**Creating Indicators of Wetland Status**
**(Quantity and Quality):**
Freshwater Wetland Mitigation in New Jersey

# APPENDIX

# A

Mitigation Study Site Summary Table

Developing an Indicator of Wetland Status

Wetland Mitigation Study Site Information Worksheet

ASGECI Project #1706, October 3, 2001

| Mitsite # | WMA | Age (in years) | Total Proposed (in acres) | Mitigation Goals | | | Mitigation Type | | | | Wetland Area Evaluated | Wetland Area Achieved | Percent Area Achieved | Concurrence Evaluation Indicator Score | Wetland Mitigation Quality Assessment Index Score |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Creation | Restoration | Enhancement | PFO | PSS | PEM | SOW | | | | | |
| 002 | 15 | 4.34 | 0.50 | 0.50 | | | 0.50 | | | | 0.50 | 0.09 | 18.00 | 40.32 | 0.56 |
| 004 | 05 | 7.90 | 2.60 | | 2.60 | | 2.60 | | | | 0.05 | 0.05 | 100.00 | 28.62 | 0.44 |
| 006 | 20 | 4.17 | 0.10 | 0.10 | | | 0.10 | | | | 0.10 | 0.00 | 0.00 | 50.00 | 0.00 |
| 007 | 20 | 3.76 | 5.04 | 5.04 | | | 5.04 | | | | 5.04 | 1.86 | 36.90 | 46.32 | 0.69 |
| 008 | 19 | 5.92 | 1.86 | | 1.86 | | 0.86 | | 1.00 | | 1.86 | 0.11 | 5.91 | 29.53 | 0.46 |
| 009a | 18 | 6.48 | 0.29 | 0.00 | 0.00 | 0.29 | | | 0.29 | | 0.29 | 0.07 | 24.14 | 17.97 | 0.31 |
| 009b | 18 | 6.48 | 0.56 | 0.00 | 0.56 | 0.00 | | | 0.56 | | | | | 18.17 | 0.29 |
| 009c | 18 | 6.48 | 0.12 | 0.12 | 0.00 | 0.00 | | | 0.12 | | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 |
| 010 | 14 | 2.36 | 1.50 | 1.50 | | | | | 1.50 | | 1.50 | 0.12 | 8.00 | 65.02 | 0.49 |
| 011 | 20 | 5.92 | 1.01 | | 1.01 | | | | 1.01 | | 1.01 | 0.37 | 36.63 | 27.58 | 0.30 |
| 013 | 15 | 7.87 | 0.17 | 0.17 | | | 0.17 | | | | 0.17 | 0.04 | 23.53 | 31.15 | 0.39 |
| 017 | 18 | 4.07 | 1.20 | 1.20 | | | 1.20 | | | | 1.20 | 1.19 | 99.17 | 51.52 | 0.45 |
| 018 | 17 | 7.23 | 12.10 | 12.10 | | | 10.60 | | 0.50 | 1.00 | 12.10 | 4.21 | 34.79 | 63.99 | 0.79 |
| 020 | 18 | 3.53 | 1.42 | 1.42 | | | | | 1.42 | | 1.42 | 0.56 | 39.44 | 38.47 | 0.33 |
| 022 | 18 | 7.79 | 4.14 | 4.14 | | | 3.42 | | 0.72 | | 4.14 | 2.22 | 53.62 | 24.13 | 0.49 |
| 024 | 18 | 4.22 | 8.13 | | 8.13 | | 7.72 | | 0.41 | | 4.50 | 2.06 | 45.78 | 45.67 | 0.48 |
| 025 | 18 | 5.06 | 2.30 | | 2.30 | | | 2.33 | | | 2.30 | 1.04 | 45.22 | 66.35 | 0.53 |
| 027 | 18 | 2.34 | 1.03 | 1.03 | | | 1.03 | | | | 1.03 | 0.39 | 37.86 | 33.13 | 0.31 |
| 028 | 18 | 1.23 | 1.96 | 1.96 | | | | 0.39 | 0.50 | 1.07 | 1.96 | 1.22 | 62.24 | 45.33 | 0.42 |
| 031 | 08 | 5.75 | 1.50 | 1.50 | | | | 1.50 | | | 1.50 | 0.50 | 33.33 | 35.67 | 0.60 |
| 033 | 11 | 7.59 | 0.37 | | 0.37 | | 0.17 | | | 0.20 | 0.37 | 0.00 | 0.00 | 100.00 | 0.00 |
| 034 | 11 | 0.00 | 1.90 | 0.90 | 0.20 | 0.80 | | 0.90 | 0.20 | 0.80 | 1.90 | 0.65 | 34.21 | 71.36 | 0.58 |
| 035a | 11 | 6.99 | 0.70 | 0.70 | | | 0.70 | | | | 0.70 | 0.17 | 24.29 | 36.24 | 0.57 |
| 035b | 11 | 6.99 | 3.90 | 3.90 | | | 3.90 | | | | 3.90 | 0.67 | 17.18 | 8.53 | 0.46 |
| 037 | 11 | 3.01 | 1.73 | 1.73 | | | | | 1.73 | | 1.73 | 1.21 | 69.94 | 71.96 | 0.53 |
| 038 | 11 | 9.35 | 0.60 | 0.60 | | | | 0.60 | | | 0.60 | 0.31 | 51.67 | 60.55 | 0.31 |
| 039a | 11 | 6.45 | 0.66 | 0.66 | | | 0.66 | | | | 0.66 | 0.00 | 0.00 | 13.36 | 0.00 |
| 039b | 11 | 6.45 | 1.10 | 1.10 | | | 0.50 | 0.20 | 0.40 | | 1.13 | 0.73 | 64.60 | 86.28 | 0.68 |
| 039c | 11 | 6.45 | 2.67 | 2.67 | | | 1.51 | 0.46 | 0.70 | | 2.67 | 0.90 | 33.73 | 48.76 | 0.50 |
| 040 | 11 | 2.70 | 3.31 | 3.31 | | | 1.74 | 0.54 | 0.84 | 0.19 | 3.31 | 1.49 | 45.02 | 60.30 | 0.47 |
| 042 | 10 | 2.14 | 2.20 | 2.20 | | | 2.20 | | | | 2.20 | 0.00 | 0.00 | 3.80 | 0.00 |
| 046 | 09 | 6.37 | 0.24 | | 0.24 | | 0.24 | | | | 0.24 | 0.09 | 37.50 | 48.99 | 0.29 |
| 050a | 10 | 4.27 | 4.25 | 4.25 | | | 1.64 | 0.76 | 1.55 | 0.30 | 4.25 | 3.36 | 79.06 | 44.70 | 0.42 |
| 050b | 10 | 4.27 | 11.15 | 11.15 | | | 4.93 | 3.23 | 2.99 | | 11.15 | 6.03 | 54.08 | 34.37 | 0.33 |
| 051 | 09 | 0.00 | 13.01 | 13.01 | | | 10.61 | 1.20 | 1.20 | | 13.01 | 0.00 | 0.00 | 65.83 | 0.00 |
| 053 | 09 | 0.00 | 0.36 | | 0.36 | | | 0.36 | | | | | | 73.01 | 0.56 |
| 055 | 09 | 7.71 | 14.38 | 14.38 | | | | | | | 14.38 | 5.65 | 39.29 | 36.45 | 0.53 |
| 056 | 09 | 0.00 | 1.80 | 1.80 | | | 1.00 | | | 0.80 | 1.80 | 0.93 | 51.67 | 65.60 | 0.56 |
| 059 | 07 | 7.55 | 12.20 | 12.20 | | | | | 9.20 | 3.00 | 12.20 | 12.30 | 100.82 | 65.85 | 0.56 |
| 061 | 12 | 0.00 | 0.50 | 0.50 | | | 0.50 | | | | 0.50 | 0.02 | 4.00 | 35.69 | 0.32 |
| 064 | 09 | 0.00 | 0.38 | 0.38 | | | 0.38 | | | | 0.38 | 0.00 | 0.00 | 11.10 | 0.00 |
| 066 | 20 | 5.95 | 0.08 | 0.08 | | | 0.04 | 0.04 | | | | | | 77.88 | 0.83 |
| 068 | 08 | 5.47 | 1.88 | 1.88 | | | 0.33 | 0.37 | 1.18 | | 1.88 | 1.10 | 58.51 | 60.83 | 0.69 |
| 070 | 06 | 4.83 | 0.16 | 0.16 | | | 0.16 | | | | 0.16 | 0.00 | 0.00 | 23.60 | 0.00 |
| 073 | 06 | 9.24 | 1.50 | 1.50 | | | 1.50 | | | | 1.50 | 0.93 | 62.00 | 76.39 | 0.52 |
| 074a | 06 | 10.26 | 0.41 | 0.41 | | | | | 0.41 | | 0.41 | 0.14 | 34.15 | 57.05 | 0.48 |
| 074b | 06 | 10.26 | 0.20 | 0.20 | | | 0.20 | | | | 0.20 | 0.00 | 0.00 | 4.65 | 0.00 |
| 077 | 06 | 0.00 | 1.02 | 1.02 | | | | 0.49 | 0.53 | | 0.49 | 0.32 | 65.31 | NA | 0.75 |
| 078a | 03 | 5.70 | 0.24 | 0.24 | | | 0.24 | | | | 0.24 | 0.22 | 91.67 | 78.36 | 0.33 |
| 078b | 03 | 5.70 | 0.37 | 0.37 | | | | | 0.37 | | 0.37 | 0.35 | 94.59 | 52.14 | 0.33 |
| 079 | 08 | 9.26 | 0.30 | | 0.30 | | 0.15 | 0.15 | | | 0.51 | 0.22 | 43.14 | 44.06 | 0.48 |
| 082 | 13 | 3.45 | 1.29 | | 1.29 | | | | | 1.29 | 1.29 | 0.93 | 72.09 | 92.17 | 0.60 |
| 083 | 13 | 6.71 | 0.46 | 0.46 | | | 0.46 | | | | 0.46 | 0.25 | 54.35 | 61.94 | 0.61 |
| 084 | 13 | 3.24 | 0.87 | 0.47 | | 0.40 | 0.87 | | | | 0.87 | 0.00 | 0.00 | 5.06 | 0.00 |

