RCC Design, Inc.

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MUNICIPAL

STORMWATER MANAGEMENT PLAN

PREPARED FOR

TOWNSHIP OF WEST CALDWELL
ESSEX COUNTY, NEW JERSEY

PREPARED BY

RCC DESIGN, INC.
76 GOSHEN STREET
PATERSON, NEW JERSEY 07503

MARCH, 2005

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Introduction

This Municipal Stormwater Management Plan (MSWMP) documents the strategy for West Caldwell Township ("the Township") to address stormwater-related impacts. The creation of this plan is required by N.J.A.C. 7:14A-25 Municipal Stormwater Regulations. This plan contains all of the required elements described in N.J.A.C. 7:8 Stormwater Management Rules. The plan addresses groundwater recharge, stormwater quantity, and stormwater quality impacts by incorporating stormwater design and performance standards for new major development, defined as projects that disturb one or more acre of land. These standards are intended to minimize the adverse impact of stormwater runoff on water quality and water quantity and the loss of groundwater recharge that provides baseflow in receiving water bodies.

The final component of this plan is a mitigation strategy for when a variance or exemption of the design and performance standards is sought. As part of the mitigation section of the stormwater plan, specific stormwater management measures are identified to lessen the impact of existing development.

Goals

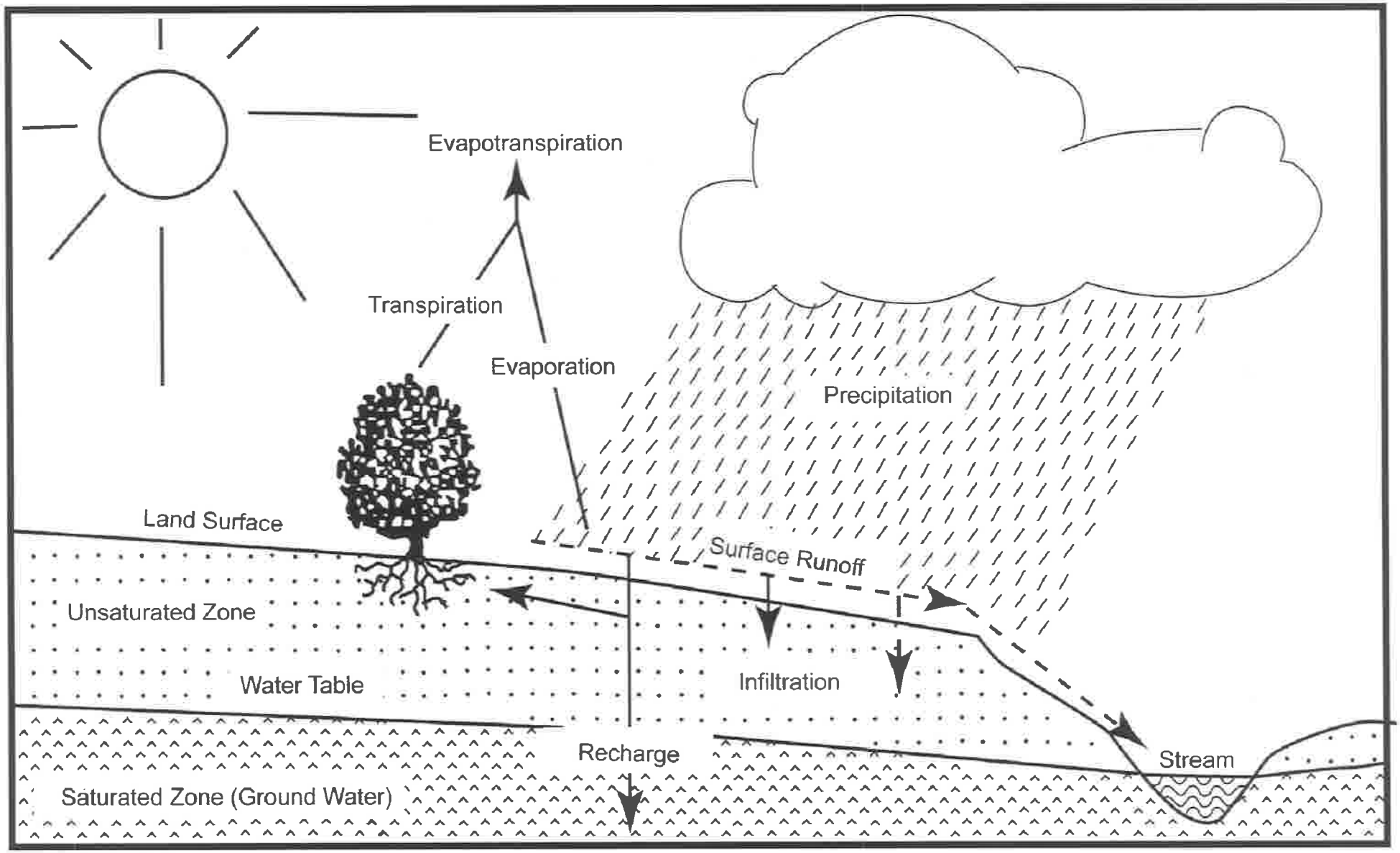
The goals of this MSWMP are to:

- reduce flood damage, including damage to life and property;
- minimize, to the extent practical, any increase in stormwater runoff from any new development;
- reduce soil erosion from any development or construction project;
- assure the adequacy of existing and proposed culverts and bridges, and other in-stream structures;
- maintain groundwater recharge;
- prevent, to the greatest extent feasible, an increase in non-point pollution;
- maintain the integrity of stream channels for their biological functions, as well as for drainage;
- minimize pollutants in stormwater runoff from new and existing development to restore, enhance, and maintain the chemical, physical, and biological integrity of the waters of the state, to protect public health, to safeguard fish and aquatic life and scenic and ecological values, and to enhance the domestic, municipal, recreational, industrial, and other uses of water; and
- protect public safety through the proper design and operation of stormwater basins.

To achieve these goals, this plan outlines specific stormwater design and performance standards for new development. Additionally, the plan proposes stormwater management controls to address impacts from existing development. Preventative and corrective maintenance strategies are included in the plan to ensure long-term effectiveness of stormwater management facilities. The plan also outlines safety standards for stormwater infrastructure to be implemented to protect public safety.

Stormwater Discussion

Land development can dramatically alter the hydrologic cycle (See Figure C-1) of a site and, ultimately, an entire watershed. Prior to development, native vegetation can either directly intercept precipitation or draw that portion that has infiltrated into the ground and return it to the atmosphere through evapotranspiration. Development can remove this beneficial vegetation and replace it with lawn or impervious cover, reducing the site's evapotranspiration and infiltration rates. Clearing and grading a site can remove depressions that store rainfall. Construction activities may also compact the soil and diminish its infiltration ability, resulting in increased volumes and rates of stormwater runoff from the site. Impervious areas that are connected to each other through gutters, channels, and storm sewers can transport runoff more quickly than natural areas. This



Source: New Jersey Geological Survey Report GSR-32.

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FIGURE C-1: GROUNDWATER RECHARGE IN THE HYDROLOGIC CYCLE

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shortening of the transport or travel time quickens the rainfall-runoff response of the drainage area, causing flow in downstream waterways to peak faster and higher than natural conditions. These increases can create new and aggravate existing downstream flooding and erosion problems and increase the quantity of sediment in the channel. Filtration of runoff and removal of pollutants by surface and channel vegetation is eliminated by storm sewers that discharge runoff directly into a stream. Increases in impervious areas can also decrease opportunities for infiltration which, in turn, reduces stream base flow and groundwater recharge. Reduced base flows and increased peak flows produce greater fluctuations between normal and storm flow rates, which can increase channel erosion. Reduced base flows can also negatively impact the hydrology of adjacent wetlands and the health of biological communities that depend on base flows. Finally, erosion and sedimentation can destroy habitat from which some species cannot adapt.

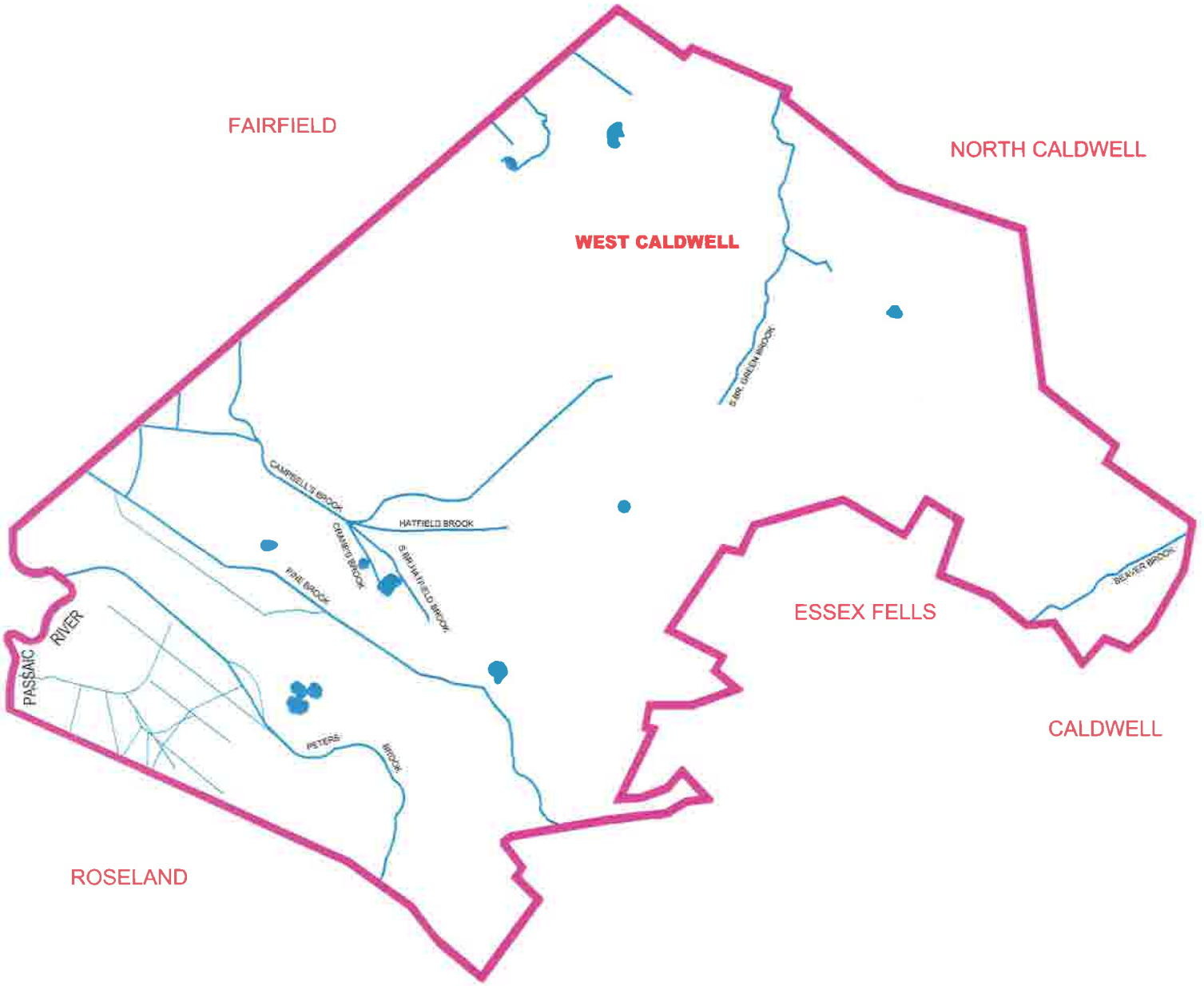
In addition to increases in runoff peaks, volumes, and loss of groundwater recharge, land development often results in the accumulation of pollutants on the land surface that runoff can mobilize and transport to streams. New impervious surfaces and cleared areas created by development can accumulate a variety of pollutants from the atmosphere, fertilizers, animal wastes, and leakage and wear from vehicles. Pollutants can include metals, suspended solids, hydrocarbons, pathogens, and nutrients.

