Appendix K

Stormwater Management and Pollution Prevention Plan - The Fairways

PUTNAM ENGINEERING, PLLC.
Engineers and Architects

STORMWATER MANAGEMENT
AND
STORMWATER POLLUTION PREVENTION PLAN

FOR

THE FAIRWAYS
EXECUTIVE SENIOR HOUSING DEVELOPMENT
TOWN OF CARMEL, COUNTY OF PUTNAM
NEW YORK

SEPTEMBER 2003

(R0332)

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STORMWATER MANAGEMENT
AND
STORMWATER POLLUTION PREVENTION PLAN
FOR
THE FAIRWAYS
EXECUTIVE SENIOR HOUSING DEVELOPMENT
TOWN OF CARMEL, COUNTY OF PUTNAM
NEW YORK

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I. BACKGROUND INFORMATION

A. Project Description

1. The Fairways is a proposed multi-family senior housing development designed in accordance with the Town of Carmel Zoning Regulations. The property is identified as Tax Map No. 44-2-1; 44.15-2-2; 44.15-2-4.

2. The proposed development contains 150 residences. The residences have been attached in groups of three dwelling units. Each unit has its own driveway. The development will contain a clubhouse, pool, two (2) tennis courts and parking to accommodate fourteen (14) automobiles.

   The main access to the property is off of Fair Street in the vicinity of Hill and Dale Road. The access crosses Centenial Ridge Golf Course. Supplemental access (emergency) is off Kelly Ridge Road and again crosses Centennial Ridge Golf Club.

3. The site is to be served by a 1,920 foot long access road and interior roads consisting of 6,400 linear feet.

   The proposed site will be serviced by Carmel Sewer District #2 and Carmel Water District #2 for sewage disposal and water supply provisions respectively.

4. A location map is provided on Drawing G-0002 which is made a part of this Stormwater Management and Stormwater Pollution Prevention Plan.

5. Erosion Control Plan has also been prepared and is made part of the Plan. A sequence of construction is prepared for this project with erosion control practices coordinated throughout the entire construction process.

6. Site limitations have been analyzed in the design of the site layout and infrastructure. Critical constraints are shown on the Plan.

7. A total of eleven (11) ponds are proposed to be constructed to meet the stormwater management and treatment objectives. Three (3) of the ponds are to be Design Type II with the remaining eight (8) as Design Type I.

8. Temporary erosion control measures such as stabilized construction entrance, silt fence, silt trap, sediment basin and diversion swale are proposed to be used during the construction of the project. Please refer to drawings titled 'Erosion Control Plan' and sequence of construction which is attached in the Appendix section of this report, and in the submitted drawing set. Permanent slope stabilization (vegetation), detention ponds, rip rap outlet protection and sump catch basin/manholes will provide permanent erosion control for the developed project. Proposed detention ponds will also provide stormwater treatment and attenuation to the project.

9. Construction of the project will begin upon final approval of the Planning Board which is anticipated to be in the Spring of 2004. The expected date of completion of the project is Spring of 2006.

10. Regulated environmental areas, conservation areas, easements, etc. are shown on the Construction Drawings.

11. Runoff (Q) and pollutant analysis for the post development condition are reduced from the pre development condition. Design Q's decrease for the 2, 10, 25 and 100 year storm events by 17, 35, 51 and 55 cfs respectively. Pollutant loading for phosphorous, nitrogen, BOD and suspended solids decrease by 0.34 lbs, 42.43 lbs, 10.0 lbs, and 3,091.59 lbs.

B. Existing (Pre Development) Conditions

1. Topography under existing conditions is shown on drawing titled 'Existing Condition Plan'. Also shown on the map are drainage patterns including ditches, culverts, permanent streams, intermittent streams, wetlands or other water bodies and existing roads.

2. The Site Plan shows existing land use, open space, public facilities, utility lines, water supply wells on site and predominant vegetation cover types.

C. Proposed (Post Development) Conditions

1. The completed project, including dwelling location, roads, final grading, parking, drainage, detention ponds, sewer system, water supply, and types of easements are shown on the Site Layout Plan, Grading Plan and Utility Plan.

2. Changes to land surfaces, including areas of cuts and fills, changes in vegetative cover types, and proposed contours for the road are shown on the Grading Plans.

