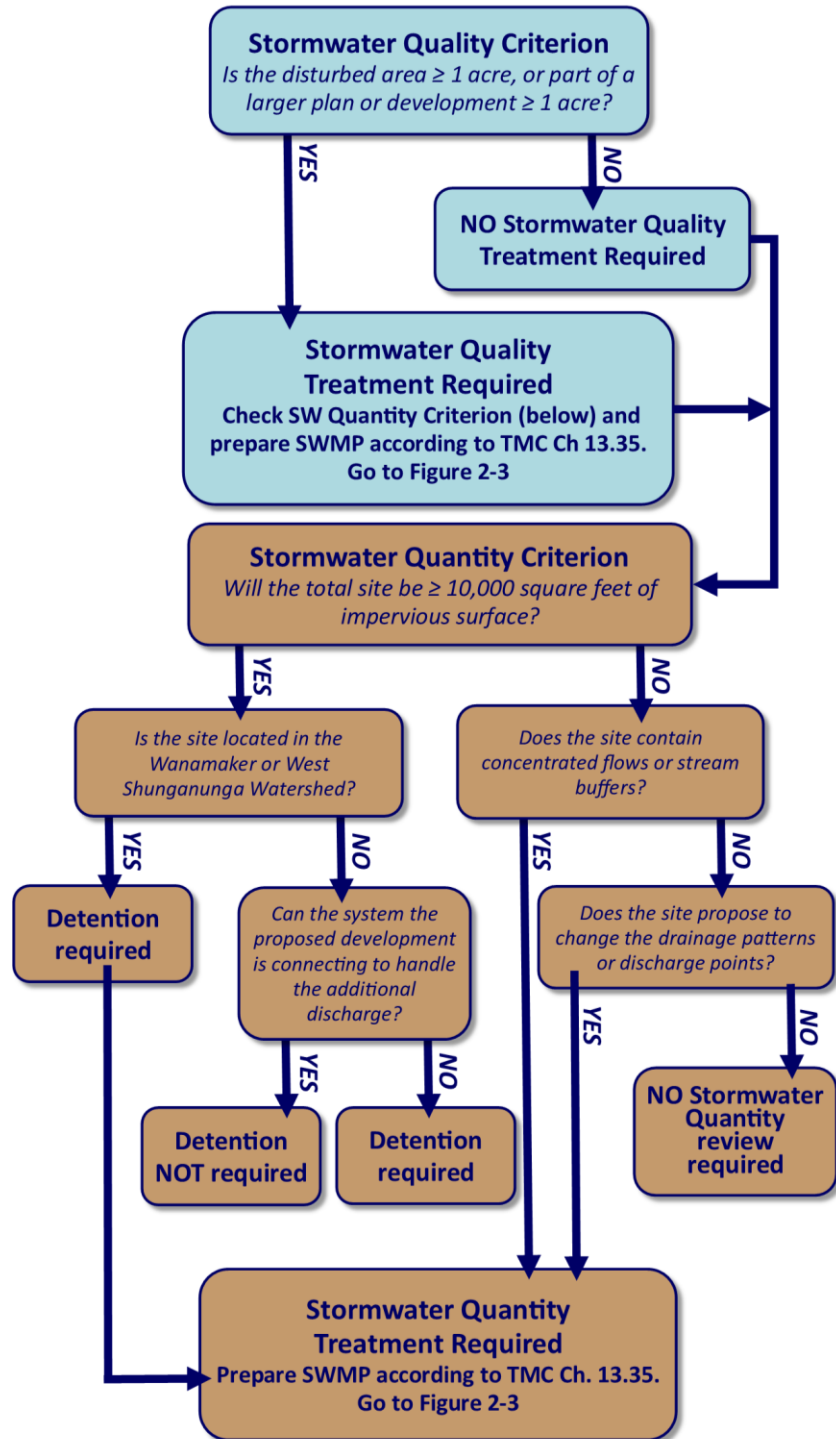




# City of Topeka, KS Stormwater Quality and Quantity Review Checklist

## Stormwater Performance Standard Applicability Flowchart



## **I. Stormwater**

### **A. Stormwater Quality Review**

1. A Stormwater Quality Review is Required, along with a Stormwater Management Plan/Drainage Report outlining implementation of best management practices (BMPs) to address post-construction stormwater quality, when any of the following are true:
  - The proposed land development plan is equal to or greater than 1 acre, including projects that cause a land disturbance less than one acre that are part of a larger common plan of development (shall include all cumulative increases in impervious surfaces since 2011).
  - The proposed land development is located within an impacted watershed as determined by the Post Construction Stormwater Quality Policy.
2. Exemptions to the above include the following:
  - Discharging the stormwater runoff to an existing stormwater management facility, whether public or private, that is an off-site facility designed, adequately sized, constructed and maintained to provide a level of stormwater control that is equal to or greater than that which would be afforded by on-site practices and there is an entity responsible for long-term operation and maintenance of the stormwater practice, provided the developer produces a written agreement permitting the discharge of stormwater runoff and long-term operation and maintenance to the existing stormwater management facility.
  - Engineering studies determine that installing a stormwater management facility in order to meet the stormwater management standards will cause adverse impact to water quality or cause a negative impact to a downstream channel.
  - Redevelopment where engineering studies demonstrate that there is no net increase in stormwater runoff from current conditions.

