



**CITY OF KALAMAZOO**  
**PERFORMANCE STANDARDS**  
**FOR**  
**GROUNDWATER PROTECTION WITHIN**  
**WELLHEAD PROTECTION CAPTURE ZONES**  
**AND**  
**STORMWATER MANAGEMENT**  
**(REFERENCE ORDINANCES NO. 1825 and No. 1826)**

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**AND THE CITY OF KALAMAZOO, MICHIGAN, 2007**

**REVISED BY THE CITY OF KALAMAZOO**  
**SEPTEMBER 2015**

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## 1.0 INTRODUCTION

This document provides Performance Standards (Standards) for groundwater protection within Wellhead Protection Time-of-Travel (Capture Zones) and for stormwater quality management throughout the City of Kalamazoo (City), Michigan. The objectives of this document are to define technical standards for site development that facilities located within the Capture Zones are required to attain for drinking water source protection, and to protect surface water quality by establishing acceptable stormwater quality management strategies throughout the City. The Standards are designed to be consistent with the objectives of the Wellhead Protection Program and maintain compliance with the City's municipal separate storm sewer system (MS4) National Pollutant Discharge Elimination System (NPDES) Permit Certificate of Coverage and the federally mandated Total Maximum Daily Load for phosphorus reduction within the Kalamazoo River Watershed.

These Standards were developed primarily for use of the Site Plan Review Committee and to supplement the City's Wellhead Protection Zoning Overlay Ordinance (Appendix A of the Kalamazoo Code of Ordinances, Chapter 3, Section 3.5) and the Stormwater System Ordinance (Chapter 29 of the City of Kalamazoo Code of Ordinances). The intent/purpose of the Wellhead Protection Zoning Overlay (WHP Overlay) Ordinance is to protect the groundwater supplies that serve as drinking water by defining non-compatible land uses within Capture Zones and to prevent their creation or establishment, including those that would prevent/limit the City's ability to obtain necessary well permits to replace or add new wells, and to minimize the risk to drinking water sources posed by both approved and non-conforming land uses by requiring compliance with the Standards established in this document. The objectives of the Stormwater System Ordinance are to provide environmental protection to surface waters by regulating discharges into the City's stormwater system, and provide the City with specific legal authority to find and eliminate illicit stormwater connections and discharges.

For the purposes of these Standards regarding Wellhead Protection, the City's Capture Zones have been divided into two groundwater contamination risk areas based on Time-of-Travel (Capture Zones) to a municipal well field: 1-Year Capture Zone = Area located within a 1-Year Capture Zone to a municipal wellfield; and 10-Year Capture Zone = Area located within a 10-Year, but outside the 1-Year, Capture Zone to a municipal wellfield.

In certain cases, more stringent standards have been developed for sites located closer to city wellheads. Consequently, proposed development of sites within the 1-Year Capture Zones is expected to implement greater controls than that within the 10-Year Capture Zones.



Section 5.0 "Stormwater Quality Management Criteria" also uses a 5-Year Capture Zone for purposes of stormwater discharge quality.

This document includes a variety of Best Management Practices (BMPs) related to groundwater and surface water protection and are considered commonly-accepted practices associated with groundwater and/or surface water protection. These BMPs were derived from a variety of sources, including "Low Impact Development Manual for Michigan - A Design Guide for Implementers and Reviewers" (SEMCOG, 2008), and "Michigan Nonpoint Source Best Management Practices Manual" (MDEQ, 2014).

Maps showing the Capture Zones are maintained by the Environmental Services Superintendent and the City Planner or their designee(s) and are available for viewing at the Department of Public Services, Environmental Services Division, 1415 North Harrison Street, and at the Community Development Center, 415 Stockbridge Avenue. Figure 1 "Wellhead Protection Zoning Overlay Map" is the official map reference of the WHP Overlay and includes the 1-Year and 10-Year Time-of-Travel Capture Zones and 2,000-foot State of Michigan Well Permit Isolation Boundaries from existing wells. Figure 2 "Performance Standards for Groundwater Protection within Wellhead Protection Capture Zones and Stormwater Quality Management Reference Map" is the same as Figure 1, but also indicates the 5-Year Capture Zones.

The Standards are divided into nine sections, which follow this Introduction. Section 2.0 "Groundwater Contamination Risk Assessment" discusses what risk category to groundwater (i.e., higher or lower risk) the Zoning Districts and various land uses were designated. Also, supporting rationale for the designations is provided.

Section 3.0 "General Site Plan Review Standards" details standard practices expected of any site within the Capture Zones, particularly those sites in possession of regulated substances (defined in the WHP Overlay Ordinance).

Section 4.0 "Land-Use Specific Site Plan Review Standards" includes more specific standards for several particular higher-risk land uses that are prohibited in one or both of the Capture Zones.

Section 5.0 "Stormwater Quality Management Criteria" establishes technical standards that apply both inside and outside the Capture Zones for stormwater management. These standards are intended to address groundwater vulnerability and land-use risks; prevent or minimize pollutant loadings to ensure compliance with the City's Stormwater NPDES Permit; and minimize potential adverse impacts to general surface water quality from stormwater runoff.

Section 6.0 "Treatment and Spill Containment" provides guidance regarding BMPs that can meet treatment requirements for stormwater quality, and provides required specifications, including spill containment cells and volumes, water quality swales, and proprietary systems.

Section 7.0 "Non-Conforming Land Uses" specifically addresses sites within the Capture Zones with existing non-conforming land uses pursuant to the WHP Overlay Ordinance, including the requirement for the implementation of BMPs and/or Spill Contingency Plans (SCPs) at those sites.

Section 8.0 "Potentially Applicable Environmental Regulations" discusses the requirement of developers to comply with all local, state, and federal regulations.

Section 9.0 "Contaminated Properties" communicates that there are cases that contaminated sites may require special considerations in the selection of BMPs.

## 2.0 GROUNDWATER CONTAMINATION RISK ASSESSMENT

Land-use zoning districts, as defined in the City's WHP Overlay Ordinance, are designated as either higher-risk or lower-risk for potential groundwater contamination, as shown in Table 1. Generally, higher-risk designations were assigned to zoning districts that allow land use activities that are either prohibited or restricted with conditions within Capture Zones. These zoning districts typically allow activities involving the storage and/or use of regulated substances.

**Table 1**  
**Zoning Risk Designations**

<u>Higher-Risk Zoning Districts</u>
Commercial, Mixed Use (CMU)
Commercial, Neighborhood (CN-2)
Commercial, Community (CC)
Commercial, Central Business District (CCBD)
Commercial, Business, Technology, and Research (CBTR)
Manufacturing, Limited (M-1)
Manufacturing, General (M-2)
Public (P)
Institutional Campus (IC)
<u>Lower-Risk Zoning Districts</u>
Residential, Single-Dwelling (RS-4, RS-5, RS-7)
Residential, Duplex (RD-8, RD-19)
Residential, Multi-Dwelling (RM-15, RM-15C, RM-24, RM-36)
Residential, Mobile Home Park (RMHP)
Residential, Mixed Use (RMU)
Commercial, Neighborhood Office (CNO)
Commercial, (Local) Neighborhood (CN-1)
Commercial, Office (CO)

Next, land use activities were categorized as either higher-risk or lower-risk to groundwater after considering prohibitions and conditions within the WHP Overlay Ordinance and reviewing various documentation, including the "Guidance for Applications for State Wellhead Protection Assistance Funds Under the Safe Drinking Water Act" by the U.S. Environmental Protection Agency (EPA) Office of Groundwater Protection published in June 1987, the "Standard Industrial Classification" (SIC) code list, also published by the EPA, "Community Planning & Zoning for Groundwater Protection: A Guidebook for Local Officials" by Lillian Dean and Mark Wyckoff, 1991, and various ordinances and standards. Table 2 provides a list of high-risk land-use activities that pose potential threats to groundwater.

**Table 2**  
**High-Risk Land-Use Activities that Pose Potential Threats to Groundwater**

<b>Commercial</b>
Analytical and clinical laboratories
Animal feedlots
Auto washes
Boat builders/refinishers
Car rental and service stations/automotive repair
Commercial establishments with fleets of trucks and cars
Concrete/asphalt/coal/tar companies
Drum recycling and cleaning
Dry cleaners and laundries
Equipment repair
Food processors/meat packers/slaughter houses
Fuel oil distributors/stores
Furniture stripping or refinishing
Gas stations
Junk and salvage yards
Motor vehicle repair/service shops
Pesticide application services/pesticide stores/retailers
Petroleum bulk storage (wholesale)
Photographic development
Printing
Salvage yards/impoundment lots
Truck or rail tanker cleaning
Wood preserving and treatment
<b>Manufacturing</b>
Chemical, paint, and plastics manufacturing
Furniture manufacturing
Metal manufacturing (including metal plating)
Mining operations/injection wells
Other manufacturing (textiles, rubber, glass, etc.)
Pulp and paper industry
<b>Transportation</b>
Airport maintenance/fueling areas
Governmental agencies with fleets of trucks and cars
Salt piles/sand-salt piles
Trucking/bus terminals
Vehicle maintenance operations (transportation/trucking, contractors/construction, auto dealers)
<b>Utilities</b>
Aboveground oil pipelines
Electric power generation substations
<b>Waste Disposal</b>
Landfills/dumps/transfer stations



Other higher-risk land-use activities are identified on the MDEQ document "Minimum Isolation Distances (From Contamination Sources and Buildings), Part 127, Act 368, P.A. 1978 And Act 399, P.A. 1976" (Attachment 1). This document specifies well isolation distances considered for the issuance of Type I well permits.

Generally, groundwater risk designations are used to help determine what land use Standards should be applied to protect groundwater as a condition for site plan approval. In addition, these Standards were designed for those land-use activities permitted within the 10-Year Capture Zones pursuant to the Wellhead Protection Capture Zones Ordinance that involve possession of a Regulated Substance exceeding 55 gallons aggregate for liquid materials or 440 pounds aggregate for dry weights.

## 3.0 GENERAL SITE PLAN REVIEW STANDARDS

The site plan review Standards detailed in this section apply to those facilities within Capture Zones in the City. This section is divided into five subsections: Site Design and Development or Redevelopment, Process Activities, Regulated Substance Storage Units, Fueling Establishments, and Waste.

### 3.1 SITE DESIGN AND DEVELOPMENT OR REDEVELOPMENT

#### 3.1.1 CONSTRUCTION ACTIVITIES

An appropriate material and equipment maintenance and storage area shall be identified on the site plan. If construction equipment is to be temporarily stored in an open area:

- The storage site should not be located within the drip line of trees.
- The storage site shall not be within 100 feet of a watercourse, wetland, or stormwater sewer inlet(s), unless approved by the City. Runoff shall be diverted away from watercourses and wetlands.
- The construction site shall be designed and operated to prevent excess solids from being discharged into wetlands and surface waters, whether directly or via a municipal stormwater collection system.
- **Secondary containment is required for regulated substances stored in containers larger than typical household quantities during site construction activities.** These substances include, but are not limited to, fuels, oils, and lubricants. All regulated substances must be stored in a manner that diminishes the possibility of a release to soils and groundwater.

#### 3.1.2 SOIL EROSION AND SEDIMENTATION CONTROL

Refer to Chapter 30 of the Kalamazoo Code of Ordinances "Soil Erosion and Sedimentation Control" regarding requirements to control soil erosion and sedimentation with respect to earth change activities within the City. Proper provision for water disposal and protection of soil surfaces is required during and after construction in order to promote the safety, public health, and general welfare of the City, as well as to limit the exposed area of any disturbed land for the shortest possible period of time.

### 3.1.3 DEWATERING

If dewatering (the temporary discharge of groundwater associated with a construction project requiring the need to maintain below grade excavation free from surface or subsurface infiltration of water) is necessary, a dewatering plan must be submitted to and approved by both the City's Environmental Services Division for water quality issues and the Engineering Division for sanitary and storm sewer capacity and condition issues. Conditional approval from the Director of Public Services or designee must be obtained prior to discharge. The plan will include items such as a map detailing pertinent dewatering activities, the proposed dewatering (pumping) rate, proposed period of dewatering activity, discharge entry point, discharge outfall location, dewatering contingency plan and emergency contact information, known historic parameters of concern (e.g., hydrocarbons, metals, volatile organic compounds, etc.), identification of known contaminated sites and any associated plumes within a radius of 1,000 feet of the dewatering points, dewatering sampling plan (frequency of sampling, parameters to be analyzed, etc.). At a minimum, Total Suspended Solids will be required to be controlled to less than 80 mg/L, routinely monitored as an indicator of effective sediment control, and reported to the City's Public Services Department, Environmental Services Division on a daily basis. Other requirements may be applicable, dependent upon site conditions and characteristics.

Sediment basins, filters, or other BMPs may be required to filter the dewatered water before it is discharged to surface water directly or via a stormwater collection system. Dewatering must be performed so that the velocity of the discharged water does not cause scouring of the receiving area. If the receiving area is a structural BMP (i.e., basin or sump), the design of the BMP should be based on the anticipated flow from the dewatered area. Sediment-laden water from cofferdams, trenches, and other areas that need to be dewatered shall be pumped through a geotextile material before the water is discharged to a watercourse. If the dewatered water is discharged through a filter to a county drain, permission must be obtained from the drain commissioner. Any proposed discharge to the sanitary sewer must be approved by the Wastewater Superintendent or designee.

The dewatering site should be inspected and its condition documented at least twice daily to ensure the pumping procedure is adequately controlling the excess water and that any filtering/sediment-reducing BMP is functioning properly (e.g., not clogged). If the BMP is not functioning properly, appropriate maintenance procedures for the specific BMP(s) must be performed immediately and/or the BMPs replaced with the appropriate new one(s).

### **3.1.4 FILL MATERIAL**

Use of fill material containing regulated substances above any state and/or federal cleanup criteria for soils is prohibited in the 1-Year Capture Zones and the 10-Year Capture Zones. Throughout the Capture Zones where filling is required, efforts should be made to ensure the fill originates from a clean source (i.e., not contaminated with regulated substances). The fill source should be from a non-industrial area and not from sites of known or suspected contamination (i.e., MDEQ Part 201 facilities, Part 213 sites, or federal Resource Conservation and Recovery Act or Comprehensive Environmental Response, Compensation and Liability Act sites). If the source is from an agricultural area, care should be taken to ensure the fill does not include pesticides or former agricultural waste process byproducts, such as manure or decomposed organic material. Fill material should not be used from industrial and/or commercial sites where hazardous materials were used, handled, or stored or from unpaved parking areas where petroleum hydrocarbons could have been spilled or leaked into the soil. Alternatives to using fill from construction sites include the use of fill material obtained from a commercial supplier of fill material or from soil pits in rural or suburban areas. However, care should be taken to ensure that these materials are also uncontaminated.

