impact assessment areas	
current or w/o pres	with	Preservation adj Adjusted mitigat	ustment factor = ion delta =		FL=de	olta x acres=	
0.200	0.000	l					
		If mitigation			Fo	or mitigation assessment areas	
Delta = [with -	current]	Time lag (t-fa	actor) =	1.03	DEO	0.39	
0.400		Risk factor =		1.00	RFG=c	ieita/(t-factor x risk)=	

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk)))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



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Site/Project Name		Application Number		Accocc	ment Area N	ame or Number		
Southern Palm Beach Island C		Assessment Area Name of Number						
Shore Stabilization Project (Pal	SAJ-2008-04086	Indirect Temporary (ETOF) Impacts						
portion)								
Impact or Mitigation	Assessment conducted	d by:						
Impact (Indirect Temporary (ET	CB&I		Area	(acres)	0.78			
Scoring Guidance	Optimal (10)	Moderate (7)	Minimal (4)			Not Present (0)		
The scoring of each indicator is based on what	Condition is optimal and	Condition is less than optimal but sufficient to	Minimal level of sup	port of	f Condition is insufficient to provide wetland/surface wat			
would be suitable for the	fully supports wetlands/surface water	maintain most	wetland /surface v	water				
type of wetland or surface water assessed	functions	wetland/surface water functions						
.500(6)(a) Location and Landscape Support w/o pres or current with 10 9	The assessment ar colonized pavemer the epibenthic com scleractinian corals <i>Dasycladus</i> , Halim the nearshore hard <i>Pterogorigia</i> , Muric habitat for immigrat green sea turtles ar	The assessment area is a wide exposure of nearshore hardbottom carbonate rock with primarily low relief areas and colonized pavement. Benthic characterization surveys within the project area revealed the dominant components of the epibenthic communities to be turf and macroalgae, and also supporting wormrock, sponges, tunicates, scleractinian corals, octocorals, bryozoans, and zoanthids. Common macroalgal taxa are <i>Dictyota, Padina, Hypnea, Dasycladus, Halimeda</i> , and <i>Laurencia</i> . Small (<3 cm) colonies of scleractinian corals have been documented on the nearshore hardbottom, including <i>Siderastrea</i> spp. and <i>Solenastrea bournoni</i> . Common octocorals are <i>Pterogorigia, Muricea</i> , and <i>Eunicea</i> . The nearshore hardbottom provides an important settlement and nursery habitat for immigrating larvae of many important fisheries species. It is also provides foraging habitat for juvenile green sea turtles and the beach provides nesting habitat for loggerhead, green and leatherback sea turtles.						
.500(6)(b) Water Environment (n/a for uplands) w/o pres or current with 6 6	The assessment ar high wave energy v	The assessment area is in the nearshore habitat of the Atlantic Ocean with open circulation. It is often exposed to high wave energy with generally clear water. Water quality will not be altered.						
.500(6)(c) Community structure 1. Vegetation and/or 2. Benthic Community w/o pres or current with 10 9	The community stru organisms thriving macroalgae assem scleractinian corals <i>Siderastrea</i> spp. ar limits succession a	ructure is a high stress (low relief) to sub-climax (moderate relief) community, with some benthic g in this habitat for many years (scleractinians, large sponges). It supports a multi-species mblage and a diverse invertebrate community in the form of wormrock, sponges, tunicates, Is, octocorals, bryozoans, and zoanthids. The most abundant scleractinian species are and <i>Solenastrea bournoni</i> . Size distribution indicates recruitment, but repeated burial of habitat and colony growth.						
Score = sum of above scores/30, (if unlands	ı r							
divide by 20)	If preservation a	s mitigation,			For in	npact assessment areas		
current or w/o pres with 0.867 0.800	Preservation adj Adjusted mitigat	ustment factor =		FL=de	elta x acres=	0.052064131		
								
	If mitigation				For mitic	ation assessment areas		
Delta = [with - current]	Time lag (t-fa	ctor) =				,		
0.067	Risk factor =	,			RFG=delta/	(t-factor x risk)=		

Site/Project Name	Application Number		Assessment Area Name or Number			
Southern Palm Beach Island Co Shore Stabilization Project (Pal portion)	omprehensive m Beach County	SAJ-2008-04086		Mitigation for Indirect Temporary (ETOF) Impacts		
Impact or Mitigation		Assessment conducted	d by:	Assessment date:		
Miligation		CDai		001. 2	2014	
Scoring Guidance	Optimal (10)	Moderate (7)	Minimal (4)	Not Present (0)	
The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed	Condition is optimal and fully supports wetlands/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface water functions	Minimal level of su wetland /surface functions	pport of water	Condition is insufficient to provide wetland/surface water functions	
.500(6)(a) Location and Landscape Support w/o pres or current with 0 10	The mitigation area is shallow water nearshore habitat of unconsolidated sandy substrate in similar water depth as the impact area. Nearshore hardbottom resources exist in the adjacent area to facilitate recruitment to the proposed mitigative artificial reef.					
.500(6)(b) Water Environment (n/a for uplands) w/o pres or current with 6 6	The assessment ar exposed to high wa	ea is in the nearshore h ve energy with general	abitat of the Atlar y clear water. Wa	ntic Ocea ater quali	an with open circulation. It is often ity will not be not altered.	
.500(6)(c) Community structure 1. Vegetation and/or 2. Benthic Community w/o pres or current with 0 10	An artificial reef will and will create a ref sea turtles since pro nearshore habitat o	of will provide substrate for benthic recruitment of macroalgae and sessile invertebrates a refuge for fish and other motile marine organisms. It will create a foraging resource for ce preferred macroalgae have been documented to grow on artificial reefs in the nitat of Southeast Florida.				
	r			-		
Score = sum of above scores/30 (if uplands, divide by 20)	If preservation a	s mitigation,			For impact assessment areas	
current or w/o pres with	Preservation adj Adjusted mitigat	ustment factor = ion delta =		FL=de	elta x acres=	
0.200 0.807	I					
	If mitigation					
Delta - [with - current]	Time log (t fo	uctor) –	1.03	Fo	or mitigation assessment areas	
0.667	Risk factor =		1.25	RFG=c	delta/(t-factor x risk)=	

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored



(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assesses in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.



(c) Mitigation needed to offset impacts, when not using a bank



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For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable/((t-factor)(risk))

(a) Mitigation Bank Credit Determination

(b) Mitigation needed to offset impacts, when using a mitigation bank

(c) Mitigation needed to offset impacts, when not using a bank

To determine the acres of mitigation needed to offset impacts when not using a bank or a regional offsite mitigation area as mitigation, divide functional loss (FL) by relative functional gain (RFG). If there are more than one impact assessment area or more than one mitigation assessment area, the total functional loss and the total relative functional gain is determined by summation of the functional loss (FL) and relative functional gain (RFG) for each assessment area.

	Impact Types	FL	/	RFG	=	Acres of Mitigation	*Note: for temporary impacts, <i>Mitigation</i> = (FL/RFG) - Impact Area
1	Permanent	2.36		0.52	1	4.55	1
	Direct Temporary						
2	(< 1 Year)	0.34		0.58		0.02	
	Direct Temporary						
3	(>1 year)	0.15		0.45		0.08	
	Direct Temporary						
4	(>2 year)	0.10		0.32		0.14	
	Indirect Temporary						
5	(1 year)	1.82		0.52		0.48	
	Indirect Temporary						
6	(2 years)	0.85		0.39		0.77	
	Indirect Temporary						
7	(ETOF)	0.05		0.52		0.10	
	total					6 1 5	
	iotal					0.15	J

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APPENDIX I

MITIGATION PLAN

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SOUTHERN PALM BEACH ISLAND COMPREHENSIVE SHORELINE STABILIZATION PROJECT MITIGATION PLAN

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1.0 GOALS AND OBJECTIVES

The proposed Southern Palm Beach Island Comprehensive Shoreline Stabilization Project (the Project) (designated as Alternative 2 - the Applicants' Preferred Project Alternative) would use a combination of beach nourishment, dune reconstruction and coastal structures between R-129-210 and R-138+551 on Palm Beach Island, Palm Beach County, Florida (Figure 1-1). The Project includes two projects which will be constructed by two separate Applicants: the Town of Palm Beach (project area extending from R-129-210 to R-134+135) and Palm Beach County (County) (project area extending from R-134+135 to R-138+551).

The Applicants' goals and objectives for both beach nourishment projects are to provide more sand to the littoral system, create a stable beach and dune profile that will buffer the effects of storm surge and wave action, provide wildlife habitat, allow for recreational use and protect upland infrastructure. Approximately 142,800 cubic yards (cy) of fill will be placed along the shoreline within the Project Area from R-129-210 to R-138+551 (approximately 3.33 km (2.07 mi)). The fill volume will be split between the two Applicants' separate project areas – 65,200 cy of sand in the Town of Palm Beach and 77,600 cy in the County project area within South Palm Beach, Lantana and Manalapan. From north to south, the project would place dune nourishment only from R-129-210 to R-129+150, dune and beach nourishment from R-129+150 to R-131, dune nourishment only from R-131 to R-134+135 (Town of Palm Beach southern limit), and beach nourishment with seven low-profile groins from R-134+135 to R-138+551 (Figure 1-2).

1



Figure 1-1. Southern Palm Beach Island Comprehensive Shoreline Stabilization Project location map.

2

Southern Palm Beach Island Comprehensive Shoreline Stabilization Project Final Environmental Impact Statement It is anticipated that the delivery mechanism for the nourishment will be a truck-haul operation. The sand source would be a combination of stockpiled dredge material from the Reach 7 Phipps Ocean Park Beach Restoration Project (Phipps) or the Mid-Town Beach Restoration Project (Mid-Town) for placement within the Town of Palm Beach project limits (R-129-210 to R-134+135) and upland sand for placement within the County project limits in South Palm Beach, Lantana and Manalapan (R-134+135 to R-138+551) (Figure 1-2). For the initial construction of the proposed Project, the Town of Palm Beach proposes to utilize an offshore sand stockpile which will be located within the permitted Phipps template, as authorized by USACE Permit No. SAJ-2000-00380 and authorized by FDEP under the Palm Beach Island Beach Management Agreement (BMA) (FDEP, 2013). For subsequent maintenance of the Project, the Town of Palm Beach plans to alternate between utilizing the Phipps stockpile and an offshore sand stockpile within the permitted Mid-Town template as authorized by USACE under Permit No. SAJ-1995-03779 and authorized by FDEP under the BMA (FDEP, 2013). If the project schedules do not coincide, the Town of Palm Beach may truck in sand from upland mines. The County only proposes upland sand for construction of its portion of the project.

3



Figure 1-2. Proposed Southern Palm Beach Island Comprehensive Shoreline Stabilization Project (Alternative 2 – Applicants' Preferred Alternative).


Figure 1-2 (cont.). Proposed Southern Palm Beach Island Comprehensive Shoreline Stabilization Project (Alternative 2 – Applicants' Preferred Alternative).

This Project has been designed to avoid and minimize impacts to nearshore hardbottom to the maximum extent practicable, including reducing the volume of sand placed below mean high water (MHW) and constructing the Project using a truck haul approach instead of dredging an offshore borrow area and hydraulically pumping the sand through a pipeline to the Project Area. The dredging and hydraulic pumping of sand will be authorized under the Phipps and Mid-Town projects as described above. The Project is anticipated to impact nearshore hardbottom through direct placement of sand during project construction and due to beach profile equilibration (spreading) following construction. Based on engineering and Delft 3D modeling results (Appendix G to the EIS), it is anticipated that the Project would permanently impact between 3.86 and 3.99 ac and temporarily impact between 9.53 and 9.93 ac of intertidal and subtidal hardbottom. Figure 1-3 presents the sediment accumulation polygons that result in hardbottom impacts based on the Delft3D modeling using a 0.36 mm grain size (see Figures 4-1 and 4-3 in the EIS for results of 0.25 mm and 0.60 mm grain size). Impacts to hardbottom were based on a time-average of exposed hardbottom delineated from aerial images between 2003 and 2014 (the time-average methodology is described below in Section 4.1.). Using the engineering and Delft 3D modeling results, historic exposed hardbottom acreage, and recent benthic characterization data, a preliminary Uniform Mitigation Assessment Method (UMAM) evaluation was conducted (provided as Appendix H to the EIS). This draft UMAM analysis determined that between 6.55 and 6.66 ac of mitigation may be required to offset these impacts to intertidal and subtidal hardbottom.

The USACE would also consider assessing impacts based on a more traditional equilibrium toe of fill (ETOF) analysis such as profile translation. The ETOF is presented on the plan view figures of the alternatives in Chapter 2 of the EIS. This type of assessment would consider all impacts to hardbottom within the ETOF as permanent and require mitigation to compensate for those impacts. This analysis has not been completed for the EIS but remains a potential means for determining impacts and mitigation requirements. The USACE will determine which method to apply prior to permit decision

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This Mitigation Plan (MP), prepared under guidance provided in the Mitigation Rule (33 CFR 332.4(c)), outlines the Applicants' plan to provide compensatory mitigation for adverse impacts to nearshore hardbottom. This section describes the nearshore hardbottom resources that will be impacted, the proposed mitigation sites and specifications, and the manner in which the mitigation will restore the ecological functions lost due to anticipated project impacts to the nearshore hardbottom habitat.

Based on the Applicants' Preferred Alternative, the specific goals of the MP are:

- 1. To provide compensatory mitigation to offset between 3.86 and 3.99 ac of permanent impacts and between 9.53 and 9.93 ac of temporary impacts to hardbottom due to construction of the Project.
- 2. To create between 6.55 and 6.66 ac of mitigation in the form of low relief artificial reefs designed to mimic the ecological function of the nearshore hardbottom habitat that will be impacted. The reef shall:
 - Include similar physical features as the nearshore hardbottom low relief modules or boulders spaced at the same ratio of sand to hardbottom as the nearshore hardbottom;
 - b. Include similar substrate as the nearshore hardbottom limestone surface that facilitates recruitment of organisms found on the natural hardbottom;
 - c. Be placed in a similar water depth as the nearshore hardbottom that will be impacted;
 - d. Include a benthic habitat with interstitial spaces that provides refuge for benthic organisms; and
 - e. Create a habitat that fully offsets the functional loss of the impacted hardbottom.

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Figure 1-3. Anticipated nearshore hardbottom impacts from Alternative 2 – Applicants' Preferred Alternative based on Delft3D modeling using 0.36 mm grain size.



Figure 1-3 (cont.). Anticipated nearshore hardbottom impacts from Alternative 2 – Applicants' Preferred Alternative based on Delft3D modeling using 0.36 mm grain size.

1.1. IMPACT SITE

Due to direct sand placement and subsequent spreading (equilibration) of sand, it is anticipated that the Project may permanently impact between 3.86 and 3.99 ac and temporarily impact between 9.53 and 9.93 ac of intertidal and subtidal hardbottom (Figure 1-3). A benthic characterization survey was conducted in the fall of 2013 to assess the habitat adjacent to the Project Area (R-127 to R-141), including intertidal and subtidal hardbottom (CB&I, 2014, provided as Appendix D to the EIS). This included a quadrat-based assessment to quantify the benthos as well as shore-perpendicular transects to determine sediment conditions. During this survey, maximum relief measurements were taken within each quadrat: the mean maximum vertical relief of the intertidal area was 7.0 cm (SD 10.5) and the mean maximum vertical relief for the subtidal area was 9.3 cm (SD 8.8). Based on these results, the impact site is characterized as low relief (\leq 30 cm).