Developing an Indicator of Wetland Status

Wetland Mitigation Study Site Information Worksheet

ASGECI Project #1706, October 3, 2001

| Mitsite # | WMA | Age (in years) | Total Proposed (in acres) | Mitigation Goals | | | Mitigation Type | | | | Wetland Area Evaluated | Wetland Area Achieved | Percent Area Achieved | Concurrence Evaluation Indicator Score | Wetland Mitigation Quality Assessment Index Score |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Creation | Restoration | Enhancement | PFO | PSS | PEM | SOW | | | | | |
| 085a | 13 | 9.34 | 2.00 | 2.00 | | | | 2.00 | | | 2.00 | 1.89 | 94.50 | 65.23 | 0.73 |
| 085b | 13 | 8.34 | 0.45 | 0.45 | | | | 0.45 | | | 0.45 | 0.00 | 0.00 | 1.00 | 0.00 |
| 086 | 13 | 5.28 | 0.86 | 0.86 | | | 0.68 | | 0.18 | | 0.86 | 0.51 | 59.30 | 60.81 | 0.64 |
| 089a | 03 | 5.44 | 41.20 | 41.20 | | | | | 29.90 | 11.30 | 41.20 | 51.51 | 125.02 | 50.00 | 0.62 |
| 089c | 03 | 12.44 | 10.00 | 10.00 | | | | | 10.00 | | 10.00 | 9.54 | 95.40 | 71.56 | 0.46 |
| 093 | 06 | 9.50 | 1.46 | 1.46 | | | 1.46 | | | | 1.46 | 0.67 | 45.89 | 62.67 | 0.58 |
| 096 | 09 | 5.60 | 4.46 | | 4.46 | | | | 1.90 | 2.56 | 4.46 | 1.95 | 43.72 | 60.11 | 0.67 |
| 097 | 10 | 0.00 | 2.93 | 2.42 | 0.51 | | 2.93 | | | | 2.06 | 0.00 | 0.00 | 28.88 | 0.00 |
| 098 | 09 | 3.46 | 1.19 | | 1.19 | | 0.63 | | 0.56 | | | | | 43.96 | 0.53 |
| 100 | 09 | 5.91 | 0.80 | 0.80 | | | | | 0.80 | | 0.80 | 0.46 | 57.50 | 69.08 | 0.47 |
| 102a | 09 | 7.63 | 6.62 | | 6.62 | | | | 6.62 | | | | | NA | 0.25 |
| 102b | 09 | 0.00 | 6.39 | 6.39 | | | | | | | 6.39 | 0.00 | 0.00 | 35.04 | 0.00 |
| 104 | 09 | 0.00 | 0.52 | | 0.52 | | | 0.52 | | | 0.52 | 0.19 | 36.54 | 85.74 | 0.56 |
| 105 | 02 | 3.62 | 0.92 | 0.92 | | | | | 0.92 | | 0.92 | 0.84 | 91.30 | 96.32 | 0.56 |
| 107 | 03 | 8.55 | 0.36 | 0.36 | | | 0.36 | | | | 0.36 | 0.13 | 36.11 | 48.75 | 0.52 |
| 108 | 02 | 4.39 | 13.70 | 13.70 | | | | | 13.70 | | 5.20 | 3.66 | 70.38 | 92.23 | 0.76 |
| 111 | 20 | 2.10 | 6.50 | 6.50 | | | | 1.90 | 4.60 | | 6.50 | 4.57 | 70.31 | 55.28 | 0.68 |
| 112 | 17 | 0.00 | 0.75 | 0.75 | | | 0.12 | 0.02 | 0.35 | 0.26 | 0.75 | 0.61 | 81.33 | 76.57 | 0.69 |
| 113 | 13 | 1.86 | 0.84 | 0.84 | | | 0.84 | | | | 0.84 | 0.07 | 8.33 | 7.52 | 0.36 |
| 116 | 09 | 8.55 | 3.00 | 3.00 | | | 3.00 | | | | 3.00 | 1.48 | 49.33 | 32.66 | 0.35 |
| 118 | 12 | 0.83 | 24.52 | 24.52 | | | 24.52 | | | | 24.52 | 15.07 | 61.46 | 50.45 | 0.38 |
| 119 | 10 | 2.57 | 25.50 | 25.50 | | | 25.50 | | | | 25.50 | 16.15 | 63.33 | 35.82 | 0.35 |
| 121 | 06 | 4.08 | 0.28 | | 0.28 | | 0.14 | 0.01 | 0.13 | | 0.28 | 0.00 | 0.00 | 5.00 | 0.00 |
| 123 | 10 | 8.07 | 13.20 | 13.20 | | | | 2.90 | 6.57 | 3.73 | 13.20 | 11.09 | 84.02 | 37.84 | 0.41 |
| 125 | 11 | 11.02 | 9.60 | 9.60 | | | 0.60 | | | | 9.60 | 6.69 | 69.69 | 44.91 | 0.56 |
| 126 | 15 | 8.17 | 1.50 | | 1.50 | | 1.50 | | | | 1.50 | 0.75 | 50.00 | 76.16 | 0.79 |
| 127 | 06 | 2.61 | 4.10 | 1.41 | | 2.69 | 3.90 | | | 0.20 | 1.41 | 0.87 | 61.70 | 63.13 | 0.53 |
| 128a | 03 | 6.66 | 0.64 | 0.00 | | 0.64 | 0.00 | 0.64 | | | 0.64 | 0.40 | 62.50 | 38.48 | 0.42 |
| 128b | 03 | 6.66 | 0.25 | 0.25 | | 0.00 | 0.25 | 0.00 | | | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 |
| 129 | 12 | 2.46 | 0.20 | 0.20 | | | 0.20 | | | | 0.20 | 0.02 | 10.00 | 48.99 | 0.36 |
| 130 | 08 | 8.80 | 0.72 | 0.72 | | | 0.51 | | 0.21 | | 0.72 | 0.91 | 126.39 | 76.18 | 0.74 |
| 131 | 09 | 6.38 | 0.55 | 0.11 | | 0.44 | 0.55 | | | | 0.55 | 0.77 | 140.00 | 77.89 | 0.60 |
| 132 | 11 | 7.61 | 1.72 | 0.33 | | 1.39 | | | | | 0.33 | 0.39 | 118.18 | 67.99 | 0.46 |
| 133 | 06 | 0.00 | 1.10 | 1.10 | | | 1.10 | | | | 1.10 | 0.00 | 0.00 | 4.58 | 0.00 |
| 134 | 18 | 2.39 | 2.30 | 2.30 | | | 2.30 | | | | 2.30 | 0.60 | 26.09 | 50.15 | 0.59 |
| 135 | 18 | 10.24 | 0.75 | 0.75 | | | 0.75 | | | | 0.75 | 0.05 | 6.67 | 24.71 | 0.42 |
| SUM | | - | 325.60 | 284.65 | 34.30 | 6.65 | 139.71 | 21.96 | 105.77 | 26.69 | 296.87 | 186.91 | - | 4181.49 | 37.68 |
| AVG | | 5.13 | 3.62 | 3.85 | 1.63 | 0.67 | 2.45 | 0.88 | 2.78 | 1.91 | 3.49 | 2.20 | 45.09 | 47.52 | 0.42 |
| MEDIAN | | 5.65 | 1.24 | 1.10 | 0.56 | 0.42 | 0.75 | 0.52 | 0.82 | 0.90 | 1.20 | 0.50 | 43.72 | 48.87 | 0.47 |
| SD | | 3.12 | 6.31 | 6.88 | 2.20 | 0.83 | 4.90 | 0.92 | 5.48 | 2.93 | 6.37 | 6.28 | 35.23 | 24.87 | 0.23 |
| MIN | | 0.00 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.12 | 0.19 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 |
| MAX | | 12.44 | 41.20 | 41.20 | 8.13 | 2.69 | 25.50 | 3.23 | 29.90 | 11.30 | 41.20 | 51.51 | 140.00 | 100.00 | 0.83 |