In addition to increased pollutant loading, land development can adversely affect water quality and stream biota in more subtle ways. For example, stormwater falling on impervious surfaces or stored in detention or retention basins can become heated and raise the temperature of the downstream waterway, adversely affecting cold water fish species such as trout. Development can remove trees along stream banks that normally provide shading, stabilization, and leaf litter that falls into streams and becomes food for the aquatic community.

Background

West Caldwell Township encompasses a 5.13 square mile area in the western portion of Essex County, New Jersey. Since the development of the West Caldwell Flood Plain and Stormwater Management Ordinance in 1979, the Township of West Caldwell, through aggressive site plan review and zoning regulations that insure large areas of open space as well as density controls, has managed and mitigated impacts from storm water runoff generated by local development. Unfortunately, West Caldwell cannot control the higher density development occurring in surrounding communities what can impact stream flows in West Caldwell. Also, the Township of West Caldwell has no jurisdiction over these streams where they traverse private property. That responsibility is shared by the property owner, the NJDEP and, in some cases, the County of Essex, through their Mosquito Control operation. Figure C-2 illustrates the waterways in the Township. Figure C-3 depicts the Township boundary on the USGS quadrangle maps. The northern portion of the Township that drains toward Deepavaal Brook is part of NJDEP Watershed Management Area 4, Lower Passaic and Saddle. The remainder of the Township is located within NJDEP Watershed Management Area 6, Upper Passaic, Whippany, and Rockaway.

The New Jersey Department of Environmental Protection (NJDEP) has established an Ambient Bio-monitoring Network (AMNET) to document the health of the state's waterways. There are over 800 AMNET sites throughout the state of New Jersey. These sites are sampled for benthic macroinvertebrates by NJDEP on a five-year cycle. Streams are classified as non-impaired, moderately impaired, or severely impaired based on the AMNET data. The data is used to generate a New Jersey Impairment Score (NJIS), which is based on a number of biometrics related to benthic macroinvertebrate community dynamics. The one major river that borders the Township to the south and west is the Passaic River. There is an existing AMNET Station for the Passaic River at Eagle Rock Avenue in East Hanover, located approximately 0.8 river miles upstream from the West Caldwell Township border.



NORTH

REFERENCE: MAP SOURCE DATA, i-MAP NJ DEP

0 1250 2500 5000

(IN FEET)

1 inch = 2500 ft.

LEGEND

- TWP. BOUNDARY
- WATERWAYS

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FIGURE C-2: TOWNSHIP AND ITS WATERWAYS

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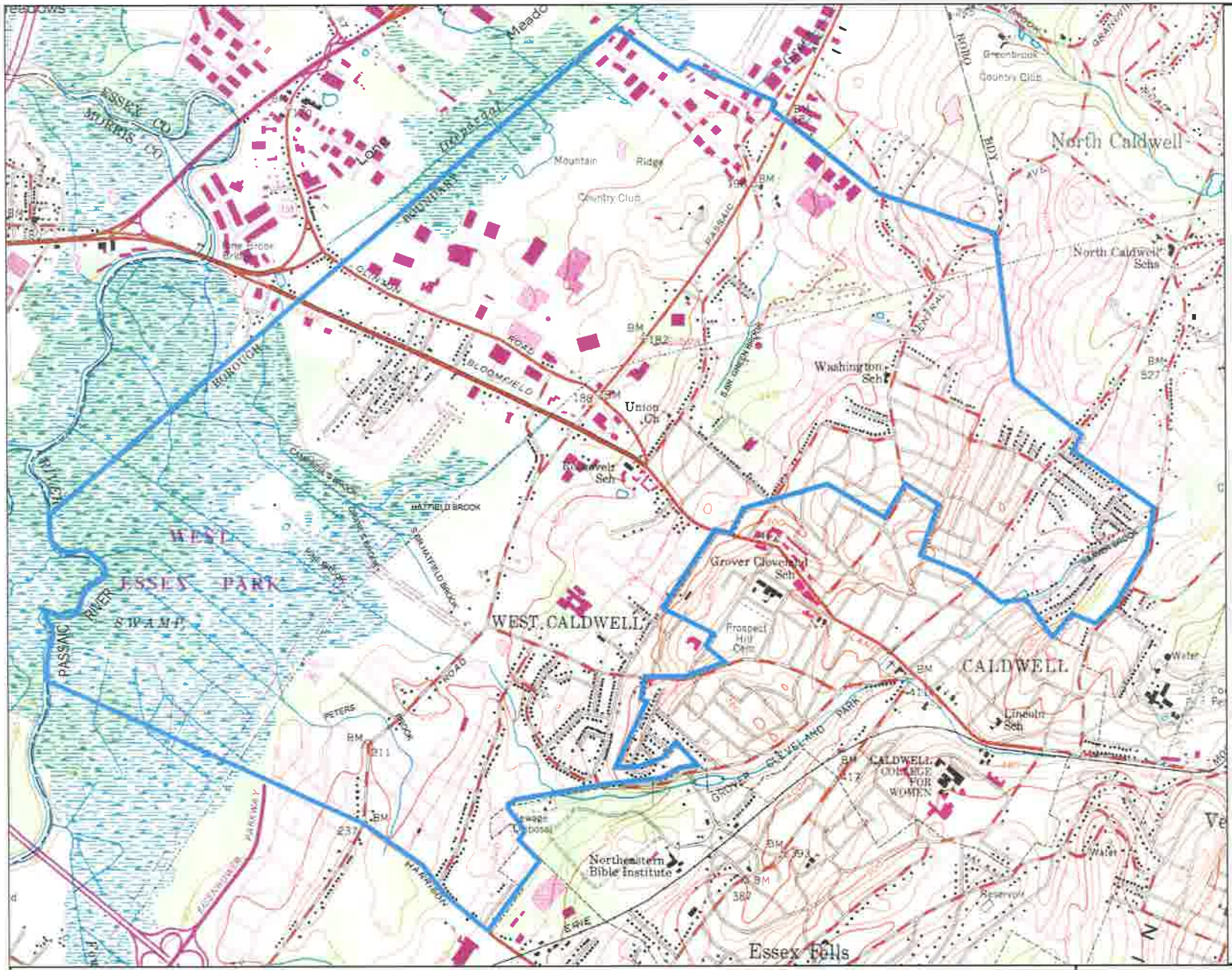

REFERENCE: MAP SOURCE DATA, USGS CALDWELL QUADRANGLE MAP – 1954, PHOTO REV. 1981

0 1250 2500 5000

(IN FEET)

1 inch = 2500 ft.

LEGEND

TWP. BOUNDARY

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FIGURE C-3: TOWNSHIP BOUNDARY ON USGS QUADRANGLES

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Four tributaries to the Passaic River: Green Brook/Deepavaal Brook, Campbell's Brook, Peter's Brook and Pine Brook, flow through the Township of West Caldwell. These tributaries, with the exception of a downstream reach of Deepavaal Brook with an AMNET station, are not studied by any known water monitoring agencies but appear to be moderately impaired. We recommend that the Township nominates one or more of said tributaries, especially Pine Brook, for inclusion into the NJDEP AMNET Monitoring System. In addition to the AMNET data, the NJDEP and other regulatory agencies collect water quality chemical data on the streams in the state. These data show that the in-stream total phosphorus, dissolved solids, total suspended solids, and certain metals concentrations and fecal coliform concentrations of the Passaic River frequently exceed the state's criteria. This means that this river is an impaired waterway and the NJDEP is required to develop a Total Maximum Daily Load (TMDL) for these pollutants for each waterway.

A TMDL is the amount of a pollutant that can be accepted by a waterbody without causing an exceedance of water quality standards or interfering with the ability to use a waterbody for one or more of its designated uses. The allowable load is allocated to the various sources of the pollutant, such as stormwater and wastewater discharges, which require a NJPDES permit to discharge, and non-point source, which includes stormwater runoff from agricultural areas and residential areas, along with a margin of safety. Provisions may also be made for future sources in the form of reserve capacity. An implementation plan is developed to identify how the various sources will be reduced to the designated allocations. Implementation strategies may include improved stormwater treatment plants, adoption of ordinances, reforestation of stream corridors, retrofitting stormwater systems, and other BMPs.

The New Jersey Integrated Water Quality Monitoring and Assessment Report (305(b) and 303 (d))(Integrated List) is required by the federal Clean Water Act to be prepared biennially and is a valuable source of water quality information. This combined report presents the extent to which New Jersey waters are attaining water quality standards, and identifies waters that are impaired. Sublist 5 of the Integrated List constitutes the list of waters impaired or threatened by pollutants, for which one or more TMDLs are needed.