3. Construction sequences are discussed in the attached Appendix section of this report.

D. Design Pollutant Description

A single design point has been chosen for pre and post drainage conditions. The post drainage condition for the road crossing the Golf Course allows for diverting existing drainage and the capture and treatment of the road improvements only. Ponds are organized to function in a "+ rain" to maximize the pollutant reductions.

II. STORMWATER MANAGEMENT AND CONVEYANCE

A. Stormwater Management Facilities

To provide stormwater attenuation and treatment for the proposed development, extended detention ponds are proposed, namely Ponds 1Q, 2Q and 8Q. These ponds will store and treat runoff produced from contributing areas for a minimum of 24 hours.

Detention Ponds 3R, 4R, 5R, 6R, 7R, 9R, 10R and 11R are designed to help attenuate storm flow and reduce pollutant loadings.

Pond 3R, 4R, 5R, 6R, 7R, 9R, 10R and 11R

These ponds are designed to be Type I 'First Flush' basins, which act as routing ponds for site drainage. Outlet structures for these ponds are designed with an average detention time of 8 hours. 6" standing water is provided at the bottom of each pond.

Pond 1Q, 2Q and 8Q

These three (3) ponds are Design Type III wet extended detention ponds. Storage volume for runoff generated from contributing areas in a 2 year, 24 hour storm event is provided in each pond. Outlet structure for both ponds are designed to provide detention time between 24 - 72 hours for extended detention. 6" standing water is provided at the bottom of each pond, which will provide habitat for wetland plants and hence enhance stormwater treatment.

B. Stormwater Conveyance System

Drainage swales, catch basins, manholes, interceptor drains and HDPE pipes are used to collect and transport the runoff from the developed site. Rip rap outlet protection is provided at each outfall of the conveyance system. Please refer to appendix section of this report for calculations of these structures.

C. Runoff Analysis

SCS TR-55 Method is used to estimate runoff for this project in both pre and post development conditions. A computer modeling program "HEC-1", developed by U.S. Army Corps of Engineers is used in aiding the analysis.

Total analysis area is 62.36 acres for pre development condition and 63.95 acres for post development condition.

D. Pre and Post Development Peak Runoff Comparison at Design Points

Peak runoff is computed and compared to determine the impact the project will have on existing hydrology.

Design Point:

Event (Yr)	2	10	25	100
Pre Development (cfs)	31	73	105	156
Post Development (cfs)	14	38	54	101

Runoffs are all under pre development condition, hence the proposed project will not have negative impact on the downstream hydrology.

III. STORMWATER POLLUTION TREATMENT

A. Methodology - Coefficient Method

Coefficient Method is used to estimate the pollutant generated for both pre and post development condition. Pollutant loading rates are taken from Table 9 on Page 40 of "Reducing the Impacts of Stormwater Runoff from New Development" published by the New York State Department of Environmental Conservation, and values suggested by Terreine Institute, 1994. These tables are attached in the Appendix section of this report together with a spreadsheet for the calculations. Formula for calculating pollutant loading per year is given below:

L = Area x Pollutant Loading Rate.

B. Proposed BMPs Pollutant Removal Efficiency

BMP A: First Flush Detention Pond (Design 1)

The following table provides estimates of pollutant removal rates:

Pollutant	Percent Removal	Recommended Removal
Total Phosphorous	20 - 40%	20%
Total Nitrogen	20 - 40%	20%
BOD	20 - 40%	20%
TSS	60 - 80%	60%

BMP B: Extended Detention Pond (Design 3)

The following table provides estimates of pollutant removal rates:

Pollutant	Percent Removal	Recommended Removal
Total Phosphorous	60 - 80%	60%
Total Nitrogen	40 - 60%	40%
BOD	40 - 60%	40%
TSS	80 - 100%	80%

C. Pre and Post Development Pollutant Loading Comparison at Design Point

Design Point	TP	TN	BOD	TSS
Pre Development (lb/yr)	6.24	150.14	374.16	8106.80
Post Development (lb/yr)	5.90	108.71	364.16	5015.21
Net Change (lb/yr)	0.34	42.43	10.00	3091.59

The pollutant comparison shows improvement in the quality of stormwater at Design Point and a decrease of TP, TN, BOD and TSS.

IV. EROSION AND SEDIMENT CONTROL

A. Temporary Erosion and Sediment Control Facilities

1. Temporary erosion and sediment control facilities employed in the design of this project are silt fence, stabilized construction entrances, temporary sediment basin, silt traps, temporary diversion swales and erosion control blanket.

