Appendix D: Developer Guidelines

The City of Plymouth developed a Water Resources Management Plan to analyze and minimize the impact of existing and future development on the City's natural resources. It is important to the City to have consistent analysis and data collection. Therefore, all hydrologic, hydraulic and water quality analysis will be prepared in a common format. Data must be submitted in a consistent format that will allow for a timely review by City staff.

Submittal sheets for projects are enclosed. Projects and development related analysis shall utilize methods identified in Appendix F of this plan, those identified in Plymouth's Engineering Guidelines (published separately), or by methods specifically approved by the City.

A submittal checklist is also included. The checklist will be used to verify if all the information is included. No approval action will occur until all data is received.

Key Points
When preparing your engineering calculations, please remember these key points:

- A pre-design meeting with the City and the appropriate WMO is required before **ANY** data will be accepted. The purpose of the meeting is to specifically address approvals and permits, pond requirements, trunk storm drain analysis, wetland impacts, water quality treatment, erosion control and discharge to lakes and sensitive wetland resources.

- Rate control is not required IF downstream systems (ponds and storm drains) can be shown to adequately detain/retain the runoff and If the design flows meet the rates shown in this plan (Appendix F) when available.

- Regional sedimentation ponds may be used for some developments.

- All hydrologic data shall be submitted to the City using NRCS (SCS) methodology; i.e. HydroCad or TR20/TR55, XPSWMM or compatible, approved method.

- Hydraulic calculations will be accepted in the Rational Method format or in

commonly used software packages such as FHWA HY-8, Eagle Point or XPSWMM.

- All water quality analysis shall be submitted to the City using the P8 Urban Catchment model or compatible, approved method.

- The first cell of a multi-cell storm water treatment pond should be in an upland area. Second and subsequent cells may be allowed within existing wetlands, based on wetland impacts and permit requirements.

- Effective upon approval of the City's Water Resources Management Plan by the four WMOs having jurisdiction over Plymouth, the City will be the permitting authority for water resources related activities.

City of Plymouth
Water Resources Management Plan
Developer Guidelines
City Project/A-File _____

CONSULTANT _____
CONTACT _____
TELEPHONE _____
FAX _____
EMAIL _____

DEVELOPMENT NAME
_____
_____

DEVELOPER _____
CONTACT _____
TELEPHONE _____
FAX _____
EMAIL _____

SUBMITTAL CHECKLIST

(Used by City Staff to verify all information is submitted)

	Submitted**	**Approved****
• Drainage Map	_____	_____
• Land Use by Hydrologic Classification	_____	_____
• Land Use with Percent Impervious Cover	_____	_____
• Soils Map with Drainage Areas Shown	_____	_____
• Soils Map with Hydrologic Soils Groups	_____	_____
• Erosion Control Plan and Schedule	_____	_____
• DNR Permits*	_____	_____
• Wetland Permits - Joint Notification Form	_____	_____
• State and Local Permits*	_____	_____
• Erosion Control Check List	_____	_____
• Computation Check List	_____	_____

* Attach copy of permit applications
** NA if not applicable

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Reviewed by: _____
Review Date: _____
City Approval Date: _____

City of Plymouth Water Resources Management Plan Developer Guidelines City Project/A-File _____ CONSULTANT _____ CONTACT _____	DEVELOPMENT NAME _____ _____ DEVELOPER _____ CONTACT _____

EROSION CONTROL PLAN CHECKLIST 1 of 2

When developing a plan, you must satisfy all the following criteria. If a criterion does not apply, provide supporting documentation.