**Creating Indicators of Wetland Status**
**(Quantity and Quality):**
Freshwater Wetland Mitigation in New Jersey

# APPENDIX

# B

Standardized Data Summary and Field Data Sheets

# MAIN MENU
# NJDEP Wetland Mitigation Monitoring
## *Database Application*

**Plan/File Review- (before site visit)**

- File Evaluation Checklist

**Site Assessment**

- Wetland Area Determinations
- Wetland Mitigation Quality Assessment (WMQA)
- Concurrence Evaluation
- Observation Point Data
- Photographs

# File Evaluation Checklist - pg. 1 of 2

Mitsite# | Municipal_code | Yr | Sequence_number | Study Site?

Date MIT Site Const. Complete

Age in Years: 0.0

Permitted/Responsible

Mit. Consultant/Contact | Firm_Name

MIT Site Name | MIT Site Municode | MIT County

MIT Site Block | MIT Site Lot | MIT Drainage Basin Code | WMA | MITSite Wetclass | Acres Mit. in Permit

MIT Site Waterway | MIT Site Quad Map

**PROPOSED ACREAGE** TOT. MITIGATION PROPOSED | TOTAL AREA EVALUATED

PFO | PSS | PEM | SOW | TDW | ISS | Type Not Specified | Total Mitigation Goals: 0

MIT Goals Create | MIT Goals Restore | MIT Goals Enhance | MIT Goals Other | Total Mitigation Goals: 0

**FILE CHECKLIST:**

Refer to Other Mitsite #: | Area Specified? | Goals Specified? | Type Specified? | # of Mitig. Areas

Preimpact Veg Provided? | Quad Map Provided? | Mit Site Plan Provided? | Grading Plan Provided?

Topsoil Specified? | Hydrologic Source Specified? | Plant List Provided? | Planting Specs Provided?

Linear Site? | Landscape Plan Provided? | Seed Mix Specifications Provided?

Site Location/Boundary Findable?

**NOTES:**

# File Evaluation Checklist - pg. 2 of 2

Plants/Seed Mix Specifications for Mitigation Site #

| Municipal_code | Yr | Sequence_number |
|---|---|---|
| | | |

| Name | Common Name | Scientific Name | Indicator R | Layer | # or % |
|---|---|---|---|---|---|
| | | | | | |

# Wetland Area Determination

| Mitsite# | Municipal_code | Yr | Sequence# | DATE | OBSERVER |
|---|---|---|---|---|---|
| | | | | | |

| LINE | AREA (sf) | ACRES | ISLAND | X | Y |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

| Total Acres Achieved | Total Acres Evaluated | % Area Achieved |
|---|---|---|
| | | 0.00 |

| | Type Achieved % | Type Achieved (ac.) | Proposed (ac.) | Achieved % |
|---|---|---|---|---|
| PFO | | 0.00 | | NA |
| PSS | | 0.00 | | NA |
| PEM | | 0.00 | | NA |
| SOW | | 0.00 | | NA |

| Type Not Specified | Total Target Achieved |
|---|---|
| | NA |

# Wetland Mitigation Quality Assessment

| Mitsite# | Municipal_code | Yr | Sequence_number | Permitted/Responsible | OBSERVER | DATE |
|---|---|---|---|---|---|---|
| | | | | | | |

**HYDROLOGY**

| Hydrology | Undesirable Plant Colonization? | Plant Stress? | Plant Mortality? |
|---|---|---|---|
| | | | |

| Surface Inundation? | Channelization? | Redoximorphic Features? | Hydric Soils? |
|---|---|---|---|
| | | | |

**Hydrology Score**

**SOILS**

| Topsoil Depth | Erosion | Compaction | Debris |
|---|---|---|---|
| | | | |

**Soil Score**

**VEGETATION COMPOSITION/DIVERSITY**

| | Plant Cover | Invasive Species | Natural Recruitment | Plant Growth | Insects & Herbivory | Plant Stress | Diversity |
|---|---|---|---|---|---|---|---|
| **Overstory** | | | | | | | |
| **Ground Cover** | | | | | | | |

Veg. Overstory Score

Veg. Ground Cover Score

**Vegetation Score**

NA

**WILDLIFESUITABILITY**

| Cover | Adjacent Resources | Human Impediments | Nest/Breeding Activity |
|---|---|---|---|
| | | | |

**Wildlife Score**

**SITE CHARACTERISTICS**

| Maintenance | Edge: Area Ratio | Heterogeneity | Location |
|---|---|---|---|
| | | | |

Size

**Site Score**

**LANDSCAPE CHARACTERISTICS**

| | Width | Invasive Species | Wildlife Suitability | Cover | Slope | Buffer Score |
|---|---|---|---|---|---|---|
| **Adjacent Buffer** | | | | | | |

**Contiguity** Contiguity Score

**Land Use** Land Use Score

**Landscape Score**

NA

**WETLAND QUALITY ASSESSMENT SCORE**

| Raw Scores | | Weighted Factor | Weighted Scores |
|---|---|---|---|
| Hydrology Score | | NA | NA |
| Soil Score | | NA | NA |
| WQAVegTotal | NA | NA | NA |
| Wildlife Score | | NA | NA |
| Site Score | | NA | NA |
| WQALandTotal | NA | NA | NA |

**Total WQA Score**

0.00

**Sum of Factors**

0.00

**WQA Index Score**

NA

# Concurrence Evaluation - pg. 1 of 2

Mitsite# | Municipal_code | Yr | Sequence_number | Permitted/Responsible | MIT Site Const. Completed | DATE

OBSERVER | Mitsite Boundary Discernable

**GRADING**

Grading Plan Adequate? | % Site Graded | % Grading Conducive to Goals | Is Regrading Recommended?

**% Grading Concurrence**

**HYDROLOGY**

Specified Hydrologic Source #1 | Specified Hydrologic Source #2

Dominant Source Hydrology = Diversion | Dominant Source Hydrology = Groundwater | Dominant Source Hydrology = Sheetflow

Dominant Source Hydrology = Stream Diversion | Dominant Source Hydrology = Stormwater | Stormwater Outfalls Evident?

Monitoring Device Approved? | Monitoring Device Installed? | Is Drainage Provided? | Is Drainage Functional?

Water Control Structure Approved? | Water Control Structure Installed? | Water Control Structure Functioning?

% Hydrology Conducive to Goals | % Wetland Hydrology Acheived | % Site Impounded | Is Impoundment Detrimental?

**% Hydrology Concurrence**

**SOILS**

Topsoil Specified? | Topsoil Provided? | Acid Soil Specified? | Soil Stabilized in Accordance w/Plan? | % Soil Conducive to Hydrophytes

% Soil Conducive to Goal | Is Topsoil Placement Recommended?

**% Soil Concurrence**

**VEGETATION**

% Site Vegetated | % Site Dominated by Hydrophytes | Adequate Planting Specifications?