### **3.1.5 CONTAMINATED SITES**

Site plans must take into consideration the location and extent of any contaminated soils and/or groundwater on the site and the need to protect public health and the environment. A depiction of the location and extent of contamination shall be submitted on or with the site plan. See Section 9.0 for discussion regarding contaminated properties.

Any site used to temporarily store contaminated soils (such as during removal of an UST) must do so in a designated area indicated on the site plan. This area should be located indoors. Alternatively, the soils/material shall be containerized in Michigan Department of Transportation (MDOT)-approved drums or covered with tarp or plastic and placed on a paved/impermeable material contained by a curb, dike, or berm. The storage area must be designed to prevent or minimize stormwater run-on to the area.

### **3.1.6 PARKING AREAS**

Parking areas that are designed to accommodate 20 or more vehicles or exceed 6,000 square feet are considered "larger parking areas" and shall be paved with concrete, asphalt, or an equivalent smooth, impervious surface with a minimum of a 2% cross slope to prevent ponding of water. These areas should be served by an appropriate and approved stormwater treatment system as described in Section 5 "Stormwater Quality Management." Surface areas where regulated materials are to be stored, transferred,



or otherwise have a potential use should be served with an approved treatment system. Within a 1-Year Capture Zone, the larger parking areas shall be controlled so that all runoff is directed to the collection system, prohibiting the potential migration offsite or into groundwater. Parking sites having limited or short-term use (i.e., churches or similar), with limited potential for contamination, may be granted exceptions or modifications to the above requirements where other controls or solutions will be incorporated.

### **3.1.7 FLOOR DRAINS AND DRY WELLS**

General purpose floor drains must be connected to a public sanitary sewer system or an onsite holding tank (not a septic system) in accordance with state, county, and municipal requirements, unless a groundwater discharge permit has been obtained from the MDEQ. General purpose floor drains that discharge to groundwater or a stormwater collection system are prohibited.

Dry wells are a type of drainage well used for the underground disposal of stormwater runoff from paved areas, which include parking lots, streets, highways, residential subdivisions, building rooftops, agricultural areas, and industrial areas. Dry wells are prohibited within the 1-Year Capture Zone and within 200 feet from a Type I Public Water Supply well, and may require a pre-treatment BMP in a 5-Year Capture Zone. Dry wells must be located only in areas that receive clean water discharges and are required to be managed in accordance with Section 5 "Stormwater Quality Management Criteria." Dry wells may also require a groundwater discharge permit from the MDEQ. The site plan must show the known and proposed location of any dry well(s).

### **3.1.8 WELLS**

All currently functioning, proposed, and abandoned wells, including potable water wells and monitoring wells, should be indicated on the site plan.

The WHP Overlay Ordinance prohibits within any Capture Zone:

- Installation of a private water well for the purpose of drinking water or irrigation if, in the determination of the City's Department of Public Services or the Kalamazoo County Health and Community Services Department, Environmental Health Division, public water service is reasonably available.
- Use of a private well, if said well is likely to cause an adverse impact to the public water supply.

- Installation or use of a water well not installed for the purpose of drinking water or irrigation, unless it is determined by the Department of Public Services that the well owner (or representative) has scientifically demonstrated that the well will not cause an adverse impact to the public water supply.
- Drilling for natural gas or petroleum, whether for exploration, production, or otherwise.
- Presence of an abandoned well, which is defined as any well that has either been discontinued for more than one year, is in such disrepair that its continued use for obtaining groundwater is impractical, has been left uncompleted, is a threat to groundwater resources, or is a health or safety hazard. A well shall not be considered abandoned if it has been properly plugged pursuant to the Groundwater Quality Control Act, Part 127, 1978 PA 368. When a well is plugged, formal well abandonment logs must be completed and provided to the City's Environmental Services Division, except in cases where wells were abandoned in the past and no well abandonment logs are available.

### **3.1.9 WELL ISOLATION DISTANCE REQUIREMENTS**

Per the WHP Overlay Ordinance, "Within a capture zone, no person shall cause or allow uses or activities that would violate the terms and conditions set forth in the document 'Minimum Well Isolation Distances (From Contamination Sources and Buildings), Part 127, Act 368, P.A. 1978 and Act 399, P.A.1976' as prepared by the MDEQ, Water Division, as it may be amended." This document is presented as Attachment 1. These land use restrictions directly relate to the City's ability to replace or add new wells to its Public Water Supply System, since they are part of the permit criteria used by the MDEQ.

### **3.1.10 SEPTIC SYSTEMS**

The construction or replacement of any privy, privy vault, septic tank, cesspool, or other facility intended or used for the disposal of domestic or non-domestic wastewater is prohibited within the 1-Year Capture Zones. Sites within the 10-Year Capture Zones must connect to the municipal sanitary sewer, where it is available. For sites where the municipal sanitary sewer is not available, all septic systems must comply with Kalamazoo County sewage disposal system requirements, including the acquisition of necessary permits. Flow restrictors and low-flow faucets for sinks and spray nozzles should be installed to minimize hydraulic loading to subsurface disposal systems. Floor drains may not be connected to septic systems. The locations of existing and proposed septic tanks and drain fields should be indicated on the site plan. Refer to Chapter 28 of the Kalamazoo Code of Ordinances "Wastewater Discharge Regulations and Enforcement Procedures" for other specific issues regarding wastewater.

## **3.2 PROCESS ACTIVITIES**

### **3.2.1 REGULATED SUBSTANCE USE AREAS**

The possession of regulated substances, including fuel in quantities that exceed 55 gallons aggregate for liquid materials or 440 pounds aggregate for dry weights, unless prepackaged and intended for retail sale or for commercial or household use (such as salt used in water softeners, fertilizers, pesticides, herbicides) is prohibited in the 1-Year Capture Zones and are only allowed in the 10-Year Capture Zones if engineering controls are designed and implemented consistent with the BMPs contained herein, the City's Fire Code, and applicable State of Michigan laws and regulations. Where otherwise permitted, sites where regulated substances are stored, used, or generated shall be designed to prevent spills and discharges of such materials to the environment. The storage or presence of a regulated substance in a manner in which the substance could reasonably enter the soils or groundwater is prohibited. A Spill Contingency Plan may be required: If a SCP is not available, Attachment 2 provides a SCP Template.

Floor surfaces in work areas shall be impervious to the types of materials that may be used or generated at the facility and, if necessary, should be sealed with an impermeable material. The work area floor should be pitched to an appropriate floor drain or collection area (e.g., holding tank). Alternatively, if floor drains are not used, or if they are located close to entranceways, then entrances should be designed to prevent stormwater runoff from entering the building and prevent spills from leaving the building. Curbing and internal floor berms should be used to isolate floor drains from spill-prone areas, where necessary.

Whenever possible, manufacturing and processing activities involving the possession or control of regulated substances should be conducted indoors. If indoor manufacturing/processing is not feasible, the potentially pollutant-generating activities should be segregated from nonpolluting activities and conducted on an impervious surface. The area should be covered, if possible and as appropriate. The surface should be graded to minimize run-on of stormwater and runoff of spills. The area must be adequately designed to prevent spilled regulated materials from escaping the area. Drains in these areas can be connected to the sanitary sewer, with approval and appropriate pretreatment, or to a holding tank meeting the specifications of this Standard. If potentially polluting activities cannot be covered, discharge of low-volume, high-frequency storms to the sanitary sewer should be considered.

### **3.2.2 LOADING/UNLOADING AREAS**

Loading/unloading areas used to transfer regulated substances shall be indicated on the site plan. The areas shall be paved with concrete or another material sufficiently impervious to the materials loaded and unloaded in that area. If possible, loading/unloading docks shall be isolated from storm drains and dry



wells to prevent potential spills from contaminating stormwater or discharging to the ground. If floor drains and/or dry wells already exist, inlets must be appropriately protected during loading/unloading operations to prevent pollutants to enter the storm sewer or infiltrate within pervious surfaces. If stormwater runoff is a concern in the loading/unloading dock, and the site is located within the 1-Year Capture Zone, the area shall be covered or enclosed and be designed to reduce stormwater run-on. If the loading/unloading dock is uncovered, grading and/or berms shall directly drainage to a dead-end sump or another appropriate collection device. A positive control valve should be installed on the drain. Alternatively, at the discretion of the Site Plan Review Committee, a precipitation valve may be installed in the curb, which may be left open to drain precipitation, except during loading/unloading. If tanker trucks are used to load/unload aboveground storage tanks (ASTs) or USTs containing regulated substances, full containment of the loading/unloading area should be considered and may be required.

The storage of spill response equipment should be indicated on the site plan. Storage should be in an area accessible to loading/unloading areas where regulated substances are transferred. A Spill Contingency Plan may be required. If a SCP is not available, Attachment 2 provides a SCP Template.

### **3.2.3 SPILL RESPONSE EQUIPMENT**

Sites intending to use, store, or generate regulated substances in quantities meeting or exceeding 55 gallons for liquids or 440 pounds for solids are required to have emergency spill response equipment and must indicate on the site plan the locations for it and other similar equipment. Spill response equipment shall be located throughout the site so that spills may be contained in storage areas, loading/unloading areas, dispensing areas, and work areas, as appropriate. The specific types of spill response equipment to be stored shall reflect the types of chemicals and petroleum products stored onsite, other engineering controls present, the potential threat to site soils/groundwater, and the location of the site within the Capture Zones. A Spill Contingency Plan may be required. If a SCP is not available, Attachment 2 provides a SCP Template.

### **3.2.4 AGRICULTURAL USES**

Only the application of agricultural chemicals, fertilizers, mineral acids, organic sulfur compounds, etc., as used in routine agricultural operations and applied under the "Generally Accepted Agricultural Management Practices" (GAAMPs) and consistent with label directions approved by the EPA or the Michigan Department of Agriculture are allowed.



### **3.2.5 VEHICLE WASHING**

Commercial vehicle washing must be conducted on a wash pad. Wash areas must be paved with an impervious surface and bermed or curbed to prevent stormwater run-on and wash water runoff. The wash area shall be sloped for wash water collection, which may be discharged to a wash water recycling system, directly to the sanitary sewer (with approval and appropriate pretreatment), or to a dead-end sump (from which the material may be pumped to the sanitary sewer or to an offsite treatment facility). Because wastewaters from vehicle washing represent significant flows that can hydraulically overload an oil/grit separator, any such treatment device must be sufficiently sized to accept these volumes. The wash pad areas should be covered, if possible.

The cleaning of semi-trailer and tanker truck interiors may be approved in Capture Zones, if the following standards are met:

The interior of the semi-trailer should be swept, and all debris should be collected and properly disposed.

Dry cleaning methods should be used whenever possible. If rinsing the inside of the trailer is necessary, cleaning shall be conducted over an impervious surface. Wash water must not be discharged to the storm sewer or the ground. With approval and appropriate pretreatment, rinse water may be disposed to the sanitary sewer.

Wash water from the interior of tanker trucks or rail tankers shall be pumped directly into containers for appropriate offsite disposal or, with approval and appropriate pretreatment, must be pumped directly to a sanitary sewer drain. Rail tankers may not be cleaned in the 1-Year Capture Zones, unless the wash water can be completely contained and appropriately disposed.

### **3.2.6 PRESSURE WASHING/STEAM CLEANING**

Pressure washing and steam cleaning activities are permitted within covered, completely contained areas, particularly where these methods replace cleaning/dégreasing operations that would otherwise use solvents. Pressure washing and steam cleaning may be conducted on a sealed impervious surface that is completely contained and graded toward a drain that discharges either to the sanitary sewer (with approval and appropriate pretreatment), or a holding tank (not into the storm sewer or directly to site soils or groundwater). Alternatively, steam cleaning or pressure washing facilities may have zero-discharge recycling systems equipped with oil/water separators or other treatment devices.

The MDEQ has prepared a Guidance Document on Mobile Power Washing. This document contains further details regarding BMPs for these systems. The guidance document can be obtained at <http://www.oseh.umich.edu/pdf/deq-ead-tas-powrwash.pdf>.

### **3.2.7 COOLING WATER**

Closed-loop cooling systems should be considered to eliminate cooling water discharges in Capture Zones. Alternatively, non-contact cooling water may be discharged to a storm sewer, sanitary sewer, or stream provided all federal, state, and local discharge requirements are met. Discharge of cooling water to site soils/groundwater is not permitted without City approval.

### **3.2.8 ROAD SALT STORAGE AND USE**

All salt and associated sand mix piles must be stored on an impermeable surface and covered with a waterproof material. Inside the 1-Year Capture Zone, salt shall be stored in indoor sheds surrounded by impervious paving. Stockpiles should not be located near surface waters, in flood plains, or areas with steep slopes, and shall be designed to prevent surface water runoff. Snow containing road salt should not be brought to sites inside the 1-Year Capture Zone for disposal. Alternative deicing chemicals include calcium chloride, magnesium chloride, Calcium magnesium acetate (CMA), and products that are mixtures of chlorides and organic compounds. Environmentally friendly snow and ice removal products and procedures are encouraged.

### **3.2.9 MATERIAL SUBSTITUTION/POLLUTION PREVENTION**

Whenever possible, sites should select non-hazardous or less-hazardous chemicals for processes such as degreasing, cleaning, and plating that have historically used toxic materials. In addition, when possible, materials such as oils should be standardized throughout a site to reduce the quantity of leftover material and mixed waste. Practices that minimize waste generation, such as countercurrent solvent cleaning, are encouraged.

## **3.3 REGULATED SUBSTANCE STORAGE UNITS**

A regulated substance storage unit is considered to be any UST, AST, drum, carboy, or other container used for the storage of one or more regulated substance(s) including silo, bag, tank wagon, box, glass, cylinder, total bin, truck body, rail car, tanker, or tool crib when used for permanent or temporary storage of regulated substances. The following standards apply to specific types of regulated substance storage units.

### 3.3.1 GENERAL PROVISIONS

Regulated substance storage units containing greater than 55 gallons for liquids or 440 pounds for solids are prohibited within the 1-Year Capture Zones.

Within the 10-Year Capture Zones, regulated substance storage units containing greater than 55 gallons for liquids or 440 pounds for solids shall be indicated on the site plan and are allowed if the following standards are applied.