The State of New Jersey's proposed 2004 Integrated List of Waterbodies was reviewed to identify any water bodies within and proximate to the Township of West Caldwell where water quality information is available. The most current (1998) Ambient Biomonitoring Network (AMNET) macroinvertebrate data for Watershed Management Areas 3, 4, 5, and 6, Passaic Region was likewise reviewed to identify any AMNET monitoring sites within or nearby to West Caldwell Township. Sublist 5 of the 2004 Integrated List (by Waterbody/Parameter) with Priority Ranking was also consulted to identify any impaired waterbodies and the type of impairment.

The above lists indicate that there are no water quality or macroinvertebrate monitoring data for water bodies within West Caldwell Township. The closest water quality and AMNET sampling stations for the Passaic River are located at Eagle Rock Avenue in East Hanover (Site ID#EWQ0231 and ID#AMN0231), approximately 0.8 river miles upstream of the West Caldwell Township border. The water quality data for this station from the Existing Water Quality Network (EWQ) list impairments for the parameters of Dissolved solids, Phosphorus, and Total Suspended Solids. In addition, the AMNET site (#AMN0231) indicates an impairment for macroinvertebrates. Specifically, the 1998 NJIS Rating 6 corresponds to a severely impaired biological condition for this site. The closest downstream water quality sampling station for the Passaic River on Sublist 5 is the Passaic River at Two Bridges in Fairfield (Site ID#01382000, 6-Site 3) located approximately 10.2 river miles downstream of the West Caldwell Township northerly border at the River. The water quality data for this site, provided by NJDEP/USGS Data, Metals Recon, list impairments for the parameters of arsenic, mercury, and phosphorus. In addition, this same reach of the Passaic River from Route 280 to the confluence of the Pompton River (Two Bridges) also list an impairment for mercury from the NJDEP Fish Tissue Monitoring program. The only other waterbody contained in Sublist 5 that is applicable to any sub-watershed area within West Caldwell Township is Deepavaal Brook. Sublist 5 lists a station for Deepavaal Brook at Little Falls Road in Fairfield, approximately 1.5 river miles downstream of where the northerly border of West Caldwell

Township intersects the Green Brook/Deepavaal Brook system. There is only an AMNET station (Site ID#AN0271) in this location, where an impairment for Benthic macroinvertebrates is listed. Specifically, this station has a NJIS rating: 9 and a Moderately Impaired Biological Condition.

According to the State of New Jersey's Proposed 2004 Intregrated List of Waterbodies, TMDLs approved by the USEPA for the parameter of Fecal Coliform have been identified for the above-described Passaic River and Deepavaal Brook waterbodies in the vicinity of West Caldwell Township. The Amendment to the Northeast Water Quality Management Plan, dated March 28, 2003 established Total Maximum Daily Loads for Fecal Coliform to address 32 streams in the Northeast Water Region. TMDLs for Fecal Coliform were established for the Deepavaal Brook at Fairfield (TMDL # 6), Passaic River near Chatham (TMDL #25) and Passaic River at Two Bridges (TMDL #32). These TMDL's have not been adopted to date. For Fecal Coliform at the segment of Deepavaal Brook, a target Wasteload Allocation (WLA) percent reduction with margin of safety (MOS) is listed at 93%. At the upstream segment of the Passaic River at Chatham, the WLA for Fecal Coliform is listed as 96% and the WLA for this parameter is listed at 83% for the downstream segment of the Passaic River at Two Bridges. The amended Northeast Water Quality Management Plan includes short-term and long-term management strategies to reduce non-point sources of fecal coliform. Such fecal coliform management measures, such as proper pet waste disposal and Canada goose control, could be implemented through a public education program and eventually within a Stormwater Management Ordinance adopted by West Caldwell Township.

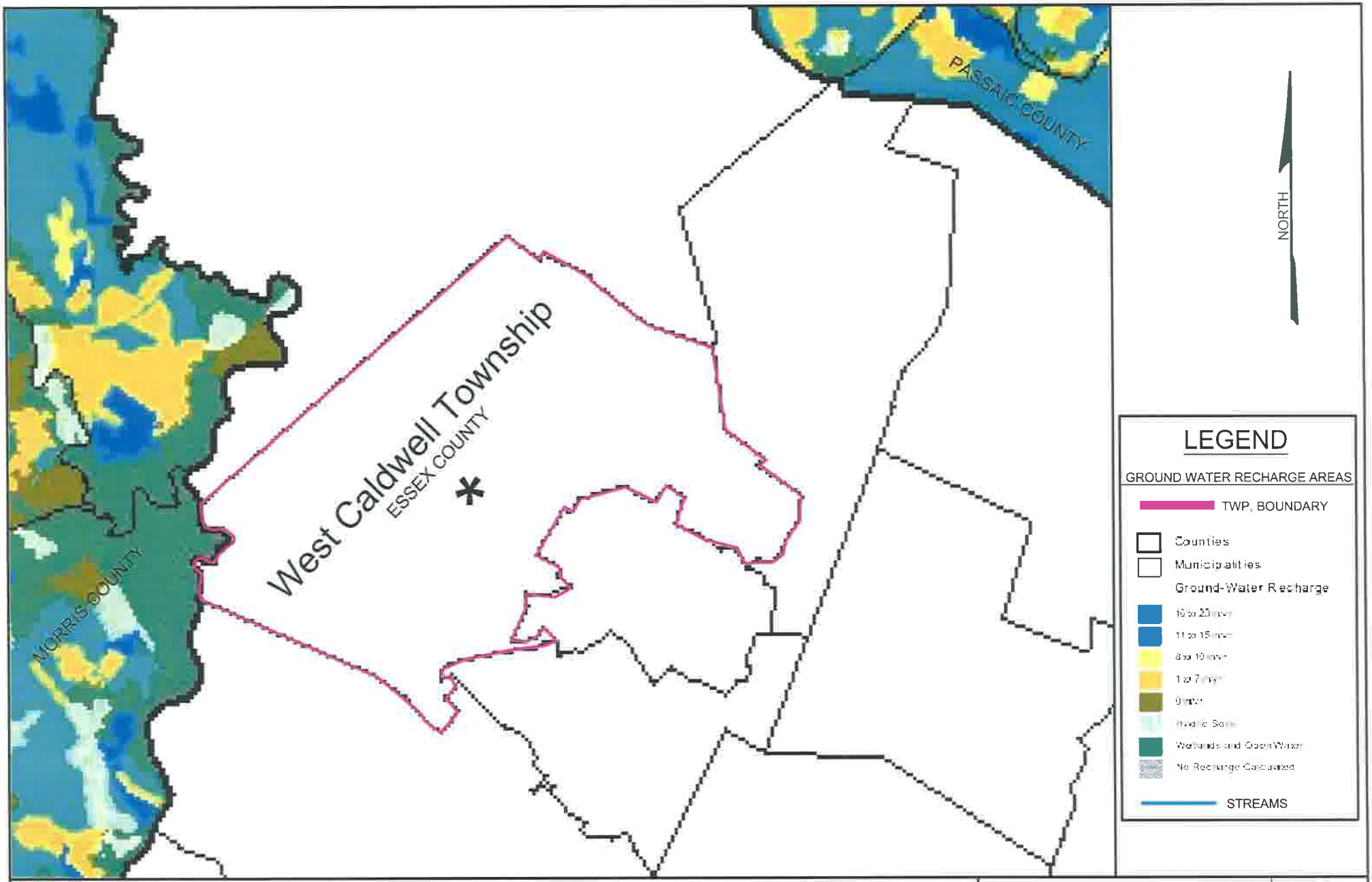
In addition to water quality problems, the Township has exhibited some water quantity problems including stream bank erosion and diminished base flow in its streams. Many of the culverts associated with road crossings in the Township were designed many years ago for smaller storm events than today's (100-year) design storm. In addition, the hydrologic conditions (i.e. impervious coverage) was considerably less at the time of their design in both West Caldwell as well as in the upstream municipalities. During severe storm events, these undersized culverts do not have adequate capacity, thereby causing a backwater effect and flooding upstream.

Even so, virtually no homes in West Caldwell are ever seriously threatened by flooding. In fact, since the adoption of the 1979 Ordinance, West Caldwell has prohibited the construction of any residential property within the floodplain of the Passaic River. Historically, Essex County has been responsible in maintaining and/or replacing culverts, even on local roads. Should any culverts need replacement or repairs, we would ask Essex County to assume this responsibility.

Though there has not been a significant increase in impervious areas within West Caldwell over the past 25 years, upstream development has caused the peak and volumes of stream flows to continue to increase. The increased amount of water resulted in stream bank erosion, which resulted in unstable areas at roadway/bridge crossings, and degraded stream habitats. The high imperviousness (estimated by the NJDEP to be approximately 25 percent of the total acres of the municipality as of 1997) of the Township has significantly decreased groundwater recharge, decreasing base flows in streams during dry weather periods. Lower base flows can have a negative impact on instream habitat during the summer months. A map of the groundwater recharge areas are not available for Essex County at this time. However, details on where they will eventually be posted are shown on Figure C-4. Wellhead protection areas, also required as part of the MSWMP, are shown in Figure C-5.

