

MILESTONE 4A:
REGULATORY STANDARDS
FOR THE DEAL LAKE WATERSHED
REGIONAL STORMWATER MANAGEMENT PLAN

PREPARED BY
THE DEAL LAKE COMMISSION
LEAD PLANNING AGENCY

AND

PRINCETON HYDRO, LLC

Standards

This section presents the regulatory standards that will be mandated by law under N.J.A.C. 7:8-3.6 upon NJDEP adoption of the Deal Lake Watershed Regional Stormwater Management Plan. The influx of sediment into Deal Lake has historically been on the major problems impacting this waterbody. As well as cause the lake to look turbid and muddy, the sediment impair the lake's clarity, causes the infilling of the lake's littoral areas, degrades habitat, and is a source of particulate phosphorus. Sediment inputs are largely the result of unmitigated stormwater runoff that both transport eroded soils into the lake and, as a result of storm flow related scouring, erodes the bed and banks of the tributaries. This is most evident within the Hollow Brook and Harvey Brook tributaries. To control sediment loading, the RSWMP will establish a TSS removal standard of 90% for all new development, including redevelopment projects. Preferably, this minimum TSS removal requirement will be satisfied on site. However, when not possible or practicable it can be satisfied as part of a regionally based mitigation solution.

To address the RSWMPC's concern of the increase in both volume and rate of flow that causes flooding and stream bank erosion in the watershed, the standard for recharge for all development, including redevelopment, will be set at 110% as per GSR-32. Preferably, this recharge requirement will be satisfied on site. However, when not possible or practicable it can be satisfied as part of a regionally based mitigation solution.

In addition to sediment related impacts, the influx of phosphorus also significantly impacts water quality by increasing the lake's trophic state and promoting the development and magnitude of algae blooms and invasive aquatic plant growth. Minimization of sediment loading to the lake will prove beneficial to the minimization of the lake's phosphorus load as much of the phosphorus entering the lake is in a particulate form. The significance of phosphorus loading on the long-term health and ecology of the lake is reflected in the fact that the EPA-approved phosphorus TMDL attributes phosphorus impairment almost exclusively to nonpoint stormwater sources and calls for a 79% reduction in phosphorus loading. Satisfaction of the TMDL requires the reduction of stormwater conveyed nutrient loading to the lake. In order to accomplish this, phosphorus and nitrogen standard removal rates of a 60% and 30%, respectively will be implemented as part of the RSWMP. These removal rates are consistent with the minimum standards identified in the NJDEP BMP Manual (2004) for bioretention systems. Preferably, these minimum TP and TN removal requirements will be satisfied on site. However, when not possible or practicable they can be satisfied as part of a regionally based mitigation solution.

Finally, bacterial impairments are well documented in Deal Lake. Routinely the lake's bacteria levels, as measured through indicator surrogates such as fecal coliform and *E. coli*, exceed State standards for direct contact. As it is the goal of the DLC and the NJDEP to restore Deal Lake to a condition that is swimmable and fishable (that is suitable for direct contract recreation) the RSWMP will seek to reduce bacteria contamination. The most obvious and well documented contamination of this nature results from illicit sanitary connections. Some of this is a result of failing or breeched sanitary infrastructure and some is due to illegal cross-connections to the

stormwater collection system. As such, within the RSWMP bacterial impairments will be addressed by mandatory illicit connection inspections and elimination.

Measures

The standards in Plan A address water quality, quantity, and recharge using the following measures:

1. Ordinances
 - Fertilizer Application Ordinance
 - Riparian Buffer Conservation Ordinance
 - Waste Reduction Ordinances
 - 1.3.1 Yard Waste
 - 1.3.2 Pet Waste
 - 1.3.3 Litter
 - 1.3.4 Improper Waste Disposal
 - 1.3.5 Wildlife Feeding
2. Zero Silt Runoff
3. Mandatory Illicit Connection Inspection and Elimination
4. Coastal Lakes Committee
5. DLC as review board for all new and re-developments

The following paragraphs discuss each measure in greater detail including rationale and implementation strategy.

1. Ordinances

The following ordinances are presented as a means of alleviating, correcting and reducing the outstanding water quality problems identified above and documented within the RSWMP. All ordinances will be reviewed and approved by the DLC prior to municipal adoption. It should be noted that some of the member municipalities as part of their MSWMP requirements have already adopted and are enforcing some of the ordinances listed below.