- Unless other sufficient measures have been implemented at the site, these regulated substance storage units shall be completely contained, isolated from floor and storm drains, have sealed surfaces, comply with fire safety regulations, and should not be accessible to unauthorized personnel. Whenever possible, regulated substance storage units should be consolidated into one location for better control of material and waste inventory. All storage units shall be properly labeled as to contents and periodically inspected for evidence of leaks, improper storage, or potential hazards that may result in a release of regulated substances being stored in or transferred into or out of the storage unit. All doors, valves, or other openings through which a release could occur must be locked or otherwise secured when not in use.
- Regulated substances should be stored inside, whenever feasible. If it is not feasible, it is required that outside storage areas be covered, preferably with a roof. A curb or berm may be required along the perimeter of outdoor storage areas to prevent the run-on of uncontaminated stormwater from adjacent areas, as well as runoff of stormwater from the storage area. The area inside the curb should slope to a drain, then to a holding tank or sanitary sewer (if approved) with a positive control such as a lock, valve, or plug.
- Regulated substances stored outdoors must be in product-tight containers that are protected from weather, leakage, accidental damage, and vandalism. Sites storing regulated substances outdoors must implement security measures that are appropriate for the material stored and the nature of the site. Measures to be implemented, as appropriate, include:
  - Fencing the regulated substance storage unit or the entire site and locking or guarding entrance gates when the storage unit/facility is not in production or is unattended.
  - Ensuring that valves permitting direct outward flow of a container's contents have adequate security measures so they remain in the closed position when in non-operating or standby status.



- o Preventing unauthorized access to starter controls of pumps.
- o Providing facility lighting that will assist in the discovery of releases during hours of darkness and prevention of discharges occurring through acts of vandalism.

In addition, see Appendix A of the Kalamazoo Code of Ordinances (Zoning Ordinance) 6.6F for the section "Fire and Explosive Materials."

### **3.3.2 SECONDARY CONTAINMENT (FOR REGULATED SUBSTANCES OTHER THAN FUEL)**

Secondary containment must be provided for regulated substance storage units. Secondary-containment facilities shall be designed and constructed so that potential polluting material cannot escape from the unit by gravity through sewers, drains, or other means directly or indirectly into a sewer or stormwater collection system or to the waters of the state, including groundwater. Secondary containment shall include protective measures, such as double walls, dikes, vaults, or impervious liners (both natural and synthetic).

Exterior secondary containment provided by dikes shall be constructed of poured concrete or a pre-manufactured containment tub. Concrete-block containment is prohibited in outdoor areas because it can easily crack and does not weather well. Exterior secondary-containment areas should be capable of containing 100% of the largest vessel or 10% of the total volume of tanks in containment, whichever is larger, plus freeboard to contain precipitation from a 25-Year storm. Alternatively, the vessel may be an Underwriters Laboratories, Inc.-approved, double-walled tank. If containment is provided by a dike, the containment must be higher than the 100-year flood level. When possible and as appropriate, exterior storage of regulated substances and their containment structures should be covered to protect the containers from exposure to precipitation. If this is not possible, the base of the dike should be sloped to a collection point or sump to allow for controlled removal of accumulated stormwater or spilled regulated substances. If the dike is penetrated by a drainage or conveyance pipe, the opening must be sealed on both sides to ensure a liquid-tight penetration. Drainage pipes must have a lockable valve. This valve must be kept closed and locked under normal conditions, until a determination is made by a trained individual that the discharge of the stormwater is acceptable (this may require a Stormwater Permit with Required Monitoring).. Discharge of accumulated stormwater from a secondary-containment structure containing petroleum products shall be pre-treated, as necessary, to meet all applicable water quality standards prior to discharge to soils, surface water, or a stormwater collection system.

Secondary containment for indoor ASTs may be provided by the building, as long as discharge from the AST cannot escape the building via floor drains, entrances, or any other means, and no specific



containment is required by other regulations. Although not permitted for outdoor containment structures, concrete-block containment may be used indoors with the City's approval.

For other specific requirements, refer to the Appendix A – Zoning Ordinance of the Kalamazoo Code of Ordinances, including 6.6G (Hazardous Materials) and H (Materials and Waste Handling), and 8.3.H.7.v requiring that any utilizing, storing, or handling of hazardous material must provide secondary containment facilities and documentation of compliance with all appropriate state and federal regulations.

### **3.3.3 ASTs**

ASTs shall be certified, installed, operated, maintained, closed, or removed in accordance with MDEQ regulations and the local fire code. All ASTs must be indicated on the site plan. A copy of any required local or state AST registration document should be provided to the City's Environmental Services Division.

All ASTs containing flammable or combustible materials must meet the requirements of the MDEQ Rules for the Storage and Handling of Flammable and Combustible Liquids, and be found on the MDEQ website in the section LARA, Fire Services, Storage Tank Division.

No ASTs shall be located in direct contact with site soils. The tank should have sufficient ground clearance for visual inspection of the bottom of the AST for deterioration, unless the size of the AST prevents raising the tank, as required, or if the AST is a concrete-vaulted tank.

Any AST that is open to vehicle damage must be protected against impact with physical barriers. Any impervious dike utilized as secondary containment meets the requirements for a physical barrier. Objects used as physical barriers should be included in the site plan.

For ASTs not subject to the MDEQ Rules for the Storage of Flammable and Combustible Materials, the following conditions apply:

- Regulated substances must have secondary containment meeting the standards of Section 3.3.
- Tank piping must be located within secondary containment whenever possible and must be located below the product level.
- Piping must be designed so that liquid will not continue to flow by gravity or siphoning from the storage tank if the piping or fittings break.

- Fuel filling ports must have secondary containment beneath the fill area to prevent a release from reaching the pervious ground surface or storm drain/inlet.
- Tanks must be equipped with a shut-off valve, preferably an automatic shear valve, with the shut-off located inside the tank.
- For flood control, all exterior ASTs should have a monitoring system and secondary standpipe above the 100-year flood-control level for monitoring and recovery.
- Fill-pipe inlets must be above the elevation of the top of the storage tank.
- ASTs must have overfill protection, such as a visual liquid-level-indicator gauge or alarms.

### **3.3.4 USTs**

USTs are prohibited within the 1-Year Capture Zones if 55 gallons aggregate for liquid material or 440 pounds aggregate for dry weights are exceeded and shall not be used in the 10-Year Capture Zones unless the use of ASTs is impractical. The USTs must conform to EPA, MDEQ, and local fire code requirements. The minimum requirements are outlined in the Proposed Rules for the Storage and Handling of Flammable and Combustible Liquids and Michigan Underground Storage Tank Rules. MDEQ requirements include such protective measures as secondary containment within Wellhead Protection Areas.

If new tanks are to be installed, a copy of all registration documents shall be provided to the City's Environmental Services Division. If existing USTs are to be closed, all MDEQ closure procedures must be followed, and a copy of the closure documents should be submitted to the City's Environmental Services Division. All current and proposed USTs must be indicated on the site plan.

## **3.4 FUELING ESTABLISHMENTS**

Fueling establishments where storage, handling, or use of fuels exceed 55 gallons aggregate including, but not limited to, gasoline, diesel, kerosene, and jet fuel are prohibited in the 1-Year Capture Zones. ASTs and USTs are prohibited in the 10-Year Capture Zones, unless such tanks meet the minimum requirements outlined in the Proposed Rules for the Storage and Handling of Flammable and Combustible Liquids and Michigan Underground Storage Tank Rules. These rules require the use of secondary containment for storage tank systems within wellhead protection areas.

The fuel dispensing area must be paved with concrete or an equivalent smooth impervious surface (not asphalt) with a suggested 2 to 4% slope to prevent ponding of stormwater. The fuel dispensing area must be covered at least as far as the length that the hose and nozzle assembly may be operated, plus one foot. The cover must not drain onto the fuel dispensing area. The covered fuel dispensing area must be separated from the rest of the site by a grade break that prevents run-on of stormwater to the maximum extent practicable. Drains at the site should be labeled to indicate whether they flow directly to the sanitary sewer or storm sewer or if they flow through an oil/water separator. All stormwater shall be managed in accordance with Section 5.0.

All fuel dispensing nozzles should have automatic shut-off mechanisms to help prevent overfilling. Spill response equipment should be stored in the fuel dispensing area. The proposed location of this equipment should be indicated on the site plan.

ASTs and USTs at fueling areas must be in compliance with local, state, and federal regulations and comply with the Standards detailed in other portions of this document. In addition, when fueling is not the primary land use, whenever possible, fueling should be conducted at an offsite location better equipped to handle fuel and spills properly. If equipment/vehicle fueling is conducted onsite, fueling should be conducted in properly designed, designated areas, as indicated on the site plan.

The Standards detailed in this section also apply to existing, nonconforming fueling establishments in Capture Zones.

In addition, Appendix A of the Kalamazoo Code (Zoning Ordinance), Sections 4.2 N and O provide general use-specific standards for gasoline and fuel sales, with and without vehicle service or repair.

### **3.4.1 HOLDING TANKS**

Floor drains should discharge to holding tanks if they are located where municipal sanitary sewers are not available, subsurface disposal systems are failing, or they are higher-risk facilities located in Capture Zones. Holding tanks should adhere to the Standards listed for ASTs and USTs, including secondary containment, unless otherwise approved by the City.

### **3.4.2 TRUCKS, TRAILERS, TANKERS, RAIL CARS, AND TOOL CRIBS**

The possession of regulated substances in trucks, trailers, tanker trucks, rail cars, tool cribs, or similar vehicles is prohibited in the 1-Year Capture Zones where possession or control of a regulated substance

exceeds 55 gallons aggregate for liquid materials or 440 pounds aggregate for dry weights, unless allowed pursuant to the WHP Overlay Ordinance.

In the 10-Year Capture Zones, the possession of a regulated substance stored in trucks, trailers, tanker trucks, rail cars, tool cribs, or similar vehicles is prohibited, unless secondary containment is provided that is sufficient to contain the entire contents of the largest distinct compartment of the container. Sites must also implement appropriate security measures, such as those detailed in Section 3.3.1.

### **3.5 WASTE**

#### **3.5.1 SOLID WASTE**

Solid-waste dumpsters must have lids and be stored on a paved surface, unless otherwise approved by the City. All dumpsters must be indicated on the site plan. Refer to the Code of the City of Kalamazoo, including Chapters 15A and 31, for other specific requirements.

#### **3.5.2 SCRAP METAL**

Dumpsters and drums containing scrap metal that may contain residual chemicals or oils shall be stored on an impervious surface in an enclosed area or covered with an impervious liner to prevent accumulation of stormwater, whenever possible. Where stormwater may otherwise accumulate in the scrap metal collection units, drain plugs should be left in place to prevent discharge onto the ground. If necessary, such collection units should be located on an impervious surface with a separate collection catch basin containing an oil/grit separator that discharges to the municipal sanitary sewer (with prior approval and pretreatment) or a holding tank.

#### **3.5.3 HAZARDOUS WASTES**

Regulated Substances exceeding 55 gallons aggregate for liquids and 440 pounds aggregate for solids are prohibited within the 1-Year Capture Zones, and only allowed in the 10-Year Capture Zones if the site meets all applicable performance Standards contained herein.

If the site will generate, transport, recycle, or treat hazardous waste, the applicant shall indicate in the Water Resources and Environmental Protection Questionnaire the site's expected waste management status (e.g., small-quantity generator). Proposed hazardous waste accumulation areas should be indicated on the site plan. Hazardous waste management techniques must comply with all applicable federal, state, and local requirements.



When possible, hazardous-waste-generating operations at the site should be physically segregated from other operations. Work areas and all storage areas containing hazardous waste shall be located within a containment area with appropriately sealed floors and no direct access outside the facility.

Refer to the City of Kalamazoo Code of Ordinances, including Chapter 6, Sections 6.6G and 6.6H, for other specific requirements.

### **3.5.4 LIQUID WASTE PONDS**

Open liquid-waste ponds are not permitted in Capture Zones without City approval. Any such ponds must be engineered to be protective of the site environment, particularly site groundwater, and comply with all applicable state and federal rules and regulations.

## 4.0 LAND USE SPECIFIC SITE PLAN REVIEW STANDARDS

This section highlights specific standards for certain land-use types identified in the Ordinance as being prohibited in specific Capture Zones or requiring site-specific review. All land uses should incorporate the general standards detailed in Section 3.0. Other use-specific standards not contained herein may be required and subsequently adopted, if determined to be a generally accepted industry standard.

### 4.1 BULK MIXING OF FERTILIZERS AND PESTICIDES

Lawn, garden, pesticide, and agricultural services with onsite bulk mixing or blending of fertilizers, pesticides, and other industry-related chemicals for commercial application are prohibited in the 1-Year Capture Zones when onsite quantities of these chemicals exceed 55 gallons aggregate for liquid materials or 440 pounds aggregate for dry weights.

The following standards apply to all facilities conducting bulk mixing of fertilizers, pesticides, and related materials within Capture Zones, including existing nonconforming sites in the 1-Year Capture Zones:

- Storage areas must be designed to protect these chemicals from possible theft, unauthorized use by untrained personnel, and temperature extremes. Outdoor storage areas shall be located within a permanently fenced area and should have a permanent roof to prevent precipitation and sunlight from entering the storage area. All storage areas shall have an impervious surface and secondary containment. Floor drains shall not be located in storage areas without City approval.
- Pesticides, fertilizers, and similar chemicals should be stored separately to minimize the possibility of cross-contamination in case of fire or other disaster. Smaller facilities may choose to construct a containment area with multiple storage compartments for pesticides and fertilizers.
- Mixing areas for pesticides should be located indoors or mixing should be done at the application site. Onsite mixing and loading areas shall have a spill-containment surface. For liquids, this surface shall be curbed, bermed, or sloped to contain spillage and drain into an impermeable liquid-tight containment structure. For non-liquid materials, this surface should be constructed to prevent water from flowing into the containment system.
- Facility piping from bulk storage tanks shall be installed aboveground to facilitate inspection for leaks.

- Truck rinse/cleaning areas shall be conducted within a containment area. The floor must be sealed with a suitable impermeable material. Washing areas shall drain into a watertight containment structure.

The application of agricultural chemicals, fertilizers, mineral acids, organic sulfur compounds, etc., as used in routine agricultural operations are not allowed unless consistent with existing Generally Accepted Agricultural Management Practices (GAAMPs), Michigan Department of Agriculture, and consistent with label directions approved by the EPA or Michigan Department of Agriculture.

## **4.2 DRY CLEANING FACILITIES**

Dry-cleaning facilities are prohibited in the 1-Year Capture Zones where possession or control of a regulated substance exceeds 55 gallons aggregate for liquid materials or 440 pounds aggregate for dry weights.

The following standards apply to all dry-cleaning facilities within the Capture Zones, including existing non-conforming sites in the 1-Year Capture Zones:

- Documentation of compliance with MDEQ dry-cleaning regulations must be provided to the City upon request.
- The dry-cleaning area should be isolated from other site operations.
- Dry cleaners must provide secondary containment for machines containing solvents. The containment area should be impermeable and capable of holding 110% of the largest possible spill and should prevent the spill from reaching the sanitary sewer, storm drains, or soil.

The following BMPs should be considered and implemented whenever possible:

- Traditional dry-cleaning solvents may be replaced by petroleum solvents with a flash point greater than 140 degrees and with a specific gravity less than 1.0. These solvents present a lower fire hazard and are less mobile if released to the environment.
- Dry-to-dry machines are preferred to transfer machines because of the elimination of the need to transfer solvent-laden garments from a washer unit to a dryer unit, which reduces solvent vapor loss.
- A hamper enclosure or a room enclosure of impermeable construction may be installed to reduce solvent release during transfer.

