The Mitigation and Restoration Strategies for Habitat and Ecological Sustainability (MARSHES) Initiative

Saw Mill Creek Pilot Wetland Mitigation Bank
Staten Island, New York

Functional (Ecological) Assessment

Submitted to:
The Interagency Review Team (IRT)
U.S. Army Corps of Engineers, Chair
New York, NY
Application Number NAN-2013-00259-EHA

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November 2013

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1.0 INTRODUCTION

To support the establishment of the Saw Mill Creek Pilot Wetland Mitigation Bank (Pilot Bank), the New York City Economic Development Corporation (NYCEDC) is employing a functional assessment methodology to determine wetland mitigation credits generated by the proposed ecological improvements. This approach is consistent with the *Final Rule for Compensatory Mitigation for Losses of Aquatic Resources* (33 CFR Parts 325 and 332 and 40 CFR Part 230) which encourages the use of functional assessment metrics as a basis to establish bank credits.

Specifically, 33 CFR 332.8(o)(3) states that "The number of credits must reflect the difference between pre- and post-compensatory mitigation project site conditions, as determined by a functional or condition assessment." This report provides:

- the basis and justification for the use of the functional (ecological) assessment methodology, Uniform Mitigation Assessment Method (UMAM), at the Pilot Bank,
- a detailed description of UMAM,
- the findings of an initial application of the method,
- a discussion of how UMAM was adapted for use within tidal areas of New York City; and,
- the findings from the application of UMAM to the Pilot Bank.

UMAM was developed with the purpose of providing a standardized methodology to assess functions of wetlands and surface waters for baseline conditions, the measurable reduction of functions due to impacts, and the amount of mitigation required to offset the impacts. The method also allows for the determination of functional uplift and the number of mitigation bank credits that could be generated for a proposed bank project.

2.0 MITIGATION BANK CREDIT GENERATION

The overall goal of compensatory wetland mitigation is to provide suitable compensation that will meet the federal policy of No-Net-Loss of wetland functions and services first established by Executive Order 11990 under President George H.W. Bush in 1990 and supported in subsequent administrations. Compensatory mitigation is typically provided in the form of wetland restoration, establishment (creation), enhancement or preservation, or a combination of these approaches. The expected outcome is a net increase in wetland functions and services.

The National Research Council published guidelines for the improvement of wetland mitigation (NRC, 2001) which included the use of wetland functional assessments to determine appropriate wetland mitigation ratios; this was further supported by the 2008 *Final Rule for Compensatory Mitigation for Losses of Aquatic Resources* (2008 Mitigation Rule). While there are many different models and approaches nationally, presently there are few models appropriate for use in the New York City region. In addition, the models or assessment methods are typically not designed to estimate the amount of mitigation required or bank credit generation.

For each mitigation approach, some U.S. Army Corps of Engineers (USACE) Regulatory Districts' and State agencies have employed the use of mitigation ratios to determine the amount of mitigation area required to offset a certain area of impact. This practice has also been extended to mitigation banks. The New York State Department of Environmental Conservation (NYSDEC) does not have set mitigation ratios for different mitigation approaches, but addresses each mitigation project on a case by case basis.

With the implementation of the 2008 Mitigation Rule, the USACE and the United States Environmental Protection Agency (USEPA) clearly set a preference for the use of ecological assessments as the means to establish the number of credits generated from a mitigation bank. As stated in the §332.8(o)(3) of the Rule:

> "Credit production. The number of credits must reflect the difference between pre- and post-compensatory mitigation project site conditions, as determined by a functional or condition assessment or other suitable metric".

Presently, functional assessment tools have been used within the USACE New York District to demonstrate that a proposed mitigation approach would result in an ecological uplift if implemented, and provided the justification to regulatory agencies to issue permits. The methods used have limitations in that the results are not quantifiable into a single unit and easily translated into mitigation credits. The use of UMAM as an ecological assessment method to determine the credits generated from a wetland mitigation bank offers several advantages over the alternative approach of using a more arbitrary and less scientific approach of applying negotiated mitigation ratios. The advantages include:

- Practical process that relies on reasonable scientific judgment;
- Can be applied within typical permit and bank development timeframes;
- The credit generation process is linked to a measurement of ecological uplift obtained from proposed actions;
- Method assesses both existing conditions and post-restoration conditions to generate an overall score or measurement of ecological uplift for a single assessment area, which is then converted to credits; and
- Provides consistent determination process and encourages collaboration between regulatory agencies and bank sponsors.

Based on these advantages, the use of UMAM was determined to be the preferred approach for defining the ecological uplift and credit generation for the Pilot Bank.

3.0 DESCRIPTION AND APPLICATION OF THE UNIFIED MITIGATION ASSESSMENT METHOD

3.1 Description of Methodology

The Uniform Mitigation Assessment Method (UMAM) was developed in 2004 by the Florida Department of Environmental Protection (FDEP) and various Water Management Districts

(WMDs) in response to the need to better track wetland functional losses and gains from impacts and mitigation projects and banks. The methodology provides a standardized framework to assess wetland functions for baseline and post-mitigation conditions for assessment areas using a qualitative description and quantitative scoring.

Part I of the assessment method is a qualitative characterization process that summarizes available descriptive information of the assessment area and surrounding features. Information sources include online databases, wetland field guides or other relevant publications, and information gained from a field visit. The purpose of the qualitative assessment is to provide a sufficient amount of detail about the assessment area to evaluate and identify the functions and wildlife resources associated with the site. This "frame of reference" informs the second part of the assessment method, the quantitative assessment.

Part II of the assessment method is a quantitative assessment of three broad Functional Assessment categories: Location and Landscape Support, Water Environment, and Community Structure. Each of these sections are characterized using a series of guidance statements defining the attributes or functions of the assessment area that are each scored on a scale of 0 to 10. A score of 10 indicates that the function or attribute is optimal within the assessment area, and a score of 0 indicates the function or attribute is absent. This portion of the assessment method relies on best professional judgment, site knowledge of the evaluator(s) and the interpretation of guidance statements.

For each of the three functional assessment categories, an overall score of the assessment area for current and proposed conditions is estimated (not averaged) based on the evaluators' interpretation of the individual attribute score assignments. The scores are then used to calculate mitigation ratios or mitigation bank credits for the assessment areas. The UMAM also includes score adjustments or modifiers for preservation, time lag, and risk factors.

While the methodology was originally prepared for use in Florida, it has since been used in other states. The qualitative assessment process in Part I is sufficiently general to be applicable to New York wetland systems since it relies on information obtained from State and local sources as well as a site visit. The field procedures and data collection conducted during the site visit corresponds to the same approach typically employed for a wetland mitigation site selection evaluation.

The quantitative assessment in Part II utilizes specific guidance statements that define attributes or functions of the assessment area. Since the method was developed for use in freshwater and tidal wetlands in Florida, certain aspects of the guidance statements and supporting documentation and examples are not applicable to tidal wetlands in the NYC region; however, the majority of the guidance statements are appropriate for use. In addition, the functional assessment categories of Location and Landscape Support, Water Environment, and Community Structure each encompass a range of attributes that cover tidal wetland functions and services associated with tidal wetlands in New York City. Table 1 depicts the correlation between UMAM functional assessment categories and corresponding tidal wetland functions and services described in the *New York State Salt Marsh Restoration and Monitoring Guidelines* (NYSDOS and NYSDEC, 2000).

Table 1: UMAM Functional Assessment Categories with Attribute Guidance Correlated to Tidal Wetland Functions and Services

UMAM Functional Assessment Category	Tidal Wetland Functions and Services, NY
Location and Landscape Support	Provision of Habitat
	Support of Food Web Dynamics
	Storage of Floodwater
Water Environment	Provision of Habitat
	Support of Food Web Dynamics
	Cycling of Nutrients
	Export of Organic Matter
	Attenuation of Wave Energy
	Enhancement of Sedimentation/Accretion
Community Structure	Provision of Habitat
	Primary Production
	Support of Food Web Dynamics
	Cycling of Nutrients
	Removal of Contaminants
	Enhancement of Sedimentation/Accretion

3.2 Evaluation and Application of UMAM to the Pilot Mitigation Bank

3.2.1 Potential Credit Generation

The potential credit generation using the UMAM methodology was first evaluated using a subset of the Pilot Bank area that represents potential wetland enhancement, restoration, and buffer enhancement mitigation approaches.

The procedure as outlined above was followed beginning with Part I – Qualitative Characterization, which required the team to identify information sources that served the equivalent purpose and provided similar information to that required by the UMAM. Equivalent information was readily available from several sources, including the *New York State Salt Marsh Restoration and Monitoring Guidelines* (NYSDOS and NYSDEC, 2000), the *Ecological Communities of New York State, 2nd Edition* (NYNHP 2002), and various online data sources. Aerial photographs and *Bing* Birds-Eye View imagery was used to assess site conditions during the initial evaluation of UMAM procedures.

Part II of the methodology was completed utilizing a team approach to evaluate each attribute and assign scores following the guidelines included in the methodology. In the absence of detailed site knowledge, a conservative approach was taken when selecting attribute scores. Also as part of this process, each question was evaluated for its relevance to tidal wetlands, particularly in the northeast and New York City region. This UMAM evaluation process was useful in evaluating functional category attributes that required rewording or removal to create a UMAM procedure that was more appropriate to the Pilot Bank site and region.

3.2.2 Modifications to UMAM

As noted, the UMAM process was evaluated during this preliminary application to identify areas where potential changes to the method may be required to adapt the procedure to use for coastal wetlands in the NYC area. Through the review the following items were noted:

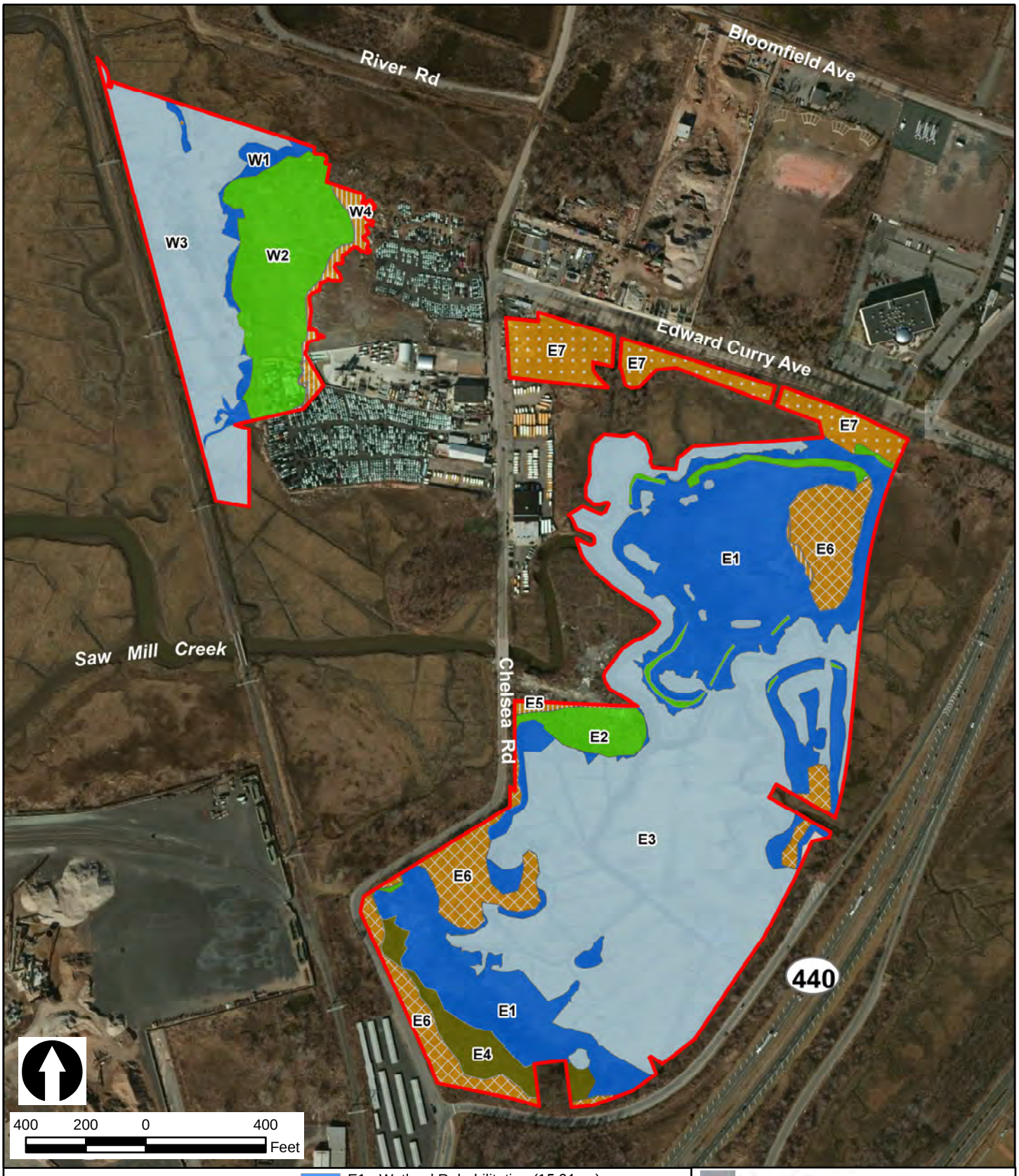
- The main format, structure and scoring process of UMAM is appropriate for use with tidal wetlands and can be adopted for application in the NYC region.
- Some of the attribute statements could be reworded to clarify their intent and strengthen the overall assessment.
- Some attribute statements (three) can either be removed entirely due to their Florida-specific nature or incorporated into other subject-linked attribute statements.
- Additional attribute statements can be added to the Location and Landscape Support category to address societal or recreational benefits of coastal wetlands.
- Incorporate a comment section for each attribute to record the evaluator's justification for score selection.
- The guidance document requires revision to provide appropriate regional examples and further clarity on the evaluation and scoring of certain attributes.
- As the score adjustments or modifiers for preservation, time lag, and risk factors did not affect the outcome for wetland mitigation banks, an additional modifier was added to account for social significance and public benefits.

Based on the evaluation of the UMAM procedure, several improvements and additions to the UMAM process were made. The changes range from items as simple as numbering each box on the assessment forms to correlate with the guidance text, to providing summary tables of descriptive information to facilitate completion of the site characterization. The modified UMAM Guidance Documents are provided as follows: Appendix A-Standardized Field Protocol; Appendix B-Location and Landscape Support Guidance Module; Appendix C-Water Environment Guidance Module; Appendix D-Community Structure Guidance Module; Appendix E-Expected Variation Guidance Module; and Appendix F-Adjustment Factors Guidance.

3.2.3 Application of Modified UMAM to Pilot Bank

The modified UMAM procedure was applied to the proposed 68.45-acre Pilot Bank. Figure 1 outlines the Assessment Areas used in this evaluation. Representative photographs of the Assessment Areas are provided in Appendix G and the completed Part I and Part II information and score sheets are presented in Appendix H. The mitigation approaches applied to the assessment areas consist of wetland enhancement, wetland restoration (rehabilitation), wetland restoration (re-establishment) and upland buffer rehabilitation. These mitigation approaches follow the definitions provided in the 2008 Mitigation Rule and the NYSDEC Mitigation Guidance.

A similar procedure as outlined above for the initial UMAM assessment was followed. The Team began with Part I – Qualitative Characterization, which utilized readily available information from several sources, including the *New York State Salt Marsh Restoration and Monitoring Guidelines* (NYSDOS and NYSDEC, 2000), the *Ecological Communities of New York State, 2nd Edition* (NYNHP 2002), aerial imagery, and recent site visits and site observations.



Project Site

Assessment Areas

- W1 - Wetland Rehabilitation (1.02 ac)
- W2 - Wetland Reestablishment (5.17 ac)
- W3 - Tidal Wetlands Enhancement (7.69 ac)
- W4 - Upland Buffer Rehabilitation Slope (0.72 ac)
- E1 - Wetland Rehabilitation (15.61 ac)
- E2 - Wetland Reestablishment (1.87 ac)
- E3 - Tidal Wetlands Enhancement (26.03 ac)
- E4 - Forested Wetland Enhancement (1.52 ac)
- E5 - Upland Buffer Rehabilitation Slope (0.33 ac)
- E6 - Upland Buffer Rehabilitation Forest (5.19 ac)
- E7 - Upland Buffer Rehabilitation Edward Curry Road Area (3.3 ac)

NYCEDC
New York City Economic Development Corporation

Saw Mill Creek Wetland Mitigation Bank
Staten Island, New York

Assessment Areas

Louis Berger & Assoc, PC

November 2013

Figure 1

Sources: Image courtesy of USGS, Microsoft Corporation 2013; Concept Plan, Louis Berger & Assoc, PC, 2013.

Part II of the methodology was completed utilizing a team approach to evaluate each attribute and assign scores following the methods described in Part 4.0 and the functional category guidelines included in the Appendices. The results of the assessment are summarized in Table 2.

The credit generation for each mitigation approach was converted to a ratio. Overall, the method provides a credit generation ratio that is generally consistent with previously applied ratios for rehabilitation (~2:1), re-establishment (~1:1) and enhancement (10:1). A main advantage of the credit generation ratio with the UMAM procedure is that it is based on an ecological assessment process that is sensitive to the attributes of an individual site assessment area and not the static application of a set of ratios.

The ecological uplift obtained for each mitigation approach varied by assessment area and was tied to key drivers that affected some attributes more than others, leading to a net increase in the functional category scores. The following sections summarize the general assessment area conditions, the proposed mitigation actions, and the factors affecting the functional improvements and attribute scoring.

Reference Standard Wetland

Reference standard wetlands provide examples of healthy ecosystems and indicate the potential for restoration of nearby disturbed sites. The functions and services of reference standard wetlands are characteristic of the least-altered wetlands. They provide a physical representation of functioning wetland ecosystems that can be observed and measured. Application of the UMAM to a Reference Standard Wetland provides an indication of the possible functional uplift that could be obtained by a nearby Mitigation Site or Bank.

An approximately 7-acre Reference Standard Wetland is located north of the Pilot Bank, on the west side of Chelsea Road. The Reference Wetland is bounded by the Williams-Transco underground natural gas pipeline to the south, railroad tracks to the west, and River Road to the north and east. While the Reference Site is near the Pilot Bank, the Reference Site is functionally superior to the Project Site as it generally lacks historic fill and non-native vegetation. The UMAM assessment of the Reference Standard Wetland generated a score of 0.87, which is likely the highest score that a wetland could obtain in this geographic area.

Location and Landscape Support attributes and related functions are fairly high due to the presence of a native plant community but are limited by surrounding land uses (railroad, pipeline road) as is typical in this urban environment.

Water Environment attributes and functions are high due to the open tidal circulation in the wetland.

The Community Structure attributes and functions are high due to the diverse native plant community and the lack of invasive species.

Wetland Restoration (Rehabilitation) Assessment Areas

As defined by the 2008 Federal Rules for wetland mitigation (33 CFR 332.2), wetland restoration (rehabilitation) means the manipulation of the physical, chemical, or biological characteristics of

Table 2: Summary of UMAM mitigation bank credit generation

	Functional Assessment Category	W1 - Tidal Wetland Restoration (Rehabilitation)		W2 - Wetland Restoration (Re-establishment)		W3 - Tidal Wetland Enhancement		W4 - Upland Buffer Rehabilitation$_{SLOPE}$		Wetland Reference Site
		Current Condition	With Rehabilitation	Current Condition	With Re-establishment	Current Condition	With Enhancement	Current Condition	With Rehabilitation	Current Condition
West	Location & Landscape	4	7	0	7	6	7	4	6	8
	Water Environment	4	9	0	9	8	9	0	0	9
	Community Structure	3	9	0	9	9	9	5	8	9
	Score	*0.367*	*0.833*	*0.00*	*0.83*	*0.77*	*0.87*	*0.45*	*0.70*	*0.87*
	Functional Uplift (Delta)	0.467		0.83		0.10		0.25		n/a
	Acres	1.02		5.17		7.69		0.72		7
	Mit. Credits (relative functional gain x acres)	0.50		5.17		0.77		0.18		n/a
	Mit. Ratio (Acres/credits)	**2.04**		**1.00**		**10.00**		**4.00**		**n/a**

	Functional Assessment Category	E1 - Tidal Wetland Restoration (Rehabilitation)		E2 - Wetland Restoration (Re-establishment)		E3 - Tidal Wetland Enhancement		E4 - Forested Wetland Enhancement	
		Current Condition	With Rehabilitation	Current Condition	With Re-establishment	Current Condition	With Enhancement	Current Condition	With Enhancement
East	Location & Landscape	4	7	0	7	6	7	6	7
	Water Environment	4	9	0	9	8	9	9	9
	Community Structure	3	9	0	9	9	10	8	9
	Score	*0.37*	*0.83*	*0.00*	*0.83*	*0.77*	*0.87*	*0.77*	*0.83*
	Functional Uplift (Delta)	0.47		0.83		0.10		0.07	
	Acres	15.61		1.87		26.03		1.52	
	Mit. Credits (relative functional gain x acres)	7.65		1.87		2.60		0.10	
	Mit. Ratio (Acres/credits)	**2.04**		**1.00**		**10.00**		**15.00**	

	Functional Assessment Category	E5 - Upland Buffer Rehabilitation SLOPE		E6 - Upland Buffer Rehabilitation Forest		E7 - Upland Buffer Rehabilitation EDWARD CURRY AVE		UPLAND BUFFER TOTALS (East and West)
		Current Condition	With Rehabilitation	Current Condition	With Rehabilitation	Current Condition	With Rehabilitation	
East	Location & Landscape	5	6	6	7	4	5	
	Water Environment	0	0	0	0	0	0	
	Community Structure	5	8	8	9	4	7	
	Score	*0.5*	*0.7*	*0.7*	*0.8*	*0.4*	*0.6*	
	Functional Uplift (Delta)	0.20		0.10		0.20		
	Acres	0.33		5.19		3.30		9.54
	Mit. Credits (relative functional gain x acres)	0.07		0.52		0.66		1.43
	Mit. Ratio (Acres/credits)	**5.00**		**10.00**		**5.00**		**6.69**

The proposed credit ratios for the Pilot Bank are highlighted in blue.

a site with the goal of repairing natural/historic functions to a degraded aquatic resource. Rehabilitation results in a gain in aquatic resource function, but does not result in a gain in aquatic resource area.

Assessment Area W1, approximately 1.02 acres within the northeast and southern portions of the western section of the site, is currently wetland dominated by fill and invasive *Phragmites*. Survey data indicates that elevations in this area are too high to support salt marsh species due to the past placement of fill material.

Assessment Area E1, approximately 15.61 acres within the eastern section of the site, consists of *Phragmites*-dominated remnant berms and wetlands at elevations that are too high to support salt marsh species, as well as a barren panne located east of an island in the northeast that only holds water at its western extremity. This area was also subject to the placement of fill which altered (raised) site topography, leading to a change in hydrology of the wetland and altering the plant community.

The rehabilitation assessment areas have very little connectivity to tidal flow, little microtopography, extremely low plant species diversity, and supports few wildlife species. These areas would be restored through removal of debris, herbicide treatment and mowing/cutting of *Phragmites*, excavation of historic fill material to provide suitable tidal marsh elevations, excavation of tidal channels, and replanting with native salt marsh grasses and shrubs. These areas would be managed for any reinvasion by *Phragmites* through herbicide treatment under a long term management plan and protected in perpetuity.

Rehabilitation activities would restore tidal hydrology, create appropriate microtopography, establish a native salt marsh plant community, and promote greater wildlife use, significantly improving Location and Landscape Support attributes and related functions. Additionally, improved connectivity would reduce the adverse effects of adjacent land condition and use. Rehabilitation activities of the adjacent, invasive-dominated upland buffer areas would further improve Location and Landscape Support functions.

Water Environment attributes and related functions would be much improved by proposed rehabilitation activities. Rehabilitation of tidal hydrology and microtopography would establish native salt marsh plant community zonation, restore appropriate tidal soil moisture conditions, increase use by tidally-dependent wildlife species, and improve flushing of runoff from adjacent land uses and overall water quality.

Rehabilitation activities would dramatically improve the assessment area's plant community structure. The resulting plant community would be a healthy, thriving salt marsh characterized by a diversity of native species with abundant seed production and recruitment, and a high degree of plant cover. Any reinvasion by *Phragmites* would be minimal and managed under a long term management plan.

Wetland Restoration (Re-establishment) Assessment Areas

As defined by the 2008 Federal Rules for wetland mitigation (33 CFR 332.2), wetland restoration (re-establishment) means the manipulation of the physical, chemical, or biological characteristics

of a site with the goal of returning natural/historic functions to a former aquatic resource. Re-establishment results in rebuilding a former aquatic resource and results in a gain in aquatic resource area and functions.

Approximately 5.17 acres of wetland will be re-established within the western section of the site (Assessment Area W2). This AA consists of construction/demolition debris and other fill material over former marshlands. This material will be removed and the area graded to marsh elevations, tidal creeks will be excavated to restore tidal flow and circulation, and the marsh plain will be planted with appropriate native salt marsh grasses and shrubs.

Approximately 1.87 acres of wetlands will be re-established within the eastern section of the site (Assessment Area E2). This AA consists of a former junkyard area located south of Saw Mill Creek and east of Chelsea Road. The area will be restored through the removal of existing debris (tires, cement, asphalt, etc.) and excavating the fill to target elevations that will support tidal hydrology and planted with native salt marsh species. The AA also includes portions of remnant berms that consist of uplands dominated by invasive species. These berms will be removed and the area will be graded to an appropriate marsh plain elevation and planted with native salt marsh species.

These assessment areas currently lack wetland functions and have minimal value as upland habitat. Restoration activities include the removal of upland fill and existing debris to create elevations that will support tidal salt marsh habitat. The areas will be graded to suitable tidal marsh elevations, tidal creeks will be excavated to restore tidal flow, microtopography will be established, and the marsh plain will be replanted with native salt marsh grasses and shrubs.

For re-establishment areas, the baseline scores for functional assessment categories reflect the non-wetland condition of the site and are scored with a 0 for each attribute. Restoration activities would restore tidal hydrology, create appropriate microtopography, establish a native salt marsh plant community, and promote greater wildlife use, significantly improving Location and Landscape Support attributes and related functions. Additionally, improved connectivity with other marsh habitats would reduce the adverse effects of adjacent land condition and use. Rehabilitation activities within the adjacent, invasive-dominated upland buffer areas would further improve Location and Landscape Support functions.

Water Environment attributes and related functions would be re-established by proposed restoration activities. Re-establishment of tidal hydrology and microtopography would facilitate native salt marsh plant community zonation, restore appropriate tidal soil moisture conditions, allow use of habitat by tidally-dependent wildlife species, and establish tidal flushing of runoff from adjacent land uses to improve overall water quality.

Restoration activities would re-establish the assessment area plant community structure. The resulting plant community would be a healthy, thriving salt marsh characterized by a diversity of native species with abundant seed production and recruitment, and a high degree of plant cover. Any reinvasion by *Phragmites* would be minimal and managed under a long term management plan.

Wetland Enhancement Assessment Areas

The Final Rule for Compensatory Mitigation for Losses of Aquatic Resources (33 CFR 332.2) defines enhancement as the manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s). Tidal wetland enhancement areas consist of functioning low and high marsh dominated by native plant species, as well as several pannes. Within the western section of the site, approximately 7.69 acres of tidal wetland (Assessment Area W3) will be enhanced. Within the eastern section of the site, approximately 26.03 acres of tidal wetland (Assessment Area E3) will be enhanced. Based on conditions within the site, it is expected that *Phragmites* will continue to spread, threatening wetland habitats and degrading functions over time, especially in the eastern section where there are several freshwater inputs. In addition, these marshes are threatened by pervasive dumping in the area. Existing debris will be removed and *Phragmites* will be managed during the life of the Bank to prevent future decline of these wetlands.

An approximately 1.52 acre red maple-sweetgum swamp located within the southern portion of the eastern section of the site (Assessment Area E4) contains storm surge debris that will be removed to enhance habitat quality and function. To prevent the decline of this wetland, encroachment of invasive species (*Phragmites*, Japanese knotweed, etc.) into this area will be managed through select herbicide application and/or cutting.

By enhancing these wetlands as part of a mitigation bank, the threat of illegal filling and dumping within the tidal and forested wetlands is minimized. The design will include impediments to dumping to the maximum extent possible. Subsequent to site construction and planting, the site will be posted and frequently inspected.

Location and Landscape Support attributes and related functions would be improved through the protection of the native plant community. Restoration of the adjacent, invasive-dominated wetland areas would further improve habitat connectivity to adjacent natural plant communities.

Water Environment attributes and functions would be slightly improved due to the restoration of adjacent wetland areas and rehabilitation of upland buffers.

The Community Structure attributes and functions would also be improved through prevention of invasive species encroachment and maintaining a sustainable native plant community. The assessment area would be managed for invasive species under a long term management plan and protected in perpetuity.

Upland Buffer Rehabilitation Assessment Areas

As defined by the 2008 Federal Rules for wetland mitigation (33 CFR 332.2), buffer means an upland, wetland, and/or riparian area that protects and/or enhances aquatic resource functions associated with wetlands, rivers, streams, lakes, marine, and estuarine systems from

disturbances associated with adjacent land uses. Upland buffers within the site will be rehabilitated to further protect and enhance adjacent wetlands and their associated functions.

On the west side, Assessment Area W4 is an approximately 0.72 acre upland slope currently dominated by invasive species and debris. This area contains Hurricane Sandy storm surge-driven debris as well as historic debris such as tires, plastic containers, and other floatable debris. Upland buffer rehabilitation Assessment Areas within the eastern section (E5 – 0.33 acres, E6 – 5.19 acres, and E7 -3.3 acres) consists of upland slope and upland forest containing debris and non-native, invasive species that compromise native diversity and wildlife usage. These upland areas will be rehabilitated through removal of debris and non-native, invasive species. Invasive species include, but are not limited to, *Polygonum cuspidatum* (Japanese knotweed), *Celastrus orbiculatus* (Oriental bittersweet), and tree-of-heaven. These and other dominant non-native invasive species will be managed through herbicide application and/or cutting, and by the seeding and/or planting of native species. Subsequent to site construction and planting, the site will be posted and frequently inspected to discourage dumping.

Location and Landscape Support attributes and related functions would be improved through the establishment of a native plant community, promoting greater wildlife use and improving functions as a buffer to wetlands. Additionally, improved connectivity would reduce the adverse effects of adjacent land condition and use. Restoration of the adjacent, invasive-dominated wetland areas would further improve habitat connectivity.

The upland assessment area was not scored for Water Environment attributes per the methodology.