1.1 Fertilizer Application Ordinance

Rationale

Elevated levels of nutrients, particularly phosphorus, in surface waterbodies can result in a eutrophic system. A system that is eutrophic tends to support an excessive and accelerated growth of algae and aquatic plants that degrades the aesthetic and recreational value of a waterbody. Enhanced plant and algae growth can also degrade conditions for aquatic life

because dissolved oxygen levels in the water drop when dead plant material decomposes; low levels of dissolved oxygen can cause fish kills in many lakes and streams in New Jersey.

When applied improperly, in excessive amounts, or at the wrong time, fertilizer use can degrade water quality and cause the conditions of the receiving waterbody to become eutrophic. Most soils in New Jersey contain sufficient amounts of phosphorus to support adequate root growth for established turf. Over time, it is necessary to replenish available phosphorus, but generally not at the levels commonly applied. A soils test and fertilizer application recommendation geared to the soil and planting type is the best means to determine the amount of nutrients to apply to a lawn.

The results of the RSWMP water quality monitoring of Deal Lake clearly demonstrate that phosphorus concentrations in the lake are at elevated levels that are conducive of eutrophic conditions. Measured concentrations of total phosphorus (TP) exceeded the 2006 New Jersey State Surface Water Quality Standard (found at N.J.A.C. 7:9B) during every sampling event of the 2005 monitoring program with one exception. During the late summer sampling events in August and September, TP concentrations in Deal Lake were routinely measured in the 0.2 and 0.3 mg/L range, which is 4 to 6 times greater than the State standard of 0.05 mg/L. These in-lake concentrations are much greater than that needed to stimulate and support a dense algae bloom. Furthermore, there is a TMDL for Deal Lake for phosphorus. All water quality monitoring results for the RSWMP are included in the Characterization and Assessment Report that was completed as part of Milestone 2.

A solution to the improper or excessive use of fertilizers is to regulate its use by means of an ordinance. A non-phosphorus fertilizer application ordinance will help protect water quality of Deal Lake by aiding in the overall decrease in phosphorus loading. The ordinance will have its greatest positive impact when implemented to regulate the use of phosphorus fertilizers on lakeshore lawns. However, its utility and benefit can be will be implemented and will be enforced.

Implementation Strategy

Within 12 months following the adoption of the RSWMP, the DLC member watershed municipalities will adopt and enforce a non-phosphorus fertilizer application ordinance its adoption. The ordinance will be based on similar existing ordinances passed and in effect in Sparta (Lake Mohawk watershed) and in Hopatcong, Jefferson, Roxbury and Mt. Arlington (Lake Hopatcong watershed). The DLC RSWMP municipalities may also chose to adapt the NJDEP model ordinance, presented in Appendix A.

The ordinance must state that a soil test is required prior to selection and application of fertilizer. Only fertilizers that contain no more than 2 % phosphorus or other compounds containing phosphorus, such as phosphate, may be applied to all lawns that border any section of Deal Lake, including its coves, tributaries, main stem and headwaters streams feeding the lake. Allowances will be made for the establishment of new lawns and the maintenance of trees or shrubs. Municipalities will work with the DLC and local businesses to promote low phosphorus

products and these businesses will post signage in a conspicuous spot communicating to customers the regulations set forth in this ordinance and the effects of phosphorus on Deal Lake.

The no-phosphorus fertilizer element of the plan will be promoted on the DLC website and through presentations made to the Township Committee of each DLC community. Soil testing facilities will be identified by the DLC (County Agricultural Extension Service and Rutgers) so as to make it easy for the community to obtain such testing services. In concert with the ordinance and outreach effort, the DLC will develop and implement an educational campaign. The DLC will make full use of similar successful educational programs developed and implemented by others including Rutgers Agricultural Extension Service, the Lake Hopatcong Commission and the Lake Mohawk County Club. The educational program will again make full use of the DLC website to promote and distribute educational materials and flyers dealing with the benefits of phosphorus management and mandatory compliance with the phosphorus fertilizer ordinance.