2. The design details and implementation schedule for these facilities are shown on the Erosion Control Plans.

B. Permanent Erosion and Sediment Control Facilities

1. Permanent erosion and sediment control facilities employed in the design of this project include immediate slope stabilization, rip rap outlet protection, detention ponds and catch basin/manhole sump.

V. MAINTENANCE OF STORMWATER AND EROSION CONTROL FACILITIES

A Home Owners Association will be created and this Association will be responsible for maintaining all drainage improvements (swales, catch basins, ponds, etc.).

A. Temporary Measures

1. Silt Fence

Sediments shall be removed from behind the fence when it becomes 0.5 feet deep at the fence. It should also be inspected weekly and after each storm event. repair shall be performed as needed.

2. Diversion Swale

Proposed rip rap and grass swales are used as diversion swales during the construction phase. These swales are to be inspected weekly for scour and erosion. Remove deposits or sediment or other obstructions.

3. Construction Entrance

Construction entrance shall be maintained in a condition which will prevent tracking or flowing of sediment onto public rights-of-way. Visual inspection shall be performed daily throughout the project construction, top dressing with additional stone or additional length as conditions demand, and repair and/or cleanout of any measures used to trap sediment. All sediment spilled, dropped, washed or tracked onto public rights-of-way must be removed immediately.

4. Sediment Basin

Visual inspection of the basin embankment, outlet structure and dewatering device shall be performed every 3 month, prior to any forecasted storms and after all storm events. Repairs shall be made as needed.

Sediment should be removed every six (6) months or when sediment accumulation reaches the design cleanout level, in order to preserve the available stormwater management capacity of the sediment basin and to prevent the outlet orifices or filter medium from becoming clogged. Also, unless removed, accumulated sediment may become unsightly.

The level of sediment at which cleanout is required shall be marked on a fixed reference point. Some methods to accomplish this are:

a. Set stake in sediment storage area with painted mark showing cleanout elevation.

b. When using a riser type outlet, a paint mark on the pipe shows cleanout elevation.

5. Curb Inlet Protection

Inlet protection shall be inspected weekly and after each storm event. Sediments and debris shall be removed from behind the fence if present. repair shall be performed as needed.

B. Permanent Measures

1. Rip Rap Outlet Protection

Inspect yearly or after major storm events for signs of scour beneath rip rap layer and dislodged stone. Immediate repair is required.

2. HDPE Pipe

Maintenance need is fairly low for HDPE pipe. Inspection shall be carried out after major storm events or once a year. If pipe is clogged or damaged, repair must be made immediately

3. Catch Basin/Yard Drain

Inspected every three months, visually review rim/grate and sump for accumulated sediments, erosion and stormwater bypass.

Maintenance:

a. Remove sediments if greater than 12" deep.
b. Clear rim and grate of debris and leaves.
c. Ensure swale that drains towards the catch basin (if any) is clear of debris and evidence of erosion is repaired with grass plantings on rip rap as required.

4. Extended Detention Basin (Design 1 & 3) - Basins 1Q, 2Q, 3R, 4R, 5R, 6R, 7R, 8Q 9R 10R and 11R:

a. Inspections:

Basins should be inspected quarterly for the first year after construction and annually each spring thereafter to ensure that the structure operates in the manner originally intended.

The extended detention outlet structures should be regularly inspected, as noted above, for evidence of clogging. Inlet and outlet pipes should be checked for clogging and vandalism.

b. Mowing:

The side slopes and embankment of the basin must be mowed periodically, approximately 2 times annually.

c: Debris and Litter:

Debris and litter will accumulate near outlet structures and should be removed two times annually.

d. Erosion Control:

If erosion takes place, these areas should be stabilized (grassed) or vegetated to control erosion.

e. Structural Repair / Replacement:

Approximately every 50 to 75 years, the inlet, outlet and riser works may deteriorate and must be replaced if this does take place.

f. Nuisance Control:

Periodic mowing, debris and litter removal in the basin provides adequate nuisance control.

g. Sediment Removal:

Accumulated sediment should be removed from the lower stage every 5 to 10 years. More frequent cleanouts are needed around the flow control devices. Light weight equipment can be used to scrape off a bulk of accumulated sediment, followed by manual removal around the outlet structures. Disturbed area shall be immediately stabilized with vegetation / grass after removal operations are completed to prevent the outlet structure from clogging again.

