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JON S. CORZINE  
Governor

LISA P. JACKSON  
Commissioner

**ADMINISTRATIVE ORDER NO. 2007-01**

**WHEREAS**, the Department of Environmental Protection (the "Department") adopted Stormwater Management rules (rules) at N.J.A.C. 7:8 on February 2, 2004 in order to protect and restore water resource health in New Jersey through the management of stormwater and minimization of nonpoint source pollution; and

**WHEREAS**, the New Jersey Surface Water Quality Standards (N.J.A.C. 7:9B-1 et seq.) require that Category One waters are to be protected from measurable changes in water quality because of their clarity, color, scenic setting, or other characteristics of aesthetic value, exceptional ecological significance, exceptional recreational significance, exceptional water supply significance or exceptional fisheries resources; and

**WHEREAS**, the rules at N.J.A.C. 7:8- 5.5(h) require a Special Water Resource Protection Area (SWRPA) adjacent to all Category One waters and their upstream tributaries located within the same HUC 14, as the most effective means to maintain and restore water quality and support designated uses associated with Category One waters; and

**WHEREAS**, the rules at N.J.A.C. 7:8-5.5(h) define the SWRPA as a 300-foot area provided on each side of the waterway to consist of existing vegetation or vegetation allowed to follow natural succession so as to maintain and/or create an unbroken, undisturbed vegetated buffer along Category One waters and upstream tributaries,

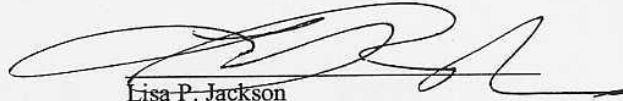
**WHEREAS**, the rules at N.J.A.C. 7:8- 5.5(h) only allow encroachment within the designated SWRPA when necessary to meet the Standard for Off-Site Stability in the Standards for Soil Erosion and Sediment Control in New Jersey (N.J.A.C. 2:90-1.3) or where previous development or disturbance has occurred and where an applicant can demonstrate that the functional value and overall condition of the SWRPA will be maintained to the maximum extent practicable; and

**WHEREAS**, the rule does not require any specific model or method to demonstrate that the functions and values of the special water resource protection area are being maintained; and

**WHEREAS**, the Department finds it necessary and desirable to provide additional guidance on this functional value assessment at the present time,

**NOW, THEREFORE,** I, Lisa P. Jackson, Commissioner, pursuant to the authority vested in me by the enabling legislation of the Department of Environmental Protection (N.J.S.A. 13:1D-1 et seq.), and by the Stormwater Management Act (N.J.S.A. 40:55D-93 through 99), the Water Pollution Control Act (N.J.S.A. 58:10A-1 et seq.), and the Water Quality Planning Act (N.J.S.A. 58:11A-1 et seq.), hereby direct that, effective immediately, the Department shall not approve any encroachment, into a special water resource protection area under N.J.A.C. 7:8-5.5(h)1ii or N.J.A.C. 7:8-5.5(h)3 unless the applicant demonstrates that the functional value and overall condition of the special water resource protection area will be maintained to the maximum extent practicable in accordance with the attached functional value assessment guidance as required by the Stormwater Management rule, titled "Special Water Resource Protection Area Functional Value Analysis" dated January 2, 2007, and that in the absence of such a demonstration, encroachment into the SWRPA shall be denied.