The Community Structure attributes and functions would also be improved through the replacement of an invasive species dominated community with a sustainable native plant community. The assessment area would also be managed for invasive species under a long term management plan.

3.2.4 Proposed Mitigation Credits at the Pilot Bank

Based on the application of the Modified UMAM to the site, the following credit ratios and credits are proposed at the Saw Mill Creek Tidal Wetland Mitigation Bank.

Table 3: Proposed Credits Based on UMAM results

Mitigation Type	Acres	Ratio	Credits
Wetland Restoration (Re-establishment)	7.04	1.00 :1	7.04
Wetland Restoration (Rehabilitation)	16.63	2.04 :1	8.15
Wetland Enhancement (Tidal)	33.72	10 :1	3.37
Wetland Enhancement (Forest)	1.52	15 :1	0.10
Buffer Rehabilitation	9.54	6.69 :1	1.43
Total	**68.45**		**20.09**

Note: Buffer rehabilitation ratio is averaged among the total credit generation from each buffer assessment area.

4.0 MODIFIED UNIFIED MITIGATION ASSESSMENT METHOD

4.1 INTRODUCTION

Following the careful review and testing of the Uniform Mitigation Assessment Method, the methodology was adopted and modified slightly for use with the Pilot Bank. The modifications do not substantially change the procedures originally developed and tested by the University of Florida Howard T. Odum Center for Wetlands (UF-CFW) and the Florida Department of Environmental Protection (FDEP) in compliance with Chapter 62-345, Florida. The intent of the slight modifications is to increase the method's applicability to coastal wetlands in the New York City region. Additional minor modifications were also made to references and data sources. In general, the modifications consist of:

- Rewording of the attribute statements to clarify their intent and strengthen the overall assessment.
- Removal of attribute statements (three) specific to Florida wetland systems, and combining one related subject-linked attribute statements.
- Adding attribute statements to the Location and Landscape Support functional assessment category to address societal or recreational benefits of coastal wetlands.
- Incorporating a comment section on the Part II data form for each attribute to record the evaluator's justification for score selection.
- Developing a revised guidance document to provide appropriate regional examples and further clarity on the evaluation and scoring of certain attributes.
- Adding a new score modifier to account for social significance of public investments in habitat restoration projects.

The intent of the following sections is to provide instruction and guidance to the evaluator in the proper use of the assessment method to evaluate coastal wetlands, surface waters, as well as upland mitigation areas. This method provides a standardized procedure for assessing the functions provided by wetlands and other surface waters, the amount that those functions are reduced by a proposed impact, and the amount of mitigation required offsetting those losses, or the relative amount of wetland bank credits that could be generated.

4.2 BACKGROUND

As the result of a report in 2000 (Report No. 99-40) by the Office of Program Policy Analysis and Governmental Accountability (OPPAGA) that highlighted shortcomings in the State of Florida's mitigation process, the FDEP and water management districts (WMDs) jointly developed the Uniform Mitigation Assessment Method (UMAM) rule (Chapter 62-345, F.A.C.), which became effective in February 2004. Implementation of the Rule led to establishment of the UMAM procedures upon which this assessment methodology is based.

As stated in the background section of the UMAM procedure, UMAM "is designed to assess any type of impact and mitigation, including the preservation, enhancement, restoration, and creation of wetlands, as well as the evaluation and use of mitigation banks, and it provides a

framework for statewide standardized wetland assessment across community type and assessor".

Each assessment area is evaluated based a qualitative description and a quantification of the assessment area. Part I of the assessment method is a qualitative characterization process that summarizes available descriptive information of the assessment area and surrounding features. Information sources include online databases, wetland field guides or other relevant publications, and information gained from a field visit. The purpose of the qualitative assessment is to provide a sufficient amount of detail about the assessment area to evaluate and identify the functions and wildlife resources associated with the site. This "frame of reference" informs the second part of the assessment method, the quantitative assessment.

Part II of the assessment method is a quantitative assessment of three broad Functional Assessment categories: Location and Landscape Support, Water Environment, and Community Structure. Each of these sections are characterized using a series of guidance statements defining the attributes or functions of the assessment area that are each scored on a scale of 0 to 10. A score of 10 indicates that the function or attribute is optimal within the assessment area, and a score of 0 indicates the function or attribute is absent. This portion of the assessment method relies on best professional judgment, site knowledge of the evaluator(s) and the interpretation of guidance statements.

For each of the three functional assessment categories, an overall score of the assessment area for current and proposed conditions is estimated (not averaged) based on the evaluators' interpretation of the individual attribute score assignments. The scores are then used to calculate mitigation ratios or mitigation bank credits for the assessment areas, with score adjustments for preservation, time lag, risk and public restoration factors.

4.3 DEFINITIONS

(1) "Assessment area" means all or part of a wetland or surface water impact site, or a mitigation site, that is sufficiently homogeneous in character, impact, or mitigation benefits to be assessed as a single unit.
(2) "Reviewing agency" means the New York State Department of Environmental Conservation and the U.S. Army Corps of Engineers.
(3) "Ecological value" means the value of functions performed by uplands, wetlands, and other surface waters to the abundance, diversity, and habitats of fish, wildlife, and listed species. Included are functions such as providing cover and refuge; breeding, nesting, denning, and nursery areas; corridors for wildlife movement; food chain support; natural water storage, natural flow attenuation, and water quality improvement which enhances fish, wildlife, and listed species utilization.
(4) "Impact site" means wetlands and other surface waters as delineated pursuant to the 1987 Wetland Delineation Manual and applicable Supplements that would be impacted by the project. Uplands shall not be included as part of the impact site.
(5) "Indicators" means physical, chemical, or biological indications of wetland or other surface waters function.
(6) "Invasive Species" for purposes of this methodology means animal and plant species that are outside of their natural range or zone of dispersal and have or are able to form self-sustaining

and expanding populations in communities in which they did not previously occur, and consisting of those species listed by NYSDEC as Invasive, available online at http://www.dec.ny.gov/animals/265.html. Additional information on invasive species as listed on the New York Invasive Species Clearinghouse website, which is incorporated by reference herein, may be found online at http://www.nyis.info/index.php.

(7) "Listed species" means those animal or plant species that are endangered, threatened, or of special concern and are listed by the USFWS or NYSDEC.

(8) "Mitigation credit" or "credit" means a standard unit of measure which represents the increase in ecological value resulting from restoration, enhancement, preservation, or creation activities.

(9) "Mitigation site" means wetlands and other surface waters, or uplands, that are proposed to be created, restored, enhanced, or preserved by the mitigation project.

(10) "With impact assessment" means the reasonably anticipated outcome at an assessment area assuming the proposed impact is conducted.

(11) "With mitigation assessment" means the outcome at an assessment area assuming the proposed mitigation is successfully conducted.

(12) "Without preservation assessment" means the reasonably anticipated outcome at an assessment area assuming the area is not preserved.

(13) "Reference Standard Wetland" means a wetland that is considered good quality and is surrounded by natural land uses, with no external anthropogenic influences.

(14) "Frame of Reference" means when a frame of reference is used as a benchmark for comparing the historical or expected functions of an assessment area with the current functions.

4.4 METHODOLOGY

4.4.1 PART I QUALITATIVE CHARACTERIZATION

An impact or mitigation assessment area must be described with sufficient detail to provide a frame of reference for the type of community being evaluated and to identify the functions that will be evaluated. Part I must be completed before scoring the assessment area in Part II, since this frame of reference will be used to determine the degree to which the assessment area provides those functions and the amount of function lost or gained by the project.

Much of the information in Part I can be compiled in the office using desktop tools, including the NYSDEC Environmental Resource Mapper (ERM) (www.dec.ny.gov/imsmaps/ERM/viewer.htm), and aerial photographs, topographic and other maps, scientific literature, technical reports, and similar information. Other portions should be completed during the site visit, such as the "Assessment Area Description" and "Observed Evidence of Wildlife Utilization."

The last two sections of UMAM Part I are best filled out in the field during the field visit.

PART I – Qualitative Description
(See Section 4.4.1)

(1) Site/Project Name	(2) Application Number	(3) Assessment Area Name or Number

(4) Habitat Code	(5) Further classification (optional)	(6) Impact or Mitigation Site?	(7) Assessment Area Size

(8) Basin/Watershed Name/Numbe	(9) Affected Waterbody (Class)	(10) Special Classification (local/state/federal designation of importance)

(11) Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands

Can be filled out in office……

(12) Assessment area description

(13) Significant nearby features	(14) Uniqueness (considering the relative rarity in relation to the regional landscape.)

(15) Functions	(16) Mitigation for previous permit/other historic use

(17) Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to be found)	(18) Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area)

Use Wetland summary Table & Published Sources

(19) Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.):

(20) Additional relevant factors:

Can be filled out in office……

(21) Assessment conducted by:	(22) Assessment date(s):

Form 62-345.900(1), F.A.C. [effective date 02-04-2004]

- Steps For Completing Part 1

1. Identify the assessment areas. For a proposed wetland bank, the assessment areas can be defined by different areas within the project boundary that correspond to different mitigation approaches. For project-specific mitigation actions, the assessment areas are defined by proposed wetland/surface water impact area(s) and proposed mitigation area(s).

2. Compile information for Part I -Qualitative Characterization. Table 4 provides a list of information sources that can be used to complete the information in the corresponding box on the form.

    - Use Environmental Resource Mapper (ERM) to identify wetlands, sensitive natural communities, threatened and endangered species, and water quality classifications for the assessment area and surrounding areas;
    - Identify the ecological communities and land cover of the site and adjacent parcels;
    - Calculate the size of the Assessment area;
    - Determine the basin/watershed name/number;
    - Identify water bodies and their classification;
    - Review maps and aerial photos of the assessment area and surrounding area;
    - Develop Wetland Summary Tables;
    - Print aerial maps (300 feet and 1 mile buffer) of assessment area and locate possible sampling sites based on surrounding landscape and land uses, vegetation signature within sampling area, and size of assessment area.

3. Complete the office portions of Part 1 - Qualitative Characterization for each type of assessment area identified.

4. Conduct Field Visit of the project site and surrounding landscape.

    - Prior to going into the field, obtain regional tidal data and weather data to become familiar with hydrologic influences on the site.
    - In the field, complete Observed Evidence of Wildlife Utilization and Additional Relevant Factors.

        - Observed Evidence of Wildlife Utilization: List species directly observed or other signs such as tracks, droppings, casings, nests, burrows, etc.

        - Additional Relevant Factors: Some additional factors may be identified in the office, for instance recent reports documenting wildlife observations at the site or presence of invasive species. Others may become evident upon a site visit, i.e., changes in surrounding land use since the most recent aerial photographs.

Table 4: UMAM Part 1 Potential Sources of Information

Box	UMAM Box	Guidance and Sources of Information
1	Site/ Project Name	User defined
2	Application Number	N/A
3	Assessment Area Name or Number	Applicant defined Local stream/creek name
4	Habitat Code (community type classification)	Cowardin, L. M., V. Carter, F. C. Golet, E. T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. Jamestown, ND: Northern Prairie Wildlife Research Center Online. http://www.npwrc.usgs.gov/resource/wetlands/classwet/index.htm (Version 04DEC1998).
		Edinger, G.J., D.J. Evans, S. Gebauer, T.G. Howard, D.M. Hunt, and A.M. Olivero (editors). 2002. Ecological Communities of New York State. Second Edition. A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. (Draft for review). New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY. (http://www.dec.ny.gov/animals/29392.html)
5	Further Classification (Optional)	community type, mitigation approach (restoration, creation, enhancement, preservation, etc.)
6	Impact or Mitigation Site?	User defined
7	Assessment Area Size	Acres
8	Basin/ Watershed Name/Number	Watershed Name, 8-digit HUC Code (USGS Base Map Service - ESRI and its data suppliers; HUC 8 Data - USDA Geospatial Data Gateway, 2012)
9	Affected Waterbody (class)	New York State Section 303 (d) list (http://www.dec.ny.gov/chemical/31290.html),
		NYSDEC's Waterbody Inventory/Priority Waterbodies List for Atlantic Ocean/ Long Island Sound (http://www.dec.ny.gov/chemical/36748.html)
10	Special Classification	(i.e., DEC Wetlands, EPA Priority Wetlands) NYSDEC Geodata Inventory (http://www.dec.ny.gov/geodata/), NYSDEC Interactive online maps
11	Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands	NYSDEC Geodata Inventory (http://www.dec.ny.gov/geodata/), NYSDEC Interactive online maps
12	Assessment Area Description	field visit, professional judgment
13	Significant Nearby features	(national, state, or city parks, forests, reserves, major industry, commercial airports, etc.) NYSDEC Geodata Inventory (http://www.dec.ny.gov/geodata/), NYSDEC Interactive online maps, http://www.nycgovparks.org/maps
14	Uniqueness	aerial photos, scientific literature, professional judgment
15	Functions	Functions performed by the assessment area's native community type: providing cover, substrate, and refuge, breeding, nesting, denning, nursery, wildlife corridors, food chain support, natural water storage, flow attenuation, water quality improvement. Must be related to the benefits provided to fish and wildlife
		Niedowski, Nancy L. 2000. New York State Salt Marsh Restoration and Monitoring Guidelines. New York State Department of State Division of Coastal Resources and New York State Department of Environmental Conservation Division of Fish, Wildlife, and Marine Resources. (http://www.dos.ny.gov/communitieswaterfronts/pdfs/SALTMARSH.PDF)
16	Mitigation for previous permit/ other historic use	aerial photos, scientific literature, NYSDEC and USACE agency contacts
17	Anticipated Wildlife Utilization based on Literature Review	aerial photos, field visit, scientific literature (see supplementary table)
18	Anticipated Utilization by listed species	aerial photos, field visit, scientific literature

4.4.2 PART II QUANTIFICATION OF ASSESSMENT AREA

Part II of the UMAM procedure must be conducted in the field at the Assessment Area. A Standardized Field Protocol (SFP) for conducting the site assessment is provided in Appendix A and should be reviewed and implemented prior to conducting the scoring of the UMAM Part II functional assessment categories described below.

- Steps for completing Part II

The generalized sequence for completing Part II of UMAM is outlined below:

1. Review UMAM Part I -Qualitative Characterization, and make any necessary adjustments to Geographic Relationships/Hydrologic Connections, Description, and Significant Nearby Features.

2. Consult maps and aerial photographs obtained in Part I -Qualitative Characterization to verify the correct Assessment Area.

3. Consult other information obtained in Part I, such as weather data, tidal conditions, Field Guides etc. to become familiar with conditions, species, etc. that are likely to be encountered.

4. On aerial photographs, determine locations of wetland/water body edge and tentative locations of walking transects based on Standardized Field Protocol.

5. Conduct the Standardized Field Protocol.

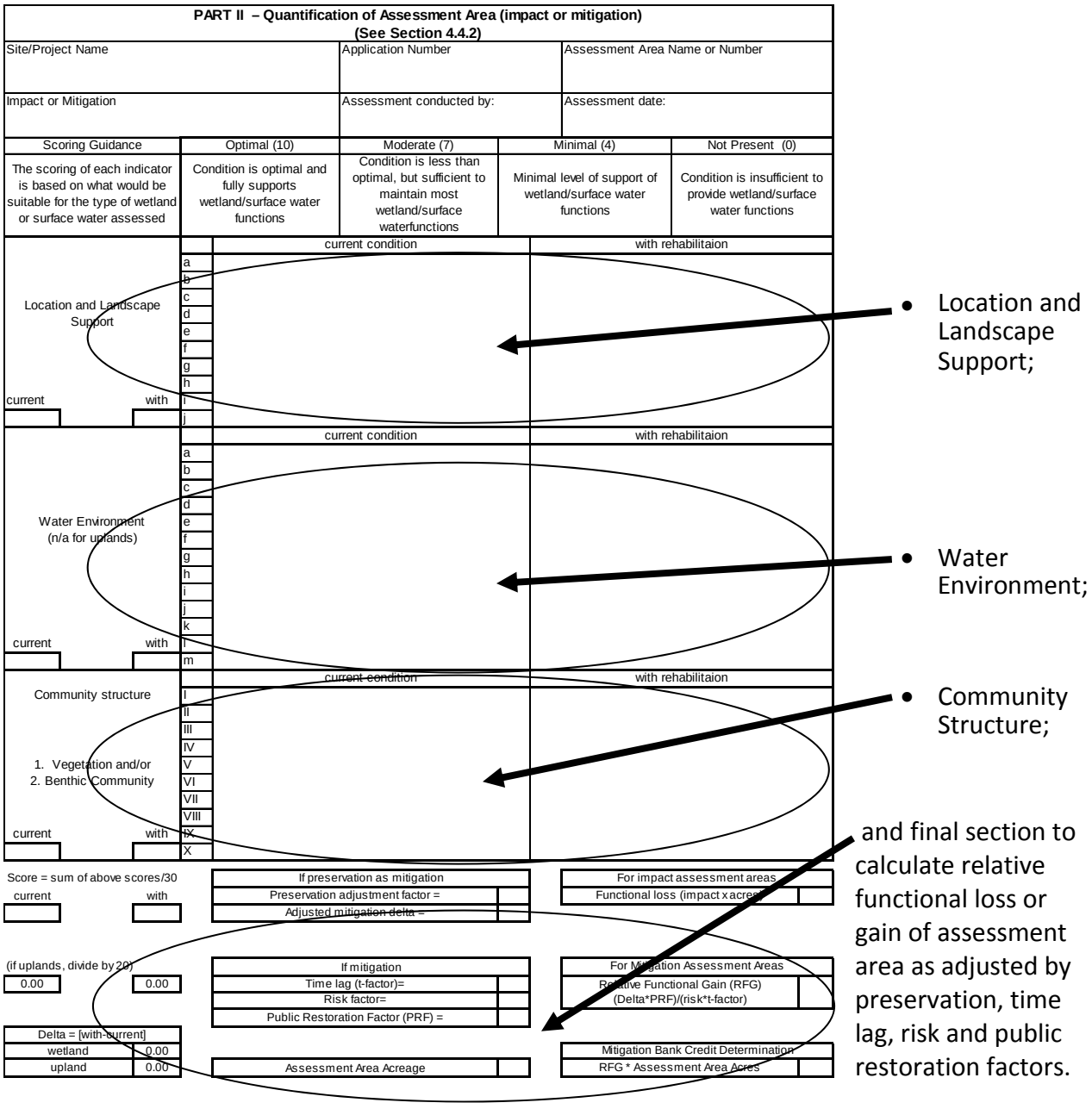
6. Score the three Functional Assessment Categories and record attribute score justification:

   - Location and Landscape Support
   - Water Environment
   - Community Structure

7. Calculate final overall score with adjustments.

- **Scoring UMAM Part II**

There are three sections for scoring:



PART II – Quantification of Assessment Area (impact or mitigation)
(See Section 4.4.2)

Site/Project Name	Application Number	Assessment Area Name or Number
Impact or Mitigation	**Assessment conducted by:**	**Assessment date:**

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 wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

		current condition	with rehabilitaion
Location and Landscape Support	a		
	b		
	c		
	d		
	e		
	f		
	g		
	h		
current / with	i		
	j		

		current condition	with rehabilitaion
Water Environment (n/a for uplands)	a		
	b		
	c		
	d		
	e		
	f		
	g		
	h		
	i		
	j		
	k		
current / with	l		
	m		

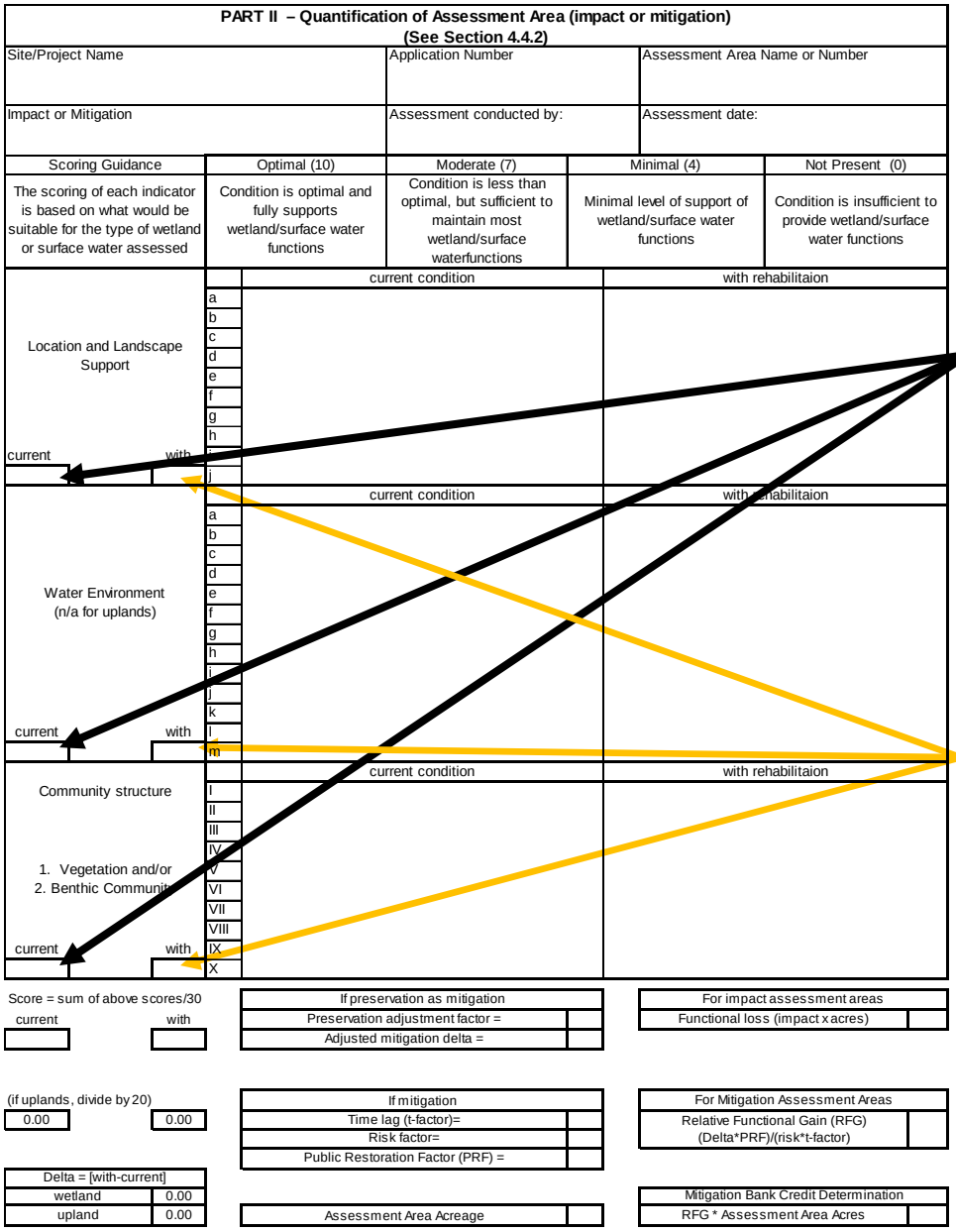
		current condition	with rehabilitaion
Community structure	I		
	II		
	III		
	IV		
1. Vegetation and/or 2. Benthic Community	V		
	VI		
	VII		
	VIII		
current / with	IX		
	X		

Score = sum of above scores/30		If preservation as mitigation		For impact assessment areas	
current	with	Preservation adjustment factor =		Functional loss (impact x acres)	
		Adjusted mitigation delta =			
(if uplands, divide by 20)		If mitigation		For Mitigation Assessment Areas	
0.00	0.00	Time lag (t-factor)=		Relative Functional Gain (RFG) (Delta*PRF)/(risk*t-factor)	
		Risk factor=			
		Public Restoration Factor (PRF) =			
Delta = [with-current]					
wetland	0.00			Mitigation Bank Credit Determination	
upland	0.00	Assessment Area Acreage		RFG * Assessment Area Acres	

- Location and Landscape Support;
- Water Environment;
- Community Structure;

and final section to calculate relative functional loss or gain of assessment area as adjusted by preservation, time lag, risk and public restoration factors.

Each impact assessment and each mitigation assessment area must be evaluated under two conditions:



PART II – Quantification of Assessment Area (impact or mitigation)
(See Section 4.4.2)

Site/Project Name	Application Number	Assessment Area Name or Number
Impact or Mitigation	Assessment conducted by:	Assessment date:

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 wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

		current condition	with rehabilitaion
Location and Landscape Support	a		
	b		
	c		
	d		
	e		
	f		
	g		
	h		
current / with	i		
	j		

		current condition	with rehabilitaion
Water Environment (n/a for uplands)	a		
	b		
	c		
	d		
	e		
	f		
	g		
	h		
	i		
	j		
	k		
current / with	l		
	m		

		current condition	with rehabilitaion
Community structure	I		
	II		
	III		
	IV		
1. Vegetation and/or 2. Benthic Communit	V		
	VI		
	VII		
	VIII		
current / with	IX		
	X		

Score = sum of above scores/30

current	with

If preservation as mitigation	
Preservation adjustment factor =	
Adjusted mitigation delta =	

For impact assessment areas	
Functional loss (impact x acres)	

(if uplands, divide by 20)

0.00	0.00

If mitigation	
Time lag (t-factor)=	
Risk factor=	
Public Restoration Factor (PRF) =	

For Mitigation Assessment Areas	
Relative Functional Gain (RFG) (Delta*PRF)/(risk*t-factor)	

Delta = [with-current]	
wetland	0.00
upland	0.00

Assessment Area Acreage	

Mitigation Bank Credit Determination	
RFG * Assessment Area Acres	

a) Current condition (or <u>without</u> preservation in the case of preservation mitigation);

b) "With impact" or "With mitigation". These assessments are based on the reasonably expected outcome, which may represent an increase, decrease, or no change in value relative to the current condition.

Location and Landscape Support

The value of functions provided by an assessment area to fish and wildlife are influenced by the landscape position of the assessment area and its relationship with surrounding areas. If surrounding habitats are unavailable, poorly connected, or degraded, then the value of functions provided by the assessment area to the fish and wildlife identified in Part I is reduced. The availability, connectivity, and quality of offsite habitats, and offsite land uses which might adversely impact fish and wildlife utilizing these habitats, are factors to be considered in assessing the location of the assessment area.

Refer to Appendix B- Location and Landscape Support Guidance Module, for a complete description of this indicator category.

Ten attributes are identified to evaluate this category. To provide guidance, examples that depict variation in conditions for each of the attributes are included.

- Support to wildlife by outside habitats
- Invasive exotics or other invasive plant species in proximity of the assessment area
- Wildlife access to and from outside – distance and barriers
- Functions that benefit fish and wildlife downstream – distance or barriers
- Impacts of land uses outside assessment area to fish and wildlife
- Benefits to downstream or other hydrologically connected areas
- Benefits to downstream habitats from discharges
- Protection of wetland functions by upland mitigation assessment areas.
- Protection for uplands from flooding and storm surge
- Site elevations sufficient to adapt to effects of sea level rise.

Users are cautioned that not all attributes are applicable to all assessment areas, and in some cases some attributes may be more relevant than others.

The final score for the Location and Landscape Support category is a reflection of the overall condition of an assessment area, taking into consideration all applicable attributes (do not score each attribute and average them in the end, but rather think of this in terms of what final score best fits the overall conditions of the assessment area). Any whole number score between 0-10 may be used.

The method provides a list of descriptors of attributes for 4 categories of scores as guidance:

- A score of (10) means the assessment area is ideally located and the surrounding landscape provides full opportunity for the assessment area to perform beneficial functions at an optimal level.

- A score of (7) means that, compared to the ideal location, the location of the assessment area limits its opportunity to perform beneficial functions to 70% of the optimal ecological value.

- A score of (4) means that, compared to the ideal location, the assessment area location limits its opportunity to perform beneficial functions to 40% of the optimal ecological

value.

- A score of (0) means that the location of the assessment area provides no habitat support for wildlife utilizing the assessment area and no opportunity for the assessment area to provide benefits to fish and wildlife outside the assessment area.

A Summary Worksheet for Location and Landscape Support is included to help in the field assessment scoring.

- **Water Environment**

The quantity of water in an assessment area, including the timing, frequency, depth and duration of inundation or saturation, flow characteristics, and the quality of that water, may facilitate or preclude its ability to perform certain functions and may benefit or adversely impact its capacity to support certain wildlife. If the water environment is degraded, then the value of functions provided by the assessment area to the fish and wildlife identified in Part I is reduced.

Refer to Appendix C-Water Environment Guidance Module for a complete description of this indicator category.

Fourteen attributes are identified to evaluate this category. To provide guidance, examples that depict variation in conditions for each of the attributes are included.

- Tidal Regime
- Water level indicators/ hydroperiod
- Soil moisture
- Soil erosion or deposition
- Vegetation -community zonation
- Vegetation – hydrologic stress
- Use by animal species with specific hydrological requirements
- Plant community composition – species tolerant of and associated with water quality degradation or flow alteration
- Direct observation of standing water
- Existing water quality data
- Water depth, currents and light penetration
- Wave energy, fetch
- Tidal marsh stability

Users are cautioned that not all attributes are applicable to all assessment areas, and in some cases some attributes may be more relevant than others.

The final score for the Water Environment category is a reflection of the overall condition of an assessment area, taking into consideration all applicable attributes (do not score each attribute

and average them in the end, but rather think of this in terms of what final score best fits the overall conditions of the assessment area). Any whole number score between 0-10 may be used.

The rule lists descriptors of attributes for 4 categories of scores as guidance:

- A score of (10) means that the hydrology and water quality fully supports the functions and provides benefits to fish and wildlife at optimal capacity for the assessment area.
- A score of (7) means that the hydrology and water quality supports the functions and provides benefits to fish and wildlife at 70% of the optimal capacity for the assessment area.
- A score of (4) means that the hydrology and water quality supports the functions and provides benefits to fish and wildlife at 40% of the optimal capacity for the assessment area.
- A score of (0) means that the hydrology and water quality does not support the functions and provides no benefits to fish and wildlife.

A Summary Worksheet for the Water Environment is included to help in the field assessment scoring.

- **Community Structure**

Each impact and mitigation assessment area is evaluated with regard to its characteristic community structure. In general, a wetland or other surface water is characterized either by plant cover or by open water with a submerged benthic community.

When an Assessment Area has plant cover present, the area is assessed using the "Vegetation and Structural Habitat" section. Non-vegetated areas with a benthic community are assessed using the "Benthic Communities" section. If the assessment area includes both plant cover and submerged benthic communities, then both of these indicators are scored and the resulting scores are averaged to obtain a single community score. Refer to Appendix D for a complete description of this indicator category.