Design and Performance Standards

The Township will adopt the design and performance standards for stormwater management measures as presented in N.J.A.C. 7:8-5 to minimize the adverse impact of stormwater runoff on water quality and water quantity and loss of groundwater recharge in receiving water bodies. The design and performance standards include the language of maintenance of stormwater management measures consistent with the stormwater management rules at N.J.A.C. 7:8-5.8 Maintenance Requirements, and language for safety standards consistent



* NOTE:
GROUND-WATER RECHARGE MAPPING IS CURRENTLY UNAVAILABLE FOR ESSEX COUNTY MUNICIPALITIES. THE NEW JERSEY GEOLOGICAL SURVEY ANTICIPATES GROUND-WATER RECHARGE MAPPING AVAILABILITY IN LATE 2005 OR EARLY 2006.
SEE: http://www.state.nj.us/dep/gis/imapnj-geo/splash.htm#

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FIGURE C-4: GROUNDWATER RECHARGE AREAS IN THE TOWNSHIP

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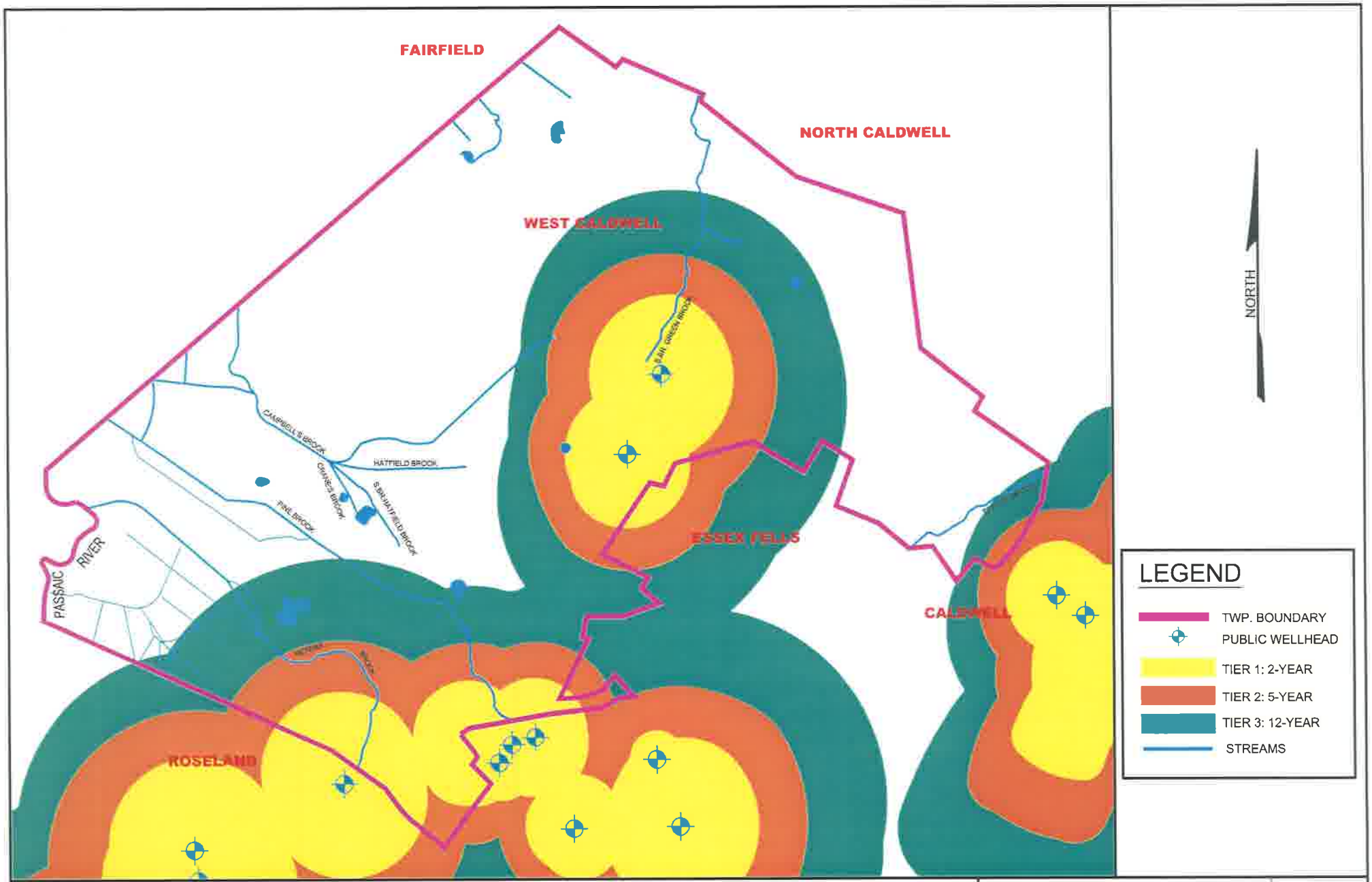

REFERENCE: MAP SOURCE DATA, i-MAP NJ DEP

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(IN FEET)

1 inch = 2500 ft.

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FIGURE C-5: WELLHEAD PROTECTION AREAS IN THE TOWNSHIP

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with N.J.A.C. 7:8-6 Safety Standards for Stormwater Management Basins. The ordinances will be submitted to the county for review and approval within 24 months of the effective date of the Stormwater Management Rules.

During construction, Township inspectors will observe the construction of the project to ensure that the stormwater management measures are constructed and function as designed. Should any of the requirements of the New Jersey State regulations exceed or be inconsistent with Federal regulation or requirements to be an unfunded mandate under the provisions of N.J.S.A. 53:13H, et.seq. and may not proceed with the implementation of such requirements or regulations until and unless full funding is provided by the State of New Jersey under the terms of N.J.S.A.52:13H, et.seq.

Plan Consistency

The Township is not within a Regional Stormwater Management Planning Area and no TMDLs have been developed for waters within the Township; therefore this plan does not need to be consistent with any regional stormwater management plans (RSWMPs) nor any TMDLs. If any RSWMPs or TMDLs are developed in the future, this Municipal Stormwater Management Plan will be updated to be consistent.

The Municipal Stormwater Management Plan is consistent with the Residential Site Improvement Standards (RSIS) at N.J.A.C. 5:21. The municipality will utilize the most current update of the RSIS in the stormwater management review of residential areas. This Municipal Stormwater Management Plan will be updated to be consistent with any future updates to the RSIS.

The Township's Stormwater Management Ordinance requires all new development and redevelopment plans to comply with New Jersey's Soil Erosion and Sediment Control Standards. During construction, Township inspectors will observe on-site soil erosion and sediment control measures and report any inconsistencies to the local (Hudson-Essex-Passaic) Soil Conservation District.

Nonstructural Stormwater Management Strategies

The Township has reviewed the master plan and ordinances, and has provided a list of the sections in the Township land use and zoning ordinances that are to be modified to incorporate nonstructural stormwater management strategies. These are the ordinances identified for revision. Once the ordinance tests are completed, they will be submitted to the county review agency for review and approval within [24 months of the effective date of the Stormwater Management Rules]. A copy will be sent to the Department of Environmental Protection at the time of submission.

Section 20-21.1: Buffers requires buffer areas along all lot and street lines separating residential uses from arterial and collector streets, separating a non-residential use from either a residential use or residential zoning district line, and along all street lines where loading and storage areas can be seen from the street. The landscape requirements for these buffer areas in the existing section do not recommend the use of native vegetation. The language of this section should be amended to require the use of native vegetation, which requires less fertilization and watering than non-native species. Additionally, language should be included to allow buffer areas to be used for stormwater management by disconnecting impervious surfaces and treating runoff from these impervious surfaces.

Section 20-23.5(b): Curbs and Gutters requires that Belgian block curb be installed along every street within

and fronting on a development and also within the perimeter of parking lots.. This section should be amended to allow for curb cuts or flush curbs with curb stops to allow vegetated swales to be used for stormwater conveyance and to allow the disconnection of impervious area.

Although sidewalks are not required along all streets, the Township can require them in areas where the probable volume of pedestrian traffic, the development's location in relation to other populated areas and high vehicular traffic, pedestrian access to bus stops, schools, parks, and other public places, and the general type of improvement intended indicate the advisability of providing a pedestrian way. Sidewalks are to be a minimum of four feet wide and constructed of concrete. Language should be added to this section to require developers to design sidewalks to discharge stormwater to neighboring lawns where feasible to disconnect these impervious surfaces, or use permeable paving materials where appropriate.

Section 21-8.5: Drainage, Watercourses and Flood Hazard Areas requires that all streets be provided with inlets and pipes where the same are necessary for proper drainage. This section should be amended to encourage the use of natural vegetated swales in lieu of inlets and pipes, and preserve/protect slopes along stream banks.

Section 19-9.9: Natural Features requires that natural features, such as trees, brooks, swamps, hilltops, and views, be preserved whenever possible, and that care be taken to preserve selected trees to enhance soil stability and landscaped treatment of the area. This section should be amended to expand trees to forested areas, to ensure that leaf litter and other beneficial aspects of the forest are maintained in addition to the trees.

Section 21-8.7 & 8.8: Exceeding the Maximum Percent Impervious: The homeowner must mitigate the impact of the additional impervious surfaces unless the stormwater management plan for the development provided for these increases in impervious surfaces. This mitigation effort must address water quality, flooding, and groundwater recharge as described in Chapter 135.

Section 20-23.5: Off-street Parking and Loading details off-street parking and loading requirements. All parking lots and all loading areas are required to have Belgian block curbing around the perimeter of the parking and loading areas. This section also requires that Belgian block curbing be installed around all landscaped areas within the parking lot or loading areas. This section amended to allow for flush curb with curb stop, or curbing with curb cuts to encourage developers to allow for the discharge of impervious areas into landscaped areas for stormwater management. Also, language should be added to allow for use of natural vegetated swales for the water quality design storm, with overflow for larger storm events into storm sewers. This section also provides guidance on minimum parking space requirements. These requirements are based on the number of dwelling units and/or gross floor area. The section allows a developer to demonstrate that fewer spaces would be required, provided area is set aside for additional spaces if necessary. This section should be amended to allow pervious paving to be used in areas to provide overflow parking, vertical parking structures, smaller parking stalls, and shared parking.

Section 19-9.1: Streets describes the requirements for streets in the Township. The Township has several street classifications, ranging from "Arterial", which has a minimum right-of-way of 80 feet, to "Minor" which has a minimum right-of-way of 50 feet. Street paving widths are a function of the number of units served, whether a street is curbed, whether on-street parking is permitted, whether the interior streets serve lots of two acres or larger, and whether on-site topographical constraints allow design flexibility. Depending on these factors, paving widths for internal streets in an industrial development shall be determined by the Board. This section should be amended to encourage developers to limit on-street parking to allow for narrower paved widths.