Date: Jan. 3, 2007



Lisa P. Jackson  
Commissioner

**Special Water Resource Protection Area**  
**FUNCTIONAL VALUE ANALYSIS**  
**January 2, 2007**

**INTRODUCTION:**

The Stormwater Management Rules establish a 300-foot Special Water Resource Protection Area (SWRPA) adjacent to all Category One waters and their mapped tributaries within the same HUC 14 watershed. Encroachment into the SWRPA is only allowed under limited circumstances where the applicant has demonstrated that the functional value and overall condition of the SWRPA are maintained to the maximum extent practicable. This Special Water Resource Protection Area Functional Value Analysis guidance shall be used to determine whether the functional value and overall condition of the SWRPA are maintained. This guidance assesses four central functions of a SWRPA based on existing and proposed conditions: Habitat, Nonpoint Source Pollutant Reduction, Temperature Modification and Channel Integrity. If under this analysis a loss of any of these functions is indicated, then the determination of whether the functional value and overall condition are “maintained to the maximum extent practicable” shall be made through one of the following when a permit triggering the stormwater review is required from the Division of Land Use Regulation: a Freshwater Wetlands Individual Permit (N.J.A.C. 7:7A-3), a Hardship Waiver under the Flood Hazard Area Control Act Rules (N.J.A.C. 7:13-4.8) or under the Coastal Permit Program Rules at N.J.A.C. 7:7-1.10. For projects that do not require a permit from the Division of Land Use Regulation that require a stormwater management review, the Division of Watershed Management shall use Hardship Criteria at N.J.A.C. 7:13-4.8 in determining whether the functional value and overall condition of the SWRPA are maintained to the maximum extent practicable.

**Proposed Encroachment into Disturbed SWRPA**

The Surface Water Quality Standards (SWQS) at N.J.A.C. 7:9B designate “Category One waters” and define them as those waters designated in the tables in N.J.A.C. 7:9B-1.15(c) through (h), for purposes of implementing the antidegradation policies set forth at N.J.A.C. 7:9B-1.5(d), for protection from measurable changes in water quality characteristics because of their clarity, color, scenic setting, other characteristics of aesthetic value, exceptional ecological significance, exceptional recreational significance, exceptional water supply significance, or exceptional fisheries resource(s).

Treatment of nonpoint source (NPS) pollution has traditionally been handled by the Department through Best Management Practices (BMPs). Therefore, the Stormwater Management rules at N.J.A.C. 7:8-5.5(h) define a Special Water Resource Protection Area (SWRPA) as the most effective means to maintain/restore water quality and support designated uses associated with Category One waters. In accordance with N.J.A.C. 7:7-5.5(h)1i the SWRPA shall consist of the area within 300 feet of a Category One water and its upstream tributaries within the HUC 14 drainage area, including both perennial and intermittent streams depicted on either USGS Quadrangle Maps or the County Soil

Surveys. The 300 feet shall be measured perpendicular to the waterway and outward from the top of bank, or from the centerline of the waterway where the bank is not defined.

A project or activity that is subject to review under N.J.A.C. 7:8 is subject to the SWRPA requirements. N.J.A.C. 7:8 applies to “major development”, which is development that would disturb one or more acres, or, if a LUR or Dam Safety permit is involved, would add one quarter of an acre or more of impervious surface. The rules define “development” as construction, reconstruction, conversion, structural alteration, relocation or enlargement of any building or structure; mining, excavation or landfill; or use/change in use of any building, other structure, land or extension of use of land that requires permission under the Municipal Land Use Law (N.J.S.A. 40:55D-1 et seq.). “Disturbance” means the addition of impervious surface (e.g. pavement); exposure or movement of soil or bedrock (e.g. grading, excavation); or clearing, cutting, or removing vegetation. “Impervious surface” means an area that has been covered by a layer of material that is highly resistant to infiltration by water. Impervious surfaces include concrete, asphalt, swimming pools and buildings.

N.J.A.C. 7:8-5.5(h)1ii stipulates that “Encroachment within the designated special water resource protection area under (h)1i above shall only be allowed where previous development or disturbance has occurred (for example active agricultural us, parking area or maintained lawn area). **The encroachment shall only be allowed where the applicant demonstrates that the functional value and overall condition of the special water resource protection area will be maintained to the maximum extent practicable.** In no case shall the remaining special water resource protection area be reduced to less than 150 feet as measured perpendicular to the top of bank or the waterway or centerline of the waterway where the bank is undefined. All encroachments proposed under this subparagraph shall be subject to review and approval of the Department.” (emphasis supplied). A developed or disturbed SWRPA exists only if there are structures or other impervious cover (development) or a lack of woody vegetation (disturbance), unless herbaceous-only vegetation is the natural condition as in an emergent wetland. A disturbed condition could be an active agricultural field, lawn or other maintained grassy area. An active agricultural area is intended to include any area where **all** woody vegetation (trees and shrubs) has been removed for the purposes of raising food, fiber or livestock. Where an agricultural area has been fallow for such period of time as to allow the growth of woody vegetation, which takes several years, the area is not considered to be actively farmed.

