*Notes to the user:*

1. The Engineer should add a cover sheet (with information as required in ISWMM Section 1.05) and a Table of Contents at the beginning of the report. Headers and footers should be edited for each project.
2. The fonts and styles used in this template may be changed by the user.
3. The user should edit the text in the grey boxes (†).
4. Text highlighted in orange are examples of potential responses, which can be deleted as the report is prepared (‡).
5. Text highlighted in blue are directions related to completing tables, which may be deleted as the report is prepared (††).

## Project Description

†Provide a basic description of the project and its purpose.

Include a summary of local jurisdictional stormwater management requirements.

Indicate if the proposed project is considering future development plans within the watershed being studied (e.g. are the practices being designed at this time intended to manage runoff from future phases, or are additional practice planned to be implemented later). Detail to what extent existing upstream or downstream stormwater practices were considered as part of the project.

Describe how runoff from upstream off-site areas is being considered (e.g. are these flows being detained or are adjustment being made to pass these flows through the practice?).

††Complete Table 1 with information based on local site and watershed conditions. If the project will drain to multiple outfall locations, provide a separate column for each.

‡Examples:

“This project is an 80-acre site proposed for single family development, creating 140 lots.”

“This project is a 40-acre site proposed for multifamily development, creating 240 attached townhome units.”

“This project is a 20-acre site proposed for commercial development, including three building sites, with associated parking and drives.”

“This project includes redevelopment of a 7.4-acre parcel, which will remove an existing building and parking area and replace it with a new structure and improved parking and landscaping.”

“This project is intended to provide stormwater management for the Plat 2 development area. Future developments upstream will require construction of additional stormwater management practices at a later date.”

“This project is intended to provide stormwater management for the site area as well as regional stormwater detention for an additional 150-acre area that drains through the project site.”

“The effects of an existing stormwater pond located upstream of the project has been considered as part of this study.”

“The local post-construction stormwater ordinance requires that the site address the Unified Sizing Criteria. Management requirements are as follows:

* Rev: Reduce runoff volume from the 1” rainfall event to the maximum extent possible
* WQv: Capture and treat runoff from the 1.25” rainfall event
* CPv: Provide extended detention of the 1-year storm event, with a 24-hour drawdown period
* Qp - Qf: For the 2-year through 100-year storm events (24-hour duration), limit peak runoff rates to the lesser of the peak rate from the site based on natural conditions (maximum CN=58, Tc for natural conditions) or the peak rate from the site based on existing site conditions caused by a 5-year storm event.”

“The local jurisdiction requires that site improvements which create more than 10,000 SF of new impervious surfaces address the Unified Sizing Criteria. Management requirements are as follows:

* WQv: Capture and treat runoff from the 1.25” rainfall event
* CPv: Provide extended detention of the 1-year storm event, with a 24-hour drawdown period
* Qp - Qf: For the 2-year through 100-year storm events (24-hour duration), limit peak runoff rates to the peak rate from the site based on natural conditions (maximum CN=71, Tc for natural conditions).”

Table 1. General Watershed Overview

| **Parameter** | **Unit** | **Watershed #1** | **Watershed #2** |
| --- | --- | --- | --- |
| On-Site Area | acres |  |  |
| Upstream Off-Site Area  | acres |  |  |
| Direct Discharge Area | acres |  |  |

EXAMPLE – Table 1. General Watershed Overview

| **Parameter** | **Unit** | **Watershed #1** | **Watershed #2** |
| --- | --- | --- | --- |
| On-Site Area | acres | 40.0 | 25.0 |
| Upstream Off-Site Area  | acres | 12.5 | 11.0 |
| Direct Discharge Area | acres | 0.25 | 0.13 |

## Summary of Project Impacts

†Provide a quick summary of the expected hydrologic changes and management practices to be used to mitigate negative impacts. Be aware that information that will be provided in greater detail later in this report will be needed to complete this table.

‡Example: “The project will employ several non-structural and structural BMPs which are intended to address small storm requirements and comply with the local release rate requirements for larger storm events.”

††Complete Table 2 with information, based on project stormwater calculations. Values in the “Required” column should be based on local jurisdictional application of ISWMM and account for release rate adjustments for upstream off-site and/or direct discharge runoff.

*Note: Throughout this report, if more than one table of a given type is needed, add a letter suffix to the table number (e.g. 1a, 1b…)*

**Table 2. Stormwater Management Summary**

(for developments draining to more than one location, provide separate tables for the watershed area draining to each outlet point)

| **BMP Name or Identification** |
| --- |
|  |  | **Required\*** | **Provided** |
| **Rev** | Recharge Volume\* |  |  |
| **WQv** | Water Quality Volume\* |  |  |
| **CPv****(1-year)** | Maximum Peak Release Rate (at outlet) |  |  |
| Max. Storage – site watershed total (in watershed-inches) |  |  |
| High Water Elevation within Stormwater BMP |  |  |
| **10-year** | Maximum Peak Release Rate (at outlet) |  |  |
| Max. Storage – site watershed total (in watershed-inches) |  |  |
| High Water Elevation within Stormwater BMP |  |  |
| **100-year** | Maximum Peak Release Rate (at outlet) |  |  |
| Max. Storage – site watershed total (in watershed-inches) |  |  |
| High Water Elevation within Stormwater BMP |  |  |
|  | Auxiliary Spillway Elevation |  |  |
|  | Crest of Dam Elevation |  |  |

*\*For watershed area to be treated by the BMP. Refer to Part V.C of the SWMP for calculations for allowable release rates.*

**EXAMPLE - Table 2. Stormwater Management Summary**

| **Watershed for Stormwater Wetland (SW1)** |
| --- |
|  |  | **Required\*** | **Provided** |
| **Rev** | Recharge Volume\* | 160,000 CF | 160,000 CF |
| **WQv** | Water Quality Volume\* | 207,000 CF | 321,000 CF |
| **CPv****(1-year)** | Maximum Peak Release Rate (at outlet) | 3.2 cfs | 2.8 cfs |
| Max. Storage – site watershed total (in watershed-inches) |  | 253,000 CF |
| High Water Elevation within Stormwater BMP |  | 101.8 |
| **10-year** | Maximum Peak Release Rate (at outlet) | 26 cfs | 19 cfs |
| Max. Storage – site watershed total (in watershed-inches) |  | 498,000 CF |
| High Water Elevation within Stormwater BMP |  | 103.1 |
| **100-year** | Maximum Peak Release Rate (at outlet) | 95 cfs | 89 cfs |
| Max. Storage – site watershed total (in watershed-inches) |  | 931,000 CF |
| High Water Elevation within Stormwater BMP |  | 104.9 |
|  | Auxiliary Spillway Elevation |  | 105.5 |
|  | Crest of Dam Elevation |  | 107.0 |

*\*For watershed area to be treated by the BMP. Refer to Part V.C of the SWMP for calculations for allowable release rates.*

## Pre-Project Conditions

1. *Soil Conditions*
	1. Soil Types and Hydrologic Soil Groups

†Provide a brief description of site soil conditions including drainage characteristics. Use the best available information for the project site, based on geotechnical reports or County Soil Maps. Relevant soil maps should be included in Appendix F.