Site >85% Hydrophytes? | Site >10% Invasive? | % PFO | % PSS | % PEM | % SOW

% Vegetation Consistant w/Goals | Is Replanting Recommended?

Are Trees Specified in Plan? | % Survival Trees | Are Shrubs Specified in Plan? | % Survival Shrubs

Are Herbaceous Plants Specified in Plan? | % Survival Herbaceous | Is a Seed Mix Specified in Plan? | % Cover of Persistant Grasses

Wetland Overstory Present?

**% Concurrence Vegetation Cover**

**% Concurrance Veg Survival**

# Concurrence Evaluation - pg. 2 of 2

| Mitsite# | Municipal_code | Yr | Sequence_number | Permitted/Responsible | MIT Site Const. Completed |
|---|---|---|---|---|---|
| | | | | | |

**DESIGN CHARACTERISTICS**

| Maintenance Specified in Plan? | Maintenance Required? | Maintenance Access Provided? |
|---|---|---|
| | | |

| Inflow/Outflow Specified? | Inflow/Outflow Provided? | Wetland Type Specified in Plan? | Wetland Type Consistant w/Goals? |
|---|---|---|---|
| | | | |

| Transition Area Specified in Plan? | Transition Area Consistant w/Goals? | Planting Specifications for TA Provided? |
|---|---|---|
| | | |

| % 50 Ft. Transition Area Forested | % 50 Ft. Transition Area Scrub/Shrub | % 50 Ft. Transition Area Herbaceous |
|---|---|---|
| | | |

| Shape/Location of Wetland Specified in Plan? | Shape/Location of Wetland Consistant w/Plan? | Evidence of Human Disturbance? |
|---|---|---|
| | | |

| Was Design Based on Hydrology? | % of Design Conducive to Goals |
|---|---|
| | |

**% Design Concurrence**

**OVERALL CONCURRENCE SCORE**

| Raw Scores | Weighting Factor | Weighted Scores |
|---|---|---|
| % Grading Concurrence | 4.1 | 0 |
| % Hydrology Concurrence | 4.7 | 0 |
| % Soil Concurrence | 3.5 | 0 |
| % Concurrence Vegetation Cover | 2.9 | 0 |
| % Concurrence Veg Survival | 2.3 | 0 |
| % Design Concurrence | 4.2 | 0 |

| Sum of Weighting Factors | Sum of Weighted Scores | Overall Concurrence Score |
|---|---|---|
| 21.7 | 0 | 0.00 |

# Observation Point Data

| Municipal_code | Yr | Sequence_number | Mitsite# | Date | Observer |
|---|---|---|---|---|---|
| | | | | | |

| Type | Satur? | DepthSat | DepthWat | Ponding? | WetHyd | Soilmin | Soilmax | Matrix | Redox | Gleyed? | Motdep | Mot1Chr | Mot2Chr | Hydric? |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |

# Photographs

| Municipal_code | Yr | Sequence_number | Mitsite# | Date | Observer |
|---|---|---|---|---|---|
| | | | | | |

| Photo_ID | Direction_ | Northing | Easting |
|---|---|---|---|

Scroll Down for More Photographs of this Mitigation Site

**Creating Indicators of Wetland Status**
**(Quantity and Quality):**
Freshwater Wetland Mitigation in New Jersey

# APPENDIX

# C

Wetland Mitigation Quality Assessment (WMQA)
Procedure Manual

# DEVELOPING AN INDICATOR OF WETLAND STATUS

# FRESHWATER WETLAND MITIGATION QUALITY ASSESSMENT PROCEDURE

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**DEVELOPING AN INDICATOR OF WETLAND STATUS**

**FRESHWATER WETLAND MITIGATION QUALITY ASSESSMENT PROCEDURE**

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## I. Introduction

As an active participant in the National Environmental Performance Partnership System (NEPPS), the New Jersey Department of Environmental Protection (NJDEP) has established the following goal for New Jersey wetlands:

*"Improve quality and function and achieve no net loss.*
*Explore innovative techniques for creation, enhancement*
*and maintenance of New Jersey wetlands"*

NJDEP is developing an indicator of wetland mitigation status to evaluate current conditions of mitigation sites in relation to the NEPPS wetlands goals. The indicators of wetland mitigation status include: 1) the extent to which mitigation conforms with approved plans, 2) the amount of wetland achieved through mitigation, and 3) the probability that the mitigation will function as a natural wetland system. It is this third mitigation indicator that is addressed through the Freshwater Wetland Mitigation Quality Assessment Procedure.

The Freshwater Wetland Mitigation Quality Assessment Procedure was developed as an interim assessment tool to evaluate the relative probability that a constructed freshwater wetland will develop into a natural wetland system over time. This standardized rating index can be used in combination with professional judgment to provide a consistent measure of relative mitigation success. It is probable that a constructed wetland that receives a high rating index will have a greater potential to function as a natural system over time. Therefore, this method is intended to accomplish a number of objectives: 1) establish a simple, consistent and timely assessment tool based on readily observable field indicators; 2) be applicable to a wide range of wetland community types and field conditions; and 3) offer consistency and guidance in evaluating the NEPPS goal of no net loss of wetland function and value. It is similar to the Wetland Rapid Assessment Procedure developed by the South Florida Water Management District (Miller and Gunsalus, 1997).

The science of evaluating wetland quality and function, especially in relation to constructed wetland mitigation projects, is evolving. Establishment of predictive wetland mitigation quality indicators would require a prospective study over many years to determine what factors in the early years of a created or restored wetland are most predictive of its future success. Therefore, this procedure does not allow for direct measurement of wetland functions and it is not intended to provide a numerical value that can be used to establish absolute quality of an individual wetland mitigation project or be a surrogate for more quantitative procedures that may be used to evaluate mitigation success. At the current time, this procedure is not intended for regulatory evaluation and does not replace performance criteria that NJDEP may use to determine mitigation success. Instead, this method provides NJDEP with some relative indicators of constructed mitigation site potential. NJDEP is currently conducting research in collaboration with Rutgers University scientists to review wetlands quality assessment methods and test these at NJ reference wetlands. Future plans include testing this rapid mitigation site quality assessment tool at these NJ reference wetlands, as well.

The assessment of the mitigation site requires both office and field preparation. Office preparation includes a review of pertinent data including maps, plans and specifications. Field preparation includes a determination of the extent of wetlands following the *1989 Federal Manual for Identifying and Delineating Jurisdictional Wetlands*. This assessment procedure is only applied within jurisdictional wetlands.

The procedure provides a method to describe variables and assign a relative value on a scale from 0 to 3 for each variable being evaluated. The procedure relies on observation of field indicators and use of best

professional judgement to identify the relative value that best describes the variable being measured. The variables include the following:

A. Hydrology
B. Soils
C. Vegetation Composition/Diversity
D. Wildlife Suitability
E. Site Characteristics
F. Landscape Characteristics

The value for both the Vegetation Composition/Diversity Variable and the Landscape Variable are further sub-divided. The value of each variable is calculated as an average of applicable sub-categories. A sub-category that is not applicable to the wetland being evaluated (i.e. Vegetation Composition/Diversity – Overstory) is assigned a score of NA. Sub-categories include:

C. Vegetation Composition/Diversity
- C.1 Overstory Layer
- C.2 Ground Cover

F. Landscape Characteristics
- F.1 Adjacent Buffer
- F.2 Contiguity
- F.3 Land Use

This procedure anticipates that the reviewers are experienced in wetland identification, delineation, and mitigation construction techniques. It also anticipates that a team of two (2) wetland scientists will collaborate to assign a relative value.

**For each variable, a range of field indicators is provided that can be used by the reviewers to assign a relative value for each variable. These field indicators are included to provide general guidance for the reviewers. It is anticipated that all field indicators provided will not fit all mitigation sites. Therefore, the reviewers should assign the value for each variable (from 0-3) based on the "best fit" for a particular site. Not all field indicators need to be met in order for a site to obtain a given score.** If the reviewers observe additional field indicator(s) that are not listed, they can use these indicators to assign a value in addition to those indicators listed. In this case, it is important to document these additional indicators in the field notes. There is no significance assigned to the order in which the field indicators are listed. The reviewers should assign weight to those field indicators that are most characteristic of the wetland being evaluated based on field observations. The weight assigned to each field indicator may vary from site to site based on the best professional judgment of the reviewers. The reviewers should record the basis for their determination by identifying the field indicators used to make their determination. The reviewers should also record other field observations that may have influenced their determination.