1.2 Riparian Buffer Conservation Ordinance

Rationale

Natural riparian areas, or streamside buffers, provide various functions, many of which are a direct benefit to public health and safety. Ecologically, streamside or riparian buffers provide critical habitat for many aquatic organisms or organisms that rely on the lake and its tributaries for foraging, nesting or refuge habitat. Riparian buffers are also important in the maintenance of water quality as they serve to filter runoff, attenuate flood volumes and flows and maintain the physical stability of stream or lake banks. When riparian buffers are undisturbed and in a natural vegetated state, the combined ecological function of the stream and the riparian corridor is maximized. Riparian buffers provide ecological functions such as:

- provide shade that reduces water temperature;
- filter sediments and other contaminants;
- reduce nutrient loads of streams;
- stabilize stream banks with vegetation;
- reduce erosion caused by uncontrolled runoff;
- provide riparian wildlife habitat;
- protect fish habitat;
- maintain aquatic food webs;
- provide a visually appealing greenbelt;
- provide recreational opportunities; and
- reduce flooding by absorbing water.

In contrast, as the riparian corridor becomes increasingly denuded of vegetation, disturbed, colonized by non-native, invasive vegetation or increasingly covered by impervious surfaces, these areas lose their ecological function and their ability to reduce or mitigate the impacts of stormwater runoff.

Buffer width is an important factor in maintaining the functional attributes of the riparian corridor, including maintenance of the water quality and ecological function of the associated waterway. Even a small buffer (i.e. 25 feet in width) provides some ecological and stability benefit. However, as recognized by the NJDEP riparian corridor widths of greater dimension are more likely to substantially reduce polluted runoff, provide an effective habitat for wildlife, ensure flood control and maintain the stability of stream banks and lake shorelines. **The Riparian Buffer Conservation Ordinance for the Deal Lake watershed will therefore require a minimum buffer of 100 feet as measured from top of bank.**

The Deal Lake watershed has quickly become a developed landscape with large amounts of impervious surfaces. Large, in-tact forested buffers are few and invasive species, such as *Phragmites* and Japanese knotweed (*Fallopia japonica*), are prevalent throughout the stream corridors of both Harvey Brook and Hollow Brooks. As previously noted, due to the erosive and acidic nature of the soils that are predominant in the Deal Lake watershed, once disturbed and cleared in some capacity of vegetation, it is difficult to revegetate the banks. This leads to stream bank erosion and failure which in turn contribute to the lake's sedimentation problems.

A Riparian Buffer Conservation Ordinance will be adopted and will be enforced in order to prevent further degradation of riparian areas throughout the Deal Lake watershed. By ensuring a functioning riparian buffer, the amount of sediment, nutrients and other pollutants entering Deal Lake will be alleviated. As the streams flowing into Deal Lake are FW2-NT, the maximum existing buffer is 50 feet from the top of bank as per the recently enacted NJ Flood Hazard Area Rules (N.J.A.C. 7:13). The proposed 100' buffer is justified given the erosion, low nutrient and acidic soils prevalent in the Deal Lake watershed. As emphasized above, once denuded of vegetation these soils are difficult to revegetate. It should be noted that in areas where there are documented acid producing soils, the buffer will be 150' as in keeping with the Flood Hazard Area Rules (7:13-4.1(c)2).

Implementation Strategy

Watershed municipalities will adopt and will enforce an ordinance to address riparian buffer conservation within 16 months of the adoption of the RSWMP. The NJDEP model ordinance in Appendix A provides a resource for municipalities. The Deal Lake watershed municipalities are to draft, adopt and enforce this ordinance. The timeframe set for this element of the RSWMP is 18 months of the adoption of the RSWMP.

1.3 Waste Reduction Ordinances

Rationale

Watershed municipalities will adopt and will enforce the five (5) following ordinances upon approval of this RSWMP; these measures are in accordance with NJPDES permit requirements for Tier A municipalities. Municipal code enforcement officers and local police officers will enforce these ordinances. Violators of these ordinances will be issued a warning for first time offenses, but penalties, as determined by the DLC in concert with the member

municipalities, will be levied for subsequent offenses. A copy of each ordinance, as adapted from the NJDEP sources is included in Appendix A.