### **B. Stormwater Quantity Review**

1. A Stormwater Quantity Review is Required, along with a Stormwater Management Plan/Drainage Report outlining the features that will be in place to adequately meet the Storm Drainage Design Criteria, if any of the following are true:
  - The total site is greater than 10,000 square feet of impervious surface.
  - The proposed site contains concentrated flows or stream buffers.
  - The proposed site will change drainage patterns or discharge points.
2. Exemption to the above include the following:
  - When the development results in no increase in impervious area, no existing on-site or downstream drainage problems are evident, and there are no changes to existing drainage patterns.
  - When the development is in an area covered by an existing drainage report that contains the information that is still applicable to the proposed development.
  - When a drainage study is deemed not necessary by the Utilities Director or designee and so stated in written form.

### C. Policies & Guidelines

1. Stormwater runoff generated from new developments shall not discharge directly into a jurisdictional wetland or local water body without adequate treatment and controls.
2. The owner is responsible for complying with all local, state and federal permit requirements, plans and programs as related to discharges into a local water body.
3. BMP's shall be designed to promote infiltration to the maximum extent possible using structural and/or non-structural methods.
4. All structural stormwater treatment practices shall be designed in accordance with provisions contained in TCC Chapter 13.35 Stormwater Management.
5. All BMPs for water quality shall be designed in accordance with the most recent addition of the Mid-American Regional Council (MARC) and American Public Works Association Manual of Best Management Practices.
6. BMPs shall reduce discharge and Total Maximum Daily Load (TMDL) of the regulated pollutants designated in the City's MS4 permit and Post Construction Stormwater Quality Policy. Permit and Policy can be found at <https://www.topeka.org/utilities/about-the-stormwater-utility/>.
7. Stormwater Management Easements and/or Access Easements shall be provided by the owner for access to the stormwater facilities; including but not limited to BMP's, Detention, and Retention facilities; at reasonable times for periodic inspection by the city or its designees. These easements may be dedicated by plat or granted by separate instrument. Easements by separate instrument shall be reviewed, approved & recorded copy submitted prior to final approval. Easement language can be found in the Subdivision Checklist beginning on page 5, which is located at <https://www.topeka.org/planning/application-forms/>
8. Detention or retention is required for all new development within the drainage basins designated by the Utilities Director, where downstream problem areas have been identified, where development will create downstream problems, or where existing system lacks sufficient capacity to handle additional discharges.
9. Stormwater sewer, channel and detention or retention facilities shall be designed to conform to "City of Topeka Standards and Design Criteria Manual" or generally accepted engineering practices and design shall be sealed by a professional Engineer.
10. All development shall be designed to plan for and control the 100-yr storm event, and all minimum opening elevations of structures shall be 1' above the highest adjacent 100-year water surface elevation.
11. No more than 1.5 cfs (10-yr storm event) is allowed to discharge out of a private driveway into a public street.
12. If development changes drainage patterns from overland flow to point source discharges without dissipating to overland flow before it leaves the property, a recorded drainage agreement between property owners will be required and a copy submitted. See <https://www.topeka.org/engineering/easement-forms/>.
13. If a public drainage structure type is altered or a new structure installed in the Public Right-of-Way or public drainage or utility easement, a Public Improvement Project will be required. See City Project Request and Number Assignment Form located at <https://www.topeka.org/engineering/standard-front-end-documents/>; along with the "Steps in Initiating and Administering a Developer Financed Public Improvement Project".

14. A City of Topeka land disturbance activity permit is required when the removal, increase or stockpiling of any materials exceeds either 3,000 square feet or 100 cubic yards; the grading, excavation, or stockpiling of any earthwork significantly changes an established watercourse or significant changes runoff conditions to a drainage easement; land disturbance activity exceeds 1 acre, or unique circumstances have potential environmental impact.
15. Any project or combination of projects in which construction activities will disturb one or more acres must submit a Notice of Intent (NOI) form to the KDHE at least 60 days before the start of the scheduled construction for authorization to discharge under the construction stormwater permit.

#### **D. Stormwater Management Plan:**

The Stormwater Management Plan shall include the following:

1. A Title Sheet including the Report Name, Site/Project Name and Project Location.
2. A written narrative outlining implementation of best management practices (BMPs) to address post-construction stormwater quality.
3. Identification of proposed land use “Hot Spots” that may contribute greater concentrations of hydrocarbons, metals and/or other pollutants. Land use “hot spots” are identified in Section 4.4 of the MARC Manual. Identified commercial and industrial “hot spots” will require industry-specific BMPs to provide additional measures to manage the water quality.
4. A map indicating location of existing and proposed buildings, roads, parking areas, utilities, structural stormwater management and sediment control facilities, and drainage patterns. Include individual drainage basin / tributary areas.
5. A pre-development and post-development topographic base map (1”=200’) that extends 100’ beyond the limits of the proposed development and indicates all existing drainage features and proposed natural and manmade drainage features.
6. Hydrologic and hydraulic design calculations for the pre-developed and post-developed conditions. The calculations shall include the following:
  - a. Calculate the percent (%) impervious area and weighted curve number (CN) for pre-developed and post-developed conditions.
  - b. Use the Level of Service (LS) Method for BMP selection if post-development has increased impervious areas.
  - c. Calculate the weighted Value Rating (VR).
  - d. If post-development VR will not meet the LS, create a mitigation package by applying BMPs until the LS is met for the site.
  - e. Calculate the required water quality volume WQv for the post-developed site.
  - f. Calculate the existing runoff and post-developed runoff (weighted runoff coefficients can be used)
  - g. Determine capacity of the City storm sewer system at the point where the development site storm sewer will tie into the City’s storm sewer system.
    - a. If the City system will not handle the additional runoff, determine the type, size and location of detention storage
7. Hydrologic (and infiltration) soil information and properties, including infiltration test results if applicable.
8. BMP planting schedule prepared by qualified personnel. The BMP plant schedule shall specify the type of plant by genus and species, as well as by common name. Additionally, the BMP plant schedule shall specify the seeding rate or planting density. It is recommended that a registered landscape architect,