Several changes should be made to the Township Code entitled "Schedule of District Regulations". The Township has 5 types of residential districts. Each district has a maximum percent impervious surface allocation, 30 percent. The Township has 6 types of non-residential districts. Each of these districts has a maximum percent impervious surface allocation, ranging from 25 percent to 35 percent. Although each zone has a maximum allowable percent impervious surface, the Township Code should be amended to remind developers that satisfying the percent impervious requirements does not relieve them of responsibility for complying with the Design criteria for Stormwater Management facilities. The Township is evaluating the maximum allowable impervious cover for each zone to determine whether a reduction in impervious cover is appropriate. The Township is also evaluating a maximum percent of disturbance for each zone, for those areas identified as natural features in Section 19-9.9. Also, if a developer is given a variance to exceed the maximum allowable percent imperviousness, the developer must mitigate the impact of the additional impervious surfaces. This mitigation effort must address water quality, flooding, and groundwater recharge.

An important nonstructural stormwater management strategy is a local public education program. All Tier A Municipalities (West Caldwell Township) are required to educate their residents and businesses on the impact of their day-to-day activities on stormwater quality. The NJDEP Division of Watershed Management, Office of Outreach and Education, offers numerous materials and programs that can assist municipalities in developing and implementing a local public education program. West Caldwell Township agencies can develop such a program using the guidance provided in "Chapter 5 – Local Public Education" contained in the Appendix of this Municipal Stormwater Management Plan Report.

Land Use/Build-Out Analysis

Most of the remaining vacant land within the Township is located to the west of Passaic Avenue where it is environmentally constrained by wetlands, waterways and floodplains.

Since less than 1 square mile of land is currently available for development within the Township, a Land Use/Build-out analysis is not required. (see Figures C-6, C-7, C-8, and C-9.)

Mitigation Plans

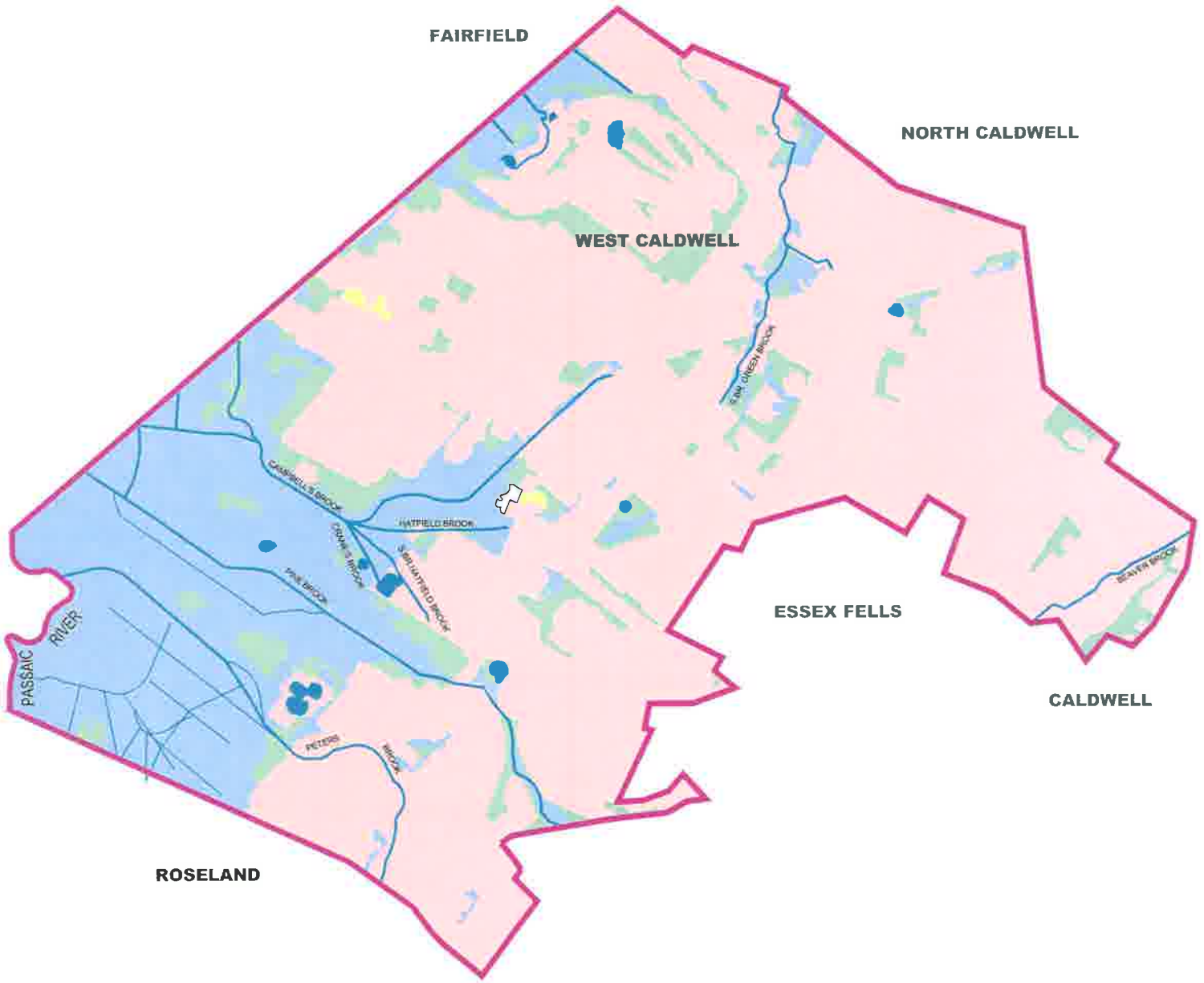
This mitigation plan is provided for a proposed development that is granted a variance or exemption from the stormwater management design and performance standards or improvements the Township believes are necessary to implement as well as publicly sponsored projects. Presented is a hierarchy of options.

Mitigation Project Criteria

1. The mitigation project must be implemented in the same drainage area as the proposed development. The project must provide additional groundwater recharge benefits, or protection from stormwater runoff quality and quantity from previously developed property that does not currently meet the design and performance standards outlined in the Municipal Stormwater Management Plan. The developer must ensure the long-term maintenance of the project, including the maintenance requirements under Chapters 8 and 9 of the NJDEP Stormwater BMP Manual.

a. The applicant can select one of the following projects to compensate for the deficit from the performance standards resulting from the proposed project. More detailed information on the projects can be obtained from the Township Engineer. Listed below are specific projects that can be used to address the mitigation requirement. (to be completed with input from West Caldwell Township officials)

I. Groundwater Recharge



NORTH

LEGEND

LAND USE

- TWP. BOUNDARY
- AGRICULTURE
- BARREN LAND
- FOREST
- URBAN
- WATER
- WETLANDS
- STREAMS

REFERENCE: MAP SOURCE DATA, I-MAP NJ DEP-LAND USE MAP 1995

0 1250 2500 5000

(IN FEET)

1 inch = 2500 ft.

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FIGURE C-6: TOWNSHIP'S EXISTING LAND USE

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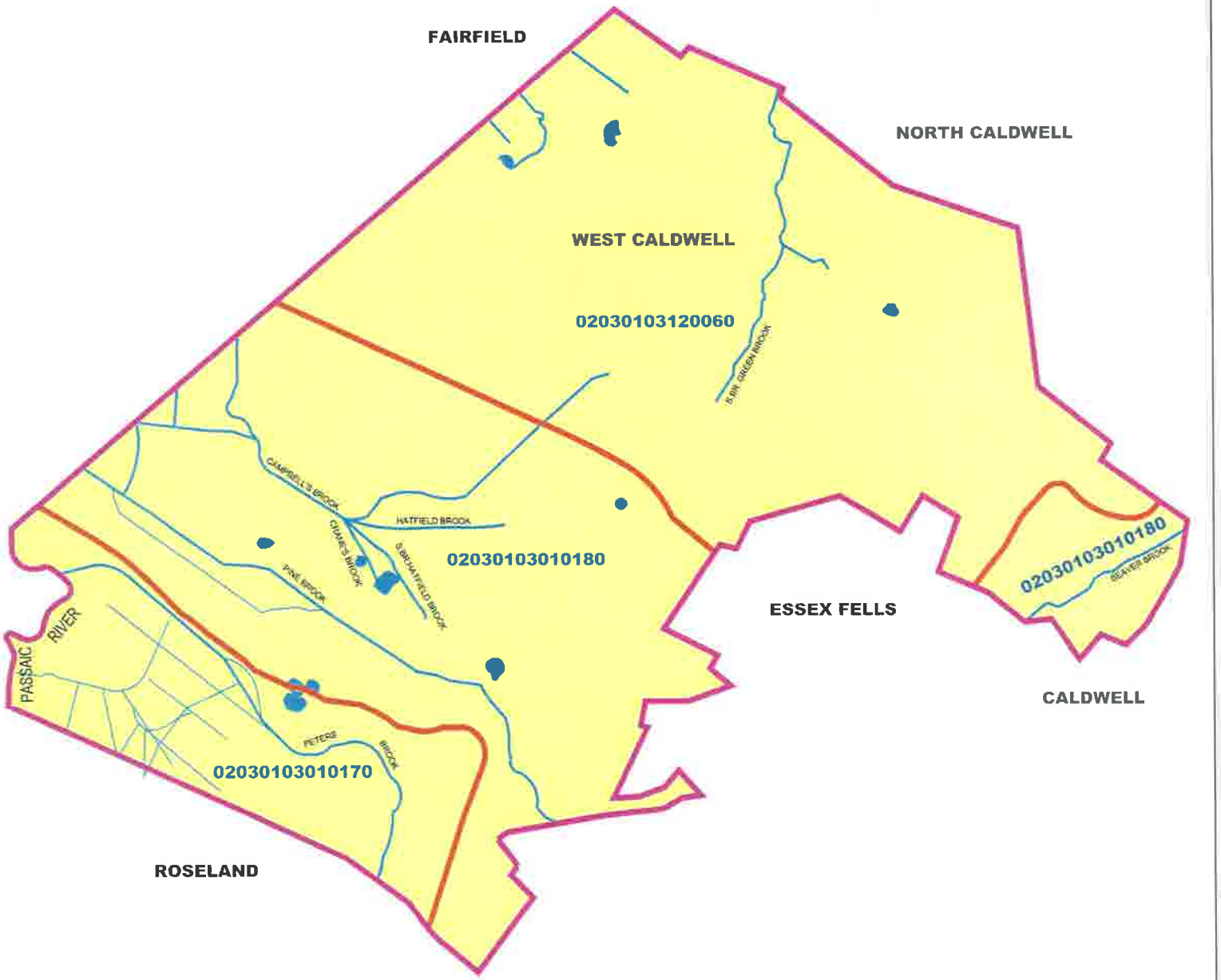
Scale: 1"= 2500'
Sheet 6 of 9



LEGEND

- TWP. BOUNDARY
- ZONING BOUNDARY
- HUC14 BOUNDARY
- WATERWAYS

NORTH

REFERENCE: MAP SOURCE DATA, i-MAP NJ DEP

0 1250 2500 5000

(IN FEET)

1 inch = 2500 ft.