1.3.1 Yard Waste

Regular yard waste collections help to ensure that the wastes are not transported to storm sewers and eventually discharged into the lake or its tributaries. Dumped yard waste can clog stormwater systems, causing flooding and requiring additional maintenance at municipal expense. If yard wastes enter local waterways, they remove oxygen from the water during the decomposition process and lead to increased nutrients, which cause excessive plant and algal growth.

Each watershed municipality will adopt and will enforce an ordinance that prohibits placing yard waste in the street closer than 10 feet to any stormwater inlet and leaving said waste in the street for a period in excess of seven (7) days. The ordinance will also strictly prohibit the direct or indirect (e.g., leaf blowing) dumping of leaves or other yard waste into the lake.

Supplementing this ordinance will be an educational program and related outreach materials posted on the DLC website dealing with yard waste management. Within these educational materials the DLC will encourage property owners to compost yard materials.

1.3.2 Pet Waste

Pet waste can be a significant source of organic pollutants and pathogens. When pet waste is left on sidewalks and streets and is not properly disposed of, it may be transported into storm drains during precipitation events. The storm drains and inlets within the Deal Lake watershed for the most part have no associated best management practice (BMP). As a result any pet waste washing off of the watershed into the stormwater collection system is most likely conveyed into the lake. As noted above, Deal Lake is impacted by bacterial contamination. It is highly likely, as underscored by a recently completed study of the watershed conducted by Monmouth University, pet waste is a documented source of this contamination.

By controlling pet waste, pollutant loading entering the lake and its tributary surface waters is reduced. Watershed municipalities will therefore adopt and enforce an ordinance that requires pet owners or their keepers to immediately and properly collect and dispose of pet waste deposited on any property, public or private, not owned or possessed by that person. It should be noted that some of the DLC communities have in effect such an ordinance. Supplementing this ordinance and the ongoing efforts of the member municipalities will be an educational program and related outreach materials posted on the DLC website dealing with pet waste management. Information on the Pet Waste Ordinance and the benefits of proper disposal of pet wastes could also be distributed with pet licenses.

1.3.3 Litter (Floatables)

The accumulation of floatables in Deal Lake is pervasive and a growing concern of many residents and municipal officials. Several volunteer clean-ups are routinely scheduled by the DLC and other community groups to address this litter. Littering not only causes aesthetic problems throughout the Deal Lake watershed, but can also significantly impact receiving waters. When litter reaches these surface water bodies it can have negative impacts on aquatic life and other wildlife. The accumulation of litter, trash and floatables at the lake's flume can exacerbate flooding problems by clogging the protective grate and potentially becoming lodged within the flume itself.

Similar to the yard waste ordinance, the Deal Lake member municipalities will adopt and enforce a floatable/litter ordinance to help prevent the discharge of urban trash and litter such as wrappers, soda cans and bottles, and other refuse into the lake, its tributary streams or the stormwater conveyance systems that collect and direct runoff into the lake or any of the feeder streams. Supplementing this ordinance will be an educational program and related outreach materials posted on the DLC website dealing with litter control and floatable management.

1.3.4 Improper Waste Disposal

The improper disposal of pollutants can have a negative effect on surface and ground water quality in the Deal Lake watershed. Allenhurst Borough has already implemented an ordinance addressing illegal discharge of wastes. Failure to properly dispose of materials like automotive fluids, motor oil, lawn and garden supplies, household cleaning supplies, and paints and solvents, can have a direct impact on the water quality of the lake and its streams. Watershed municipalities will adopt and will enforce an ordinance prohibiting the improper spilling, dumping, or disposal of materials into the catch basins and stormwater collection devices within the lake's watershed. Supplementing this ordinance will be an educational program and related outreach materials posted on the DLC website.

1.3.5 Wildlife Feeding

Feeding wildlife, especially Canada geese, is detrimental to the environment. Feeding of geese can result in poor nutrition, delayed migration, spread of disease, overcrowding, unnatural behavior, water pollution, and aggressive behavior. Feeding attracts wildlife in unnatural numbers, typically in excess of densities that can be supported by natural food sources. Fecal contamination of public areas resulting from these high densities degrade user enjoyment and can actually create conditions that are intolerable to people. This overcrowding often results in overgrazing which can lead to erosion that in turn exacerbates sediment erosion and transport into the lake and its streams. The nutrients associated with this waste material can result in water-quality problems such as bacterial contamination, algal blooms, impacted habitat, fish kills, unpleasant odors and sanitary problems.