‡Example: “Surface soils within the site area are Hydrologic Soil Group(s) C, C/D and D, as identified by the **???** County Soil Survey (data obtained by the USDA NRCS Web Soil Survey web application). Soil maps are included in Appendix F.”

<https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx>).

††Complete Table 3 based on site conditions.

**Table 3. Site Soil Properties**

| **Soil Classification** | **Area****(acres)** | **Hydrologic Soil Group (HSG)** |
| --- | --- | --- |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
| **Total Site Area** |  |  |

**EXAMPLE - Table 3. Site Soil Properties**

| **Soil Classification** | **Area****(acres)** | **Hydrologic Soil Group (HSG)** |
| --- | --- | --- |
| 8B – Judson silty clay loam, 2-5% slope | 25.0 | C |
| 11B – Colo silty clay loam, 2-5% slope | 1.0 | C/D |
| 76C2 – Ladoga silty clay loam, 5-9% slope | 3.2 | C |
| 76D2 – Ladoga silty clay loam, 9-14% slope | 12.3 | C |
| 133 – Colo silty clay loam, deep loess, 0-2% slope | 38.5 | C/D |
| **Total Site Area** | 80.0 |  |

* 1. Depth to Water Table

†Include details about seasonal groundwater levels (can influence grading, buildings, infiltrative practices).

‡Examples:

“The soil survey data indicates typical depth to the water table within the site work area should be approximately 1.0 to 6.5 feet (30 to 200 cm).”

“The site geotechnical report indicates the seasonal high-water table within the project area ranges from 4.5 to 15.0 feet deep.”

* 1. Presence of Hydric Soils

†List any areas or soil types with hydric soil properties.

‡Example:

“The soil survey data indicates that some hydric soils may be present at the project site. The following site soils have hydric ratings above zero: 8B – Judson (5%), 11B – Colo (60%) and 133 – Colo (95%).”

* 1. Soil Conditions for Infiltration-Based Practices

†Describe supporting information or tests used to project subsoil infiltration rates (if applicable). Provide estimated infiltration and percolation rates or hydraulic conductivities of surface and subsurface soils. Are there potential sites that have sandy soils with high percolation rates? Refer to ISWMM Section 7.02 as applicable.

‡Examples:

“Site geotechnical studies performed as per ISWMM Section 7.02 indicate that subsurface infiltration rates are expected to be approximately 2 inches/hour near Bioretention Cell #1 and 0.5 inches/hour near Bioretention Cell #2 and 1.4 inches/hour near the Permeable Paver installation.”

“Site geotechnical studies performed as per ISWMM Section 7.02 indicate that subsurface infiltration rates are expected to be approximately 0.3 inches/hour near Bioretention Cell #1 and 0.1 inches/hour near Bioretention Cell #2.”

* 1. Bedrock or Karst Topography

†Note conditions such as the depth to bedrock or the presence of Karst topography, based on information from soil surveys or geotechnical reports.

‡Examples:

“Information from the County soil survey indicates that bedrock layers should be located greater than 15 feet from the surface in all areas.”

“The site geotechnical report indicates that bedrock layers are between 8 and 25 feet from the existing surface in all areas.”

“The site geotechnical report indicates that bedrock layers are between 3 and 10 feet from the existing surface, which was considered in the design of storm sewers and stormwater quality and quantity practices.”

“Karst topographic features may be present within the site area, based on County soil survey information.”

1. *Site Vegetation*

†Provide a general description of existing surface conditions. Briefly describe existing surface vegetation (farmstead, row crops, woodlands, native prairie, savanna, etc.).

For woodland areas or native prairie, provide a general description of the woodland area (e.g. volunteer growth, small diameter trees, larger mature trees, invasive species, restored prairie, historic prairie remnant, etc.). Include a brief overview of any information about the presence of wetlands within the project area (e.g. National Wetland Inventory maps, delineation report, etc.).

‡Examples:

“Of the project area, 5 acres is a farmstead featuring a house, barn, outbuildings and a lawn area. 20 acres is farmed as row-crop agriculture. The remaining 40 acres is currently used as pastureland.”

“The project area consists of 40 acres farmed as row-crop agriculture, with 20 acres being a woodland area. The woodland features several large diameter trees. The understory is densely overgrown with small diameter volunteer trees and honeysuckle.”

“The site area includes 120 acres, with 84 acres of row-crop agriculture, 20 acres along a woodland savanna riverine buffer along the river, 11 acres within a restored prairie and 5 acres with wetland vegetation.”

1. *Topography and General Drainage Patterns*

†Include a brief description of site topography (slopes, ridgelines, drainage patterns). Note if any areas have critical or unstable slopes. Topographic maps may be included in Appendix E. Some jurisdictions may have sensitive area ordinances or other restrictions related to surface slopes, which may need to be included in the response to this topic.

‡Examples of text pieces which could be incorporated into this response:

“There is a ridgeline through the center of the property, with drainage being directed to the west and east from that line. Surface slopes range from 0.5 – 15%, with the steepest slopes along a ravine at the northeast corner of the site.”

“The site drains to three outlet points, two along its southern boundary and one along the east.”

“The river is meandering near the northeast part of the site, leading to a very steep and unstable slope in that area.”

“Most of the site drains toward a ravine near the southern edge of the site, which appears to be incising, with significant erosion occurring near and just downstream of the property boundary.”

1. *Existing Streams and Floodplains*
	1. Streams or Drainageways Passing through Site

†Identify any perennial or intermittent streams and/or concentrated flow paths that pass through the site work area.