Check if applicable:	(1)	(2)	(3)
1. Stabilize all exposed soils and soil stockpiles. A. All exposed soils must be stabilized from the erosive forces of rain, wind and flowing water in accordance with City Ordinance. B. All stockpiles must have an adequate sediment trapping systems surrounding them, or, if it is planned that a stock pile is to remain undisturbed for more than 30 days, it must be stabilized.			
2. Establish permanent vegetation on all exposed soils not otherwise permanently stabilized in accordance with City Ordinance.			
3. Prevent erosion damage to public properties and other designated areas with properly designed and implemented erosion control measures.			
4. Provide schedule of erosion and sediment control practices. A detailed schedule and the phasing of land disturbance activities must be provided. A. All properties and watercourse downstream of any land disturbance activities shall be protected from increased volume, velocity and rates of runoff resulting from development. B. Concentrated runoff leaving a development site must discharge into a stable, well-defined natural or man-made receiving water or conveyance system.			
5. Construct temporary sedimentation basins for runoff from all disturbed soil areas greater than 5 acres, prior to commencing grading activities, in accordance with City Ordinance and NPDES Construction site Permit (MPCA)			
6. Stabilize steep slopes in a manner that will minimize erosion potential and maintain stability. Considerations include slope length, gradient, drainage area, ground water conditions and the inherent shear angle for the soil material.			

(1) Item addressed on plans or in specifications.
(2) Field verification of implementation.
(3) Erosion control measures permanently established, or removed.

Shaded portions to be completed by City

EROSION CONTROL PLAN CHECKLIST 2 of 2

Check if applicable:		(1)	(2)	(3)
7.	**Stabilize all waterways and outlets** so that storm water will be conveyed and discharged without erosion.			
8.	**Prevent sediment from entering storm sewer systems.** All functional storm sewer inlets shall be fitted with an appropriate sediment-trapping device. This criteria may be waved if, in the judgement of the permitting authority, the contributing drainage area is properly stabilized.			
9.	**When working adjacent to, in or crossing water bodies,** take precautions to contain sediment, stabilize the work area during construction to minimize erosion, and re-stabilize the work area in accordance with City Ordinance.			
10.	**Re-stabilize utility construction areas** as soon as possible. If dewatering is necessary during utility construction, adjacent properties shall not be flooded and/or eroded by the dewatering activity.			
11.	**Protect paved roads from sediment and mud** brought out from vehicle access routes. If material is tracked onto a paved surface, the surface shall be cleaned daily by shoveling or by sweeping, not by washing.			
12.	**Dispose of temporary erosion and sediment control devices** within 30 calendar days following the permanent soil stabilization or turf establishment.			
13.	**Maintain all temporary and permanent erosion and sediment control practices** to assure their continued performance.			
14.	**Conform to City Erosion Control Ordinances**			

(1) Item addressed on plans or in specifications.
(2) Field verification of implementation.
(3) Erosion control measures permanently established, or removed.
Shaded portions to be completed by City

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DEVELOPER _____
CONTACT _____

DEVELOPMENT NAME

_____

_____

WATERSHED _____
SUBWATERSHED _____
DRAINAGE AREA I.D. _____
DRAINS TO: _____

COMPUTATION CHECKLIST

HYDROLOGY, HYDRAULICS, WETLANDS, WATER QUALITY

Pond I.D.	Status	Hydrologic Summary Sheet	Hydrologic Curve No.	Time of Concentration	Stage Storage Curve	Stage Discharge Curve	Water Quality Sheet	Wetland Mitigation
	Submitted							
	Approved							
	Submitted							
	Approved							
	Submitted							
	Approved							
	Submitted							
	Approved							
	Submitted							
	Approved							
	Submitted							
	Approved							
	Submitted							
	Approved							