1. Vegetation and Structural Habitat

The presence, abundance, health, condition, appropriateness, and distribution of plant communities in surface waters, wetlands, and uplands can be used as indicators to determine the degree to which the functions of the community type are provided. Human activities such as groundwater withdrawal, ditching, and diking or the construction of conveyance canals, or other permanent structures such as seawalls in an aquatic system can permanently damage vegetation and structural habitat. Environmental factors such as excessive rainfall, drought, and fire can have temporary short-term impacts on vegetation. If the community structure is degraded, then the value of functions provided by the assessment area to the fish and wildlife identified in Part I is reduced.

Ten attributes are identified in the UMAM Rule to evaluate the "Vegetation and Structural Habitat" section of this category. To provide guidance, examples are given that depict variation in conditions for each of the attributes.

- Plant species in the canopy, shrub, or ground stratum
- Invasive exotics or other invasive plant species
- Regeneration & recruitment
- Age & size distribution
- Density and quality of coarse woody debris, snag, den, and cavity
- Plant condition
- Land management practices
- Topographic features such as refugia ponds, creek channels, flats or hummocks
- Siltation or algal growth in submerged aquatic plant communities
- Upland mitigation area - level of habitat and support for fish and wildlife in the associated wetlands or surface waters

Users are cautioned that not all attributes are applicable to all assessment areas, and in some cases some attributes may be more relevant than others.

The final score for the Community Structure – Vegetation and Structural Habitat category is a reflection of the overall condition of an assessment area, taking into consideration all applicable attributes (do not score each attribute and average them in the end, but rather think of this in terms of what final score best fits the overall conditions of the assessment area). Any whole number score between 0-10 may be used that best represents the level of function of the assessment area.

The rule lists descriptors of attributes for 4 categories of scores as guidance:

- A score of (10) means that the vegetation community and physical structure provide conditions which support an optimal level of function to benefit fish and wildlife utilizing the assessment area as listed in Part I.

- A score of (7) means that the level of function provided by plant community and physical structure is limited to 70% of the optimal level.

- A score of (4) means that the level of function provided by the plant community and physical structure is limited to 40% of the optimal level.

- A score of (0) means that the vegetation communities and structural habitat do not provide functions to benefit fish and wildlife.

A Summary Worksheet for Vegetation and Structural Habitat is included to help in the field assessment scoring.

2. Benthic and Sessile Communities

This indicator is intended to be used in marine or freshwater aquatic systems that are not characterized by a terrestrial or emergent plant community. These systems include live hard bottom communities, such as oyster bars and beds, reefs, and soft-bottom systems such as riverine systems.

- Oyster bars and beds in nearshore habitats and estuaries filter large amounts of particulate matter and provide food and habitat for a variety of species, such as boring sponges, mollusks, and polycheate worms.

- The distribution and quality of seagrass beds reflect a balance of water temperature, salinity, nutrients, and water quality.

- Benthic infauna of soft-bottom systems stabilize the substrate, provide a food source, and serve as useful indicators of water quality.

All of these communities are susceptible to human disturbance through direct physical damage, such as dredging, filling, or boating impacts, and indirect damage through changes in water quality, currents, and sedimentation.

Seven attributes are identified in UMAM to evaluate the "Benthic and Sessile Communities" section of this category. To provide guidance, examples that depict variation in conditions for each of the attributes are included.

- Species number and diversity of benthic organisms
- Non-native or inappropriate species
- Regeneration, recruitment and age distribution
- Condition of appropriate species
- Structural features
- Topographic features such as relief, stability, and interstitial spaces (hard bottom and reef communities) or snags and coarse woody debris (riverine systems)
- Spawning or nesting habitats

Users are cautioned that not all attributes are applicable to all assessment areas, and in some cases some attributes may be more relevant than others.

Implementing a sampling program may be necessary in some environments to adequately assess benthic communities in order to address the attributes above.

The final score for the Community Structure – Benthic and Sessile Communities category is a reflection of the overall condition of an assessment area, taking into consideration all applicable attributes (do not score each attribute and average them in the end, but rather think of this in terms of what final score best fits the overall conditions of the assessment

area). Any whole number score between 0-10 may be used that best represents the level of function of the assessment area.

The rule lists descriptors of attributes for 4 categories of scores as guidance:

- A score of (10) means that the benthic communities are indicative of conditions that provide optimal support for all of the functions typical of the assessment area and provide optimal benefit to fish and wildlife.

- A score of (7) means that, relative to ideal habitat; the benthic communities of the assessment area provide functions at 70% of the optimal level.

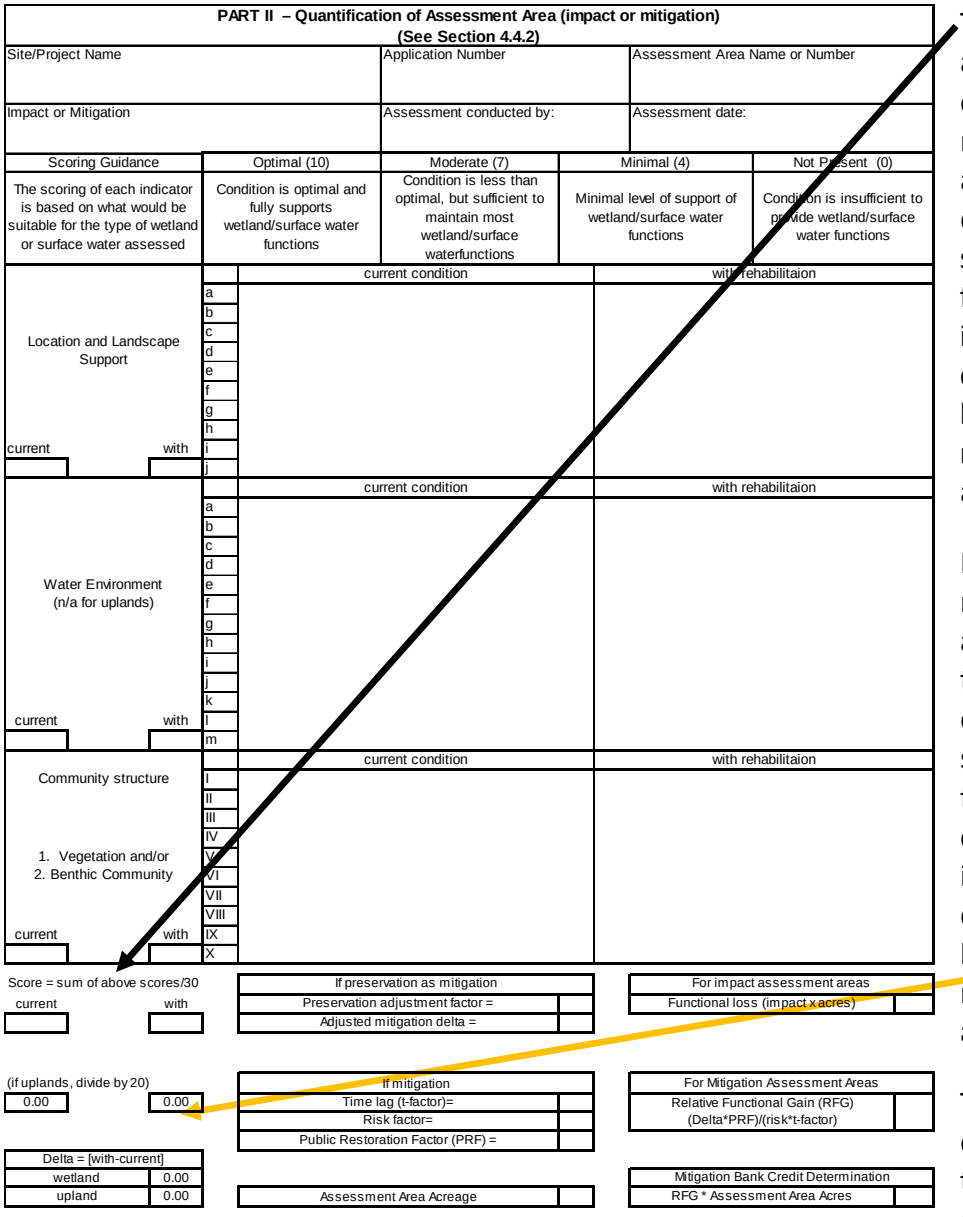
- A score of (4) means that, relative to ideal habitat; the benthic communities of the assessment area provide functions to 40% of the optimal level.

- A score of (0) means that the benthic communities do not support the functions identified and do not provide benefits to fish and wildlife.

A Summary Worksheet for Benthic and Sessile Communities is included to help in the field assessment scoring.

4.5 MITIGATION CREDIT DETERMINATION

This section describes step by step procedures for incorporating the Preservation, Time Lag, Risk and Public Restoration Factors to determine the amount of mitigation required or the corresponding bank credit yield.



PART II – Quantification of Assessment Area (impact or mitigation)
(See Section 4.4.2)

Site/Project Name	Application Number	Assessment Area Name or Number
Impact or Mitigation	**Assessment conducted by:**	**Assessment date:**

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 wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

Location and Landscape Support		current condition	with rehabilitaion
	a		
	b		
	c		
	d		
	e		
	f		
	g		
	h		
	i		
	j		

current with

Water Environment (n/a for uplands)		current condition	with rehabilitaion
	a		
	b		
	c		
	d		
	e		
	f		
	g		
	h		
	i		
	j		
	k		
	l		
	m		

current with

Community structure 1. Vegetation and/or 2. Benthic Community		current condition	with rehabilitaion
	I		
	II		
	III		
	IV		
	V		
	VI		
	VII		
	VIII		
	IX		
	X		

current with

Score = sum of above scores/30

current with

(if uplands, divide by 20)

0.00 0.00

Delta = [with-current]	
wetland	0.00
upland	0.00

If preservation as mitigation	
Preservation adjustment factor =	
Adjusted mitigation delta =	

If mitigation	
Time lag (t-factor)=	
Risk factor=	
Public Restoration Factor (PRF) =	

Assessment Area Acreage	

For impact assessment areas	
Functional loss (impact x acres)	

For Mitigation Assessment Areas	
Relative Functional Gain (RFG) (Delta*PRF)/(risk*t-factor)	

Mitigation Bank Credit Determination	
RFG * Assessment Area Acres	

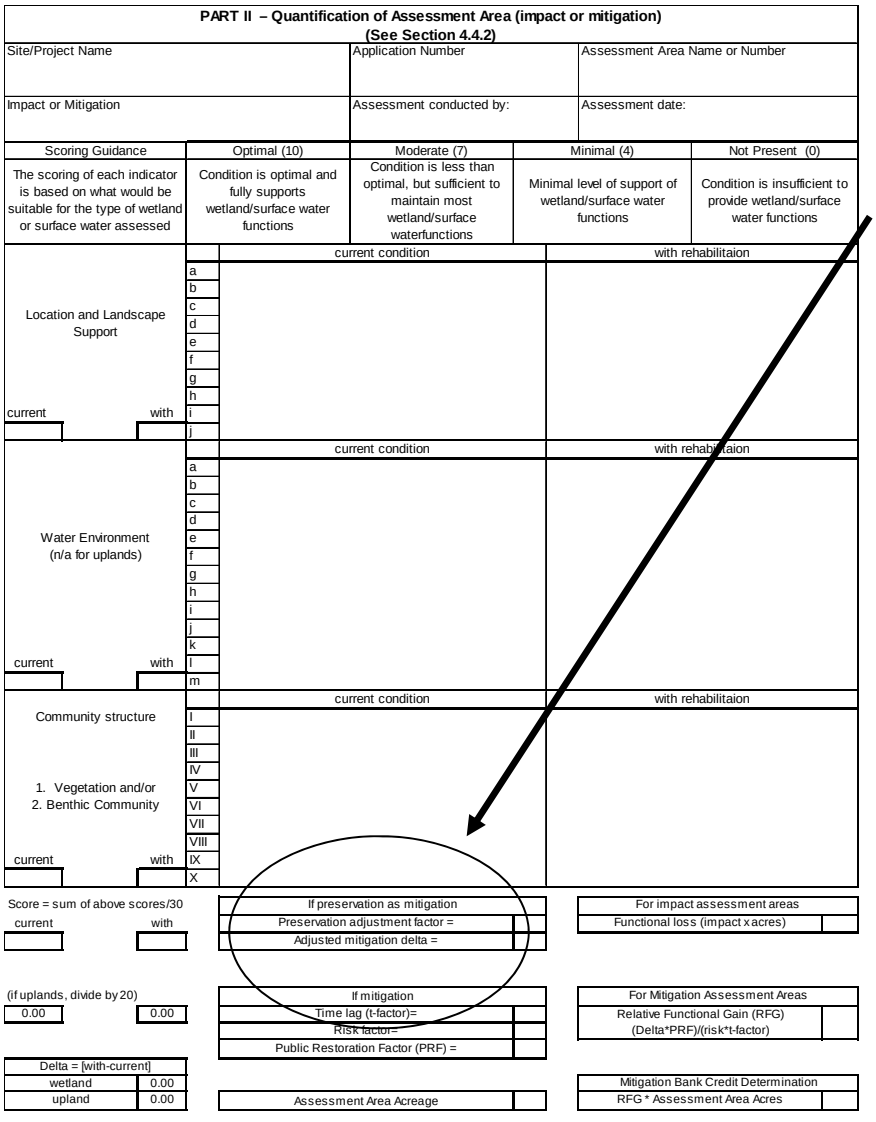
The Part II score for an impact, wetland, or surface water mitigation assessment area is determined by summing the scores for each of the indicators and dividing that value by 30 to yield a number between 0 and 1.

For upland mitigation assessment areas, the Part II score is determined by summing the scores for the location and community structure indicators and dividing that value by 20 to yield a number between 0 and 1.

The mathematical difference between the current condition and with-impact condition assessment, and between the current condition or without preservation and the with mitigation condition assessments is termed the “delta.”

- PRESERVATION ADJUSTMENT FACTOR

When assessing preservation, the gain in ecological value is determined by multiplying the delta by a preservation adjustment factor. The preservation adjustment factor is scored on a scale from 0 (no preservation value) to 1 (optimal preservation value), on one-tenth increments.
The score is based on:



PART II – Quantification of Assessment Area (impact or mitigation)
(See Section 4.4.2)

Site/Project Name	Application Number	Assessment Area Name or Number
Impact or Mitigation	Assessment conducted by:	Assessment date:

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 wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

		current condition	with rehabilitaion
Location and Landscape Support	a		
	b		
	c		
	d		
	e		
	f		
	g		
	h		
current / with	i		
	j		
		current condition	with rehabilitaion
Water Environment (n/a for uplands)	a		
	b		
	c		
	d		
	e		
	f		
	g		
	h		
	i		
	j		
	k		
current / with	l		
	m		
		current condition	with rehabilitaion
Community structure	I		
	II		
	III		
	IV		
1. Vegetation and/or	V		
2. Benthic Community	VI		
	VII		
	VIII		
current / with	IX		
	X		

Score = sum of above scores/30		If preservation as mitigation		For impact assessment areas	
current	with	Preservation adjustment factor =		Functional loss (impact x acres)	
		Adjusted mitigation delta =			
(if uplands, divide by 20)		If mitigation		For Mitigation Assessment Areas	
0.00	0.00	Time lag (t-factor)=		Relative Functional Gain (RFG) (Delta*PRF)/(risk*t-factor)	
		Risk factor=			
		Public Restoration Factor (PRF) =			
Delta = [with-current]				Mitigation Bank Credit Determination	
wetland	0.00				
upland	0.00	Assessment Area Acreage		RFG * Assessment Area Acres	

1. The extent the preserved area will promote natural ecological conditions such as fire patterns or the exclusion of invasive exotic species.

2. The ecological and hydrological relationship between wetlands, other surface waters, and uplands to be preserved.

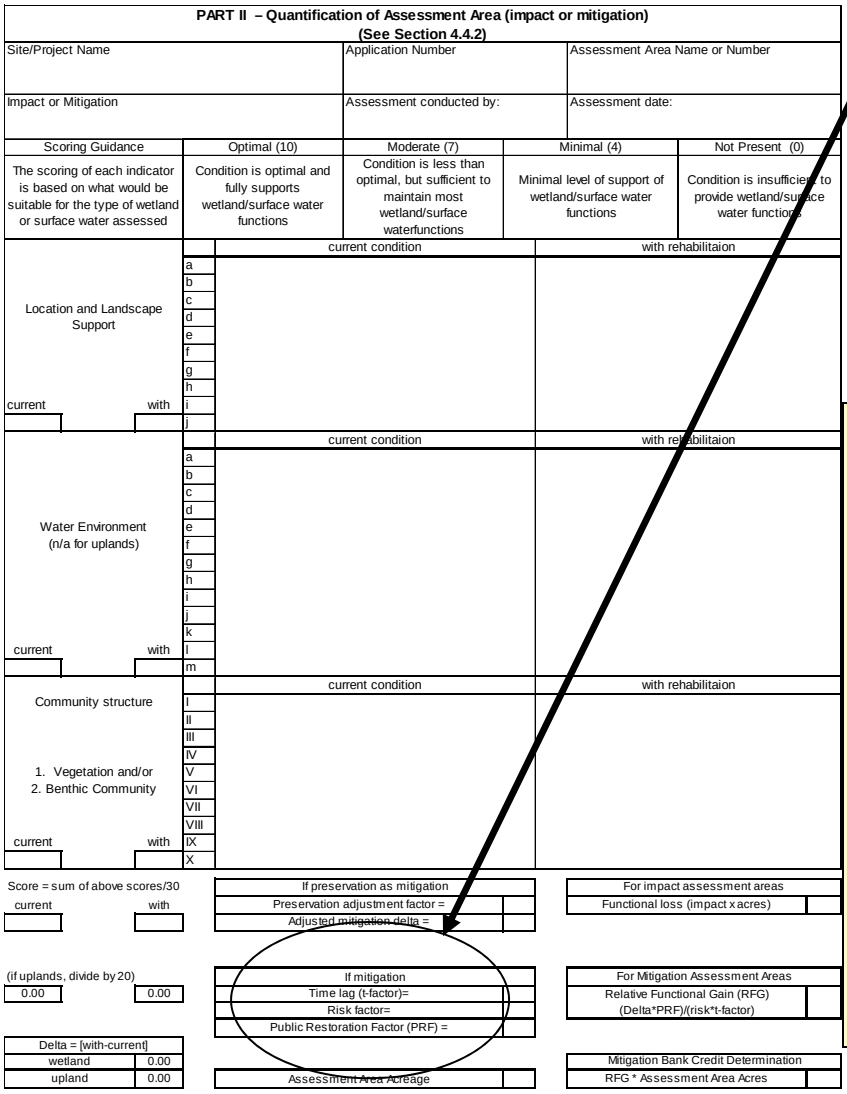
3. The scarcity of the habitat provided by the proposed preservation area and the level of use by listed species.

4. The proximity of the preserved area to areas of national, state, or regional ecological significance, and whether the areas to be preserved include corridors between these habitats.

5. The extent and likelihood of potential adverse impacts if the assessment area were not preserved.

- TIME LAG

The time lag associated with mitigation means the period of time between when the functions are lost at an impact site and when those functions are replaced by the mitigation.



PART II – Quantification of Assessment Area (impact or mitigation)
(See Section 4.4.2)

Site/Project Name	Application Number	Assessment Area Name or Number
Impact or Mitigation	Assessment conducted by:	Assessment date:

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 wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

		current condition	with rehabilitaion
Location and Landscape Support	a		
	b		
	c		
	d		
	e		
	f		
	g		
	h		
current / with	i		
	j		
		current condition	with rehabilitaion
Water Environment (n/a for uplands)	a		
	b		
	c		
	d		
	e		
	f		
	g		
	h		
	i		
	j		
	k		
current / with	l		
	m		
		current condition	with rehabilitaion
Community structure	I		
	II		
	III		
	IV		
1. Vegetation and/or 2. Benthic Community	V		
	VI		
	VII		
	VIII		
current / with	IX		
	X		

Score = sum of above scores/30
current | with

(if uplands, divide by 20)
0.00 | 0.00

Delta = [with-current]
wetland 0.00
upland 0.00

If preservation as mitigation
Preservation adjustment factor =
Adjusted mitigation delta =

If mitigation
Time lag (t-factor)=
Risk factor=
Public Restoration Factor (PRF) =
Assessment Area Acreage

For impact assessment areas
Functional loss (impact x acres)

For Mitigation Assessment Areas
Relative Functional Gain (RFG)
(Delta*PRF)/(risk*t-factor)

Mitigation Bank Credit Determination
RFG * Assessment Area Acres

The time lag, in years, is related to a factor (T-factor) as established in the table below, to reflect the additional mitigation needed to account for the deferred replacement of wetland or surface water functions.

Year	T-factor
< or = 1	1
2	1.03
3	1.07
4	1.10
5	1.14
6 – 10	1.25
11 – 15	1.46
16 – 20	1.68
21 – 25	1.92
26 – 30	2.18
31 – 35	2.45
36 – 40	2.73
41 – 45	3.03
46 – 50	3.34
51 – 55	3.65
>55	3.91

- RISK

For mitigation assessment areas, mitigation risk shall be evaluated to account for the degree of uncertainty that the proposed conditions will be achieved, resulting in a reduction in the ecological value of the mitigation assessment area.

PART II – Quantification of Assessment Area (impact or mitigation)
(See Section 4.4.2)

Site/Project Name	Application Number	Assessment Area Name or Number
Impact or Mitigation	Assessment conducted by:	Assessment date:

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 wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

		current condition	with rehabilitaion
Location and Landscape Support	a		
	b		
	c		
	d		
	e		
	f		
	g		
	h		
current with	i		
	j		

		current condition	with rehabilitaion
Water Environment (n/a for uplands)	a		
	b		
	c		
	d		
	e		
	f		
	g		
	h		
	i		
	j		
	k		
current with	l		
	m		

		current condition	with rehabilitaion
Community structure	I		
	II		
	III		
	IV		
1. Vegetation and/or 2. Benthic Community	V		
	VI		
	VII		
	VIII		
current with	IX		
	X		

Score = sum of above scores/30		If preservation as mitigation		For impact assessment areas	
current	with	Preservation adjustment factor =		Functional loss (impact x acres)	
		Adjusted mitigation delta =			

(if uplands, divide by 20)		If mitigation		For Mitigation Assessment Areas	
0.00	0.00	Time lag (t-factor)		Relative Functional Gain (RFG) (Delta*PRF)/(risk*t-factor)	
		Risk factor=			
		Public Restoration Factor (PRF) =			

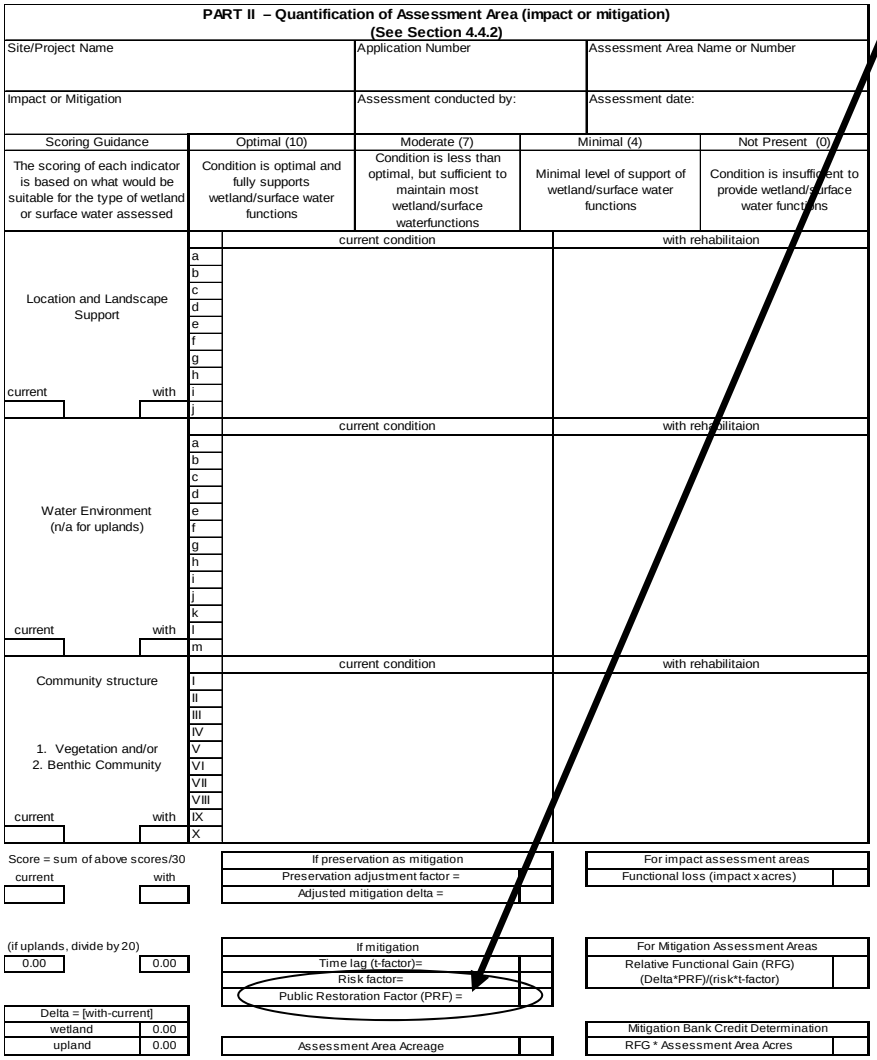
Delta = [with-current]	
wetland	0.00
upland	0.00

		Mitigation Bank Credit Determination	
Assessment Area Acreage		RFG * Assessment Area Acres	

The assessment area shall be scored on a scale from 1 (for no for de minimus risk) to 3 (high risk), on quarter-point (0.25) increments. A score of one would most often be applied to mitigation conducted in an ecologically viable landscape and deemed successful or clearly trending towards success prior to impacts (such as in a wetland bank), whereas a score of three would indicate an extremely low likelihood of success based on a number of ecological factors.

- PUBLIC RESTORATION FACTOR

Construction costs for restoration projects are driven primarily by the amount of earthwork required to attain appropriate grades and the cost to dispose of the excavated material, particularly if the material is contaminated. This adjustment factor accounts for the societal value of a publically sponsored restoration project, many of which would not likely occur without the investment from public agencies.



PART II – Quantification of Assessment Area (impact or mitigation)
(See Section 4.4.2)

Site/Project Name	Application Number	Assessment Area Name or Number
Impact or Mitigation	Assessment conducted by:	Assessment date:

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 wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

		current condition	with rehabilitaion
Location and Landscape Support	a		
	b		
	c		
	d		
	e		
	f		
	g		
	h		
current / with	i		
	j		
		current condition	with rehabilitaion
Water Environment (n/a for uplands)	a		
	b		
	c		
	d		
	e		
	f		
	g		
	h		
	i		
	j		
	k		
current / with	l		
	m		
		current condition	with rehabilitaion
Community structure	I		
	II		
	III		
	IV		
1. Vegetation and/or 2. Benthic Community	V		
	VI		
	VII		
	VIII		
current / with	IX		
	X		

Score = sum of above scores/30 (current / with)

If preservation as mitigation
Preservation adjustment factor =
Adjusted mitigation delta =

For impact assessment areas
Functional loss (impact x acres)

(if uplands, divide by 20) 0.00 / 0.00

If mitigation
Time lag (t-factor)=
Risk factor=
Public Restoration Factor (PRF) =

For Mitigation Assessment Areas
Relative Functional Gain (RFG) (Delta*PRF)/(risk*t-factor)

Delta = [with-current]	
wetland	0.00
upland	0.00

Assessment Area Acreage

Mitigation Bank Credit Determination
RFG * Assessment Area Acres

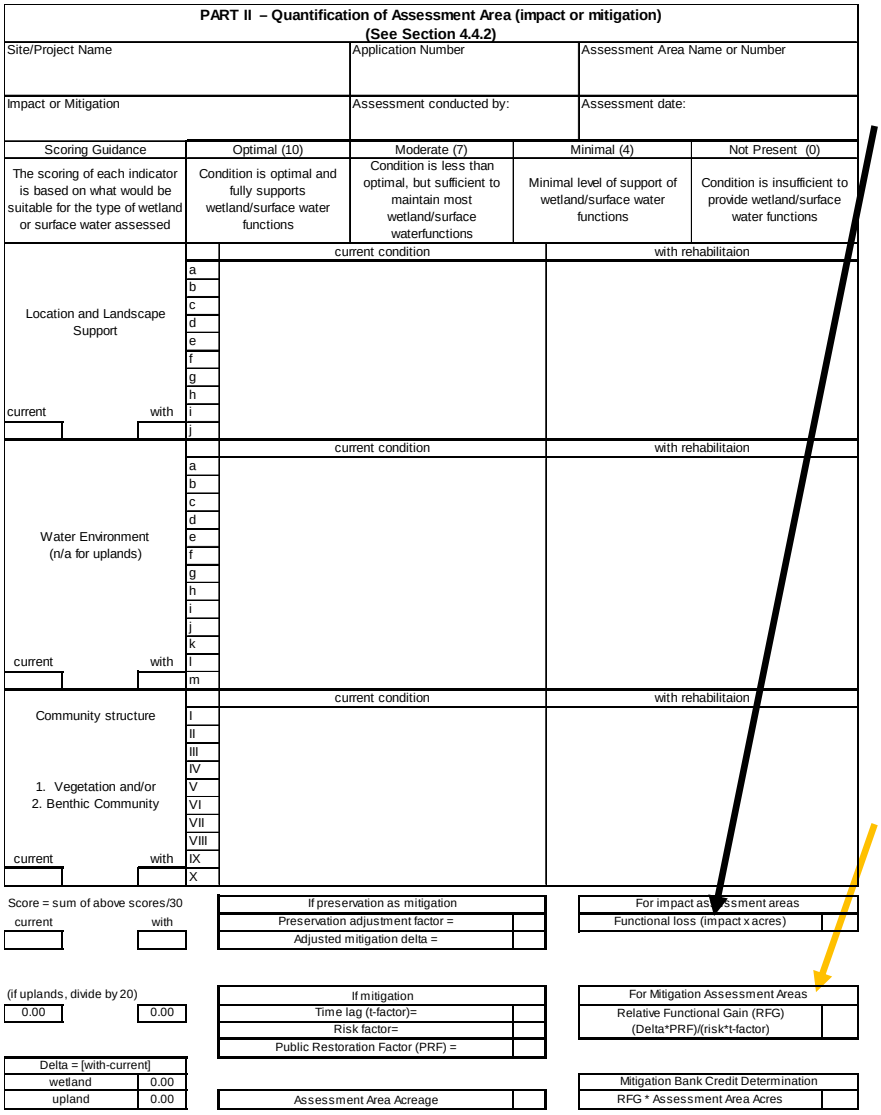
The adjustment factor score evaluates the investment from public agencies to achieve the restoration goals. The score modifier starts at 1 and increases by a factor of 0.05 as the per acre cost of restoration increases up to a maximum of score of 1.2. The Functional Gain score would be multiplied by the adjustment factor to determine the final Relative Functional Gain score.