The benthic community located in the impact area is dominated by turf algae, sediment and macroalgae (CB&I, 2014). A total of 14 macroalgae genera were identified during the 2013 characterization survey, five of which are known to be preferred food items of C. mydas. These included Dictyota, Dictyopteris, Bryothamnion, Dasycladus, and Jania. Of all macroalgae genera recorded, Dictyota, Gelidiella and Dasycladus dominated the macroalgae cover in the Study Area and were also the most frequently occurring genera. In 2013, 20 scleractinian colonies (0.5 colonies m⁻²) and 225 octocoral colonies (6.1 colonies m⁻²) were documented on the same 12 transects. Oculina diffusa added to the scleractinian species diversity in 2013; however, only one 1-cm colony of this species was observed on R-139. The octocoral community was made up of four genera (Eunicea, Muricea, Pseudopterogorgia and Pterogorgia), all of which occurred in the subtidal portion of the sampling area Average size was 2.6 cm for all observed scleractinian corals and 5.3 cm for all observed octocorals. No Acropora coral species and none of the five coral species listed as threatened in August 2014 were observed during the survey, or during an Acropora survey conducted by Palm Beach County's Department of Environmental Resources Management (PBC-ERM) in October 2013 (provided as Appendix C to the EIS).

A total of 56 fish taxa from 29 families were recorded along the natural hardbottom during this survey, including 18 predatory species and 11 species of the snapper/grouper management complex.

2.0 MITIGATION SITE SELECTION CRITERIA

In order to offset lost ecological functions from the burial of hardbottom from the Project, the Town of Palm Beach and the County propose to provide in-kind mitigation through construction of artificial reef substrate within the vicinity of and similar depths to the impact area. The mitigation will be located in Palm Beach County and extend into the Atlantic Ocean, Class III Waters. The Applicants determined that suitable mitigation sites should be located near the proposed impact site in similar water depths as the impacted hardbottom (less than 20 ft). Further, to avoid impacts from the mitigation structures themselves, the mitigation sites must be located on sandy seafloor where there are no hardbottom resources. These areas must also have a relatively thin sand layer, covering subsurface rock and or consolidated rubble that will prevent and or minimize settlement of the mitigation units. The general artificial reef citing criteria being used by the Town of Palm Beach and the County are as follows:

- 1. Offshore of the predicted ETOF, beyond the anticipated impact area;
- 2. Similar water depth to impacted hardbottom resources;
- 3. Maintain a protective buffer of at least 7.6 m (25 ft) from all nearshore hardbottom;
- 4. Underlying sediment thickness between 0.3 and 1.2 m (1 and 4 ft).

The criteria listed above place the artificial reef outside the anticipated project impact area and protect the existing natural hardbottom during construction of the mitigative reef while placing the reef within the vicinity of these resources. These locations maintain proximity and connectivity to aquatic resources, which will allow recruitment of organisms from adjacent hardbottom onto the artificial reef, thereby increasing the likelihood that the artificial reef will succeed at developing a natural community similar to that found on the impacted nearshore hardbottom.

2.1. SITE SELECTION PROCESS

The Town of Palm Beach has conducted field surveys in August 2014 to support mitigation reef siting for the Mid-Town Project. These surveys were based on the most recent site information including probe measurements of nominal sand depth. A minimum of 0.5 acres is available and identified. Additional viable acreage is potentially available within the vicinity, though site specific investigations of additional areas have not been conducted. No additional surveys are planned at this time; however, additional surveys will be required to support the full mitigation acreage that will be required and to finalize design and construction.

In order to determine potential sites for the County's mitigative artificial reef, a time series of aerials was analyzed in August 2014 to identify areas where hardbottom has not historically been exposed. A sub-bottom profile and hydrographic survey was completed in October 2014 between R-134 and R-139 (provided in Sub-Appendix I-2). The investigation was completed in order to map the vertical extent of sand overlying hardbottom and to verify the feasibility of the proposed area (described in Section 2.2) to support an artificial reef based on the depth of sand over bedrock.

2.2. PROPOSED MITIGATION SITES

Based on the selection criteria and surveys conducted to date, the Town of Palm Beach and the County have identified potential locations for their respective mitigative artificial reefs (Figure 2-1). However, the final site determinations will be based on additional surveys and on final mitigation conditions which will be required by project permits.

The preferred location for the Town of Palm Beach's mitigation reef is in the nearshore zone in the vicinity of R-104.5, approximately 244 m (800 ft) seaward of the MHWL in approximately 4.6 m (15 ft) water depth (Figure 2-1), located about 7.7 km (4.8 mi) north of the Project Area. Field surveys of the area have been conducted to support mitigation reef siting for the Mid-Town Project. These were completed in August 2014 and are based on the most recent site information including probe measurements of nominal sand depth. The proposed mitigation reef dimensions would be approximately 91 m x 23 m (300 ft x 75 ft) and will consist of one layer of limestone boulders providing 0.3-1.2 m (1-4 ft) vertical Southern Palm Beach Island

relief with a maximum of 1.8 m (6 ft) vertical relief. Sketches of the typical layout and cross-section of the proposed artificial reef are included in Sub-Appendix I-1.

The preferred location for the County's mitigation reef is in the nearshore zone between R-137-330 and R-137+400 (Lantana Public Beach) (Figure 2-1). The mitigation reef will consist of a single layer of limestone boulders clusters in approximately -6 ft to -20 ft NGVD and will be placed on substrate that is approximately 0.3-0.9 m (1-3 ft) of sand over bedrock. To minimize potential impacts to sediment transport, the spacing between the clusters will be similar to those of the mitigation built for the Juno Beach Renourishment Project. The clusters will likely have a dimension of 6 m x 12 m (20 ft x 40 ft) and space between each cluster will likely be 11 m (35 ft) laterally and 9 m (30 ft) longitudinally. The limestone boulders will likely have a minimum weight of 998 kg (2,200 lbs) and 2,631 kg (5,800 lbs). Sketches of the typical layout and crosssection of the proposed artificial reef designed by Palm Beach County Department of Environmental Resources Management (PBC-ERM) are included in Sub-Appendix I-2. Construction will be similar to the FDEP approved mitigation for the Juno Beach renourishment (FDEP Permit No. 0267415-001-JC).

Based on the observed performance of other mitigative artificial reefs constructed in southeast Florida, the proposed mitigation structures are expected to provide the intended mitigating effect. Given the nature of the rock and consolidated rubble beneath the proposed mitigation area, the likelihood of unanticipated settlement is minimal. The mitigation units themselves will be sized such that they will be individually stable under the influence of tide, current, and wave conditions that are reasonably likely to occur for storm events with a return period of at least 25 years. Thus, movement due to such conditions is unlikely.



Figure 2-1. Potential mitigation sites.

3.0 SITE PROTECTION INSTRUMENT

The mitigation will be constructed on sovereign submerged lands of the State of Florida. This mitigation will be authorized by the State of Florida under FDEP permits for the Town of Palm Beach and the County projects. The Town of Palm Beach and the County will be responsible for the construction and management of their respective artificial reefs. The USACE will have access to the mitigation site subsequent to the issuance of a Department of the Army permit.

4.0 **BASELINE INFORMATION**

This section describes the baseline conditions found at the impact site and the proposed mitigation sites.

4.1. IMPACT SITE

The results of the engineering and Delft 3D modeling study (Appendix G) provided polygons that represented sand accumulation in the nearshore habitat over three years due to project implementation for each alternative and for each grain size modeled. These polygons were overlaid onto aerial delineations of exposed hardbottom digitized in GIS from 2003 through 2014 to determine potential impacts to this resource. From these polygons, seven levels of potential impact to hardbottom were developed based on temporal and spatial factors. These impact types are described in greater detail in Appendix H of the EIS. Initial investigation of the hardbottom habitat in the project area revealed a resource that is very dynamic and ephemeral in nature. The constant burial and re-exposure of hardbottom in this area facilitates the development of an opportunistic community dominated by turf and macroalgae species that recruit guickly when substrate is available. Between 2003 and 2014, the amount of exposed hardbottom in the Project Area varied widely ranging between 1.51 ac (2009) to 36.61 ac (2006). Because of the variability observed from year to year, the USACE determined that a time-average analysis of the amount of hardbottom exposed would best represent the habitat since it smooths out short-term fluctuations and provides longer-term trends by averaging a function over iterations of time. In this case, the average amount of exposed hardbottom (ac) between two surveys is multiplied by the number of days between those two surveys

(ac-days). The sum of ac-days is divided by the total number of days between the first survey and the last survey. This provides the time-averaged amount of hardbottom in an area. For each alternative, a UMAM was conducted for each type of impact to determine potential mitigation requirements.

Based on engineering and Delft 3D modeling results, it is anticipated that the Project may result in permanent impacts to between 3.86 and 3.99 ac of hardbottom as well as temporary impacts to between 9.53 and 9.93 ac of hardbottom due to direct sand placement and subsequent spreading (equilibration) of sand (Figure 1-3). Impacts to hardbottom were based on a time-average of exposed hardbottom delineated from aerial images between 2003 and 2014. The hardbottom environment within the project impact area is highly ephemeral, consisting primarily of low-relief intertidal and subtidal hardbottom habitat, located in less than 15 ft water depth. Surveys have shown a benthic community dominated by turf algae and macroalgae, but also supporting wormrock, tunicates, sponges, bryozoans and small coral colonies. Motile species such as fish, sea turtles and crabs also utilize this habitat. Species are accustomed to the ephemeral nature of the habitat which is subject to frequent burial and re-exposure. Figure 4-1 presents a selection of hardbottom delineations between 2003 and 2014 to represent the ephemeral nature of the hardbottom.

Section 1.1 of this mitigation plan describes the benthic community found in this habitat and summarizes the results of the 2013 benthic characterization survey (CB&I, 2014). The nearshore marine habitat may be utilized by listed species, including sea turtles, manatees, smalltooth sawfish, *Acropora* spp. corals, as well as five coral species recently listed as threatened under the ESA. The Project Area is also designated as loggerhead critical habitat (terrestrial and marine). The USACE will coordinate with NMFS and USFWS for potential project impacts to federally listed species, loggerhead critical habitat and Essential Fish Habitat (EFH).



Figure 4-1. Nearshore hardbottom and dune resources within the Study Area (R-127 to R-141+586).

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4.2. MITIGATION SITES

Based on the results the UMAM evaluation (Appendix H of the EIS), between 6.55 and 6.66 ac of mitigation will be required to offset impacts to between 3.86 and 3.99ac of hardbottom as well as temporary impacts to between 9.53 and 9.93ac of hardbottom due to direct sand placement and subsequent spreading (equilibration) of sand (Figure 1-3). The Applicants will construct artificial reefs to offset these impacts, and will place these reefs in similar depths as the impacted resources. The artificial reefs will be spaced so as to replicate the spacing of the natural nearshore hardbottom habitat.

The preferred location for the Town of Palm Beach's mitigation reef is in the nearshore zone in the vicinity of R-104.5, approximately 244 m (800 ft) seaward of the MHWL in approximately 4.6 m (15 ft) water depth (Figure 2-1). The proposed mitigation reef dimensions would be approximately 91 m x 23 m (300 ft x 75 ft) and will consist of one layer of limestone boulders providing 0.3-1.2 m (1-4 ft) vertical relief with a maximum of 1.8 m (6 ft) vertical relief. The preferred location for the County's mitigation reef is in the nearshore zone between R-137-330 and R-137+400 (Lantana Public Beach) (Figure 2-1). The mitigation reef will consist of a single layer of limestone boulders clusters in approximately -2 m to -6 m (-6 ft to -20 ft) NGVD and will be placed on substrate that is approximately 0.3-0.9 m (1-3 ft) of sand over bedrock. Both areas are currently sandy bottom areas of the nearshore region which contain thin layers of sand over rock or rubble. The nearshore areas are located within designated loggerhead critical habitat. Final mitigation sites will be determined based on historic aerial analysis of exposed hardbottom and the potential of any nourishment projects in the vicinity that may impact the artificial reef.

5.0 DETERMINATION OF CREDITS

The area of impact determined from the engineering analysis and Delft 3D modeling study (provided as Appendix G to the EIS) was used to complete a Uniform Mitigation Assessment Method (UMAM) evaluation (Chapter 62-345, F.A.C.) for the Project. UMAM assesses the functions and services of the hardbottom resources predicted to be impacted, and determines the amount of appropriate mitigation to compensate for impacts to these resources. Time lag and risk are incorporated into the calculations to ensure the appropriate amount of compensatory mitigation is identified that will effectively offset the loss of ecological functions and services due to hardbottom impacts. Time lag refers to the period of time between when the functions are lost at an impact site and when those functions are replaced by the mitigation. Mitigation risk accounts for the degree of uncertainty that the proposed mitigation will succeed at offsetting project impacts.

In UMAM, the input factors that determine mitigation requirements are:

- 1. The area (ac) of impact;
- 2. The parameters of the impact area without and with the project;
- 3. The parameters of the mitigation area without and with the project;
- 4. The risk factor; and
- 5. The time lag (t-factor).

The UMAM Analysis provided as Appendix H to the EIS details the input factors used to determine mitigation for the Project. The UMAM evaluation was developed to specifically assess the anticipated loss of nearshore hardbottom function attributed to the construction of the Applicants' Preferred Alternative, as well as to all proposed alternatives evaluated in the EIS. Based on the Delft 3D modeling and ETOF analyses, seven types of impacts to hardbottom were defined for the purpose of this UMAM evaluation. These impact types are described in the UMAM Analysis, provided as Appendix H. Tables 4-1 through 4-3 in Chapter 4 of the EIS summarize the estimated impact acreage for each impact type and each grain size and the associated mitigation which may be required for each alternative. For the Applicants' Preferred Alternative (Alternative 2), the UMAM assessment determined that between 6.55 and 6.66 ac of mitigative artificial reef would be required to offset between 3.86 and 3.99 ac of permanent hardbottom and between 9.53 and 9.93 ac of temporary hardbottom impacts due to direct sand placement and subsequent spreading (equilibration) of sand.

It is noted that the federal and state requirements regarding time lag are slightly different. This results in a slightly higher mitigation area required by FDEP compared to USACE. Table 2-1 in Appendix H - UMAM Analysis provides the difference in the ratio of impact to mitigation between the two agencies.

6.0 MITIGATION WORK PLAN

Based on the UMAM analysis for the Applicants' Preferred Project (Alternative 2), between 6.55 and 6.66 acres of mitigative artificial reef will be required to offset between 3.86 and 3.99 ac of permanent hardbottom and between 9.53 and 9.93 ac of temporary hardbottom impacts due to direct sand placement and subsequent spreading (equilibration) of sand (see Section 2.0 and Figure 1-3). The UMAM approach is provided in Appendix H to the EIS and the UMAM evaluation for Alternative 2 is provided as Sub-Appendices H-1a through H-1c. The Project is comprised of a Town of Palm Beach project and a County project. The EIS is intended to evaluate the impacts of the two similar actions; therefore, the alternatives evaluated in the EIS consist of various combinations of three potential Town of Palm Beach projects with three potential County projects. However, since the Applicants must obtain separate permits, the Town of Palm Beach and County projects were also modeled as standalone projects. Additional UMAM evaluations were conducted based on the results for the separated Town of Palm Beach and County projects. UMAM forms for the Preferred Alternative (Alternative 2) for the Town of Palm Beach and County are provided as Sub-Appendices H-2a through H-2c and H-3, respectively.