LEGEND

SUB-WATERSHEDS (HUC14)

SUB-WATERSHED NAME	HYDROLOGIC UNIT CODE (14DIGIT)
DEEPAALL BROOK	02030103120060
UPPER PASSAIC RIVER (PINE BROOK TO ROCKAWAY RIVER)	02030103010180
UPPER PASSAIC RIVER (ROCKAWAY RIVER TO HANOVER RR)	0203010301070

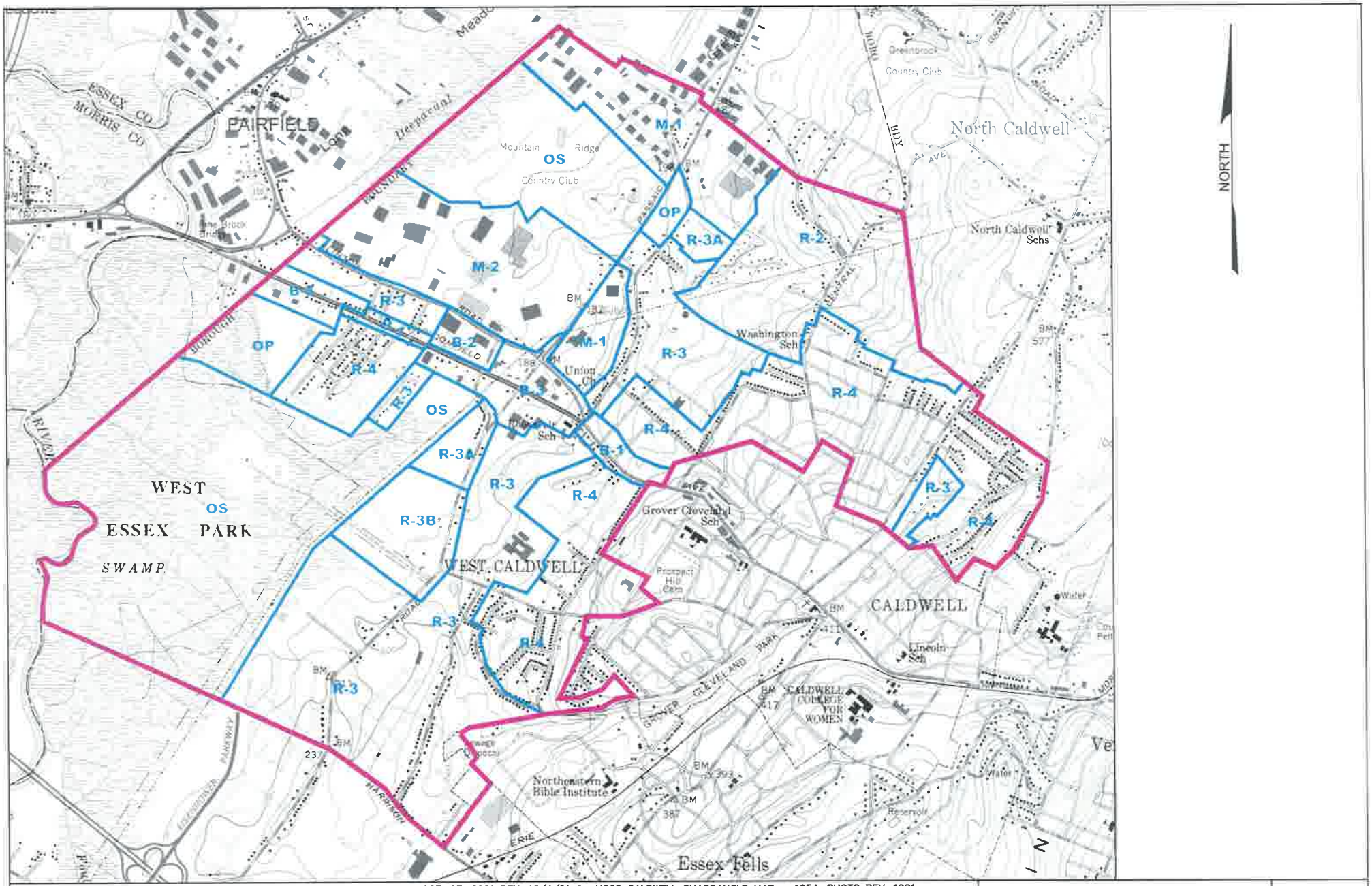
SOURCE: i-MAP NJDEP, 2005

STORMWATER MANAGEMENT PLAN
PREPARED FOR
THE TOWNSHIP OF WEST CALDWELL
ESSEX COUNTY NEW JERSEY

FIGURE C-7: HYDROLOGIC UNITS (HUC14s) WITHIN THE TOWNSHIP

RH Design, Inc.
Engineering Planning Surveying Wetlands Delineation
DIVISION OF CONSUMER AFFAIRS LICENSE NUMBER 24GA28030900
76 GOSHEN STREET • PATERSON • NEW JERSEY • 07503
PH. (973) 227-6700 • FAX (973) 227-7992

Designer: AP/JAL
Drafteman: FHD
Checked By: AP/JAL
Project No.: 046346
Scale: 1"= 2500'
Sheet 7 of 9



REFERENCE: MAP SOURCE DATA, TOWNSHIP OF WEST CALDWELL ZONING MAP OCT. 03, 2001 REV. 12/4/01 & USGS CALDWELL QUADRANGLE MAP – 1954, PHOTO REV. 1981

0 1250 2500 5000

(IN FEET)

1 inch = 2500 ft.

R-2	SINGLE-FAMILY RESIDENCE DISTRICT	17,500 S.F.
R-3	SINGLE-FAMILY RESIDENCE DISTRICT	14,000 S.F.
R-3A	SINGLE-FAMILY RESIDENCE DISTRICT & CLUSTER DISTRICT	14,000 S.F./10 AC.
R-4	SINGLE-FAMILY RESIDENCE DISTRICT	11,500 S.F.
B-1	SPECIAL BUSINESS & MULTI-FAMILY RESIDENCE DISTRICT	5,000 S.F.
B-2	PLANNED SHOPPING DISTRICT	15 AC.
B-3	GENERAL SHOPPING DISTRICT	20,000 S.F.
M-1	LIMITED MANUFACTURING DISTRICT	80,000 S.F.
M-2	LIMITED INDUSTRY, OFFICE BUILDING AND RESEARCH LABORATORY DISTRICT	5 AC.
OP	OFFICE & PROFESSIONAL BUILDING DISTRICT	3 AC.
OS	OPEN SPACE DISTRICT	
R-3B	SINGLE-FAMILY RESIDENCE & CONTINUING CARE RETIREMENT COMMUNITY DISTRICT	25 AC.

LEGEND

TWP. BOUNDARY

ZONING BOUNDARY

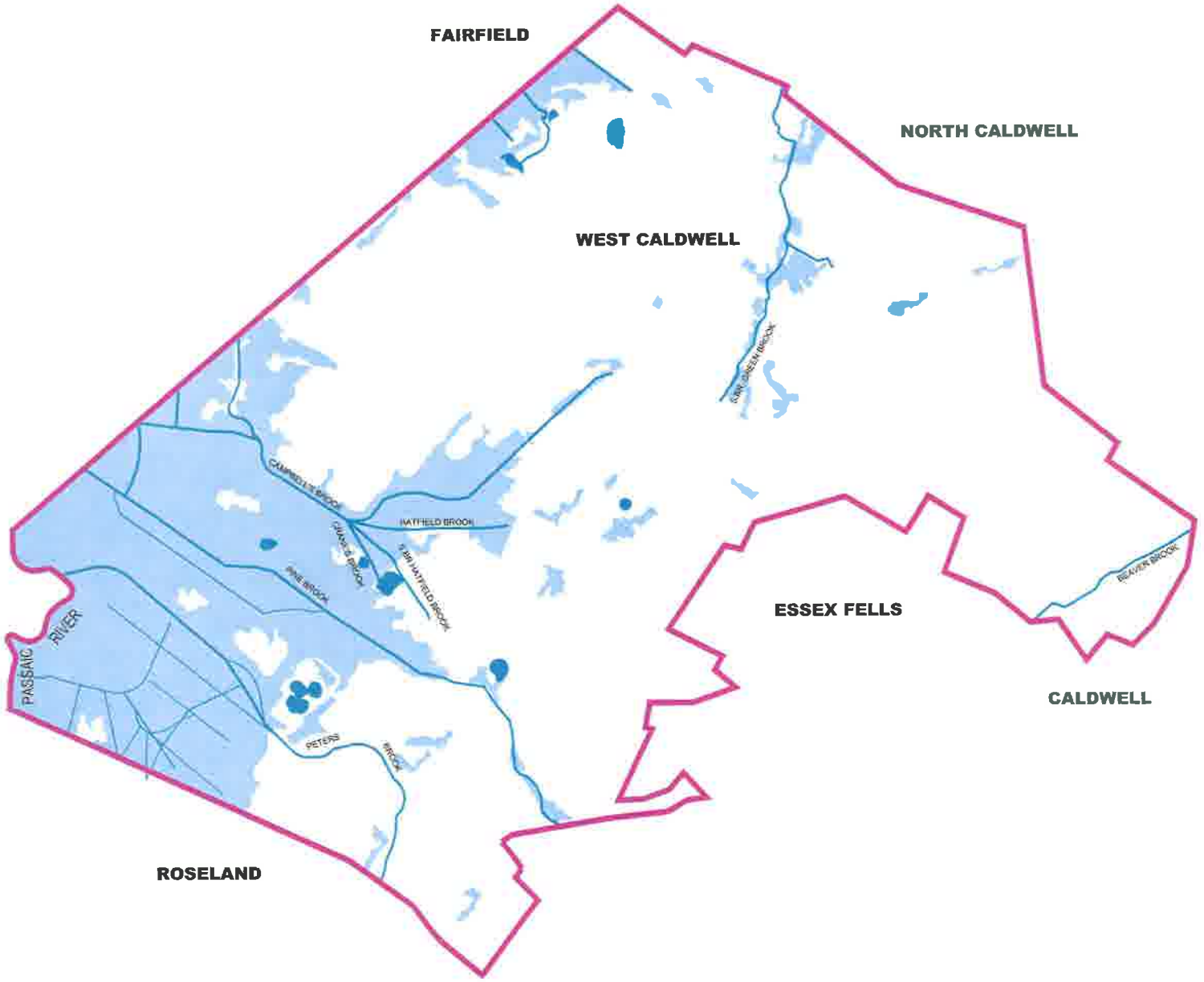
R-2 ZONE

STORMWATER MANAGEMENT PLAN
PREPARED FOR
THE TOWNSHIP OF WEST CALDWELL
ESSEX COUNTY NEW JERSEY

FIGURE C-8: ZONING DISTRICTS WITHIN THE TOWNSHIP

RTG Design, Inc.
Engineering Planning Surveying Wetlands Delineation
DIVISION OF CONSUMER AFFAIRS LICENSE NUMBER 24GA28030600
76 GODWIN STREET • PATERSON • NEW JERSEY • 07503
PH. (973) 227-8700 • FAX (973) 227-7982