VI. LIST OF ENFORCEMENT ACTIONS

There is no existing enforcement action against the applicant. Any alleged violation of law related to the activity for which approval is sought.

VII. LIST OF APPROVALS

The following is a list of the approvals required for this project and the status of same:

Approval	Type	Status
Town of Carmel Planning Board	Site Plan Approval	In Progress
Town of Carmel Env. Conservation Board	Wetlands	In Progress
Putnam County Health Department	Water Supply/Sewage Disposal	In Progress
NYC Department of Env. Protection	Sewage Disposal/Drainage/SPPP	In Progress
NYS Department of Env. Conservation	SPDES/ SPPP	In Progress

VIII. LIST OF VALID PERMITS AND EXPIRATION DATES

None.

IX. CONCLUSION

As discussed previous sections of this report, the development of the Fairways Executive Senior Housing Development will not have negative impacts on existing conditions in the vicinity of the site.

APPENDIX A

EXISTING CONDITIONS
CURVE NUMBERS

HEC-1 DRAINAGE REPORTS
(REFER TO ATTACHED CD)

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : fairways User: pml Date: 06-19-2003

County : State: Checked: ____ Date: _____
Subtitle: existing
Subarea : 1

COVER DESCRIPTION		Hydrologic Soil Group A	B	C	D
			Acres (CN)		
OTHER AGRICULTURAL LANDS					
Brush - brush, weed, grass mix	good	-	-	2.36(65)	-
Woods	good	-	14.0(55)	46.0(70)	-
Total Area (by Hydrologic Soil Group)			14	48.3	
			====	====	

SUBAREA: 1 TOTAL DRAINAGE AREA: 62.36 Acres WEIGHTED CURVE NUMBER: 66

TIME OF CONCENTRATION AND TRAVEL TIME Version 2.10

Project : fairways User: pml Date: 06-19-2003

County : State: Checked: _____ Date: _____
Subtitle: existing

Subarea #1 - 1

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	3.5	200	.085	h					0.334
Shallow Concent'd		720	.218	u					0.027
								Time of Concentration =	0.36*
									=====

--- Sheet Flow Surface Codes ---

A Smooth Surface	F Grass, Dense	--- Shallow Concentrated ---
B Fallow (No Res.)	G Grass, Burmuda	--- Surface Codes ---
C Cultivated < 20 % Res.	H Woods, Light	P Paved
D Cultivated > 20 % Res.	I Woods, Dense	U Unpaved
E Grass-Range, Short	J Range, Natural	

APPENDIX B

DEVELOPED CONDITIONS

CURVE NUMBERS
TIME OF CONCENTRATION

HEC-1 DRAINAGE REPORTS
(REFER TO ENCLOSED CD)

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : FAIRWAYS User: PML Date: 09-09-2003

County : PUTNAM State: Checked: _____ Date: _____
Subtitle: DEVELOPED
Subarea : 1

COVER DESCRIPTION		Hydrologic Soil Group A	B	C	D
			Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)					
Open space (Lawns,parks etc.)					
Good condition; grass cover > 75%		-	-	5.94(74)	-
Impervious Areas					
Paved parking lots, roofs, driveways		-	-	4.13(98)	-
Streets and roads					
Paved; open ditches (w/right-of-way)		-	-	1.74(92)	-
Gravel (w/ right-of-way)		-	-	0.06(89)	-
OTHER AGRICULTURAL LANDS					
Brush - brush, weed, grass mix	good	-	-	3.94(65)	-
Woods	good	-	-	0.2(70)	-
Total Area (by Hydrologic Soil Group)				16.0	

SUBAREA: 1 TOTAL DRAINAGE AREA: 16.01 Acres WEIGHTED CURVE NUMBER: 80

IMPERVIOUS

$\frac{5.93}{16.01} = 37\%$

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : FAIRWAYS User: PML Date: 09-09-2003

County : PUTNAM State: Checked: ____ Date: _____
Subtitle: DEVELOPED
Subarea : 2

COVER DESCRIPTION		Hydrologic Soil Group A	B	C	D
			Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)					
Open space (Lawns,parks etc.)					
Good condition; grass cover > 75%		-	-	6.14(74)	-
Impervious Areas					
Paved parking lots, roofs, driveways		-	-	3.35(98)	-
Streets and roads					
Paved; open ditches (w/right-of-way)		-	-	1.71(92)	-
Gravel (w/ right-of-way)		-	-	0.05(89)	-
OTHER AGRICULTURAL LANDS					
Brush - brush, weed, grass mix	good	-	.02(48)	3.23(65)	-
Woods	good	-	-	0.20(70)	-
Total Area (by Hydrologic Soil Group)			.02	14.6	
			====	====	