- Distillation equipment designed to allow still bottoms to be removed without opening the still is preferred.

### **4.3 FUELING ESTABLISHMENTS**

Fueling establishments where storage, handling, or use of fuels exceed 55 gallons aggregate including, but not limited to, gasoline, diesel, kerosene, and jet fuel are prohibited in the 1-Year Capture Zones. ASTs and USTs are prohibited in the 10-Year Capture Zones, unless such tanks meet the minimum requirements outlined in the most recent State of Michigan Rules for the Storage and Handling of Flammable and Combustible Liquids and Michigan Underground Storage Tank Rules. These rules require the use of secondary containment for storage tank systems within wellhead protection areas. Required standards include, but may not be limited to, the following.

- The fuel dispensing area must be paved with concrete or an equivalent smooth impervious surface (not asphalt) with a suggested 2 to 4% slope to prevent ponding of stormwater. The fuel dispensing area must be covered at least as far as the length that the hose and nozzle assembly may be operated, plus one foot. The cover must not drain onto the fuel dispensing area. The covered fuel dispensing area must be separated from the rest of the site by a grade break that prevents run-on of stormwater to the maximum extent practicable. Drains at the site should be labeled to indicate whether they flow directly to the sanitary sewer or storm sewer or if they flow through an oil/water separator. All stormwater shall be managed in accordance with Section 5.0.
- All fuel dispensing nozzles shall have automatic shut-off mechanisms to help prevent overfilling. Spill response equipment should be stored in the fuel dispensing area. The proposed location of this equipment shall be indicated on the site plan.
- ASTs and USTs at fueling areas must be in compliance with local, state, and federal regulations and comply with the Standards detailed in other portions of this document. In addition, when fueling is not the primary land use, whenever possible, fueling should be conducted at an offsite location better equipped to handle fuel and spills properly. If equipment/vehicle fueling is conducted onsite, fueling should be conducted in properly designed, designated areas, as indicated on the site plan.

The Standards detailed in this section also apply to existing, nonconforming fueling establishments in Capture Zones.

### **4.4 FURNITURE STRIPPING OR REFINISHING**

The use of a site for furniture stripping or refinishing is prohibited in a 1-Year Capture Zone, if the site possesses a regulated substance exceeding 55 gallons aggregate for liquids and 440 pounds aggregate



for solids. If the use is allowed as consistent with the WHP Overlay Ordinance, the use may be allowed within the 10-Year Capture Zones, if it meets all applicable standards contained in this document. In addition, the following minimum standards should be attained to gain this approval:

- Chlorinated hydrocarbons, such as methylene chloride and tetrachloroethylene, which have a specific gravity greater than 1.0, should be avoided whenever possible. Replacements can include solutions containing either dimethylformamide and xylene or dimethyl adipate, dimethyl glutarate, and hydrated aluminum silicate. Other stripping agents are available that use a methylene chloride/phenol solution diluted with water, which reduces the quantity of methylene chloride used.

#### **4.5 SCRAP AND SALVAGE OPERATIONS**

Scrap and salvage operations including, but not limited to, those related to auto, appliance, and machine parts are prohibited in the 1-Year and 10-Year Capture Zones.

The WHP Overlay Ordinance, Section 4.2Y contains Use-Specific Standards related to scrap and salvage operations. The following Standards apply to all scrap and salvage operations located within Capture Zones including existing non-conforming sites in the 1-Year and 10-Year Capture Zones:

- The site plan shall be designed to consolidate, contain, and collect differing sources of hazardous substances into manageable point sources. For efficiency, and to prevent contamination of areas not specifically designed for certain activities, the site should be segregated into specific areas especially equipped for receiving, holding, dismantling, cleaning, inventory flow, parts storage, core storage, fuel storage, special waste storage, crushing, sales, shipping, receiving, and the office (as applicable to the proposed use). There should be a logical relationship between these areas so that salvaged materials flow smoothly from area to area and eventually offsite.
- The receiving area shall be designed for temporary storage prior to any dismantling or transfer to a longer-term storage area. This area shall have an impervious surface and be able to sufficiently contain damaged, leaking items. Fluid-containing items, including vehicles, should be inspected for leaks or unwanted contents at the time of receiving.
- Any fluid removal from salvaged items shall be conducted, as soon as possible after receiving the item, in an area equipped to drain fluids into appropriate collection containers.

- Any dismantling of fluid-containing items shall be conducted in an area equipped to drain fluids into appropriate collection vessels. The area must be able to contain spills from these vessels and from the work area .
- Steam cleaning of parts shall be conducted only when absolutely necessary and only in an area capable of fully containing associated wastewater for appropriate disposal.
- The site must have an established secure area to store certain components of vehicles and other materials that pose special hazards, such as mercury switches, air-bags containing sodium azide propellants, lead-acid batteries, tires, and oily rags. The site also must be able to accommodate storage of various fluids, which, depending on items received and processed, could include gasoline, diesel fuel, motor oil, transmission oil, power steering fluid, brake fluid, hydraulic fluid, differential fluid, antifreeze, windshield washer fluid, refrigerants, battery acid, cleaning solvents, and contaminated water. Waste fluid storage areas must conform with the Standards established in earlier portions of this document.
- Once all fluids have been drained and there is no more possibility of regulated substances reaching the ground, salvaged items may be stored in a long-term storage area until the item is sold or otherwise disposed.
- Scrap vehicles or other units brought into a commercial junk yard located within the Capture Zone must have all fluids removed in accordance with current federal, state, and local regulations before onsite crushing. However, the crushing area must be adequately contained to capture any residual fluids .
- Certain parts that can be remanufactured or rebuilt have intrinsic value, unless seriously damaged. These parts are removed and stored prior to being sold and will usually contain fluids and lubricants. Such parts shall be stored on an impervious, contained surface.
- Concrete or asphalt surfaces at junk and salvage yards must be properly designed to minimize cracking as they age. These surfaces are required to be sealed with epoxy or another chemical resistant material, as necessary.

#### **4.6 MOTOR VEHICLE REPAIR/SERVICE SHOPS AND/OR BODY REPAIR**

Motor vehicle repair/service shops and body repair shops are prohibited in the 1-Year Capture Zones where the possession or control of a regulated substance exceeds 55 gallons aggregate for liquid

materials or 440 pounds aggregate for dry weights. See the WHP Overlay Ordinance for relevant Use-Specific Standards and other conditions of use.

The following Standards apply to all motor vehicle repair/service shops and/or body repair shops operating within the Capture Zones, and the existing non-conforming sites in the 1-Year Capture Zones:

- Floor drains in service bays and vehicle washing areas must either be connected to a holding tank with a gravity discharge pipe, to a sump that pumps to a holding tank, or to an appropriately designed oil/grit separator that discharges to a municipal sanitary sewer. Also see Section 3.1.6.
- Vehicle washing is encouraged to be conducted at a commercial car wash, especially when cars only need to be washed occasionally. If vehicle washing is conducted regularly, it should be done either in a wash bay or on a wash pad, in accordance with the Standards detailed in Section 3.2.5.
- Service bay floors and service pits must be constructed of concrete and sealed with an impervious material to facilitate clean-up without using solvents . Also see Section 3.2 and 3.3 for other relevant standards.
- Areas where vehicles are stored or repaired must have provisions for containment of vehicle leaks and shall be paved with an impervious material. Also see Sections 3.2 and 3.3 for other relevant standards.
- Parts cleaning and degreasing should be isolated from other operations, preferably located within a containment area with no direct access outside the facility, and the floor must be sealed with a suitable impermeable material. Also see Sections 3.2 and 3.3 for other relevant standards.
- Auto body painting shall be done in a separate, secure area with no floor drains. Also see Sections 3.2 and 3.3.

#### **4.7 PLATING AND ANODIZING**

Metal plating, polishing, etching, engraving, anodizing, and similar processes are prohibited in the 1-Year Capture Zones where the possession or control of a regulated substance exceeds 55 gallons aggregate for liquid materials or 440 pounds aggregate for dry weights. Also see Sections 3.2 and 3.3 for other relevant standards.

The following Standards apply to all plating, polishing, etching, engraving, anodizing, and similar facilities within the Capture Zones, and the existing non-conforming sites in the 1-Year Capture Zones.

Facilities shall minimize or eliminate the use of particularly hazardous plating chemicals in accordance with prevailing industry BMPs. For example, the following chemical replacements should be implemented whenever possible:

- Replace hexavalent chromium solutions with trivalent chromium solutions (UME, website).
- Replace cadmium plating with zinc-nickel plating (UME, website).
- Substitute persulfate with sulfuric peroxide for copper etching where technically feasible (UME, website).
- Eliminate terpene usage by implementing a "no-clean" technology and glycol ethers usage by implementing a water-based process.
- Substitute cyanide plating solutions with alkaline zinc, acid zinc, acid sulfate copper, pyrophosphate copper, alkaline copper, copper fluoborate, electroless nickel, ammonium silver, halide silver, methanesulfonate-potassium iodide silver, amino or thio complex silver, no free cyanide silver, cadmium chloride, cadmium sulfate, cadmium fluoborate, cadmium perchlorate, gold sulfite, and cobalt-hardened gold (UME, website).
- Ion vapor deposition of aluminum may be used for corrosion protection in place of cadmium plating.
- Replace vapor degreasers, typically using trichloroethylene or 1,1,1-trichloroethane, with aqueous or semi-aqueous based cleaning systems.

The following process-related practices should be considered for implementation:

- Use deionized water in place of tap water to facilitate recycling and to minimize the generation of sludges.
- Reduce drag-out by one or more of the following methods: use wetting agents to decrease surface tension in the tank; lower the concentration of plating bath to the minimum possible; reduce the plating bath viscosity with higher bath temperature; proper rack and barrel design; use drip bars; increase drain time over the process tanks; decrease withdrawal rate of parts from the plating bath; shake, vibrate, or pass the parts through an air knife; angle drain boards between tanks; and/or install drainage boards between tanks.



- Install overflow systems on process baths for make-up water and flow restrictors on rinse tanks to control the flow rate of water.
- Reduce the frequency of bath dump by using filtration to remove suspended solids.
- Recover metals from solution using an electrowinning process.
- Regenerate the plating bath by activated carbon filtration to remove built-up organic contaminants.
- Conserve water by methods such as: using countercurrent or cascade rinse tank arrangements, installing a closed-loop system for rinse water, using spray rinsing, or rinse water agitation.

#### **4.8 TRUCKING AND BUS TERMINALS**

Trucking and bus terminals are prohibited in the 1-Year Capture Zones where the possession or control of a regulated substance exceeds 55 gallons aggregate for liquid materials or 440 pounds aggregate for dry weights .

The following standards apply to all trucking and bus terminals within the Capture Zones, including existing non-conforming sites in the 1-Year Capture Zones:

- All truck and bus parking at terminals must take place on an impermeable surface, except where otherwise approved by the City. In particularly high-risk areas, grading to a containment area (holding tank, curbing, etc.) may be required to reduce impact of potential leaks or spills in the area.
- If fueling takes place at the terminal, all requirements in Section 3.2 must be followed, in addition to those Standards described for ASTs and USTs in Sections 3.3 and 3.4.
- Vehicle maintenance must be conducted indoors in a contained area or offsite. Also see Sections 3.2 and 3.3.
- If onsite cleaning of trucks or buses is proposed to be conducted, full containment of wash water is required. Also see Sections 3.2 and 3.3.
- Onsite painting of trucks/buses is not permitted without City approval. Also see Sections 3.2 and 3.3.

- If regulated substances will be loaded on/off trucks or other vehicles, it is required that this activity be conducted on an impervious surface. Spill response equipment must be readily accessible to the loading/unloading area. Also see Sections 3.2 and 3.3.

## 5.0 STORMWATER MANAGEMENT CRITERIA

The general objectives of stormwater quality management in the City are to achieve predevelopment conditions with respect to stormwater runoff rates and volume to reduce/control flooding, maintain or increase the quality of surface water and groundwater resources, and maintain compliance with its Municipal Separate Storm Sewer System (MS4) Stormwater Program National Pollutant Discharge Elimination System (NPDES) Permit and associated Certificate of Coverage (COC). It is also recognized that the quality and sustainability of the City's drinking water (groundwater) resources can depend to some extent on the management of stormwater runoff.

Some general strategies for minimizing stormwater volume and improving stormwater quality management that should be included wherever possible are listed below:

- Accommodate stormwater that complements the natural drainage patterns, maintains the integrity of stream channels for both their drainage and biological functions, and protects wetlands.
- Reduce or maintain impervious surface area.
- Prevent erosion and sedimentation.
- Provide naturalized stormwater treatment for parking lot runoff using bioretention basins, rain gardens, filter strips, and/or other practices that can be integrated into landscaped areas and traffic islands where allowed and appropriate.
- Direct rooftop runoff to pervious areas such as yards, open areas, or vegetated areas (e.g., rain gardens), thus avoiding rooftop runoff to the roadway and stormwater collection system.
- Use native vegetation, where practical, to reduce the need for chemical applications and to enhance plant root absorption of infiltrated stormwater. Non-vegetative stormwater treatment structures will be incorporated, if naturalized treatment systems are not practical or consistent with the Standards discussed below.
- Maintain or increase groundwater recharge by allowing non-polluted stormwater infiltration in designated areas (e.g. non-WHPAs).

## 5.1 KEY DEFINITIONS

**Best Management Practice (BMP):** A structural or non-structural practice or combination of practices that are designed to prevent or reduce stormwater runoff and/or associated pollutants.

**Bioretention (Rain Gardens):** Shallow surface depressions planted with specially selected native vegetation to capture and treat stormwater runoff from rooftops, parking lots, and streets.

**Buffer Strip:** A defined zone of selected plantings along a surface water feature capable of filtering stormwater.

**Catch Basin:** A solid-walled stormwater inlet to the stormwater collection system that includes a sump to capture coarse sediments.

**Channel Protection Performance Standard:** Criteria that requires maintaining at the post-development project site runoff volume and peak flow rate at or below pre-development levels for all storms up to the 2-year, 24-hour event.

**Constructed Filter:** Structures or excavated areas containing a layer of sand, compost, organic material, peat, or other media that reduce pollutant levels in stormwater runoff by filtering sediments, metals, hydrocarbons, and other pollutants.

**Detention:** The temporary storage of stormwater runoff to control peak discharge rates and provide gravity settling of sediments.

**Detention Basin:** A constructed basin that temporarily stores water before discharging into a surface water feature (e.g., dry basin: <24 hour drain-time; extended dry basin: 24-40 hours drain-time; and wet detention basin: permanent pool of water).