‡Examples of text pieces which could be incorporated into this response:

“An intermittent stream passes through the northeast corner of the site. Its watershed area is 84 acres as it enters the site.”

“A concentrated flow path enters the site from the north and proceeds southeasterly to the creek.”

“A perennial stream flows through the eastern 1/3 of the site area, with a watershed of 150 acres as it enters the site.”

“The river passes along the southern boundary of the site.”

* 1. Receiving Waters

†Identify the first uniquely named stream or waterbody located downstream of the project area. Note the approximate distance to that waterbody.

‡Examples:

“The project drains to two discharge locations and is tributary to Sugar Creek which is tributary to the Raccoon River. Sugar Creek is located approximately ½ mile north of this site.”

“The project drains to one discharge locations and is tributary to the City of Dubuque MS4 which is tributary to the Mississippi River. The Mississippi River is located approximately one mile east of this site.”

(trace to first uniquely named stream)

* 1. FEMA FIRM Panel Information

††Complete the information below for the site area:

†Map Number: ###

Revision Date: month ##, YEAR

The site is located within Zone ## – Description.

Source: FEMA Flood Map Service Center – <https://msc.fema.gov/portal/home>

Attach maps in Appendix H.

‡Example:

Map Number: 19153C0166F

Revision Date: 02/01/2019

Most of the site is located within Zone X – Areas Determined to be Outside the 0.2% Annual Chance Floodplain

Some site areas along the river are located within Zone AE and the Regulatory Floodway.

Source: FEMA Flood Map Service Center – <https://msc.fema.gov/portal/home>

* 1. Floodplain Protection or Stream Buffer Requirements

†Note any expected protection requirements.

‡Examples:

“Local jurisdictional requirements designate a required buffer width along the river and creek passing through the site. These areas will need to be preserved as conservation easements or included in a parkland / greenbelt dedication. The width of the dedication is variable, based on site conditions to be consistent with local requirements.”

“A 75-foot easement is required along the intermittent stream, as per local code.”

* 1. Floodplain or Stream Buffer Impacts

†Note any expected grading, obstructions or alterations within these areas and any mitigation or permit requirements. Note if proposed construction activities require any state or local floodplain construction permits. The designer may wish to review historical aerial photos or other maps to review historic stream locations, if the project is along a perennial stream or river. Such maps may also be included in Appendix H.

‡Examples:

“Fill is required to be placed in the floodplain for an approach to a proposed culvert. This will require authorization from the Iowa DNR and local floodplain management authority.”

“Fill is being placed within the flood fringe near the project site entrance, however compensatory excavation is proposed in an adjacent area, which exceeds 1.5 times the volume of material to be placed within the flood fringe. This activity will require floodplain construction permit authorization.”

1. *Historic (Natural) Site Conditions*

†Describe historic (natural) site conditions. Note the Curve Number(s) or other rainfall loss parameters used to represent natural site conditions (refer to ISWMM Section 3.01 or as adopted by local jurisdictional ordinances or policies).

‡Example:

“Prior to settlement, this site would have been either tall grass prairie or savanna or riparian woodland. Local requirements establish a maximum value of 58 to be used for Curve Numbers to represent natural site conditions.”

1. *Existing Site Conditions*

†Describe existing site conditions, land uses and impervious surface coverage. These should specifically relate to factors which would be used to select site rainfall loss parameters. Refer to ISWMM Sections 2.05, 3.01 and 7.03 for additional information. Detailed calculations may be included in Appendices A and E.

‡Examples of text pieces which could be incorporated into this response:

“The site is currently row-crop agriculture.”

“The site is an open parcel within an existing commercial development.”

“More detailed calculations for impervious cover and CNs are included in Appendices A and E.”

††Adapt Table 4 with information as appropriate to reference the various land uses at a given site. Divide the site into separate watersheds when the site discharges to multiple outflow points, or where multiple stormwater detention BMPs are proposed.

Table 4. Existing Site Conditions

| **Parameter** | **Watershed #1** | **Watershed #2** |
| --- | --- | --- |
| Total Site Area | #.## acres | #.## acres |
| Row-crop Agriculture | #.## acres | #.## acres |
| Woodland | #.## acres | #.## acres |
| Natural  | #.## acres | #.## acres |
| Lawns or Open Spaces | #.## acres | #.## acres |
| Impervious Surfaces | #.## acres | #.## acres |
| Impervious % | #.# % | #.# % |
| Weighted Curve Number\* | ## | ## |
| Time of Concentration | ## min. | ## min. |

\* May be changed to other relevant runoff loss parameter used in stormwater management modeling

EXAMPLE - Table 4. Existing Site Conditions

| **Parameter** | **Watershed #1** | **Watershed #2** |
| --- | --- | --- |
| Total Site Area | 38.9 acres | 10.5 acres |
| Row-crop Agriculture | 35.2 acres | 8.70 acres |
| Woodland | 2.15 acres | 1.82 acres |
| Natural  | 0.25 acres | 0.00 acres |
| Lawns or Open Spaces | 0.50 acres | 0.00 acres |
| Impervious Surfaces | 0.75 acres | 0.00 acres |
| Impervious % | 1.9 % | 0.0 % |
| Weighted Curve Number\* | 74 | 75 |
| Time of Concentration | 25 min. | 17 min. |

1. *Contributing Off-site Drainage*

†Detail the property of watershed areas where flows enter the project site and any stormwater management practices in those areas. Note that ISWMM Section 3.01-5 describes how inflow from off-site areas may be considered when determining site stormwater management requirements.

‡Examples:

“Approximately 45 acres enters the site from the north. The watershed is primarily row-crop agriculture.”

“Approximately 80 acres enters the site from the west. The watershed is currently row-crop agricultural areas, but plans are for this area to be developed into 40 acres of mixed land uses (single- / multi-family and commercial) and 40 acres of single-family residential uses.”

“A stormwater wetland has been constructed upstream with an adjacent development. The stormwater study for that development was used to develop models of that practice’s operation.”

††Adapt Table 5 with information as appropriate to reference the various land uses for upstream areas. List information about watersheds to different practices separately when multiple stormwater detention BMPs are proposed.