6.1. TIMING OF MITIGATION

The construction of the nourishment projects and mitigative reefs will be constructed as separate projects. The Town of Palm Beach artificial reef is expected to be constructed within the same year as the nourishment project and the County intends to construct the artificial reef prior to Project construction.

6.2. CONSTRUCTION SCHEDULE

The amount of mitigation required for the Town of Palm Beach and County projects will be finalized during the permitting process for the Project. Mitigation unit deployment of the mitigation modules and/or limestone boulders will likely occur during late-spring, summer, and early fall months when sea conditions are most favorable for working offshore of Palm Beach County. The total time to complete the mitigation project is not known at this time given uncertainties with fabrication and deployment rates, as well as the unknown final amount of mitigation that will be required. Time required to deploy the mitigation units will be highly dependent upon the amount of suitable working conditions during the summer months.

6.3. MITIGATIVE REEF DESIGN AND CONSTRUCTION METHODS

The Town of Palm Beach's proposed mitigation reef will consist of one layer of limestone boulders. The Town of Palm Beach's proposed mitigation reef layout and reef specifications are provided as Sub-Appendix I-1. Palm Beach County's mitigation reef will consist of a single layer of limestone boulders clusters. To minimize potential impacts to sediment transport, the spacing between the clusters will be similar with those of the mitigation built for the Juno Beach Renourishment Project (FDEP Permit No. 0267415-001-JC). The clusters will likely have a dimension of 6 m x 12 m (20 ft x 40 ft) and space between each cluster shall be 11 m (35 ft) laterally and 9 m (30 ft) longitudinally. The limestone boulders will likely have a minimum weight of 998 kg (2,200 lbs) and shall not exceed 2,722 kg (6,000 lbs) with at least 95% of the boulders between 998 kg (2,200 lbs) and 2,631 kg (5,800 lbs). Construction will likely be consistent with the FDEP approved mitigation for the Juno Beach re-nourishment. Details of the County's proposed mitigation are provided in Sub-Appendix I-2.

7.0 MAINTENANCE PLAN

The Town of Palm Beach and the County will conduct mid-construction observations and an immediate post-construction as-built survey to ensure their respective mitigative reefs are constructed properly. A line-intercept survey will be conducted on the artificial reefs as part of the as-built in order to estimate percent of net reef cover. The goal of this is to ensure that the artificial reef site reflects a similar hardbottom to sand ratio as the preconstruction natural hardbottom. Annual surveys will also be conducted for three years post-construction to document that the reef is providing appropriate mitigation for hardbottom impacts. During the third (and final) annual mitigation monitoring, the edge of the artificial reef will be delineated to quantify the total acreage of functional artificial reef.

8.0 PERFORMANCE STANDARDS

Success of the compensatory mitigation project will be achieved when the benthic community and colonization of the mitigation reef have been documented to be comparable to the benthic community and species composition which were observed in the impact area during pre-construction. The monitoring and reporting requirements are described in Section 9.0. Based on permit requirements for similar projects, the mitigation success criteria may include:

- 1. An obvious trend toward similarity in the benthic community between the artificial reef and the natural hardbottom by the completion of the monitoring period;
- Percent cover by each of the major groups of organisms (functional groups) in the mitigation site shall be no less than it was in the impact site (difference shall be statistically insignificant);
- 3. 90% of the functional groups, octocoral genera and scleractinian coral species shall be present on the artificial reef compared to the natural hardbottom; and
- 4. A line-intercept survey shall demonstrate that net amount of reef versus sand did not change from the time of construction due to subsidence (not more than 5% buried from results of initial survey).

9.0 MONITORING REQUIREMENTS

The mitigative artificial reef monitoring is described below. Nearshore hardbottom biological monitoring will also be required, and will be designed to supplement the protocol detailed in the Beach Management Agreement (BMA) (see EIS Section 5.2.3. for details on natural hardbottom monitoring).

9.1. MITIGATIVE ARTIFICIAL REEF MONITORING

The Town of Palm Beach and the County will monitor the artificial reefs for benthic colonization and succession in order to detect whether the success criteria (defined in Section 8.0) have been met. Monitoring of the mitigation reefs will be conducted in the summer, likely beginning approximately one year after construction and repeated annually for five years post-construction (five events), or until data from biological monitoring show the reefs are trending towards success at offsetting project impacts to natural hardbottom.

The functional success of the artificial reefs will be tracked through a biological monitoring program coordinated with state and federal agencies. Depending on the layout of the reefs, transects will be likely be spaced throughout the reef and quadrats will be sampled along these transects to quantify the benthic habitat. Additionally, video and photo-documentation will be collected. Line-intercept may also be conducted to ensure the correct rock to sand ratio is installed within the mitigation reef footprint. This monitoring will determine trends toward success or failure. If the benthic communities on the artificial reefs are not similar to the impacted hardbottom resources after three years of monitoring, the Applicants will conduct additional monitoring, if required. The Applicants will coordinate with state and federal agencies to determine a path forward if the mitigation does not succeed at offsetting hardbottom impacts.

The boundaries of the artificial reefs shall be mapped one time during the third annual survey to document potential subsidence of the boulders. The mapping survey is conducted *in situ* by biologists following outer boundary of the artificial reef. A buoy with a Differential Global Positioning System (DGPS) antenna linked to a topside laptop computer running HYPACK navigational software is towed along reef edge to record the position of the reef boundary. The reef edge will be presented on a map within the 3-year post-mitigation annual monitoring report and a shapefile will be provided as well.

Monitoring reports shall be completed after each annual post-deployment surveys of the artificial reef and shall be provided within 90 days after completion of each annual monitoring event. The FDEP JCP Compliance Officer and the USACE shall be notified at

the commencement and completion of each monitoring event, along with weekly progress updates throughout monitoring. Each annual report shall document the colonization of the artificial reef and compare the species composition on this reef to that documented in the impact area during the pre-construction survey.

10.0 LONG-TERM MANAGEMENT PLAN

Based on previous performance of artificial reefs in southeast Florida, including Palm Beach County, it is anticipated that the proposed mitigative artificial reef substrate will succeed at offsetting project impacts to the nearshore natural hardbottom. The Applicants will implement Biological Monitoring Plans (see Section 9.0) that include monitoring the mitigative artificial reef to ensure the colonization and development of the reef proceeds as anticipated. However, if the benthic communities on the artificial reefs are not similar to the impacted hardbottom resources after five years of monitoring, the Applicants will conduct additional monitoring, if required. The Applicants will coordinate with state and federal agencies to determine a path forward if the mitigation does not succeed at offsetting hardbottom impacts.

11.0 ADAPTIVE MANAGEMENT PLAN

As stated above in Section 10.0, if the benthic communities on the artificial reefs are not similar to the impacted hardbottom resources after three years of monitoring, the Applicants will conduct additional monitoring, if required. The Applicants will coordinate with state and federal agencies to determine a path forward if the mitigation does not succeed at offsetting hardbottom impacts. Impacts to the artificial reefs as a result of a hurricane (or other storm events) or sea level rise are considered acts of nature. The Applicants will not be responsible for reparations due to acts of nature.

12.0 FINANCIAL ASSURANCES

The Town of Palm Beach and the County will be responsible for their share of the costs associated with construction and monitoring of their respective artificial reefs. The Applicants will provide the USACE with financial assurances prior to a permit decision/

13.0 LITERATURE CITED

CB&I (Coastal Planning & Engineering, Inc., a CB&I Company). 2014. Southern Palm Beach Island Comprehensive Shoreline Stabilization Project, 2013 characterization report. Prepared for The Town of Palm Beach. January 2014.

Florida Department of Environmental Protection (FDEP). 2013. Palm Beach Island Beach Management Agreement (BMA). http://www.dep.state.fl.us/beaches/pb-bma/docs/BMA-MainAgreement.pdf. Prepared by Florida Department of Protection.

SUB-APPENDIX I-1

TOWN OF PALM BEACH PROPOSED MITIGATION

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SUB-APPENDIX I-2

PALM BEACH COUNTY PROPOSED MITIGATION

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PALM BEACH COUNTY

SUB-BOTTOM PROFILE INVESTIGATION AND HYDROGRAPHIC SURVEY





SHEET INDEX			
SHEET NAME DESCRIPTION			
1	COVER		
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3 BATHYMETRIC CONTOU			
4-7	PROFILES		

EAST / WEST PROFILE CONTROL					
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EW2	N/A	822265.88	970907.96	95°	N/A
EW3	N/A	822016.10	970984.50	95°	N/A
EW4	N/A	821766.33	970881.04	95°	N/A
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EW6	N/A	820949.00	970836.99	95°	N/A
EW7	N/A	820699.22	970823.53	95°	N/A
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EW9	N/A	819986.43	970785.12	95°	N/A
EW10	N/A	819736.65	970771.66	95°	N/A
EW11	N/A	819254.25	970745.66	95°	N/A
EW12	N/A	819004.47	970732.20	95°	N/A
EW13	N/A	818565.88	970708.56	95°	N/A
EW14	N/A	818316.10	970965.10	95°	N/A
EW15	N/A	818066.33	970681.64	95°	N/A
EW16	N/A	817816.55	970688.18	95°	N/A
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R-136	JUN1989	820529.79	820529.79	95°	3.26
R-137	JUN1989	819523.04	970562.42	95°	9.03
R-138	JUN1989	818824.69	818824.69	95°	12.51
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NS2	N/A	822756.71	971034.56	183°	N/A
NS3	N/A	822747.99	971134.24	183°	N/A
NS4	N/A	822739.27	971233.91	183°	N/A
NS5	N/A	822730.55	971333.59	183°	N/A
NS6	N/A	822721.83	971433.26	183°	N/A
NS7	N/A	822713.11	971532.94	183°	N/A
NS8	N/A	822704.39	971632.61	183°	N/A
NS9	N/A	822695.67	971732.29	183°	N/A
NS10	N/A	822686.95	971831.96	183°	N/A
NS11	N/A	822678.23	971931.64	183°	N/A

LEGEND			
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0	PROFILE CONTROL		

ABBREVIATIONS		
AZ.	AZIMUTH	
FDEP FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION		
EL / ELEV	ELEVATION	_
GPS	GPS GLOBAL POSITIONING SYSTEM	
N/A	N/A NOT APPLICABLE	
NAD NORTH AMERICAN DATUM		
NAVD NORTH AMERICAN VERTICAL DATUM		
RTK REAL TIME KINEMATIC		

SURVEY CONTROL				
NAME	NORTHING FEET NAD83/90	EASTING FEET NAD83/90	ELEV. FEET NAVD88	DESCRIPTION
R137	819523.04	970562.42	9.03	DNR BRASS DISK "R137 PM BH 1989"

SUB-BOTTOM PROFILE INVESTIGATION AND HYDROGRAPHIC SURVEY

R134-R139 SOUTH PALM BEACH COUNTY / MANALAPAN PALM BEACH COUNTY, FLORIDA









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APPENDIX J

CUMULATIVE IMPACT ANALYSIS

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SOUTHERN PALM BEACH ISLAND COMPREHENSIVE SHORELINE STABILIZATION PROJECT DRAFT CUMULATIVE IMPACT ANALYSIS

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1.0 INTRODUCTION

This Cumulative Impact Analysis (CIA) has been prepared to support the Southern Palm Beach Island Comprehensive Shoreline Stabilization Project (the Project) Final Environmental Impact Statement (EIS). The combined, incremental effects of human activity, referred to as cumulative impacts, may pose a serious threat to the environment. While they may be insignificant by themselves, cumulative impacts accumulate over time, from one or more sources, and can result in the degradation of important resources. Because federal projects cause or are affected by cumulative impacts, this type of impact must be assessed in documents prepared under the National Environmental Policy Act (NEPA). The NEPA definition of a cumulative impact comes from the Council on Environmental Quality (CEQ), which defines a cumulative impact as:

...the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR §1508.7.).

Cumulative effects analysis is an iterative process in which consequences are assessed repeatedly following incorporation of avoidance, minimization, and mitigation measures into the alternatives. Monitoring is the last step in determining the cumulative effects that ultimately result from the action. The significance of cumulative effects depends upon the ecosystem, resource baseline conditions, and relevant resource stress thresholds (CEQ, 1997). CEQ regulations require all federal agencies to consider the cumulative effects of all proposed agency actions. A cumulative impact analysis is required whenever an environmental document is prepared (i.e., an Environmental Assessment or Environmental Impact Statement). A cumulative impact is defined in both spatial (geographic) and temporal terms (i.e., timeframes in which to identify past, present, and reasonably foreseeable actions) and results from spatial and temporal crowding of environmental perturbations. "The effects of human activities will accumulate when a

second perturbation occurs at a site before the ecosystem can fully rebound from the effect of the first perturbation" (CEQ, 1997). Chapter 4 of the EIS – Environmental Consequences considers direct, indirect and cumulative effects anticipated to result from construction of each of the alternatives and construction of the mitigative artificial reefs which will be required to offset impacts to nearshore hardbottom resources. The Biological Assessment (BA) (provided as Appendix E to the EIS), prepared in accordance with Section 7 of the Endangered Species Act, also considers direct effects, indirect effects, interrelated or interdependent actions, and cumulative effects to listed and proposed species and critical habitat.

While the EIS is assessing the proposed Town of Palm Beach and Palm Beach County (County) projects (and alternatives) as similar actions under the combined project name of "Southern Palm Beach Island Comprehensive Shoreline Stabilization Project", it is understood that these projects are located within the same coastal cell as other past, present and future coastal projects. Therefore, this CIA has been prepared to assess the scope of impact from the Southern Palm Beach Island Comprehensive Shoreline Stabilization Project as well as from other coastal projects on Palm Beach Island which have occurred, and which are expected to be constructed again, in the vicinity of the Project Area.

The principal goal of this assessment is to identify, avoid, minimize, and mitigate adverse environmental impacts associated with the project objective of providing storm protection along the project shoreline, with particular emphasis upon potential cumulative impacts to the nearshore hardbottom resources and the sand beach habitat along the projects and adjacent shorelines.

1.1. PROJECT DESCRIPTION

The Applicants' Preferred Project Alternative (Alternative 2) for the Southern Palm Beach Island Comprehensive Shoreline Stabilization Project (the Project) proposes a combination of beach nourishment, dune reconstruction and coastal structures between R-129-210 and R-138+551 on Palm Beach Island, Palm Beach County, Florida (Figure 1-1). The Project includes two projects which will be constructed by two separate Applicants: the Town of Palm Beach (project area extending from R-129-210 to R-134+135) and the County (project area extending from R-134+135 to R-138+551). Both applicants intend to construct artificial reefs as compensatory mitigation for unavoidable impacts due to project implementation.

The Applicants' goals and objectives for both nourishment projects are to provide more sand to the littoral system, create a stable beach and dune profile that will buffer the effects of storm surge and wave action, provide wildlife habitat, allow for recreational use and protect upland infrastructure. The total volume of sand needed to construct the Project will be dependent on the results from surveys conducted immediately prior to construction; however, based on 2014 survey conditions, approximately 142,800 cubic yards (cy) of fill is required to fill the design template within the Project Area from R-129-210 to R-138+551 (approximately 3.33 km [2.07 mi]). The fill volume will be split between the two Applicants' separate project areas – 65,200 cy of sand in the Town of Palm Beach and 77,600 cy in the County project area (South Palm Beach, Lantana and Manalapan). From north to south, the Project would place dune nourishment only from R-129-210 to R-129+150, dune and beach nourishment from R-129+150 to T-131, dune nourishment only from T-131 to R-134+135 (Town of Palm Beach southern limit), and beach nourishment with seven low-profile groins from R-134+135 to R-138+551 (Figure 1-2). As compensatory mitigation for unavoidable impacts, the Applicants propose to create between 6.55 and 6.66 ac of low relief artificial reefs designed to mimic the ecological function of the nearshore hardbottom habitat that will be impacted.