**First Flush:** The delivery of a highly concentrated pollutant loading during the early stages of a storm due to the washing effect of runoff on pollutants that accumulated on the land.

**Flood Control Volume:** The stormwater volume detained or infiltrated to protect downstream areas from flooding.

**Green Roofs:** Conventional rooftops that include a thin covering of vegetation allowing the roof to function more like a vegetated surface.



**Groundwater Recharge:** The replenishment of existing natural water bearing subsurface layers of porous stone, sand, gravel, silt or clay via infiltration.

**Impervious Surface:** A surface that prevents the infiltration of water into the ground such as roofs, streets, sidewalks, driveways, parking lots, and highly compacted soils.

**Infiltration Practices:** Natural or constructed land areas using permeable soils that capture, store, and infiltrate the volume of stormwater runoff into surrounding soil. Examples include but are not limited to dry wells, infiltration basins, infiltration trenches, and subsurface infiltration beds.

**Infiltration/Retention Basin:** A facility without a positive outlet in which stormwater runoff is collected and allowed to infiltrate into the ground.

**Manufactured Treatment Devices:** A pre-fabricated stormwater treatment structure utilizing settling, filtration, absorptive/absorptive materials, vortex separation (hydrodynamic separator), vegetative components, and/or other appropriate technology to remove pollutants from stormwater runoff.

**New Jersey Corporation for Advanced Technology (NJCAT) Program:** A private/public partnership that pools the best talents and diverse resources of business and industry, entrepreneurs, university research centers, utilities and government to promote the development and commercialization of exciting, new energy and environmental technologies, including the verification of stormwater MTDs.

**New Jersey Department of Environmental Protection (NJDEP) Standard for Manufactured Treatment Devices:** A list of third-party certified Manufactured Treatment Devices (MTDs) that were laboratory and/or field tested by the NJCAT Program and approved by the NJDEP to serve as acceptable BMPs. The most current listing available will be used as the list of acceptable MTDs for use in the City of Kalamazoo for removing pollutants from stormwater runoff.

**Peak Discharge Rate:** The maximum instantaneous rate of flow (volume of water passing a given point over a specific duration (such as cubic feet per second) during a storm, usually in reference to a specific design storm event.

**Pervious Pavement:** Infiltration technique that combines stormwater infiltration, storage, and structural pavement consisting of a permeable surface underlain by a storage reservoir.

**Pretreatment:** The additional measures taken to protect groundwater and/or surface water quality by removing pollutants from collected stormwater beyond those required to adequately collect and remove stormwater. Typically, pretreatment is accomplished by a BMP designed to provide controlled removal of oils and grease, coarse to fine sediments, and may provide for a containment area in the case of an accidental spill or other release.

**Runoff:** That portion of precipitation that does not infiltrate or evaporate but runs off to a surface water feature or stormwater collection system.

**Sediment Basin:** A man-made depression in the ground surface where runoff is collected and stored to allow suspended solids to settle out. Sediment basins may be wet or dry.

**Sediment Forebay:** A small, separate storage area located upstream to the inlet to a stormwater facility used to trap and settle incoming sediments.

**Sediment Sump:** A constructed sump or surface depression used to trap and settle incoming sediments. Generally smaller than a sediment basin or forebay.

**Spill Containment Cell:** A BMP designed to provide controlled removal of oils and grease, coarse to fine sediments, and other subject pollutants to protect groundwater and surface water resources, and to provide for a containment area in the case of a spill or other pollutant release.

**Spill Containment Volume:** The containment volume of stormwater required to protect groundwater and surface water from a release of regulated substances.

**Stormwater Filter:** An open drainage channel or depression, explicitly designed to filter runoff through a self-contained bed of sand to provide water quality treatment and spill containment.

**Vegetated Filter Strip:** A permanent, maintained strip of vegetation designed to slow runoff velocities and filter out sediment and other pollutants from stormwater.

**Water Quality Swale:** An open drainage channel or depression with an impermeable liner, explicitly designed to filter runoff through a self-contained bed of sand to provide water quality treatment and spill containment.

**Water Quality Treatment Volume Standard:** Criteria that requires a stormwater treatment volume that is intended to reduce or prevent water quality impacts of stormwater runoff by capturing and treating the initial "first flush" volume expected to contain the majority of pollutants.

## 5.2 UNIFORM STORMWATER STANDARDS

### Project Site Size

For the purposes of Sections 5 and 6, a site:

- $< \frac{1}{2}$  acre (21,780 square feet) is considered a "small site";
- $\geq \frac{1}{2}$  acre (21,780 square feet) up to 1 acre is a "medium site";
- $\geq 1$  acre is considered a "large site"; and
- Parking lot(s) with a cumulative total of  $\geq 20$  parking places and/or exceeding a 6,000-square-foot area is considered a "larger parking area."

### **Required Stormwater Runoff Calculations and Associated Information**

For all projects, the Uniform Stormwater Standard 1: Water Quality Treatment Volume Worksheet and the Uniform Stormwater Standard 2: Channel Protection Volume Worksheet are required to be completed. Also, if Manufactured Treatment Devices (MTDs) are being proposed for the site, the (MTD) Worksheet is required. In addition, the following information must also be provided on the Site Plan or as an attachment to the Site Plan: Percentage and volume of stormwater runoff proposed to be infiltrated; percentage and volume of stormwater runoff to be discharged to City storm sewer; percentage and volume of stormwater runoff to be discharged *directly* to surface water; and off-site surface water features (river, creek, pond) to *directly* receive stormwater runoff.

**STANDARD 1:** A water quality treatment runoff volume of one-inch generated from the entire site that contributes to runoff is required for medium sized sites, large sites, and those with larger parking areas. One inch also equals the 90 Percent Non-Exceedance Storm based on the closest weather station (Gull Lake). To calculate the *volume* in cubic feet of one inch of stormwater runoff: Multiply area contributing stormwater runoff (square feet) by 1/12 feet (0.083).

For the purpose of selecting the appropriate size of a stormwater Manufactured Treatment Device (MTD), the Water Quality Treatment *Flow Rate* (Wq) shall be calculated based on the Rational Method Equation:  $Wq = CIA$ , where

**Wq = Discharge in cubic feet per second (cfs)**

**C = Runoff coefficient depending on the characteristics of the drainage area**

**I = Rainfall intensity in inches/hour**

**A = Drainage area in acres**



The runoff coefficient (C) shall be a weighted average that is based on the percentage of different surface types shown in the Uniform Stormwater Standard 1: Water Quality Treatment Volume Worksheet.

**The rainfall intensity (I) to be used shall be 1.44 inches/hour** (using 0.72 inches of the 1-year/30-minute storm for the area that represents a treatment volume equivalent to the 90 percent annual non-exceedance storm).

The drainage area (A) means the entire upstream land area which drains to and from that location (in acres).

In addition:

- The MTD shall be designed to treat 100% of the flow without bypass at the calculated water quality treatment flow rate.
- The storm pipe shall be designed at a 10-year storm event.
- The MTD shall have the capacity to handle the designed 10-year storm pipe flows without losing floatables or sediment.

Small sites do not require a water quality treatment volume unless water quality discharge is a concern due to land use characteristics that pose a high risk to water quality. City-approved catch basin inserts may only be used on small sites as a water quality treatment BMP and when hydrodynamic separators and other BMPs are not physically practical due to site characteristics, such as depth to storm sewer, hydraulics, etc.

To meet the objective of Standard 1, the BMP method(s) selected to treat the water quality volume shall be designed on a site-specific basis to achieve a minimum of 80 percent removal of Total Suspended Solids (TSS), as compared with uncontrolled runoff, or a discharge concentration of TSS that does not exceed 80 mg/L. Many BMPs are sufficient individually to achieve the required removal of TSS, or compliance can also be achieved through the use of a system of BMPs that cumulatively, reach the 80% reduction factor. **If MTDs are selected as BMPs, they are required to be NJCAT verified and NJDEP certified to satisfy the Water Quality Treatment Volume Standard.** The model/size of the certified unit shall be selected on the basis to effectively pre-treat stormwater at the calculated water quality flow rate. The NJDEP 50% Certified TSS Removal Rate approximates 80% net TSS reduction for the Kalamazoo region.

The effective removal of TSS and implementation of other stormwater control strategies by other proposed BMPs will be estimated by reference sources such as: "Low Impact Development Manual for Michigan," SEMCOG, 2008; "Non-Point Source Best Management Practices Manual," MDEQ, 2014;



"Urban Runoff BMP Pollutant Load Reduction Worksheet Calculator," MDEQ, 1999; and any other City of Kalamazoo acceptable industry standard technical manuals used for estimating stormwater pollutant load reductions by BMPs. **The Uniform Stormwater Standard 1: Water Quality Treatment Volume Worksheet must be prepared and submitted to demonstrate compliance with this Standard.**

**STANDARD 2:** A Channel Protection Performance Standard is required to maintain the post-development project site *runoff volume and peak flow rate* at or below pre-development levels for all storms up to the 2-year, 24-hour event, or 2.37 inches (Source: Rainfall Frequency Atlas of the Midwest, Bulletin 71, Midwestern Climate Center, 1992). **This standard is required for medium and large sites. If the post-development volume of runoff is equal to or less than the volume of runoff from the existing site then the channel protection performance standard is met.** The intent of the Channel Protection Performance Standard is to prevent excess sediment and channel instability caused by the increased rate and volume of stormwater runoff that can result from development.

Compliance with this requirement for the medium and large sites is determined by calculating the existing ("pre-development") and post-development runoff volume and rate for the 2-year and smaller events. If the post-development volume or rate exceeds the existing volume or rate, then appropriate controls or design changes shall be implemented to make post-development runoff volume and rate equal to or less than the existing levels for all storms up to the 2-year, 24-hour event. If site conditions challenge or prohibit feasibility of meeting this standard, the applicant should consider the incorporation of green infrastructure requirements. If extended detention is used as a post-construction stormwater runoff control, additional BMPs will likely be needed to maintain the pre-development volume and peak rate levels for all storms up to the 2-year, 24-hour event. The Rational Method Equation will be used to calculate whether BMPs are necessary to meet the Channel Protection Performance Standard.

The appropriate use, implementation, and estimated effectiveness stormwater control strategies by proposed BMPs will be determined by reference sources such as: "Low Impact Development Manual for Michigan," SEMCOG, 2008, and "Non-Point Source Best Management Practices Manual," MDEQ, 2014, and any other City of Kalamazoo acceptable industry standard technical manuals. **The Uniform Stormwater Standard 2: Channel Protection Volume Worksheet is required to demonstrate compliance with this Standard.**

**STANDARD 3:** A flood control performance standard is required to ensure stormwater entering the City MS4 is  $\leq$  than the existing (pre-development) conditions and on-site retainage is properly designed to protect neighboring properties. The City Engineer or designee will review each site plan for approval on a case-by-case basis to determine if the proposed strategy meets industry standards and is appropriate for the specific site.

**STANDARD 4:** On large sites, a minimum 25-foot **naturally vegetated buffer** system shall be incorporated along all perennial streams, wetlands, and other surface water features to protect water quality, reduce erosion and sedimentation, reduce the potential for flooding, and enhance aesthetics and wildlife habitat. On medium sites, a 20-foot buffer is required; on small sites, a 15-foot naturally vegetated buffer is required.

**STANDARD 5:** All reasonable efforts will be made to **maintain and protect wetlands**. If loss cannot be avoided, wetland mitigation must be accomplished on the same site, be pre-approved by the City, and must adhere to the standards as described in the Wetland Mitigation Section under Part 303, Wetlands Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended – regardless of the size of the wetland.

**STANDARD 6:** All reasonable efforts will be made to **maintain and protect the floodplain area**. If a loss cannot be avoided, a floodplain mitigation of a 2:1 ratio of new floodplain area to former floodplain area must be accomplished within the same stormwater system sub-drainage basin (the land area that drains to a single city outfall), and pre-approved by the City.

**STANDARD 7:** In all areas, the maximum design flow rate or volume of stormwater discharged from the site shall not impair or exceed the capacity of the downstream stormwater collection system, open channel, watercourse, wetland, or overland flow path.

**STANDARD 8:** A Stormwater Management Practices Operations and Maintenance Agreement is required by and between the City of Kalamazoo and the owner of the property that has incorporated stormwater management practices (e.g. manufactured treatment devices, infiltration/detention basins, subsurface infiltration bed, bioretention, vegetated swale, dry wells, vegetative roofs, porous pavement, etc.). All BMPs are required to be listed and shown on the Site Plan by the subject property owner(s). See Attachment 3.

**Table 3  
Site Size Applicability to Stormwater Standards**

	Standard 1	Standard 2	Standard 3	Standard 4	Standard 5	Standard 6	Standard 7	Standard 8
Small Sites	—	—	X	15-foot buffer	X	X	X	X
Medium Sites	X	X	X	20-foot buffer	X	X	X	X
Large Sites	X	X	X	25-foot buffer	X	X	X	X

### 5.3 STORMWATER DISCHARGE STANDARDS

The following additional requirements address stormwater discharge strategies as related to: the proposed land use and associated groundwater contamination risk assessment; the site's location in regard to Wellhead Protection Capture Zones (Ordinance 1825); the zoning district (as defined in the City Code of Ordinances); potential to directly impact surface water features; volume that enters the City's storm sewer (MS4); and any other relevant physical characteristics of the site. Stormwater discharge strategies have been incorporated into the following City-adopted Stormwater Discharge Standards that must be met at development and re-development sites that require site plan review or otherwise deemed necessary to maintain regulatory compliance for the Stormwater NPDES Permit or objectives of the MDEQ-approved WHPP. The Standards apply to the areas as described below.

**STANDARD A:** Within the 1-Year Capture Zones, sites with allowed higher-risk land uses (Tables 1 and 2) and/or those exceeding 55 gallons aggregate for liquids and 440 pounds aggregate for dry weights, must discharge to surface water with pretreatment and have a spill containment volume. This can be accomplished by solid-wall pipes that discharge to a defined stormwater collection system, surface water feature, or detention area.

**STANDARD B:** Within the 1-Year Capture Zones associated with lower-risk land uses, surface water discharge with pretreatment is preferred but groundwater infiltration may be allowed if pretreatment is provided. Larger parking areas (see Standard E) and regulated substance storage areas are required to have pretreatment, and may be required to have a spill containment volume.

**STANDARD C:** Within the 5-Year Capture Zones associated with higher-risk land uses (Tables 1 and 2), and/or those exceeding the 55-gallon/440-pound aggregate thresholds for regulated substances, stormwater infiltration is allowed only with pretreatment; a spill containment volume may be required. Larger parking areas are required to have pre-treatment regardless of discharge strategy.

**STANDARD D:** In lower-risk land use areas within the 5-Year Capture Zones, infiltration is allowed, but may require pretreatment depending upon site-specific analysis, regarding items such as larger parking areas and regulated substance areas.