Table 5. Upstream Off-site Conditions\*

| **Parameter** | **Unit** | **Watershed #1** | **Watershed #2** |
| --- | --- | --- | --- |
| Total Site Area | acres |  |  |
| Row-crop Agriculture | acres |  |  |
| Woodland | acres |  |  |
| Natural | acres |  |  |
| Lawns or Open Spaces | acres |  |  |
| Impervious Surfaces | acres |  |  |
| Impervious % | % |  |  |
| Weighted Curve Number\*\* |  |  |  |
| Time of Concentration | minutes |  |  |

\*Separate tables may be required if both existing and future conditions are reviewed

\*\*May be changed to other relevant runoff loss parameter used in stormwater management modeling

EXAMPLE – Table 5a. Upstream Off-site Conditions (Existing)\*

| **Parameter** | **Unit** | **Watershed #1** | **Watershed #2** |
| --- | --- | --- | --- |
| Total Site Area | acres | 40.0 | 40.0 |
| Row-crop Agriculture | acres | 40.0 | 40.0 |
| Woodland | acres | 0.0 | 0.0 |
| Natural | acres | 0.0 | 0.0 |
| Lawns or Open Spaces | acres | 0.0 | 0.0 |
| Impervious Surfaces | acres | 0.0 | 0.0 |
| Impervious % | % | 0.0 | 0.0 |
| Weighted Curve Number |  | 74 | 74 |
| Time of Concentration | minutes | 31.9 | 28.0 |

EXAMPLE – Table 5b. Upstream Off-site Site Conditions (Future)\*

| **Parameter** | **Unit** | **Watershed #1** | **Watershed #2** |
| --- | --- | --- | --- |
| Total Site Area | acres | 40.0 | 40.0 |
| Row-crop Agriculture | acres | 0.0 | 0.0 |
| Woodland | acres | 0.0 | 0.0 |
| Natural | acres | 0.0 | 0.0 |
| Lawns or Open Spaces | acres | 14.0 | 22.0 |
| Impervious Surfaces | acres | 26.0 | 18.0 |
| Impervious % | % | 65.0 | 45.0 |
| Weighted Curve Number |  | 85 | 74 |
| Time of Concentration | minutes | 17.0 | 17.0 |

††Enter relevant data from the stormwater modeling output for upstream off-site areas into Table 6. Complete a table of this type for areas which drain to each stormwater detention BMP or at every point of discharge from the project.

Table 6. Upstream Off-Site Hydrologic Summary

| **Storm Event** |  | **Natural** | **Existing** | **Future** |
| --- | --- | --- | --- | --- |
| **Rainfall** | **Peak rate** | **Volume** | **Peak rate** | **Volume** | **Peak rate** | **Volume** |
| **inches** | **cfs** | **CF** | **cfs** | **CF** | **cfs** | **CF** |
|  | **WQv** | 1.25 |  |  |  |  |  |  |
| **CPv** | **1-year** |  |  |  |  |  |  |  |
| **Qp** | **2-year** |  |  |  |  |  |  |  |
| **5-year** |  |  |  |  |  |  |  |
| **10-year** |  |  |  |  |  |  |  |
| **Qf** | **25-year** |  |  |  |  |  |  |  |
| **50-year** |  |  |  |  |  |  |  |
| **100-year** |  |  |  |  |  |  |  |

‡Examples:

“It is expected that when upstream areas are developed, additional stormwater management practices will be installed in compliance with current local requirements. Therefore, the release rate from the stormwater detention area proposed with this project will be based on two conditions, as per ISWMM Section 3.01-5:

1. Current operation: Release rate shall not exceed the rates found by adding the existing hydrograph from upstream areas to the natural hydrograph for on-site areas.
2. Future operation: After upstream practices are installed (which will reduce inflow rates to the practice proposed by this project), release rates shall not exceed the rates for natural conditions for the same storm event.

EXAMPLE – Table 6. Upstream Off-Site Hydrologic Summary

| **Storm Event** |  | **Natural** | **Existing** | **Future** |
| --- | --- | --- | --- | --- |
| **Rainfall** | **Peak rate** | **Volume** | **Peak rate** | **Volume** | **Peak rate** | **Volume** |
| **inches** | **cfs** | **CF** | **cfs** | **CF** | **cfs** | **CF** |
|  | **WQv** | 1.25 |  |  |  |  | NA | NA |
| **CPv** | **1-year** | 2.67 | 2.5 | 51,000 | 44 | 206,000 | 106 | 318,000 |
| **Qp** | **2-year** | 3.08 | 5.2 | 87,000 | 62 | 280,000 | 137 | 408,000 |
| **5-year** | 3.81 | 12 | 169,000 | 99 | 426,000 | 194 | 598,000 |
| **10-year** | 4.46 | 21 | 257,000 | 134 | 568,000 | 248 | 737,000 |
| **Qf** | **25-year** | 5.44 | 38 | 413,000 | 190 | 795,000 | 330 | 986,000 |
| **50-year** | 6.26 | 54 | 559,000 | 239 | 995,000 | 399 | 1,200,000 |
| **100-year** | 7.12 | 73 | 725,000 | 292 | 1,210,00 | 472 | 1,430,000 |

1. *Other Historic or Existing Site Issues of Note*

†Note any other environmentally sensitive resources, water quality issues or downstream conveyance limitations which were considered in project design.

‡Examples:

“A historic farmstead is located at the northwestern part of the site, which is to be preserved.”

“The receiving stream has a TMDL for bacteria and nutrients.”

“A jurisdictional wetland is located immediately downstream of the project site.”

## Proposed Site Conditions

1. *Overall Site Properties*

†Describe proposed site conditions. Describe soil management and/or restoration conditions planned (which would relate to selection of CNs for open spaces – refer to ISWMM Section 7.03). Detailed calculations may be included in Appendices A and E.

‡Example:

“The subject property is proposed to be developed into single family and commercial developments. More detailed calculations for impervious cover and CNs are included in Appendices A and E.”

††Adapt Table 7 with information as appropriate to reference the various land uses at a given site. Divide the site into separate watersheds when the site discharges to multiple outflow points, or where multiple stormwater detention BMPs are proposed.