For example, if the reviewers are assigning a value for hydrology on a mitigation site, they may observe field indicators such as abundant target hydrophytes that exhibit no signs of stress, no evidence of mortality of these target hydrophytes, no evidence of colonization by upland or transition species, abundant evidence of surface inundation such as hummocks, ponding, etc., and no evidence of erosion or other channelization of water flow. However, if it is a recently established site, redoximorphic features and hydric soil development may not be observed. In this case, the site would be assigned a score of 3 if the reviewers felt the site had the potential to develop other field indicators over time.

A value (V) of 3 is used if the characteristic is thought to have the greatest probability of simulating a natural wetland system over time. A value of 0 indicates that the wetland variable is severely impaired or non-existent. The evaluator has the option to assign a value for each variable in half (0.5) increments. This allows flexibility to score a variable that is not accurately described or fitted to the field indicators provided for each variable. The recorded value for each variable can be used to determine why a particular final score was attained. For example, were most sites affected by design characteristics, inadequate hydrology, etc.?

The final rating index score is expressed as a number between 0 and 1. A final index score of 1 indicates the highest potential to provide desirable wetland functions. The final score is calculated by taking the sum of all variables values (VTOTAL) and dividing it by the total maximum value (VMAX). VMAX is calculated by multiplying the number of applicable variables by 3.

This final score can also be expressed as an alphabetic score as follows:

| **Relative Rank** | **Corresponding Index Score** | **Potential to Provide Desirable Wetland Functions and Values** |
|---|---|---|
| A | 0.75 to 1.0 | HIGH |
| B | 0.50 to <0.75 | MODERATE |
| C | 0.25 to <0.50 | LOW |
| D | 0.00 to <0.25 | POOR |

## II. Constructed Wetland Mitigation Variables

**A. Hydrology:**
Provides a measure of the degree to which wetland hydrology is present through observation of field evidence of surface inundation or saturation, such as hydric soil development, redoximorphic features, adventitious roots, shallow roots, vegetated tussocks, drift lines, sediment deposition, secondary flow channels, and plant species composition and vigor.

**B. Soils:**
Evaluates whether existing conditions are favorable for the establishment/development of hydrophytic vegetation.

**C. Vegetation Composition/Diversity:**
Assesses the presence, abundance, composition and condition of plant species within the mitigation site. Also measures the extent of colonization by undesirable (i.e. invasive) plant species. This variable includes two sub-categories:

**C.1 Overstory Layer**
Describes the characteristics of the overstory layer including trees and shrubs greater than 3 feet in height.

**C.2 Ground Cover**
Describes the characteristics of the understory vegetation layer including herbaceous and woody plants 3 feet or less in height.

**D. Wildlife Suitability:**
Evaluates the degree to which the wetland provides suitable habitat characteristics for wildlife.

**E. Site Characteristics:**
Evaluates the degree to which the location and design of the mitigation site affects its capacity to perform wetland functions. Includes an evaluation of design factors such as shape and size.

**F. Landscape Characteristics:**
Evaluates the nature of surrounding land use as it affects the functional capacity of the mitigation site including transition area quality and quantity, and contiguity with adjacent habitats. This variable includes three sub-categories:

**F.1 Adjacent Buffer**
Provides a description of the vegetation characteristics of uplands within 50 feet of the wetland boundary.

**F.2 Contiguity**
The extent to which the site adjoins wetlands or open space

**F.3 Land Use**
Describes the predominant type of land use within proximity (approximately ¼ mile) of the wetland.

## III. Variable rating Index

### A. HYDROLOGY

**Objective:**

This variable evaluates the hydrologic regime based on observed field indicators for the subject wetland. The evaluation considers predicted hydroperiod duration and magnitude. It is generally interpreted by using the field indicators such as morphological adaptations, plant community structure, human induced alterations to hydrology and other physical evidence such as rafted debris, drift lines, stained leaves, secondary flow channels, and sediment deposition. Plants exhibit morphological adaptations such as adventitious/shallow roots, buttressed roots, lichen lines, vegetated hummocks. Plants that are well established can also be used as an indicator of hydroperiod. Hydrophytes will exhibit signs of stress if there is too much or too little water. Signs of stress may include wilting, dieback, prevalence of disease and mortality. If too much water is present on the mitigation site, target hydrophytes may die off and not recruit, resulting in an unvegetated open water community. If too little water is present, the result may be transition to an upland community. External features that can interfere with or alter wetland hydrology include roads, drainage canals, levees, ditches, culverts and reductions in drainage area. Diffuse water flow through the wetland can be used as an indicator of natural hydroperiod. Channelized flow as indicated by areas where the water follows a defined path rather than a diffuse area may be used as an indicator of inadequate or altered hydroperiod. Soils that have redoximorphic features, including mottling, manganese concretions, and low chroma matrix, in areas where soils that have been in place for sufficient time to develop these characteristics, can also be used as a field indicator of wetland hydrology.

| | **Relative Score:** |
|---|---|
| **STRONG EVIDENCE THAT HYDROLOGIC REGIME IS ADEQUATE TO MAINTAIN A VIABLE WETLAND SYSTEM** | **3** |

a. Wetland hydrology is **adequate** to maintain wetlands and there is an absence of external features that may interfere with hydroperiod.
b. **Negligible** evidence of colonization by transitional/upland plants.
c. Hydrophytes healthy and exhibit **no stress**, plant morphologic adaptations are evident.
d. **Negligible** evidence of hydrophyte mortality due to inappropriate hydrology.
e. **Abundant** evidence of surface inundation appropriate to support wetland vegetation.
f. **Negligible** water flow channelization.
g. Redoximorphic features **distinct and/or clearly distinguishable** from upland/transition zone.
h. **Strong** evidence of hydric soil development

**A. HYDROLOGY** (continued)

| | Relative Score: |
|---|---|
| **MODERATE EVIDENCE THAT HYDROLOGIC REGIME IS ADEQUATE TO MAINTAIN A VIABLE WETLAND SYSTEM** | **2** |

i. Wetland hydrology is **slightly impaired** due to presence of external features that may interfere with hydroperiod.
j. **Minimal** evidence of colonization by transitional/upland plants.
k. Hydrophytes healthy and exhibit **minimal** stress, plant morphologic adaptations are evident.
l. **Minimal** evidence of hydrophyte mortality due to inappropriate hydrology.
m. **Moderate** evidence of surface inundation appropriate to support wetland vegetation.
n. **Minimal** water flow channelization.
o. Redoximorphic features **present and/or moderately distinguishable** from upland/transition zone.
p. **Moderate** evidence of hydric soil development.

| | |
|---|---|
| **HYDROLOGIC REGIME IS INADEQUATE TO MAINTAIN VIABLE WETLAND** | **1** |

q. Wetland hydrology is **inadequate**.
r. **Moderate** evidence of colonization by transitional/upland plant.
s. Hydrophytes exhibit **moderate** stress, plant morphologic adaptations are minimal.
t. **Moderate** evidence of hydrophyte mortality due to inappropriate hydrology.
u. **Minimal** evidence of surface inundation appropriate to support wetland vegetation including evidence of prolonged ponding which is detrimental to the establishment of wetland vegetation.
v. **Moderate** water flow channelization.
w. Redoximorphic features **minimal and/or indistinguishable** from upland/transition zone.
x. **Minimal** evidence of hydric soil development.

| | |
|---|---|
| **HYDROLOGIC REGIME IS SEVERELY LIMITED WITH STRONG EVIDENCE OF SUCCESSION TO UPLAND OR OPEN WATER COMMUNITY** | **0** |

y. Wetland hydrology **severely limited**.
z. **Extensive** evidence of colonization by transitional/upland plants.
aa. Hydrophytes exhibit **severe** stress, and lack morphologic adaptations.
bb. **Extensive** evidence of hydrophyte mortality due to inappropriate hydrology.
cc. **Absence** of evidence of surface inundation including prolonged ponding that precludes the establishment of wetland vegetation.
dd. **Extensive** water flow channelization.
ee. Redoximorphic features **absent and/or indistinguishable** from upland/transition zone of site.
ff. **Negligible** evidence of hydric soil development.