In practice, the Department has rarely received an in depth, scientifically valid, functional value assessment as an accompaniment to an application requesting approval for a SWRPA encroachment. The Department has been criticized for making decisions on SWRPA encroachments in the absence of such an assessment and therefore finds it necessary and desirable to require functional value assessments that conform with the following guidelines.

**The functional value assessment is a test of the functional value of the SWRPA as it exists presently, or in its best condition from the February 2, 2004 adoption date of the rule to the present, as compared to that which would exist post construction, without consideration of possible structural mitigation measures or averaging of impacts within the buffer. Any encroachment into the outer 150 feet of a disturbed SWRPA that results in a loss of any functional value in any portion of the outer 150 feet of the disturbed buffer shall not be permitted unless it is demonstrated that the loss is unavoidable through project redesign including a reduction in the scope of the development. Four key areas of functional value are considered for this evaluation and are discussed below: habitat, nonpoint source pollutant load, temperature moderation, and channel integrity.**

## **ASSESSMENT OF FUNCTIONAL VALUE IMPACT**

### **I. Functional value: Habitat**

All vegetated SWRPA areas, including lawn areas and cultivated fields, provide some habitat value. Typically, the degree to which the existing vegetative cover approximates the natural vegetative condition for a particular location, the higher its habitat value. Human activity is another major determinant of habitat value. The degree of intrusion by human activity affects the suitability and use of habitat for resting, feeding and breeding purposes for those species that are not tolerant of that intrusion. Further, the area that may be rendered unsuitable for a particular species is not limited to the area of human intrusion alone. Visual and audible intrusion, and pets, radiate into adjacent habitat areas rendering them unsuitable as well. Therefore, the habitat value will be assessed in terms 1) the status of the habitat as potentially suitable for threatened and endangered species and 2) any changes in the vegetative character and degree of human activity. The Department's Landscape Maps of Habitat for Endangered, Threatened and Other Priority Wildlife and Natural Heritage Program Priority Habitats (other than macro sites) shall be used as a reference for identifying higher value habitats.

#### **A. Assess current conditions:**

In order to address this functional value, the applicant must document the existing extent and character of the SWRPA relevant to habitat value. This will require the applicant to 1) delineate on the site plan and summarize in tabular form the areas by type of the following: impervious surface, distinguishing paved and unpaved areas and other structures; bare soil; maintained lawn; cultivated agricultural; pasture or meadow; scrub/shrub; and forest; and 2) identify if the SWRPA includes potential habitat for threatened and endangered species as represented by the presence of Landscape Rank 3 (State threatened), 4 (State endangered) or 5 (Federally endangered) patches according to the Landscape Maps of Habitat for Endangered, Threatened and Other Priority Wildlife and Priority Habitats, or Natural Heritage Program Priority Habitats (other than macro sites). In determining the existing habitat value of the SWRPA the Department may also rely on recent sightings of threatened and endangered species not yet reflected on the Landscape Maps. The current level of habitat value will be presumed to decrease from

greatest to least and human disturbance will be presumed to increase from least to greatest along the following continuum: forest, scrub/shrub, pasture or meadow, cultivated agriculture, maintained lawn, unpaved impervious, paved impervious, and other structures.

**B. Assess future condition:**

To assess impact on functional value, identify the location and type of vegetative changes that would be proposed compared to the existing condition characterized above. In addition, identify any encroachments into high value habitat as identified on the Landscape Maps of Habitat for Endangered, Threatened and Other Priority Wildlife and Priority Habitats as areas with a Landscape Rank of 3 (State threatened), 4 (State endangered) or 5 (Federally endangered) or Natural Heritage Program Priority Habitats (other than macro sites).