Table 7. Proposed Site Conditions

| **Parameter** | **Watershed #1** | **Watershed #2** |
| --- | --- | --- |
| Total Site Area | #.## acres | #.## acres |
| Row-crop Agriculture | #.## acres | #.## acres |
| Woodland | #.## acres | #.## acres |
| Natural  | #.## acres | #.## acres |
| Lawns or Open Spaces | #.## acres | #.## acres |
| Impervious Surfaces | #.## acres | #.## acres |
| Impervious % | #.# % | #.# % |
| Curve Number\* | ## | ## |
| Time of Concentration | ## min. | ## min. |

\*May be changed to other relevant runoff loss parameter used in stormwater management modeling

EXAMPLE - Table 7. Proposed Site Conditions

| **Parameter** | **Watershed #1** | **Watershed #2** |
| --- | --- | --- |
| Total Site Area | 39.00 acres | 10.37 acres |
| Row-crop Agriculture | 0.25 acres | 0.00 acres |
| Woodland | 0.50 acres | 0.25 acres |
| Natural  | 20.31 acres | 5.71 acres |
| Lawns or Open Spaces | 17.94 acres | 4.41 acres |
| Impervious Surfaces | 46.0 % | 42.5 % |
| Impervious % | 86 | 84 |
| Curve Number\* | 18 min. | 15 min. |
| Time of Concentration | 39.00 acres | 10.37 acres |

1. *Direct Discharge Areas*

†If there are site areas that will drain from the site without passing through a stormwater management practice, describe those in this part of the SWMP. Allowable outflow rates from on-site stormwater practice may need to be adjusted to offset for such flows. A summary of how allowable release rates are calculated should be included in Part V.3 of the SWMP. Details of these calculations can be incorporated into Appendix C.

‡Examples:

“Some of the site entrance drive areas will leave the site via direct discharge.”

“Some of the perimeter open space areas will bypass on-site stormwater management practices.”

††Adapt Table 8 with information as appropriate to reference the various land uses within watershed areas which leave the site area without passing through a stormwater water quality and/or detention practice. Divide these areas by watersheds when the site discharges to multiple outflow points.

Table 8. Direct Discharge Summary

| **Parameter** | **Unit** | **Area #1** | **Area #2** |
| --- | --- | --- | --- |
| Direct Discharge Area | acres |  |  |
| Woodland | acres |  |  |
| Natural | acres |  |  |
| Lawns or Open Spaces | acres |  |  |
| Impervious Surfaces | acres |  |  |
| Impervious % | % |  |  |
| Curve Number\* |  |  |  |
| Time of Concentration | minutes |  |  |

\*May be changed to other relevant runoff loss parameter used in stormwater management modeling

EXAMPLE – Table 8. Direct Discharge Summary

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Area #1** | **Area #2** |
| Direct Discharge Area | acres | 0.15 | 0.20 |
| Woodland | acres | 0.00 | 0.00 |
| Natural | acres | 0.10 | 0.00 |
| Lawns or Open Spaces | acres | 0.05 | 0.10 |
| Impervious Surfaces | acres | 0.00 | 0.10 |
| Impervious % | % | 0.0 | 50.0 |
| Curve Number |  | 59 | 80 |
| Time of Concentration | minutes | 5.0 | 5.0 |

## Stormwater Modeling Information

1. *Stormwater Model(s) Used*

†List the software programs used to simulate the stormwater model for the site area.

‡Examples:

“Hydraflow Hydrographs version 2020 was used to simulate the NRCS TR-55 model of this project.”

“A NRCS TR-55 model was constructed using HydroCAD software.”

1. *Parameters*
	1. Time of Concentration

†Note the method used to calculate times of concentration. Refer to ISWMM Section 2.03 for more information. Details of these calculations may be included in Appendices A and or C.

‡Example:

“The Lag Method was used to model natural conditions. The NRCS Velocity Method was used to model existing and proposed conditions. Details of these calculations are included in Appendix A and C.”

* 1. Precipitation

†Describe the rainfall depths and distribution used for stormwater management and conveyance calculations. Refer to ISWMM Section 2.02 for rainfall values.

††Complete Table 9 with the rainfall values used for stormwater modeling for detention BMPs.

‡Example:

For TR-55 modeling, a 24-hour storm event has been simulated, using a Type II rainfall distribution. Rainfall values are based on NOAA Atlas 14 datasets for [Region] Iowa (Region ## of the Iowa Stormwater Management Manual).

For storm sewer design, rainfall values are based on values from NOAA Atlas 14 datasets for [Region] Iowa (Region ## of the Iowa Stormwater Management Manual) based on the time of concentration for the tributary area to a particular storm sewer intake or pipe.

Table 9. Design Rainfall Values

| **Storm Event** | **Rainfall** |
| --- | --- |
| 1-year |  |
| 2-year |  |
| 5-year |  |
| 10-year |  |
| 25-year |  |
| 50-year |  |
| 100-year |  |
| 500-year |  |

EXAMPLE - Table 9. Design Rainfall Values (For South Central Iowa – Region 8)

| **Storm Event** | **Rainfall** |
| --- | --- |
| 1-year | 2.77” |
| 2-year | 3.20” |
| 5-year | 3.99” |
| 10-year | 4.74” |
| 25-year | 5.90” |
| 50-year | 6.90” |
| 100-year | 7.98” |
| 500-year | 10.80” |

* 1. Rainfall Losses

†List the runoff loss method and parameters used for stormwater models and calculations. Refer to ISWMM Sections 2.04 and 2.05, as applicable.

††Provide related tables of values, as needed.

‡Example:

“Within the TR-55 model, rainfall losses are represented by selection of Curve Numbers (CNs). At this site, the following CNs were used, based on site soil conditions (HSG B) and proposed land uses. It is proposed that topsoil respread to a depth of 8” is to be used as a Soil Quality Restoration method, which was considered in selection of CNs for this location. More information is included in Appendix A.”

EXAMPLE - Table 10a. NRCS Curve Numbers

| **Surface Cover** | **CN** |
| --- | --- |
| Natural Conditions | 58 |
| Row-Crop Agriculture | 74 |
| Open Spaces | 61 |
| Impervious Surfaces | 98 |

‡Example:

“For storm sewer design, runoff coefficients have been selected based on guidance from SUDAS and site soil conditions, as mentioned above.”

EXAMPLE - Table 10b. Runoff Coefficients

| **Surface Cover** | **C5** |
| --- | --- |
| Open Spaces | 0.15 |
| Impervious Surfaces | 0.95 |

1. *Release Rate Calculations*

†For the site or subwatershed area, summarize how the allowable release rate was calculated. Generally, this will be based on local jurisdictional requirements, with appropriate adjustments to account for upstream off-site flow and direct discharge from on-site areas. Reference Part III.G and Part IV.B of the SWMP, as applicable. Detailed calculations may be included in Appendix C.