Rehabilitation	
Construction Cost/Acre	Adjustment Factor
0 - $200,000	1
>$200,000 - $350,000	1.05
>$350,000 - $450,000	1.1
>$450,00 - $499,999	1.15
>500,000	1.2

Re-establishment	
Construction Cost/Acre	Adjustment Factor
0 - $350,000	1
>$350,000 - $425,000	1.05
>$425,000 - $475,000	1.1
>$475,00 - $525,000	1.15
>525,000	1.2

- **Functional Loss (FL) and Relative Functional Gain (RFG)**

The quantification of functional loss and relative functional gain for assessment areas are used to support the determination of the amount of mitigation that may be required, or the total potential credits generated for a Bank.



PART II – Quantification of Assessment Area (impact or mitigation)
(See Section 4.4.2)

Site/Project Name	Application Number	Assessment Area Name or Number
Impact or Mitigation	Assessment conducted by:	Assessment date:

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 wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

		current condition	with rehabilitaion
Location and Landscape Support	a		
	b		
	c		
	d		
	e		
	f		
	g		
	h		
current / with	i		
	j		

		current condition	with rehabilitaion
Water Environment (n/a for uplands)	a		
	b		
	c		
	d		
	e		
	f		
	g		
	h		
	i		
	j		
	k		
current / with	l		
	m		

		current condition	with rehabilitaion
Community structure	I		
	II		
	III		
	IV		
1. Vegetation and/or 2. Benthic Community	V		
	VI		
	VII		
	VIII		
current / with	IX		
	X		

Score = sum of above scores/30		If preservation as mitigation		For impact assessment areas	
current	with	Preservation adjustment factor =		Functional loss (impact x acres)	
		Adjusted mitigation delta =			
(if uplands, divide by 20)		If mitigation		For Mitigation Assessment Areas	
0.00	0.00	Time lag (t-factor)=		Relative Functional Gain (RFG) (Delta*PRF)/(risk*t-factor)	
		Risk factor=			
		Public Restoration Factor (PRF) =			
Delta = [with-current]					
wetland	0.00			Mitigation Bank Credit Determination	
upland	0.00	Assessment Area Acreage		RFG * Assessment Area Acres	

Functional Loss

The loss of functions provided by impact assessment area is determined using the following formula:

FL = Impact Delta x Impact Acres

Relative Functional Gain

The relative gain of functions provided by a mitigation assessment area must be adjusted using the following formula:

RFG= {Mitigation Delta (or adjusted mitigation delta for preservation) x Public Restoration Factor}/(Risk x T-factor).

Mitigation Determination Formulas

After calculating the FL and RFG, the Mitigation Determination Formulas can be used to determine:

1. Total Potential credits for a mitigation bank
2. Mitigation needed to offset impacts

Mitigation Determination Formulas

For each Impact Assessment Area:
(FL) Functional Loss = Impact Delta X Impact Area

For each Mitigation Assessment Area:
(RFG) Relative Functional Gain = {Mitigation Delta (adjusted for preservation, if applicable) x Public Restoration Factor} / ((t-factor)x(risk factor))

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.

Bank Assessment Area

Example	RFG	X	Acres	=	Credits
a.a.1					
a.a.2					
Total					

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Appendix A
Standardized Field Protocol

Appendix A Standardized Field Protocol

Review of UMAM Part I -Qualitative Characterization

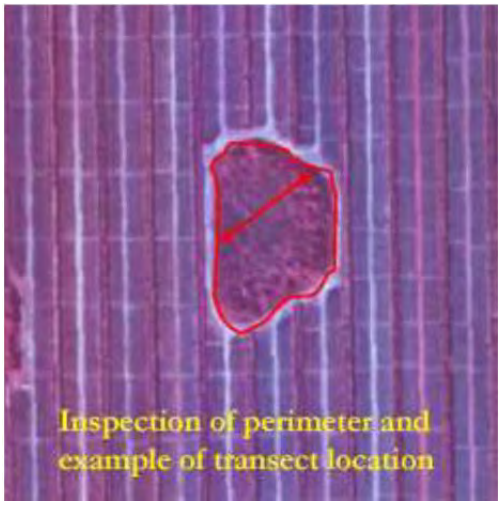
The Geographic Relationships/Hydrologic Connections, Description, and Significant Nearby Features of **Part I – Qualitative Characterization** should be evaluated in light of the information obtained during the field survey; and, during the field assessment, observations of wildlife use or signs of use as well as listed species should be documented in the section related to wildlife utilization in **Part I – Qualitative Characterization.** Finally, the last section of Part I should be updated based on observation of the assessment area and its immediately surrounding area.

Guidance: To fill out Part II, it is necessary to conduct a field survey of the assessment area and the areas immediately adjacent to the assessment area. A standardized protocol is necessary to insure reproducibility of results as well as defensibility should the assessment be challenged. The following Standardized Field Protocol (SFP) is the minimum necessary to adequately assess an area. If time allows, a more detailed field evaluation should be employed.

A SFP is part of a Quality Assurance/Quality Control program which results in assessments that are conducted in such a way as to insure that they are comprehensive, repeatable, and defensible.

In addition to a SFP, training and standard scientific precautions are necessary to insure that staff is capable of producing unbiased sampling of the assessment area. The field methods should be calibrated on sites whose ecological functions are known, and duplications conducted where members of the field team assess the same areas and achieve the same results.

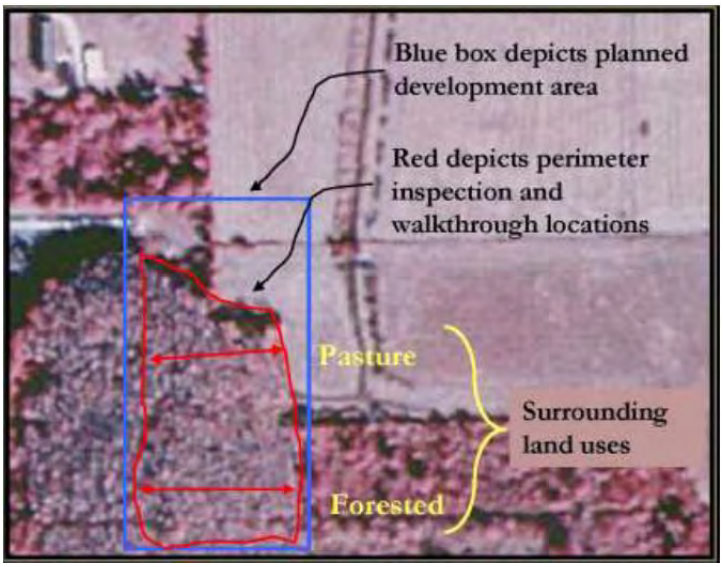
Field Surveys



Field surveys should include an inspection of the entire perimeter of the assessment area (i.e. the area that receives direct impacts from the proposed activity; the inspection can be done in conjunction with the examination of the wetland delineation line). In addition to the perimeter, an examination of the wetland interior to the fullest extent possible should be conducted, based on time availability and site requirements. These guidelines can be adjusted to account for site accessibility, (both physical and legal), and depending on the homogeneity and size of the site.

- The transects are located from the wetland or water body edge towards the interior of the assessment area, perpendicular to the edge, for a distance of 30 meters or until the limit of the proposed activity, whichever

is greater. Depending on the homogeneity of the site, these minimum requirements can be adjusted. For instance, when sampling a *Juncus* spp. marsh where there is ample visibility of the entire site, it may not be necessary to repeat the transects.



- When assessing an area that is surrounded by different land uses, make sure to divide your efforts equally among the portions of the assessment area that are surrounded by different land uses, so that they can be equally represented. For instance, in the image below, complete a walk -through of each portion of the site, as depicted below.

Secondary Impacts

NYSDEC regulates activities within 150-ft wide upland buffers adjacent to tidal wetlands, and 100 wide buffers adjacent to freshwater wetlands. When buffers are present and remain intact, the wetland is assumed to receive no secondary impacts. However, when an upland buffer requirement cannot be provided, as in the case of a road or a driveway that bisects a wetland, potential secondary impacts must be assessed. In this case, the area of anticipated secondary impacts needs to be defined, based on the proposed activity, before being scored as a separate assessment area.

Appendix B
Location and Landscape Support Guidance Module

Appendix B Location and Landscape Support Guidance Module

The value of functions provided by an assessment area to fish and wildlife are influenced by the landscape position of the assessment area and its relationship with surrounding areas. If surrounding habitats are unavailable, poorly connected, or degraded, then the value of functions provided by the assessment area to the fish and wildlife identified in Part I is reduced. The availability, connectivity, and quality of offsite habitats, and offsite land uses which might adversely impact fish and wildlife utilizing these habitats, are factors to be considered in assessing the location of the assessment area.

The following ten (10) attributes are identified to evaluate location and landscape support of the assessment area. To provide guidance, examples that depict variation in conditions for each of the attributes are included.

- Support to wildlife by outside habitats
- Invasive exotics or other invasive plant species in proximity of the assessment area
- Wildlife access to and from outside – distance and barriers
- Functions that benefit fish and wildlife downstream – distance or barriers
- Impacts of land uses outside assessment area to fish and wildlife
- Benefits to downstream or other hydrologically connected areas
- Benefits to downstream habitats from discharges
- Protection of wetland functions by upland mitigation assessment areas
- Protects uplands from flooding and storm surge
- Site elevations sufficient to adapt to sea level rise

The user is cautioned that not all attributes are applicable to all assessment areas, and in some cases, some attributes may be more relevant than others. The final score for the Location and Landscape Support category is a reflection of the overall condition of an assessment area, taking into consideration all applicable attributes (do not score each attribute and average them in the end, but rather think of this in terms of what final score best fits the overall conditions of the assessment area). Any whole number score between 0-10 may be used.

The following are descriptors of attributes for 4 categories of scores as guidance:

- A score of (10) means the assessment area is ideally located and the surrounding landscape provides full opportunity for the assessment area to perform beneficial functions at an optimal level.

- A score of (7) means that, compared to the ideal location, the location of the assessment area limits its opportunity to perform beneficial functions to 70% of the optimal ecological value.

- A score of (4) means that, compared to the ideal location, the assessment area location limits its opportunity to perform beneficial functions to 40% of the optimal ecological

value.

- A score of (0) means that the location of the assessment area provides no habitat support for wildlife utilizing the assessment area and no opportunity for the assessment area to provide benefits to fish and wildlife outside the assessment area.

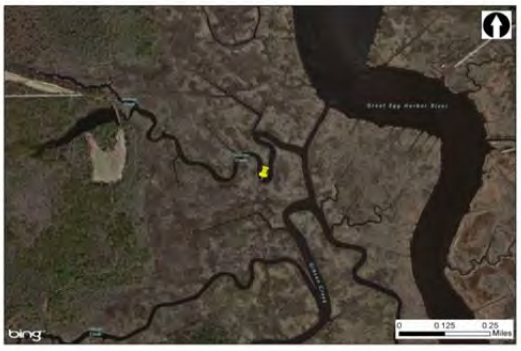
A Summary Worksheet for **Location and Landscape Support** is included as Table B.1 to help in the field assessment scoring.

LOCATION AND LANDSCAPE SUPPORT ATTRIBUTES

a. Support to wildlife by outside habitats

Guidance: This attribute assesses the extent to which habitats outside the assessment area represent the full range of habitats needed to fulfill the life history requirements of all wildlife listed in Part I, and the extent to which these habitats are available in sufficient quantity to provide optimal support for wildlife. Evaluate an area surrounding the assessment area that is appropriate for the species listed in Part I.

Many species that nest, feed, or find cover in a specific habitat or habitat type are also dependent in varying degrees upon other habitats, including upland, wetland, and surface waters, that are present in the regional landscape. Depending on the wildlife species listed in Part I, an area of outside habitats up to 1 mile in radius may be appropriate. Further distances may be appropriate for colony nesting bird species that may travel greater distances to feeding sites.



Example of outside habitats providing optimal support conditions with a mix of habitats in close proximity to wetland assessment area that could support target wildlife species.

Example of outside habitats providing limited support to some, or minimal support to many wildlife species due to extensive urban development that limits access to diverse habitats in close proximity to the assessment area.

TABLE B.1	Optimal (10)	Moderate (7)	Minimal (4)	Not Present (0)
Location and Landscape Support	full opportunity to perform beneficial functions at optimal level	opportunity to perform beneficial functions is limited to 70% of optimal ecological value	opportunity to perform beneficial functions is limited to 40% of optimal ecological value	provides no habitat support or opportunity to provide benefits to fish and wildlife
a. Support to wildlife by outside habitats	full range of habitats needed to support all wildlife species	optimal support for most, but not all wildlife species	fail to provide support for some, or minimal support for many wildlife species	no habitat support for wildlife
b. Invasive exotics or other invasive plant species in proximity of the assessment area	not present	present but cover is minimal and has minimal adverse effects	majority of plant cover consists of invasive exotics that adversely affect functions	predominance of plant cover consists of invasive exotics so that little or no function is provided
c. Wildlife access to and from outside – distance and barriers	not limited by distance or barriers	partially limited by distance or barriers	substantially limited by distance or barriers	precluded by distance or barriers
d. Functions that benefit fish & wildlife downstream – distance or barriers	not limited by distance or barriers	somewhat limited by distance or barriers that reduce opportunity to provide benefits	limited by distance or barriers that substantially reduce opportunity to provide benefits	functions not present
e. Impacts of land uses outside assessment area to fish and wildlife	no adverse impacts on wildlife	minimal adverse impacts on wildlife	significant adverse impacts on wildlife	severe adverse impacts on wildlife
f. Benefits to downstream or other hydrologically connected areas	opportunity is not limited by hydrologic impediments or flow restrictions	limited by hydrologic impediments or flow restrictions so that benefits are provided with lesser freq. or magnitude	limited by hydrologic impediments so that benefits are rarely provided or are provided at greatly reduced levels	no opportunity to provide benefits due to hydrologic impediments or flow restrictions
g. Benefits to downstream habitats from discharges	downstream habitats are critically or solely dependent on discharges	downstream habitats derive significant benefits from discharges	downstream habitats derive minimal benefits from discharges	downstream habitats derive negligible or no benefits from discharges
h. Protection of wetland functions by upland mitigation assessment areas	optimal protection of wetland functions	significant, but suboptimal, protection of wetland functions	minimal protection to wetland functions	no protection of wetland function
i. Protection for uplands from flooding and storm surge	Wetlands are horizontally extensive and contain vertical relief that buffers storm surges	Wetlands are moderately extensive, with some vertical relief, providing some buffering functions	Wetlands are minimally extensive, with little vertical relief, providing minor buffering function	Wetlands not horizontally or vertically extensive, provide little to no buffering ability
j. Site elevations sufficient to adapt to effects of sea level rise	Scrub-shrub and high marsh habitats abundant, allowing for habitat migration	Some scrub-shrub and high marsh habitats present, providing for habitat migration	Low marsh abundant, little high marsh available for habitat migration	Site consists of low marsh and mudflat, no onsite areas available for habitat migration

Source: FDEP, 2004. Uniform Mitigation Assessment Method Training Manual; Louis Berger & Assoc., P.C. 2013.

b. Invasive exotics or other invasive plant species in proximity to the assessment area

Guidance: The value of functions provided by an assessment area to fish and wildlife are influenced by the condition of surrounding areas. If surrounding habitats (i.e., habitats within the range of expected fish and wildlife species that utilize the assessment area) are degraded due to the presence, and especially dominance, of invasive or exotic plant species, then the value of functions provided by the assessment area to the fish and wildlife identified in Part I is reduced.

Under optimal conditions, less than 5 percent of the site and adjacent habitats would be dominated by invasive plant species. Consistent with regulatory guidance for mitigation actions, 10 to 15 percent cover by invasive plant species would be consistent with a more moderate condition that would require management intervention to attain a more optimal condition. A predominance of invasive plant species cover of over 85 percent or more of the assessment area would be consistent with a score of not present.

c. Wildlife access to and from outside – distance and barriers

Guidance: The value of functions provided by an assessment area to fish and wildlife are influenced by wildlife access (both to and from outside areas). Access may be influenced by distance to other natural habitats, or by landscape barriers such as roads, walls, canals, and other human-made structures. Avian fauna are probably least affected by distance and barriers. Mammals are more affected, but can obviously cover greater distances than can herpetofauna. The degree of influence is highly dependent on type and amount of cover in the intervening area and the types of barriers. Fauna traversing open fields are more susceptible to predators than if traveling through dense shrubs. Well-traveled roads offer greater hazards to ground dwelling fauna than seldom traveled “two-track” dirt roads.

This variable reflects that availability of habitat that an animal is likely to be able to traverse during its daily movements without encountering significant barriers. The primary reason for this is that wildlife will utilize the entire habitat complex and will not be confined to or deterred by project boundaries. A single habitat patch rarely supplies all of the needs of a particular wildlife species throughout the year. A yearly home range may consist of one large habitat block but often consists of a collection of habitat patches. Predatory wildlife requires larger home ranges to avoid depleting prey populations. In addition, wildlife must access adjoining home ranges when breeding or dispersing. Therefore, the contribution of nearby habitats is weighted according to the ability of different classes of wildlife (highly mobile and less mobile) to traverse between patches. The more classes of wildlife that are blocked by lack of an effective corridor, the lower the attribute score.

In assessing habitat connectivity of tidal wetlands, the needs and abilities of the following four wildlife classes can be considered in evaluating this variable:

- A highly mobile animal (e.g., river otter (*Lutra canadensis*)) with a large home range.
- A moderately mobile animal (e.g., clapper rail (*Rallus longirostris*)) with a moderate home range.

- A weakly mobile animal (e.g., marsh wren (*Cistothorus palustris*)) with a small home range.
- A highly mobile animal that uses the wetland subclass only as one of several possible foraging habitats (e.g., great egret (*Casmerodius albus*)).

In assessing this attribute, consider the perimeter of the assessment area and visually estimate the percentage of the perimeter that borders habitats accessible to wildlife that could use the assessment area, and those land uses that are unsuitable (developed land, highways, construction sites, landscaped areas). Also consider the distance accessible habitats extend up to 0.5 miles beyond the assessment area boundary. Are continuous corridors present between the assessment area and natural habitats? The following list provides a guide to assessing the quality of the habitat connections.

Attribute Score	**Corridor Type**	**Corridor Description**
10 to 8	Contiguous	**1)** Open water stretches <150 feet wide (regardless of depth), and/or, **2)** Continuous stretch of undeveloped wetland habitat.
7 to 5	Partially Impeded	**1)** Open water stretches from 150-500 feet (regardless of depth) and/or, **2)** Continuous stretch of undeveloped wetland and upland habitat, and/or, **3)** Railways and dirt roads with little traffic.
4 to 3	Impeded	**1)** Open water stretches from 500–1,000 feet (regardless of depth), and/or, **2)** Stretches of developed land <300 feet in width, and/or, **3)** Railroads and paved roads with <100 vehicle crossings per day that are unbridged or have a bridge opening < 10 feet wide.
2 - 0	Absent or barrier present	**1)** Open water stretches >1000 feet in width, and/or, **2)** Highly developed urban, residential, or industrial areas (>300 feet 0 – wide), and/or, **3)** Roadways with >100 vehicle crossings per day that are unbridged or have a bridge opening < 10 feet wide.

d. Functions that benefit fish and wildlife downstream – distance or barriers

Guidance: The functions provided by an assessment area to fish and wildlife in "downstream locations" are influenced by distance or barriers that reduce the opportunity for the assessment area to provide these benefits. Are there physical barriers to hydrologic connections (for instance, dams, elevated culverts, berms, or shallow ditches or channels

mostly less than 1 foot deep)? Is the distance so great that little influence to downstream fish and wildlife populations is possible? Are there intervening conditions that make a connection with downstream habitats unlikely (for instance waters with zero dissolved oxygen, or highly contaminated)? If the assessment area were to serve as a nursery or breeding area for a species, can the young disperse to downstream habitats? Do predatory fish have access to portions of the site? In assessing potential barriers, the information provided in c. above can be used for guidance.

Scoring this attribute for isolated wetlands: It is recognized that isolated wetlands generally lack surface water connections to downstream waters except in seasonally high waters, and as a result, this attribute should be evaluated in light of potential connections rather than existing connections.

e. Impacts of land uses outside assessment area to fish and wildlife

Guidance: The functions provided by an assessment area to fish and wildlife are influenced by the intensity and types of land uses in the surrounding areas. Some land uses, by the presence of associated attributes like noise, people, domesticated animals, industrial activities, and runoff of pollutants, can have deleterious effects on habitat quality. Do surrounding land uses have noise levels that might reduce habitat quality? Are there other disturbances such as potential for humans or domesticated animals to affect habitat quality? Is the assessment area situated in such a way as to receive direct runoff from parking lots, roads, or buildings? Are there adjacent land uses that may adversely affect habitat quality because of night lighting, or activity?

Reference tidal wetland with adjacent commercial, residential and transportation corridor land uses that collectively may have moderate adverse impacts to fish and wildlife.

Reference tidal wetland with high density industrial, commercial, and transportation land uses that collectively may have significant adverse impacts to fish and wildlife use of the assessment area.

f. Benefits to downstream or other hydrologically connected areas

Guidance: The assessment area may provide water quantity and quality benefits to downstream habitats based on the degree of hydrologic connectivity, which in turn can be impaired by roads, ditches, channels, and other water barriers. Are there hydrologic impediments or flow restrictions that may limit the opportunity of the assessment area to provide benefits to downstream or other hydrologically connected areas?

Scoring this attribute for isolated wetlands: It is recognized that isolated wetlands generally lack surface water connections to downstream waters except in seasonally high waters, and as a result, this attribute should be evaluated in light of potential connections during the wet season rather than existing connections.

g. Benefits to downstream habitats from discharges

Guidance: This attribute evaluates the extent to which downstream habitats are affected by surface water or groundwater discharges from the assessment areas. If a downstream system is critically or solely dependent on hydrologic discharges from the assessment area, then the benefits to downstream habitats would be very high.

Scoring this attribute for isolated wetlands: It is recognized that isolated wetlands generally lack surface water connections to downstream waters except in seasonally high waters, and as a result, this attribute should be evaluated in light of potential connections during the wet season rather than existing connections.

h. Protection of wetland functions by upland mitigation assessment areas

Guidance: This factor applies to upland mitigation areas only. It assesses the level of protection of wetland functions by the upland mitigation areas. Does the proposed upland mitigation area adequately protect wetland functions through adjacency? Is it connected? Does it provide some measure of water quality improvement or sediment control? Does it act as a buffer to surrounding land uses or other adverse activities? Does the upland mitigation area provide some measure of habitat enhancement through interconnection with wetland areas?

i. Protects uplands from flooding and storm surge

Guidance: This attribute assesses the extent to which onsite wetlands function to protect adjacent and nearby upland properties, including developed properties, from the effects of storm surges and resultant coastal flooding, as well as minor flooding associated with spring tide events. Many areas immediately landward of the shoreline in NYC are filled former wetlands or open water habitats and are only minimally elevated and/or are within the 100 year flood zone. Horizontally extensive wetlands (> 100 feet wide) can absorb a portion of the wave energy and help to store floodwaters, thereby protecting nearby uplands environments from shoreline erosion. However, based on studies conducted in the aftermath of Hurricane Katrina (Wamsley, et al. 2009) the width of wetlands required to have a notable effect on storm

surge suppression is over >10,000 linear feet in width. Therefore, narrow, fringing wetlands have little to no ability to reduce storm surges and store floodwaters.

j. Site elevations sufficient to adapt to sea level rise

Guidance: This attribute assesses the ability of a tidal wetland site to adapt to sea level rise by migrating landward. As sea level rises, the hydroperiod of low marsh elevations may become too long to support vascular salt marsh vegetation such as *Spartina alterniflora*, and may become mudflat. Likewise, the hydroperiod of high marsh elevations presently dominated by species including *Spartina patens*, *Distichlis spicata*, and *Juncus gerardii* may become too long to support these species, and these elevations may become low marsh habitat. Similarly, sea level rise may cause the scrub-shrub zone often vegetated with *Iva frutescens* and *Baccharis hamilifolia* to become high marsh over time. Nearshore upland areas may also be subjected to some tidal hydrology and become coastal scrub-shrub habitat over time. The ability of the abovementioned tidal wetland habitat types to migrate landward as a result of sea level rise depends on the availability of suitable elevations. A tidal wetland site has little to no ability to migrate in response to sea level rise if it is bordered by a seawall or other hardened development, or if it only consists of low marsh, or has a narrow vertical elevation range. However, a site with a diversity of elevations and habitat types and abundant horizontal expanse is more likely to successfully adapt to rising sea level.

Appendix C
Water Environment Guidance Module

Appendix C Water Environment Guidance Module

The quantity of water in an assessment area, including the timing, frequency, depth and duration of inundation or saturation, flow characteristics, and the quality of that water, may facilitate or preclude its ability to perform certain functions and may benefit or adversely impact its capacity to support certain wildlife. If the water environment is degraded, then the value of functions provided by the assessment area to the fish and wildlife identified in Part I is reduced.

The following thirteen (13) attributes are identified to evaluate this category. To provide guidance, examples that depict variation in conditions for each of the attributes are included.

- Tidal regime
- Water level indicators
- Soil moisture
- Soil erosion or deposition
- Vegetation -community zonation
- Vegetation – hydrologic stress
- Use by animal species with specific hydrological requirements
- Plant community composition – species tolerant of and associated with water quality degradation or flow alteration
- Direct observation of standing water
- Existing water quality data
- Water depth, currents, and light penetration
- Wave energy/ fetch
- Tidal marsh stability

Be aware that not all attributes are applicable to all assessment areas and in some cases, some attributes may be more relevant than others. The final score for the Water Environment category is a reflection of the overall condition of an assessment area, taking into consideration all applicable attributes (do not score each attribute and average them in the end, but rather think of this in terms of what final score best fits the overall conditions of the assessment area). Any whole number score between 0-10 may be used.

The following are descriptors of attributes for 4 categories of scores as guidance:

- A score of (10) means that the hydrology and water quality fully supports the functions and provides benefits to fish and wildlife at optimal capacity for the assessment area.

- A score of (7) means that the hydrology and water quality supports the functions and provides benefits to fish and wildlife at 70% of the optimal capacity for the assessment area.

- A score of (4) means that the hydrology and water quality supports the functions and provides benefits to fish and wildlife at 40% of the optimal capacity for the assessment

area.

- A score of (0) means that the hydrology and water quality does not support the functions and provides no benefits to fish and wildlife.

A Summary Worksheet for the **Water Environment** is included as Table C.1 to help in the field assessment scoring.

WATER ENVIRONMENT ATTRIBUTES

a. Tidal regime

Guidance: Tidal wetlands in the New York City region have been significantly altered by hydrologic manipulations, mosquito-ditching, excavation, filling, channel dredging and constrictions and other alterations. Tidal influence is restricted by the presence of bridges, culverts, berms and other manipulations to tidal channels. The effects of changes in the hydrologic regime affect physical, chemical, and biological processes occurring within a tidal marsh. Wetlands with the least alterations exhibit the closest conditions to that of a natural tidal wetland.

Sites open to the free exchange of tidal waters during normal tidal cycles with no significant hydrologic alterations or restrictions present represent the optimal condition.

The presence of restrictions such as low-elevation berms which are frequently overtopped by high tide events or have multiple breaches, or culverts or narrow bridges that alter the free exchange of tidal flow represent a moderate restriction. Typically in these instances a tidal marsh will retain the requisite plant species.

The presence of restrictions such as a high-elevation berm which is infrequently overtopped by high-tide events or has a single opening or breach, or small, undersized culverts or bridge which restrict tidal flow represent severe hydrologic restriction. Typically in these instances the site receives full tidal inundation only during extreme storm tide events and a functional tidal marsh may no longer be present or the requisite plant species are not dominant.

Sites isolated from tidal exchange except during extreme events such as storm surges are lacking this attribute.

b. Water level indicators/Hydroperiod

Guidance: Several hydrologic indicators exist in tidal and nontidal wetlands that can help assess water conditions at a site and determine the type of wetland hydroperiod associated with the assessment area wetland. This section focuses on those indicators that give insight into typical water levels experienced within the assessment area, and the predominant wetland hydroperiod within the assessment area.

Wetland hydroperiods are defined as water regime modifiers within the U.S. Fish and Wildlife Service (USFWS) wetland classification system, as described in the *Classification of wetlands and deepwater habitats of the United States* (Cowardin, et al., 1979). The descriptions are informative and can be useful in further illustrating the relationship between hydroperiod and wetland community type. The publication is available at: http://www.npwrc.usgs.gov/resource/wetlands/classwet/.

Water levels and wetland hydroperiod indicators for tidal and nontidal wetland systems are described below to provide further information useful in assessing this attribute.

Tidal Systems

Factors influencing the hydroperiod of a tidal marsh include astronomical tides, metrological/climatological events, vertical movements of the land surface, and coastal geomorphology (Rozas 1995). Field indicators of a tidal hydroperiod include:

- presence/absence of standing water
- presence/absence of high tide water line
- presence/absence of a wrack line
- presence/absence of plant species adapted to specific hydrologic conditions.

The presence of plant species in specific salt marsh zones (low marsh, high marsh, shrub zone) is determined by factors such as the duration, frequency, and depth of flooding. Salt marsh vegetation typically occurs in well-defined zones determined by elevation and the resultant effect on the tidal flooding regime. The following table presents tidal wetland hydroperiods and typical field indicators (Cowardin et al. 1979). It should be noted that the absence of the indicators can be informative and suggest a reduced or absent condition.