**C. Standard:**

A loss in habitat functional value will occur if:

- 1) The project will disturb any high value habitat as identified on the Landscape Maps of Habitat for Endangered, Threatened and Other Priority Wildlife and Priority Habitats as areas with a Landscape Rank of 3 (State threatened), 4 (State endangered) or 5 (Federally endangered) or Natural Heritage Program Priority Habitats (other than macro sites).
- 2) Changes are proposed in any portion of the buffer which would result in a shift to a less valuable vegetative condition.
- 3) Changes are proposed in any portion of the buffer which would cause a shift from a lesser to a greater level of human disturbance, or which would introduce additional barriers (roads, fences or other structures).

**II. Functional value: Nonpoint source pollutant reduction**

Nonpoint source pollutant loading varies by land use. For example, agricultural land uses or maintained lawns where fertilizers, pesticides and herbicides are routinely applied will tend to release those constituents to an adjacent stream through stormwater. Paved parking areas do not tend to generate those constituents (unless used for storage) but do generate oils, greases, polycyclic aromatic hydrocarbons and metals. The value of vegetated buffers is that they provide for pollutant removal by taking up excess nutrients, binding metals and other pollutants and allowing natural chemical and biological processes to alter the chemical composition of pollutants to render them harmless or less harmful. Natural vegetated riparian buffers often act as sinks for pollutants rather than as sources.

Filtration is provided to the extent that stormwater is allowed to flow across vegetated land, during which time some of the flow is intercepted by the vegetation or infiltrates into the ground, where various physical, chemical and biological processes act on the pollutants, reducing pollutant load. However, to the extent that land uses located within the buffer actually generate pollutant loads and/or prevent the natural processes of infiltration and amelioration, the buffer's natural functional value in nonpoint source pollutant reduction is reduced and there is a net increase in pollutant load. For the purpose of this analysis, the pollutant loading generated will be assessed, comparing the current and proposed condition for each land use type in the buffer. The functional value will be maintained if the pollutant load for each parameter that would be generated with the proposed project remains the same or is reduced compared to the current condition of the buffer.

This analysis is without regard to any structural water quality measures that may be proposed for the site. This is because structural BMPs applied to meet the Stormwater Management Rule water quality requirements achieve an improvement that is only relevant to the post construction pollutant load (see N.J.A.C. 7:8-5.5(a)). Thus even the required 80 or 95 percent reduction in the post development total suspended solids load could result in an increase in the load generated compared to the existing condition.

This assessment also requires an evaluation of changes in the character of the pollutant loads. As mentioned previously, different land uses tend to generate different pollutants. Limiting the analysis to one parameter ignores the other potential adverse water quality effects associated with the encroachment. For example if the pre-development condition is an agricultural land use and the post development condition would be a parking lot, narrowing the analysis to nutrients alone would show an improvement in water quality. However, the parking lot will generate other pollutants that are potentially toxic to aquatic organisms, and that were not contributed in the pre-development condition. To disregard this contribution of new pollutants would fail to protect water quality in the Category One water. In addition, in this example the change in disturbance involves the addition of impervious surfaces, which would also reduce the ability of the buffer to perform the pollutant load reduction function.

#### **A. Assess current conditions:**

Nonpoint sources of pollution shall be assessed using pollutant loading coefficients that have been developed for various land uses. Selected loading coefficients for basic land use types are presented in the table in Attachment A. Determine pollutant loading for each parameter attributed to the each existing land use by multiplying the loading for each parameter by the area of each land use. Determine land use category by comparing land use characteristics to Anderson definitions and selecting the Anderson type that most closely describes the land use characteristics.

**B. Assess proposed future conditions:**

Determine the extent to which the project includes conversion of each land use type that would increase pollutant loading for any of the selected parameters in Attachment A by comparing the pollutant loading for the proposed future condition as described above for the current condition. Some parameters do not have a loading coefficient for all land use types; refer to instructions following the table of values for these cases.