‡Examples:

“Local requirements for this site require peak runoff rates for events up to the 100-year storm event to not exceed natural conditions for the same storm event or existing conditions created by a 5-year storm event.”

“This site receives runoff from upstream areas, which are not yet developed. The proposed basin has been designed so that under the proposed initial operation, release rates will not exceed those when a hydrograph for natural conditions for on-site areas are added to existing conditions for off-site areas. Future conditions have been analyzed, so that it is projected that the proposed basin will limit peak rates to natural conditions for the entire watershed area, after potential stormwater BMPs area installed as part of development in upstream areas. Additional adjustments to allowable release rates have been made to account for flows leaving the site via direct discharge. ISWMM Section 3.01-5 was referenced in this analysis. Refer to Appendix C for more detailed calculations.”

††Complete a table similar to the one below for each stormwater detention practice. Adapt table as needed to reflect project conditions.

Table 11. Release Rate Calculation Summary

| **Storm Event** | **Future Allowable****Release Rate from Basin**(1)**(cfs)** | **Current Operation Adjusted for Upstream****Off-site Areas**(2)**(cfs)** | **Direct Discharge****from On-site Areas**(3)**(cfs)** | **Adjusted Allowable Release Rate from Practice**(4)**(cfs)** |
| --- | --- | --- | --- | --- |
| **1-year (CPv)** |  |  |  |  |
| **2-year** |  |  |  |  |
| **5-year** |  |  |  |  |
| **10-year** |  |  |  |  |
| **25-year** |  |  |  |  |
| **50-year** |  |  |  |  |
| **100-year** |  |  |  |  |

EXAMPLE - Table 11. Release Rate Calculation Summary

| **Storm Event** | **Future Allowable****Release Rate from Basin**(1)**(cfs)** | **Current Operation Adjusted for Upstream****Off-site Areas**(2)**(cfs)** | **Direct Discharge****from On-site Areas**(3)**(cfs)** | **Adjusted Allowable Release Rate from Practice**(4)**(cfs)** |
| --- | --- | --- | --- | --- |
| **1-year (CPv)** | 4.3 | 72 | 0.13 | 72 |
| **2-year** | 8.9 | 103 | 0.28 | 103 |
| **5-year** | 21 | 163 | 0.60 | 163 |
| **10-year** | 35 | 222 | 0.94 | 221 |
| **25-year** | 62 | 315 | 1.5 | 313 |
| **50-year** | 88 | 397 | 2.0 | 395 |
| **100-year** | 118 | 484 | 2.6 | 481 |

1. Allowable release rate from practice for future operations, based on natural conditions for entire watershed area (assumes future upstream practices have been installed).
2. Adjusted release rate from practice for current proposed conditions, based on adding hydrograph for natural conditions for on-site area and existing conditions for upstream areas.
3. Peak flow rates for hydrograph from 0.50-acre open space area which leaves the site via direct discharge.
4. Adjusted allowable outflow rate when direct discharge hydrograph is subtracted from current operation hydrograph.

## Stormwater Management Approaches

1. *Recharge Volume*

†Briefly describe structural and non-structural stormwater BMPs employed on-site to address local requirements related to Recharge Volume (Rev).

More details of these calculations may be included in Appendix B.

‡Example:

“At this site, Soil Quality Restoration, two bioretention cells and a permeable pavement installation are being employed to address the Rev requirements. SQR is being used to address runoff discharged from the roof of the building across a native planting area. The bioretention cells will collect runoff from two parking areas which do not drain to the permeable pavement installation. The permeable pavement installation collects runoff from itself and an adjacent drive area near the eastern part of the site. A summary of the performance of these features is listed in Table 12. More detailed calculations are included in Appendix B.”

††Adapt Table 12 based on the methods used. Refer to ISWMM Section 3.01 for additional guidance.

Table 12. Recharge Volume Summary

| **BMP Type or Identification** | **Recharge Volume Retained by BMP****(CF)** |
| --- | --- |
| Soil Quality Restoration | 4,138 |
| Bioretention Cell #1 | 1,372 |
| Permeable Pavement  | 6,207 |
| Bioretention Cell #2 | 2,421 |
|  |  |
| Recharge Volume Retained by BMPs (CF) | 14,139 |
| Site Recharge Volume Target (CF) | 14,139 |
| % of Site Recharge Volume Retained | 100.0% |

EXAMPLE - Table 12. Recharge Volume Summary

| **BMP Type or Identification** | **Recharge Volume Retained by BMP****(CF)** |
| --- | --- |
| Soil Quality Restoration | 4,138 |
| Bioretention Cell #1 | 1,372 |
| Permeable Pavement  | 6,207 |
| Bioretention Cell #2 | 2,421 |
|  |  |
| Recharge Volume Retained by BMPs (CF) | 14,139 |
| Site Recharge Volume Target (CF) | 14,139 |
| % of Site Recharge Volume Retained | 100.0% |

1. *Water Quality Volume*

†Briefly describe structural and non-structural stormwater BMPs employed on-site to address local requirements related to Water Quality Volume (WQv). If the same practices are used for both Recharge Volume and Water Quality, simply refer to Part VI.A for descriptions as applicable.

‡Example:

“At this site, two bioretention cells, a bioswale and a stormwater wetland are being proposed to address the WQv requirements. The bioretention cells will collect runoff from a building and two parking areas. A bioswale will collect runoff and convey it to the stormwater wetland. A summary of the performance of these features is listed in Table 13. More detailed calculations are included in Appendix B.”

††Adapt Table 13 based on the methods used. Refer to ISWMM Section 3.01 for additional guidance.

†More details of these calculations may be included in Appendix B.

Table 13. Water Quality Volume Summary

| **BMP Type or Identification** | **Water Quality Volume Treated by BMP****(CF)** |
| --- | --- |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
| Water Quality Volume Treated by BMPs (CF) |  |
| Site Water Quality Volume Requirement (CF) |  |
| % of Site Water Quality Volume Treated |  |

EXAMPLE - Table 13. Water Quality Volume Summary

| **BMP Type or Identification** | **Water Quality Volume Treated by BMP****(CF)** |
| --- | --- |
| Bioretention Cell A | 2,000 |
| Bioretention Cell B | 3,000 |
| Bioswale | 5,000 |
| Stormwater Wetland | 10,000 |
|  |  |
| Water Quality Volume Treated by BMPs (CF) | 20,000 |
| Site Water Quality Volume Requirement (CF) | 19,500 |
| % of Site Water Quality Volume Treated | 100.0% |

(Not the same site example as for Table 12)

1. *Stormwater Detention Practices*

†Briefly describe stormwater BMPs used for stormwater detention, either to provide extended detention of the Channel Protection Volume (CPv), or to address Overbank and Extreme Flood Events (Qp) and (Qf). Refer to ISWMM Sections 9.01 – 9.13 for additional information. More details on these calculations may be included in Appendix C.