The two separate public entities proposing projects may utilize sand originating from different sources. The proposal by the Town of Palm Beach includes transportation of dredged fill material originating from the Reach 7 Phipps Ocean Park Beach Restoration Project (Phipps) and/or the Mid-Town Beach Nourishment Project (Mid-Town) or an upland sand mine. These projects have both recently occurred and material was dredged under authorization by USACE Permit Nos. SAJ-2000-00380 (Phipps) and SAJ-1995-03779 (Mid-Town), and both projects are authorized by FDEP under the Palm Beach Island Beach Management Agreement (BMA) (FDEP, 2013). If timing permits, and these projects are constructed in the future, the dredged material would be stockpiled within the

Phipps and/or Mid-Town project areas and actively transported by truck using the local network of roadways for placement within the Town of Palm Beach project limits (R-129-210 to R-134+135). The County has proposed to utilize sand originating from an upland sand mine to be placed within the County project limits along South Palm Beach, Lantana and Manalapan (R-134+135 to R-138+551) (Figure 1-2). The Town of Palm Beach plans to time future beach nourishment projects so that the sand source alternates between stockpiled sand excavated in excess during dredging for Phipps and Mid-Town projects. If the project schedules do not coincide, the Town of Palm Beach may truck in sand from upland mines. The County only proposes upland sand for construction of its portion of the Project.



Figure 1-1. Southern Palm Beach Island Comprehensive Shoreline Stabilization Project location map.



Figure 1-2. Proposed Southern Palm Beach Island Comprehensive Shoreline Stabilization Project (Alternative 2 – Applicants' Preferred Alternative).



Figure 1-2 (cont.). Proposed Southern Palm Beach Island Comprehensive Shoreline Stabilization Project (Alternative 2 – Applicants' Preferred Alternative).

This Project has been designed to avoid and minimize impacts to nearshore hardbottom to the maximum extent practicable, including reducing the volume of sand placed below mean high water (MHW) and by avoiding mobilization of a separate dredging operation offshore and hydraulic pumping of sand through a pipeline to the Project Area. However, the Project is anticipated to result in adverse effects to nearshore hardbottom through direct placement of sand during construction and equilibration (spreading) following construction.

The results of the engineering and Delft3D modeling study (EIS Appendix G) provided polygons that represented sand accumulation in the nearshore habitat over three years due to project implementation for each alternative and for each grain size modeled. These polygons were overlaid onto aerial delineations of exposed hardbottom digitized in GIS from 2003 through 2014 to determine potential impacts to this resource. From these polygons, seven levels of potential impact to hardbottom were developed based on temporal and spatial factors. These impact types are described in greater detail in Appendix H of the EIS. Initial investigation of the hardbottom habitat in the project area revealed a resource that is very dynamic and ephemeral in nature. The constant burial and re-exposure of hardbottom in this area facilitates the development of an opportunistic community dominated by turf and macroalgae species that recruit quickly when substrate is available. Between 2003 and 2014, the amount of exposed hardbottom in the Project Area varied widely ranging between 1.5 ac at the lowest (2009) and 36.6 ac at the highest (2006). Because of the variability observed from year to year, the USACE determined that a time-average analysis of the amount of hardbottom exposed over 10 years would best represent the habitat since it smooths out short-term fluctuations and provides longer-term trends by averaging a function over iterations of time. The 2014 dataset was added during updates to the EIS extending the time-average analysis over 11 years. To determine a time-averaged amount of exposed hardbottom, the average amount of exposed hardbottom (ac) between two surveys is multiplied by the number of days between those two surveys (ac-days). The sum of ac-days from a series of surveys is divided by the total number of days between the first survey and the last survey. This provides the time-averaged amount of hardbottom in an area. In order to determine the area of potential impact due to project construction, the amount of exposed hardbottom from each hardbottom delineation (2003 – 2014) that fell within the impact polygons generated by the Delft3D modeling was determined in GIS and these areas were input into the time-average calculation. For each alternative (and each grain size modeled), these impact areas were input into Uniform Mitigation Assessment Method (UMAM) to determine potential mitigation requirements.

Based on this analysis, it is anticipated that the Project may result in permanent impacts to between 3.86 and 3.99 acres of hardbottom, and temporary impacts to between 9.53 and 9.93 acres of hardbottom due to direct sand placement and subsequent equilibration (Figure 1-3 through 1-5). Using the engineering and modeling results, historic exposed hardbottom acreage, and recent benthic characterization data, a preliminary UMAM evaluation was conducted (provided as Appendix H to the EIS). This draft UMAM analysis determined that between 6.55 and 6.66 acres of mitigation may be required to offset these impacts to intertidal and subtidal hardbottom. The County and Town of Palm Beach propose to offset the unavoidable impacts in the form of low relief artificial reefs designed to mimic the ecological function of the nearshore hardbottom habitat that will be impacted. The mitigation will be located in Palm Beach County and extend into the Atlantic Ocean, Class III Waters. The Applicants determined that suitable mitigation sites should be located near the proposed impact site in similar water depths as the impacted hardbottom (less than 20 ft). Further, to avoid impacts from the mitigation structures themselves, the mitigation sites must be located on sandy seafloor where there are no hardbottom resources.



Figure 1-3. Anticipated nearshore hardbottom impacts from Alternative 2 – Applicants' Preferred Alternative. Impacts based on modeling a grain size of 0.25 mm in the Town of Palm Beach and 0.36 mm in the County.



Figure 1-3 (cont.). Anticipated impacts to nearshore hardbottom resources from Alternative 2 – Applicants' Preferred Alternative. Impacts based on modeling a grain size of 0.25 mm in the Town of Palm Beach and 0.36 mm in the County.



Figure 1-4. Anticipated impacts to nearshore hardbottom resources from Alternative 2 – Applicants' Preferred Alternative. Impacts based on modeling a grain size of 0.36 mm in the Town of Palm Beach and 0.36 mm in the County.

Southern Palm Beach Island Comprehensive Shoreline Stabilization Project Final Environmental Impact Statement



Figure 1-4 (cont.). Anticipated impacts to nearshore hardbottom resources from Alternative 2 – Applicants' Preferred Alternative. Impacts based on modeling a grain size of 0.36 mm in the Town of Palm Beach and 0.36 mm in the County.



Figure 1-5. Anticipated impacts to nearshore hardbottom resources from Alternative 2 – Applicants' Preferred Alternative. Impacts based on modeling a grain size of 0.60 mm in the Town of Palm Beach and 0.36 mm in the County.



Figure 1-5 (cont.). Anticipated impacts to nearshore hardbottom resources from Alternative 2 – Applicants' Preferred Alternative. Impacts based on modeling a grain size of 0.60 mm in the Town of Palm Beach and 0.36 mm in the County.

1.1.1. SAND SOURCES FOR PROPOSED PROJECT

Offshore sand source. A stockpile of dredged material from the Phipps Project (USACE permit number SAJ-2000-00380) and/or the Mid-Town Project (USACE permit number SAJ-1995-03779) is the preferred sand source for the Project Area within the Town of Palm Beach limits. Phipps and Mid-Town projects dredged sand from South Borrow Area 2 (SBA2) and North Borrow Area 1 (NBA1), respectively (Figure 1-6). The sand would be transported to the beach by truck and placed on the beach mechanically. Based on the 2014 conditions, the total proposed volume for placement within the Town of Palm Beach is approximately 65,200 cy, 3,400 cy of which will be placed below Mean High Water (MHW). For subsequent maintenance of the Project, the Town of Palm Beach plans to alternate between utilizing dredged sand stockpiled during Phipps or Mid-Town construction. Both projects have recently been constructed (Mid-Town in winter 2014-2015 and Phipps in winter 2015-2016) and dredged sand was transported by truck and placed on the dunes in Reach 8 (approximately 40,000 cy from Mid-Town and approximately 10,000 cy from Phipps). If the timing of Project construction does not coincide with future Mid-Town or Phipps construction projects, the Town would consider using upland sand. The County only proposes upland sand for construction of its portion of the project. Based on the 2014 conditions, the total proposed volume for placement within the County is approximately 77,600 cy, 26,600 cy of which will be placed below Mean High Water (MHW). Additional information about the offshore borrow areas is provided in Section 6.0.



Figure 1-6. Potential borrow areas to be used during Phipps and Mid-Town projects that may supply the sand for the proposed Project within the Town of Palm Beach limits (R-129-210 to R-134+135).

Southern Palm Beach Island Comprehensive Shoreline Stabilization Project 17 Final Environmental Impact Statement **Upland sand source.** Upland sand mines and other upland sources (such as publicly owned land with available sand resources) have provided sand for beach and dune restoration projects in Florida for over a decade. Upland sand has historically been used for small projects (less than 50,000 cy) (USACE, 2001), but upland sand has recently been utilized for larger projects in Indian River County, Broward County, and Brevard County. Within Palm Beach County, upland sand has been used for restoration efforts in Coral Cove Park in Tequesta, Singer Island, Jupiter/Carlin Beach, Town of Palm Beach, South Palm Beach, Lantana, and Delray Beach. Specifically within the Project Area, there have been dune restorations completed in the Towns of South Palm Beach and Lantana since 2003 (Miranda, pers. comm., 2013, see Chapter 1, Table 1-1 in the EIS) and one dune restoration in Reach 8 in the Town of Palm Beach in 2011 using upland sand.

The sand source for the County project area within the limits of the Towns of South Palm Beach, Lantana, and Manalapan (R-134+135 to R-138+551) is sand from domestic upland sand quarries within the State of Florida. The sand would be transported to the beach and placed on the beach mechanically, rather than hydraulically. A study conducted in Broward County found that due to a larger mean grain size and smaller fines content, upland sand is expected to be more stable and produce less turbidity in the nearshore environment than sand obtained from offshore borrow areas (OAI and CPE, 2013).

Each mine would be evaluated based on compliance with the F.A.C., Rule 62B-41.007(2)(j), the BMA cell-wide sediment quality specifications (presented in Chapter 2, Table 2-8 in the EIS), the County's technical sand specifications outlined in the County's Annual Dune and Wetlands Restoration contract (Table 2-2; Appendix B), sediment characteristics, location relative to the Project Area, compliance with state and federal laws and method of transport available. Previous County projects have utilized sand from E.R. Jahna Industries, Inc. Ortona Sand Mine (Ortona) and Stewart Mining Industries in Ft. Pierce, as well as from local County preserves. The Town of Palm Beach identified Ortona as their preferred upland sand mine, which has been previously utilized within the Town of Palm Beach, as well as Stewart Mining Industries, Inc. in Ft. Pierce. The County has also proposed to utilize sand from Ortona and/or Stewart Mining Industries. The location of the upland mines and their approximate distances to the Project Area are provided in Table 1-1 and Figure 1-7.

Table 1-1. Potential upland sand sources.

Company	Mine Name	Distance from Project Area (km)*	Distance from Project Area (mi)*
E.R. Jahna Industries, Inc.	Ortona	154	96
Stewart Mining Industries	Ft. Pierce	127	79

*Distance is the shortest driving distance (km/miles) between each mine and Lantana Municipal Beach Park; actual distance will depend on routes selected by contractor.



Figure 1-7. Upland sand mines with potentially feasible sources of material that could be considered for a truck-haul project for placement in the proposed Project Area.

One consideration involved with selecting upland sand sources is the availability of sand resources within the mines, as this can affect overall construction rate of the project. The mine(s) selected must have sufficient total and daily production capacity to meet the project needs. Sand mines can stockpile some of the material to ensure that they can keep pace with required delivery rates. Other considerations that affect project efficiency include the distance from the mine to the project, the number of trucks and other machinery at the staging and beach nourishment areas, as well as the number of active access points. In the event that delivery rate exceeds handling time on the beach, the utilization of offsite truck waiting areas may be required in order to avoid congestion at the access points. The Town of Palm Beach and the County would consider mines that can provide suitable sand material based on the state and county sediment guidelines, the cost per cubic yard, as well as having sufficient production capacity and a reasonable trucking distance from the Project Area.

1.1.2. GROIN CONSTRUCTION

The County portion of this Project includes the construction of seven (7) groins placed perpendicular to the shoreline extending from the existing seawalls to the postconstruction (beach fill) shoreline in South Palm Beach, Lantana and Manalapan (R-134+135 to R-138+551) (Figure 1-2). The groins are proposed to be low-profile, meaning that they are designed to be level with the height of the existing berm and are intended to be concealed by sand most of the time. The construction materials potentially include concrete king pile and panel groins with 18 inch (+/-) wide H-piles spaced every 8 to 10 ft. Exact location and length of the groins would depend on the presence of nearshore hardbottom resources at the time of construction. The proposed Project includes a series of approximately 90 ft long walls spaced approximately 300 ft apart. As the sand naturally erodes from the beach, the groins would gradually become exposed until the next nourishment. The groins act to hold the sand within the littoral system which results in a disruption of the natural littoral sand transport system along the beach. Typically sand accretion/sediment deposition occurs on the updrift side and erosion would be expected on the downdrift side. Groin construction will require the use of heavy equipment with a land-based or water-based operation or a combination thereof. Depending on site conditions, the contractor's means and methods, and site access, construction of the groins will likely require but is not limited to clamshells, cranes, excavators, front end loaders, bulldozers, barges, temporary trestles, and/or pile drivers.

2.0 SCOPE OF ANALYSIS

The "Scope of Analysis" was discussed in Section 1.7.1 in Chapter 1 of the EIS. For the proposed Project, the regulated activities include placement of sand below MHW, construction of seven lowprofile groins that extend perpendicular to shore into the Atlantic Ocean, and construction of artificial reefs.

Historically, beach erosion control and inlet management activities have been regulated by the FDEP and USACE on a project-by-project basis. In an effort to adopt a more holistic approach to ecosystem management that could address the full scope of Palm Beach Island's shoreline erosion problems, the Town of Palm Beach and the County requested that FDEP enter into a binding Beach Management Agreement (BMA) for beach nourishment, inlet sand bypassing, and dune restoration projects along



Figure 2-1. Limits of Beach Management Agreement Area (FDEP, 2013).

the Palm Beach Island shoreline in 2012. A primary goal of the BMA is to develop a coordinated, long-term process that facilitates predictable approval of qualifying coastal erosion control and inlet management activities within the Palm Beach Island coastal cell

(Lake Worth Inlet to the South Lake Worth Inlet), encompassing 15.7 miles of Atlantic Ocean shoreline, and covering 34.5% of the Palm Beach County Shoreline (Figure 2-1) (FDEP, 2013).

The final BMA, executed on September 26, 2013, includes authorization from FDEP for maintenance dredging of the Lake Worth Inlet with placement on downdrift beaches, construction of an improved sand transfer plant at Lake Worth Inlet, repair and removal of groins throughout the cell, nourishment of the Mid-Town Project, nourishment of the Phipps Project, and dune restoration (FDEP, 2013).

The BMA's approach to authorizing projects and activities is centered on regional management of the coastal system rather than the conventional project-by-project permitting process. In addition, the BMA is expected to generate a more cost-effective and efficient permitting process that will reduce the BMA Participants' costs, time delays, and permitting uncertainty.