Table C-1	Optimal (10)	Moderate (7)	Minimal (4)	Not Present (0)
Water Environment	hydrology and water quality fully supports functions and provides benefits to fish and wildlife at optimal capacity	hydrology and water quality supports functions and provides benefits at 70% of optimal capacity	hydrology and water quality supports functions and provides benefits at 40% of optimal capacity	hydrology and water quality does not support functions and provides no benefits to fish and wildlife
a. Tidal regime	Site is open to free exchange of tidal waters, water depths appropriate to wetland community type	Moderate hydrologic restriction present	Severe hydrologic restriction present	Site is isolated from tidal exchange
b. Water level indicators/Hydroperiod	Appropriate, water depths/soil saturation and duration is appropriate to wetland community type	Slight deviation	Moderate deviation	Extreme degree of deviation
c. Soil moisture	appropriate with no evidence of soil desiccation, oxidation or subsidence	minimal soil oxidation or subsidence; soils are drier than expected	strong evidence of soil desiccation, oxidation or subsidence	strong evidence of substantial soil desiccation, oxidation or subsidence
d. Soil erosion or deposition	not atypical or indicative of altered flow rates	minor alteration in flow rates or points of discharge	atypical and indicative of alterations in flow rates or points of discharge	greatly atypical and indicative of greatly altered flow rates or points of discharge
e. Vegetation -community zonation	appropriate in all strata	inappropriate in some strata	inappropriate in most strata	inappropriate in all strata
f. Vegetation – hydrologic stress	no signs of hydrologic stress such as excessive mortality, leaning or fallen trees, thinning canopy, insect damage or disease associated with hydrologic stress	slightly greater than normal mortality, leaning or fallen trees, thinning canopy, or signs of insect damage or disease associated with hydrologic stress	strong evidence of greater than normal mortality, leaning or fallen trees, thinning canopy, or signs of insect damage or disease associated with hydrologic stress	strong evidence of much greater than normal mortality, leaning or fallen trees, thinning of canopy, or signs of insect damage or disease associated with hydrologic stress
g. Use by animal species with specific hydrological requirements	consistent with expected hydrological conditions	less than expected	greatly reduced	lacking
h. Plant community composition – species tolerant of and associated with water quality degradation or flow alteration	Plant community composition is not characterized by species tolerant of and associated with water quality degradation or flow alteration	some species tolerant of and associated with water quality degradation or flow alteration	much of the community consists of species tolerant of and associated with water quality degradation or flow alteration	community consists predominantly of species tolerant of and associated with water quality degradation or flow alteration
i. Direct observation of standing water	no water quality degradation such as discoloration, turbidity, or oil sheen	slight water quality degradation such as discoloration, turbidity, or oil sheen	moderate water quality degradation such as discoloration, turbidity, or oil sheen	significant water quality degradation such as obvious discoloration, turbidity, or oil sheen
j. Existing water quality data	conditions are optimal for community type	slight deviation from normal, with minimal ecological effects	moderate deviation from normal, with expected ecological effects	large deviation from normal, with expected adverse ecological effects
k. Water depth, currents and light penetration	optimal for community type	generally sufficient but expected to cause some changes in species, age classes and densities	not well suited for and expected to cause significant changes in species, age classes and densities	inappropriate for community type
l. Wave energy/fetch	No potential for shoreline erosion due to wave energy	Minimal shoreline erosion due to wave energy	Moderate shoreline erosion due to wave energy	Severe shoreline erosion due to wave energy
m. Tidal marsh stability	Marsh elevation is stable	Minor accretion or subsidence is occurring; minimal change in marsh area.	Moderate accretion or subsidence is occurring; marsh area has decreased notably or plant community has been partially altered.	Severe accretion or subsidence is occurring; significant loss or marsh area over time observed, or significant conversion of marsh community to non-native plant species.

Tidal Hydroperiod	Definition (USFWS)	Indicators
Subtidal	The substrate is permanently flooded with tidal water.	Presence of water throughout all tidal cycles Presence of *Ruppia maritime*, *Zostera maritima*
Irregularly Exposed	The land surface is exposed by receding tides less often than daily.	Presence of water during most tidal cycles Absence of vegetation
Regularly Flooded	Tidal water alternately floods and exposes the land surface at least once daily.	High tide water line visible on vegetation/structures Wrack line evident at upper limit Presence of near monoculture of *Spartina alterniflora*
Irregularly Flooded	Tidal water floods the land surface less often than daily.	Presence of *Spartina patens*, *Distichlis spicata*, *Juncus gerardii*, *Salicornia* spp.

Nontidal Systems

Nontidal wetland hydrology indicators for water levels and wetland hydroperiods are presented in the USACE's 2012 *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region* (Version 2.0). This reference can be used to assist in identifying and documenting field indicators of the predominant

Examples of field indicators include:

- presence of standing water or shallow groundwater
- presence/absence of high water line
- presence/absence of a wrack line
- presence/absence plant species adapted to specific hydrologic conditions.

For nontidal wetlands, vegetation present in wetland communities is determined by factors such as the duration, frequency, and depth of flooding. The following table presents nontidal wetland hydroperiods and typical field indicators (Cowardin et al. 1979).

Nontidal Hydroperiod	Definition (USFWS)	Indicators
Permanently Flooded	Water covers the land surface throughout the year in all years.	Presence of water throughout all seasons. Presence of aquatic plants such as *Nymphea odorata, Nuphar lutea* or *Potomogeton* spp.
Intermittently Exposed	Surface water is present throughout the year except in extreme drought.	Presence of aquatic plants such as *Nymphea odorata, Nuphar lutea* or *Potomogeton* spp.

Semi-permanently Flooded	Surface water persists throughout the growing season in most years. When surface water is absent, the water table is usually at or very near the land surface.	Presence of non-persistent emergent plants such as *Alisma-plantago aquatica, Polygonum* spp.*,* or *Pontederia*.
Seasonally Flooded	Surface water is present for extended periods especially early in the growing season, but is absent by the end of the season in most years. When surface water is absent, the water table is often near the land surface.	Presence of woody plants tolerant of prolonged flooding such as *Nyssa sylvatica* or *Cephalanthus occidentalis*, and presence of persistent emergent plants such as *Typha* spp. or *Scirpus* spp. Thick (=> 12 inches) accumulation of organic matter is upper soil layer.
Saturated	The substrate is saturated to the surface for extended periods during the growing season, but surface water is seldom present.	Presence of hydrophytic vegetation Soil indicators of reducing conditions.
Temporarily Flooded	Surface water is present for brief periods during the growing season, but the water table usually lies well below the soil surface for most of the season. Plants that grow both in uplands and wetlands are characteristic of the temporarily flooded regime.	Presence of hydrophytic vegetation Soil indicators of reducing conditions.

Additional field indicators of hydrologic conditions include the following:

Mosses or liverworts. These are in a group of plants called bryophytes, which lack true roots and leaves, and are found in moist environments. When water levels fall, they appear as a dark greenish-brown growth on the bark of trees or on hard substrates such as rocks.

Drift lines and rafted debris. These are composed of vegetation, litter, and other materials that have been carried by water and have been deposited, usually in distinct lines or locations, directly on the ground or sometimes entangled within vegetation. They can be indicative of high water levels. This indicator will typically be found in coastal wetlands as well as floodplains or any wetland exhibiting high water levels fluctuations.

Elevated lichen lines. Lichens are an association of a fungus and an alga, and appear as flattened film on the bark of trees. They are not tolerant of inundation, therefore high standing water around the trunks of trees impedes their growth, thus producing a distinct line which is indicative of ordinary or seasonal high water levels. In wetlands that do not have prolonged inundation, lichens can grow on the trunks at ground level.

Morphological Plant Adaptations. These refer to special structures or features developed by plants under water logged conditions, which are not normally present in dry conditions. They include adventitious roots and lenticels. The former are usually developed on the stem or trunk of certain plants, and they aid the plant's aerobic respiration during anoxic periods. When the inundation period ends, these roots stop developing. Lenticels are another mechanism for aerobic respiration, and they appear as blister-like breaks on the outer bark of stems and roots.

Many species of bottomland hardwood trees develop adventitious roots and lenticels, as well as shrub species such as wax myrtle (*Myrica cerifera*), water-primrose (*Ludwigia* spp.), and St. John's wort (*Hypericum* spp.).

Other examples of morphological plant adaptations to water logged conditions include the buttressed trunks of swamp tupelo (*Nyssa sylvatica* var. biflora), American elm (*Ulmus americana*), and pin oak (*Quercus palustris*).

Water Marks. Water marks are the result of sustained water levels and appear as distinct stain lines on fixed objects and vegetation. These are usually related to the elevated lichen lines, and can be used to evaluate ordinary or seasonal high water levels.

In assessing this attribute, hydrologic indicators can be used to document the water conditions within the assessment area. The evaluator should examine the site for distinct water lines and other indicators to determine if they are indicative of reasonable water levels for the wetland community type. Optimal conditions within an assessment area would occur when indicators are distinct and consistent with those expected for the community type. The absence of expected indicators or indicators inconsistent with expected hydrologic conditions would indicate the attribute was not present.

c. Soil moisture

Guidance: Most wetlands exhibit moist or saturated soils throughout the year. In some cases, practices such as ditching, loss of groundwater recharge from land use changes, or excessive well water pumping result in lowered groundwater tables and consequent drainage of wetlands. Dry soils oxidize rapidly and this can result in soil subsidence, which is defined as the lowering of the soil level caused by the shrinkage of organic layers due to desiccation, consolidation, and biological oxidation. When scoring this indicator criterion, you must determine whether the soil moisture is appropriate for the particular system you are evaluating, taking into consideration seasonal variation, antecedent weather, and other climatic effects. The following hydric soil indicators identify soils with a high water table capable of providing saturation to the soil surface for extended periods of time. Further elaboration regarding technical hydric soil criteria can be found in *Field Indicators of Hydric Soils in the United States* (USDA, NRCS, 1996 and 1998).

All Soils	**Sandy Soils**	**Loamy and Clayey Soils**
Stratified Layers	Sandy Redox	Depleted Matrix
Organic Bodies	Stripped Matrix	Marl
	Dark Surface	Umbric Surface
	Polyvalue Below Surface	Thick Dark Surface
	Thin Dark Surface	Fe/Mn Masses
		Depleted Dark Surface
		Redox Dark Surface

Generally, in sandy textured soils, if the soils are wetland/hydric soils, the hydric soil indicators should be prevalent within 6 inches of the soil surface. In loamy and clayey textured soils, the hydric soil indicators should be prevalent within 12 inches of the soil surface.

d. Soil erosion or deposition

Guidance: Evidence of soil erosion and deposition is usually found in flowing systems such as floodplain swamps. When the river or stream overflows its banks, it deposits its sediment load in the floodplain. Water flowing through the system can also carry away some of the topsoil, and this is more prominent when water levels and velocity are excessively high. It is important to make the distinction between natural erosion/deposition and one indicative of deviation from that normal state (i.e., bends in a river versus a delta at the mouth of a canal). Anthropogenic sources of erosion and sediments should also be considered if it is leading to untypical rates of sediment deposition within the wetland. Additional sources of sediment deposition can include bank erosion from adjacent fill areas and stormwater discharges.

e. Vegetation – community zonation

Guidance: This attribute assesses whether the community zonation is appropriate for the ecosystem type. Many wetland types exhibit distinct community zonation. For instance, isolated freshwater marshes may have distinct rings of vegetation from the edge towards the interior. Tidal marshes also have distinct zonation along an elevation gradient that is tied to variations in tidal inundation frequency and duration.

When a wetland becomes hydrologically impaired, this community zonation can be disrupted. For instance, the presence of *Phragmites australis* (common reed) in a tidal marsh can be indicative of a tidal restriction or a change in surface elevations. Similarly, upland species encroachment into a wetland is also indicative of wetland drainage. On the other hand, community zonation can also be disrupted by water impoundment. For instance, cattails (*Typha* spp.) are adapted to high water levels in marshes, while in forested systems water impoundment results in the lack of an herbaceous layer.

f. Vegetation – hydrologic stress

Guidance: This attribute assesses the extent of hydrologic stress on vegetation. Hydrologic stress can manifest itself in many different ways, including increased mortality, leaning or fallen trees, thinning canopy, as well as susceptibility to insect damage or disease. Do you see a large number of leaning or fallen trees? Is there increased plant mortality at the site? Is there evidence of insect damage or disease?

g. Use by animal species with specific hydrological requirements

Guidance: This attribute assesses the presence or evidence of use by certain animal species with specific hydrologic requirements. However, when scoring this factor keep in mind that many species will not be seen during a brief site investigation, so the mere absence of sightings should not be counted against the particular site.

Many amphibians, such as grey tree frog, wood frog and spotted salamander, can only reproduce in isolated, ephemeral or vernal pool wetlands that lack predatory fish. In tidal systems, crabs and shellfish require cyclic tidal inundation.

h. Plant community composition

Guidance*:* The presence of tolerant wetland plant species can be an indication of degraded water quality. For instance, cattails (*Typha* spp.), duckweeds (*Lemna* spp.), common reed (*Phragmites australis*) are usually associated with high levels of nutrients. Species typical of low nutrient conditions include bladderwort (*Utricularia* spp.), and pitcher plants (*Sarracenia* spp.).

i. Direct observation of standing water

Guidance: When standing water is present, observations of water discoloration, turbidity, and oil sheen can help assess the water quality conditions at a site. It is extremely important, however, not to confuse what is a normal discoloration and turbidity from an atypical situation. For instance, even natural ecosystems exhibit an oil sheen on the water surface, but its appearance is very different from anthropogenic sources of oil.

j. Existing water quality data

Guidance: When water quality data exist for a particular site, it is important to compare them with expected values for the same ecosystem type. Studies have been conducted over the years that show typical values for nutrients and oxygen levels in different types of wetlands. However, the natural variability can be high, so caution needs to be used when interpreting water quality data, especially if the information was collected only once and does not represent long-term collection and analysis. Dissolved oxygen, pH and salinity are biologically important parameters that are easily measured in the field.

Dissolved Oxygen - Optimal oxygen levels are those where fish utilization of the site is not restricted and fish growth potential and survival are highest. Concentrations of less than 4 mg/l and 60% saturation are limiting (Adamus et al. 1987), and lower concentrations which are lethal are considered unsuitable. Water oxygen content is considered optimal when oxygen levels are usually greater than 5 mg/l and unsuitable when oxygen levels are frequently less than 2 mg/l. Intermediate oxygen levels are considered suboptimal, but not lethal (Bartoldus, et al. 1994). Direct observation of fish, especially younger stages, can indicate regular presence and/or successful reproduction of fish.

pH -The pH level of water affects fish survival, growth, and larval development. The pH is considered optimal when levels are between 6.5 to 8.5 and unsuitable when pH levels are ≤5.0 or ≥9.5. Intermediate levels are considered suboptimal, but not lethal (Bartoldus, et al. 1994).

pH Modifiers from Cowardin classification system.

Modifier	pH of Water
Acid	<5.5
Circumneutral	5.5-7.4
Alkaline	>7.4

Source: Cowardin et al. 1979.

Salinity – The salinity levels of surface waters have a direct influence on the plant and wildlife composition of a wetland community. Observed salinities can vary due to the dilution of sea water with fresh water inputs and the concentration of sea water by evaporation. Salinities can also vary in both surface water and interstitial (soil) water.

Salinity Modifiers used in the Cowardin classification system.

Coastal Modifiers[a]	Inland Modifiers[b]	Salinity (parts per thousand)	Approximate specific conductance (µMhos at 25°C)
Hyperhaline	Hypersaline	>40	>60,000
Euhaline	Eusaline	30.0-40	45,000-60,000
Mixohaline (Brackish)	Mixosalinec	0.5-30	800-45,000
Polyhaline	Polysaline	18.0-30	30,000-45,000
Mesohaline	Mesosaline	5.0-18	8,000-30,000
Oligohaline	Oligosaline	0.5-5	800-8,000
Fresh	Fresh	<0.5	<800

[a]Coastal Modifiers are used in the Marine and Estuarine Systems.
[b]Inland Modifiers are used in the Riverine, Lacustrine, and Palustrine Systems.
[c]The term Brackish should not be used for inland wetlands or deepwater habitats.
Source: Cowardin et al. 1979.

k. Water depth, currents, and light penetration

Guidance: This attribute assesses the appropriateness of water depth, currents, and light penetration in the particular type of wetland or surface water. For instance, seagrasses or other submerged aquatic vegetation are more likely found in clear water versus turbid water, where instead the submerged vegetation is usually sparse. While currents do not generally apply to isolated systems, they can be quite important to streams and coastal systems.

l. Wave Energy and Fetch

Guidance: One of the most common causes of erosion and sediment release into waterways is wind borne waves. This attribute is applicable to assessment areas with exposure to wind

generated waves due to a fetch distance greater than 100 feet, and boat wakes that occur on a regular basis. Assessment areas with high exposure will be subject to greater wave energy and have a higher potential for shoreline erosion. Fetch is the maximum distance over which wind can blow unimpeded across open water to create waves. When the fetch distance is large, wave energy increases and there is greater potential for shoreline erosion.

The presence of salt marsh grasses such as *Spartina alterniflora* reduces the energy of waves moving shoreward. At the seaward edge of salt marshes, a wave energy reduction of 26% per m-1 of vegetation has been reported (Fonseca & Cahalan, 1992). Wave energy reduction decreases with distance into the marsh. The ability of salt marsh vegetation to reduce wave energy in this manner helps prevent shoreline erosion (Niedowski, et al. 2000). A fetch distance greater than one mile presents a condition where the potential for shoreline erosion due to wave energy is significantly increased (Bartoldus, et al. 1994).

The optimal attribute condition reflects an assessment area where the shoreline is stable and there is limited potential for shoreline erosion due to wind-generated wave energy due to a fetch distance under one mile. Assessment areas with fetch distances over 1 mile and with evidence of severe shoreline erosion would be indicative of severe shoreline erosion due to wave energy.

m. Tidal Marsh Stability

Guidance: Tidal marshes maintain their vertical and horizontal position in the coastal landscape by achieving a balance between two processes: 1) the accretion of mineral and organic materials, and 2) coastal submergence due to the combined effects of sea-level rise, subsidence, and erosion. The vertical position of the marsh surface relative to mean sea level is determined by sediment and organic matter supply and the frequency of tidal flooding events. Deposition occurs when the marsh surface is inundated, and suspended materials settle onto the marsh surface. Most material settles out in the low marsh and along tidal creeks; the least amount of material settles out in the high marsh. Removal of excess material can occur during receding tides, particularly during spring tides and storm surges.

Several factors may potentially affect the process of sediment and organic matter accumulation in tidal marshes including elevation, flooding duration, suspended solid concentration, flow baffling by vegetation, and proximity to source (DeLaune, Baumann, and Gosselink 1983; Cahoon and Reed 1995; Leonard and Luther 1995; Leonard 1997).

Tidal marshes accrete vertically and expand horizontally across the coastal landscape by accumulating sediments and organic matter. If sediment availability is reduced, or if accretion rates are insufficient to maintain pace with relative sea-level rise or storm-induced erosion, marsh loss will result. High levels of function are associated with low elevation, high concentration of suspended sediment in floodwaters, low organic content of the suspended sediments and high coverage of native vegetation. A review of historical aerials can be used to assess is the marsh area receding over time.

When scoring this attribute, an optimal condition means the marsh is not receding and is maintaining a stable elevation that supports tidal marsh hydrology and vegetation. Assessment areas that are accreting sediments at a more rapid rate may elicit changes in vegetation patterns over time, including the establishment of common reed. Assessment areas that are losing vegetated marsh over time due to low rates of accretion or subsidence should be scored lower based on the apparent rate of change.

Appendix D
Community Structure Guidance Module

Appendix D Community Structure Guidance Module

Community Structure - Vegetation Introduction

Each impact and mitigation assessment area is evaluated with regard to its characteristic community structure. In general, a wetland or other surface water is characterized either by plant cover or by open water with a submerged benthic community.

When a plant cover is present, the area is assessed using the "Vegetation and Structural Habitat" section. When the Assessment area is almost entirely a benthic habitat, then the benthic communities are assessed using the "Benthic Communities" section. If the assessment area includes a mosaic of plant cover and submerged benthic communities, then both of these indicators are scored and the resulting scores will be averaged to obtain a single community score.

The presence, abundance, health, condition, appropriateness, and distribution of plant communities in surface waters, wetlands, and uplands can be used as indicators to determine the degree to which the functions of the community type are provided. Human activities such as groundwater withdrawal, ditching, and diking or the construction of conveyance canals, or other permanent structures such as seawalls in an aquatic system can permanently damage vegetation and structural habitat. Environmental factors such as excessive rainfall, drought, and fire can have temporary short-term impacts on vegetation. If the community structure is degraded, then the value of functions provided by the assessment area to the fish and wildlife identified in Part I is reduced.

Ten (10) attributes are used to evaluate the "Vegetation and Structural Habitat" section of this category. To provide guidance, examples are given that depict variation in conditions for each of the attributes.

- Plant species in the canopy, shrub, or ground stratum
- Invasive exotics or other invasive plant species
- Regeneration & recruitment
- Age & size distribution
- Density and quality of coarse woody debris, snag, den, and cavity
- Plant condition
- Land management practices
- Topographic features such as refugia ponds, creek channels, pannes, flats or hummocks
- Siltation or algal growth in submerged aquatic plant communities
- Upland mitigation area -level of habitat and support for fish and wildlife in the associated wetlands or surface waters

Be aware that not all attributes are applicable to all assessment areas, and in some cases, some attributes may be more relevant than others. The final score for the Community Structure – Vegetation and Structural Habitat category is a reflection of the overall condition of an assessment area, taking into consideration all applicable attributes (do not score each

attribute and average them in the end, but rather think of this in terms of what final score best fits the overall conditions of the assessment area). Any whole number score between 0-10 may be used that best represents the level of function of the assessment area.

The following are descriptors of attributes for 4 categories of scores as guidance:

- A score of (10) means that the vegetation community and physical structure provide conditions which support an optimal level of function to benefit fish and wildlife utilizing the assessment area as listed in Part I.
- A score of (7) means that the level of function provided by plant community and physical structure is limited to 70% of the optimal level.
- A score of (4) means that the level of function provided by the plant community and physical structure is limited to 40% of the optimal level.
- A score of (0) means that the vegetation communities and structural habitat do not provide functions to benefit fish and wildlife.

A Summary Worksheet for **Vegetation and Structural Habitat** is included as Table D.1 to help in the field assessment scoring.

VEGETATION AND STRUCTURAL HABITAT ATTRIBUTE GUIDANCE

I. Plant cover and species in the canopy, shrub, or ground stratum

Guidance: This attribute evaluates the appropriateness of the plant composition in the canopy, shrub, and ground stratum of the wetland type being evaluated. Refer to the *Ecological Communities of New York State* (Edinger et al. 2002) to identify appropriate and desirable species based on the wetland type. All three strata should be evaluated when present. In forested wetlands, often the herbaceous community (ground stratum) will exhibit changes in species composition resulting from degraded environment conditions long before the species composition of the shrub or canopy stratum.

The plant species composition and its relative dominance by native species appropriate to the wetland community type should be used to guide the scoring of this attribute.

II. Invasive exotics or other invasive plant species

Guidance: Identify any invasive exotic species within the assessment area, and estimate their cover with respect to desirable vegetation. Become familiar with the NYSDEC *Interim List of Invasive Plant Species in New York State* and refer to the wetland field guides for identification of the most common exotic wetland herbaceous and hardwood species.

The estimated percent cover of invasive plant species within the assessment area should be used to guide the scoring of this attribute. Under optimal conditions, less than 5 percent of the site and adjacent habitats would be dominated by invasive plant species. Consistent with regulatory guidance for mitigation actions, 10 to 15 percent cover by invasive plant species would be consistent with a more moderate condition that would require management

intervention to attain a more optimal condition. A predominance of invasive plant species cover of over 85 percent or more of the assessment area would be consistent with a score of not present.

III. Regeneration and recruitment

Guidance: Regeneration and recruitment should be noted, since evidence of seed production can provide insight into the health of an ecosystem. Is there evidence of tree recruitment or seed production? Recruitment is not always evenly spaced throughout a wetland. For instance, a higher density of seedlings is typical in open canopy areas, where canopy cover is reduced either due to natural causes (tree fall or fire), or anthropogenic disturbance (harvest).

The relative amount of observable recruitment throughout the assessment area should be used to guide the scoring of this attribute.

IV. Age and size distribution

Guidance: Forested wetland ecosystems should exhibit a wide range of age and size distribution that includes several cohorts of mature trees, younger trees, and a variety of seedlings and saplings. This ensures that when the mature tree dies and/or falls, there will be quick recruitment by younger trees to fill the open space. Age and size distributions that lack young (small) trees may be indicative of environmental conditions that preclude germination.

The observable amount of trees within different age classes, or the absence of age classes, should be used to guide the scoring of this attribute.

V. Density and quality of coarse woody debris, snag, den and cavity

Guidance: Woody debris, snags, dens and tree cavities provide cover habitat for wildlife, as well as offering a diversity of forage and nesting sites. Fallen tree logs also increase the microtopographic diversity within sites, thus allowing a diverse assemblage of plant species and providing microhabitats for various wildlife. Does the density and quality of coarse woody debris, snags, dens and cavities within the wetland appear to provide appropriate structural habitat for the type of system being evaluated? How's does the overall health of the forest reflect the quantity of density and quality of coarse woody debris?

The observable amount of coarse woody debris, snags, dens and cavity trees paired with the structural health of the forest should be used to guide the scoring of this attribute.

VI. Plant condition

Guidance: The overall condition of the plant community can be an indication of disturbance and can be evaluated by observing dead or dying vegetation, chlorotic (yellowing or bleaching) or spindly growth, and damage caused by insects. Often herbaceous vegetation and tree seedlings will exhibit chronic conditions before more mature vegetation. Careful attention should be given to seasonality effects on plant communities.

Table D.1 Community Structure	Optimal (10)	Moderate (7)	Minimal (4)	Not Present (0)
1. Vegetation and Structural Habitat	vegetation community and physical structure provide conditions which support an optimal level of function to benefit fish and wildlife	vegetation community and physical structure limited to 70% of optimal level of function to benefit fish and wildlife in Part I	vegetation community and physical structure limited to 40% of optimal level of function to benefit fish and wildlife in Part I	vegetation community and physical structure do not provide function to benefit fish and wildlife in Part I
I. Plant species in the canopy, shrub, or ground stratum	all or nearly all appropriate and desirable	majority appropriate and desirable	majority inappropriate or undesirable	no appropriate or desirable species
II. Invasive exotics or other invasive plant species	not present	present, but cover is minimal	majority of plant cover	high presence and cover
III. Regeneration & recruitment	normal and natural	near-normal	minimal evidence	no evidence
IV. Age & size distribution	typical of type of system with no deviation from normal patterns of succession or mortality	no indication of permanent deviation, but may have had temporary deviations or impacts to age and size distribution	atypical and indicative of permanent deviation from normal successional pattern, with greater than expected mortality	high percentage of dead and dying vegetation, with no typical age and size distribution
V. Density and quality of coarse woody debris, snag, den, and cavity	optimal structural habitat	slightly lower or slightly greater than normal quantity	not present or greater than normal because vegetation is dead or dying	not present or exist only because native vegetation is dead or dying
VI. Plant condition	good condition, with very little to no evidence of chlorotic or spindly growth or insect damage	generally good, with little evidence of chlorotic or spindly growth or insect damage	generally poor, with evidence of chlorotic or spindly growth or insect damage	overall very poor, with strong evidence of chlorotic or spindly growth or insect damage
VII. Land management practices	optimal for long term viability of plant community	generally appropriate some possible fire suppression or water control features that have caused a shift in plant community	partial removal or alteration of natural structure, or introduction or artificial features, such as mosquito ditches or drainage ditches	removal or alteration of natural structure, or introduction or artificial features, such as furrow or ditches
VIII. Microtopographic features	present and normal	slightly less than optimal	reduction in extent of topographic features from what is normal	lack of topographic features that are normal for the area being assessed
IX. Siltation or algal growth in submerged aquatic plant communities	no evidence	minor degree of siltation or algal growth	moderate degree of siltation or algal growth	high degree of siltation or algal growth
X. Upland mitigation area -level of habitat and support for fish and wildlife in the associated wetlands or surface waters	optimal level of habitat and life history support	high, but less than optimal level of habitat and life history support	moderate level of habitat and life history support	little or no habitat and life history support

The absence of disturbance or the extent of disturbance across the assessment area should be used to guide the scoring of this attribute.

VII. Land management practices

Guidance: This attribute includes observations of land management practices in and around the wetland. Mowing, grazing, water control features (furrows or ditches), as well as logging operations, can affect the condition of the plant community. Is there evidence of the management practices that will affect the plant community either in a positive (enhancing long term sustainability of the community) or negative manner? For tidal marshes, are functioning mosquito ditches present that alter marsh hydrology and avian populations (Tonjes, 2013)?

In assessing the future condition of the assessment area, the establishment of a long term management plan and the placement of a conservation easement on the site should also be considered for the long term benefits that are conveyed to the site by these measures.

The degree of alteration of the wetland and plant community across the assessment area due to land management practices should be used to guide the scoring of this attribute.

VIII. Microtopographic features

Guidance: Slight elevation differences control many marsh functions, from flooding and nutrient cycling to draining of the marsh interior. This microtopography is critical for development and maintenance of foraging habitat for invertebrates, fish, and birds. Microtopographic features typically present in salt marshes include hummocks, pannes, pools, and shallow channels.

The presence and extent of microtopographic features within the assessment area should be used to guide the scoring of this attribute. An optimal score means that microtopographic features are present and typical for the community type. Lower scores should represent conditions that reflect the reduced frequency or absence of these features.

IX. Siltation or algal growth in submerged aquatic plant communities

Guidance: Applicable only to submerged aquatic plant communities, this attribute evaluates the degree of siltation and algal growth, and the degree that it can impede normal aquatic plant growth. Waters dominated by algae or that have high silt loads and turbidity impedes photosynthesis of submerged vegetation. Secchi depth is a long-accepted methods for evaluating the transparency of water in lakes. However, care must be used in interpreting secchi data because of the potential influence of non-algal or silt particulate material, such as the tea color of some lakes that's due to dissolved organic matter and organic tannins.

X. Upland mitigation area

Guidance: This indicator assesses the level of habitat and life history support provided by adjoining uplands for the fish and wildlife in the associated wetlands and surface water. Applicable to upland mitigation area only, this attribute assesses whether the plant community

and physical structure of the upland provides an optimal level of habitat and life history support for fish and wildlife associated with the nearby wetlands and other surface waters.

The scoring of this attribute should reflect the quality and level of disturbance within the upland habitat. High quality, fully functioning upland plant communities represent the optimal condition, whereas disturbed habitats or those dominated by non-native species would score as providing little or no habitat and life history support.

Community Structure- Benthic Introduction

This indicator is intended to be used in marine or freshwater aquatic systems that are not characterized by a terrestrial or emergent plant community. These systems include live hardbottom communities, such as oyster bars and beds, reefs, and soft-bottom systems such as riverine systems. The benthic communities within nearshore, inshore, marine and freshwater aquatic systems are analogous to the vascular plant communities of terrestrial wetland systems in that they provide food and habitat for other biotic components of the system and function in the maintenance of water quality. If the assessment area is a mosaic of relatively equal parts of submerged plant cover and submerged benthic community as defined above, then both of these indicators will be scored and those scores averaged to obtain a single community structure score.