**STANDARD E:** Parking areas within a 1-Year or 5-Year Capture Zone designed to accommodate 20 or more vehicles or exceed 6,000 square feet (larger parking areas) should be paved with concrete, asphalt, or an equivalent smooth impervious surface with a minimum 2% cross slope to prevent ponding of water. These parking areas shall be controlled so that all runoff is directed to a collection system with pretreatment, thus minimizing the potential of flows with pollutants to migrate offsite or into groundwater.



Parking sites having limited or short-term use (i.e., churches or similar) with limited potential for releases of regulated substances inside the 5-Year Capture Zones, but outside the 1-Year Capture Zones, may be granted exceptions or modifications to the above requirements.

**STANDARD F:** Within the 10-Year Capture Zones, stormwater infiltration is preferred with lower-risk land uses, but larger parking areas and regulated substance storage areas on larger sites may require pretreatment. Spill containment volume may be required for higher-risk land use areas.

**STANDARD G:** In areas outside the Capture Zones, infiltration of stormwater is preferred to promote groundwater recharge. All lots or parcels should retain and infiltrate stormwater onsite, unless drainage agreements between adjacent property owners are obtained or the site is limited to only surface water discharge. Certain large sites with higher-risk land uses and those with larger parking lots may require pretreatment.

Table 4 summarizes the discharge strategy in different land-use risk types.



**Table 4**  
**Stormwater Discharge Strategy**  
**Infiltration to Groundwater and MS4 Connection**

Capture Zone	Applicable Standards	Higher-Risk Land Use <sup>1</sup> and/or Above Quantity Thresholds <sup>1</sup>	Lower-Risk Land Use
1-Year Capture Zones	A, B, E	<ul style="list-style-type: none"> <li>No stormwater infiltration.</li> <li>Pretreatment with spill containment volume<sup>3</sup> is required and reduction in peak flow may be required to connect to MS4.</li> </ul>	<ul style="list-style-type: none"> <li>Stormwater infiltration may be allowed with pretreatment.</li> <li>Larger parking areas<sup>2</sup> and regulated substance areas require pretreatment, reduction in peak flow, and may require spill containment volume<sup>3</sup> prior to connection to MS4.</li> </ul>
5-Year Capture Zones	C, D, E	<ul style="list-style-type: none"> <li>Stormwater infiltration may be allowed with pretreatment.</li> <li>Pretreatment is required for Larger parking areas<sup>2</sup> and regulated substance areas; spill containment volume<sup>3</sup> may be required.</li> <li>10% reduction in existing flows may be required to connect to MS4.</li> </ul>	<ul style="list-style-type: none"> <li>Pretreatment may be required for stormwater infiltration, pending site-specific evaluation.</li> <li>Larger parking areas<sup>2</sup> and regulated substance areas require pretreatment.</li> <li>20% reduction in existing flows may be required to connect to MS4.</li> </ul>
10-Year Capture Zones	E, F	<ul style="list-style-type: none"> <li>Stormwater infiltration allowed pending site-specific evaluation.</li> <li>Larger parking areas<sup>2</sup> require pretreatment; regulated substance areas may require spill containment volume<sup>3</sup>.</li> <li>30% reduction in existing flows may be required to connect to MS4.</li> </ul>	<ul style="list-style-type: none"> <li>Stormwater infiltration preferred.</li> <li>Larger parking areas<sup>2</sup> and regulated substance areas for large sites may require pretreatment.</li> <li>40% reduction in existing flows may be required to connect to MS4.</li> </ul>
Outside Capture Zones	E, G	<ul style="list-style-type: none"> <li>Stormwater infiltration required.</li> <li>Larger parking areas<sup>2</sup> require pretreatment; regulated substance areas may require spill containment volume<sup>3</sup>.</li> <li>50% reduction in existing flows may be required to connect to MS4.</li> </ul>	<ul style="list-style-type: none"> <li>Stormwater infiltration required.</li> <li>Larger parking areas<sup>2</sup> may require pretreatment prior to connection to MS4.</li> <li>75% reduction in existing flows may be required to connect to MS4.</li> </ul>

<sup>1</sup>See Tables 1 and 2 for Higher-Risk Land Use designations.

Regulated Substance Thresholds: 55 gallons aggregate for liquids and 440 pounds aggregate for dry weights.

<sup>2</sup>20 or more parking spaces or >6,000-square-foot paved area.

<sup>3</sup>See Section 6 for requirements.

## 6.0 TREATMENT AND SPILL CONTAINMENT

Acceptable types of BMPs that can meet treatment, storage, and spill containment requirements for stormwater quality can be found in the following documents: Low Impact Development Manual for Michigan (SEMCOG, 2008) and the Michigan Nonpoint Source Best Management Practices Manual (MDEQ, 2014).

### Spill Containment Volume

A spill containment volume may be required as an additional component of pretreatment for both surface and groundwater discharges for certain higher risk land uses and within certain Capture Zones as specified below:

Spill Containment Volume is required to protect both groundwater and surface water from pollutant spills in: all of the 1-Year Capture Zone Higher-Risk Land Use and/or for sites above regulated substance thresholds; certain 1-Year Capture Zone Lower-Risk Land Use areas; certain 5-Year Capture Zones and 10-Year Capture Zones with Higher-Risk Land Use, and/or for sites above regulated substance thresholds. In higher-risk land use areas, spill containment may also be required regardless of proximity to capture zones, if it is deemed appropriate to safeguard environmentally sensitive areas.

The Spill Containment Volume is equivalent to 30% of 0.5 inch of runoff per impervious acre (30% of 1,815 cubic feet). The volume is given by the following equation:

$$\begin{aligned} V &= \text{Spill Containment Volume} \\ &= 30\% \text{ of } 1,815 \text{ cubic feet per impervious acre} \\ &= 30\% \text{ of } 13,577 \text{ gallons per impervious acre} \\ &= 4,073 \text{ gallons per impervious acre} \end{aligned}$$

A minimum spill containment volume of 400 gallons shall be provided. The minimum volume is allowable only on small sites where proprietary treatment systems are used.

In general, measures meeting Spill Containment standards must have an impermeable barrier between the treated material and the groundwater; have provisions for the capture of oil, grease, and sediments; and meet the volume requirements. Spill containment may be provided by one of the following BMPs:

- Spill-containment cell
- Water quality swale

- Proprietary stormwater treatment system

These measures are described in the following sections.

## 6.1 SPILL-CONTAINMENT CELL

A spill-containment cell may be used to trap and localize incoming sediments and to capture slug pollutant loads from accidental spills of regulated substances (spill containment volume). A spill-containment cell, which is depicted in Figure 3, must have the following characteristics:

### General Specifications

- The spill-containment cell shall be a wet basin with an impermeable bottom and sides to the design high-water level.
- The minimum surface area shall be 25% of the required volume.
- The length-to-width ratio shall be a minimum of 3:1 and a maximum of 4:1 to allow for adequate hydraulic length, yet minimize scour velocities.
- The minimum hydraulic length shall be equal to the length specified in the length-to-width ratio.
- The minimum diameter of the transfer pipe, between the spill containment cell and the infiltration basin, shall be 12 inches.
- The overflow structure from the spill containment cell shall be sized for the peak inflow from a 10-year rainfall event.
- The top-of-berm elevation between the spill-containment cell and the basin shall be a minimum of one foot below the outer berm elevation.
- The spill-containment cell shall have a minimum one-foot-deep sump below the inlet pipe for sediment accumulation.
- The outlet structure from the spill-containment cell shall be designed to draw water from the central portion of the water column within the cell, to trap floatables, and to contain sediments. The crown of the inlet end of the transfer structure pipe shall be located vertically, a minimum of 1 foot below the

normal water level and a minimum of 1.5 feet from the bottom of the spill-containment cell (minimum depth of the permanent pool is 2.5 feet).

#### Material Specifications

- The spill-containment cell shall be lined with impermeable materials extending up to the design high-water elevation. A minimum 18-inch-thick clay layer or an impermeable liner protected with a minimum 12 inches of soil cover are acceptable alternatives.
- Maximum allowable permeability shall be  $1 \times 10^{-7}$  centimeter per second (cm/sec), as determined by the geotechnical consultant for clay placement or manufacturer's certificate for liner products.
- A 40-millimeter polyvinyl chloride liner is an acceptable impermeable material.
- Maintenance.
- Maintenance responsibility shall be vested with the owner or authorized operator.

## **6.2 WATER QUALITY SWALES**

Water quality swales may be used for spill containment on smaller sites of less than 1/2 acre, or larger sites where space is limited and/or a permanent pool of water is not desirable. Figure 4 depicts a dimensioned water quality swale. The water quality swale shall be sized to contain the spill-containment volume without release. Following is a summary of required characteristics of a water quality swale:

#### Pretreatment Criteria

- A minimum 25-foot vegetated buffer is required between directly contributing impervious surfaces and the water quality swale.

#### Controls

- Inlet pipes shall not be fully submerged at normal pool elevations.
- All inlet pipes must enter this swale for pretreatment.
- A manhole or catch basin shall be required immediately downstream of the water quality swale.



- The swale and outlet shall be sized to pass the 10-year design flood.
- A 4-inch perforated-pipe underdrain shall be placed along the center length of the swale and bedded in coarse aggregate.
- Upland construction areas shall be completely stabilized prior to final swale construction. The detention basin may be constructed first, as a temporary erosion control measure during construction.
- Inlets and outlets require energy dissipation and transition from outlet to open channel.
- Inlets shall have a riprap apron to dissipate the velocity of incoming stormwater runoff. The following minimum square yards of riprap shall be provided based on pipe diameter.

<u>Pipe Diameter (inches)</u>	<u>Riprap (square yards)</u>
12 to 18	4
21 to 36	12
42 to 60	24

### Geometry

- The swale shall have a minimum bottom width of two feet.
- Side slopes shall be 3:1 (horizontal:vertical) or flatter.
- The sand filter shall be placed to a depth of 24 inches below the swale invert.
- The sand filter media shall meet at least MDOT Class II requirements for granular materials.
- Six inches of coarse aggregate shall be placed below the sand filter.
- The filter fabric shall be a nonwoven geotextile with a minimum weight of 3.5 ounces per square yard, a minimum coefficient of permeability of 0.02 cm/sec, and apparent opening size ranging between 70 to 120 U.S. standard sieve size.
- The coarse aggregate shall be washed, rounded-stone aggregate, 1.5 to 3 inches in diameter, or other City-approved aggregate with void ratio adjusted accordingly (i.e., MDOT 6A,  $V_v = 0.33$ ).

- The bottom and sides of the swale shall be lined with an impermeable liner.

#### Public Safety

- The swale shall be designed for a maximum depth of 2 feet of water.
- If the water quality swale receives runoff from a higher-risk land use or zoning district, as indicated in Section 2.1 Groundwater Contamination Risk Assessment, the owner/operator shall indicate in the site's SCP actions to be taken to contain the spill prior to leaving the downstream manhole/catch basin.

#### Maintenance

Maintenance responsibility shall be vested with the owner or authorized operator. At a minimum, a maintenance plan shall include the following components:

- Sediment shall be removed when it reaches a depth equal to 50% of the water-quality depth. A visual inspection shall be conducted at least once per year.
- The sand filter shall be replaced, if the swale fails to infiltrate.
- If a pollutant spill occurs, permeable soil shall be removed and disposed in accordance with applicable regulations. Clean permeable fill shall replace it.
- Eroded and barren areas shall be re-vegetated as soon as possible. Trash and debris shall be removed on a regular schedule. Outlets and underdrain outlets shall be inspected annually.

### **6.3 STORMWATER MANUFACTURED TREATMENT DEVICES**

If Manufactured Treatment Devices (MTDs) are proposed to be used, the MTD Worksheet is required to be prepared and submitted to determine compliance with these Standards. In addition, a Stormwater Best Management Practice Operations and Maintenance Agreement between the City and the Landowner or Designee is required.

### **Catch Basin/Inlet Inserts**

Only small sites are allowed to use City-approved catch basin/inlet inserts that provide treatment through vertical (gravity-based) flow only. These systems require a suitable treatment media (filter) for the subject contaminants of concern at the subject site. Typically, these systems are used on small higher-risk sites (e.g., gasoline stations or larger parking lots) where the larger hydrodynamic separators are not practical. Detailed hydraulic calculations shall be provided to demonstrate that the system will treat the first one-half inch of rainfall (the first flush) and have the capacity to allow flows from the 10-year storm to pass without causing surface ponding.

### **Hydrodynamic Separators**

Many proprietary stormwater systems may not achieve full spill containment volumes as a stand-alone practice. Proprietary stormwater treatment systems can be used alone or in combination with other BMPs to meet the treatment criteria. Acceptable proprietary stormwater treatment systems must be NJCAT verified and NJDEP certified. See the Manufactured Treatment Device requirements in the Uniform Stormwater Standard 1 section.

## **7.0 NONCONFORMING LAND USES**

A nonconforming use is defined as any existing use that, as of the effective date of the WHP Overlay Ordinance (2007), would otherwise be prohibited within a designated Capture Zone.

### **7.1 CONFORMANCE WITH STANDARDS**

Existing nonconformities will be allowed within a capture zone only if in accordance with Chapter 9 "Nonconformities" of Appendix A (Zoning Ordinance) of the City of Kalamazoo's Code of Ordinances.

In addition, nonconforming land uses pursuant to the WHP Overlay Ordinance must meet the requirements of the Standards established in this document and/or shall prepare an Environmental Services Division-approved Spill Contingency Plan (SPC). The City reserves the right to approve/determine which option(s) is to be implemented for the specific circumstance.

### **7.2 SPILL CONTINGENCY PLANNING**

Proposed land uses that are allowed within the 10-Year Capture Zones that have in possession regulated substances in quantities exceeding 55 gallons aggregate for liquids and 440 pounds aggregate for solids are required to conform to the specific land use standards within this document and/or have a SCP for the site. In addition, nonconforming land uses within any Capture Zone are also required to conform to these standards and/or have a SCP. An example template of a SCP is provided in Attachment 2. Any existing SCPs for the site may be submitted to the Environmental Services Division for review and approval to meet these requirements, as discussed in Section 7.2.5.

Finally, a SCP may be required if the proposed land use poses a direct or potential significant adverse impact to a surface water feature, such as a river, stream, pond, lake, or wetland.

#### **7.2.1 REGULATED SUBSTANCE INVENTORY**

The City's Department of Public Services and Department of Public Safety collaborate in the collection of chemical storage information for the purposes of the Wellhead Protection Program, Stormwater Management Program, and the Fire Fighters Right-to-Know Program. All businesses are required to complete Part 1 "Kalamazoo Department of Public Safety Right-to-Know Questionnaire" to comply with the Michigan Fire Prevention Code, Act No. 207, P.A. of 1941 as amended. If a business is located within a Wellhead Protection Area, they are also required to complete Part 2 "Drinking Water Protection



Questionnaire" to comply with the City of Kalamazoo Ordinance No. 1825 (Wellhead Protection Zoning Overlay) and Ordinance No. 1826 (these Performance Standards). These forms are provided in the Site Plan Application Packet.