In 2006, DLC initiated a goose management program; this Wildlife Feeding Ordinance, which will prohibit the feeding of geese, will complement the past management efforts of volunteers and serve as an effective means to further reduce the amount of goose waste polluting

Deal Lake. Watershed municipalities will adopt and will enforce a wildlife feeding ordinance to prohibit the feeding of wildlife on municipally owned or operated property, including municipal parks. This prohibition will help prevent nutrients, organic pollutants, and pathogens associated with wildlife (in particular Canada goose) fecal matter from entering the lake and its tributaries. The control of geese will also help prevent overgrazing of common lawn areas thus avoiding erosion related problems. It should be noted that this ordinance would allow residents to have and maintain backyard bird feeders if they are located on private property. Supplementing this ordinance will be an educational program and related outreach materials posted on the DLC website.

Implementation Strategy

Watershed municipalities will adopt the five waste reducing ordinances within 6 months of NJDEP adoption of this RSWMP. Since many of these ordinances are State Basic Requirements (SBRs) for Tier A municipalities, for many of the Deal Lake watershed municipalities these ordinances are either already in place or have been promulgated to some capacity independent of the RSWMP. Municipal code enforcement officers will be the primary enforcement authority.

2. Zero Silt Runoff

Rationale

One of Deal Lake's most significant and ongoing problems is the introduction of sediment and silt from the surrounding watershed. The magnitude of external sediment influxes to the lake have been great enough to necessitate the dredging several sections of the lake. These past dredging efforts have collectively removed in excess of 100,000 cubic yards of sediment at a cumulative cost of well over \$2,000,000. Lakeshore residents attending the monthly meetings of the DLC consistently voice concerns about sedimentation its deleterious effects on the aesthetic and recreational value of the lake. The major tributaries to Deal Lake, Harvey Brook and Hollow Brook, are major conduits for sediment transport. A major source of the sediment problem is watershed development. In the past development has proceeded with inadequate stormwater management. Even with the passage of the new stormwater regulations, new development and the redevelopment of previously developed properties continues with minimal effort to control sediment loading to the lake.

The NJ Soil Erosion and Sediment Control Standards apply to all new construction disturbing greater than 5,000 square feet. This RSWMP will impose the State standards on all new construction and redevelopment related activities occurring within 500' of the lake or any of its tributaries that disturbs greater than 1,000 square feet. Projects determined subject to the Zero Silt Runoff requirements will first develop and submit for the review and approval by the Deal Lake Commission the proposed erosion and sediment control plan before submitting such plan to the Freehold Soil Conservation District. The plan must identify in detail the measures that will be implemented to avoid soil disturbance and mitigate any such disturbance such that any time over the course of the subject project no silt is conveyed into the lake, its tributaries or a stormwater collection system that discharges to the lake or its tributaries.

The plan must include access approval for the DLC or its representative to inspect all erosion and sediment control practices proposed for a project over the life of the project. The DLC or its representatives will be allowed access to the site for routine inspection at a minimum weekly and following every significant rain event.

In addition to the standard erosion and sediment control techniques and materials (e.g., hay bales and silt fencing), developers will be encouraged to use of additional runoff management techniques such as those highlighted below:

Examples of inlet and storm drain protection devices	
Ultra-Inlet Guard [®]	http://www.spillcontainment.com/products/stormwater/catch_basin/inletguard.htm
Ultra-Grate Guard [®]	http://www.spillcontainment.com/products/stormwater/catch_basin/grateguard.htm
Ultra-Drain Guard [®]	http://www.spillcontainment.com/products/stormwater/catch_basin/drainguard.htm
Inlet Filter	http://www.blocksom.com/sedimenterosioncontrol_moreinfo.htm
IPP Inlet Filter	http://www.inletfilters.com/index.php

For those sites where extreme conditions exist (e.g., slopes > 15%, located within 100” of the lake, etc.) the DLC will encourage developers to use advanced soil erosion control practices such as polymers (e.g., Soiltac[®] Soil Stabilizer <http://www.soiltac.com/>, PAM-12 <http://www.encap.net/ProductGuide/PAM12ErosionGranules/tabid/79/Default.aspx>, Terra Tubes http://www.profileproducts.com/erosion_control/product.cfm?category=50&product=tr-tbs_fbrflttbs). The DLC will also require where needed the use of Erosion Control Blankets or Fiber Matrices and Hydroseeding to facilitate the rapid stabilization and revegetation of bare soil.