**C. Standard:**

If, as the result of the proposed land use conversions, the load of any pollutant increases, that encroachment does not maintain the pollutant load reduction functional value.

**III. Functional value: temperature moderation**

Temperature moderation is provided to the extent that there is direct shading of a waterbody by overhanging canopy as well as the degree to which vegetation is present to provide ground shading, and structures and impoundments are absent, as these factors affect moderation of microclimate. The greater the density and permanence of the vegetation, the less stormwater flowing through the area will pick up heat from the ground or from direct sunlight. Structures and other impervious cover retain heat and artificially elevate air temperature and the temperature of stormwater runoff. In addition, impounded areas, such as water features of a golf course or swimming pools, even if they have no discharge, retain heat from solar radiation and affect microclimate.

**A. Assess current conditions:**

The applicant shall delineate on the site plan and summarize in tabular form the areas by type of the following: impervious surface, distinguishing paved and unpaved areas and other structures; impounded areas; bare soil; maintained lawn; cultivated agricultural; pasture or meadow; scrub/shrub; and forest. These cover types represent a continuum of temperature moderation that increases from least to greatest. In addition, applicant shall provide a percent cover of the waterbody by canopy with leaves on, where this cover exists adjacent to the waterbody.

**B. Assess potential future condition:**

To assess impact on functional value, identify the location and type of vegetative changes that would be proposed compared to the existing condition characterized above.

**C. Standard:**

1) Changes in the existing vegetation on any portion of the site that would shift that portion of the site to a less shaded position on the continuum will reduce the temperature moderation functional value.

2) Placement of new structures or pavement within the SWRPA will result in a loss of the temperature moderation functional value of the SWRPA. However, removing or relocating impervious surfaces away from the waterway will improve the temperature moderation function of the buffer. Therefore, removal of impervious surfaces from the SWRPA is encouraged. Where encroachment into the SWRPA has been approved, removal of impervious surfaces from the inner 150 feet and replacement of an equivalent or lesser amount on a disturbed portion of the outer 150 feet, is encouraged.

3) Impoundment of water, if impounded water is allowed to reach the waterbody will reduce the temperature moderation functional value. If an impoundment is sufficiently shaded, temperature moderation is maintained.

#### **IV. Functional value: channel integrity**

Channel integrity captures both the physical and biological characteristics of a stream. Protection of the physical and biological integrity of the stream requires that the surface and subsurface (groundwater) hydrology of the site be maintained both during storm and dry weather periods. Increases in storm flow within a stream channel increase the likelihood of stream bank and stream bed erosion which can remove essential aquatic habitat structure in some places, bury critical aquatic habitat where that eroded material eventually settles out of the water column, and cause loss of near stream vegetation that shades the waterbody. The failure to maintain groundwater recharge reduces base flows in the stream so that during dry or drought conditions the stream channel has no water which increases the chances for stream bank erosion when again subjected to stream flows. This change in hydrology would extirpate various species (such as finfish) thereby changing the aquatic community.

In general, the most erosive force acting to disrupt channel integrity is based on the elevation and the velocity of water within the channel for bank-full flow, which usually equates to the two-year storm. The maintenance of base flows is reliant on maintaining groundwater recharge. The vegetation adjacent to a stream not only provides bank stabilization but reduces the velocity of the runoff as it passes through the riparian area and influences the amount of infiltration or recharge of stormwater that occurs. Therefore, where an encroachment increases the volume or velocity of runoff or reduces infiltration by changing the vegetation or imperviousness of the SWRPA, the channel integrity function of the buffer is reduced.

##### **A. Assess current condition:**

Determine existing volume and rate of runoff and recharge generated within the SWRPA using the approved analytical methods at N.J.A.C. 7:8-5.6. Also evaluate the flow paths through the SWRPA (i.e., is it sheet flow completely through, are there undulations in the ground that cause it to collect and spill from small impoundments or are there concentrated channels).