Oyster bars and beds in nearshore habitats and estuaries filter large amounts of particulate matter and provide food and habitat for a variety of species, such as boring sponges, mollusks, and polycheate worms. The distribution and quality of coral reefs reflect a balance of water temperature, salinity, nutrients, water quality, and presence of nearby productive mangrove and seagrass communities. Benthic infauna of soft-bottom systems stabilize the substrate, provide a food source, and serve as useful indicators of water quality.

All of these communities are susceptible to human disturbance through direct physical damage, such as dredging, filling, or boating impacts, and indirect damage through changes in water quality, currents, and sedimentation.

Seven attributes are identified in the UMAM Rule to evaluate the "Benthic and Sessile Communities" section of this category. To provide guidance, examples that depict variation in conditions for each of the attributes are included.

- Species number and diversity of benthic organisms
- Non-native or inappropriate species
- Regeneration, recruitment and age distribution
- Condition of appropriate species
- Structural features
- Topographic features such as relief, stability, and interstitial spaces (hardbottom and reef communities) or snags and coarse woody debris (riverine systems)
- Spawning or nesting habitats

Be aware that not all attributes are applicable to all assessment areas and in some cases, some attributes may be more relevant than others. The final score for the Community Structure – Benthic and Sessile Communities category is a reflection of the overall condition of an assessment area, taking into consideration all applicable attributes (do not score each attribute and average them in the end, but rather think of this in terms of what final score best fits the overall conditions of the assessment area). Any whole number score between 0-10 may be used that best represents the level of function of the assessment area.

The following are descriptors of attributes for 4 categories of scores as guidance:

- A score of (10) means that the benthic communities are indicative of conditions that provide optimal support for all of the functions typical of the assessment area and provide optimal benefit to fish and wildlife.

- A score of (7) means that, relative to ideal habitat, the benthic communities of the assessment area provide functions at 70% of the optimal level.

- A score of (4) means that, relative to ideal habitat, the benthic communities of the assessment area provide functions to 40% of the optimal level.

- A score of (0) means that the benthic communities do not support the functions identified and do not provide benefits to fish and wildlife.

A Summary Worksheet for **Benthic and Sessile Communities** is included as Table D.2 to help in the field assessment scoring.

BENTHIC COMMUNITIES ATTRIBUTE GUIDANCE

Appropriate levels of benthic species richness, diversity, and abundance can be derived from available scientific literature for specific habitat types such as intertidal mudflat, subtidal creek bed, etc. Differences between site conditions and literature-based community metric values for an unaffected site would indicate the degree of benthic community impairment. Depending on site conditions, grab sampling, Sediment Profile Imagery (SPI) or other methods could be used to characterize the infaunal benthic macroinvertebrate community; however, these studies require a high level of effort. A rapid benthic community assessment approach such as a benthic species checklist may be useful to support benthic and sessile species community characterization.

I. Species number and diversity of benthic organisms

Guidance: This attribute evaluates the appropriateness, number and diversity of benthic organisms.

II. Non-native and inappropriate species

Guidance: This attribute evaluates the presence or absence of non-native benthic organisms.

III. Regeneration, recruitment and age distribution

Guidance: Natural regeneration and recruitment should be noted, as well as evidence of appropriate age distribution.

IV. Condition of appropriate species

Guidance: This attribute evaluates the health and biomass of appropriate species.

Table D.2 Community Structure	Optimal (10)	Moderate (7)	Minimal (4)	Not Present (0)
2. Benthic and Sessile Communities	benthic and sessile communities provide optimal support for all functions typical of the assessment area and provide optimal benefit to fish and wildlife	benthic and sessile communities provide functions at 70% of optimal level	benthic and sessile communities provide functions at 40% of optimal level	benthic and sessile communities do not support functions or provide benefits
I. Species number and diversity of benthic organisms	appropriate species number and diversity optimal for type of system	majority of species are appropriate with number and diversity slightly less than normal	appropriate species greatly decreased	lack of appropriate species, any appropriate species in poor condition
II. Non-native or inappropriate species	not present	represent a minority	majority	dominant
III. Regeneration, recruitment and age distribution	optimal	slightly less than expected	minimal	no indication
IV. Condition of appropriate species	good, with typical biomass	generally good	substantial number dying or in poor condition	not present
V. Structural features	typical with no evidence of past physical damage	typical, or with little evidence of past physical damage	atypical	structural integrity very low or non-existent, evidence or serious physical damage
VI. Topographic features such as relief, stability, and interstitial spaces (hard bottom and reef communities) or snags and coarse woody debris (riverine systems)	typical and optimal	slight deviation from expected	greatly reduced	lacking
VII. Spawning or nesting habitats	optimal	less than expected	few are available	none

V. Structural features

Guidance: This attribute evaluates whether the structural features are appropriate for the system or whether there is evidence of physical damage.

VI. Topographic features

Guidance: This attribute evaluates the appropriateness and condition of topographic features such as relief, stability, and interstitial spaces for hardbottom and reef communities, or snags and coarse woody debris for riverine systems.

VII. Spawning or nesting habitats

Guidance: This attribute assesses the condition and number of spawning and nesting habitats such as rocky or sandy bottoms.

Appendix E
Expected Variation Guidance Module

Appendix E Expected Variation Guidance Module

- Natural wetland communities may exhibit seasonal and regional variability in vegetation community structure and hydrology. For example, many wetland communities will be inundated during the wetter winter and spring season but may have no standing water during the summer dry season.

- Deciduous wetland communities will appear green and lush in the summer months, while they will be bare of leaves in the winter. The lack of lush vegetation during the winter months should not be taken as a sign of diseased or stressed vegetation.

- Forested wetland communities may completely lack an understory depending on time of year and water depths, while at other times they may be heavily vegetated.

- Tidally influenced wetlands may exhibit daily tidal fluctuations, while other wetlands like hydric hammocks exhibit little change seasonally.

- Similar hydrologic conditions may result in very different vegetative communities and standing biomass. From year to year a wetland may be dominated by different vegetation depending on depths of inundation, fire history, or time of year.

- Nutrient availability has a significant effect on the vegetative community. Oligotrophic (low nutrient) environments result in relatively sparse vegetation, small in stature, and often very slow growing, while eutrophic (high nutrient) environments are often dominated by thick vegetation, robust in stature, and relatively fast growing.

Appendix F
Adjustment Factors Guidance

Appendix F Adjustment Factors Guidance

Preservation Adjustment Factor

When assessing preservation, the gain in ecological value is determined by multiplying the delta by a preservation adjustment factor. The preservation adjustment factor is scored on a scale from 0 (no preservation value) to 1 (optimal preservation value), on one-tenth increments. The score is based on:

1. The extent the preserved area will promote natural ecological conditions such as biodiversity, hydrologic patterns or the exclusion of invasive exotic species.

2. The ecological and hydrological relationship between wetlands, other surface waters, and uplands to be preserved.

3. The scarcity of the habitat provided by the proposed preservation area and the level of use by listed species.

4. The proximity of the preserved area to areas of national, state, or regional ecological significance, and whether the areas to be preserved include corridors between these habitats.

5. The extent and likelihood of potential adverse impacts if the assessment area were not preserved.

Time Lag Adjustment Factor

The time lag associated with mitigation means the period of time between when the functions are lost at an impact site and when those functions are replaced by the mitigation. The time lag, in years, is related to a factor (T-factor) as established in the adjacent Table, to reflect the additional mitigation needed to account for the deferred replacement of wetland or surface water functions. For wetland mitigation banks, Time Lag should be considered to be less than or equal to one since the functional uplifts will be realized prior to project impacts, in some cases for one or more years before a credit is used to offset impacts.

Year	T-factor
< or = 1	1
2	1.03
3	1.07
4	1.10
5	1.14
6 – 10	1.25
11 – 15	1.46
16 – 20	1.68
21 – 25	1.92
26 – 30	2.18
31 – 35	2.45
36 – 40	2.73
41 – 45	3.03
46 – 50	3.34
51 – 55	3.65
>55	3.91

Risk Adjustment Factor

For mitigation assessment areas, mitigation risk shall be evaluated to account for the degree of uncertainty that the proposed conditions will be achieved, resulting in a reduction in the ecological value of the mitigation assessment area. The assessment area shall be scored on a scale from 1 (for no or de minimus risk) to 3 (high risk), on quarter-point (0.25) increments. A score of one would most often be applied to mitigation conducted in an ecologically viable landscape and deemed successful or clearly trending towards success prior to impacts, whereas a score of three would indicate an extremely low likelihood of success based on a number of ecological factors.

For wetland mitigation banks, the risk factor should be scored as a 1 since there is a high level of scrutiny and review of the project resulting in a high level of assurance that the proposed mitigation approaches will be successful. In addition, the release of credits is dependent upon the project components meeting specific success and performance criteria; therefore, the degree of uncertainty that proposed conditions are achieved resulting in the release of mitigation credits is greatly minimized.

Public Restoration Adjustment Factor

Construction costs for restoration projects are driven primarily by the amount of earthwork required to attain appropriate grades and the cost to dispose of the excavated material, particularly if the material is contaminated. This adjustment factor accounts for the societal value of a publically sponsored restoration project, many of which would not likely occur without the investment from public agencies. The public restoration factor evaluates the investment from public agencies to achieve the restoration goals. The score modifier starts at 1 and increases by a factor of 0.05 as the per acre cost of restoration increases up to a maximum of score of 1.2

Public Restoration Adjustment Factor

Rehabilitation

Construction Cost/Acre	Adjustment Factor
0 - $200,000	1.0
>$200,000 - $350,000	1.05
>$350,000 - $450,000	1.1
>$450,00 - $499,999	1.15
>500,000	1.2

Re-establishment

Construction Cost/Acre	Adjustment Factor
0 - $350,000	1.0
>$350,000 - $425,000	1.05
>$425,000 - $475,000	1.1
>$475,00 - $525,000	1.15
>525,000	1.2

The construction costs per acre in the table above are based on the range of costs of recent publicly sponsored restoration projects. The per acre construction cost range for the

adjustment factor of 1 is representative of project costs of permittee-sponsored mitigation projects in the region that do not have significant earthwork and disposal costs. As project construction costs increase due to increasing earthwork and disposal costs, the Adjustment Factor increases.

For example, the USACE New York District restored the KeySpan site on Staten Island, New York, in 2006/2007 to mitigate for unavoidable impacts resulting from the dredging and deepening of the Arthur Kill Channel in the New York/New Jersey Harbor. The 9-acre restoration effort included: the removal and grading of approximately 36,200 cubic yards of materials to create tidal channels and marshland; the removal of *Phragmites* and debris; re-grading the marsh surface to promote the growth of *Spartina* grass; the limited placement of clean soil; and planting native wetland vegetation for a total cost of ~$5,400,000 (USACE, 2009). Similarly, the USACE New York District restored the Medwick Wetland in Carteret, New Jersey to mitigate for unavoidable impacts from the dredging and deepening of the Arthur Kill Channel. The $3,300,000 mitigation project restored approximately 14-acres of tidal wetlands by removing invasive *Phragmites* and approximately 30,000 cubic yards of soil, re-contouring the site to elevations suitable for native plant and planting 270,000 native wetland plants (USACE, 2009).

The per acre mitigation costs for the KeySpan Marsh and the Medwick Wetland were $600,000 and $236,000, respectively. The 2006-2007 construction cost for the USACE's 43-acre Elders Point East Wetland Project, with 248,500 cubic yards of material movement and installation of 750,000 plants, was $16 million ($372,000 per acre) (USACE, 2008a). These three projects demonstrate the wide range of costs associated with publicly sponsored wetland restoration projects. The average cost per acre for these three sites was $403,000.

Appendix G
Assessment Area Photographs

Photo 1: Tires, wood, and metal debris dumped in wetland –Assessment Area W1.

Photo 2: Filled wetland, central portion of western section – Assessment Area W2.

Photo 3: Asphalt dumped in wetland – Assessment Area W2.

Photo 4: Dumping within emergent marsh – Assessment Area W3.

Photo 5: Salt panne – Assessment Area W3.

Photo 6: Scrap metal, boulders, concrete debris along upland slope – Assessment Area W4.

Photo 7: Storm surge debris along upland slope– Assessment Area W4.

Photo 8: Tire in low marsh habitat with *Phragmites* encroachment the in background – Assessment Areas E3 (foreground) and E1 (background).

Photo 9: Filled wetland east of Chelsea Road, south of Saw Mill Creek – Assessment Areas E2.

Photo 10: Remnant berm in northeastern section of site – Assessment Area E2.

Photo 11: Deer within the palustrine forested wetland – Assessment Area E4.

Photo 12: *Phragmites* cover and tires dumped in palustrine forested wetland – Assessment Area E4.

Photo 13: Tires dumped in upland forested area adjacent to Chelsea Road and Route 440 ramp – Assessment Area E6.

Photo 14: Upland oak forest – Assessment Area E6.

Photo 15: Scattered tires and other debris dumped in upland forest- Assessment Area E6.

Photo 16: Japanese knotweed and *Phragmites*, upland south of Edward Curry Avenue – Assessment Area E7.

Appendix H
Completed Assessment Area Data Forms

PART I – Qualitative Description
(See Section 4.4.1)

(1) Site/Project Name	(2) Application Number	(3) Assessment Area Name or Number
Sawmill Creek Bank	NAN-2013-00259-EHA	W1 - West Tidal Wetland Restoration (Rehabilitation)

(4) Habitat Code	(5) Further classification (optional)	(6) Impact or Mitigation Site?	(7) Assessment Area Size
II.C. 4 Estuarine Cultural	Estuarine Impoundment Marsh	Mitigation	1.02

(8) Basin/Watershed Name/Number	(9) Affected Waterbody (Class)	(10) Special Classification (local/state/federal designation of importance)
HUC 02030104	Sawmill Creek, Class SD (impaired: floatables and Oxy demand)	DEC HM (high marsh) wetlands

(11) Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands

AA hydrologically connected to Sawmill Creek and Arthur Kill, geographically adjacent to Sawmill Creek and Arthur Kill Complex(No. 18) (USFWS,NY Bight Study, 1997)

(12) Assessment area description

Phragmites marsh. Adjacent to past fill/development activities.

(13) Significant nearby features	(14) Uniqueness (considering the relative rarity in relation to the regional landscape.)
Pralls Island; Sawmill Creek wetland complex; Sarnelli Brothers, Inc Trucking and Demolition, storage lot	AA is part of a unique natural system within the highly urbanized NY/NJ region

(15) Functions	(16) Mitigation for previous permit/other historic use
Habitat; Primary Production; Nutrient Cycling; Removal Contaminents; flood storage; (NYSDOS and NYSDEC 2000)	Bank credit development

(17) Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to be found)	(18) Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area)
Red-winged blackbird, marsh wren. See also: Ecological Communities of NY State (NYNHP 2002); Salt Marsh Restoration and Monitoring Guidelines (NYSDOSand NYSDEC 2000)	Not expected to be present.

(19) Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.):

No evidence observed during site visits conducted between May and June, 2013.

(20) Additional relevant factors:

Sources of stormwater runoff from adjacent land uses; connectivity to adjacent tidal marsh restricted by rail line and box culvert; adjacent invasive species present (Phragmites); potential for further encroachment from adajcent land use; potential for tide driven debris accumulation. Under five miles from Newark Airport (FAA coordination required). The estimated construction cost for this publicly funded wetland rehabilitation is ~$280,000 per acre.

(21) Assessment conducted by:	(22) Assessment date(s):
LBA PC	10/30/2013

Table I.1: Anticipated Wildlife Utilization in Tidal Wetland Communities

Tidal Wetland Community	Common Name	Scientific Name
High marsh	salt marsh mosquitoes	*Aedes* spp.
	greenhead flies	*Tabanidae*
	coffeebean snail	*Melampus bidentatus*
	clapper rail	*Rallus longirostris*
	sharp-tailed sparrow	*Ammodramus caudacutus*
	marsh wren	*Cistothorus palustris*
	eastern meadowlark	*Sturnella magna*
	American black duck	*Anas rubripes*
Low marsh	clapper rail	*Rallus longirostris*
	willet	*Catoptrophorus semipalmatus*
	marsh wren	*Cistothorus palustris*
	seaside sparrow	*Ammodramus maritimus*
	fiddler crabs	*Uca* spp.
	ribbed mussel	*Geukensia demissa*
	mummichog	*Fundulus heteroclitus*
Salt shrub	marsh wren	*Cistothorus palustris*
Salt panne	mummichog	*Fundulus heteroclitus*
	sheepshead minnow	*Cyprinodon variegatus*

Source: Edinger, et al., 2002.; Louis Berger & Assoc., P.C., 2013

Table I.1: Summary of State and Federal Listed Species

NEW YORK NATURAL HERITAGE DATA	Common Name	Scientific Name	NY State Listing	Heritage Conservation Status	Type of Use/Occurrence
T&E documented at or near the site, generally within 0.5 mile	Least bittern	*Ixobrychus exilis*	Threatened		documented near site
	Pied-billed grebe	*Podilymbus podiceps*	Threatened		documented near site
Rare animals documented at or in vicinity of site	Cattle egret	*Bubulcus ibis*	Protected bird	Imperiled in NYS	foraging/breeding offsite
	Glossy ibis	*Plegadis falcinellus*	Protected bird	Imperiled in NYS	foraging/breeding offsite
	Little blue heron	*Egretta caerulea*	Protected bird	Imperiled in NYS	foraging/breeding offsite
	Snowy egret	*Egretta thula*	Protected bird	Imperiled in NYS	foraging/breeding offsite
	Yellow-crowned night-heron	*Nyctanassa violacea*	Protected bird	Imperiled in NYS	foraging/breeding offsite
	Southern leopard frog	*Lithobates sphenocephalus*	Special concern	Critically imperiled in NYS	foraging/breeding offsite
Plants listed as Endangered or Threatened	Nantucket juneberry	*Amelanchier nantucketensis*	Endangered	Critically imperiled in NYS	
	Persimmon	*Diospyros virginiana*	Threatened	Imperiled in NYS	documented at site
	Rose pink	*Sabatia angularis*	Endangered	Critically imperiled in NYS	
	Sweetbay magnolia	*Magnolia virginiana*	Endangered	Critically imperiled in NYS	
Rare species with historical records at the site or in the vicinity	Eastern mud turtle	*Kinosternum subrubrum*	Endangered	Critically imperiled in NYS	Historical occurrence
	Log fern	*Dryopteris celsa*	Endangered	Critically imperiled in NYS	Historical occurrence
	Orange fringed orchid	*Platanthera ciliaris*	Endangered	Critically imperiled in NYS	Historical occurrence
USFWS	**Common Name**	**Scientific Name**	**Federal Listing**		
Species may occur within the project boundary and/or may be affected by project	Piping plover	*Charadrius melodus*	Threatened		
	Roseate tern	*Sterna dougallii dougalli*	Endangered		

Source: USFWS, 2013; NYSDEC, NHP 2013; Louis Berger & Assoc., P.C., 2013

PART II – Quantification of Assessment Area (impact or mitigation)
(See Section 4.4.2)

Site/Project Name	Application Number	Assessment Area Name or Number
Sawmill Creek Bank	NAN-2013-00259-EHA	W1 - West Tidal Wetland Restoration (Rehabilitation)
Impact or Mitigation	**Assessment conducted by:**	**Assessment date:**
Mitigation	LBA PC	10/30/2013

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 wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

		current condition	with rehabilitation
Location and Landscape Support	a	6 - adjacent areas support some wildlife species	7 - restoration of adjacent areas will improve wildlife support
	b	6 - Phragmites is present within and adjacent to site	8 - Invasives management will reduce Phrgamites cover
	c	4 -adjacent development and hydrological impairment are barriers	7 - improved hydrology & Phragmites removal will improve wildlife access
	d	4 - hydrology of area is impaired, area is somewhat impounded	8- restoration to tidal conditions will improve connectivity
	e	3 - effects of adjacent fill and development (industry/roads) impact habitat	4 - restoration of tidal flushing will reduce adverse effects from outside land use
	f	3 - poor connectivity with downstream areas impairs function	7 - hydrologic improvements will provide greater benefits to surrounding areas
	g	3 - provides minimal downstream benefits	5 - improved connectivity provides more effective functions (nutrient cycling, sediment trapping)
	h	N/A to wetland areas	N/A to wetland areas
current: 4	i	2 - area not horizontally or vertically extensive, little buffering ability	3 - hydrologic restoration would slightly improve buffering/storage functions
with: 7	j	7 - elevation appears suitable for high marsh & scrub-shrub habitats	7 - negligible change of elevation with restoration

		current condition	with rehabilitation
Water Environment (n/a for uplands)	a	5 - significant hydrologic restriction present	9 - tidal hydrology will be restored
	b	7 - water level indicators not apparent in dense Phragmites	9 - water level indicators will be distinct and consistent with expected
	c	8 - soil moisture sufficient to support wetland vegetation (Phragmites)	10 - hydrologic improvement will restore appropriate tidal soil moisture conditions
	d	4 - atypical flow in Phragmites-dominated area	8 - tidal ebb and flow will be improved
	e	2 - area is dominated by Phragmites	9 - grading to tidal elevations will improve target strata
	f	4 - hydrologic stress indicated by Phragmites monoculture	9 - reconnection with tidal hydrology will allieviate hydrologic stress
	g	4 - wildlife with specific hydrologic requirement (i.e. fiddler crab) not expected to be abundant in Phragmites monoculture	10 - restoration of tidal hydrology will increase use by tidally-dependent wildlife species
	h	3 - Phragmites monoculture typical of water quality degradation/flow alteration	9 - native tidal marsh plant community indicative of good water quality and proper flows
	i	8 - none observed, but potential for slight degradation from surrounding land use	9 - restoration will reduce potential for degradation from surrounding land use
	j	3 - water quality impairment from adjacent land uses; tidal flow from estuary is listed as impaired for floatables and oxygen demand; poor hydrologic connectivity	7 - improved flows will assist cycling of contaminants from uplands; restoration will divert/educe runoff from adjacent industrial site
	k	2 - depths, currents and light penetration not well suited for salt marsh community	9 - improvements will establish proper depth and currrents for high marsh; improved tidal marsh functions will improve water quality
current: 4	l	10 - nearby shorelines are stable; shoreline erosion due to wind-generated wave energy not expected	10 - no change expected
with: 9	m	9 - elevation appears stable	9 - restored marsh expected to maintain stable elevation

		current condition	with rehabilitation
Community structure 1. Vegetation and/or 2. Benthic Community	I	1 - area is dominated by Phragmites	9 - area will be vegetated with native salt marsh species
	II	1 - Phragmites comprises nearly all plant cover	8 - Phragmites cover will be minimal and managed
	III	3 - minimal evidence of seed production and recruitment	10 - high degree of native plant seed production and recruitment expected
	IV	N/A - no woody debris in assessment area	N/A - no woody debris in assessment area
	V	N/A - no woody debris in assessment area	N/A - no woody debris in assessment area
	VI	9 - Phragmites appears in good condition	9 - native tidal marsh plant species expected to be in good condition as in adjacent areas
	VII	2 -ditching, disturbance, and lack of management resulted in Phragmites dominance	10 - long term management plan and conservation easement will support viable native salt marsh community
	VIII	3 - poor microtopography and lack of channels in Phragmites dominated area	9 - excavation of channels and grading to tidal elevations will establish proper tidal topography
current: 3	IX	N/A, no SAV in region	N/A, no SAV in region
with: 9	X	N/A to wetland areas	N/A to wetland areas

Score = sum of above scores/30

current	with
0.37	0.83

If Preservation as mitigation	
Preservation adjustment factor =	
Adjusted mitigation delta =	

For impact assessment areas	
Functional loss (impact x acres)	

(if uplands, divide by 20)

If mitigation	
Time lag (t-factor) =	1.00
Risk factor =	1.00
Public Restoration Factor (PRF) =	1.05

For Mitigation Assessment Areas	
Relative Functional Gain (RFG) (Delta*PRF)/(risk*t-factor)	0.49

Delta = [with-current]	
wetland	0.47
upland	0.00

Assessment Area Acreage	1.02

Mitigation Bank Credit Generation	
RFG * Assessment Area Acreage	**0.50**

PART I – Qualitative Description
(See Section 4.4.1)

(1) Site/Project Name	(2) Application Number	(3) Assessment Area Name or Number
Sawmill Creek Bank		E1 - East Tidal Wetland Restoration (Rehabilitation)

(4) Habitat Code	(5) Further classification (optional)	(6) Impact or Mitigation Site?	(7) Assessment Area Size
II.C. 4 Estuarine Cultural	Estuarine Impoundment Marsh	Mitigation	15.61

(8) Basin/Watershed Name/Number	(9) Affected Waterbody (Class)	(10) Special Classification (local/state/federal designation of importance)
HUC 02030104	Sawmill Creek, Class SD (impaired: floatables and Oxy demand)	DEC HM (high marsh) wetlands

(11) Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands

AA hydrologically connected to Sawmill Creek and Arthur Kill, geographically adjacent to Sawmill Creek and Arthur Kill Complex(No. 18) (USFWS,NY Bight Study, 1997)

(12) Assessment area description

Phragmites marsh. Adjacent to past fill/development activities. Includes 0.31 acre unvegetated area with clay substrate that is potential panne habitat.

(13) Significant nearby features	(14) Uniqueness (considering the relative rarity in relation to the regional landscape.)
Pralls Island; Sawmill Creek wetland complex	AA is part of a unique natural system within the highly urbanized NY/NJ region

(15) Functions	(16) Mitigation for previous permit/other historic use
Habitat; Primary Production; Nutrient Cycling; Removal Contaminents; flood storage; (NYSDOS and NYSDEC 2000)	Bank credit development

(17) Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to be found)	(18) Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area)
Red-winged blackbird, marsh wren. See also: Ecological Communities of NY State (NYNHP 2002); Salt Marsh Restoration and Monitoring Guidelines (NYSDOSand NYSDEC 2000)	Not expected to be present.

(19) Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.):

No evidence observed during site visits conducted between May and June, 2013.

(20) Additional relevant factors:

Sources of stormwater runoff from adjacent land uses; adjacent invasive species present (Phragmites); potential for further encroachment from adajcent land use; potential for tide driven debris accumulation. Under five miles from Newark Airport (FAA coordination required). The estimated construction cost for this publicly funded wetland rehabilitation is ~$280,000 per acre.

(21) Assessment conducted by:	(22) Assessment date(s):
LBA PC	10/30/2013

PART II – Quantification of Assessment Area (impact or mitigation)

(See Section 4.4.2)

Site/Project Name	Application Number	Assessment Area Name or Number
Sawmill Creek Bank	NAN-2013-00259-EHA	E1 - East Tidal Wetland Restoration (Rehabilitation)
Impact or Mitigation	**Assessment conducted by:**	**Assessment date:**
Mitigation	LBA PC	10/30/2013

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 wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

		current condition	with rehabilitation
Location and Landscape Support	a	6 - adjacent areas support some wildlife species	7 - restoration of adjacent areas will improve wildlife support
	b	6 - Phragmites is present within and adjacent to site	8 - Invasives management will reduce Phrgamites cover
	c	4 -adjacent development and hydrological impairment are barriers	7 - improved hydrology & Phragmites removal will improve wildlife access
	d	4 - hydrology of area is impaired, area is somewhat impounded	8- restoration to tidal conditions will improve connectivity
	e	3 - effects of adjacent development (industry/roads) impact habitat	4 - restoration of tidal flushing will reduce adverse effects from outside land use
	f	3 - poor connectivity with downstream areas impairs function	7 - hydrologic improvements will provide greater benefits to surrounding areas
	g	3 - provides minimal downstream benefits	5 - improved connectivity provides more effective functions (nutrient cycling, sediment trapping)
	h	N/A to wetland areas	N/A to wetland areas
current / with	i	2 - area not horizontally or vertically extensive, little buffering ability	3 - hydrologic restoration would slightly improve buffering/storage functions
4 / 7	j	7 - elevation appears suitable for high marsh & scrub-shrub habitats	7 - negligible change of elevation with restoration

		current condition	with rehabilitation
Water Environment (n/a for uplands)	a	5 - significant hydrologic restriction present	9 - tidal hydrology will be restored
	b	7 - water level indicators not apparent in dense Phragmites	9 - water level indicators will be distinct and consistent with expected
	c	8 - soil moisture sufficient to support wetland vegetation (Phragmites)	10 - hydrologic improvement will restore appropriate tidal soil moisture conditions
	d	4 - atypical flow in Phragmites-dominated area	8 - tidal ebb and flow will be improved
	e	2 - area is dominated by Phragmites	9 - grading to tidal elevations will improve target strata
	f	4 - hydrologic stress indicated by Phragmites monoculture	9 - reconnection with tidal hydrology will allieviate hydrologic stress
	g	4 - wildlife with specific hydrologic requirement (i.e. fiddler crab) not expected to be abundant in Phragmites monoculture	10 - restoration of tidal hydrology will increase use by tidally-dependent wildlife species
	h	3 - Phragmites monoculture typical of water quality degradation/flow alteration	9 - native tidal marsh plant community indicative of good water quality and proper flows
	i	8 - none observed, but potential for slight degradation from surrounding land use	9 - restoration will reduce potential for degradation from surrounding land use
	j	3 - assumed water quality impairment from adjacent land use runoff, poor hydrologic connectivity; tidal flow from estuary is listed as impaired for floatables and oxygen demand	7 - improved flows will assist cycling of contaminants from uplands, eliminate standing water
	k	2 - depths, currents and light penetration not well suited for salt marsh community	9 - improvements will establish proper depth and currrents for high marsh; improved tidal marsh functions will improve water quality
current / with	l	10 - nearby shorelines are stable; shoreline erosion due to wind-generated wave energy not expected	10 - no change expected
4 / 9	m	9 - elevation appears stable	9 - restored marsh expected to maintain stable elevation

		current condition	with rehabilitation
Community structure	I	1 - area is dominated by Phragmites	9 - area will be vegetated with native salt marsh species
	II	1 - Phragmites comprises nearly all plant cover	8 - Phragmites cover will be minimal and managed
	III	3 - minimal evidence of seed production and recruitment	10 - high degree of native plant seed production and recruitment expected
1. Vegetation and/or 2. Benthic Community	IV	N/A - no woody debris in assessment area	N/A - no woody debris in assessment area
	V	N/A - no woody debris in assessment area	N/A - no woody debris in assessment area
	VI	9 - Phragmites appears in good condition	9 - native tidal marsh plant species expected to be in good condition as in adjacent areas
	VII	2 -ditching, disturbance, and lack of management resulted in Phragmites dominance	10 - long term management plan and conservation easement will support viable native salt marsh community
	VIII	3 - poor microtopography and lack of channels in Phragmites dominated area	9 - excavation of channels and grading to tidal elevations will establish proper tidal topography
current / with	IX	N/A, no SAV in region	N/A, no SAV in region
3 / 9	X	N/A to wetland areas	N/A to wetland areas

Score = sum of above scores/30

current	with
0.37	0.83

If Preservation as mitigation	
Preservation adjustment factor =	
Adjusted mitigation delta =	

For impact assessment areas	
Functional loss (impacts x acres)	

(if uplands, divide by 20)

If mitigation	
Time lag (t-factor) =	1
Risk factor =	1
Public Restoration Factor (PRF) =	1.05

For Mitigation Assessment Areas	
Relative Functional Gain (RFG) (Delta*PRF)/(risk*t-factor)	0.49

Delta = [with-current]	
wetland	0.47
upland	0

Assessment Area Acreage	15.61

Mitigation Bank Credit Determination	
RFG * Assessment Area Acreage	**7.65**

PART I – Qualitative Description
(See Section 4.4.1)

(1) Site/Project Name	(2) Application Number	(3) Assessment Area Name or Number
Saw Mill Creek Bank	NAN-2013-00259-EHA	W2 - West Tidal Wetland Restoration (Re-establishment)

(4) Habitat Code	(5) Further classification (optional)	(6) Impact or Mitigation Site?	(7) Assessment Area Size
VI. D. 32 Urban Vacant lot	Sparsely vegetated historic fill	Mitigation	5.17

(8) Basin/Watershed Name/Number	(9) Affected Waterbody (Class)	(10) Special Classification (local/state/federal designation of importance)
HUC 02030104	Sawmill Creek, Class SD (impaired: floatables and Oxy demand)	DEC HM (high marsh) wetlands

(11) Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands

AA hydrologically connected to Sawmill Creek and Arthur Kill, geographically adjacent to Sawmill Creek and Arthur Kill Complex (No. 18) (USFWS NY Bight Study, 1997)

(12) Assessment area description

Formet tidal wetland, filled and used as vehicle storage, construction/demolition debris disposal, and junkyard

(13) Significant nearby features	(14) Uniqueness (considering the relative rarity in relation to the regional landscape.)
Pralls Island; Sawmill Creek wetland complex; Sarnelli Brothers Inc. vehicle storage, trucking and demolition debris disposal	AA is part of a unique natural system within the highly urbanized NY/NJ region

(15) Functions	(16) Mitigation for previous permit/other historic use
The AA is an upland area and does not provide wetland functions, but does minimally provide/support: Habitat; Food Web; Nutr. Cycling; OM export (leaf litter).	Bank credit development

(17) Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to be found)	(18) Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area)
Feral cats, mice, common bird species such as starlings and sparrows. See also: Ecological Communities of NY State (NYNHP 2002)	Not expected to be present.