The Zero Silt Runoff requirements will be backed by a regular maintenance schedule to be implemented by the developer of any of the approved soil erosion control, sediment trapping devices, or other measures implemented to retain soils on the project site. These inspections will be conducted by trained professionals identified and hired by the developer. As noted above, the DLC will conduct periodic independent inspections of the project sites.

Implementation Strategy

Watershed municipalities must draft an ordinance supporting the Zero Silt Runoff requirements within 18 months of the adoption of the RSWMP. Each and every construction site, including new and re-development sites, will adhere to the Zero Silt Runoff strategy. The Zero Silt Runoff strategy will be implemented with assistance from the building inspectors and planning boards of the member municipalities as a mandatory checklist item that must be satisfied in advance of the issuance of any building permit or development approval. Inspections will be conducted by the DLC’s representatives and compliance required through the building inspectors and/or board or township engineer of the member municipalities located within the DLC watershed.

5. Mandatory Illicit Connection Detection and Elimination

Rationale

Illicit connections can be a common problem in urban areas, especially in older communities with aging infrastructure. Past studies suggest that illicit connections throughout the Deal Lake watershed are intentional, accidental, or a function of aging infrastructure. Clearly given the lake's long-standing bacteria related impacts, if illicit connections are not detected and eliminated, contaminated wastewater will continue to enter into storm drains or directly into the lake or its tributaries. High bacterial concentrations and excessive nutrient concentrations are common indicators of a possible illicit connection.

Deal Lake appears on Sublist 5 for fecal coliform (FC) and Hollow Brook has a TMDL for fecal coliform. The RSWMP water quality monitoring results included FC measurements for five dates between July and September 2005. The sampling was conducted at two in-lake stations and two tributary stations. At one in-lake station and at the Hollow Brook tributary station, FC concentrations were routinely elevated and contravened the 2006 State Surface Water Quality Standards (N.J.A.C. 7:9B). At this in-lake station, on two sampling dates, FC concentrations were elevated enough to exceed the laboratory's limit of detection (>1600 CFU/100 ml). The second in-lake station was the only station where FC concentrations did not exceed 200 CFU/100 ml, the State standard. In fact, the highest concentration recorded at this station was 120 CFU/100 ml, as measured in July. However, these lower FC numbers may be a function of the periodic saline conditions measured in the lower reaches of the lake near the lake's flume. The nominal, but measurable salinity may mitigate the affects of the FC loading. Conversely, this may also be a function of the greater dilution volume associated with the lake's main body. All water quality monitoring results for the RSWMP are included in the Characterization and Assessment Report that was completed as part of Milestone 2.

Illicit discharge detection and elimination programs are designed to prevent contamination of the lake and its tributaries via monitoring and inspection and the subsequent repair and elimination of these illegal non-stormwater discharges. The first step of the detection initiative is to complete thorough mapping of the sanitary sewer system within the watershed. Most of this work was previously done by the DLC municipalities, and some of this was recently updated as part of the MSWMP requirements of the municipalities. An essential element of this initiative is the authority to inspect properties suspected of releasing contaminated discharges into storm drain systems. Another important element is the establishment of enforcement actions for those properties found to be in noncompliance or that refuse to allow access to their facilities.

Implementation Strategy

Watershed municipalities must draft a detection and elimination plan to address illicit connections within 18 months of the adoption of the RSWMP. The model plan in Appendix A includes language to address illicit discharges in general, as well as illicit connections from industrial sites. The language is borrowed from a number of ordinances and communities will

need to assess what enforcement methods are appropriate for their area. Other resources may be used such as Center for Watershed Protection.

Responsible Party: Watershed municipalities to draft, adopt, implement and enforce plan.
Timeframe: Watershed municipalities are to draft and implement a plan to address illicit connections within 18 months of the adoption of the RSWMP.