## B. SOILS

**Objective:**

The soil variable is a measure of suitability of soils to support and enhance the recruitment and growth of desirable wetland vegetation. The reviewers should inspect the site for signs that soils are stabilized, and suitable to wetland vegetation growth. Field evidence that can be used to evaluate the suitability of soils may include depth, texture, and compaction.

| | **Relative Score:** |
|---|---|
| **STRONG EVIDENCE THAT SOILS ARE FAVORABLE FOR THE GROWTH OF WETLAND VEGETATION** | **3** |

a. Topsoil depth **6" or greater** and conducive to growth of wetland vegetation.
b. **Negligible** evidence of erosion or loss of topsoil (e.g. cracking, subsidence, etc.).
c. **Negligible** evidence of soil compaction that inhibits growth of vegetation.
d. **Negligible** amount of debris, concrete or garbage.

| | |
|---|---|
| **MODERATE EVIDENCE THAT SOILS ARE FAVORABLE FOR THE GROWTH OF WETLAND VEGETATION** | **2** |

e. Topsoil depth **3-6"** and conducive to growth of wetland vegetation.
f. **Minimal** evidence of erosion or loss of topsoil (e.g. cracking, subsidence, etc.).
g. **Minimal** evidence of soil compaction that inhibits growth of vegetation.
h. **Minimal** amount of debris, concrete, or garbage.

| | |
|---|---|
| **MINIMAL EVIDENCE THAT SOILS ARE FAVORABLE FOR THE GROWTH OF WETLAND VEGETATION** | **1** |

i. Topsoil **present, up to 3" deep**, and conducive to growth of wetland vegetation.
j. **Moderate** evidence of erosion or loss of topsoil (e.g. cracking, subsidence, etc.).
k. **Moderate** evidence of soil compaction that inhibits growth of vegetation.
l. Soils contain **moderate** amounts of debris, concrete, or garbage.

| | |
|---|---|
| **ABSENCE OF THAT SOILS ARE FAVORABLE FOR THE GROWTH OF WETLAND VEGETATION** | **0** |

m. Topsoil **absent** or not conducive to growth of wetland vegetation.
n. **Strong** evidence of erosion or loss of topsoil (e.g. cracking, subsidence, etc.).
o. **Strong** evidence of soil compaction that inhibits growth of vegetation.
p. Soils contain **extensive** amounts of debris, concrete, or garbage.

## C. VEGETATION COMPOSITION/DIVERSITY –

### C.1 OVERSTORY (TREE AND SHRUB) LAYER

**Objective:**

The vegetation composition/diversity - overstory layer variable evaluates the presence, health, and abundance of the wetland's tree and shrub layer 3 feet or more in height, where applicable. Desirable plant species are those plants that one would expect to see in a comparable undisturbed wetland and those that do not have a tendency to become invasive. Undesirable plant species are plant species that are not usually considered nuisance species, however may be indicative of other problems (i.e. - improper hydrology) and may dominate a particular stratum. Nuisance or invasive plant species have the potential to dominate plant communities (e.g. tree-of-heaven, multiflora rose, Russian olive). This variable is not applicable to emergent habitats where overstory layers are typically not present. In this case a score of NA (not applicable) should be noted on the field data sheets. (Note - Overstory trees >15' height, Shrub = >3-15' height).

Refer to Appendix A - list of plants defined by NJDEP to be "nuisance or invasive" species.

| | **Relative Score:** |
|---|---|
| **ABUNDANT AMOUNT OF DESIRABLE WETLAND OVERSTORY LAYER PRESENT** | **3** |

a. **Abundant** wetland overstory layer present (75-100% cover).
b. Wetland contains negligible nuisance or invasive trees and shrubs **(<1%).**
c. **Strong** evidence of natural recruitment of desirable tree and shrub seedlings.
d. **Abundant** signs of recent growth.
e. **Negligible** evidence of insect damage and/or herbivory.
f. **Negligible** signs of abnormal growth patterns, chlorosis, or other abnormalities.
g. **High** tree and shrub diversity.

| | |
|---|---|
| **MODERATE AMOUNT OF DESIRABLE WETLAND OVERSTORY LAYER PRESENT** | **2** |

h. **Moderate** wetland overstory layer present (50-74% cover).
i. Wetland contains minimal nuisance or invasive trees and shrubs **(1-10%)**.
j. **Moderate** evidence of natural recruitment of desirable tree and shrub seedlings.
k. **Moderate** signs of recent growth.
l. **Minimal** evidence of insect damage and/or herbivory.
m. **Minimal** signs of abnormal growth patterns, chlorosis, or other abnormalities.
n. **Moderate** tree and shrub diversity.

**C. 1 OVERSTORY (TREE AND SHRUB) LAYER** (continued)

| | **Relative Score:** |
|---|---|
| **LIMITED AMOUNT OF DESIRABLE WETLAND OVERSTORY LAYER PRESENT** | **1** |

o. **Minimal** wetland overstory layer present (25-49% cover).
p. Nuisance or invasive trees and shrubs are well-established **(>10-50%)**.
q. **Minimal** evidence of natural recruitment of desirable tree and shrub seedlings.
r. **Minimal** signs of recent growth.
s. **Moderate** evidence of insect damage and/or herbivory.
t. **Abundant** signs of abnormal growth patterns, chlorosis, or other abnormalities.
u. **Minimal** tree and shrub diversity.

| | |
|---|---|
| **UNDESIRABLE WETLAND OVERSTORY LAYER PRESENT** | **0** |

v. **Negligible** wetland overstory layer present (0-24% cover).
w. Wetland is dominated by nuisance or invasive trees and shrubs **(>50%)**.
x. **Negligible** signs of natural recruitment of desirable tree and shrub seedlings.
y. **Negligible** signs of recent growth.
z. **Strong** evidence of insect damage and/or herbivory.
aa. **Extensive** signs of abnormal growth patterns, chlorosis, or other abnormalities.
bb. **Negligible** tree and shrub diversity.

## C. VEGETATION COMPOSITION/DIVERSITY –

## C.2 GROUND COVER

**Objective:**

The vegetation composition/diversity - ground cover variable evaluates the presence, abundance, regrowth, and condition of herbaceous and woody plants 3 feet or less in height. Such impacts as hydroperiod, herbivory, disease, insect damage, nutrient deficiencies, mechanical human disturbance (e.g. – ATV use, tramping, etc.), and chemical disturbances (e.g. herbicides, nutrient shifts, etc.) affect this variable. Undesirable plant species are plant species that are not usually considered nuisance species, however may be indicative of other problems (i.e. - improper hydrology) and may dominate a particular stratum (e.g. *Rubus* sp. in an emergent wetland). Nuisance or invasive plant species have the potential to dominate plant communities and form large monocultures (e.g. *Phragmites,* reed canary grass, Japanese knotweed, etc.). Desirable plant species are those plants that one would expect to see in an undisturbed example of a comparable wetland type and that do not have a tendency to become invasive.

Refer to Appendix A - list of plants defined by NJDEP to be "nuisance or invasive" species.

| | **Relative Score:** |
|---|---|
| **ABUNDANT AMOUNT OF DESIRABLE WETLAND GROUND COVER PRESENT** | **3** |

a. **Abundant** wetland groundcover layer present (75-100% cover).
b. Wetland contains negligible nuisance or invasive groundcover **(<1%).**
c. **Strong** evidence of natural recruitment of desirable plants.
d. **Abundant** signs of recent growth.
e. **Negligible** evidence of insect damage and/or herbivory.
f. **Negligible** signs of abnormal growth patterns, chlorosis, or other abnormalities.
g. **High** groundcover diversity.

| | |
|---|---|
| **MODERATE AMOUNT OF DESIRABLE WETLAND GROUND COVER PRESENT** | **2** |

h. **Moderate** wetland groundcover layer present (50-74% cover).
i. Wetland contains minimal nuisance or invasive groundcover **(1-10%)**.
j. **Moderate** evidence of natural recruitment of desirable plants.
k. **Moderate** signs of recent growth.
l. **Minimal** evidence of insect damage and/or herbivory.
m. **Minimal** signs of abnormal growth patterns, chlorosis, or other abnormalities.
n. **Moderate** groundcover diversity.