††Enter relevant data from the stormwater modeling output into Table 14. Complete a table of this type for each stormwater detention BMP or at every point of discharge from the project.

Table 14. Hydrologic Summary

(for developments draining to more than one practice or outflow point, provide separate tables for the watershed area draining to each point)

| **Storm Event** |  | **Natural** | **Existing** | **Developed\*** |
| --- | --- | --- | --- | --- |
| **Rainfall****inches** | **Peak rate****cfs** | **Volume****CF** | **Peak rate****cfs** | **Volume****CF** | **Peak rate****cfs** | **Volume****CF** |
|  | **WQv** | 1.25 |  |  |  |  |  |  |
| **CPv** | **1-year** |  |  |  |  |  |  |  |
| **Qp** | **2-year** |  |  |  |  |  |  |  |
| **5-year** |  |  |  |  |  |  |  |
| **10-year** |  |  |  |  |  |  |  |
| **Qf** | **25-year** |  |  |  |  |  |  |  |
| **50-year** |  |  |  |  |  |  |  |
| **100-year** |  |  |  |  |  |  |  |

*\*Flow data into the proposed management practice (prior to detention release rate control)*

‡Example response:

“A stormwater wetland is being proposed for the southeastern corner of the project site. Modeling results listed in Table 9 show the change in hydrologic conditions from the site area that is expected to be treated by the practice. Table 10 shows how the performance of this BMP complies with local requirements. Table 11 includes the stage-storage relationship for the detention BMP. The wetland will use a multi-stage outfall structure as described in Table 12. More details on these calculations are included in Appendix C.

EXAMPLE - Table 14. Hydrologic Summary

| **Storm Event** |  | **Natural** | **Existing** | **Developed\*** |
| --- | --- | --- | --- | --- |
| **Rainfall****inches** | **Peak rate****cfs** | **Volume****CF** | **Peak rate****cfs** | **Volume****CF** | **Peak rate****cfs** | **Volume****CF** |
|  | **WQv** | 1.25 |  |  |  |  | 61 | 206,000 |
| **CPv** | **1-year** | 2.77 | 3.1 | 59,100 | 42 | 221,000 | 106 | 364,000 |
| **Qp** | **2-year** | 3.20 | 6.3 | 98,900 | 59 | 300,000 | 136 | 463,000 |
| **5-year** | 3.99 | 15 | 191,000 | 95 | 459,000 | 193 | 655,000 |
| **10-year** | 4.74 | 26 | 298,000 | 131 | 623,000 | 249 | 846,000 |
| **Qf** | **25-year** | 5.90 | 48 | 491,000 | 191 | 896,000 | 336 | 1,150,000 |
| **50-year** | 6.90 | 70 | 678,000 | 243 | 1,140,000 | 412 | 1,420,000 |
| **100-year** | 7.98 | 95 | 898,000 | 303 | 1,420,000 | 494 | 1,710,000 |

*\*Flow data into the proposed management practice (prior to detention release rate control)*

††Enter relevant data from the stormwater modeling output into Table 15. Also enter the allowable release rate from the BMP, based on local jurisdictional requirements. Complete a table of this type for each stormwater detention BMP or at every point of discharge from the project. Allowable release rate should match information provided in Table 11.

Table 15. Stormwater Compliance Review

(for developments draining to more than one practice or outflow point, provide separate tables for the watershed area draining to each point)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Storm Event** | **Allowable Release Rate****(cfs)** | **Proposed Outflow****(cfs)** | **Water Surface Elevation****(feet)** | **Maximum Temporary Storage\*****(CF)** | **Maximum Temporary Storage\*****(watershed-inches)** |
| **1-year (CPv)** |  |  |  |  |  |
| **2-year** |  |  |  |  |  |
| **5-year** |  |  |  |  |  |
| **10-year** |  |  |  |  |  |
| **25-year** |  |  |  |  |  |
| **50-year** |  |  |  |  |  |
| **100-year** |  |  |  |  |  |

*\*Above permanent pool or lowest basin surface elevation*

EXAMPLE - Table 15. Stormwater Compliance Review

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Storm Event** | **Allowable Release Rate****(cfs)** | **Proposed Outflow****(cfs)** | **Water Surface Elevation****(feet)** | **Maximum Temporary Storage\*****(CF)** | **Maximum Temporary Storage\*****(watershed-inches)** |
| **1-year (CPv)** | 3.2 | 2.8 | 101.76 | 253,000 | 0.87 |
| **2-year** | 6.3 | 4.1 | 102.17 | 321,000 | 1.1 |
| **5-year** | 15 | 10 | 102.64 | 409,000 | 1.4 |
| **10-year** | 26 | 19 | 103.10 | 498,000 | 1.7 |
| **25-year** | 48 | 36 | 103.78 | 655,000 | 2.3 |
| **50-year** | 70 | 61 | 104.32 | 788,000 | 2.7 |
| **100-year** | 95 | 89 | 104.88 | 931,000 | 3.2 |

*\*Above permanent pool or lowest basin surface elevation*

††Enter stage-storage information for each stormwater detention BMP into Tables 16 and 17. Table 16 may be omitted if the practice does not feature a permanent pool of water. Complete tables of this type for each stormwater detention BMP or at every point of discharge from the project.