4. Coastal Lakes Stormwater Committee

Rationale

In order to better disseminate watershed information, learn about new technologies, educate municipal employees, and create opportunities for roundtable discussions about stormwater issues, a Coastal Lakes Stormwater Committee will be formed composed of members of the DLC, Deal Lake municipal representatives, Monmouth County Planning and Engineering, Monmouth County Mosquito Commission, Monmouth University Coastal Zone Institute, Rutgers Cooperative Extension and other interested groups that manage stormwater in Coastal Region of New Jersey.

Implementation Strategy

A Coastal Lakes Stormwater Committee should be formed within 6 months of NJDEP adoption of the Deal Lake RSWMP. Members should meet no less than 4 times per year. The Committee will organize yearly stormwater conferences or training workshops for municipal officials and employees.

5. Site development review by the Deal Lake Commission

Rationale

In order to achieve proper long term management of the Deal Lake watershed, all applications requiring local site plan approval will be subject to review by the DLC. This applies to new and redevelopment proposals. The DLC will not usurp the approval powers of the governing municipality, planning board or zoning board, but rather will function in an advisory capacity similar to an environmental commission. Site development review by the DLC will ensure that the regulatory and structural measures that affect water quality are addressed in the stormwater management, environmental protection, erosion control and related mitigative strategies proposed by the developer.

As the state-appointed stewards of Deal Lake, the DLC is the most appropriate entity to review development proposals that could potentially disturb soil, stress existing infrastructure, increase impervious surface and impact water quality, quantity and recharge. The DLC represents an active and knowledgeable contingency of volunteers and environmental professionals that are able to perform technical and regulatory review and provide comment that is both practical and representative of progressive stormwater practices. The actual review of the plans will be

conducted by the DLC's professionals with the fee for these review services paid for by the applicant.

This RSWMP will mandate the DLC as a review board for site development and comment on all applications for all major development or redevelopments of significant proportion, as well as for any projects that results in a significant amount of soil disturbance (>1000 ft²) in areas located within 500' of the lake proper or any of its tributaries. Development or redevelopment plans must be approved by DLC prior to the issuance of local approvals.

If a project fails to fully comply with N.J.A.C. 7:8-5, Design and Performance Standards for Stormwater Management Measures, the DLC will specify mitigation sites and projects within the Deal Lake watershed. These projects will be stormwater-related and will focus on improving water quality, decreasing the amount of runoff from the site, controlling sediment loading and promoting recharge to groundwater supplies. Where applicable, these projects will showcase Low Impact Development (LID) or green initiatives that conserve water, energy and use native vegetation to address non-point source pollution.

Implementation Strategy

Immediately following NJDEP adoption of the Deal Lake Watershed RSWMP, all applications for development and redevelopment within the watershed will be required to submit plans to the DLC for review and comment.

6. Long-term Monitoring Program

As per N.J.A.C. 7:8-3.1, a long term monitoring program will be drafted and implemented in order to assess the success of the measures of the RSWMP. For all BMP sites, a detailed water quality monitoring plan will be prepared prior to installation of the stormwater management device. The plan will include a QAPP. Post installation monitoring will occur following the installation or the construction of the BMP and the resulting data utilized to quantify the removal rate of the selected BMP. Removal rates will be calculated using the EPA Region 5 model, StepL (Spreadsheet Tool for Estimating Pollutant Load). This model is easy to use and is available as a download from the EPA website in Microsoft Excel format.

Supplementing the BMP specific pre- and post-installation monitoring will be a lake and tributary sampling program that enables the DLC to not only maintain a running long-term database on the status of the lake, but to gauge the positive impacts of the RSWMP initiatives. The monitoring plan will include a QAPP and be designed so as to generate data much in the manner as that generated through the RSWMP monitoring effort. Specifically the monitoring program will entail the following:

Deal Lake and its tributaries will be monitored eight (8) times through the course of the growing season, from May through October. A total of four (4) in-lake sampling stations and five (5)

tributary stations will be monitored during each sampling event. All sampling will be conducted under baseflow conditions, with baseflow defined as a condition of 72 continuous hours where less than 0.5 inches of rain has fallen. The sampling events will intentionally span different seasons and a variety of baseflow conditions in order to document and quantify the variability in water quality condition at baseflow. As a result, there will be no restrictions on either flow or dissolved oxygen prior to sampling.