horticulturalist or plant ecologist be consulted early in the process to ensure the long-term functionality and success of the vegetation selected for the BMP.

9. Stormwater BMP and Landscape post-construction detailed maintenance plan, including responsibility for maintenance and practices to be employed to ensure vegetative cover is preserved and BMPs continue to operate as designed. These provisions shall be provided by qualified personnel.
10. Document floodplain restrictions and any previous restrictions or agreements that affect drainage.

**[See Recommended Outline of Stormwater Management Plan and Appendices]**

## **E. Storm Sewer Design Criteria**

### **1. Piping**

- a. On-site storm sewer system shall be designed according to the latest edition of the “City of Topeka Standards and Design Criteria Manual” or other accepted engineering methods.
- b. The system shall be designed for the 10-year storm with provisions for overflow for the 100-yr. storm.
- c. The following information shall be provided:
  - i. Inlet Design:
    - Area that drains to each inlet
    - C factor for the area
    - Time of concentration for the area
    - Intensity associated with the Tc
    - Total flow at the inlet (including any upstream bypass)
    - Total flow entering the inlet
    - Total bypass
  - ii. Pipe Design:
    - Contributing area
    - C factor for the area
    - Time of concentration (including pipe travel time)
    - Flow in pipe
    - Pipe size
    - N factor
    - Slope
    - Pipe Capacity
    - Velocity
- d. The following minimum design standards shall apply:
  - Minimum pipe size = 15”
  - Minimum velocity = 3 fps
  - Minimum gutter slope = 0.5%
  - Minimum Tc = 5 minutes

### **2. Channels**

- a. Channels shall be designed according to the latest edition of the “City of Topeka Standards and Design Criteria Manual” or other accepted engineering methods.
- b. Channels shall be designed to provide adequate capacity to convey the 100-year storm flow plus the required freeboard.

- c. Channels shall be designed to provide adequate protection from erosion caused by the 5-year storm flow. The top elevations for all linings and structures shall be placed at or above the anticipated water surface elevation for the 5-year storm flow.
  - d. The following information shall be provided for each channel:
    - Contributing area
    - C factor
    - Tc
    - Intensity
    - Flow
    - n factor
    - Slope
    - 5-year depth and velocity
    - 100-year depth and velocity
    - Cross Sections and Typical Sections including freeboard
    - All relevant calculations
3. Detention Facilities
- a. Storm Detention Facilities shall be designed according to the latest edition of the “City of Topeka Standards and Design Criteria Manual”.
  - b. Design of the detention facilities shall be accomplished using any recognized engineering method to establish the inflow hydrograph.
  - c. The post-development discharge from the site shall not exceed the pre-development discharge for any return period from 2 years to 100 years. The storm frequency and release rate from the detention structure shall be determined by the capacity of downstream structures, previous basin-wide drainage reports or, if designated as an area that requires on-site detention, by the undeveloped flow rate.
  - d. An emergency spillway shall be designed for detention/retention ponds to provide both a flow path for the ultimate protection of the integrity of the embankment and control the location of overtopping.
    - a. Sufficient erosion protection of the concentrated overflows shall be designed.
  - e. The following information shall be provided for each detention area:
    - Inflow hydrograph (tabular or graphical)
    - Stage-storage-outflow table
    - Routing information including peak storage and outflow

## F. Required Notes

- 1. The following notes are required on a plat, if applicable (Refer to Subdivision Checklist):
  - Public Utility Easements
  - Drainage Easements
  - Private Drainage Easements
  - Stormwater Management Easements
  - Stream Buffer Easements
  - Minimum Opening Elevations
  - Floodplain and Floodway, with base flood elevation
  - If any of the below conditions apply, the following note shall be added: “No Building Permit shall be issued until all Stormwater Management Plans have been approved.”

- i. Plat is not fully approved when site plan application is submitted.
  - ii. Plat is not fully approved when building permit application is submitted.
  - iii. Unresolved Stormwater Review comments remain.
2. The following notes are required on construction documents, if applicable:
  - Public Utilities Notes and Easements
  - Drainage Easements
  - Private Drainage Easements
  - Stormwater Management Easements
  - Stream Buffer Easements
  - Minimum Opening Elevations
  - Floodplain and Floodway, with base flood elevation
  - Grading Notes
  - Soil Preparation Notes
  - Erosion Control Notes
  - Maintenance Notes to provide protection for BMP's and all other storm assets during construction
  - Sequence of Construction
  - Landscape installation notes with planting specifications and scheduling
  - Inlet and Outlet Details
  - Pavement Specifications and Notes
3. Easements granted by Instrument, forms can be found at <https://www.topeka.org/engineering/easement-forms/>.