SUBAREA: 2 TOTAL DRAINAGE AREA: 14.7 Acres WEIGHTED CURVE NUMBER: 80

IMPERVIOUS %

$\frac{5.11}{14.70} = 35\%$

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : fairways User: pml Date: 06-19-2003

County : State: Checked: _____ Date: _____
Subtitle: developed
Subarea : 3

COVER DESCRIPTION		Hydrologic Soil Group A	B	C	D
			Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)					
Open space (Lawns,parks etc.)					
Good condition; grass cover > 75%		-	-	.06(74)	-
Impervious Areas					
Paved parking lots, roofs, driveways		-	-	.02(98)	-
Streets and roads					
Gravel (w/ right-of-way)		-	-	.04(89)	-
OTHER AGRICULTURAL LANDS					
Pasture, grassland or range	good	-	-	.49(74)	-
Total Area (by Hydrologic Soil Group)				.61	
				====	

SUBAREA: 3 TOTAL DRAINAGE AREA: .61 Acres WEIGHTED CURVE NUMBER: 76

Impervious

$\frac{.02}{.61} = 3\%$

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : fairways User: pmi Date: 06-19-2003

County : State: Checked: ____ Date: _____
Subtitle: developed
Subarea : 4

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Open space (Lawns,parks etc.)				
Good condition; grass cover > 75%	-	-	.07(74)	-
Impervious Areas				
Paved parking lots, roofs, driveways	-	-	.02(98)	-
Streets and roads				
Gravel (w/ right-of-way)	-	-	.04(89)	-
OTHER AGRICULTURAL LANDS				
Pasture, grassland or range good	-	-	.54(74)	-
Total Area (by Hydrologic Soil Group)			.67	

SUBAREA: 4 TOTAL DRAINAGE AREA: .67 Acres WEIGHTED CURVE NUMBER: 76

IMPERVIOUS

$\frac{.02}{.67} \approx 3\%$

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : fairways User: pml Date: 06-19-2003

County : State: Checked: ____ Date: _____
Subtitle: developed
Subarea : 5

COVER DESCRIPTION		Hydrologic Soil Group A	B	C	D
			Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)					
Open space (Lawns,parks etc.)					
Good condition; grass cover > 75%		-	.01(61)	-	-
Impervious Areas					
Paved parking lots, roofs, driveways		-	-	.04(98)	-
Streets and roads					
Gravel (w/ right-of-way)		-	.01(85)	.03(89)	-
OTHER AGRICULTURAL LANDS					
Pasture, grassland or range	good	-	-	.63(74)	-
Woods	good	-	-	.49(70)	-
Total Area (by Hydrologic Soil Group)			.02	1.19	
			====	====	

SUBAREA: 5 TOTAL DRAINAGE AREA: 1.21 Acres WEIGHTED CURVE NUMBER: 74

IMPERVIOUS

$\frac{.04}{1.21} = 3\%$

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : fairways User: pml Date: 06-19-2003

County : State: Checked: _____ Date: _____
Subtitle: developed
Subarea : 6

COVER DESCRIPTION		Hydrologic Soil Group A	B	C	D
			Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)					
Open space (Lawns,parks etc.)					
Good condition; grass cover > 75%		-	-	.02(74)	-
Impervious Areas					
Paved parking lots, roofs, driveways		-	-	.01(98)	-
Streets and roads					
Gravel (w/ right-of-way)		-	.03(85)	.02(89)	-
OTHER AGRICULTURAL LANDS					
Pasture, grassland or range	good	-	.06(61)	.19(74)	-
Total Area (by Hydrologic Soil Group)			.09	.24	
			====	====	

SUBAREA: 6 TOTAL DRAINAGE AREA: .33 Acres WEIGHTED CURVE NUMBER: 74

IMPERVIOUS

$\frac{.01}{.33} = 3\%$

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : fairways User: pml Date: 06-19-2003