The location of all lake and stream sampling stations will be recorded in the field using GPS technology. The GPS locations will be integrated into the GIS map of sampling stations prepared as part of this project. Four (4) sampling stations will be located within the main body of Deal Lake: Station #1, upstream of the flume and below the Park Ave./Norwood Ave. bridge; Station #2, near the railroad bridge; Station #3, in the southern arm of the lake near the Sunset Ave. bridge; and Station #4, in the northern arm of the lake near the Corlies Ave. bridge. One (1) additional station will be located within each of the lake's five (5) main tributary streams: Station #5, in Harvey Brook (formerly known as Hog Swamp Brook) at end of Wickapecko Drive (Ocean Twp.); Station #6, upstream of Wickapecko Drive (Ocean Twp.); Station #7, in the unnamed tributary off English Lane and Dorset Road (Ocean Twp.); Station #8, in the unnamed tributary behind Lincoln Drive (Colonial Terrace Golf Course, Ocean Twp.); and Station #9, in Hollow Brook at the Route 35 crossing (Neptune Twp.).

At each in-lake sampling stations, a calibrated Eureka Manta multi-probe will be used to monitor the in situ parameters dissolved oxygen (DO), temperature, pH and conductivity. Data will be recorded at 1.0 meter increments beginning at 0.5 meters below the water's surface to within 0.5 meters of the lake's sediment bottom. In addition, water clarity will be measured at each station with a Secchi disk. At each tributary sampling station, the same calibrated Eureka Manta multi-probe will be used to monitor the in situ parameters dissolved oxygen (DO), temperature, pH and conductivity. Data will be recorded within a flowing portion of the tributary.

Discrete water quality samples will be collected at the in-lake sampling stations of Deal Lake approximately 0.5 meters below the water's surface with a Van Dorn or Kemmerer sampling bottle. These samples will be collected and delivered to a State-certified laboratory for the analysis of total phosphorus, SRP, TSS and nitrate-nitrogen. Additionally, discrete water samples will be collected at the Deal Lake tributary sampling stations and analyzed for total phosphorus, SRP, TSS and nitrate-nitrogen. Samples will also be collected at Stations # 1, 3, 5 and 9 and delivered to a State-certified laboratory for the analysis of fecal coliform and fecal streptococcus. It should be noted that Station #9 is located within Hollow Brook, for which a TMDL was approved by EPA in 2003 (NJDEP 2003). A field duplicate and rinse blank will also be collected during each sampling event. Field duplicates will be collected from a different sampling station, and for a different water quality parameter, during each individual sampling event.

Two methods of flow estimation will be used to cross-validate discharge estimates for each water quality sampling location. First, discharge measurements from the USGS station on the Manasquan River at Squankum (Station ID 01408000) will be obtained from the USGS for the dates and times of sample collection. This station was selected as the most hydrologically appropriate site within the Kirkwood-Cohansey formation. Discharge measurements from this

station will be obtained for each sampling date and time from the USGS, and estimates of flow at the project sampling stations will be obtained by area weighting the discharge measurements at this station with the watershed areas for each sampling station. These empirical discharge estimates will then be cross-validated with modeled discharges for each stream based on land cover, soils group, slope, and precipitation history for the upstream catchment of each sampling station. Specifically, the BASINS model will be used in combination with precipitation data from the National Weather Service station located at Freehold - Marlboro (Cooperative Network ID #283181) to model the expected discharge at each sampling station at the time of sampling. The two discharge values for each station will then be compared, with a final discharge calculated as a weighted average of the two flow estimates.

In addition to the water quality parameters, biological assessment of the stream invertebrate community will be conducted at a single stream sampling station located within each of the lake's five tributaries. The location of all stream sampling stations will be recorded in the field using GPS technology. The GPS locations will be integrated into the GIS map depicting sampling stations, prepared as part of this project.

Benthic macroinvertebrates will be sampled at each sampling station a single time in June in accordance with USEPA Rapid Bioassessment Protocols, NJDEP Ambient Biomonitoring Network (AMNET) guidelines, and Mid-Atlantic Coastal Streams Workgroup guidelines (see Section C above for detailed protocols).

Appendix A:
Model Ordinances