Table 16. Stormwater Detention BMP Permanent Pool Stage-Storage Information

| **Elevation****(feet)** | **Contour Area****(SF)** | **Incremental Volume****(CF)** | **Cumulative Volume****(CF)** |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

*\*Include only stage-storage information for volume below permanent pool (“dead” storage)*

EXAMPLE – Table 16. Stormwater Detention BMP Permanent Pool Stage-Storage Information

| **Elevation****(feet)** | **Contour Area****(SF)** | **Incremental Volume****(CF)** | **Cumulative Volume****(CF)** |
| --- | --- | --- | --- |
| 93.00 | 16,400 |  |  |
| 94.00 | 19,400 | 17,900 | 17,900 |
| 95.00 | 22,500 | 20,950 | 38,850 |
| 96.00 | 26,000 | 24,250 | 63,100 |
| 97.00 | 26,400 | 26,200 | 89,300 |
| 98.00 | 36,300 | 31,350 | 120,650 |
| 98.50 | 39,300 | 18,900 | 139,550 |
| 99.00 | 85,400 | 31,175 | 170,725 |
| 99.50 | 87,500 | 43,225 | 213,950 |
| 100.00 | 125,900 | 53,350 | 267,300 |

*\*Include only stage-storage information for temporary detention volumes (“live” storage)*

Table 17. Stormwater Detention BMP Temporary Stage-Storage Information

| **Elevation****(feet)** | **Contour Area****(SF)** | **Incremental Volume****(CF)** | **Cumulative Volume****(CF)** |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Total Permanent Pool Storage (CF) |  |
| Combined Permanent Pool and Temporary Storage (CF) |  |

*\*Include only stage-storage information for temporary detention volumes (“live” storage)*

EXAMPLE - Table 17. Stormwater Detention BMP Temporary Stage-Storage Information

| **Elevation****(feet)** | **Contour Area****(SF)** | **Incremental Volume****(CF)** | **Cumulative Volume****(CF)** |
| --- | --- | --- | --- |
| 100.00 | 125,900 |  |  |
| 101.00 | 144,500 | 135,200 | 135,200 |
| 102.00 | 163,500 | 154,000 | 289,200 |
| 103.00 | 210,600 | 187,050 | 476,250 |
| 104.00 | 249,300 | 229,950 | 706,200 |
| 105.00 | 261,400 | 255,350 | 961,550 |
| 106.00 | 273,700 | 267,550 | 1,229,100 |
| 107.00 | 286,300 | 280,000 | 1,509,100 |
| Total Permanent Pool Storage (CF) | 267,300 |
| Combined Permanent Pool and Temporary Storage (CF) | 1,776,400 |

*\*Include only stage-storage information for temporary detention volumes (“live” storage)*

††Enter information to describe the various stages of outfall control for each stormwater detention BMP into Table 18. Complete a table of this type for each stormwater detention BMP or at every point of discharge from the project.

Table 18. Stormwater Detention BMP Outlet Control Information

(for developments draining to more than one practice or outflow point, provide separate tables for the watershed area draining to each point)

| **Control Stage** | **Elevation** | **Size** | **Type** | **Notes** |
| --- | --- | --- | --- | --- |
| 1 |  |  |  |  |
| 2 |  |  |  |  |
| 3 |  |  |  |  |
| 4 |  |  |  |  |
| 5 |  |  |  | Auxiliary Spillway |
| 6 |  |  |  | Dam Crest |

EXAMPLE - Table 18. Stormwater Detention BMP Outlet Control Information

| **Control Stage** | **Elevation** | **Size** | **Type** | **Notes** |
| --- | --- | --- | --- | --- |
| 1 | 93.00 | 33” | RCP | Culvert A – Primary Spillway |
| 2 | 97.00 | 9” | PVC | Culvert B – Subsurface inlet, submerged orifice control.Modeled with CL at normal pool (elev = 100.00) |
| 3 | 102.00 | 4’ wide | Weir (A) | Front side of inlet. Set above CPv elevation |
| 4 | 104.00 | 8’ wide | Weir (B) | Left and right side of inlet.(Back side set above 100-yr high water elevation.) |
| 5 | 105.50 | 30’ long | Broad-crested | Auxiliary Spillway |
| 6 | 107.00 |  |  | Dam Crest |

## Stormwater Conveyance Design

†Describe methods used to size culverts, storm sewer pipes, inlets and channels. Details of the capacity analysis may be included in Appendices A, D and E.

‡Example response:

“Storm sewer system design was completed consistent with local jurisdictional requirements, following methods described in Chapter 2 of the SUDAS Design Manual.

Site storm sewer pipes were designed to convey the peak flow expected during a 5-year storm event, without surcharge. Projected flows were computed using the rational method.

Storm inlets were placed along streets to comply with gutter flow standards, based on street classification. Calculations for area intakes were performed to determine high-water elevations expected to be caused by a 100-year storm event. These elevations were used to set finished floor and protection elevations for surrounding structures.

Culverts at road crossings were designed to convey the 25-year storm event while maintaining at least one foot of freeboard from the elevation that would allow flow to cross over the collector street.

Additional details of these calculations are included in Appendices A, D and E.”

## Downstream Analysis

†If a downstream routing analysis is required for a given project, describe its findings here. Refer to ISWMM Section 9.07 for additional information. Details of the routing analysis may be included in Appendix C.

‡Example responses:

“This project did not require a downstream analysis, as extended detention of the CPv is being provided and outflow rates are being controlled to natural rates (CN=58). This should result in the following reductions in flow from existing conditions at the outlet from the stormwater management BMP:

* CPv (1-year storm) = 94%
* 10-year storm = 85%
* 100-year storm = 71%”

“Downstream storm sewer capacities and frequent flash flood conditions have required a downstream hydrologic assessment to be performed. This assessment has been completed as per ISWMM Section 9.07 to the location noted on the watershed map included in Appendix E. The conclusion of this assessment has determined that the proposed stormwater detention BMPs will not cause any overlapping of the peaks of hydrographs which would result in an increase in peak flow rates within the study area. Details of this assessment are included in Appendix C.

## Other Relevant Information

†Include any other relevant information. Include a summary of any past related studies which were used as a basis for this report. Include PDF copies of such studies with the SWMP (as Appendix K).

## List of Appendices

Appendix A Subarea Land Use Calculations (Time of Concentration Calculations may go here)

Appendix B Recharge Volume and Water Quality Volume Calculations

Appendix C Hydrograph Modeling Input and Output (Time of Concentration Calculations may go here, if calculated by software)

Appendix D Storm Sewer Pipe, Intake and Culvert Design Calculations

Appendix E Watershed or Drainage Area Maps

Appendix F Soil Property Maps or Geotechnical Information

Appendix G Wetland Information (need to discuss)

Appendix H Floodplain Maps (if needed)

Appendix I Permit Documentation

Appendix J Maintenance Plan

Appendix K Past Related Stormwater Studies