County : State: Checked: ____ Date: _____
Subtitle: developed
Subarea : 7

COVER DESCRIPTION		Hydrologic Soil Group A	B	C	D
			Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)					
Open space (Lawns,parks etc.)					
Good condition; grass cover > 75%		-	-	.05(74)	-
Impervious Areas					
Paved parking lots, roofs, driveways		-	-	.02(98)	-
Streets and roads					
Gravel (w/ right-of-way)		-	-	.05(89)	-
OTHER AGRICULTURAL LANDS					
Pasture, grassland or range	good	-	-	.42(74)	-
Total Area (by Hydrologic Soil Group)				.54 ====	

SUBAREA: 7 TOTAL DRAINAGE AREA: .54 Acres WEIGHTED CURVE NUMBER: 76

IMPERVIOUS

$\frac{.02}{.54} = 4\%$

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : FAIRWAYS User: PML Date: 09-09-2003

County : PUTNAM State: Checked: _____ Date: _____
Subtitle: DEVELOPED
Subarea : 8

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Open space (Lawns,parks etc.)				
Good condition; grass cover > 75%	-	-	.96(74)	-
Impervious Areas				
Paved parking lots, roofs, driveways	-	-	.03(98)	-
Streets and roads				
Paved; open ditches (w/right-of-way)	-	-	.82(92)	-
Total Area (by Hydrologic Soil Group)			1.81	

SUBAREA: 8 TOTAL DRAINAGE AREA: 1.81 Acres WEIGHTED CURVE NUMBER: 83

IMPERVIOUS

$\frac{.85}{1.81} = 47\%$

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : FAIRWAYS User: PML Date: 09-09-2003

County : PUTNAM State: Checked: ____ Date: _____
Subtitle: DEVELOPED
Subarea : 9

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Open space (Lawns,parks etc.)				
Good condition; grass cover > 75%	-	-	.24(74)	-
Impervious Areas				
Paved parking lots, roofs, driveways	-	-	.02(98)	-
Total Area (by Hydrologic Soil Group)			.26	

SUBAREA: 9 TOTAL DRAINAGE AREA: .26 Acres WEIGHTED CURVE NUMBER: 76

IMPERVIOUS

$\frac{.02}{.26} = 8\%$

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

roject : fairways User: pml Date: 06-19-2003

ounty : State: Checked: ____ Date: _____
ubtitle: developed
ubarea : 10

COVER DESCRIPTION		Hydrologic Soil Group A	B	C	D
			Acres (CN)		
ULLY DEVELOPED URBAN AREAS (Veg Estab.)					
pen space (Lawns,parks etc.)					
Good condition; grass cover > 75%		-	-	.08(74)	-
mpervious Areas					
Paved parking lots, roofs, driveways		-	-	.04(98)	-
Streets and roads					
Gravel (w/ right-of-way)		-	-	.09(89)	-
THER AGRICULTURAL LANDS					
asture, grassland or range	good	-	-	1.20(74)	-
otal Area (by Hydrologic Soil Group)				1.41 ====	

UBAREA: 8 TOTAL DRAINAGE AREA: 1.41 Acres WEIGHTED CURVE NUMBER: 76

IMPERVIOUS

.04 / 1.41 3%

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : fairways User: pml Date: 07-18-2003

County : putnam State: Checked: ____ Date: _____
Subtitle: developed
Subarea : 11

COVER DESCRIPTION		Hydrologic Soil Group A	B	C	D
			Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)					
Streets and roads					
Gravel (w/ right-of-way)		-	.02(85)	-	-
OTHER AGRICULTURAL LANDS					
Pasture, grassland or range	good	-	.1(61)	-	-
Brush - brush, weed, grass mix	good	-	-	.2(65)	-
Woods	good	-	-	.5(70)	-
Total Area (by Hydrologic Soil Group)			.12	.7	
			====	====	

SUBAREA: 9 TOTAL DRAINAGE AREA: .82 Acres WEIGHTED CURVE NUMBER: 68

IMPERVIOUS

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

Project : FAIRWAYS User: PML Date: 09-09-2003

County : PUTNAM State: Checked: _____ Date: _____
Subtitle: DEVELOPED
Subarea : 12