## **II. Stream Buffer**

### **A. Stream Buffer Review**

A Stream Buffer Review is Required when any of the following are true:

- The site includes areas within 100 feet (measured from the outer wet edge of a channel during base flows) of a Type I Stream (perennial streams shown as solid blue lines of a USGS survey map)
- The site includes areas within 50 feet (from centerline of the channel) of a Type II Stream (intermittent streams shown as a dashed blue line on a USGS survey map)
- The site includes areas within 30 feet (from centerline of the channel) of a Type III Stream (waterways or channels having a contributing drainage area of 50 acres or greater)

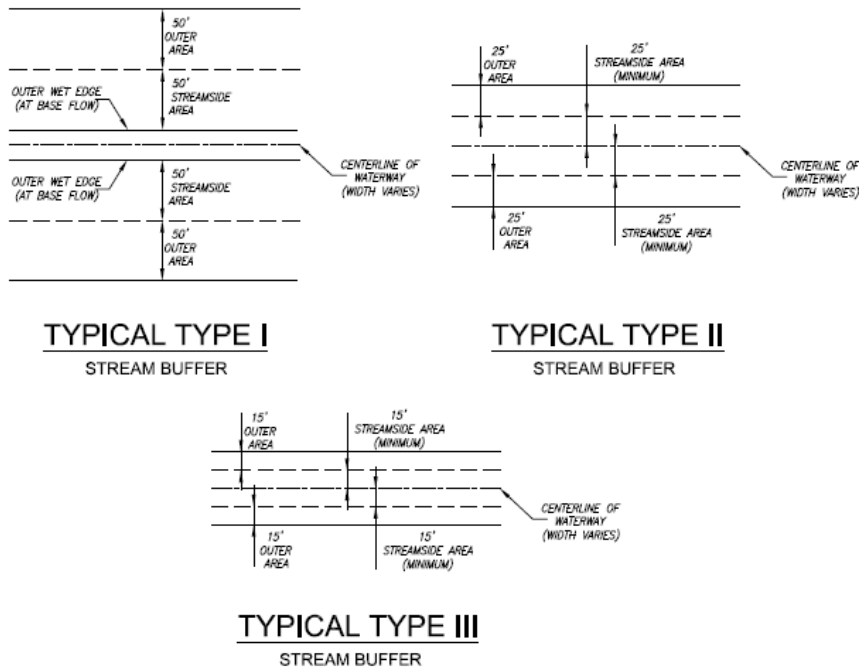
### **B. Policies & Guidelines**

1. A stream buffer easement shall protect all areas within the prescribed distances referenced above. If granting by instrument see: <https://www.topeka.org/engineering/easement-forms/>.
2. A buffer for a stream shall consist of a strip of land extending along both sides of a stream and its adjacent wetlands, floodplains, or slopes. The buffer width shall be adjusted to include contiguous sensitive areas, such as steep slopes or erodible soils, where development or disturbance may adversely affect slope stability, water quality, streams, wetlands, or other water bodies.
3. The stream buffer shall be expanded based on the following:

- a. Wetlands or critical areas
- b. Steep slopes adjacent to the waterway that drain into the system (Type I streams only)
- 4. Water pollution hazards must be set back from any stream or water body by the following distances.
  - a. Storage and use of hazardous substances: 300 feet
  - b. Above or below ground petroleum storage facilities: 300 feet
  - c. Drain fields from on-site sewage disposal and treatment system: 200 feet
  - d. Raised septic systems: 500 feet
  - e. Solid waste landfills or junkyards: 600 feet
  - f. Confined animal feedlot operations: 500 feet
- 5. The buffer shall be composed of two distinct areas: a streamside area and outer area. Each area has allowable uses and vegetative targets.
- 6. The following activities are prohibited within the stream buffer, except with written approval by the Utilities Director.
  - a. Clearing of existing vegetation
  - b. Grading, stripping, or other soil disturbing practices
  - c. Filling or dumping
  - d. Draining the buffer area by ditching, underdrains, or other systems
  - e. Use, storage, or application of pesticides, except for the spot spraying of noxious weeds or nonnative species consistent with recommendations of the Shawnee County soil conservation district
  - f. Housing, grazing, or other maintenance of livestock
  - g. Storage or operation of motorized vehicles, except for maintenance and emergency use
- 7. Written requests for waivers or variances for development within a stream buffer shall be submitted for review by the Utilities Director per Chapter 17.10.080 of the Topeka Municipal Code.
- 8. A diagram showing the stream buffer streamside area and outer area for each type of stream is shown below

WATERWAY BUFFERS						
	STREAMSIDE AREA			OUTER AREA		
	TYPE I	TYPE II	TYPE III	TYPE I	TYPE II	TYPE III
<i>Width</i>	<i>50 feet</i>	<i>25 feet</i>	<i>15 feet</i>	<i>50 feet</i>	<i>25 feet</i>	<i>15 feet</i>
<i>Vegetation</i>	<i>Native Vegetation</i>			<i>Native Vegetation or Managed Lawn (Type II or III)</i>		
<i>Uses</i>	<i>Flood Control, Utility Corridors</i>			<i>Biking/hiking paths, flood control, detention/retention structure, utility corridors, stormwater BMPs, residential yards, landscape areas.</i>		
	<i>Flood Paths, Road Crossings</i>					
<i>Function</i>	<i>Protect the physical and ecological integrity of the stream ecosystem</i>			<i>Protect key components of the stream and filter and slow velocity of water runoff</i>		