### **B. Assess potential future condition:**

Determine the volume and rate of runoff and recharge that would be generated by the project within the SWRPA using the approved analytical methods at N.J.A.C. 7:8-5.6.

### **C. Standard:**

Any increase in the volume or rate of runoff generated for the two-year storm in the SWRPA or any decrease in the groundwater recharge occurring in the SWRPA when compared to the current condition, shall be considered a loss in the channel integrity functional value of the SWRPA.

### **Proposed Disturbance of Undisturbed SWRPA**

There are very limited circumstances under which disturbance of an undisturbed SWRPA may be allowed. The Stormwater Management rules further state at N.J.A.C. 7:8-5.5(h)2 that “All stormwater shall be discharged outside of but may flow through the special water resource protection area and shall comply with the Standard For Off-Site Stability in the “Standards for Soil Erosion and Sediment Control in New Jersey,” established under the Soil Erosion and Sediment Control Act, N.J.S.A. 4:29-39 et seq. (see N.J.A.C. 2:90-1.3).”

N.J.A.C. 7:8-5.5(h)3 addresses the conditions which must be met if a stormwater discharge cannot comply with the Standard For Off-Site Stability, prior to allowing the placement of stabilization measures in the special water resource protection area. Those requirements are: stabilization measures may not be placed within 150 feet of the waterway; stormwater must be treated to achieve a 95 percent reduction of total suspended solids, temperature must be addressed to ensure no impact on the receiving waterway, **the applicant must demonstrate that the functional value and overall condition of the special water resource protection area will be maintained to the maximum extent practicable**; a conceptual design meeting must be held between the applicant, the Department and the Soil Conservation District; and all encroachments under this section are subject to review and approval of the Department.

### **Proposed Disturbance of Inner 150-Foot**

The SWRPA requirements in the Stormwater Management Rules make no allowance for encroachment within 150-feet of a Category One Water or their tributaries in the same HUC 14 watershed. However, the Department recognizes that in extreme circumstances an allowance must be made for a linear development that has no feasible alternative route and for which the Department makes the findings required to grant a hardship waiver under the Flood Hazard Area Control Act Rules (N.J.A.C. 7:13-4.8), an Individual Permit under the Freshwater Wetlands Protection Act Rules (N.J.A.C. 7:7A-3) and under N.J.A.C. 7:7-1.10 of the Coastal Permit Program Rules, as applicable (see Response to comments 787-790 at 36 N.J.R. 751).

## **MINIMIZATION AND MITIGATION OF UNAVOIDABLE DISTURBANCE OF UNDISTURBED SWRPA**

Where an encroachment is approved by the Department under one of the noted circumstances, the Department will require minimization and mitigation of the impact to functional value. Functional value loss shall be assessed as described above. Minimization of the loss of functional value shall be determined as described below. Once minimized the loss of functional value shall be mitigated by planting other disturbed areas of SWRPA with native trees on a 2:1 area basis. The exception to forest-type revegetation would be where a grassland species is the basis for a designation as high value habitat; in this case, revegetation shall be with meadow species. The hierarchy for placement of the mitigation is provided below. Additional mitigation requirements, depending on the functional value reduced, are as follows:

### **Temperature:**

- 1) Provide shading, on a 2:1 basis, of impervious surfaces off-site that contribute stormwater to the waterway such as through tree planting in parking lot islands; and
- 2) Select stormwater management measures which minimize temperature impact such as:
  - a. Infiltrate all runoff for the water quality design storm;
  - b. Detention of stormwater underground in such as way as to lower temperature; or
  - c. All runoff for the water quality design storm from non-vegetated, developed areas is treated by a bioretention basin, sand filter or other media passing through a minimum of three feet of filter media below grade. It must also be demonstrated that shading is provided to prevent increases in temperature for water ponded within a stormwater management BMP until the runoff is infiltrated or filtered through the water quality device. Shading of the water quality basin must not impede vegetative growth in the basin.