(19) Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.):

No evidence observed during site visits conducted between May and June 2013.

(20) Additional relevant factors:

Historic fill area. The estimated construction cost for this publicly funded wetland re-establishment is ~$690,000 per acre.

(21) Assessment conducted by:	(22) Assessment date(s):
LBA PC	10/30/13

PART II – Quantification of Assessment Area (impact or mitigation)
(See Section 4.4.2)

Site/Project Name	Application Number	Assessment Area Name or Number
Saw Mill Creek Bank	NAN-2013-00259-EHA	W2 - West Tidal Wetland Restoration (Re-establishment)
Impact or Mitigation	**Assessment conducted by:**	**Assessment date:**
Mitigation	LBA PC	10/30/13

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 wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

Location and Landscape Support

	current condition	with re-establishment
a	0	7 - adjacent land use and partial connectivity limits wildlife support; restoration expands existing marsh size
b	0	8 - minimal invasive cover expected in restoration areas; invasives expected to persist in adjacent areas
c	0	7 - corridor partially impeded; most expected species are highly mobile and not severly limited by barriers that remain
d	0	7 - assessment area will be accessible to fish with some barriers still present
e	0	4 - surrounding land uses will remain, however associated attributes like noise and industrial activities will be reduced
f	0	7 - hydrologic connection will be restored; nearby impairments remain (railroad, ditching in downstream wetlands)
g	0	5 - assessment area will provide contaminant buffering from adjacent uplands
h	0	N/A to wetland areas
i	0	3 - wetlands in assessment area will have minimal vertical relief and width to provide minor buffering
j	0	7 - high marsh will be abundant and diversity of elevation/habitat types will be present. Adjacent land use limits habitat migration.

current	with
0	7

Water Environment (n/a for uplands)

	current condition	with re-establishment
a	0	7 - hydrologic connection will be restored; nearby impairments (railroad, ditching in downstream wetlands) persist
b	0	9 - most indicators expected to be present and consistent with proposed hydroperiod
c	0	10 - soil moisture expected to be appropriate for the tidal marsh system
d	0	8 - tidal flow will be restored; downstream ditching and railroad tracks present minor alterations of flow/discharge
e	0	9 - communitiy zonation expected to be appropriate
f	0	9 - restored wetland will support target vegetation; slight stress due to downstream ditching and flow constriction
g	0	10 - animals with specific hydrologic requirements (heron, terrapin, fiddler crab, mummichog) expected to be present
h	0	9 - species tolerant of or associated with water quality degradation or flow alteration not expected
i	0	9 - potential for slight degradation from immediately adjacent upland industrialized area
j	0	7 - estuary is listed as impaired for floatables and oxygen demand; improved flows will assist cycling of contaminants from uplands
k	0	9 - depths, currents and light penetration expected to be sufficient for salt marsh habitat
l	0	10 - shoreline is stable; shoreline erosion due to wind-generated wave energy not expected
m	0	9 - marsh expected to maintain stable elevation

current	with
0	9

Community structure

1. Vegetation and/or
2. Benthic Community

	current condition	with re-establishment
I	0	9 - plant species composition expected to be appropriate to habitat type; native species expected to be dominant
II	0	9 - minimal cover by invasive species expected
III	0	10 - high degree of native plant seed production and recruitment expected
IV	0	9 - age and size distribution expected to be typical of system
V	0	N/A - no woody debris in assessment area
VI	0	9 - plants expected to be in good condition
VII	0	10 - restored wetland will be managed/maintained per Banking Instrument/conservation easement
VIII	0	9 - microtopographic features are expected to be present and typical for the proposed habitat type
IX	0	N/A, no SAV in region
X	0	N/A to wetland areas

current	with
0	9

Score = sum of above scores/30

current	with
0.00	0.83

(if uplands, divide by 20)

Delta = [with-current]	
wetland	0.83
upland	0

If preservation as mitigation	
Enhancement adjustment factor =	
Adjusted mitigation delta =	

If mitigation	
Time lag (t-factor) =	1
Risk factor =	1
Public Restoration Factor (PRF) =	1.2

Assessment Area Acreage	5.17

For impact assessment areas	
Functional loss (impact x acres)	

For Mitigation Assessment Areas	
Relative Functional Gain (RFG) (Delta*PRF)/(risk*t-factor)	1.00

Mitigation Bank Credit Determination	
RFG * Assessment Area Acres	**5.17**

PART I – Qualitative Description
(See Section 4.4.1)

(1) Site/Project Name	(2) Application Number	(3) Assessment Area Name or Number
Saw Mill Creek Bank	NAN-2013-00259-EHA	E2 - East Tidal Wetland Restoration (Re-establishment)

(4) Habitat Code	(5) Further classification (optional)	(6) Impact or Mitigation Site?	(7) Assessment Area Size
VI. D.	Phragmites-vegetated manmade berm	Mitigation	1.87

(8) Basin/Watershed Name/Number	(9) Affected Waterbody (Class)	(10) Special Classification (local/state/federal designation of importance)
HUC 02030104	Sawmill Creek, Class SD (impaired: floatables and Oxy demand)	

(11) Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands

AA hydrologically connected to Sawmill Creek and Arthur Kill, geographically adjacent to Sawmill Creek and Arthur Kill Complex (No. 18) (USFWS NY Bight Study, 1997)

(12) Assessment area description

Former earthen containment berm, primarily vegetated with Phragmites and Ailanthus altissima

(13) Significant nearby features	(14) Uniqueness (considering the relative rarity in relation to the regional landscape.)
Pralls Island; Sawmill Creek wetland complex	AA is part of a unique natural system within the highly urbanized NY/NJ region

(15) Functions	(16) Mitigation for previous permit/other historic use
The AA is an upland area and does not provide wetland functions, but does provide/support: Habitat; Food Web; Nutr. Cycling; OM export (leaf litter).	Bank credit development

(17) Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to be found)	(18) Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area)
Marsh wren, redwing blackbird, small mammals	Not expected to be present.

(19) Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.):

Marsh wren nesting observed in May 2013.

(20) Additional relevant factors:

Dominated by invasive species, primarily Phragmites and Ailanthus altissima. Berm is a barrier to tidal hydrology for wetland areas.The estimated construction cost for this publicly funded wetland re-establishment is ~$690,000 per acre.

(21) Assessment conducted by:	(22) Assessment date(s):
LBA PC	10/30/13

PART II – Quantification of Assessment Area (impact or mitigation)
(See Section 4.4.2)

Site/Project Name	Application Number	Assessment Area Name or Number
Saw Mill Creek Bank	NAN-2013-00259-EHA	E2 - East Tidal Wetland Restoration (Re-establishment)
Impact or Mitigation	**Assessment conducted by:**	**Assessment date:**
Mitigation	LBA PC	10/30/13

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 wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

		current condition	with re-establishment
Location and Landscape Support	a	0	9 - adjacent wetland habitats would be fully connected; expands overall tidal marsh acreage
	b	0	9 - minimal invasive cover expected in restoration areas
	c	0	7 - corridor partially impeded; most expected species are highly mobile and not severly limited by barriers that remain
	d	0	7 - assessment area will be accessible to fish with some barriers still present
	e	0	7 - surrounding land uses would remain but have minimal adverse impacts on fish and wildlife
	f	0	8 - hydrologic connection will be restored; nearby impairments will remain (railroad, ditching in downstream wetlands)
	g	0	3 - assessment area will provide some contaminant buffering from adjacent uplands
	h	0	N/A to wetland areas
current / with	i	0	3 - wetlands in assessment area have minimal vertical relief and width to provide buffering
0 / 7	j	0	6 - assessment area would be restored to high marsh, allowing for habitat migration with sea level rise

		current condition	with re-establishment
Water Environment (n/a for uplands)	a	0	10 - hydrologic connection will be restored; nearby hydrologic impairments would remain (railroad, ditching in downstream wetlands)
	b	0	9 - most indicators expected to be present and consistent with proposed hydroperiod
	c	0	10 - soil moisture expected to be appropriate for the tidal marsh system
	d	0	8 - flow will be restored; downstream ditching present minor alterations of flow/discharge
	e	0	9 - communitiy zonation expected to be appropriate
	f	0	9 - restored wetland will support target vegetation; slight impacts due to downstream ditching and flow constriction
	g	0	10 - animals with specific hydrologic requirements (heron, terrapin, fiddler crab, mummichog) expected to be present
	h	0	9 - species tolerant of or associated with water quality degradation or flow alteration not expected
	i	0	9 - potential for slight degradation from surrounding land use
	j	0	7 - estuary is listed as impaired for floatables and oxygen demand; improved flows will assist cycling of contaminants from uplands
	k	0	9 - depths, currents and light penetration sufficient for a salt marsh
current / with	l	0	10 - nearby shorelines are stable; shoreline erosion due to wind-generated wave energy not expected
0 / 9	m	0	9 - marsh expected to maintain stable elevation

		current condition	with re-establishment
Community structure	I	0	9 - plant species composition expected to be appropriate to habitat type; native species expected to be dominant
	II	0	9 - minimal cover by invasive species expected
	III	0	10 - high degree of native plant seed production and recruitment expected
1. Vegetation and/or 2. Benthic Community	IV	0	9 - age and size distribution expected to be typical of system
	V	0	N/A - no woody debris in assessment area
	VI	0	9 - plants expected to be in good condition
	VII	0	10 - restored wetland will be managed/maintained per Banking Instrument/conservation easement
	VIII	0	9 - microtopographic features are expected to be present and typical for the proposed habitat type
current / with	IX	0	N/A, no SAV in region
0 / 9	X	0	N/A to wetland areas

Score = sum of above scores/30

current	with
0.00	0.83

If preservation as mitigation	
Enhancement adjustment factor =	
Adjusted mitigation delta =	

For impact assessment areas	
Functional loss (impact x acre)	

(if uplands, divide by 20)

If mitigation	
Time lag (t-factor)=	1
Risk factor=	1
Public Restoration Factor (PRF) =	1.2

For Mitigation Assessment Areas	
Relative Functional Gain (RFG) (Delta*PRF)/(risk*t-factor)	1.00

Delta = [with-current]	
wetland	0.83
upland	0

Assessment Area Acreage	1.87

Mitigation Bank Credit Determination	
RFG * Assessment Area Acres	**1.87**

PART I – Qualitative Description
(See Section 4.4.1)

NAN-

(1) Site/Project Name	(2) Application Number	(3) Assessment Area Name or Number
Sawmill Creek Bank	NAN-2013-00259-EHA	W3 - West Tidal Wetland Enhancement

(4) Habitat Code	(5) Further classification (optional)	(6) Impact or Mitigation Site?	(7) Assessment Area Size
II.B.8 Estuarine Brackish Tidal Marsh	Estuarine Brackish Tidal Marsh	Mitigation	7.68

(8) Basin/Watershed Name/Number	(9) Affected Waterbody (Class)	(10) Special Classification (local/state/federal designation of importance)
HUC 02030104	Sawmill Creek, Class SD (impaired: floatables and Oxy demand)	DEC HM (high marsh)and IM (intertidal marsh) wetlands

(11) Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands

AA hydrologically connected to Sawmill Creek and Arthur Kill, geographically adjacent to Sawmill Creek and Arthur Kill Complex (No. 18) (USFWS NY Bight Study, 1997)

(12) Assessment area description

Brackish high and low marsh, altered by mosquito ditching. Adjacent to railroad tracks, Chelsea Road and Rt 440. and filled wetlands.

(13) Significant nearby features	(14) Uniqueness (considering the relative rarity in relation to the regional landscape.)
Pralls Island; Saw Mill Creek wetland complex; former auto salvage yard, commercial and industrial development	AA is part of a unique natural system within the highly urbanized NY/NJ region

(15) Functions	(16) Mitigation for previous permit/other historic use
Habitat;Prim. Production; Food Web; Nutr. Cycling; OM export; Removal Contam; wave energy attenuation; flood storage;sedimentation/accretion (NYSDOS and NYSDEC 2000)	Bank credit development

(17) Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to be found)	(18) Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area)
See Attached Table I.1: See also:Ecological Communities of NY State (NYNHP 2002); Salt Marsh Restoration and Monitoring Guidelines(NYSDOSand NYSDEC 2000)	See Attached Table I.2

(19) Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.):

Based on site visits conducted between May and June, 2013: fiddler crabs, ribbed mussels, mummichogs, marsh snails, diamondback terrapin; yellow crowned and snowy egrets; osprey, mallard; clapper rail.

(20) Additional relevant factors:

Sources of stormwater runoff from adjacent land uses; connectivity to adjacent tidal marsh restricted by rail line and box culvert; adjacent invasive species present (Phragmites); potential for further encroachment from adajcent land use; potential for tide driven debris accumulation. Under five miles from Newark Airport (FAA coordination required).

(21) Assessment conducted by:	(22) Assessment date(s):
LBA PC	10/30/13

PART II – Quantification of Assessment Area (impact or mitigation)
(See Section 4.4.2)

Site/Project Name	Application Number	Assessment Area Name or Number
Sawmill Creek Bank	NAN-2013-00259-EHA	W3 - West Tidal Wetland Enhancement
Impact or Mitigation	**Assessment conducted by:**	**Assessment date:**
Mitigation	LBA PC	10/30/13

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 wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

		current condition	with enhancement
Location and Landscape Support	a	8 - adjacenct areas support wildlife species; reduced connectivity and adjacent land uses are slightly limiting	8 - no change
	b	6 - Phrag is present within/adjacent to AA, has potential to invade site in future as surface elevation increases	9 - invasives would be removed/regularly treated to maintain condition
	c	7 - type of fauna in tidal marsh dominant sites are less affected by the existing barriers. Tidal channel is present.	7 - no change
	d	7 - some potential for contamination; impaired for oxygen levels in creek	7 - no change
	e	5 - disturbance from adjacent development (industry/railroad) impacts habitat	6 - no additional fill in future, slightly less magnitude of adjacent land use
	f	7 - fill in adjacent areas, railroad embankment and tidal ditching impair function	8 - hydrologic connection will be restored to adjacent formerly filled wetlands; nearby impairments would remain
	g	4 - provides contaminant buffering from adjacent uplands	4 - no change
	h	N/A to wetland areas	N/A to wetland areas
current / with	i	4 - more than 100 ft. width provide minimal support	4 - width will not change significantly
6 / 7	j	8 - large area of high marsh and some scrub shrub areas	9 - expansion of adjacent high marsh

		current condition	with enhancement
Water Environment (n/a for uplands)	a	7 -site has been ditched and overmarsh flow affected by railroad tracks	7 - no change expected
	b	9 - water level not significantly affected by manmade barriers	9 - no change expected
	c	10 - no apparent soil moisture issues	10 - no change expected
	d	8 - Ditching and railroad tracks cause minor alterations of flows/discharges	8 -- no change expected
	e	9 - nearly optimal community zonation	9 - no change expected
	f	9 - appropriate for all strata, though mild effects due to ditching and constricted flow in Sawmill Creek	9 - no change expected
	g	10 - animals with specific hydrologic requirement (i.e, muskrat, heron, terrapin, fiddler crab) expected to be present	10 - no change expected
	h	9 - no sign of hydrologic stress	9 - no change expected
	i	9 - none observed evidence in assessment area	9 - no change expected
	j	4 - water quality impairment from adjacent land uses; tidal flow from estuary is listed as impaired for floatables and oxygen demand	6 - restoration of adjacent marsh will divert/educe runoff from adjacent industrial site
	k	8 - depths, currents and light penetration sufficient for a salt marsh	9 - improved marsh health will slighlty improve water quality
current / with	l	10 - wave energy and fetch appropriate for community type	10 - no change expected
8 / 9	m	9 - marsh appears stable	9 - no change expected

		current condition	with enhancement
Community structure	I	9 - some Phragmites presence (< 2%)	9 - treatment would control any Phragmites expansion
	II	9 - Phragmites present in small patches	10 - treatment would remove Phragmites cover/prevent future degradation.
	III	10 - Plant cover appears total	10 - no change expected
1. Vegetation and/or	IV	9 - age and size distribution typical of system	9 - no change expected
2. Benthic Community	V	N/A - no woody debris in assessment area	N/A - no woody debris in assessment area
	VI	9 - plant condition is good	9 - no change expected
	VII	7 - ditching has affected original high marsh community	10 -long term management plan, conservation easement will support viable native salt marsh community
	VIII	7 -microtopography present; ditching present throughout marsh	7 - no change proposed
current / with	IX	N/A, no SAV in region	N/A, no SAV in region
9 / 10	X	N/A to wetland areas	N/A to wetland areas

Score = sum of above scores/30

current	with
0.77	0.87

If preservation as mitigation	
Preservation adjustment factor =	
Adjusted mitigation delta =	

For impact assessment areas	
Functional loss (impact x area)	

(if uplands, divide by 20)

If mitigation	
Time lag (t-factor)=	1
Risk factor=	1
Public Restoration Factor (PRF) =	1

For Mitigation Assessment Areas	
Relative Functional Gain (RFG) (Delta*PRF)/(risk*t-factor)	0.10

Delta = [with-current]	
wetland	0.10
upland	0

Assessment Area Acreage	7.69

Mitigation Bank Credit Determination	
RFG * Assessment Area Ac.	**0.769**

PART I – Qualitative Description
(See Section 4.4.1)

(1) Site/Project Name	(2) Application Number	(3) Assessment Area Name or Number
Sawmill Creek Bank	NAN-2013-00259-EHA	E3 - East Tidal Wetland Enhancement

(4) Habitat Code	(5) Further classification (optional)	(6) Impact or Mitigation Site?	(7) Assessment Area Size
II.B.8 Estuarine Brackish Tidal Marsh	Estuarine Brackish Tidal Marsh	Mitigation	25.47

(8) Basin/Watershed Name/Number	(9) Affected Waterbody (Class)	(10) Special Classification (local/state/federal designation of importance)
HUC 02030104	Sawmill Creek, Class SD (impaired: floatables and Oxy demand)	DEC HM (high marsh)and IM (intertidal marsh) wetlands

(11) Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands

AA hydrologically connected to Sawmill Creek and Arthur Kill, geographically adjacent to Sawmill Creek and Arthur Kill Complex (No. 18) (USFWS NY Bight Study, 1997)

(12) Assessment area description

Brackish high and low marsh, altered by mosquito ditching. Adjacent to Chelsea Road, Rt 440., and filled wetlands.

(13) Significant nearby features	(14) Uniqueness (considering the relative rarity in relation to the regional landscape.)
Pralls Island; Saw Mill Creek wetland complex; former auto salvage yard, commercial and industrial development	AA is part of a unique natural system within the highly urbanized NY/NJ region

(15) Functions	(16) Mitigation for previous permit/other historic use
Habitat;Prim. Production; Food Web; Nutr. Cycling; OM export; Removal Contam; wave energy attenuation; flood storage;sedimentation/accretion (NYSDOS and NYSDEC 2000)	Bank credit development

(17) Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to be found)	(18) Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area)
See Attached Table I.1: See also:Ecological Communities of NY State (NYNHP 2002); Salt Marsh Restoration and Monitoring Guidelines(NYSDOSand NYSDEC 2000)	See Attached Table I.2

(19) Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.):

Based on site visits conducted between May and June, 2013: fiddler crabs, ribbed mussels, mummichogs, marsh snails, yellow crowned and snowy egrets; osprey, mallard; clapper rail.

(20) Additional relevant factors:

Sources of stormwater runoff from adjacent land uses; connectivity to adjacent tidal marsh restricted by rail line and box culvert; adjacent invasive species present (Phragmites); potential for further encroachment from adajcent land use; potential for tide driven debris accumulation. Under five miles from Newark Airport (FAA coordination required).

(21) Assessment conducted by:	(22) Assessment date(s):
LBA PC	10/30/13

PART II – Quantification of Assessment Area (impact or mitigation)
(See Section 4.4.2)

Site/Project Name	Application Number	Assessment Area Name or Number
Sawmill Creek Bank	NAN-2013-00259-EHA	E3 - East Tidal Wetland Enhancement
Impact or Mitigation	**Assessment conducted by:**	**Assessment date:**
Mitigation	LBA PC	10/30/13

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 wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

		current condition	with enhancement
Location and Landscape Support	a	8 - adjacenct areas support wildlife species; reduced connectivity and adjacent land uses are slightly limiting	8 - no change
	b	6 - Phrag is present within/adjacent to AA, has potential to invade site in future as surface elevation increases	9 - invasives would be removed/regularly treated to maintain condition.
	c	7 - type of fauna in tidal marsh dominant sites are less affected by the existing barriers. Tidal channel is present.	7 - no change
	d	7 - some potential for contamination; impaired for oxygen levels in creek	7 - no change
	e	5 - disturbance from adjacent development (industry/roadways) impacts habitat	6 - no additional fill in future
	f	7 - fill inadjacent areas, tidal ditching, and roadways impair function	8 - hydrologic connection will be restored to adjacent formerly filled wetlands; nearby impairments would remain
	g	4 - provides contaminant buffering from adjacent uplands	4 - no change
	h	N/A to wetland areas	N/A to wetland areas
current / with	i	4 - more than 100 ft. width provide minimal support	4 - width will not change significantly
6 / 7	j	8 - large area of high marsh and some scrub shrub areas	9 - expansion of adjacent high marsh

		current condition	with enhancement
Water Environment (n/a for uplands)	a	7 -site has been ditched and overmarsh flow affected by roadway/culverts	7 - no change expected
	b	9 - water level not significantly affected by manmade barriers	9 - no change expected
	c	10 - no apparent soil moisture issues	10 - no change expected
	d	8 - Ditching and roadway/culverts cause minor alterations of flows/discharges	8 -- no change expected
	e	9 - nearly optimal community zonation	9 - no change expected
	f	9 - appropriate for all strata, though mild effects due to ditching and constricted flow in Sawmill Creek	9 - no change expected
	g	10 - animals with specific hydrologic requirement (i.e, muskrat, heron, terrapin, fiddler crab) expected to be present	10 - no change expected
	h	9 - no sign of hydrologic stress	9 - no change expected
	i	9 - none observed evidence in assessment area	9 - no change expected
	j	4 - water quality impairment from adjacent land uses; tidal flow from estuary listed as impaired for floatables and oxygen demand	6 -restoration of adjacent marsh will divert/educe runoff from adjacent industrial site
	k	8 - depths, currents and light penetration sufficient for a salt marsh	9 - improved marsh health will slighlty improve water quality
current / with	l	10 - wave energy and fetch appropriate for community type	10 - no change expected
8 / 9	m	9 - marsh appears stable	9 - no change expected

		current condition	with enhancement
Community structure	I	9 - some Phragmites presence (< 2%)	9 - treatment would control any Phragmites expansion
	II	9 - Phragmites present in small patches	10 - treatment would remove Phragmites cover/prevent future degradation.
	III	10 - Plant cover appears total	10 - no change expected
1. Vegetation and/or 2. Benthic Community	IV	9 - age and size distribution typical of system	9 - no change expected
	V	N/A - no woody debris in assessment area	N/A - no woody debris in assessment area
	VI	9 - plant condition is good	9 - no change expected
	VII	7 - ditching has affected original high marsh community	10 -long term management plan, conservation easement will support viable native salt marsh community
	VIII	7 -microtopography present; ditching present throughout marsh	7 - no change proposed
current / with	IX	N/A, no SAV in region	N/A, no SAV in region
9 / 10	X	N/A to wetland areas	N/A to wetland areas

Score = sum of above scores/30

current	with
0.77	0.87

If preservation as mitigation	
Preservation adjustment factor =	
Adjusted mitigation delta =	

For impact assessment areas	
Functional loss (impact x acres)	

(if uplands, divide by 20)

If mitigation	
Time lag (t-factor)=	1
Risk factor=	1
Public Restoration Factor (PRF) =	1

For Mitigation Assessment Areas	
Relative Functional Gain (RFG) (Delta*PRF)/(risk*t-factor)	0.10

Delta = [with-current]	
wetland	0.10
upland	0

Assessment Area Acreage	26.03

Mitigation Bank Credit Determination	
RFG * Assessment Area Acres	**2.603**

PART I – Qualitative Description
(See Section 4.4.1)

(1) Site/Project Name	(2) Application Number	(3) Assessment Area Name or Number
Saw Mill Creek Bank	NAN-2013-00259-EHA	E4 - East Forested Wetland Enhancement

(4) Habitat Code	(5) Further classification (optional)	(6) Impact or Mitigation Site?	(7) Assessment Area Size
V.C.4. Red Maple-Sweetgum Swamp		Mitigation	1.52

(8) Basin/Watershed Name/Number	(9) Affected Waterbody (Class)	(10) Special Classification (local/state/federal designation of importance)
HUC 02030104	Sawmill Creek, Class SD (impaired: floatables and Oxy demand)	NYSDEC Freshwater Wetlands (AR-49)

(11) Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands

AA hydrologically connected to Sawmill Creek and Arthur Kill, geographically adjacent to Sawmill Creek and Arthur Kill Complex (No. 18) (USFWS NY Bight Study, 1997)

(12) Assessment area description

Red maple-sweetgum swamp located between Phragmites-dominated edge of tidal marsh and uplands.

(13) Significant nearby features	(14) Uniqueness (considering the relative rarity in relation to the regional landscape.)
Pralls Island; Sawmill Creek wetland complex, Rt 440 and Chelsea Road	AA is part of a unique natural system within the highly urbanized NY/NJ region

(15) Functions	(16) Mitigation for previous permit/other historic use
Habitat; Primary Production; Food Web; Nutr. Cycling; OM export; Removal Contam; flood storage; (NYSDOS and NYSDEC 2000)	Bank credit development

(17) Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to be found)	(18) Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area)
Neotropical migrants, small mammals, deer. See also: Ecological Communities of NY State (NYNHP 2002)	Most species not expected to be present; Persimmon is listed by NYSDEC as present within AA.

(19) Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.):

No wildlife observed in May and June, 2013.

(20) Additional relevant factors:

Sources of stormwater runoff from adjacent land uses; Phragmites in/adjacent to area, potential for tide driven debris accumulation. Under five miles from Newark Airport (FAA coordination required).