### III. Floodplains

#### A. Floodplain Review

A Floodplain Review is required when any of the following are true:

- A FEMA special flood hazard area is located on the site.
- Channelized drainage is located on the site

#### B. Policies & Guidelines

1. A Drainage Easement shall be granted to cover the 100-year (1% annual chance) water surface elevation. The 100-year (1% annual chance) water surface elevation and 100-year (1% annual chance) water surface extents shall be shown, with the easement boundary. If granting by instrument see <https://www.topeka.org/engineering/easement-forms/>.
2. A Floodplain Development Permit is required when the development is located in a FEMA special flood hazard area. The Floodplain Development permit and applicable attachments shall be submitted to the City's floodplain administrator.
3. Development shall not have any negative flooding impacts to upstream or downstream properties. Provide documentation and/or calculations to show there are no negative impacts upstream or downstream to existing properties.
  - a. A hydraulic model shall provide an accurate comparison of existing conditions and proposed conditions as a result of the improvements. The results shall be submitted to the applicable agencies and a copy of the results, with all applicable agency approvals, shall be provided to the City. The hydraulic model shall include existing structures in the flooding source.
  - b. FEMA Flood Zone "A" or "AH":
    - i. If the proposed development is located in a Zone A or AH floodplain, the following is required.

1. An analysis shall be completed and provided for review verifying that the development will not cause more than a 1.0-foot rise in the water surface elevation or a rise that exceeds the lowest adjacent grade of the lowest impacted infrastructure, whichever elevation is less. If the existing hydraulic model does not include structures, it should be updated to include all existing structures. If an existing structure is located in the floodplain, there should be no rise to the water surface elevation at the location of the impacted structure.
  2. If compensatory storage is proposed for a Zone AH floodplain, the above analysis is not required.
- c. FEMA Flood Zone “AE”:
- i. When developing in a Zone AE floodway fringe, it is implied that no more than a 1.0 ft rise will occur to the water surface elevation. If there are structures impacted by the development, documentation and/or calculations shall be provided to show that there are no negative impacts to those existing properties upstream or downstream of proposed improvements. If an existing structure is located in the floodplain, there should be no rise to the water surface elevation at the location of the impacted structure. Compensatory storage is recommended.
  - ii. A KDA-DWR Permit and FEMA no-rise certification is required when the development is located in a FEMA Zone AE floodway. Development in the floodway shall result in no increases in upstream or downstream flood elevations. A copy of the no-rise certification, documentation/calculations supporting the no-rise certificate and the KDA-DWR approval letter shall be submitted.
4. Alterations to a stream that has a drainage area greater than 640 acres (1 sq. mile) requires a KDA-DWR Permit for the stream changes.
  5. Shawnee County Flood Insurance Study can be found at <http://snmapmod.snco.us/fmm/maps.asp>

## **IV. Levees**

### **A. Levee Review**

1. A Levee Review is required when any portion of the development lies within a levee critical zone (500 feet landside or 500 feet riverside from the centerline of a levee).

### **B. Policies & Guidelines**

1. Any physical subsurface work within the levee critical zone, must be approved by the US Army Corps of Engineers (USACE) through the Levee Sponsor. Submittal of “Checklist for Construction – Flood Control Projects”, which is included as Appendix “C” and relevant information shall be provided to the levee sponsor.
2. Below is a list of “Topic Specific Guidance” provided at the above link.
  - Borings, Posts and Power Poles
  - Dewatering
  - Directional Drilling
  - Excavation and Backfill
  - Hydraulic Considerations
  - Operations and Maintenance

- Implosions
- Interim Flood Protection and Contingency Plans
- Permit Requirements
- Piping Systems
- Slope Protection
- Slope Stability
- Sluice Gates
- Structures
- Underseepage
- Uplift

The levee sponsor for the Waterworks, Auburndale, South Topeka, Oakland, and North Topeka levee units is the City of Topeka. The representative for the City is the Levee Engineer. The levee sponsor for the Soldier Creek levee unit is North Topeka Drainage District. For any proposed work within the levee critical zone, the “Checklist for Construction – Flood Control Projects” and relevant information documenting how the proposed work will not negatively affect the operation and maintenance of the existing levee system shall be submitted to the Levee Engineer. The Levee Engineer will coordinate with USACE for their review and approval. Any comments from USACE shall be addressed and resubmitted. Documentation of approval from USACE shall be received by the City prior to issuance of any building permits for work within the levee critical zone. As-built information for completed work within the levee critical zone shall be submitted to the Levee Engineer upon completion of construction.