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HYDROLOGIC SUMMARY SHEET

	Proposed	Final
Minor Watershed Data		
Area (acres)	_____	_____
Curve Number - Attach work sheet	_____	_____
Impervious Percentage	_____	_____
Time of Concentration (hours) - Attach work sheet	_____	_____
Pond Data		
Normal Water Surface Elevation	_____	_____
High Water Elevation		
100-year, 24 hour SCS Type II Distribution, AMC II	_____	_____
100-year SCS 10 - day Runoff	_____	_____
100-year Snowmelt	_____	_____
1-year, 24 hour SCS, Type II Distribution, AMC II	_____	_____
Peak Inflow Rate (cfs)	_____	_____
Peak Outflow Rate (cfs)	_____	_____
Detention Time (hours)	_____	_____
Overflow Elevation (feet)	_____	_____
Existing Low Structure Elevation (lowest floor)	_____	_____
Minimum Building Elevation (lowest floor)	_____	_____
Downstream Trunk Storm Sewer System Trace		
Drains to (Pond I.D.)	_____	_____
Drains to Major Water Body (i.e. lake)	_____	_____
Describe drainage path from pond outflow to major water body	_____	

_____

_____

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HYDROLOGIC CURVE NUMBER SHEET

Land Use Practice based on [existing] [future] development	Hydrologic Soil Group (A,B,C,D)	Curve Number (CN)	Acres per Practice	Product (CNxAcres)
		TOTAL		
		WEIGHTED CURVE NO.	PRODUCT / ACRES	

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DRAINS TO: _____

TIME OF CONCENTRATION SHEET

SURFACE FLOW PATH	ID	"n" or VEL	FLOW LENGTH (FEET)	HIGHEST ELEVATION (FEET)	LOWEST ELEVATION (FEET)	ELEVATION CHANGE (DROP)	SLOPE (DROP/ LENGTH) (FT/FT)	TRAVEL TIME (SEC)
						TOTAL	SECONDS	
							MINUTES	
							HOURS	

ATTACH SKETCH OF FLOW PATH

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DRAINAGE AREA I.D. _____
DRAINS TO: _____

STAGE-STORAGE INFORMATION SHEET

Submit separate sheet for live storage and dead storage

	Live Storage (above the runout)			**Dead Storage (below the runout)**	
ELEVATION	AREA (ACRES)	ELEVATION DIFFERENCE	AVERAGE AREA (AC)	STORAGE (AC.FT)	CUMULATIVE STORAGE
					0

The table should be used for all contours including those below the outlet (normal water level). The last elevation in the table should be at least two feet above the emergency overflow.

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DRAINS TO: _____

STAGE-DISCHARGE INFORMATION SHEET

GENERAL INFORMATION

New Construction
Existing Control Structure

Source of Data
Survey
As-built Plans
Design
Other (specify) _____
_____
_____
_____

Overflow conditions

Weir Length _____
C Factor _____

If overflow is something other than a weir, attach appropriate documentation.

OUTLET DESCRIPTION

Pipe Size _____
Pipe Type _____
Inlet Type[1] _____
Inlet Invert _____
Outlet Invert _____
Slope _____
Length _____

[1] Based on FHWA - HDS-5

Tailwater Description
Ditch Culvert Pond Pipe

Perforated Standpipe ? Yes No

Attach Stage-discharge calculations and graph.

Describe or sketch (on separate sheet) outlet control structure if something other than a culvert. Attach pertinent calculations and/or computer output.

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WATER QUALITY SHEET 1 of 2

Land Use Practice based on [existing] [future] development	Impervious Percentage(%)	Acres per Practice	Total Impervious Acres (Impervious % x Acres)
	TOTAL		
Total Impervious Acres / Total Acres (%)			

Approximate Pond-Sizing Method

Total Impervious Acres (above) ÷ 15.8 [1] = Minimum Required Pond Acreage

_____ Ac. ÷15.8 [1] = _____Ac.

[1] Based on P8 analysis, in pond size mode with target of 85% Total Suspended Solids removal results in 15.8 acres of impervious surface.

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WATER QUALITY SHEET 2 of 2

Drainage Area

Percent Impervious
Total Impervious Acres

Pond Area

Minimum Pond Size from Page 1

Pollutant Loading

1.867 lbs. TP/ Impervious Acre
67.46 lbs TSS / Impervious Acre

Dead Storage

Treatment Efficiencies

Attach supporting computations to demonstrate no decrease in water quality of downstream waters.

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