Designer: AP/JAL
Draftsman: FHD
Checked By: AP/JAL
Project No.: 046346
Scale: 1"= 2500'
Sheet 8 of 9



REFERENCE: MAP SOURCE DATA, I-MAP NJ DEP

0 1250 2500 5000

(IN FEET)

1 inch = 2500 ft.

STORMWATER MANAGEMENT PLAN
PREPARED FOR
THE TOWNSHIP OF WEST CALDWELL
ESSEX COUNTY NEW JERSEY

FIGURE C-9: WETLANDS AND WATER LAND USES WITHIN THE TOWNSHIP – CONSTRAINED LAND

RHC design, inc.
Engineering Planning Surveying Wetlands Delineation
DIVISION OF CONSUMER AFFAIRS LICENSE NUMBER ENGINEERING
79 GREEN STREET • PATERSON • NEW JERSEY • 07503
TEL (973) 227-6700 • FAX (973) 227-7982

Designer: AP/JAL
Drafterman: FHD
Checked By: AP/JAL
Project No.: 046346
Scale: 1"= 2500'
Sheet 9 of 9

1. Infiltration basins and/or Sand filters (where applicable)

II. Water Quality

1. High School – Install plantings around existing detention basin.
2. Industrial Parks - Monitor geese and minimize the use of fertilizers and pesticides on lawn areas.
3. Streambank Erosion -Conduct stabilization methods and bioengineering measures along Campbell Brook at Wrensch Park and Pine Brook near Westville and Passaic Avenues.

III Water Quantity & Water Quality

1. If a suitable site cannot be located in the same drainage area as the proposed development, as discussed in Option 1, the mitigation project may provide mitigation that is not equivalent to the impacts for which the variance or exemptions is sought, but the addresses the same issue. For example, if a variance is given because the 80 percent TSS requirement is not met, the selected project may address water quality impacts due to a fecal impairment. As necessary, West Caldwell Township will cooperate with future site developers to identify specific projects that can be utilized to address the mitigation option.

2. The municipality may allow a developer to provide funding or partial funding to the municipality for an environmental enhancement project that has been identified in a Municipal Stormwater Management Plan, or towards the development of a Regional Stormwater Management Plan. The funding must be equal to or greater than the cost to implement the mitigation outlined above, including costs associated with purchasing the property or easement for mitigation, and the cost associated with the long-term maintenance requirements of the mitigation measure.

APPENDIX "A"

NJDEP TIER A MUNICIPALITY

STORMWATER GUIDANCE

CHAPTER 5 – LOCAL PUBLIC EDUCATION

Chapter 5 - Local Public Education

Educational activities like "Enviroscape" can enhance your Local Public Education program

Tier A Municipalities are required to educate their residents and businesses on the impact of their day-to-day activities on stormwater quality. Topics include things such as proper use and disposal of fertilizers and pesticides, using native or well-adapted vegetation that requires little or no fertilization, and properly disposing of pet wastes, used motor oil and household hazardous wastes. In addition, the Local Public Education Program may include information about how residents can become involved in local stream and/or shoreline restoration activities, as well as activities that are coordinated by local youth service and conservation corps or other citizen groups. The Division of Watershed Management, Office of Outreach and Education offers numerous materials and programs that can assist municipalities in developing and implementing a Local Public Education program. Information on these programs and educational materials can be found on the Department's Division of Watershed Management Web site at www.state.nj.us/dep/watershedmgt. The Department will also provide supplemental educational information on a compact disk supplied to each municipality that can be used to expand the Local Public Education Program.

Local Public Education Program

WHAT IS REQUIRED?

Minimum Standard

The Local Public Education Program shall describe how the Tier A Municipality will distribute educational information and specifics on how educational activities, including the educational event, will be conducted to satisfy this minimum standard. The following SBR and/or BMP topics shall be included in the Local Public Education Program:

- Stormwater/Nonpoint Source Education – impact of stormwater discharges on surface and ground waters of the State and steps that the public can take to reduce pollutants in stormwater runoff.
- Storm Drain Inlet Labeling – hazards of dumping materials into the storm drain, and fact that storm drains are usually connected to water bodies and do not receive treatment.
- Fertilizer/Pesticide Education – proper application, storage and disposal of pesticides and fertilizers, and the benefits of using native or well adapted vegetation that requires little or no fertilization.
- Waste Disposal Education – identification, proper handling and proper disposal of wastes (including the locations of hazardous waste collection facilities in the area) and the hazards associated with illicit connections and improper disposal of waste.

- Pet Waste Ordinance – information regarding the pet waste ordinance and the benefits of proper disposal of pet waste.
- Litter Ordinance - information regarding litter control and fines associated with littering
- Improper Disposal of Waste Ordinance - information regarding this ordinance.
- Wildlife Feeding Ordinance - information regarding the wildlife feeding prohibition.
- Yard Waste - information regarding home composting and yard waste recycling.

Tier A Municipalities shall provide for the duplication and annual mailing (or other means of delivery) to all residents and businesses within the municipality of the informational brochure provided by the Department. The informational brochure covers all the topics above. The Department may periodically provide the Tier A Municipality with an updated brochure for duplication and distribution.

As part of this program, Tier A Municipalities shall also conduct each year, at minimum, one education effort in the form of an "event." An event may be an activity established primarily to satisfy this requirement or may be part of a bigger existing event such as municipal festivals, county fairs, or an Earth Day, Arbor Day or Fourth of July celebration. During this event, the informational brochure shall also be made available to the public.

Measurable Goal

Tier A Municipalities shall certify annually that they have met the Local Public Education Program minimum standard and shall provide the date(s) of the annual mailing (or other means of delivery) and annual event (including a description of the event).

Implementation Schedule

Within 12 months from the effective date of permit authorization, Tier A Municipalities shall have developed and begun implementing the Local Public Education Program minimum standard.

WHAT DOES THIS MEAN?

Tier A Municipalities shall develop and implement a Local Public Education Program that includes all of the SBRs that have an educational message.

Annual Distribution of Information

Tier A Municipalities are required to duplicate and mail (or otherwise distribute) the educational brochure (provided by the Department and found at the end of this Chapter) annually to their residents and businesses. The Department may choose to periodically provide an updated version of this brochure, which shall then be duplicated and distributed annually.

Your annual event can be part of an existing Earth Day celebration.

Annual Event

As a part of the Local Public Education Program the Tier A Municipality is required to conduct or participate in an annual event during which educational materials are to be distributed. The annual event may be its own event or it can be a part of an existing event, for example, a municipal festival (e.g., a "Shad Festival", "Cranberry Festival" or "Chowderfest"), Earth Day, Arbor Day or Fourth of July celebration. Or the annual event may be part of a larger event conducted by another entity in the area like a county fair or Agricultural Field Day, as long as residents are welcome to attend. During this event, the educational brochure provided by the Department shall be made available to the public.

WANT TO KNOW MORE?

It is estimated that up to 60 percent of our existing water pollution problems are attributable to **stormwater/nonpoint pollution**. This pollution can often be linked to our daily activities and lifestyles - things like walking pets, washing cars, changing motor oil, fertilizing the lawn, and littering. When it rains, pollutants from these activities can be washed into storm drains and eventually flow into New Jersey's surface and ground waters. These pollutants can contaminate our drinking water, as well as degrade aquatic populations and habitats and beaches.

Many people and businesses use fertilizers and pesticides to enhance their lawns and gardens. However, if they are not careful, such use can contaminate stormwater through pesticide (including herbicide and insecticide) and fertilizer runoff, and soil erosion. In many cases, this stormwater flows directly or indirectly into local rivers, lakes, reservoirs, streams, and coastal water bodies. When pesticides are introduced into an aquatic ecosystem they can harm or kill aquatic life, cause population decreases by damaging the food chain, decreasing reproductive success, or reduce the oxygen levels in the water by destroying plant populations and by plant decomposition. When used improperly, pesticides can also denude an area of vegetation, which can result in soil erosion. Overfertilization can also have adverse effects on an ecosystem. As surface runoff carries excess fertilizer into the water, the nutrient levels increase, leading to excessive plant and algal growth which is directly related to a loss of habitat and wildlife, including fish kills, and eutrophication. Eutrophication is water pollution caused by excessive plant nutrients. High nutrient concentrations can stimulate blooms of algae (e.g., phytoplankton) eventually causing some species to be choked out. Eutrophication can permanently change the character of a lake by increasing the organic content, eventually converting it into marsh and land areas.

One way to help prevent overfertilization and excessive pesticide use is to educate the residents and businesses on how to properly store, handle and apply fertilizers and pesticides, and to make them aware of the need for soil testing and how to do it properly. Soil testing is a very important step in responsible fertilizer application to determine what nutrients, if any, are needed.

For more information on fertilizer use, pest identification and soil testing, contact the local agriculture extension service. A copy of the *Citizen's Guide to Pest Control and Pesticide Safety,* and other information on pesticide control and use can be found on the Pesticide Control Program of New Jersey's Web site at www.pcpnj.org.