# Comprehensive Stormwater Management Plan

## Recommended Outline

### **1. Title Sheet**

- a. Report Name
- b. Site/Project Name
- c. Project Location (common address or parcel number of site)

### **2. Introduction**

- a. Project Location
- b. Purpose of Study
- c. Site Information (characteristics of the proposed project including whether this project is a subdivision or site plan, whether it is a new development or redevelopment, and general project information as follows: proposed land use; zoning designation; current land uses of all adjacent properties; number of project driveway/roadway connections to public streets and public street names; total area of property; total project area; total disturbed area; total impervious area; and total area that will discharge stormwater to a permanent on-site stormwater quality and/or quantity BMP; number and types of permanent BMPs; the number and locations of the project's stormwater discharge outfalls; indicate the receiving system for each outfall (waterbody name or public drainage system); and, whether the site receives run-on from upstream or adjacent properties.)
- d. Watershed Information (identify the regulated drainage area(s) that will receive project discharges after development; indicate the percentage of the project area that will discharge stormwater to these drainage areas and identify the project stormwater BMPs and pollution controls for hotspots that will manage the project's stormwater discharges within each drainage area.)

### **3. Existing Conditions Narrative**

- a. Description of the existing condition land use and the topographic and hydrologic characteristics of the site
- b. List of each impervious area added since 2011
- c. Narrative of other relevant information (any other known hydrologic, hydraulic, geotechnical, or pollution/environmental relevant data, test results, studies, or analyses available for the existing site, such as soil borings and other geotechnical data, soil analyses, flood studies, capacity studies, history of potentially polluting land uses, know soil pollution, etc.)

### **4. Proposed Conditions Narrative**

- a. Description of the proposed project and intended land use of disturbed areas
- b. Description of the proposed condition topographic and hydrologic conditions. (Describe use and materials for all impervious areas to be added or replaced)
- c. Acknowledgement of requirement for City of Topeka land disturbance activity permit and/or KDHE Notice of Intent.

### **5. Stormwater Quantity Section**

- a. Description of the approach to be used for compliance with stormwater quantity performance standards (including detention and/or retention requirements, if applicable)
- b. Pre-developed Hydrologic and Hydraulic Analysis Summary
- c. Post-developed Hydrologic and Hydraulic Analysis Summary
- d. Storm Sewer Analysis Summary
- e. Overflow Path Analysis Summary
- f. Identification of Upstream and Downstream Impacts that may result from the proposed development and how these impacts are mitigated by the proposed design. (This includes, but is

not limited to, the receiving system's capacity to handle the change in stormwater flows or volumes, nearby structures or properties that may experience an increase in drainage or flooding issues, and the potential for increased pollutants in the stormwater discharges from the site.)

#### **6. Stormwater Quality Section**

- a. Receiving Stream Impairments (see the most recent Kansas §303(d) list published by KDHE)
- b. Description of the approach to be used for compliance with the stormwater quality performance standards (including non-structural and structural BMP requirements, as applicable).
- c. BMP Pollutant Removal Ability and Design Summary
- d. Value Rating Summary
- e. Mitigation Summary

#### **7. Existing Easements Section**

- a. Identification and description of any existing drainage or stormwater management easements at the proposed development and whether these easements will remain or be vacated
- b. Any potential easement conflicts that need to be resolved as part of the proposed design.

#### **8. Stream Buffer Section**

- a. Identification of all streams located on applicable development site and description of the associated stream buffer requirement.
- b. Identification and description of any land use(s) proposed in existing or future stream buffers.

#### **9. Floodplain Section**

- a. Identification and description of all FEMA Special Flood Hazard Areas (SFHAs) and channelized drainages present in the existing condition. Indicate whether channelized drainages will remain in the proposed condition.
- b. Acknowledgment of proper coverage of 100-year (1% annual chance) water surface elevations with Drainage Easements.

#### **10. USACE and Levee Section**

- a. Identification and description of all areas within the levee critical zone (within 500 ft of levee centerline), and whether the proposed modifications have been provided to the levee sponsor for review.

#### **11. Special Considerations Section**

- a. Identification of all required KDA permits, KDOT approvals, and other agreements relevant to the project/site. Indicate the status of the approvals and provide copies of the package, once complete.

#### **12. Conclusion**

- a. Summary explanation of how the proposed stormwater management design meet the requirements of the *City of Topeka Stormwater Management Ordinance* and the *Stormwater Design Handbook*.

#### **13. Appendix A- Existing Conditions Drainage Maps and Associated Tables**

- a. Topographic base map showing 2-foot contours at a minimum and extending 100 feet beyond the limits of the project boundaries.
- b. Map of hydrologic features, labeled, including but not limited to the following:
  - All natural and man-made streams, drainage features and waterbodies
  - Other natural features that can influence site hydrology and drainage including, but not limited to, wetlands, seeps, springs, and slopes greater than 15%
  - Pervious and impervious areas, labeled with general description of land cover (i.e., woods, meadow, farm, pavement, building, etc.)
  - Interior drainage area boundaries, surface flow paths, and discharge points/outfalls

- Regulatory floodplains and floodways, levees and critical areas, existing easements and any other legal, protective setback or boundaries
  - Hydrology soil group information, bounded and labeled as follows:
    - Areas of native, uncompacted soil (never disturbed, to the knowledge of the applicant) shall be labeled with the hydrologic soil groups (A, B, C, D) as determined based on the native soil
    - Areas of existing or former crops, construction fill, and soils disturbed by a prior or existing development shall be labeled as “disturbed”.
- c. Map showing the location and identification of the following, if present:
- Storm sewer systems, structural stormwater quality and quantity BMPs each labeled by BMP type
  - Waste lagoons, underground septic tanks, or similar waste collection measures
  - Areas where pollutants on the surface or in the soil are known or suspected
  - Utility corridors and roadway rights-of-way
  - Drinking water wells, water supply basins, wellhead protection areas, groundwater recharge areas
  - Preservation or conservation areas for plants, wildlife, or other
  - Areas where wet conditions or flooding are known to occur
  - Areas with contractive/expansive soils or other geotechnical/structural concerns
  - Areas of cultural, historical, archeological or wildlife significance
- d. Identification of, and calculations for, existing condition peak flows for all required design storm events at each discharge point from the existing condition property