These forms can also be found, completed, and submitted on-line at [www.kalamazoo.org/chemicalforms](http://www.kalamazoo.org/chemicalforms). Select the "Chemical Inventory and Storage Form" and complete the required parts as required. If preferred, you can print out the forms and complete manually and return via US mail to:

Environmental Services Division  
Department of Public Services  
ATTN: Environmental Programs Manager  
1415 N. Harrison Street  
Kalamazoo, MI 49007

It is recommended that a business keep an inventory that identifies all regulated substances stored at the site in containers exceeding either 10 pounds for liquids or 100 pounds for solids. For each regulated substance, the inventory should identify the type of storage container, storage location(s), and typical and maximum storage quantities in each storage location. The site should maintain a file of current Material Safety Data Sheets (MSDS) that includes the hazardous components and percentage by weight of each regulated substance on the inventory. This MSDS file should be readily accessible in the event of an emergency. Section 3.0 of the SCP template (Attachment 2) provides an example table that can be used for a Regulated Substance Inventory.

### **7.2.2 RELEASE POTENTIAL ANALYSIS**

The site should develop a written analysis of the potential for a release of each regulated substance stored at the site. This analysis should consider the potential for release during transfer of the regulated substance to and from the storage area, during storage of the regulated substance, and during use of the regulated substance. In addition, the site should evaluate the likely size of a release for each scenario, as well as the likely destination of the release (e.g., to a floor drain, sump, storm drain, etc.). The information may be compiled in table form for ease of data compilation and use. An example table is found in Section 4.0 of the SPC (Attachment 2).

### 7.2.3 RELEASE PREVENTION MEASURES

Considering each potential release identified as part of Section 7.2, the site should identify in writing release prevention measures that will minimize the likelihood and/or reduce the impact of such a release at the site. These measures could include work practices, housekeeping practices, inspection practices, and/or structural controls (e.g., secondary containment). These prevention measures may be included in the example table found in Section 4.0 of the SCP (Attachment 2).

### 7.2.4 RELEASE RESPONSE PROCEDURES

The SCP should identify procedures to be followed in the event of a release of a regulated substance. Written procedures should be established both for minor releases, which pose no danger to health or the environment and can be handled by trained employees in the immediate vicinity of the release, and for significant releases that have one or more of the following characteristics:

- The spill cannot be contained safely by site personnel.
- Sufficient resources are not available at the site to contain the spill.
- The spilled material has entered the site's drain system (sanitary or storm) and cannot be contained.
- The spilled material has entered site soils or a vegetated area.

In addition, the SCP should include the following:

- Identification of responsibilities of various site personnel in the event of an emergency.
- Internal site emergency notification procedures (chain-of-command reporting).
- Emergency contact information, including, at a minimum:
  - Key site personnel/emergency coordinators.
  - At least one 24-hour emergency contact.
  - Local emergency response agencies (e.g., police department, fire department, ambulance).
  - Local, state, and federal environmental agencies.
  - At least one spill response contractor able to respond to the site in the event of a significant spill.
- An inventory of onsite spill response equipment.

The SCP should also address methods to determine proper disposal of waste generated by a release of regulated substances. Section 5.0 of the template SCP (Attachment 2) provides an example format to document release response procedures.

## **7.2.5 USE OF OTHER EMERGENCY RESPONSE PLANS**

Many sites using or storing regulated substances are required under state or federal environmental laws to develop a written spill response plan, such as a Pollution Incident Prevention Plan (PIPP) or a Spill Prevention Control and Countermeasure (SPCC) Plan. Sites may also be required to prepare a Hazardous Waste Contingency Plan or Stormwater Pollution Prevention Plan (SWP3). Provided that all of the elements described above are included in one or more existing emergency response plans, the site may substitute the existing plan(s) for the SCP required within these Performance Standards. If the existing plan(s) addresses part, but not all, of the requirements detailed in Sections 7.1 to 7.2.4, the site may prepare an addendum to the existing plan(s) so that all requirements are met.

## 8.0 POTENTIALLY APPLICABLE ENVIRONMENTAL REGULATIONS

Facility operators subject to regulation under the WHP Overlay Ordinance and these Performance Standards must comply fully with all existing applicable federal, state, and local regulations in addition to any of the requirements herein. These other requirements may include, but are not limited to, material storage, spill prevention, recordkeeping, emergency response, transport, and disposal of hazardous substances, hazardous wastes, liquid industrial waste, or other potentially polluting materials. No discharge to surface water or groundwater, including direct and indirect discharges of waste, waste effluent, wastewater, pollutants, or cooling water, shall be allowed without approval from federal, state, county, and local agencies. The project and related improvements shall be designed to protect land and water resources from pollution, including pollution of soils, groundwater, rivers, streams, lakes, ponds, and wetlands. For example, storage tanks are required to be secondarily contained within the City's Capture Zones.

Specific areas that the State of Michigan regulate as part of their environmental regulations that pertain to proper management of Regulated Substances include, but are not limited to: underground and above-ground storage tanks; oil and other polluting materials material storages above state-specified thresholds; spill response plans; solid and liquid waste discharges and disposal; hazardous wastes generation, handling, storage and disposal; groundwater discharge; surface water discharge; stormwater discharges into the waters of the state; management of contaminated properties; and response and reporting upon discovery of contamination.



## 9.0 CONTAMINATED PROPERTIES

If the subject property contains soil and/or groundwater contamination, site-specific requirements may apply. See the MDEQ Post-Construction Storm Water Runoff Controls Program Compliance Assistance Document (MDEQ, 2014) for specifics regarding stormwater. Contact the Kalamazoo District MDEQ Office for answers to questions regarding all state environmental regulations pertaining to all contaminated sites.

## REFERENCES

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Michigan Department of Environmental Quality, Post-Construction Storm Water Runoff Controls Program Compliance Assistance Document, 2014.

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National Oceanic and Atmospheric Administration (NOAA), National Weather Service, Midwestern Climate Center and Illinois State Water Survey, "Rainfall Frequency Atlas of the Midwest" by Floyd A. Huff and James R. Angel, 1992.

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Southeast Michigan Coalition of Governments (SEMCOG), Low Impact Development Manual for Michigan – A Design Guide for Implementers and Reviewers, 2008.

University of Missouri Extension: Pollution Solutions: Waste Reduction Assistance for Business, 2007.

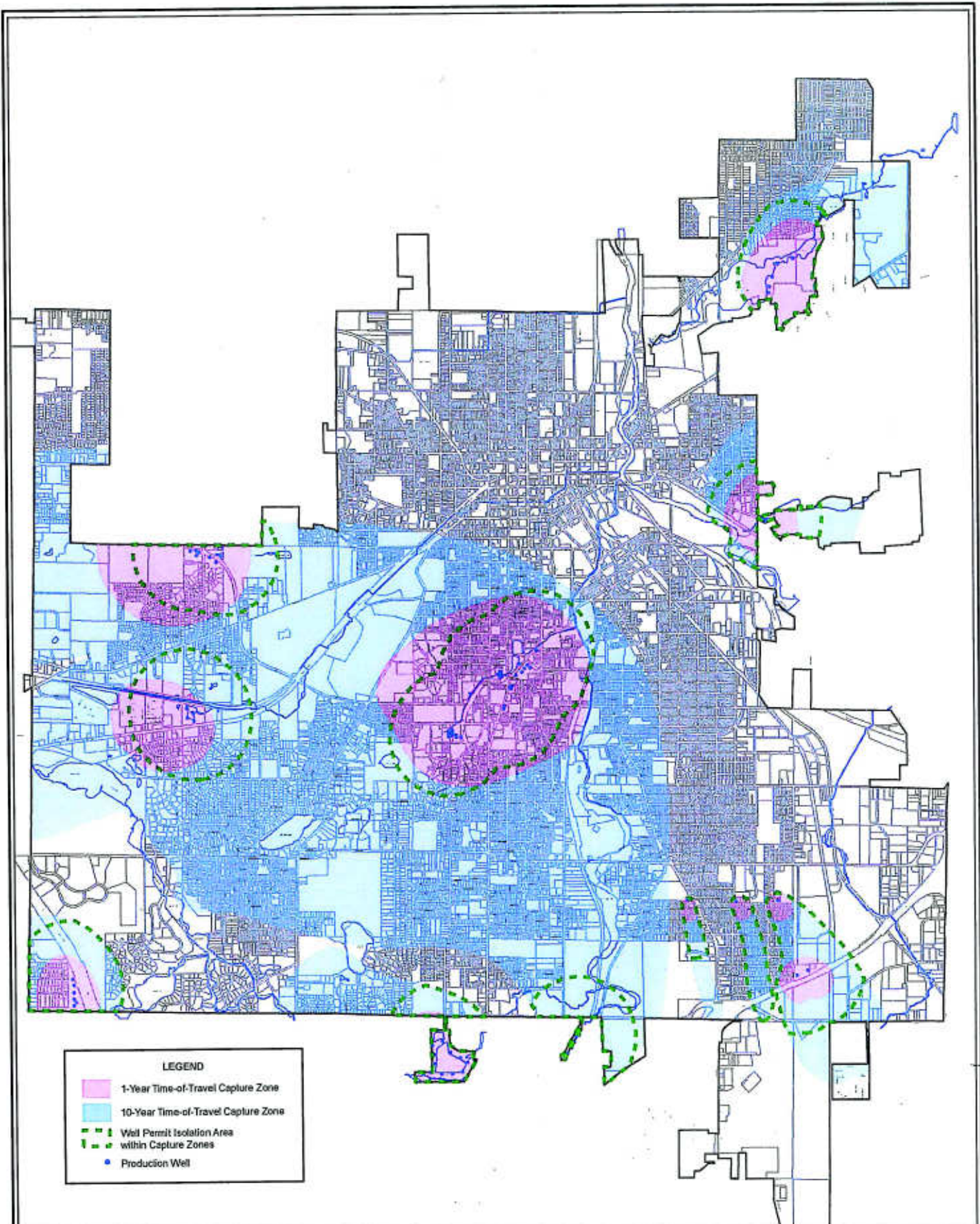
U.S. Environmental Protection Agency, Stormwater Pollution Prevention Bulletin "Managing Highway Deicing to Prevent Contamination to Drinking Water," 2010.

U.S. Environmental Protection Agency Website: document "Developing Your Stormwater Pollution Prevention Plan, 2012.

Warren County Ohio Building and Zoning Department. Frequently updated. "Aquifer Protection and Wellhead Protection Overlay Areas" Warren Co. Rural Zoning Code "A" – Chapter 5.50, 2007.

# FIGURES





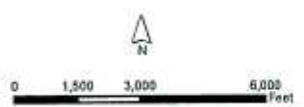
**LEGEND**

- 1-Year Time-of-Travel Capture Zone
- 10-Year Time-of-Travel Capture Zone
- Well Permit Isolation Area within Capture Zones
- Production Well

FIGURE 1

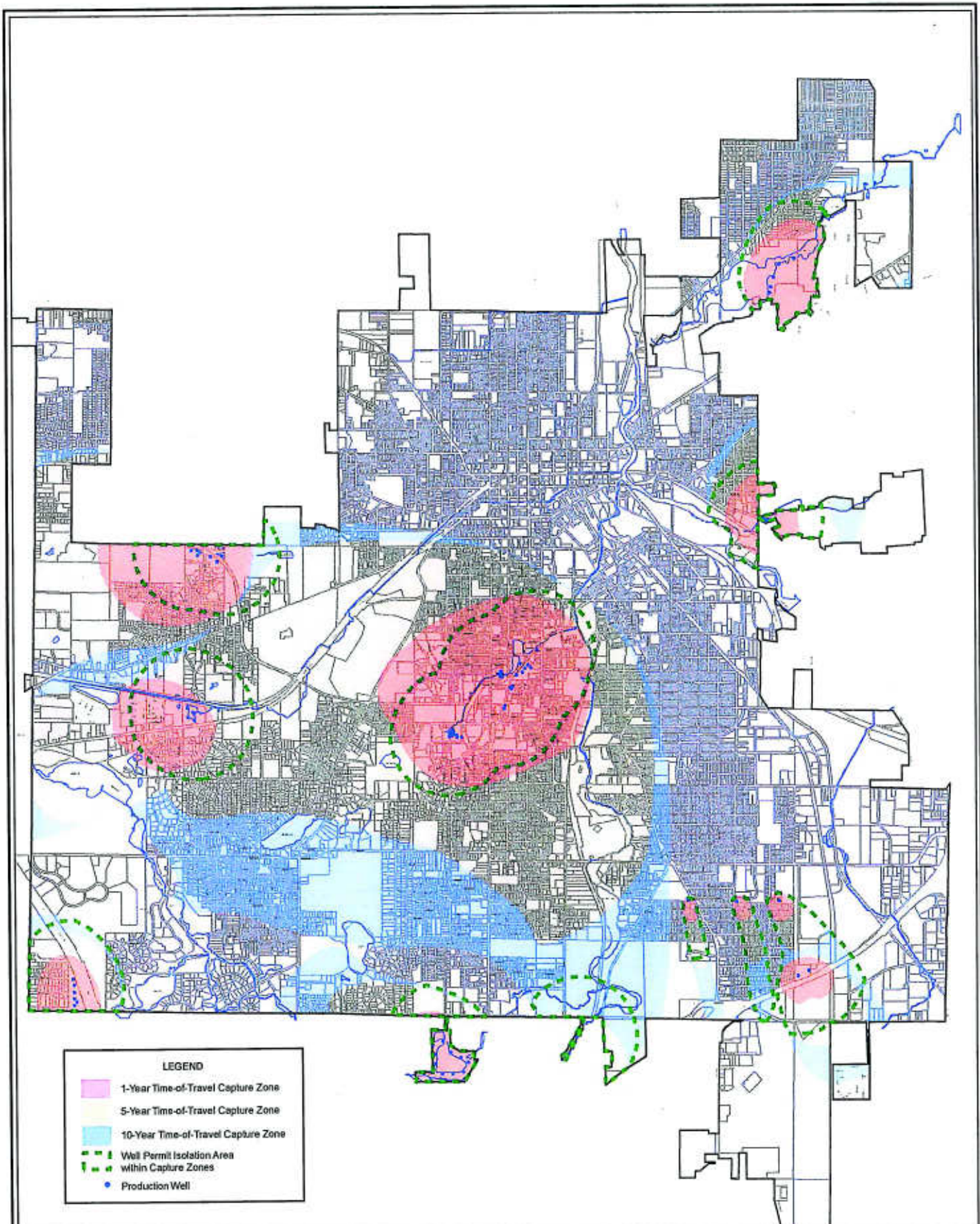


Wellhead Protection  
Zoning Overlay



Prepared by the  
Environmental Services Division  
March 2007





**LEGEND**

- 1-Year Time-of-Travel Capture Zone
- 5-Year Time-of-Travel Capture Zone
- 10-Year Time-of-Travel Capture Zone
- Well Permit Isolation Area within Capture Zones
- Production Well