**C.2 GROUND COVER** (continued)

| | Relative Score: |
|---|---|
| **LIMITED AMOUNT OF DESIRABLE WETLAND GROUND COVER PRESENT** | **1** |

o. **Minimal** wetland groundcover layer present (25-49% cover).
p. Nuisance or invasive groundcover is well-established **(>10-50%)**.
q. **Minimal** evidence of natural recruitment of desirable plants.
r. **Minimal** signs of recent growth.
s. **Moderate** evidence of insect damage and/or herbivory.
t. **Abundant** signs of abnormal growth patterns, chlorosis, or other abnormalities.
u. **Minimal** groundcover diversity.

| | |
|---|---|
| **UNDESIRABLE WETLAND GROUND COVER PRESENT** | **0** |

v. **Negligible** wetland groundcover layer present (0-24% cover).
w. Wetland and is dominated by nuisance or invasive groundcover **(>50%)**.
x. **Negligible** signs of natural recruitment of desirable plants.
y. **Negligible** signs of recent growth.
z. **Strong** evidence of insect damage and/or herbivory.
aa. **Extensive** signs of abnormal growth patterns, chlorosis, or other abnormalities.
bb. **Negligible** groundcover diversity.

## D. WILDLIFE SUITABILITY

**Objective:**

The wildlife suitability variable evaluates habitat quality as an alternative to direct observation. It evaluates wildlife suitability through the noted presence or absence of wildlife food and water sources, nesting areas, roosting areas, and protective cover. The presence of signs and suitable habitat are used as field indicators of wildlife use due to the time constraints of the assessment procedure and the secrecy, mobility, habits and seasonality of many species of wildlife. For a mitigation area to get a high relative score on this variable there must be evidence of diverse habitat characteristics suitable to support a wide range of species.

| | **Relative Score:** |
|---|---|
| **WETLAND EXHIBITS STRONG EVIDENCE OF WILDLIFE SUITABILITY** | **3** |

a. **Abundant** (in type and distribution) protective cover is available.
b. **Abundant** adjacent food sources and nesting habitat.
c. **Negligible** human impediments to wildlife use, such as roads or other disturbances.
d. **Strong** evidence that habitat can support nesting/breeding activity.

| | |
|---|---|
| **WETLAND EXHIBITS MODERATE EVIDENCE OF WILDLIFE SUITABILITY** | **2** |

e. **Adequate** (in type and distribution) protective cover is available.
f. **Available** adjacent food sources and nesting habitat.
g. **Minimal** human impediments to wildlife use, such as roads or other disturbances.
h. **Moderate** evidence that habitat can support nesting/breeding activity.

| | |
|---|---|
| **WETLAND EXHIBITS MINIMAL EVIDENCE OF WILDLIFE SUITABILITY** | **1** |

i. **Limited** (in type and distribution) protective cover is available.
j. **Limited** adjacent food sources and nesting habitat.
k. **Moderate** human impediments to wildlife use, such as roads or other disturbances.
l. **Limited** evidence that habitat can support nesting/breeding activity.

| | |
|---|---|
| **WETLAND EXHIBITS NO EVIDENCE OF WILDLIFE SUITABILITY** | **0** |

m. **Inadequate** (in type and distribution) protective cover for wildlife.
n. **Inadequate** adjacent food and nesting habitat sources are available.
o. **Extensive** human impediments to wildlife use, such as roads or other disturbances.
p. Habitat is **inadequate** to support nesting/breeding activity.

## E. SITE CHARACTERISTICS

**Objective:**
Measures the degree to which site or design characteristics affects the wetland's capacity to perform desirable functions. Includes an evaluation of design factors such as shape, size, community type, and required maintenance. Edge: area ratio can be used to distinguish between a large circular depression (low edge:area ratio) and a long linear ditch (high edge:area ratio). Heterogeneity is a measure of the degree of structure and species composition variability in the vegetation community distinguishing between those sites consisting of a single wetland community type or a combination of multiple community types. For this variable the evaluator(s) should list specific reasons the design was adequate or inadequate to achieve desirable wetland functions. Desirable functions may include flood flow alteration, sediment deposition, wildlife habitat, etc.

| | **Relative Score:** |
|---|---|
| **SITE CHARACTERISTICS ARE CONDUCIVE TO PERFORM WETLAND FUNCTIONS** | **3** |

a. Wetland is **stable,** requiring little or no maintenance to achieve desirable wetland functions.
b. **Low** edge:area ratio.
c. Wetland contains **distinct** community type heterogeneity.
d. Location is **conducive** to achieving desirable wetland functions.
e. Size is **conducive** to achieving desirable wetland functions.

| | |
|---|---|
| **SITE CHARACTERISTICS MODERATELY SUITABLE TO PERFORM WETLAND FUNCTIONS** | **2** |

f. Wetland requires **some** periodic maintenance to achieve desirable wetland functions.
g. **Moderate** edge:area ratio.
h. Mitigation area contains **moderate** community type heterogeneity.
i. Location is **adequate** to support desirable wetland functions.
j. Size is **adequate** to perform desirable wetland functions.

| | |
|---|---|
| **SITE CHARACTERISTICS MINIMALLY SUITABLE TO PERFORM WETLAND FUNCTIONS** | **1** |

k. Wetland requires **extensive** maintenance to achieve desirable wetland functions.
l. **High** edge:area ratio.
m. Mitigation area contains **low** community type heterogeneity.
n. Location **impedes** desirable wetland functions.
o. Size **impedes** desirable wetland functions.

| | |
|---|---|
| **SITE CHARACTERISTICS INADEQUATE TO PERFORM WETLAND FUNCTIONS** | **0** |

p. Wetland requires **continuous** maintenance or alteration to achieve desirable functions.
q. Edge:Area ratio is **extreme**.
r. Mitigation area contains **no** community type heterogeneity.
s. Location **inadequate** to achieve desirable functions.
t. Size is **inadequate** to perform desirable wetland functions.

## F. LANDSCAPE CHARACTERISTICS

### F.1 ADJACENT BUFFER

**Objective:**

The landscape characteristics - adjacent buffer variable is a measure of the relative quality of the 150 foot buffer or transitional area adjoining the subject jurisdictional wetland. This variable is evaluated based on the size and the ecological attributes (e.g., vegetative cover, wildlife use, sedimentation control) of the adjoining buffer in relation to the wetland being assessed. If the mitigation site has a buffer that varies in width, the reviewers should average the different buffers. For example, a site bordered on 25% of its boundary by a parking lot with no buffer, and on 75% by a >150 foot wide vegetated buffer, would have an average width equal to 112.5 feet [(.25 x 0) + (.75 x 150) = 112.5].

| | Relative Score: |
|---|---|
| **ADJACENT BUFFER STRONGLY COMPLEMENTS WETLAND FUNCTIONS** | **3** |

a. Vegetated buffer **≥150 feet** average width.
b. Buffer contains **negligible** nuisance or invasive plant species **(<1%)**.
c. Contains **predominantly** plant species that provide cover, food source, and roosting areas for wildlife.
d. Plant cover provides **adequate** nutrient retention, water flow moderation, and erosion prevention for mitigation site.
e. Buffer slope averages **less than 10%.**

| | |
|---|---|
| **ADJACENT BUFFER MODERATELY COMPLEMENTS WETLAND FUNCTIONS** | **2** |

f. Vegetated buffer **greater than 50 feet but less than 150 feet** average width.
g. Buffer **established with (<50%)** nuisance or invasive plant species.
h. Contains **some** plant species that provide cover, food source, and roosting areas for wildlife.
h. Plant cover provides **limited** nutrient retention, water flow moderation, and erosion prevention for mitigation site.
j. Buffer slope averages **10-20%**

| | |
|---|---|
| **ADJACENT BUFFER IMPEDES WETLAND FUNCTIONS** | **1** |

k. Vegetated buffer **50 feet or less** average width.
l. Buffer **dominated (> 50%)** by nuisance or invasive plant species.
m. Contains **limited** plant species that provide cover, food source, and roosting areas for wildlife.
n. Plant cover provides **inadequate** nutrient retention, water flow moderation, and erosion prevention for mitigation site.
o. Buffer slope averages **greater than 20%.**

| | |
|---|---|
| **ADJACENT BUFFER SEVERLY IMPAIRS WETLAND FUNCTIONS** | **0** |

p. No vegetated buffer.