**14. Appendix B- Proposed Conditions Site Plan and Grading Plans**

- a. Topographic base map showing proposed grading at 2-foot contours at a minimum and extending 100 feet beyond the limits of the project boundaries.
- b. Map stormwater management and related access easements, other unrelated easements, and any other legal, protective setbacks or boundaries, each properly labeled for identification
- c. Map of Low Impact Development (LID) technique areas, per the LID Technique Documentation Form, hatched and labeled for easy identification
- d. Profiles for all pipeline crossings

**15. Appendix C- Proposed Conditions Drainage Maps & Associated Tables**

- e. Map of pervious and impervious area, areas, labeled with general description of land cover (i.e., woods, meadow, turf grass, landscape, pavement, building, etc.)
- f. Map of hydrologic features, labeled, including but not limited to the following:
  - All natural and man-made streams, drainage features and waterbodies
  - Other natural features that will remain including, but not limited to, wetlands, seeps, springs, and slopes greater than 15%
  - Pervious and impervious areas, labeled with general description of land cover (i.e., woods, meadow, farm, pavement, building, etc.)
  - Interior drainage area boundaries, surface flow paths, and discharge points/outfalls
  - Regulatory floodplains and floodways, levees and critical areas
  - Hydrologic soil group information, labeled as follows:
    - Areas of native, uncompacted soil (never disturbed, to the knowledge of the applicant) shall be labeled with the hydrologic soil groups (A, B, C, D) as determined based on the native soil type

- o Areas of soils that already have been disturbed by a prior or existing development or will be disturbed as a result of the proposed development shall be labeled as “disturbed”
- g.
- h. Flow accounting information (provide peak flows for all required design storm events)
  - Peak flows intercepted by each stormwater quantity BMP (detention or retention), and total of all peak flows intercepted by all BMPs
  - Identification of, and calculations for, existing condition and proposed condition peak flows at each discharge point from the property.
  - Peak flows leaving proposed condition site from each driveway, and total peak flows leaving via all driveways
  - Peak flows leaving the proposed condition site by other routes, and total peak flows leaving via these other routes
- i.

#### **16. Appendix D- On-Site Conveyance System Calculations**

- a. Map all components of the stormwater conveyance system including but not limited to, swales, gutters, inlets, drains, manholes, catch basins, pipes, culverts, ditches, channels, headwalls, wing walls, end walls, aprons, armor, etc. All relevant information shall be shown, such as type, material, elevation, diameter, length, width, depth, etc.
- b. Storm conveyance system calculations to show compliance with City of Topeka drainage design requirements established in the *City of Topeka Design Criteria and Drafting Standards*

#### **17. Appendix E- Overland Flow Path Map & Verification**

- a. Map the overland flow pathways for flows that occur above the required design storms.
- b. Description and calculations to show the proposed design manages overflows in a manner that does not cause or increase negative impacts to other properties or infrastructure

#### **18. Appendix F- Drainage Calculations for Receiving Systems**

- a. Map the locations where stormwater discharges from the property overland or via stormwater outfalls
- b. Evaluation of the capacity of the downstream system and determine whether the addition of stormwater from the proposed development will exceed downstream capacity. Show all related calculations and data. If the City system is undersized, determine and indicate the type, size, and location of detention storage needed.

#### **19. Appendix G- Stormwater Quality Information**

- a. Stormwater Quality Maps as follows:
  - Location and boundary of LID techniques employed onsite, corresponding with information provided in the LID Technique Documentation Form. LID technique areas should be hatched and labeled indicating technique type (per the *Stormwater BMP Design Handbook* Chapter 5)
  - Drainage areas to each stormwater quality BMP with direction of stormwater flow indicated therein. Each area shall have a unique label (e.g., drainage area A, drainage area B, etc.)
  - Locations and boundaries of all stormwater quality BMPs. Each BMP should have a unique identification indicating BMP type as established in the *APWA/MARC BMP Manual* and an onsite ID corresponding to drainage area (e.g., *Bioretention A, Extended Detention B, etc.*)
  - Topography for each BMP (plan and profile view showing relevant elevations and depths, show also the subsurface detail of infiltration-based GI-BMPs)
  - If GI-BMPs are proposed, map and label all checked conditions listed on the GI-BMP Feasibility Form (see *Stormwater BMP Design Handbook*, Appendix I)
  - Map, identifying and labeling all permanent BMP protection measures for the post-developed condition (after construction), whether active or passive