A summary of projects authorized under the BMA is provided in Section 5.0. These projects are located in the vicinity of the Southern Palm Beach Island Comprehensive Shoreline Stabilization Project; therefore, these actions and the proposed Project are considered in the cumulative impacts assessment.

2.1. GEOGRAPHIC SCOPE

Palm Beach County is located on the southeastern coast of Florida and includes approximately 45 miles of Atlantic Ocean coastline. There are four ocean inlets within Palm Beach County. The geographic scope of the proposed Project is comprised of: 1) the northern limit of North Borrow Area 1 (NBA1), approximately 3.2 kilometers (2 miles) north of Lake Worth Inlet; 2) the eastern edge of NBA1, in water depths between 12 and 18 meters (40 and 60 feet), approximately 762 meters (2,500 feet) offshore of Singer Island; 3) the South Lake Worth Inlet (R-151), located approximately 3.2 kilometers (2.5 miles) south of the Project Area, and 4) the westernmost boundary of the potential upland

mines in order to encompass the truck routes to the Project Area (see Figures 1-7 and 2-2).

The Project Area extends from R-129-210 to R-138+551, which includes the majority of Reach 8, all of Reach 9, and the northern portion of Reach 10 (Figure 1-2). Potential impacts from project construction are expected to occur updrift and downdrift of the Project Area, therefore, resources were assessed within the Study Area which extends from R-127 to R-141+586. This area includes the shoreline from the dune seaward out to a distance of approximately 400 meters (1,312 feet) in order to include all areas of nearshore hardbottom habitat that have been exposed between 2003 and 2014. Nearshore hardbottom habitat is classified by FDEP to include the "200-400 meter-wide strip from the shoreline, ranging from the supralittoral zone to the depth of -4 meters", intermediate hardbottom exists "from the depth of -4 meters to the depth of closure (approximately -8 meters)", and offshore hardbottom is located in "water depths deeper than -8 meters, beyond the depth of closure to -12 meters" (FDEP, 2013). The nearshore environment of Palm Beach Island is characterized by a generally discontinuous swath of nearshore hardbottom resources along the entire 16-mile island, which is also present throughout most of the remaining shoreline in Palm Beach County. Other known exposed nearshore hardbottom resources are higher functioning reefs in deeper water (9 m or deeper) that have older classes of benthic species (e.g. corals, sponges, and algae) and tend to be persistent. It is anticipated that the nearshore hardbottom habitat is the only hardbottom resource that may be affected by direct, indirect and cumulative impacts due to project construction.

In addition to the Proposed Action, past, present, and future actions on Palm Beach Island that would contribute to cumulative impacts principally include beach management activities conducted within the littoral zone of Palm Beach Island. Beach management activities within this zone include sand bypassing and inlet sand management at Lake Worth Inlet (Port of Palm Beach) and South Lake Worth Inlet (Boynton), beach nourishments projects, and coastal structure rehabilitation/construction. Just north of the Project Area, the Lake Worth Pier provides an impediment, or littoral barrier, that interrupts sediment transport. At the south end of the Project Area, the natural shoreline has been stable with no requests to stabilize the beach.



Figure 2-2. Regional map of Palm Beach Island.

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2.2. TEMPORAL SCOPE

Planning for the Project was formulated to include a 50-year horizon considering sand resource utilization and project life-spans of approximately three to four years. The proposed projects may be authorized under a 10-year permit and would allow for initial project construction and maintenance (renourishment) for up to three renourishments. Assessment of the mitigation requirements for impacts to nearshore hardbottom was computed over an indefinite (perpetual) horizon, i.e., presuming perpetual impacts to resources. If the projects were constructed on a regular basis, the anticipated impacts assume that the actions presented will be repeated for a period of at least 50 years. The anticipated project construction start date is 2016. Initial construction is anticipated to occur between November and April 30 to avoid peak sea turtle nesting season, and includes transporting sand from an upland mine(s) or from a stockpile of dredged sand located near the Phipps or Mid-Town projects. The preferred construction window for deployment of the mitigation reef is during late-spring, summer, and early fall months when sea conditions are most favorable for working offshore of Palm Beach County.

2.3. RESOURCES WITHIN THE CUMULATIVE IMPACT ANALYSIS AREA

Priority resources within the project impact area are subject to potential cumulative effects. The proposed Project, in addition to past projects and future actions, primarily affects those resources related to the nearshore hardbottom, offshore sand borrow areas, water column, dry beach and dune, dredged sand stockpile area, and upland infrastructure.

Nearshore Hardbottom. The nearshore hardbottom habitat in particular is generally considered by the U.S. Fish and Wildlife Service (USFWS) as Resource Category 2, and no net loss of in-kind habitat value is recommended. Resource Category 1 habitats include those that would be considered unique resources which cannot be replaced; however, these resources are not known to exist within this area. The amount of exposed nearshore hardbottom along Palm Beach Island fluctuates annually (FDEP, 2013). As the shorelines within the Town of Palm Beach and the County (Towns of South Palm Beach,

Lantana, and Manalapan) are eroded, hardbottom may, depending on the location, become exposed or buried. From 2000 to 2012, the total amount of exposed nearshore hardbottom along Palm Beach Island (Reaches 1-11), as determined by aerial analysis, ranged from 171 ac to 266 ac (FDEP, 2013). This range represents the highest and lowest exposed hardbottom acreages for individual years during that time period. Based on FDEP's evaluation of the Palm Beach Island projects authorized by the BMA (see Section 5.0 below) it was determined that the Town of Palm Beach has avoided and minimized impacts to the nearshore hardbottom resulting from the projects to the greatest extent practicable. FDEP also does not anticipate direct or secondary impacts associated with the projects beyond those impacts that have occurred and have been or are being mitigated for in previously permitted projects. For example, in 2004 the Town of Palm Beach constructed a 3.1 ac artificial reef to mitigate for anticipated nearshore hardbottom impacts as part of the 2006 Phipps Project. The Town of Palm Beach also constructed a 0.8 artificial reef in 2007 to comply with the federal mitigation requirement even though FDEP determined that the 3.1 ac mitigative artificial reef completely offset nearshore hardbottom project impacts (FDEP, 2013).

For the proposed Project, the anticipated permanent impacts would account for approximately 1.5%-2.3% of the historic range of exposed hardbottom acreage and the temporary impacts would account for approximately 3.6%-5.8% of the historic range of exposed hardbottom acreage along Palm Beach Island as described above. Based on time-average analysis of the amount of hardbottom exposed from 2003-2014 (described in Section 1.1), it is predicted that the Applicants' Preferred Alternative may result in permanent impacts to between 3.86 and 3.99 ac of hardbottom as well as temporary impacts to between 9.53 and 9.93 ac of hardbottom (Figures 1-3 through 1-5). The impacts acreages were used to complete a UMAM evaluation, which determined that between 6.55 and 6.66 acres of mitigative artificial reef would be required to offset these impacts to intertidal and subtidal hardbottom. Every future project in Palm Beach Island that impacts new hardbottom areas is likely to require similar mitigation to avoid unacceptable cumulative losses attributable to shoreline stabilization projects.

Offshore Sand Borrow Areas. There are three previously authorized borrow areas that have approximately 6 million cubic yards of beach compatible sand. The amount of sand is anticipated to provide approximately 23 years of sand for all of the Town of Palm Beach's future shoreline stabilization projects based on a consumption rate of approximately 270,000 cubic yards per year. The rate was calculated by dividing the anticipated amount of sand needed to build the Phipps, Mid-Town and the Preferred Alternative Project and dividing those volumes by the life expectancy of each project. Once the previously authorized borrow areas are depleted of beach compatible sand, the Town of Palm Beach would possibly seek other borrow areas or utilize upland sand sources.

Water Column. As of September 2013, the Town of Palm Beach has identified 67 public and 103 private outfalls/discharges that currently direct stormwater onto the beach and dune system. Water discharges can cause localized scour/erosion of the adjacent beach and dune system, may affect water quality of the Atlantic Ocean, may negatively influence sea turtle nests on the beach as a result of scour or modification of the local water table, or may affect natural resources in the nearshore area. The Town of Palm Beach plans to implement a ten-year program (starting at the effective date of the BMA) to remove or divert all 67 of the public outfalls/discharges. It also plans to implement an annual education campaign targeting all residents with outfalls/discharges on the beach and dune system to consider actions to reduce or eliminate any influences. Improvements in this regard may berequired by the State of Florida as part of its permit issuance for the Proposed Action. As such, the proposed action may provide a stimulus for the non-federal interests to improve urban storm water runoff.

Water quality associated with the Project may be influenced by placement of both upland sand and stockpiled dredged sand. The placement of fill would produce a temporary increase in turbidity at the fill site and adjacent waters; however, the use of a truck haul approach minimizes these impacts. It is anticipated that water quality would return to ambient conditions with regard to turbidity shortly after completion of construction. Additionally, turbidity monitoring will be required throughout construction activities, and
implementation of proper design and best management practices (BMPs) can minimize impacts due to the potential for elevated turbidity. The grain size of the sand material determines the amount of impact on organisms; elevated amounts of fine grained material can lead to long term effects, whereas smaller amounts will diminish quickly. Sand from either source must meet FDEP requirements for beach sand compatibility as per Florida Administrative Code, Rule 62B-41.007(2)(j). For the specific Project Area, any sand source must be consistent with the BMA cell-wide sediment quality specifications (FDEP, 2013). The sand source used for the County project must also meet the County's technical sand specifications outlined in the County's Annual Dune and Wetlands Restoration contract (Appendix B to the EIS). Utilizing fill material that meets the above specifications will minimize the potential project impacts to water quality.

Dry Beach and Dune. Within the Project Area (R-129-210 to R-138+551), there is currently 8.52 ac of dune area, 4.83 ac of beach area above (landward) of the berm crest and 16.34 ac of beach area below (seaward) of the berm crest. The dry beach is located between the toe of dune or scarp and the MHW line and extends along the entire Study Area, both updrift and downdrift of the Project Area. The dry beach in the Study Area is composed of carbonate-rich sediments formed from the remains of marine flora and fauna (FDEP, 1994). This area does not support much vegetation and is susceptible to wind and storm surge. It also provides recreational areas for human activities and nesting grounds for sea turtles and various species of shorebirds.

Much of the native dune system within the Study Area has been lost to beach erosion and upland development. In November 2013, a dune vegetation investigation was performed within the Study Area. The 2013 Habitat Characterization Report (CB&I, 2014) is provided as Appendix D. Areas of interest (where vegetation was identified based on aerial photography) were ground-truthed by biologists. Exposed and buried seawalls are intermittently spaced along the shoreline from R-129 to just south of R-133. Dune vegetation exists on the seaward side of buried seawalls in this area. The shoreline includes exposed seawalls south of R-133 to R-141. The dune located immediately south of Lake Worth Pier was dominated by sea oats while the dune located immediately north of the seawall at R-129 was dominated by bitter panicum grass. Seagrapes were the dominant dune vegetation identified throughout the remainder of the survey area, which terminated at R-133+500 where dune habitat ended and upland properties were bordered by seawalls instead of dunes. One exception, near R-133, was observed where dune vegetation was sparse. Overall, just less than half of the Project Area is fronted by dunes. The endangered plant species beach jacquemontia (*Jacquemontia reclinata*) was not present within the surveyed area (CB&I, 2014).

Dredged Sand Stockpile Area. The upland stockpile areas within the limits of the Mid-Town Project and the Phipps Project proposed for interim staging of the dredged material are already developed and designated as dredged-material temporary staging areas and their boundaries and function will remain unchanged. With monitoring for nesting sea turtles, shorebirds, and other species of concern proximate to the stockpile areas, no singular or cumulative significant adverse environmental impacts are anticipated from the stockpile activity. The transport of sand from the borrow area to the temporary staging area (within Mid-Town and/or Phipps) will increase vessel traffic near the Lake Worth Inlet. Transport of fill sand from the Mid-Town and/or Phipps stockpile areas to the beach site will increase truck traffic within local upland roadways during the construction period. These activities are not continuous but would occur for several months every few years. Both activities increase air pollution and carbon emissions. Equivalent activities have occurred in the past, and will continue through the present and future. Vessel and truck activities at the Inlet and stockpile area are all within existing, developed areas with similar purposes. Transport of the sand on the public roads cumulatively increases traffic and related impacts on these roads. Thus, there are no significant cumulative impacts associated with these factors.

Upland Infrastructure. The shoreline of the Study Area is comprised of hotels, condominiums, homes, and public parks, most of which are armored with seawalls (USACE, 2013; PBC-ERM, 2013). The proposed Project will increase the length of shoreline where sand is placed to mitigate beach erosion and decrease the potential for public and private property losses. Because the upland shorefront property along the

Project Area and adjacent shores is more or less fully developed, and because the proposed beach fill and level of storm protection is relatively small, the action is not anticipated to significantly alter (increase) the density of nature of upland development – when viewed in the cumulative context of past, present and future related activities. In the absence of the Proposed Action, and/or the absence of continued or future, similar beach fill actions in the overall area, it is not reasonably anticipated that development will decrease. Instead, in the absence of the Proposed Action and other beach fill actions, it is likely that property values may decrease and maintenance of the existing properties could increase, and seawalls and shoreline armoring may increase. Thus, in regard to upland development and related trends, there are no significant adverse cumulative effects anticipated with implementation of the project. Instead, adverse impacts are more likely associated with the No Action Alternative and/or the cumulative effects of discontinuing existing and future active beach management activities.

See Table 7-1 for a summary of the cumulative impacts to resources expected from future Palm Beach Island projects and project-related activities.

2.4 ACTIONS AFFECTING THE RESOURCES, ECOSYSTEMS, AND HUMAN COMMUNITIES OF CONCERN

Other significant actions that could potentially affect the resources of concern identified in this analysis (nearshore hardbottom, offshore sand borrow areas, water column, dry beach and dune, dredged sand stockpile area, and upland infrastructure) principally include adjacent beach restoration and related activities, beach lighting and urban storm water runoff (outfalls).

There are no other direct mechanical (e.g., pipeline) impacts to the hardbottom associated with the Proposed Action or other, adjacent actions. Beach fill placement along the Project Area shall be from the upland and a dredged sand stockpile (truckhaul) originating from the Phipps or Mid-Town project areas. Elsewhere in the region, where pipeline (hydraulic) delivery of beach fill material is implemented, there are no anticipated new hardbottom resource impacts. There are no other regional beach restoration activities that result in direct impact to hardbottom that have not or will not be reviewed by the USACE.

Sand fill placement within the project impact area has previously included dune restoration to partially restore sand eroded from the dune, above MHW. These activities have not advanced the beach or shoreline relative to pre-storm conditions. The sand fill for the previous activities has been from permitted upland sources or as a result of dredging offshore borrow areas. No adverse environmental effects have been identified from these activities. The Proposed Action would serve to enhance and partially replace ongoing non-federal actions for post-storm dune restoration. It would fulfill future requirements for dune restoration (in terms of both maintenance and storm protection) using high-quality, beach compatible sand from upland or offshore sources.

The historical and future placement of beach nourishment material adjacent to the project impact area can potentially result in cumulative impacts to the nearshore hardbottom and beach habitat.