COVER DESCRIPTION		Hydrologic Soil Group A	B	C	D
			Acres (CN)		
FULLY DEVELOPED URBAN AREAS (Veg Estab.)					
Streets and roads					
Gravel (w/ right-of-way)		-	.01(85)	.07(89)	-
OTHER AGRICULTURAL LANDS					
Pasture, grassland or range	good	-	.05(61)	.28(74)	-
Brush - brush, weed, grass mix	good	-	.53(48)	2.7(65)	-
Woods	good	-	12.3(55)	9.74(70)	-
Total Area (by Hydrologic Soil Group)			12.8	12.7	

SUBAREA: 12 TOTAL DRAINAGE AREA: 25.68 Acres WEIGHTED CURVE NUMBER: 62

TIME OF CONCENTRATION AND TRAVEL TIME Version 2.10

Project : FAIRWAYS User: PML Date: 09-09-200

County : PUTNAM State: Checked: _____ Date: _____
Subtitle: DEVELOPED

Subarea - 1

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	3.5	65	.184	H					0.100
Shallow Concent'd		100	.01	U					0.017
Open Channel		1250	.075		.015	1.0	1.5		0.017

Time of Concentration = 0.13*

Subarea - 2

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	3.5	70	.043	G					0.193
Shallow Concent'd		190	.034	U					0.018
Open Channel		540	.075		.015	1.0	1.5		0.007

Time of Concentration = 0.22*

Subarea - 3

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	3.5	20	.075	F					0.037
Shallow Concent'd		55	.075	U					0.003
Shallow Concent'd		40	.35	U					0.001

Time of Concentration = 0.04*

Subarea - 4

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	3.5	50	.03	F					0.111
Shallow Concent'd		60	.083	U					0.004

Time of Concentration = 0.11*

Subarea - 5

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	3.5	80	.175	H					0.120
Shallow Concent'd		80	.225	U					0.003
Shallow Concent'd		30	.28	U					0.001

Time of Concentration = 0.12*

Subarea - 6

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Tim (hr
Sheet	3.5	5	.01	F					0.02
Shallow Concent'd		55	.144	U					0.00
								Time of Concentration =	0.03*
									=====

Subarea - 7

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Tim (hr
Sheet	3.5	65	.092	F					0.08
Shallow Concent'd		25	.24	U					0.00
								Time of Concentration =	0.09*
									=====

Subarea - 8

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Tim (hr
Sheet	3.5	120	.117	F					0.13
Shallow Concent'd		100	.10	U					0.00
Open Channel		360	.06		.15 1		1.5		0.05
								Time of Concentration =	0.19*
									=====

Subarea - 9

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Tim (hr
Sheet	3.5	25	.16	F					0.03
Sheet		40	.05	F					0.07
Shallow Concent'd		30	.093	U					0.00
								Time of Concentration =	0.11*
									=====

Subarea - 10

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Tim (hr
Sheet	3.5	60	.24	H					0.08
Shallow Concent'd		40	.24	U					0.00
Shallow Concent'd		34	.29	U					0.00
								Time of Concentration =	0.09*
									=====

Subarea - 11

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Tim (hr
Sheet	3.5	60	.23	H					0.08
Shallow Concent'd		80	.23	U					0.00
Shallow Concent'd		35	.28	U					0.00
								Time of Concentration =	0.09*
									=====

APPENDIX C

SUMMARY TABLES
PRE VS. POST PEAK DISCHARGES

(REFER TO ENCLOSED CD)

APPENDIX D

STORMWATER CONVEYANCE
SWALES
PIPE
OUTLETS

STORMWATER COLLECTION SYSTEM

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APPENDIX E

PRE AND POST POLLUTANT LOADINGS

(REFER TO ENCLOSED CD)

APPENDIX F

TEMPORARY SEDIMENT BASIN DESIGN

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APPENDIX G

CONSTRUCTION SEQUENCE

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APPENDIX H

SOILS MAPS
USGS MAP

PUTNAM ENGINEERING P.L.L.C
ENGINEERS and ARCHITECTS
4 OLD ROUTE 6, BREWSTER, NEW YORK 10509
(845) 279-6789 FAX (845) 279-6769

SOILS MAP

SCALE: 1"=1000'