- b. Completed Level of Service Worksheet (see *MARC/APWA BMP Manual*)
- c. Completed Mitigation Plan Worksheet (see *MARC/APWA BMP Manual*)
- d. Completed LID Technique Documentation form (see *Stormwater BMP Design*, Appendix D)
- e. Completed GI-BMP Feasibility form (see *Stormwater BMP Design*, Appendix I)
- f. Property owner agreements necessary for use of offsite BMPs (see City of Topeka Stormwater Management Ordinance)
- g. BMP Water Quality Volume summary table to include all stormwater quality BMPs, including the BMP ID, BMP Type, Drainage Area, and Water Quality Volume.
- h. For each stormwater quality BMP proposed as part of the mitigation package to meet the Level of Service requirement, provide the BMP design worksheet from the *MARC/APWA BMP Manual* (if one is included in the manual) or design calculations as follows:
  - Volume and/or peak flow managed by the BMP as appropriate for its function
  - Sizing and design calculations, identifying all models, data, and parameters used
  - Design, material, sizing, and related information for all appurtenances of the BMP
  - Infiltration data collected at the project and design infiltration rates (*for infiltration-based BMPs only*)
  - Vendor name, address and contact information, and BMP make, model, description, design procedure and water quality data (*for vendor-provided BMPs only*)
- i. A BMP planting plan for each vegetated BMP. Include a map showing plant species, location, and spacing. Include also a narrative explaining, for each BMP, the schedule for plant installation, the expected % coverage of the BMP surface area for each species type upon plant maturation, and the watering schedule, responsible person(s) for plant care, and water source(s) (see *Stormwater BMP Design Handbook*, Chapter 2.5.3)
- j. Map the locations and identification of land uses and/or hotspot areas which have the potential to cause higher than normal concentrations of hydrocarbons, metals, or other pollutants to stormwater (see *section 4.4 of the APWA/MARC Manual*). If hotspot areas are denoted, locate and identify the management practices proposed to mitigate pollutant discharges for these areas

## 20. Appendix H- Stormwater Quantity Information

- a. Location map of the applicable development project area within the regulated drainage basin(s) clearly shown and labeled (see *Chapter 3 of the Stormwater Design Handbook for regulated drainage basin information*). *Map size and scale do not matter provided the map is easily readable* BMP Drainage Map
- b. Stormwater BMP design information for all required design storm events as appropriate for the stormwater quantity BMP type, including, but not limited to, stage-storage-discharge tables, soil permeability. For each BMP outlet provide runoff hydrographs showing the peak flows, high water elevations, inlet, outlet and emergency spillway designs, and inlet/outlet energy dissipation/anti-scour measures.
- c. For each detention and retention basin designed solely for quantity control, provide the following:
  - Inflow and outflow calculations and hydrographs
  - Total drainage area, impervious area, % imperviousness, and weighted curve number (CN) for the pre-developed and post-developed conditions
  - Volume and/or peak flow managed by the BMPs as appropriate for its function
  - Sizing and design calculations, identifying all models, data, and parameters used
  - Design, material, sizing, and related information for all appurtenances of the BMP
  - Vendor name, address and contact information, and BMP make, model, description, and design procedure (*for vendor-provided BMPs only*)



## 21. Appendix I- BMP Inspection & Maintenance Plan

- a. BMP location map clearly indicating the location, boundary, easements (stormwater management and access) and identity (by type and drainage area) of each stormwater quality and quantity BMP. The map must also include the property boundary, building and pavement footprints, and general description of pervious landcover (e.g., turf, woods, landscaped area, etc.)
- b. For each BMP, provide a copy of the relevant BMP Inspection & Maintenance Guide from the *City of Topeka Property Owner's Guide to Stormwater BMP Inspection & Maintenance*
- c. Explanation of Maintenance Verification (such as log sheets) for any existing condition stormwater BMPs that will remain, if available.
- d. A signed copy of the Acknowledgement of BMP Responsibility
- e. For each proprietary BMPs and green roofs, provide also the vendor name and contact information, the manufacturer name, BMP make, model number, and date of manufacture, maintenance instructions and information supplied by the manufacturer or vendor, a list of BMP parts (with manufacturer's model number) that must be removed/replaced as part of normal BMP inspection maintenance (such as filtration cartridges)

## 22. Appendix J- BMP Design Specifications and Details

- a. Design details for stormwater quality and quantity BMPs and their components, including every appurtenance such as pretreatment area/forebay, inlets, outlets, clean-outs, aprons, headwalls, end walls, berms, spillways, underdrains, etc
- b. Cross-section details with appropriate labeling (invert elevations, height/width, diameter, slope, etc.) for each BMP outlet and emergency spillway. Include berms when they are a part of the BMP design. Indicate the pool elevation for each required design storm. (*Note: discharge for all design storm must exit through an outlet and/or emergency spillway without overtopping the berm.*)
- c. Outlet and emergency spillway design and sizing information (type, dimensions, material, elevations, etc.) for all design storm outlets and the emergency spillways for each BMP outlet.
- d. Necessary details to verify BMP types (such as soil information, infiltration rates, material specifications, vegetation, water depth, detention time, pretreatment, stabilization, etc.)  
Outlet Information
  - For each infiltration test performed, provide the following:
    - Test locations and elevation
    - Test method used
    - Location of soil boring(s) used to aid test interpretation
    - Soil boring results; including depth to groundwater, depth to bedrock, and infiltration rate used in BMP sizing calculations; and explanation of how they were used
    - Documentation of test results for each BMP

## 23. Appendix K- Permit, Approvals, and Agreements

- a. Documentation of all other relevant Federal, State, and local permits and any other required approvals and/or legal agreements relevant to the applicable development