An increased elevation of the beach berm combined with a loss of dune/coastal hammock vegetation may increase the exposure of the sea turtle nesting beach to artificial lighting. This lighting can lead to disorientation of nesting females as well as hatchlings, impeding their timely entry from the nest to the sea. To address this impact, to date, all beach nourishment activities along the Palm Beach County shoreline have incorporated beach lighting surveys and follow-up measures to reduce lighting impacts. The slopes, elevations and widths of the beach fill placement in the Project Area are likewise designed to minimize impacts to sea turtles. Beach lighting will be in accordance with local ordinances.

Urban storm water outfalls and discharges can cause localized scour/erosion of the adjacent beach and dune system, may affect water quality of the Atlantic Ocean, may negatively influence sea turtle nests on the beach as a result of scour or modification of the local water table, or may affect natural resources in the nearshore area.

3.0 AFFECTED ENVIRONMENT

3.1. RESPONSES BY RESOURCES, ECOSYSTEMS, AND HUMAN COMMUNITIES TO CHANGE AND THEIR CAPACITY TO WITHSTAND STRESSES

The nearshore hardbottom adjacent to the Project Area exists in a shallow, turbulent, highly dynamic, energetic and sedimentary environment. The hardbottom resources are subject to frequent burial and exposure by sand, turbidity, and abrasion. The nearshore environment where direct, indirect and cumulative impacts are anticipated is defined as the Study Area and extends from R-127 to R-141+586. Within the Study Area, aerial delineation of hardbottom resources between 2003 and 2014 revealed a highly variable range of exposed hardbottom acreage between 3.06 acres (2009) and 51.20 acres (2006). The time average amount of exposed hardbottom in this time period is 28.43 acres. The most recent delineation from 2014 aerials revealed approximately 49.77 acres of hardbottom in this area.

The natural physical stresses of the nearshore habitat limit the biodiversity and survivability of epibenthic species. Due to these conditions, some of the nearshore hardbottom within the intertidal zone is bare scoured rock or may be colonized primarily by turf algae. However, several sessile organisms are well adapted to the prevailing conditions and often cover high portions of the exposed rock. One such organism is the sabellarid polychaete *Phragmatopoma lapidosa*, which forms large gregarious colonies commonly referred to as worm rock or worm reefs (Kirtley and Tanner, 1968; McCarthy et al., 2003). The worm reef colonies are composed of sand grains cemented together to form rugose structures that add relief and structural complexity to existing natural and artificial hard bottom. The growth of worm reef depends on a combination of available hard substrate, wave energy, sediment availability, and larval supply (McCarthy et al., 2003). Wave impacts from fairly frequent to severe storms can dislodge and destroy much or almost all of the worm reef colonies that have formed upon the nearshore coquina rock outcrops. The colonies are typically reformed within a few summers thereafter (McCarthy

et al., 2003). Worm reefs support fish species and associated assemblages of organisms, such as decapod crustaceans (Gore et al., 1978); however, the 2013 characterization of the Study Area documented average wormrock cover of less than 1%. This survey did document 56 species of fish, 2 species of scleractinian corals, 4 genera of octocorals, 14 genera of macroalgae and other functional group organisms such as sponges, tunicates, hydroids, bivalves, barnacles, turf algae, anemones, bryozoans, and zoanthids.

Beach nourishment and construction of shore protection structures can introduce increased turbidity and sedimentation to the nearshore habitat. Turbidity can affect feeding, movements, and respiration in fishes. High concentrations of suspended or fine sediments can clog or abrade gills. The ability of these biota specific to the existing hardbottom resources to survive within this dynamic and turbulent environment indicates their tolerance to high levels of sedimentation, turbidity and periodic burial. Additional sediment may directly or indirectly affect the nearshore hardbottom resources. The degree to which this sediment will impart change or stress to the system is in large part associated with the amount and quality (grain size, compatibility) of the sediment, and the lines, grades and slopes to which the sediment is placed. As previously mentioned, it is anticipated that the mechanical placement of beach compatible sand will minimize these impacts.

While nesting marine turtles are adapted to a dynamic, energetic, sandy environment, non-nesting emergences may result on beaches that are overly compact due to recent beach nourishment activities. Additionally, hatching success may be adversely impacted by nests established on sand beaches with poor gas exchange, or which are subject to physical erosion or frequent inundation.

The human community (i.e. upland infrastructure) response to stresses such as erosion and storm damage have been to construct seawalls and to nourish and restore dunes within the Project Area. The No Action Alternative will not increase the capacity of the human community to withstand those stresses. The Applicants' Preferred Alternative will increase the current level of storm protection in the Project Area by adding sand to the beach and dune and will add to the resistance of the human communities against future stresses with future maintenance in the form of renourishment.

3.2. STRESSES AFFECTING RESOURCES, ECOSYSTEMS, AND HUMAN COMMUNITIES AND THEIR RELATION TO REGULATORY THRESHOLDS

Critical levels of sedimentation (in terms of thickness and temporal length of sand burial) and sedimentary abrasion affecting the survival or growth of macroalgae, wormrock, infauna and other biota associated with the nearshore hardbottom are likely cross-dependent on numerous other factors and vary with the biota, and are otherwise not definitive. Sand bars have been observed to move in and out of the nearshore habitat along the Project Area very quickly (over the course of days) making the change in volume difficult to measure.

Relevant State of Florida turbidity thresholds require that activities maintain less than 29 NTU above background levels within the mixing zone. The use of a turbidity mixing zone would be done in accordance with the 401 WQC and Rule 62-4.244(5)(c), F.A.C. It is not anticipated that the Proposed Action will result in turbidity that reaches or approaches this level due to the nature of the proposed beach fill sediment with low (<2%-3%) fines fraction, and a truck haul approach will be utilized where the sand will be placed mechanically rather than hydraulically.

Beach nourishment may affect sea turtle nesting activity if sand compaction inhibits the turtles from being able to dig and lay their nests. Standards developed by the USFWS require that measured beach compaction be less than 500 cone penetrometer units at 6 inches, 12 inches, and 18 inches below beach grade, in order that the beach be compliant with marine turtle nesting activity (else, the beach must be tilled). Monitoring for beach compaction, and subsequent tilling when required, is undertaken for all beach restoration activities in the County. The standards developed and followed in this regard have thus far appeared to be appropriate relative to their objectives.

Physical stresses affecting the human community (i.e. upland infrastructure) include waves, currents, and storms. Waves and currents transport sediments in the parallel (longshore) and perpendicular (cross-shore) directions within the littoral zone. Erosion, accretion or stabilization of the shoreline are primarily affected by this longshore transport of sediments. (USACE, 2006). The seasonal variability of storms and waves results in two distinct classes of waves, storm waves and swell waves, which have completely different effects on the beach profile (USACE, 2006). In general, storm waves erode the beach berm moving sediments to the offshore portion of the profile. Swell waves replace sediments back onshore resulting in beach accretion (Silvester and Hsu, 1993).

As of June 2015, the FDEP has classified this entire Project shoreline as "critically eroded", (FDEP, 2015); additional areas were designated within the Project Area due to the effects of Hurricane Sandy in 2012. According to FDEP (2015), "A critically eroded area is a segment of the shoreline where natural processes or human activity have caused or contributed to erosion and recession of the beach or dune system to such a degree that upland development, recreational interests, wildlife habitat, or important cultural resources are threatened or lost. Critically eroded areas may also include peripheral segments or gaps between identified critically eroded areas which, although they may be stable or slightly erosional now, their inclusion is necessary for continuity of management of the coastal system or for the design integrity of adjacent beach management projects".

3.3. BASELINE CONDITIONS FOR RESOURCES, ECOSYSTEMS, AND HUMAN COMMUNITIES

Nearshore Hardbottom. The general occurrence of nearshore hardbottom along the project impact area was described during the baseline characterization (CB&I, 2014). Aerial delineation of the nearshore hardbottom identified 49.77 acres along the Study Area shoreline (R-127 to R-141+586) in 2014.

A collection of aerial photography with sufficient clarity (in terms of water clarity, surf and turbulence, cloud cover, etc.) can assist with accurately identifying and quantifying the

amount of exposed nearshore hardbottom along this coastline, and is included in the analysis. The 2014 results represent the most recent, delineation of the hardbottom. However, a time-averaged series of aerial photographs from 2003 to 2014 were used to identify and assess impacts since there is a substantial disparity among multiple years, ranging from a high of 51.20 acres of exposed hardbottom in 2006 to a low of 3.06 acres in 2009. Persistent hardbottom is that which is constantly exposed over a given timeframe. A very small area (0.000392 acres [17.1 ft²]) of hardbottom was identified between 2003 and 2014 located approximately 350 feet north of R-133.

Sea Turtles. Baseline conditions for marine turtle nesting activities have been previously established through mostly annual monitoring conducted in Palm Beach County since before 1980. Palm Beach County beaches serve as important nesting habitat for threatened and endangered sea turtle species. Although Palm Beach County beaches comprise only 3% of the State's ocean shore length, the County accounted for 26.7% of the nesting in the State in 2015 (FWC, 2015; Palm Beach County, 2014; U.S. Census Bureau, 2012). In the same year, loggerhead, green and leatherback sea turtles accounted for 70.7%, 27.9% and 1.4%, respectively, of the nesting in the County (FWC, 2015). These three species are known to regularly nest on Palm Beach County beaches.

Water Column. Palm Beach County is one of the more heavily urbanized areas within the State of Florida. The rapid population growth is a suspected contributor to the noticeable environmental degradation of water quality along this area. These declines in water quality have been brought about mainly through the discharge of nutrient-laden sewage and storm water runoff into canals (FDEP, Division of Water Resource Management, 2003). Three major drainage canals of eastern Palm Beach County discharge into Lake Worth Lagoon (LWL). From LWL and the Atlantic Intracoastal Waterway (AICW), two maintained inlets (Lake Worth Inlet and South Lake Worth Inlet) provide access to the Atlantic Ocean; therefore, discharges and inflows eventually reach coastal waters. According to the FDEP, Division of Water Resource Management (2003), this runoff may carry bacteria, viruses, oil and grease, toxic metals, and pesticides into urban canals and eventually coastal waters. Both Lake Worth Inlet and South Lake Worth Inlet provide a mechanism for natural flushing and exchange between LWL and the Class III oceanic waters off the coast of Palm Beach County. Class III waters are defined as areas suitable for recreation and the propagation and maintenance of a healthy, well-balanced population of fish and wildlife (FDEP, Division of Water Resource Management, 2003). One of the major impediments to coastal water quality within the County is high turbidity. Turbidity, measured in Nephelometric Turbidity Units (NTU), is a measure of the loss in water clarity due to the presence if suspended particulates. The turbidity within this region is generally lowest in the summer months and highest in the winter months in relation to the frequency of storm events. This storm-induced high turbidity is caused by the re-suspension of organic matter and sediments by wave action during these storm events. High turbidity events are temporary in nature and return to lower levels within several days to several weeks following a storm, depending on the duration of the storm event.

Offshore Sand Borrow Areas. None of the alternatives being considered includes dredging directly from an offshore borrow area; however, the Town of Palm beach proposes to utilize a stockpile of dredged sand from the Phipps Project and/or the Mid-Town Project for the Project Area within the Town of Palm Beach limits. These projects dredged sand from North Borrow Area 1 (NBA1), South Borrow Area 2 (SBA2). Section 6.1 below describes the conditions of NBA1 and SBA2 in detail.

Birds. Piping plovers have been observed within the Study Area (near the Lake Worth Pier), indicating the area is utilized by this species (e-Bird, 2015a). Rufa red knots have not been documented in the Project Area but have been documented in Palm Beach County (e-Bird, 2015b). Florida sandhill cranes have been observed in Palm Beach County (e-bird, 2015c); however, the closest observation was approximately three miles west of the Project Area. Wading birds have been observed in Palm Beach County (2015d; 2015e; 2105f; 2015g). Sightings of the reddish egret and roseate spoonbill are sparse near the Project Area, while the little blue heron and tricolored heron are more common.

Human Communities. The upland developments along the shoreline in the Study Area

are comprised of hotels, condominiums, homes, and public parks, most of which are armored with seawalls (USACE, 2013; PBC-ERM, 2013a).

4.0 ENVIRONMENTAL CONSEQUENCES

4.1. CAUSE-AND-EFFECT RELATIONSHIPS BETWEEN HUMAN ACTIVITIES AND RESOURCES, ECOSYSTEMS, AND HUMAN COMMUNITIES

Anthropogenic factors that may principally, and potentially, result in substantial effects to the nearshore hardbottom communities in the project impact area would be shore protection, pollution, mechanical destruction, and overfishing. Of these, only shore protection activities are pragmatically relevant. A source of pollution may be stormwater outfalls upon the beaches, and these outfalls (67 public and 103 private outfalls/discharges) could be modified by non-federal actions in the future, particularly as the Proposed Action may be implemented. Mechanical destruction of the hardbottom (by dredging or displacement, etc.) is not known to occur or likely to occur at this location. Recreational fishing occurs along the nearshore hardbottom, from the beach and Lake Worth Pier, but is not known to be unusually frequent or abundant in the quantity of catch.

Shore protection activities can affect the nearshore hardbottom by: (1) direct burial/sedimentation by sand placement: (2) indirect burial/sedimentation by alongshore or cross-shore diffusion (transport) of sand across the hardbottom; (3) increased turbidity; (4) accumulation of sand by the construction of groins intended to entrap or stabilize sand movement; and (5) beach erosion exacerbated by seawalls and armoring.

Mechanical activities and artificial lighting along the beach can adversely impact marine turtle nesting by: (1) physical impact; (2) burial, inundation and/or exposure of nests; (3) establishment of beach sediment that is not compatible with nesting; and (4) disorientation of adults and hatchlings. Permit conditions and construction BMPs have been developed to avoid these potential adverse impacts to nesting sea turtles.

Direct burial of nearshore hardbottom may result in mortality of macroalgae and faunal epibenthic species, as well direct burial of newly settled life stages of fishes. Suspension of sediment may cause mortality to eggs and larvae of marine and estuarine fish, and a reduction in feeding in juvenile and adult fish. Settlement and shelter of juvenile fish may be reduced by the gradual burial of nearshore hardbottom habitat. Foraging sea turtles and fish could be displaced to adjacent areas of hardbottom. It is anticipated that reduced feeding success may influence survival, year-class strength, and recruitment of juvenile fish that inhabit nearshore hardbottom. For these reasons, the Proposed Action includes compensatory mitigation to serve towards replacing ecological functions potentially lost with the permanent and temporary burial of existing nearshore hardbottom in the Project Area.

4.2. MAGNITUDE AND SIGNIFICANCE OF CUMULATIVE EFFECTS

The Proposed Action is anticipated to permanently impact between 3.86 and 3.99 ac of hardbottom and temporarily impact between 9.53 and 9.93 acres of nearshore intertidal and subtidal hardbottom. Through a detailed assessment based upon field prototype investigations and related analysis, the proposed mitigation in the form of an artificial reef has been evaluated and developed in terms of its likely ability to replace ecological functions lost due to implementation of the Proposed Action. Mitigation reefs cannot be assumed to replace all ecological functions for the same suite of species or life stages that exist on natural reefs in shallower water. There are likely species-specific differences in sensory perception to water depth, wave energy, light penetration, turbidity, and other factors that may be different at the proposed mitigation site. In addition to these deterministic factors, there is an element of uncertainty associated with the colonization of newly available substrate by marine organisms that leads to variability and unpredictability. Nevertheless, over time the mitigative artificial reefs will lessen the significance of the initial adverse impact affected by direct burial of the landward edge of the nearshore hardbottom. Detailed discussion of the anticipated functional loss and functional gain associated with the biotic community and habitat at the impacted (nearshore hardbottom) and mitigation reef features is presented in the UMAM analysis

in Appendix H of the EIS and details of the mitigation plan are provided in Appendix I of the EIS.