The **improper disposal of hazardous wastes** can also impact stormwater, ground water and surface water quality. Many of the products found in homes and businesses (including automotive wastes) contain chemicals that are harmful to people and the environment. These can include things like oven cleaners, floor care products, drain cleaners, spot removers, paint, solvents, fluorescent lights, motor oil, battery acid and lead, engine cleaner, antifreeze, rust preventative, and degreasers.

These products may contain petroleum hydrocarbons, lye, phenols, trichlorobenzene, and other toxic, flammable, or corrosive chemical components, all of which may be introduced into the environment if not properly disposed. When such wastes are deliberately or inadvertently discharged into the storm drain (e.g., dumping of used motor oil, flushing of radiator coolant) they can have a significant impact on stormwater quality. Disposing these wastes directly onto the ground can impact ground water quality and disposing of them into a septic system can impact ground water quality and destroy helpful bacteria in the septic system. When hazardous wastes are discharged into the sewer system they may destroy bacteria used for treatment at the sewage treatment plant. In addition, sewage treatment plants are not designed to treat hazardous wastes, which pass through the plant, and are consequently discharged to surface water. Additional information on household hazardous wastes (including information on each county's hazardous waste collection programs) may be found at the Association of New Jersey Household Hazardous Waste Coordinators Web site at:

http://www.njhazwaste.com/index.htm

RECOMMENDATIONS

Listed below are some activities and resources that can be used to assist in developing a Local Public Education Program. These resources are not required to be used by the permit, however, the Tier A Municipality may choose to use them, or encourage residents and businesses to use them, to enhance the success of its Local Public Education Program.

Municipal Level

- Develop and maintain a municipal web page containing appropriate downloadable information regarding required public education aspects of the Stormwater Program.
- Make information sheets available year-round at appropriate municipal facilities.
- Conduct appropriate workshops, seminars, and/or presentations at the annual event and/or at other events (e.g., school assemblies, town meetings, etc.).
- At the annual event and/or at other events, provide appropriate magnets, bookmarks, pencils, buttons, T-shirts, etc. to the residents and businesses in the municipality.

Individual Level

- Wash your vehicle only when necessary – consider using a commercial car wash that recycles its wash water. If you wash your car at home use a non-phosphate detergent and wash it on the lawn. This will help prevent detergents and car grime from entering the drain and ending up in our waterways.
- Service your vehicle regularly – this will prevent oils and other fluids from leaking onto the pavement so they don't wash into the storm drains.
- Don't pour motor oil, antifreeze or other chemicals down the sink or on the ground – dispose of them on collection days or recycle them by taking them to a local public or private recycling center. One quart of motor oil dumped down a storm drain can create a two-acre oil slick.
- Compost leaves and grass clippings, or leave them on the lawn – this will return valuable nutrients to the soil and result in lower fertilization requirements (see Chapter 6 – Yard Waste

Collection Program – Want to Know More?). Fact sheets and Bulletins on composting are available at the Rutgers Cooperative Extension Web site at:

http://www.rce.rutgers.edu/pubs/subcategory.asp?cat=5&sub=36

- Use environmentally responsible, phosphate free cleaning products (e.g., baking soda, vinegar, etc.).

Education Resources

Project WET is a nationally renowned program that offers teachers a better understanding about the world's water resources through hands-on, multi-disciplinary lessons. Project WET teaches the importance and value of water in our every-day life with formal and non-formal educators while offering specialized programs about New Jersey's water resources and watersheds. NJ Project WET focuses on water supply, nonpoint source education, water conservation, watershed management, land use planning and wetlands. Additionally, the program offers a Water Festival Grant Program. The festivals offer participants a series of learning stations that examine water use over time, water's role in shaping our country, what a watershed is, how water is cleaned and used again, etc. The festivals involve both the community and schools. Finally, NJ Project WET offers a Watershed Stewards Program for high school students. This program prepares young people to initiate and implement a community watershed service project that will address an environmental concern. More information on NJ Project WET can be found on the Department's Web site (Division of Watershed Management) at http://www.state.nj.us/dep/watershedmgt.

New Jersey Watershed Ambassadors Program is a community-oriented Americorps environmental program designed to raise awareness about watershed issues in New Jersey. Through this program, Ambassadors are placed in watershed management areas across the state to serve their local communities. The program works to improve water quality by exploring the relationship between people and the environment, nurturing community-based environmental activities and empowering residents to make responsible and informed decisions regarding their watershed. Ambassadors conduct water quality monitoring, initiate community-based nonpoint source service projects and conduct nonpoint source education programs using hands-on activities and models such as Enviroscape.

NJ Watershed Ambassadors can help organize and implement:

- Stream or Shoreline Cleanups – to remove trash and debris from in and around the stream. These items are not only potential pollution sources, but they can also block the flow of the stream, which can increase flooding and erosion.
- Stream or Shoreline Surveys – walk or boat the waterway to identify potential problems along the shoreline or stream channel. While surveying the stream or shoreline look for things like fish and wildlife present, visible erosion, sewage overflow points, fish migration barriers, etc.
- Volunteer Plantings – plant native or well-adapted trees and shrubs in a watershed to help restore a healthy stream environment. Plantings will help to improve local water quality by preventing erosion, slowing stormwater runoff, and by providing food and shelter for wildlife.

More information on the NJ Watershed Ambassador program may be found at http://www.nj.gov/dep/watershedmgt/ambassadors_index.htm .

Clean Water Raingers Program offers educators a number of teaching materials for their students as well as background information on watersheds and nonpoint source pollution. Educators who participate in the Clean Water Raingers program are provided with free booklets and associated materials for their elementary school age students. The Clean Water Rainger Coloring Book, How to be a Clean Water Rainger booklet and the Clean Water Rainger stickers are also popular give-aways at family oriented events and festivals. More information on the Clean Water Raingers Program can be found on the Department's Web site (Division of Watershed Management) at www.state.nj.us/dep/watershedmgt.

Storm Drain Inlet Labeling

WHAT IS REQUIRED?

Minimum Standard

Tier A Municipalities shall establish a storm drain inlet labeling program and label all storm drain inlets that are along municipal streets with sidewalks, and all storm drain inlets within plazas, parking areas, or maintenance yards that are operated by the municipality. The program shall establish a schedule for labeling, develop a long-term maintenance plan, and when possible, coordinate efforts with watershed groups and volunteer organizations.

Examples of appropriate storm drain inlet labels

Measurable Goal

Tier A Municipalities shall certify annually that a storm drain inlet labeling program has been developed or is being implemented, and shall identify the number of storm drain inlets labeled within each year.

Implementation Schedule

Within 12 months from the effective date of permit authorization, Tier A Municipalities shall develop an inlet labeling program for the storm drains identified in the minimum standard. Tier A Municipalities must either:

- Label a minimum of 50% of the storm drain inlets within 36 months from the EDPA; and label all remaining storm drain inlets on or before 60 months from EDPA; or
- Divide the municipality into two sectors for the purposes of storm drain inlet labeling and include a map of the two sectors in the SPPP. Label the storm drain inlets in one sector within 36 months from the EDPA; and label all remaining storm drain inlets on or before 60 months from EDPA.

WHAT DOES THIS MEAN?

The storm drain inlet-labeling program, generally undertaken by local volunteer groups in cooperation with the municipality, involves labeling storm drain inlets with a cautionary message about dumping pollutants. The Tier A Municipality is responsible for placing a label with such a message on or adjacent to all of the storm drain inlets that are along municipally operated streets with sidewalks, and all storm drains within plazas, parking areas, or maintenance yards th-

operated by the municipality. The message may be a short phrase such as "The Drain is Just for Rain," "Drains to [Local Waterbody]," "No Dumping. Drains to River," "You Dump it, You Drink it. No Waste Here." or it may be a graphic such as a fish. However, although a stand-alone graphic is permissible, the Department strongly recommends that a short phrase accompany the graphic. These labels serve as a reminder to individuals that the storm sewer system connects to local surface and/or ground water bodies and that pollutants that enter via this pathway will ultimately end up in those water bodies.

WANT TO KNOW MORE?

Citizens may not be aware that water in storm sewers is not treated at sewage treatment plants before it reaches its ultimate destination. Additionally, some individuals view storm sewers as trash receptacles for general trash, used oil from their automobiles, paint from home-improvement projects, leftover herbicides, and various other pollutants. The storm drain inlet-labeling program provides an opportunity to educate the public about the connection between storm sewers and local water bodies

A key factor in the success of this program is visibility. Publicity can play a major role in bringing the issue of nonpoint source pollution into light by announcing and covering the labeling event. Another effective device is to place door hangers in targeted neighborhoods announcing the event and explaining its objectives.

Public participation, through volunteer groups such as environmental organizations, or school groups, are beneficial to the program and shall be used when possible. However, since storm drains are municipal property, an alternative could be for the municipality to perform the labeling work, although, this lacks the public participation element which lends itself to education. Another option is to have the work overseen by the municipality but carried out by volunteers to ensure adherence to permit and safety requirements.

Most people, when informed that the storm sewer discharges to the surface or ground water, will not use the storm sewer as a trash can. Education, especially of young children, continues to pay benefits into the future. The storm drain inlet label stimulates interest in the subject matter of stormwater quality and nonpoint pollution control. Once there is that interest, the rest of the message is easier to convey. Surveys continue to show that the environment, and especially water quality, is a top concern of New Jersey residents. The storm drain inlet-labeling program addresses those residents' concerns, shows an effort to improve water quality, and starts the education process that will last a lifetime. For more information on how to plan and implement a Storm Drain Inlet labeling program, go to the Department's Web site (Division of Watershed Management) at www.state.nj.us/dep/watershedmgt. The Division of Watershed Management has produced a manual that will assist you in planning your storm drain inlet-labeling program.

RECOMMENDATIONS

Since storm drain inlet labeling is an effective educational tool, and due to the relatively low cost involved, it is recommended that all municipally operated storm drain inlets be labeled. In addition, it is further recommended to expand the labeling program to include storm drain inlets in private residential and commercial areas. Ideal private commercial locations for expanded storm drain inlet labeling are areas with significant pedestrian traffic, strip malls, and shopping centers with fast food restaurants and/or auto parts stores.