### **Nonpoint Source Pollutant Load:**

The loss of functional value must be minimized by locating the disturbance in the portion of the SWRPA that currently affords the least pollutant load reduction in accordance with the loading coefficients in Attachment A.

### **Habitat:**

Impact on habitat value shall be minimized by placement of the disturbance in the portion of the buffer with the lowest value in accordance with the Landscape Maps of Habitat for

Endangered, Threatened and Other Priority Wildlife and Priority Habitats and avoiding Natural Heritage Priority Habitats (other than macros). If no high value habitats are identified on the site, the disturbance should be located outside of climax forest communities and successional areas in non-woody vegetated locations.

**Channel Integrity:**

For the project as a whole, manage the stormwater generated so that the post-construction stormwater does not exceed the volume, rate or velocity of the current condition for the 2-year storm event;

**General requirements for encroachment and revegetation mitigation:**

A. All development that has received an approval from the Department must ensure that the remainder of the SWRPA is restricted by deed restriction or conservation easement from future development and to ensure that mitigation required for the approval is maintained.

B. Any mitigation requiring the planting or establishment of vegetation shall be performed in the following hierarchical order:

- 1) Portions of the inner 150 feet of SWRPA that are unvegetated on-site
- 2) Portions of the outer 150 feet of SWRPA that are unvegetated on-site
- 3) Portions of the inner 150 feet of SWRPA that are unvegetated off-site within the same HUC 14
- 4) Portions of the outer 150 feet of SWRPA that are unvegetated off-site within the same HUC 14
- 5) In all cases, provide a contiguous buffer with existing vegetated areas to the same stream, such that the mitigation area as well as the existing vegetated area will form a restricted contiguous corridor from the mitigation site to the stream.

Attachment A (revised 7/24/07)

All units expressed in lbs/acre/year, except fecal coliform which is expressed as CFU			Total phosphorus	Total nitrogen	Total suspended solids	Biological oxygen demand	Lead	Zinc	Copper	Fecal coliform
Type	LanduseCode	SubType								
Agriculture	2100	Crop/Pasture	2.17	10.78	1,378	16.0	0.062	0.089	0.027	1.4E+10
	2120	Pasture	0.43	3.68	448	14.9	0.009	0.089	0.027	1.4E+10
Barrenland	1700	Barrenland	40.08	2.32	20,007	3.1		0.002		
Forest	4200	Coniferous	0.30	3.72						
	4100	Deciduous	0.07	2.43						
	4300	Mixed Forest	0.13	2.43	45	4.5	0.009	0.018	0.027	1.2E+10
Urban	1300	Commercial & Industrial	2.68	20.63	1,985	31.4	1.409	1.598	0.930	1.8E+04
	1200	Commercial & Services	1.78	11.33	734	42.1	0.955	0.873	0.784	5.0E+09
	1150	Mixed Residential	0.50	5.03	143		2.067	1.264	0.994	4.1E+10
	1600	Mixed Urban	1.17	9.76	1,029		5.657	3.102	3.450	2.0E+04
	1110	Residential (High density)	2.13	5.99	343	35.1	0.447	0.527	0.313	1.6E+10
	1130	Residential (Low density)	0.47	2.77	81	8.5	0.217	0.172	0.190	8.3E+09
	1120	Residential (Medium density)	0.73	5.65	191	16.1	0.123	0.143	0.140	
	1400	Transportation	1.12	5.35	667	67.2	1.922	0.863	0.144	1.6E+08
Wetlands	6000	Wetlands	0.22	4.90	24*	13.9*	*			

For parameters where no value is provided for coniferous or deciduous forest, use mixed forest value for all forest types.

For BOD, where land use is best described as mixed residential or mixed urban, defer to the next closest land use type: residential-high, medium or low, commercial or industrial.

For Wetlands and Barrenland, some metals and fecal coliform lack values: if these land uses are part of the conversion comparison, omit the analysis of parameter(s) for which values are missing.

\*The values in these cells were revised 7/24/07 as they were misaligned in the original table.