Annual monitoring of marine turtle nesting success on Palm Beach County beaches have indicated no significant adverse impacts associated with prior or ongoing renourishment activities. The Proposed Action will utilize sand from the same sources utilized for these other activities and shall adopt similar fill placement geometries, construction restrictions and monitoring protocols.

The Proposed Action may result in a cumulative increase in sand placement along the project impact area, as it will replace dune restoration that has been periodically required by the Applicants in response to dune erosion effected by severe storms. The Town of Palm Beach has previously placed 56,000 cy of dredeged sand along the dune in Reach 8 between R-129 and R-133 trucked from the 2011 Phipps Ocean Park Beach and Dune Restoration Project. The County has placed upland sand along the dune between R-135+460 and R-137+410 as part of the South Palm Beach/Lantana Dune Restoration project which was constructed six times between 2003 and 2009. The amount of sand placed ranged from 1,000 to 11,000 cy. The Applicants' Preferred Alternative proposes to place a total of 142,800 cy of sand on the dune and the beach as opposed to only on the dune. This would include 65,200 cy of dredged sand to be placed along the Town of Palm Beach shoreline, of which 61,800 cy would be placed above MHW and 77,600 cy of upland sand to be placed along the County shoreline, of which 51,000 cy would be placed above MHW. The Proposed Action should act to ensure the beach-compatible quality of the placed sand through the placement of high-quality sand from either upland or offshore sand sources that has been successfully used on the adjacent shorelines.

4.3. MODIFICATION OR ADDITION OF ALTERNATIVES TO AVOID, MINIMIZE, OR MITIGATE SIGNIFICANT CUMULATIVE EFFECTS

Special conditions of any authorization for the proposed projects would reduce the potential for significant cumulative effects to environmentally sensitive nearshore

resources from turbidity and sedimentation through turbidity monitoring and protocols to stop all activities if the limits are exceeded.

This EIS considered eight beach-fill project alternatives, which includes the No Action Alternative. The proposed projects sought to avoid and minimize project-related impacts to the greatest extent possible while maintaining the project objectives and to likewise implement mitigation for unavoidable impacts. Development of the Projects' mitigation reef structures has been proposed and should provide probable success of the reef in replicating displaced ecological function of the impacted nearshore hardbottom, by better emulating the physical nature of the impacted resource and decreasing the possibility of subsidence of the structure.

4.4. MONITORING OF THE CUMULATIVE EFFECTS OF THE SELECTED ALTERNATIVE AND ADAPTIVE MANAGEMENT

A physical and biological monitoring program will be implemented to evaluate the preand post-construction conditions, performance and effects of the proposed beach fill placement, nearshore hardbottom, and mitigation reef. Details of this program are described in Chapter 5 (Mitigation) of the EIS. This use of adaptive management actions shall be taken based on the results of pre- and post-construction monitoring efforts.

In the present instance, the Proposed Action and its predicted effects are relatively small and reversible. The resources of the nearshore hardbottom that will be affected by the proposed sand placement exist in a dynamic environment and are adapted to naturally high sedimentation, sand abrasion, turbidity, and cyclical sand burial and exposure. The physical and temporal scales of the sand placement and resultant impacts to the beach and nearshore hardbottom are relatively small. The scale of the Project can be readily adapted to respond to the monitored effects of the Project's action, relative to the predicted effects described herein.

The project shall likewise implement monitoring during construction attendant to threatened and endangered species protection, turbidity, cultural resources, beach

compaction, beach lighting and marine turtle nesting and success, and sediment-quality assurance. These monitoring activities are described in Section 5.1 of the EIS (Environmental Commitments). Each activity includes prescribed measures for monitoring and real-time response (adaptive management) to the monitoring observations. Identical or analogous monitoring protocols and measures have been successfully utilized in the past for projects constructed within the affected region and elsewhere throughout the State of Florida.

5.0 PALM BEACH ISLAND PROJECTS AUTHORIZED BY THE BMA

The following sections describe the Palm Beach Island projects currently authorized by the Beach Management Agreement (BMA) (FDEP, 2013).

5.1. LAKE WORTH INLET MAINTENANCE DREDGING

The permitted activity is periodic maintenance dredging (202,000 cy average annual volume [FDEP, 2013]) by USACE Permit No. 0216012-001-JC of the entire navigationrelated complex at Palm Beach Harbor/Lake Worth Inlet. The BMA authorizes the Town of Palm Beach to become a co-applicant with the U.S. Army Corps of Engineers (USACE) for the placement of beach quality sand from the dredging activity and to use the sand placement sites identified below. Dredged material will be placed within the beachnearshore template. The berm will have an elevation of approximately +8.7 feet (MLW), with a 1V:20H seaward slope. Placement of material may begin immediately south of the south jetty, and proceed in a southerly direction approximately 3,450 feet near FDEP Rmonument R-79. If the authorized beach placement area immediately south of the Lake Worth Inlet is filled, then beach-quality sand may be placed within the Mid-Town Beach or the Phipps nourishment template. Within the entrance channel (between USACE Stations 25.0 and 56.0), shoals of less than 5,000 cubic yards may be transferred to deeper parts of the channel to temporarily alleviate navigational hazards. The construction activity will adhere to a Sediment Quality Control/Quality Assurance Plan that was approved by the Department on July 20, 2006.

5.2. LAKE WORTH INLET SAND TRANSFER PLANT

Under the BMA, the FDEP authorizes improvements to the sand transfer plant owned by the Town of Palm Beach at Lake Worth Inlet and authorizes the operation and maintenance of the sand transfer plant. Construction improvements include a new pump house facility immediately adjacent to the existing bypass plant on the north jetty of the Lake Worth Inlet and the construction of an additional discharge pipeline. The new facility will also house a booster pump for a second pipeline to transport material from the north jetty approximately 4,500 feet south to an alternate discharge point near R-79 within Reach 2 in the Town of Palm Beach. The BMA authorizes the new pipeline to be directionally drilled beneath the inlet channel and remain below the sea bottom until it reaches a beach discharge structure anchored to pilings and enclosed in architectural formwork on the beach.

During the operation phase, the FDEP authorizes the bypassing of approximately 162,000 cubic yards of beach-quality sand per year to the beach on the south side of the inlet. Material discharge rates from the bypassing plant will be less than 5,000 cubic yards per day and on an intermittent basis as coastal littoral transport processes move sand to the intake pipe of the bypassing plant on the north jetty. The Town of Palm Beach will utilize the two discharge pipelines as needed to maintain the beach in Reach 1 and Reach 2, and protect the shore-based discharge pipeline structure located immediately south of the inlet.

5.3. MID-TOWN BEACH NOURISHMENT PROJECT

The BMA authorizes periodic beach nourishment to maintain the beach restoration project located in the central portion of the Town of Palm Beach between R-89 and R-102 (Reaches 3 and 4), and maintenance repairs to the eleven existing groins. In conjunction with this activity, the FDEP authorizes the construction and maintenance of one additional groin located at R-99.3.

The beach fill design consists of a 25-foot wide design berm plus advance beach nourishment placed seaward of the design berm at an elevation of +9 feet NGVD for an average construction berm width of 180 feet. The beach construction berm is designed to a 1V:10H (vertical; horizontal) slope. The volumetric amount will be based on existing site conditions at the time of construction, but will not exceed the permitted template. The Department authorizes the Town of Palm Beach to obtain beach compatible sand from offshore borrow areas (see Section 6.0). Alternatively, the Town of Palm Beach may obtain beach compatible sand from an approved upland source consistent with the cell-wide sand specifications outlined in Article D-2 and truck-hauled to the beach through designated beach maintenance access sites. If beach compatible sand becomes available from the maintenance dredging of Lake Worth Inlet by the USACE, it may also be used as fill material for the portion of this beach template located between R-monuments R-95+108 feet and R-101.4.

The Department authorizes repairs and maintenance to the eleven groins constructed in conjunction with the 1995 beach restoration (FDEP File No. 50-273953-9 and DBS9A0352-PB) not to exceed the parameters of the original design as shown in the approved plans and specifications. The groins are spaced approximately 325 feet apart on average and vary in length from 88 feet to 167 feet with a crest elevation at +6.0 feet NGVD, toe at approximately -1.0 feet NGVD at the landward end and approximately -4.0 feet at the seaward end. In addition, the construction and maintenance of one additional groin is authorized near the south limits of the project area at R-99.3. The authorized groin will be 98 feet long in the shore-normal direction and 12 feet wide at the crest. The sand placement described above will completely cover the groin.

5.4. PHIPPS OCEAN PARK BEACH RESTORATION PROJECT

The BMA authorizes periodic beach nourishment to maintain the beach restoration project located in the south portion of the Town of Palm Beach (Reach 7) between R-119 and R-125 and periodic placement of sand to maintain the restored dune in the northern portion of Reach 7, from R-116 to R-119. In addition, the FDEP authorizes beach restoration and periodic beach nourishment between R-monument R-125 and the northern boundary of

the Lake Worth Municipal Park at R-monument R-127 (previously the northern segment of Reach 8). Construction and maintenance of these three contiguous segments may be conducted separately or together and material may be stockpiled on the berm between R-119 and R-126 to replenish the restored dune.

The beach fill design from R-119 to R-127, consists of a +9 feet NGVD berm elevation with an average construction berm width varying from 190 feet to 455 feet. The restored dune has a typical crest width of 25 feet at an elevation of +16 feet NGVD, with a 1V:3H slope down to the beach berm, except north of R-119 where the dune crest is +10 feet. The volumetric amount will be based on existing site conditions at the time of construction, but will not exceed the permitted template.

The BMA authorizes the Town of Palm Beach to obtain beach compatible sand from offshore borrow areas (see Section 6.0), or any offshore source consistent with the cell-wide sand specifications in Article D-2 of the BMA. Alternatively, the Town of Palm Beach may obtain beach compatible sand from an approved upland source consistent with the cell-wide sand specifications and truck-hauled to the beach through designated beach maintenance access sites, including the proposed Project Area in Reach 8. The Phipps Project includes periodic dune restoration south of the Lake Worth Pier in Reach 8. The dune-only portion, from R-129 to R-134 (within Reach 8), will be constructed to an elevation of +10 feet NAVD with a 1V:3H slope.

5.5. PALM BEACH GROIN REHABILITATION

The BMA authorizes repair, rehabilitation, or removal of existing groins within the Reaches 2, 4, 5, and 6, as described in the 2011 Coastal Structures Plan for the Town of Palm Beach. The adaptive management strategy for this authorization includes revising the list of groins needing repair, rehabilitation, or removal, and updating the list of groins provided in Table 4 of the BMA.

In August 2015, a BMA Individual Project Approval (IPA) permit application was submitted to FDEP which included a total of 124 groin structures that have been identified within Reaches 2 through 6 of the Town of Palm Beach. Of the 124 groins identified, it is anticipated that 75 of them will require some level of work. Thirty-four (34) groins are expected to be removed to the greatest extent practicable based on the condition of the beach at the time of construction. Forty-one (41) groins are expected to be removed and replaced with a concrete king pile and panel groin (Table 5-1). The modular nature of the pile and panel groin allows the structure to be adjusted and customized to resemble the size and dimensions of the groins to be replaced. The pile and panel groins also allows for the structure to be adjusted following construction if needed.

Reach	Structure	Approximate Structure
	G82084	160
	G80897	120
	G76093	150
	G74650	100
	G73655	200
Reach 2	G73376	210
	G73073	220
	G72800	240
	G72426	190
	G72010	170
	G71633	150
	G71208	120
	G70910	230
	G70651	210
Reach 3	G70451	230
	G70027	90
	G69813	180
	G68412	240
	G60352	230
	G59940	240
Reach 4	G59451	240
	G59002	230
	G58554	200
	G57512	70
	G57312	140
	G57136	170
	G56253	170
	G54947	200
	G54602	200
	G51896	160
	G51225	240
Reach 5	G50946	230
	G50601	230
	G50249	180
	G49866	210
	G49583	210
	G49351	210
	G49088	200
	G48818	190
	G48015	70
Total	41	7.530

Table	5-1	I ist of	aroins	that	have	been	renaired	rehabilitated	or	removed
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5.6. DUNE AND BACKSHORE BERM RESTORATION AND MAINTENANCE

The BMA authorizes the BMA Participants to construct artificial dunes within the Agreement Area as described below. Artificial dunes constructed in the Agreement Area are intended to protect upland properties and to protect and enhance habitat. The FDEP identified segments of shoreline within the Agreement Area with conditions suitable for the construction of sustainable dune features and developed procedures the BMA Participants must follow to construct dunes on those shorelines. Implementation of this Article will not only meet the goals stated above, but also provide more efficient and predictable permitting of artificial dunes in the Agreement Area.

The FDEP identified four dune conditions, permittable by the BMA, based on aerial and visual inspection of existing dunes, armoring, beach widths and elevations within the Agreement Area. These areas are identified in BMA Appendix A-4. Condition 1 is excellent for dune restoration projects, having a wide and elevated back beach berm. Condition 1 shorelines contain the island's best existing dune features. Condition 2 is good or appropriate for dune projects, having a sufficiently wide back beach berm on which fill can be placed. These shorelines are often steep and armored and, for this reason, the sustainability of the dune feature is lower. Condition 2 dunes could be considered sacrificial, meaning dunes constructed in these locations will likely provide temporary relief from coastal erosion until persistent wave activity transports material from the template. Condition 3 is poor for dunes, as constructed dunes are likely not sustainable and are subject to erosion from high frequency storms. Condition 4 includes the dune and backshore berm designs for the Mid-Town and Phipps projects.

The BMA Participant may use an offshore borrow area to obtain beach compatible sand that is stockpiled during beach nourishment and then transported to the dune restoration site. Alternatively, beach compatible sand may be obtained from an approved upland sand source consistent with Article D-2 of the BMA. This would allow the placement of artificial dunes in new locations or the restriction of dune placement in others. Changes in areas authorized for dune placement will require a formal amendment of the Agreement. BMA Participants wishing to construct a dune must meet the criteria set forth in Appendix D of BMA, and submit the information required in Appendix F-1. Before constructing a dune, the BMA Participant must follow the authorization procedures in Article I.

6.0 PREVIOUSLY AUTHORIZED OFFSHORE BORROW AREAS

Based upon the information and analysis provided by the Applicant, the material to be excavated from the proposed borrow areas for placement in the beach project areas is expected to maintain the general character and functionality of the material occurring on the beach and in the adjacent dune and coastal system pursuant to Rule 62B41.007(2)(j), F.A.C. The proposed borrow areas include at least a 1000-foot buffer between the borrow area and any adjacent hardbottom. Potential borrow areas are shown in Figure 1-6. The 2016 nourishment of Phipps and Mid-Town dredged sand from offshore borrow areas NBA1 and SBA2; however, SBA3 is also included in the description below because the Town may use it for future nourishment events.

6.1. OFFSHORE BORROW AREAS NBA1, SBA2 AND SBA3

6.1.1. NORTH BORROW AREA 1 (NBA1)

North Borrow Area 1 is a southward extension of the borrow area used for the 2009 Juno Beach Restoration Project and is located 1 to 2 miles north of Lake Worth Inlet in water depths between 40 and 60 feet approximately 2,500 feet offshore of Singer Island (Figure 1-6). The coarsest material within this borrow area occurs along the offshore boundary. In general, the coarser material is a subsurface layer 5-10 feet thick under several feet of fine sand. The estimated 2.8 million cubic yards of material within NBA1 is based on a nominal cut thickness of 15 feet. Core composite values range from 0.25 to 0.31 mm with a composite value for NBA1 of 0.276 mm and silt content of less than 2%. Based on the data provided, the selected regions of the North Borrow Area 1 contain beach compatible material (FDEP, 2013).