THE FAIRWAYS
FAIR STREET
TOWN of CARMEL

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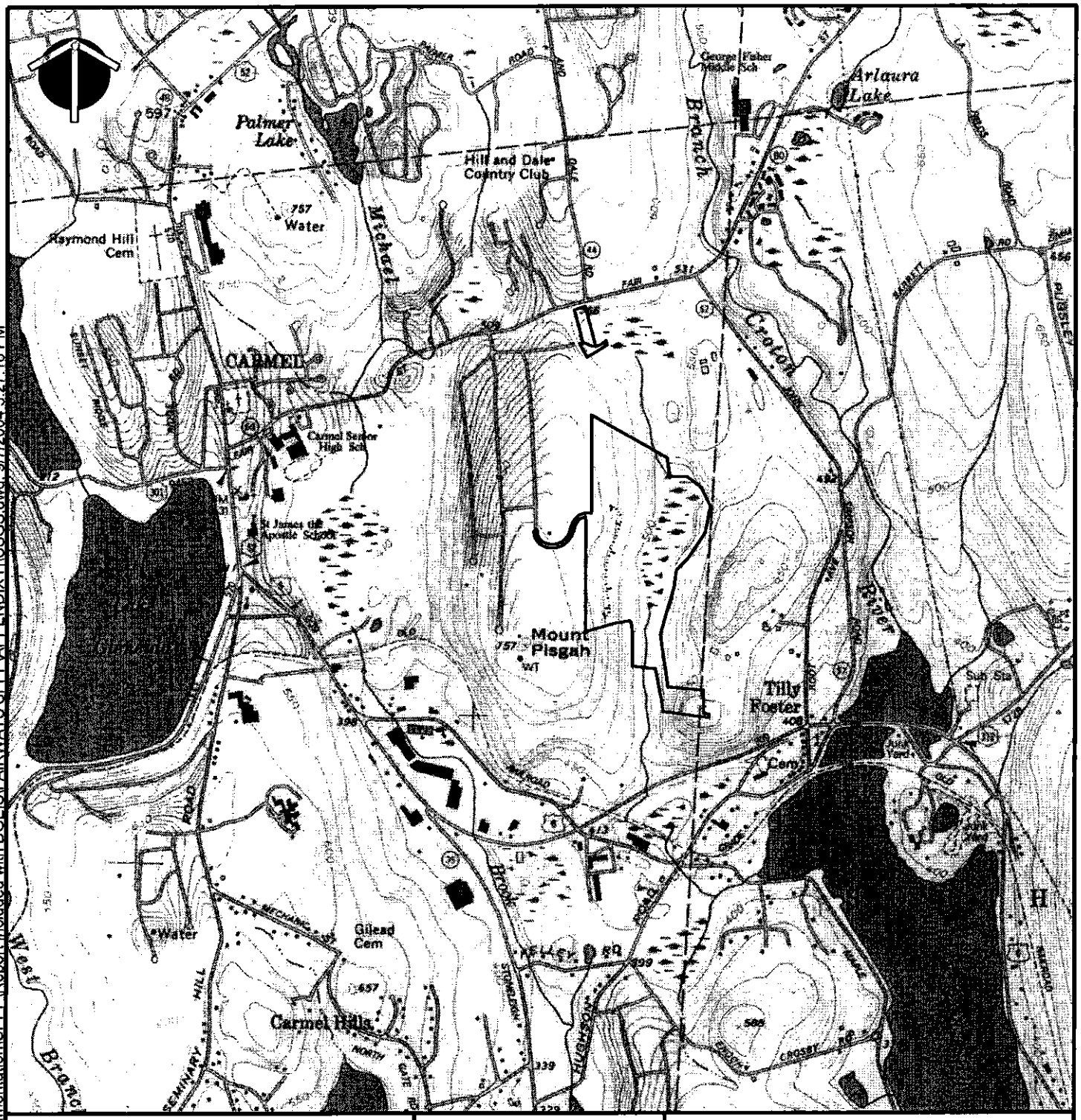

PUTNAM ENGINEERING PLLC
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4 OLD ROUTE 6, BREWSTER, NEW YORK 10509
(845) 279-6789 FAX (845) 279-6769

USGS MAP
SCALE: 1"=2000'

THE FAIRWAYS
FAIR STREET
TOWN of CARMEL

P:\PROJECTS\CIVIL\7082-Fairways\Documentation\SPPP\Report included with DGEIS\FAIRWAYS SPPP\APPENDIX H\USGS.dwg, 9/7/2004 3:27:16 PM

APPENDIX I

APPLICATION CHECKLIST FOR SPPP

APPENDIX J

SOIL TEST RESULTS

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APPENDIX K

EXTENDED DETENTION VOLUME SIZING AND DISCHARGE CALCULATIONS

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