(21) Assessment conducted by:	(22) Assessment date(s):
LBA PC	10/30/13

PART II – Quantification of Assessment Area (impact or mitigation)
(See Section 4.4.2)

Site/Project Name	Application Number	Assessment Area Name or Number
Saw Mill Creek Bank	NAN-2013-00259-EHA	E4 - East Forested Wetland Enhancement
Impact or Mitigation	**Assessment conducted by:**	**Assessment date:**
Mitigation	LBA PC	10/30/13

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 wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

		current condition	with enhancement
Location and Landscape Support	a	7 - site provides habitats for many species	8 - removal of invasive species and debris will improve habitat quality
	b	7 - Phragmites encroaching from marsh edge	8 - invasives management will reduce adverse effects
	c	5 -wildlife access limited by roads and other land use	5 - barriers to wildlife use would remain
	d	7 - functional connection limited due to habitat fragmentation and barriers	7 - no proposed changes to fragmentation or barriers
	e	5 - roads and other land use, runoff, storm debris and noise sources impact wildlife	6 - removal of debris would slightly reduce impacts
	f	5 - assessment area provides some beneficial discharges to adjacent wetlands	5 - no changes to hydrology of assessment area
	g	3 - provides minimal surface or groundwater benefit to downstream habitats	3 - no changes to hydrology of assessment area
	h	N/A to wetland areas	N/A to wetland areas
current 6 / with 7	i	5 - wetland is moderately wide and contains some vertical relief	5 - no proposed changes to width or elevation
	j	6 - elevations within wetland would allow for limited landward salt marsh migration	6 - no proposed changes to wetland topography

		current condition	with enhancement
Water Environment (n/a for uplands)	a	N/A, as assessment area is nontidal wetland	N/A, as assessment area is nontidal wetland
	b	10 - water depths, saturation, and duration are appropriate for a forested wetland	10 - no proposed changes to water levels
	c	10 - soil moisture is appropriate	10 - no proposed changes to soil moisture
	d	10 - no indications of altered flows	10 - no proposed changes to flows
	e	8 - zonation adversely affected by Phragmites encroachment	9 - Phragmites management will improve zonation
	f	10 - no evidence of hydrologic stress	10 - no proposed changes to hydrology
	g	9 - use is consistent with expected hydrological conditons	9 - no proposed changes to hydrology
	h	8 - presence of Phragmites along lower edge of wetland	9 - Phragmites management will allow for improved community composition
	i	N/A - no standing water present	N/A - no standing water present
	j	N/A - no water quality data for this forested wetland	N/A - no water quality data for this forested wetland
	k	N/A - no standing water present	N/A - no standing water present
current 9 / with 9	l	9 - little potential for shoreline erosion	9 - no proposed changes to shoreline erosion potential
	m	N/A - assessment area is nontidal	N/A - assessment area is nontidal

		current condition	with enhancement
Community structure	I	8 - some Phragmites encroachment from marsh edge	9 - Phragmites management would improve plant strata
	II	8 - Phragmites present along marsh edge	9 - Phragmites treatment would increase native cover
	III	8 - native recruitment is near normal and natural	9 - removal of invasives and debris would improve native recruitment
1. Vegetation and/or 2. Benthic Community	IV	8- age and size distribution near typical	9 - removal of invasives will improve age and size distribution of native plant species
	V	9 - density and quality of coarse woody debris sufficient for wildlife	9 - no expected changes to woody debris conditions
	VI	8 - exisitng plant condition generally good	8 - native plant condition expected to be generally good
	VII	7 - lack of land management led to debris acumulation and invasive establishment	9 - long term management, conservation easement will support viable forested wetland forest community
	VIII	8 - microtopographic features present and near normal	8 - no proposed changes to microtopography
current 8 / with 9	IX	N/A for this forested wetland site	N/A for this forested wetland site
	X	N/A to wetland areas	N/A to wetland areas

Score = sum of above scores/30

current	with
0.77	0.83

If preservation as mitigation	
Preservation adjustment factor =	
Adjusted mitigation delta =	

For impact assessment areas	
Functional loss (impact x acres)	

(if uplands, divide by 20)

If mitigation	
Time lag (t-factor)=	1
Risk factor=	1
Public Restoration Factor (PRF) =	1

For Mitigation Assessment Areas	
Relative Functional Gain (RFG) (Delta*PRF)/(risk*t-factor)	0.07

Delta = [with-current]	
wetland	0.07
upland	0

Assessment Area Acreage	1.52

Mitigation Bank Credit Determination	
RFG * Assessment Area Ac.	**0.10**

PART I – Qualitative Description
(See Section 4.4.1)

(1) Site/Project Name	(2) Application Number	(3) Assessment Area Name or Number
Saw Mill Creek Bank	NAN-2013-00259-EHA	W4 - West Upland Buffer Rehabiliation SLOPE

(4) Habitat Code	(5) Further classification (optional)	(6) Impact or Mitigation Site?	(7) Assessment Area Size
	Phragmites-dominated upland slope	Mitigation	0.72

(8) Basin/Watershed Name/Number	(9) Affected Waterbody (Class)	(10) Special Classification (local/state/federal designation of importance)
HUC 02030104	Sawmill Creek, Class SD (impaired: floatables and Oxy demand)	None

(11) Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands

AA hydrologically connected to Sawmill Creek and Arthur Kill, geographically adjacent to Sawmill Creek and Arthur Kill Complex (No. 18) (USFWS NY Bight Study, 1997)

(12) Assessment area description

Upland slopes are primarily Phragmites-dominated. Illegal dumping and storm surge debris is present.

(13) Significant nearby features	(14) Uniqueness (considering the relative rarity in relation to the regional landscape.)
Pralls Island, Sawmill Creek wetland complex, Rt 440, Chelsea Road	AA is part of a unique natural system within the highly urbanized NY/NJ region

(15) Functions	(16) Mitigation for previous permit/other historic use
The AA is an upland area and does not provide wtland functions, but does provide/support: Habitat; Food Web; Nutr. Cycling; OM export (leaf litter).	Bank credit development

(17) Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to be found)	(18) Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area)
Neotropical migrants, small mammals, deer. See also: Ecological Communities of NY State (NYNHP 2002)	Consultation with NYNHP indicates none present.

(19) Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.):

Red-winged blackbird.

(20) Additional relevant factors:

Potential for further encroachment from adajcent land use; potential for tide driven debris accumulation

(21) Assessment conducted by:	(22) Assessment date(s):
LBA PC	10/30/13

PART II – Quantification of Assessment Area (impact or mitigation)
(See Section 4.4.2)

Site/Project Name	Application Number	Assessment Area Name or Number
Saw Mill Creek Bank	NAN-2013-00259-EHA	W4 - West Upland Buffer Rehabilitation$_{SLOPE}$
Impact or Mitigation	**Assessment conducted by:**	**Assessment date:**
Mitigation	LBA PC	10/30/13

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 wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

		current condition	with rehabilitation
Location and Landscape Support	a	4 -supports primarily disturbance-tolerant species	7 - removal of invasive species and illegal dumping will improve habitat quality
	b	4 - invasive cover is high, adversely affecting functions	8 - invasives management will remove invasive plant cover
	c	5 -wildlife access limited by adjacent land use	5 - barriers to wildlife use would remain
	d	7 - functional connection somewhat limited; barriers present	6 - functional connection somewhat limited; barriers still present
	e	5 - roads and other land use, runoff, illegal dumping and noise sources impact wildlife	6 - removal of debris and prevention of additional of illegal dumping would reduce impacts slightly
	f	4 - assessment area provides little in beneficial discharges to adjacent wetlands.	4 - no changes to hydrology of upland area
	g	3 - provides minimal surface or groundwater benefit to downstream habitats	3 - no changes to hydrology of upland area
	h	4 - upland area is an important buffer between adjacent land use and wetlands	7 - removal of illegal dumping would improve buffer function
current / with	i	N/A - assessment area is not a wetland	N/A - assessment area is not a wetland
4 / 6	j	7 - upland slope capable of supporting tidal scrub shrub development.	7 - no change to elevations proposed

		current condition	with rehabilitation
Water Environment (n/a for uplands)	a	N/A	N/A
	b	N/A	N/A
	c	N/A	N/A
	d	N/A	N/A
	e	N/A	N/A
	f	N/A	N/A
	g	N/A	N/A
	h	N/A	N/A
	i	N/A	N/A
	j	N/A	N/A
	k	N/A	N/A
current / with	l	N/A	N/A
	m	N/A	N/A

		current condition	with rehabilitation
Community structure	I	4 - majority of plant community is non-native	9 - removal of invasives will improve plant community stratification
	II	4 - majority of plant species is non- native	9- site will be enhanced through establishment of native species; long term manangent plan implemented
	III	4 - native recruitment minimal and long term viability diminished by invasive species cover	9 - removal of invasives would improve native recruitment
1. Vegetation and/or 2. Benthic Community	IV	5- deviation from normal successonal patterns - recruitment limited by invasive species cover	9 - removal of invasives will improve age and size distribution of native plant species
	V	N/A - no woody debris in assessment area	N/A - no woody debris in assessment area
	VI	8 - exisitng plant condition generally good	8 - native plant condition expected to be generally good
	VII	5 - lack of land management led to dumping and invasive establishment	8 - long term management, conservation easement will support viable scrub shrub community
	VIII	7 - microtopography typical	7 - no proposed changes to microtopography
current / with	IX	N/A to uplands	N/A to uplands
5 / 8	X	4 - provides moderate level of habitat/life history support	8 -removal of invasives and dumping will improve habitat and life history support

Score = sum of above scores/30

current	with

If preservation as mitigation	
Preservation adjustment factor =	
Adjusted mitigation delta =	

For impact assessment areas	
Functional loss (impact x acres)	

(if uplands, divide by 20)

current	with
0.45	0.70

If mitigation	
Time lag (t-factor)=	1
Risk factor=	1
Public Restoration Factor (PRF) =	1

For Mitigation Assessment Areas	
Relative Functional Gain (RFG) (Delta*PRF)/(risk*t-factor)	0.25

Delta = [with-current]	
wetland	0.00
upland	0.25

Assessment Area Acreage	0.72

Mitigation Bank Credit Determinatior	
RFG * Assessment Area Ac.	**0.18**

PART I – Qualitative Description
(See Section 4.4.1)

(1) Site/Project Name	(2) Application Number	(3) Assessment Area Name or Number
Saw Mill Creek Bank	NAN-2013-00259-EHA	E5 - East Upland Buffer Rehabiliation$_{SLOPE}$

(4) Habitat Code	(5) Further classification (optional)	(6) Impact or Mitigation Site?	(7) Assessment Area Size
	Phragmites-dominated upland slope	Mitigation	0.33

(8) Basin/Watershed Name/Number	(9) Affected Waterbody (Class)	(10) Special Classification (local/state/federal designation of importance)
HUC 02030104	Sawmill Creek, Class SD (impaired: floatables and Oxy demand)	None

(11) Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands

AA hydrologically connected to Sawmill Creek and Arthur Kill, geographically adjacent to Sawmill Creek and Arthur Kill Complex (No. 18) (USFWS NY Bight Study, 1997)

(12) Assessment area description

Upland slopes are primarily Phragmites-dominated.

(13) Significant nearby features	(14) Uniqueness (considering the relative rarity in relation to the regional landscape.)
Pralls Island, Sawmill Creek wetland complex, Rt 440, Chelsea Road	AA is part of a unique natural system within the highly urbanized NY/NJ region

(15) Functions	(16) Mitigation for previous permit/other historic use
The AA is an upland area and does not provide wtland functions, but does provide/support: Habitat; Food Web; Nutr. Cycling; OM export (leaf litter).	Bank credit development

(17) Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to be found)	(18) Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area)
Neotropical migrants, small mammals, deer. See also: Ecological Communities of NY State (NYNHP 2002)	Consultation with NYNHP indicates none present.

(19) Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.):

None observed

(20) Additional relevant factors:

(21) Assessment conducted by:	(22) Assessment date(s):
LBA PC	10/30/13

PART II – Quantification of Assessment Area (impact or mitigation)
(See Section 4.4.2)

Site/Project Name	Application Number	Assessment Area Name or Number
Saw Mill Creek Bank	NAN-2013-00259-EHA	E5 - East Upland Buffer Rehabilitation$_{SLOPE}$
Impact or Mitigation	**Assessment conducted by:**	**Assessment date:**
Mitigation	LBA PC	10/30/13

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 wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

		current condition	with rehabilitation
Location and Landscape Support	a	4 -supports primarily disturbance-tolerant species	7 - removal of invasive species will improve habitat quality
	b	4 - invasive cover is high, adversely affecting functions	8 - invasives management will remove invasive plant cover
	c	5 -wildlife access limited by adjacent land use	5 - barriers to wildlife use would remain
	d	7 - functional connection somewhat limited; barriers present	6 - functional connection somewhat limited; barriers still present
	e	5 - roads and other land use, runoff, and noise sources impact wildlife	6 - removal of debris and prevention of additional of illegal dumping would reduce impacts slightly
	f	4 - assessment area provides little in beneficial discharges to adjacent wetlands.	4 - no changes to hydrology of upland area
	g	3 - provides minimal surface or groundwater benefit to downstream habitats	3 - no changes to hydrology of upland area
	h	6 - upland area is an important buffer between adjacent land use and wetlands	8 - removal of invasives would improve buffer function
current / with	i	N/A - assessment area is not a wetland	N/A - assessment area is not a wetland
5 / 6	j	7 - upland slope capable of supporting tidal scrub shrub development.	7 - no change to elevations proposed

		current condition	with rehabilitation
Water Environment (n/a for uplands)	a	N/A	N/A
	b	N/A	N/A
	c	N/A	N/A
	d	N/A	N/A
	e	N/A	N/A
	f	N/A	N/A
	g	N/A	N/A
	h	N/A	N/A
	i	N/A	N/A
	j	N/A	N/A
	k	N/A	N/A
current / with	l	N/A	N/A
	m	N/A	N/A

		current condition	with rehabilitation
Community structure 1. Vegetation and/or 2. Benthic Community	I	4 - majority of plant community is non-native	9 - removal of invasives will improve plant community stratification
	II	4 - majority of plant species is non- native	9- site will be enhanced through establishment of native species; long term manangent plan implemented
	III	4 - native recruitment minimal and long term viability diminished by invasive species cover	9 - removal of invasives would improve native recruitment
	IV	5- deviation from normal successonal patterns - recruitment limited by invasive species cover	9 - removal of invasives will improve age and size distribution of native plant species
	V	N/A - no woody debris in assessment area	N/A - no woody debris in assessment area
	VI	8 - exisitng plant condition generally good	8 - native plant condition expected to be generally good
	VII	5 - lack of land management led to dumping and invasive establishment	8 - long term management, conservation easement will support viable scrub shrub community
	VIII	7 - microtopography typical	7 - no proposed changes to microtopography
current / with	IX	N/A to uplands	N/A to uplands
5 / 8	X	4 - provides moderate level of habitat/life history support	8 -removal of invasives and dumping will improve habitat and life history support

Score = sum of above scores/30

current	with

If preservation as mitigation	
Preservation adjustment factor =	
Adjusted mitigation delta =	

For impact assessment areas	
Functional loss (impact x acres)	

(if uplands, divide by 20)

0.50	0.70

If mitigation	
Time lag (t-factor)=	1
Risk factor=	1
Public Restoration Factor (PRF) =	1

For Mitigation Assessment Areas	
Relative Functional Gain (RFG) (Delta*PRF)/(risk*t-factor)	0.20

Delta = [with-current]	
wetland	0.00
upland	0.20

Assessment Area Acreage	0.33

Mitigation Bank Credit Determination	
RFG * Assessment Area Ac.	**0.07**

PART I – Qualitative Description
(See Section 4.4.1)

(1) Site/Project Name	(2) Application Number	(3) Assessment Area Name or Number
Saw Mill Creek Bank	NAN-2013-00259-EHA	E6 - East Upland Buffer Rehabilitation$_{FOREST}$

(4) Habitat Code	(5) Further classification (optional)	(6) Impact or Mitigation Site?	(7) Assessment Area Size
VI. C. 27 - Successional southern hardwood		Mitigation	5.19

(8) Basin/Watershed Name/Number	(9) Affected Waterbody (Class)	(10) Special Classification (local/state/federal designation of importance)
HUC 02030104	Sawmill Creek, Class SD (impaired: floatables and Oxy demand)	None

(11) Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands

AA hydrologically connected to Sawmill Creek and Arthur Kill, geographically adjacent to Sawmill Creek and Arthur Kill Complex (No. 18) (USFWS NY Bight Study, 1997)

(12) Assessment area description

Upland areas are primarily native-dominated forest. Few invasive species are present (primarily Japanese knotweed). Storm surge debris is present (plastic, tires, wood debris).

(13) Significant nearby features	(14) Uniqueness (considering the relative rarity in relation to the regional landscape.)
Pralls Island, Sawmill Creek wetland complex, Rt 440, Chelsea Road	AA is part of a unique natural system within the highly urbanized NY/NJ region

(15) Functions	(16) Mitigation for previous permit/other historic use
The AA is an upland area and does not provide wtland functions, but does provide/support: Habitat; Food Web; Nutr. Cycling; OM export (leaf litter).	Bank credit development

(17) Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to be found)	(18) Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area)
Neotropical migrants, small mammals, deer. See also: Ecological Communities of NY State (NYNHP 2002)	Consultation with NYNHP indicates none present.

(19) Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.):

Deer and deer tracks observed in May and June, 2013.

(20) Additional relevant factors:

(21) Assessment conducted by:	(22) Assessment date(s):
LBA PC	10/30/13

PART II – Quantification of Assessment Area (impact or mitigation)
(See Section 4.4.2)

Site/Project Name	Application Number	Assessment Area Name or Number
Saw Mill Creek Bank	NAN-2013-00259-EHA	E6 - East Upland Buffer Rehabilitation$_{FOREST}$
Impact or Mitigation	**Assessment conducted by:**	**Assessment date:**
Mitigation	LBA PC	10/30/13

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 wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

		current condition	with rehabilitation
Location and Landscape Support	a	7 - site provides habitats for many species	8 - removal of invasive species and illegal dumping will improve habitat quality
	b	7 - invasive cover is low	8 - invasives management will remove invasive plant cover
	c	5 -wildlife access limited by roads and other land use	5 - barriers to wildlife use would remain
	d	7 - functional connection somewhat limited; barriers present	7 - functional connection somewhat limited; barriers still present
	e	5 - roads and other land use, runoff, illegal dumping and noise sources impact wildlife	6 - removal of illegal dumping would reduce impacts slightly
	f	4 - assessment area provides little in beneficial discharges to adjacent wetlands.	4 - no changes to hydrology of upland area
	g	3 - provides minimal surface or groundwater benefit to downstream habitats	3 - no changes to hydrology of upland area
	h	5 - upland area is an important buffer between adjacent land use and wetlands	7 - removal of illegal dumping would improve buffer function
current: 6	i	N/A - assessment area is not a wetland	N/A - assessment area is not a wetland
with: 7	j	8 - upland area has relatively low elevation; capable of supporting tidal scrub shrub development.	8 - no change to elevations proposed

		current condition	with rehabilitation
Water Environment (n/a for uplands)	a	N/A	N/A
	b	N/A	N/A
	c	N/A	N/A
	d	N/A	N/A
	e	N/A	N/A
	f	N/A	N/A
	g	N/A	N/A
	h	N/A	N/A
	i	N/A	N/A
	j	N/A	N/A
	k	N/A	N/A
current / w/enh	l	N/A	N/A
	m	N/A	N/A

		current condition	with rehabilitation
Community structure	I	8 - majority of plant community is native, appropriate and desireable	9 - removal of invasives will improve plant community stratification
	II	8 - majority of plant species are native	9- site will be enhanced through establishment of native species; long term manangent plan implemented
	III	8 - native recruitment is near normal and natural	9 - removal of invasives would improve native recruitment
1. Vegetation and/or 2. Benthic Community	IV	8- age and size distribution near typical	9 - removal of invasives will improve age and size distribution of native plant species
	V	8 -density and quality of coarse woody debris slightly less than optimal	9 -removal of invasives and illegal dumping will improve density/quality of woody debris
	VI	8 - exisitng plant condition generally good	8 - native plant condition expected to be generally good
	VII	6 - lack of land management led to dumping and invasive establishment	8 - long term management, conservation easement will support viable upland community
	VIII	8 - microtopographic features present and near normal, even in fill	8 - no proposed changes to microtopography
current	IX	N/A to uplands	N/A to uplands
with: 9	X	7 - provides high level of habitat/life history support	8 -removal of invasives and dumping will improve habitat and life history support

Score = sum of above scores/30

current	with

If preservation as mitigation	
Preservation adjustment factor =	
Adjusted mitigation delta =	

For impact assessment areas	
Functional loss (impact x acres)	

(if uplands, divide by 20)

current	with
0.70	0.80

If mitigation	
Time lag (t-factor)=	1
Risk factor=	1
Public Restoration Factor (PRF) =	1

For Mitigation Assessment Areas	
Relative Functional Gain (RFG) (Delta*PRF)/(risk*t-factor)	0.10

Delta = [with-current]	
wetland	0.00
upland	0.10

Assessment Area Acreage	5.19

Mitigation Bank Credit Determination	
RFG * Assessment Area Ac.	**0.52**

PART I – Qualitative Description
(See Section 4.4.1)

(1) Site/Project Name	(2) Application Number	(3) Assessment Area Name or Number
Saw Mill Creek Bank	NAN-2013-00259-EHA	E7 - East Upland Buffer Rehabiliation$_{\text{EDWARD CURRY AVE AREA}}$

(4) Habitat Code	(5) Further classification (optional)	(6) Impact or Mitigation Site?	(7) Assessment Area Size
VI. C. 27- Succesional southern hardwood/invasive dominated	Invasive hardwoods and herbaceous	Mitigation	3.30

(8) Basin/Watershed Name/Number	(9) Affected Waterbody (Class)	(10) Special Classification (local/state/federal designation of importance)
HUC 02030104	Sawmill Creek, Class SD (impaired: floatables and Oxy demand)	None

(11) Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands

AA hydrologically connected to Sawmill Creek and Arthur Kill, geographically adjacent to Sawmill Creek and Arthur Kill Complex (No. 18) (USFWS NY Bight Study, 1997)

(12) Assessment area description

Upland area is filled wetland, largely dominated by invasive plants and with evidence of llegal dumping.

(13) Significant nearby features	(14) Uniqueness (considering the relative rarity in relation to the regional landscape.)
Pralls Island; Sawmill Creek wetland complex, Rt 440, Edward Curry Ave, Chelsea Road	AA is part of a unique natural system within the highly urbanized NY/NJ region

(15) Functions	(16) Mitigation for previous permit/other historic use
The AA is an upland area and does not provide wtland functions, but does provide/support: Habitat; Food Web; Nutr. Cycling; OM export (leaf litter).	Bank credit development

(17) Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to be found)	(18) Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area)
Feral cats, mice, common bird species such as starlings and sparrows. See also: Ecological Communities of NY State (NYNHP 2002)	Consultation with NYNHP indicates none present.

(19) Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.):

No wildlife observed in May and June, 2013.

(20) Additional relevant factors:

(21) Assessment conducted by:	(22) Assessment date(s):
LBA PC	10/30/13

PART II – Quantification of Assessment Area (impact or mitigation)
(See Section 4.4.2)

Site/Project Name	Application Number	Assessment Area Name or Number
Saw Mill Creek Bank	NAN-2013-00259-EHA	E7 - East Upland Buffer Rehabiliation EDWARD CURRY AVE AREA
Impact or Mitigation	**Assessment conducted by:**	**Assessment date:**
Mitigation	LBA PC	10/30/13

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 wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

		current condition	with rehabilitaion
Location and Landscape Support	a	4 -supports primarily disturbance-tolerant species	7 - removal of invasive species and illegal dumping will improve habitat quality
	b	4 - invasive cover is high, adversely affecting functions	7 - invasives management will improve functions
	c	5 -wildlife access limited by roads and other land use	5 - barriers to wildlife use would remain
	d	6 - functional connections partially limited; barriers present	6 - functional connections partially limited; barriers still present
	e	5 - roads and other land use, runoff, illegal dumping and noise sources impact wildlife	6 - removal of debris and prevention of additional of illegal dumping would reduce impacts slightly
	f	4 - assessment area provides little in beneficial discharges to adjacent wetlands.	4 - no changes to hydrology of upland area
	g	3 - provides minimal surface or groundwater benefit to downstream habitats	3 - no changes to hydrology of upland area
	h	4 - upland area is a buffer between adjacent land use and wetlands	6 - removal of illegal dumping would improve buffer function
current / with	i	N/A - assessment area is not a wetland	N/A - assessment area is not a wetland
4 / 5	j	3 - upland area is relatively steep filled slope	3 - no change to elevations proposed

		current condition	with rehabilitaion
Water Environment (n/a for uplands)	a	N/A	N/A
	b	N/A	N/A
	c	N/A	N/A
	d	N/A	N/A
	e	N/A	N/A
	f	N/A	N/A
	g	N/A	N/A
	h	N/A	N/A
	i	N/A	N/A
	j	N/A	N/A
	k	N/A	N/A
current / with	l	N/A	N/A
	m	N/A	N/A

		current condition	with rehabilitaion
Community structure	I	4 - majority of woody and herbaceous plant species are non-native	8 - removal of invasives will improve plant community stratification
	II	4 - majority of plant species are non-native	8- site will be enhanced through establishment of native species; long term manangent plan implemented
	III	4 - native recruitment minimal and long term viability diminished by extensive invasive species cover	8 - removal of invasives would improve native recruitment
1. Vegetation and/or 2. Benthic Community	IV	5- deviation from normal successonal patterns - recruitment limited by invasive species cover	6 - removal of invasives will improve age and size distribution of native plant species
	V	5- minimal structural habitat in form of cavities or logs present	7 -removal of invasives and illegal dumping will improve density/quality of woody debris
	VI	8 - exisitng plant condition generally good	8 - native plant condition expected to be generally good
	VII	5 - lack of land management led to dumping and invasive establishment	8 - long term management plan, conservation easement will support viable upland forest community
	VIII	2 - area is filled wetland/roadway embankment	2 - no proposed changes to microtopography
current / w/enh	IX	N/A to uplands	N/A to uplands
4 / 7	X	3 - woodland dominated by non-native, invasive species; minimal habitat/life history support	7 -removal of invasives and dumping will improve habitat and life history support

Score = sum of above scores/30

current	with

If preservation as mitigation	
Preservation adjustment factor =	
Adjusted mitigation delta =	

For impact assessment areas	
Functional loss (impact x acres)	

(if uplands, divide by 20)

0.40	0.60

If mitigation	
Time lag (t-factor)=	1
Risk factor=	1
Public Restoration Factor (PRF) =	1

For Mitigation Assessment Areas	
Relative Functional Gain (RFG) (Delta*PRF)/(risk*t-factor)	0.20

Delta = [with-current]	
wetland	0.00
upland	0.20

Assessment Area Acreage	3.3

Mitigation Bank Credit Determination	
RFG * Assessment Area Acres	**0.66**

PART I – Qualitative Description
(See Section 4.4.1)

(1) Site/Project Name	(2) Application Number	(3) Assessment Area Name or Number
Sawmill Creek Bank	NAN-2013-00259-EHA	Tidal Wetland Reference Site

(4) Habitat Code	(5) Further classification (optional)	(6) Impact or Mitigation Site?	(7) Assessment Area Size
II.B.8 Estuarine Brackish Tidal Marsh	Estuarine Brackish Tidal Marsh	Mitigation	7.00

(8) Basin/Watershed Name/Number	(9) Affected Waterbody (Class)	(10) Special Classification (local/state/federal designation of importance)
HUC 02030104	Sawmill Creek, Class SD (impaired: floatables and Oxy demand)	DEC HM (high marsh)and IM (intertidal marsh) wetlands

(11) Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands

AA hydrologically connected to Sawmill Creek and Arthur Kill, geographically adjacent to Sawmill Creek and Arthur Kill Complex (No. 18) (USFWS NY Bight Study, 1997)

(12) Assessment area description

Brackish high and low marsh.

(13) Significant nearby features	(14) Uniqueness (considering the relative rarity in relation to the regional landscape.)
Pralls Island; Saw Mill Creek wetland complex;	AA is part of a unique natural system within the highly urbanized NY/NJ region

(15) Functions	(16) Mitigation for previous permit/other historic use
Habitat;Prim. Production; Food Web; Nutr. Cycling; OM export; Removal Contam; wave energy attenuation; flood storage;sedimentation/accretion (NYSDOS and NYSDEC 2000)	None

(17) Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to be found)	(18) Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area)
See Attached Table I.1: See also:Ecological Communities of NY State (NYNHP 2002); Salt Marsh Restoration and Monitoring Guidelines(NYSDOSand NYSDEC 2000)	See Attached Table I.2

(19) Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.):

Based on site visits conducted between May and July, 2013: fiddler crabs, ribbed mussels, mummichogs, marsh snails, yellow crowned and snowy egrets; osprey, mallard; clapper rail.

(20) Additional relevant factors:

Sources of stormwater runoff from adjacent land uses; connectivity to adjacent tidal marsh restricted by rail line and box culvert;

(21) Assessment conducted by:	(22) Assessment date(s):
LBA PC	8/21/13

PART II – Quantification of Assessment Area (impact or mitigation)
(See Section 4.4.2)

Site/Project Name	Application Number	Assessment Area Name or Number
Sawmill Creek Bank	NAN-2013-00259-EHA	Tidal Wetland Reference Site
Impact or Mitigation	**Assessment conducted by:**	**Assessment date:**
Mitigation	LBA PC	8/21/13

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 wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

		current condition	with enhancement
Location and Landscape Support	a	9 - difference from ideal is the size of AA, minimal connectivity reduction, and adjacent land uses	
	b	7 - Phrag is present within/adjacent to site, limited potential for invasion/expansion into site.	
	c	8 - type of fauna in TM dominant. sites w/ few existing barriers. Wide tidal channel is present.	
	d	8 - minimal potential for contamination (stormwater runoff only, upland buffer); impaired for oxygen levels in creek	
	e	8 - no additional fill in future, slightly less disruptive magnitude of adj. land use	
	f	9 - railroad embankment separate marsh from A. Kill marsh; tidal access non restrictive.	
	g	4 - provides contaminant buffering from adjacent uplands	
	h	N/A to wetland areas	
current / with	i	6 - more than 100 ft. wide, provides storage, min. surge protection	
8	j	7 -areas of high marsh, less scrub shrub areas, periphery mostly hardened edges (road, rail)	

		current condition	
Water Environment (n/a for uplands)	a	10 -site is not ditched, and overmarsh flow minimally affected by railroad berm	
	b	10 - water level not significantly affected by manmade barriers	
	c	10 - no apparent soil moisture issues	
	d	9 - Railroad berm may cause minor alterations of flows/discharges	
	e	9 - nearly optimal community zonation	
	f	9 - appropriate for all strata, though mild effects due to ditching and constricted flow in Sawmill Creek	
	g	10 - animals with specific hydrologic requirement (i.e, muskrat, heron, terrapin, fiddler crab) expected to be present	
	h	9, no sign of hydrologic stress	
	i	9 - no observed evidence in assessment area	
	j	7 - water quality impairment from adjacent land use minimal (stormwater runoff)	
	k	4 - listed as impaired for floatables and oxygen demand	
current / with	l	9 - wave energy and fetch appropriate for community type	
9	m	9 - marsh appears stable	

		current condition	
Community structure	I	9 - some Phragmites presence (< 2%)	
	II	9 - Phragmites present in small patches	
	III	10 - Plant cover appears total	
1. Vegetation and/or	IV	9 - age and size distribution typical of system	
2. Benthic Community	V	N/A - no woody debris in assessment area	
	VI	10 - plant condition is good	
	VII	8 - no ditching, Nat. gas line through high marsh	
	VIII	10 -microtopography present; no ditching	
current / with	IX	N/A, no SAV in region	
9	X	N/A to wetland areas	

Score = sum of above scores/30

current	with
0.87	

(if uplands, divide by 20)

Delta = [with-current]	
wetland	0
upland	0

If preservation as mitigation	
Preservation adjustment factor =	
Adjusted mitigation delta =	

If mitigation	
Time lag (t-factor)=	1
Risk factor=	1
Public Restoration Factor (PRF) =	1

Assessment Area Acreage	7

For impact assessment areas	
Functional loss (impact x acres)	

For Mitigation Assessment Areas	
Relative Functional Gain (RFG) (Delta*PRF)/(risk*t-factor)	0.00

Mitigation Bank Credit Determination	
RFG * Assessment Area Ac.	0

Appendix J
List of Preparers

List of Preparers

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