6.1.2. SOUTH BORROW AREA 2 (SBA2)

South Borrow Area 2 is adjacent to Reach 7 and Phipps Ocean Park between R-110 and R-120 in water depths of 24-36 feet between the first and second reef (Figure 1-6). The estimated volume of 1.68 million cubic yards is based on a nominal cut thickness of 10 feet. The cores collected show a mix of fine sand and shell fragments. Some of the cores contain coral or rock fragments. Although a few scattered rock fragments were found in the cores, the occurrence of the rock fragments was not extensive enough to identify continuous lenses or layers of rock rubble. Core composite values range from 0.21 to 0.36 mm with a composite value for SBA2 of 0.29 mm and silt content of approximately 1% (FDEP, 2013).

6.1.3. SOUTH BORROW AREA 3 (SBA3)

South Borrow Area 3 is adjacent to Reach 8 from Lake Worth Pier (South of R-128) to the city limits of the Town of Palm Beach (R-134) in water depths of 20-35 feet (Figure 1-6). SBA3 is located landward of Borrow Area III (R-127 to R-130) and immediately adjacent to Borrow Area IV (R-132 to S of R-134) used for the Phipps permit. SBA3 is same location as Borrow Area V proposed for Reach 8, only with slightly modified boundaries. The estimated volume of 1.83 million cubic yards is based on a nominal cut depth of greater than 10 feet. The cores show a mix of fine sand and shell fragments, and some contain rock and coral fragments. Core composite values range from 0.17 to 0.33 mm with a composite value for SBA3 of 0.25 mm and silt content of approximately 1%. Based on the data provided, the majority of the South Borrow Area 3 study area contains beach compatible material (FDEP, 2013).

6.2. APPROVED MIXING ZONES

Relevant State of Florida turbidity thresholds require that activities create less than 29 NTU above background levels within the approved mixing zone. The use of a turbidity mixing zone would be done in accordance with the 401 WQC and Rule 62-4.244(5)(c), F.A.C. Temporary mixing zones for each of the two beach nourishment projects already

authorized (Mid-Town and Phipps) would be implemented in order to construct the projects. A mixing zone of 150 meters offshore and downdrift would be implemented in accordance with state water quality standards for the Mid-Town beach nourishment activities. A mixing zone of 1000 meters downdrift and 300 meters offshore for the nearshore and beach placement site for the Phipps Project beach nourishment activity would be implemented in accordance with state water quality standards. This mixing zone shall only be valid during the construction period of the proposed activities. The Applicants have not requested a variance to the standard mixing zone at this time for the proposed project. In any event, they would be required to monitor the waters within the Project Area to avoid water quality degradation (FDEP, 2013).

7.0 CUMULATIVE IMPACTS TO RESOURCES

Table 7-1 summarizes cumulative impacts, both positive and negative, that are expected to result from continued construction of coastal projects on Palm Beach Island, including all activities associated with those projects authorized by the BMA (see Section 5.0) and with the proposed Southern Palm Beach Island Comprehensive Shoreline Stabilization Project. Impacts to wildlife, habitat, and the human environment are considered. These resources were identified during the scoping process and EIS preparation. As stated in Section 2.2, the temporal scope of this analysis is 50 years, The proposed projects may be authorized under a 10-year permit and would allow for initial project construction and maintenance (renourishment) for up to three renourishments. If the projects were constructed on a regular basis, the anticipated impacts summarized in Table 7-1 assume that the actions presented will be repeated for a period of at least 50 years.

Impacts to Resources	Dredging of Borrow Areas and Inlets	Lake Worth Inlet Sand Bypassing	Transport of Sand from Mines	Placement of Sand on Beach and Dune (Above MHW) (excludes inlet bypassing)	Placement of Sand in Nearshore Marine Habitat (Below MHW)	Groin Construction/Rehabilitation	Construction of Artificial Reefs
Nesting Sea Turtles and Loggerhead Terrestrial Critical Habitat Unit LOGG-T- FL-12	NA	Bypassing activities may occur during turtle nesting season. Construction of two additional discharge pipelines as proposed in the BMA would expand the impact area affected by bypassing. Compaction or other physical and chemical changes may impact nesting. Continued bypassing activities mean repeated disturbance to the habitat, but also maintain the stability of nesting beaches on Palm Beach Island.	NA	Construction will avoid peak nesting season and will use compatible sand. However, compaction or other physical and chemical changes may impact nesting. Compaction will be mitigated by annual testing and tilling. Artificial lighting could lead to disorientation of nesting females and hatchlings. Lighting will be in accordance with local ordinances and permit conditions. Continued projects mean repeated disturbance to the habitat, but also maintain the stability of nesting beaches on Palm Beach Island.	Construction will avoid peak nesting season.	Construction will avoid peak nesting season. Post-construction, groins may impede access to/from the beach for nesting/hatchling sea turtles. Groins may also cause downdrift erosion to sea turtle nesting habitat. However, the structures also help to stabilize beach habitat. Artificial lighting could lead to disorientation of nesting females and hatchlings. Lighting will be in accordance with local ordinances and permit conditions.	NA
Swimming Sea Turtles and Loggerhead Marine Critical Habitat Unit LOGG-N-19	Hopper dredging, and sometimes cutterhead dredging, occasionally results in sea turtle entrainment and death. The noise generated during dredging may also deter swimming sea turtles from the borrow and nearshore area. Turtle trawling for hopper dredging may be required by permits and or the NMFS Biological Opinion thus minimizing the impact to turtles.	NA	NA	NA	Burial of nearshore hardbottom could prove to have detrimental effects for juvenile green sea turtles by reducing the available foraging haibtat. However, it is estimated that this will be only a minor adverse effect and these impacts will be mitigated for through artificial reefs. Sea turtles may also be negatively impacted by turbidity and/or noise during the construction period.	In-water construction for the Project is unlikely due to the location of the nearshore hardbottom formations which will prevent barges from approaching the shoreline. However, the Palm Beach Groin Rehabiliation project may require in-water construction activities. All vessels will comply with NMFS Sea Turtle and Smalltooth Sawfish Construction Conditions (NMFS, 2006) in order to minimize direct impacts to swimming sea turtles during construction or maintenance of groins.	All vessels will comply with NMFS Sea Turtle and Smalltooth Sawfish Construction Conditions (NMFS, 2006) in order to minimize direct impacts to swimming sea turtles during construction of artificial reefs. Noise during construction may deter sea turtles from the area.
Florida Manatee	Manatees are rarely observed in water depths associated with the offshore borrow areas, so impacts from dredging the borrow areas are negligible. Dredging in the authorized channel may increase the potential for impacts to manatees. All vessels will comply with <i>Standard Manatee</i> <i>Construction Conditions for In-</i> <i>Water Work</i> (FWC, 2011) to reduce the potential for manatee impacts.	NA	NA	NA	There exists the possibility of increased turbidity and noise disturbing the animals during construction. These small disturbances are not anticipated to have major impacts. However more frequent nourishment projects may result in larger impacts.	If the groins are installed or repaired using in-water methods, direct impacts to manatees include the possibility of vessel strike. However, all vessels will comply with <i>Standard</i> <i>Manatee Construction Conditions for</i> <i>In-Water Work</i> (FWC, 2011) to reduce the potential for manatee impacts.	During construction of artificial reefs, direct impacts to manatees include the possibility of vessel strike. However, all vessels will comply with Standard Manatee Construction Conditions for In-Water Work (FWC, 2011) to reduce the potential for manatee impacts.

Table 7-1. Cumulative in	npacts expected	from Palm Beach I	sland projects and	project-related activities.

Impacts to Resources	Dredging of Borrow Areas and Inlets	Lake Worth Inlet Sand Bypassing	Transport of Sand from Mines	Placement of Sand on Beach and Dune (Above MHW) (excludes inlet bypassing)	Placement of Sand in Nearshore Marine Habitat (Below MHW)	Groin Construction/Rehabilitati on	Construction of Artificial Reefs
Smalltooth Sawfish	Dredging an offshore borrow or inlet increases potential for impacts with smalltooth sawfish, however NMFS has determined that there has never been a reported take of a smalltooth sawfish by a hopper dredge (NMFS, 1997). All vessels will comply with NMFS Sea Turtle and Smalltooth Sawfish Construction Conditions (NMFS, 2006).	Sand placed from bypassing may be transported into the marine environment. Potentially increased turbidity levels during bypassing activities are unlikely to impact sawfish, due to the rarity of their occurrence over nearshore hardbottom adjacent to Palm Beach Island.	NA	NA	Construction related turbidity and noise may disturb smalltooth sawfish. With mitigation measures in place, however, it is believed that the potential for smalltooth sawfish "take" will be greatly reduced (NMFS, 2006). Smalltooth sawfish are expected to avoid the small habitat area used during construction. However more frequent nourishment projects may result in larger impacts.	If the groins are constructed or rehabilitated using in-water methods, direct impacts to smalltooth sawfish include the possibility of vessel strike. However, all vessels will comply with NMFS Sea Turtle and Smalltooth Sawfish Construction Conditions (NMFS, 2006) in order to minimize impacts.	All vessels will comply with NMFS Sea Turtle and Smalltooth Sawfish Construction Conditions (NMFS, 2006) in order to minimize direct impacts to smalltooth sawfish during construction of artificial reefs. Noise during construction may deter smalltooth sawfish from the area.
Coral and Hardbottom	All BMA-approved borrow areas (FDEP, 2013) include at least a 1000 ft buffer between the offshore borrow areas and hardbottom habitat. Turbidity and biological monitoring will also be conducted as required.	Sand placed from bypassing may be transported into the marine environment. Sand bypassing activities may eliminate need for larger scale renourishments in Reaches 1 and 2.	NA	Sand placed above MHW may be transported into the marine environment at low rates.	With each nourishment project, sand is repeatedly placed on areas of intertidal and nearshore habitat, and spreading impacts areas farther offshore. Mitigative artificial reefs have been constructed for previous BMA projects, and will be constructed to offset hardbottom impacts from the proposed Project.	Project Groins will be placed with a buffer between the structures and hardbottom. BMA groins will be placed with a buffer between the structures and hardbottom to the maximum extent practicable. If impacts are caused, mitigation will be required.	Artificial reef sites have been/will be determined to avoid placement over hardbottom and will maintain at least a 25 ft buffer from adjacent hardbottom. Artificial reefs replace ecological function lost when hardbottom is buried.
Birds	No known effects.	Bypassing activities cause temporary disturbance and disruption of normal activities such as roosting and feeding, and possibly forcing birds to expend additional energy reserves to seek available habitat elsewhere, but may offset the need for larger scale episodic nourishments.	NA	Construction causes temporary disturbance and disruption of normal activities such as roosting and feeding, and possibly forcing birds to expend additional energy reserves to seek available habitat elsewhere.	Burial of infauna temporarily decreases the available food source for some shorebirds, forcing them to move to another area.	Construction causes temporary disturbance and disruption of normal activities such as roosting and feeding, and possibly forcing birds to expend additional energy reserves to seek available habitat elsewhere.	NA
Florida Panther	NA	NA	Increased traffic and noise disturbance may impact the Florida panther along the truck routes (FWC, 2012). As offshore sand is depleted, upland mines may be used more often, leading to greater cumulative impacts.	NA	NA	NA	NA

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Impacts to Resources	Dredging of Borrow Areas and Inlets	Lake Worth Inlet Sand Bypassing	Transport of Sand from Mines	Placement of Sand on Beach and Dune (Above MHW) (excludes inlet bypassing)	Placement of Sand in Nearshore Marine Habitat (Below MHW)	Constr
Dune Vegetation	NA	Sand placement from bypassing activities will provide more sand to the dry beach in the permitted fill templates. This may increase the overall sand available to the dune vegetation system in those areas.	NA	Construction of beach and dune projects will aim to enhance dune habitat with minimum impacts to existing dune vegetation. Dune vegetation plans may be implemented to enhance dune projects.	NA	Groin con impacting impacts mitigated
Recreation	Potential for temporary decreased water clarity due to elevated turbidity during construction; potential to affect fishing conditions.	Increased area for recreational use though the bypassing area has limited access for the general public. There will be a temporary disturbance during bypassing activities near the discharge pipes on the dry beach.	Heavy truck use along State Road A1A may deter bicycling temporarily.	Increased area for recreational use; temporary disturbance during construction activities due to limited site access.	Potential for temporary decreased water clarity due to elevated turbidity during construction; potential to affect fishing conditions.	Increase use of th disturbar activities access.
Aesthetics	Temporary impact due to presence of offshore dredge and support vessels and pipelines to shore.	No known effects.	Increased traffic and noise disturbance may impact aesthetics located along truck routes.	Temporary impact due to construction equipment on the beach; long-term improvement due to wider beach.	Temporary impact due to construction equipment on the beach; long-term improvement due to wider beach.	Tempora construc beach; lo due to w
Water Column	Temporary, localized increase in turbidity during dredging activities; turbidity monitoring will ensure water quality standards are maintained.	Temporary, localized increase in turbidity during bypassing activities. No known impact to water quality.	NA	NA	Temporary, localized increase in turbidity during sand placement; turbidity monitoring will ensure water quality standards are maintained.	Tempora in turbidi construc monitorir quality st maintain

Table 7-1 (cont.). Cumulative im	pacts ex	pected from	Palm B	Beach Island	projects	and pro	piect-related	activities.
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Groin ruction/Rehabilitation	Construction of Artificial Reefs
onstruction will avoid og dune vegetation. If occur,they will be d for.	NA
ed area for recreational ne beach; temporary nce during construction s due to limited site	Potential for decreased water clarity due to elevated turbidity during construction; potential to affect fishing conditions. Artificial reefs provide recreational opportunities for diving, snorkeling and fishing.
ary impact due to ction equipment on the ong-term improvement <i>i</i> der beach.	Temporary impact due to presence of offshore vessels.
ary, localized increase ity during groin ction; turbidity ng will ensure water tandards are ned.	Temporary, localized increase in turbidity during artificial reef construction; turbidity monitoring will ensure water quality standards are maintained.

8.0 CONCLUSION

The impacts presented in Table 7-1 include temporary and/or permanent impacts to resources. Compensatory mitigation has been or will be provided due to anticipated impacts to nearshore hardbottom resources. When considering cumulative impacts from all Palm Beach Island projects for the next fifty years, these temporary impacts will be repeated regularly within the system. The Town of Palm Beach and the County have already taken the forward thinking approach of managing and planning their coastal projects with a more holistic approach, rather than treat their projects on a separate standalone basis. The BMA was implemented to develop a coordinated, long-term process that facilitates predictable approval of gualifying coastal erosion control and inlet management activities within the Palm Beach Island coastal cell (Lake Worth Inlet to the South Lake Worth Inlet). The BMA is enabling the Town of Palm Beach, the County, and state and federal agencies to plan, authorize and monitor coastal projects in this area with a regional approach. The monitoring required by the BMA as well as monitoring required for the proposed Project should provide a vehicle to gain a better understanding of the cumulative impacts from these projects, and may improve the way these projects (or similar ones in the state) are implemented in the future.

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