## F. LANDSCAPE CHARACTERISTICS

### F.2 CONTIGUITY

**Objective:**

Measures the extent to which the project contributes to maintenance of the natural ecological mosaic of the landscape. In order to score high for this variable the position of the mitigation site within the landscape must provide a direct connection with adjoining open space on the majority of its perimeter, without interruptions such as roads, canals, developments, etc. An example would be a site located along a stream within an undeveloped area adjoining an existing state park.

| | | Relative Score: |
|---|---|---|
| **a.** | **SITE CONTIGUOUS ON 75-<100% OF ITS PERIMETER** | **3** |
| **b.** | **SITE CONTIGUOUS ON 50-<75% OF ITS PERIMETER** | **2** |
| **c.** | **SITE CONTIGUOUS ON 25-<50% OF ITS PERIMETER** | **1** |
| **d.** | **SITE CONTIGUOUS ON <25% OF ITS PERIMETER** | **0** |

## F. LANDSCAPE CHARACTERISTICS

### F.3 LAND USE

**Objective:**

This variable examines the dominant surrounding land use within 1/4 mile of the mitigation site as an indicator of water quality within the wetland system. It can be assumed that for selected pollutants, water quality varies with land use (Whalen and Cullum, 1988). Pollutant-load rates from undeveloped open space that is not managed for active recreational use (i.e. golf courses) via pesticides, herbicides, mowing, etc., are much lower than any other category. Pollutant-load rates for residential land uses increase steadily from low-density to high density. Commercial and industrial pollutant-load rates also vary with development intensity. Finally, contributions of nutrients from agricultural uses are much greater than loading rates for undeveloped open space (Harvey, 1990). Therefore when evaluating this variable an emphasis should be placed upon that surrounding land area which contributes to the hydrology of the mitigation site. The land use categories include low-density residential (1 unit/ acre), high-density residential (<1 unit/acre), low intensity commercial and industrial (<50% impervious), highways, agriculture, recreation/golf courses and high intensity commercial/industrial developments (>50% impervious).

If the reviewers determine there to be more than one surrounding land use that affects the mitigation site, this is mathematically expressed as follows:

[(%surrounding x LU1) + (%surrounding x LU2)]/2 = LU total

For example, if the site is 50% surrounded by industry and 50% by open space the score would be:

[.5 X .5) + (.5 X 3)}/2 = 0.9

| **Land Use Category:** | | **Relative Score:** |
|---|---|---|
| a. | undeveloped open space | 3 |
| b. | low density residential | 2 |
| c. | low intensity commercial | 1.5 |
| d. | high density residential | 1 |
| e. | recreation/golf course | 1 |
| f. | agriculture | 1 |
| g. | highway | 0.5 |
| h. | industrial | 0.5 |
| i. | high intensity commercial/industrial | 0 |

**IV. Scoring Matrix - See introduction for instructions on how to apply these guidance field indicator lists. Letters for these field indicators correspond to Section III which should be used to assign a value based on the "best fit" method.**

**A. HYDROLOGY**

| Relative Score | Wetland Hydrology | Undesirable Plant Colonization | Plant Stress | Plant Mortality | Surface Inundation | Water Flow Channelization | Redoximorphic Features | Hydric Soils |
|---|---|---|---|---|---|---|---|---|
| 3 | a. adequate | b. negligible | c. no stress | d. negligible | e. abundant | f. negligible | g. distinct | h. strong |
| 2 | i. impaired | j. minimal | k. minimal | l. minimal | m. moderate | n. minimal | o. present | p. moderate |
| 1 | q. inadequate | r. moderate | s. moderate | t. moderate | u. minimal | v. moderate | w. minimal | x. minimal |
| 0 | y. limited | z. extensive | aa. severe | bb. extensive | cc. absent | dd. extensive | ee. absent | ff. negligible |

***B. SOILS***

| Relative Score | Topsoil | Erosion | Soil Compaction | Debris |
|---|---|---|---|---|
| 3 | a. >6" | b. negligible | c. negligible | d. negligible |
| 2 | e. 3-6" | f. minimal | g. minimal | h. minimal |
| 1 | i. present, up to 3" | j. moderate | k. moderate | l. moderate |
| 0 | m. absent | n. strong | o. strong | p. extensive |

**C.1 VEGETATION COMPOSITION/DIVERSITY - OVERSTORY (TREE AND SHRUB) LAYER**

| Relative Score | Plant Cover | Invasive Plants | Natural Recruitment | Plant Growth | Insects & Herbivory | Plant Stress | Diversity |
|---|---|---|---|---|---|---|---|
| 3 | a. abundant | b. <1% | c. strong | d. abundant | e. negligible | f. negligible | g. high |
| 2 | h. moderate | i. 1-10% | j. moderate | k. moderate | l. minimal | m. minimal | n. moderate |
| 1 | o. minimal | p. >10-50% | q. minimal | r. minimal | s. moderate | t. abundant | u. minimal |
| 0 | v. negligible | w. >50% | x. negligible | y. negligible | z. strong | aa. extensive | bb. negligible |

**C.2. VEGETATION COMPOSITION/DIVERSITY - GROUND COVER**

| Relative Score | Plant Cover | Invasive Plants | Natural Recruitment | Plant Growth | Insects & Herbivory | Plant Stress | Diversity |
|---|---|---|---|---|---|---|---|
| 3 | a. abundant | b. <1% | c. strong | d. abundant | e. negligible | f. negligible | g. high |
| 2 | h. moderate | i. 1-10% | j. moderate | k. moderate | l. minimal | m. minimal | n. moderate |
| 1 | o. minimal | p. >10-50% | q. minimal | r. minimal | s. moderate | t. abundant | u. minimal |
| 0 | v. negligible | w. >50% | x. negligible | y. negligible | z. strong | aa. extensive | bb. negligible |

**IV. Scoring Matrices** (continued)

**D. WILDLIFE SUITABILITY**

| Relative Score | Cover | Adjacent Resources | Human Impediments | Nest/Breeding Activity |
|---|---|---|---|---|
| 3 | a. abundant | b. abundant | c negligible | d. strong |
| 2 | e. adequate | f. available | g. minimal | h. moderate |
| 1 | i. limited | j. limited | k. moderate | l. minimal |
| 0 | m. inadequate | n. inadequate | o. extensive | p. inadequate |

***E. SITE CHARACTERISTICS***

| Relative Score | Maintenance | Edge:Area Ratio | Heterogeneity | Location | Size |
|---|---|---|---|---|---|
| 3 | a. stable | b. low | c. distinct | d. conducive | e. conducive |
| 2 | f. some | g. moderate | h. moderate | i. adequate | j. adequate |
| 1 | k. extensive | l. high | m. low | n. impedes | o. impedes |
| 0 | p. continuous | q. extreme | r. none | s. inadequate | t. inadequate |

**F.1. LANDSCAPE CHARACTERISTICS - ADJACENT BUFFER**

| Relative | Width | Invasive Species | Wildlife Suitability | Cover | Slope |
|---|---|---|---|---|---|
| 3 | a. ≥150. | b. <1% | c. predominantly | d. adequate | e. <10% |
| 2 | f. >50-<150 ft. | g. <50% | h. some | i. limited | j. 10-20% |
| 1 | k. ≤50 ft. | l. >50% | m. limited | n. inadequate | o. >20% |
| 0 | p. 0 ft. | q. not applicable | r. not available | s. not available | t. not available |

**F.2 LANDSCAPE CHARACTERISTICS - CONTIGUITY** **F.3 LANDSCAPE CHARACTERISTICS – LAND USE**

| Relative Score | Contiguity | Land Use (Score shown in parenthesis) | |
|---|---|---|---|
| 3 | a. 75-100% | a. undeveloped open space (3) | f. agriculture (1) |
| 2 | b. 50-<75% | b. low density residential (2) | g. highway (0.5) |
| 1 | c. 25-<50% | c. low intensity commercial (1.5) | h. industrial (0.5) |
| 0 | d. <25%. | d. high-density residential (1) | i. high intensity commercial/industrial (0) |
| | | e. recreation/golf courses (1) | |

Appendix A: Nuisance and Invasive Plant List

reed canary grass (*Phalaris arundinacea*)
common reedgrass (*Phragmites australis*)
kudzu (*Pueraria montana*)
broad-leaf cattail (*Typha latifolia*)
narrow-leaf cattail (*Typha angustifolia*)
purple loosestrife (*Lythrum salicaria*)
tree-of-heaven (*Ailanthus altissima*)
Japanese barberry (*Berberis thunbergi*)
common barberry (*Berberis vulgaris*)
Russian olive (*Elaeagnus angustifolia*)
autumn olive (*Elaeagnus umbellata*)
Japanese privet (*Ligustrum obtusifolium*)
common privet (*Ligustrum vulgare*)
multiflora rose (*Rosa multiflora*)

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