Performance Standards For Groundwater Protection  
Within Wellhead Protection Capture Zones  
And Stormwater Quality Management  
Reference Map

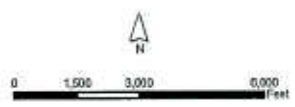
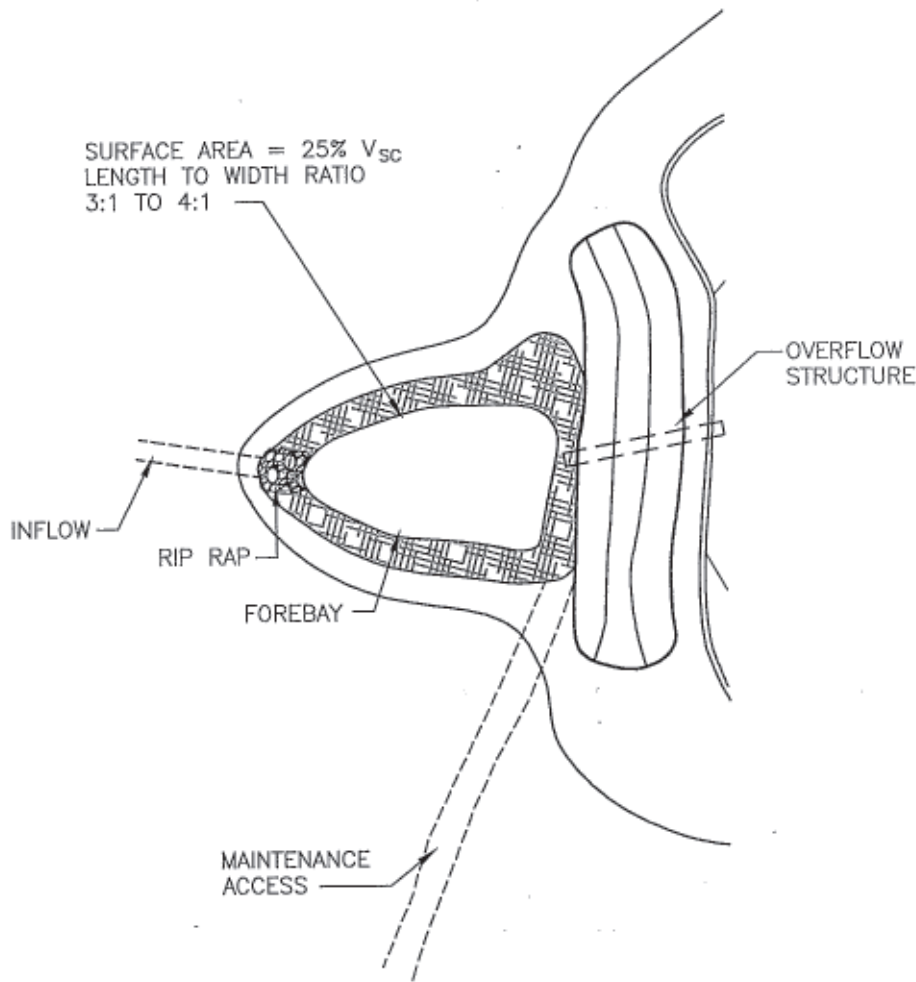


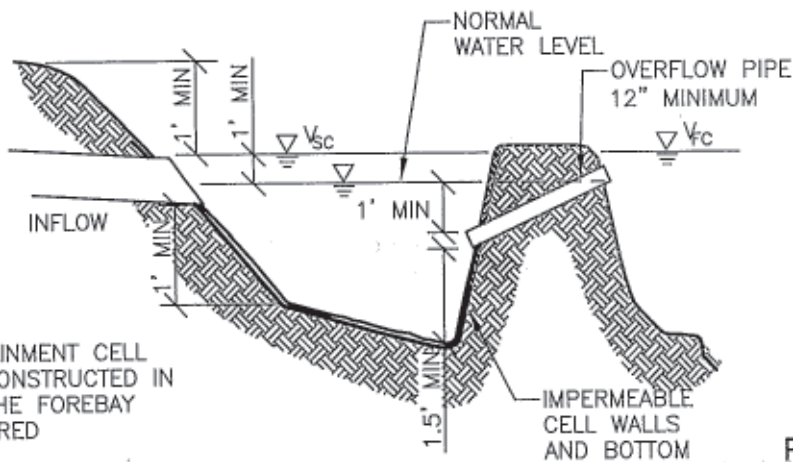
FIGURE 2

Prepared by the  
Environmental Services Division  
March 2007

# SPILL CONTAINMENT CELL



PLAN VIEW



NOTE:  
SPILL CONTAINMENT CELL  
SHALL BE CONSTRUCTED IN  
PLACE OF THE FOREBAY  
WERE REQUIRED

PROFILE

fic&h

engineers  
scientists  
architects  
constructors

fishbeck, thompson,  
car & huber, inc.

Hard copy is  
intended to be  
8.5"x11" when  
plotted. Scale(s)  
indicated and  
graphic quality may  
not be accurate for  
any other size.

**City of Kalamazoo**  
Kalamazoo County, Michigan

Performance Standards for Groundwater  
Protection and Stormwater Quality Management

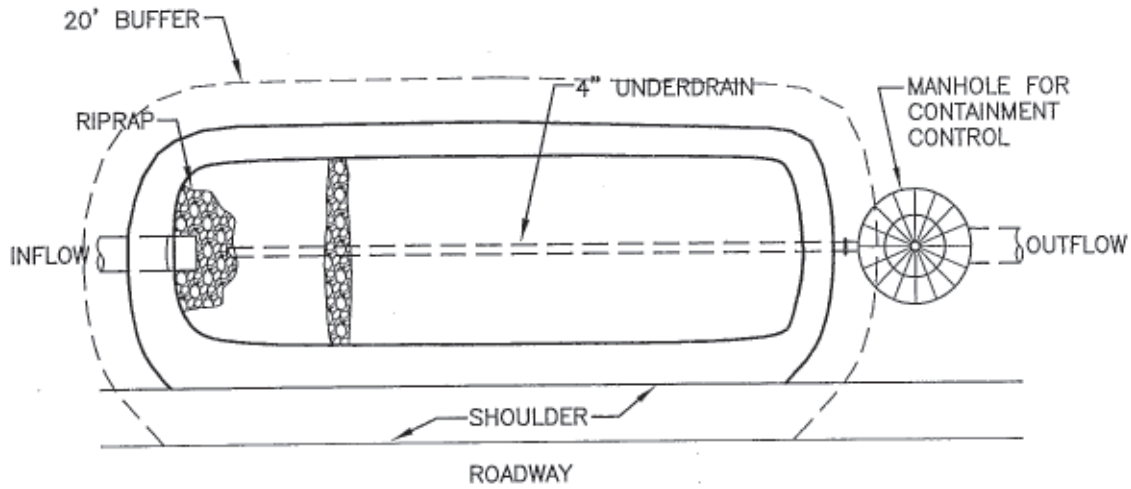
PROJECT NO.

FIGURE NO.

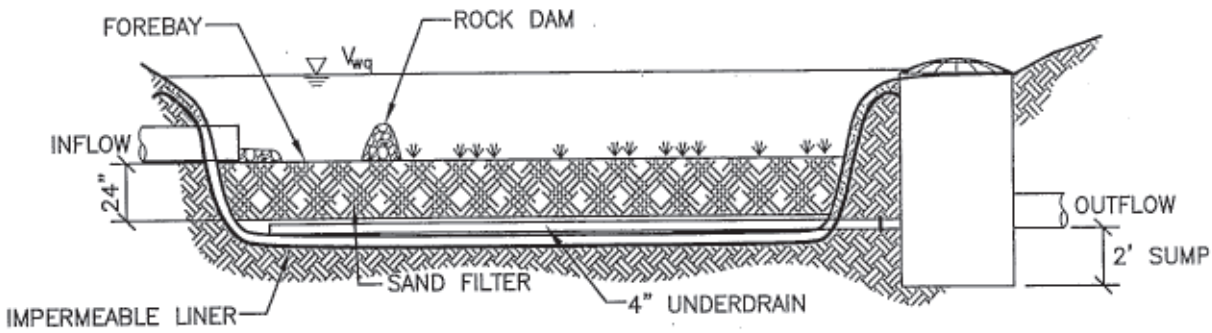
3



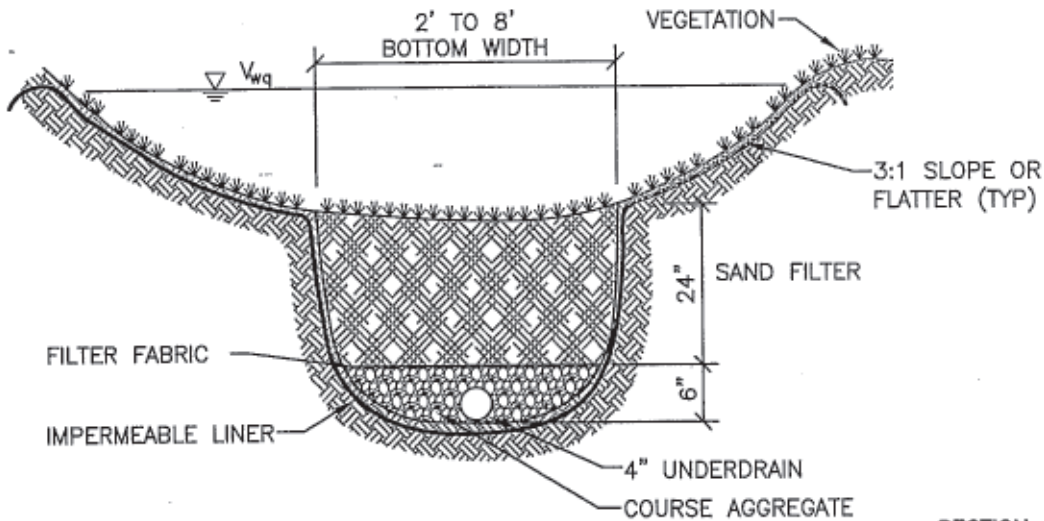
**WATER QUALITY SWALE**



PLAN VIEW



PROFILE



SECTION

PLOT INFO: F:\WORK\KALAMAZOO\FIGURE-9.DWG DATE: 3/22/2007 TIME: 1:31:51 PM USER: ACS

PROJECT NO.

FIGURE NO.

4



# ATTACHMENTS

**MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY  
WATER DIVISION  
GROUNDWATER SECTION – WELL CONSTRUCTION UNIT**

**MINIMUM WELL ISOLATION DISTANCES**

(From Contamination Sources and Buildings)

Part 127, Act 368, P.A. 1978 And Act 399, P.A. 1976

The following lists sources of contamination and the well isolation distances required from those sources by state codes. The Michigan Department of Environmental Quality and local health departments have authority to issue deviations from these minimum isolation distances on a case by case basis. Criteria for issuance of deviations are set forth in R 325.1613 of the Rules for Part 127, and R 325.10809 of the Rules for Act 399.

\* = For the isolation distances marked with a single asterisk, the isolation distance is for a source of contamination which is not specifically listed in the rules. However, the source of contamination is interpreted as belonging in a general contamination source group (example - a sewage holding tank is the same as a septic tank) which is listed in the rules, and therefore, the isolation distance listed in this document is required.

\*\* = For the isolation distances marked with a double asterisk, the isolation distance is from a source of contamination which is not specifically named in the rules. However, the Michigan Department of Environmental Quality has established a recommended isolation distance based on the contaminant involved, the risk to public health, and other factors. Under the general authority of a health officer's responsibility to protect the public health, health officers may modify this recommended isolation distance, either increasing or decreasing it, on a case by case basis.

CONTAMINATION SOURCE	REQUIRED MINIMUM ISOLATION DISTANCE (FEET)		
	Part 127, Act 368 PA 1978	Act 399, PA 1976	
		IIb and III	I and IIa
Agricultural chemical/ fertilizer storage or preparation area	150	800	2000
Animal/poultry yard	50	75	200
Brine wells/injection wells	**150	**800	**2,000
Building or projection thereof	3	3	3
Cemetery/graves	**50	*75	*200
Cesspool	50	75	200
Chemical Storage	150	800	2,000
Contaminant plumes, known (Act 307, LUST sites, etc.)	**150	**800	**2,000
Drainfield	50	75	200
Drywell	50	75	200
Footing Drains	10	10	10
Fuel/chemical storage tanks – Underground or abovegrade and associated piping			
depot/tank farm	300	800	2,000
1,100 gal. or larger, without secondary containment	300	800	2,000
1,100 gal. or larger with secondary containment	50	800	2,000
less than 1,100 gal. that store motor or heating fuel for noncommercial purpose or consumptive use on premises where fuel is stored	50	800	2,000
less than 1,100 gal. that store motor fuel for commercial purpose	*50	800	2,000
located in a basement, regardless of size	*50	800	2,000
Grease trap	50	*75	*200
Kennels	50	*75	*200
Landfill or dump sites (Active or Inactive)	800	800	2,000

Liquid Petroleum (LP) Tanks (See comments on last page)			
Liquid waste draining into the soil	50	*75	200
Metering station for pipelines	*300	*300	*300
Municipal wastewater effluent or sludge disposal area (land surface application or subsurface injection)	300	800	2,000
Oil or gas well	300	300	300
Other wastewater handling or disposal unit	50	*75	*200
Petroleum product processing or bulk storage	300	800	2,000
Pipelines			
gas, oil, etc.	*300	*300	*300
natural gas (See comments on last page)			
Privy/Outhouse	50	75	200
Seepage pit	50	75	200
Septic tank	50	75	200
Septage waste (land application area)	800	800	2,000
Sewage holding tank	50	*75	*200
Sewage lagoon serving a single family dwelling	50	75	200
Sewage lagoon effluent – land application area	50	800	2,000
Sewage or liquid waste draining into soil	50	*75	*200
Sewage pump chamber, transfer station, or lift station	50	75	200
Sewers			
Buried gravity sewer (sanitary or storm) - Service weight or heavier ductile-iron or cast iron, or schedule 40 PVC, all with watertight joints	10	75	200
Buried pressure sewer (sanitary or storm) Watertight joints (pressure tested after installation to 100 psi), equivalent to Schedule 40 or SDR 21, and meets or exceeds ASTM Specifications D1785-91 or D2241-89	10 (by written deviation only)	75	200
Buried gravity or pressure sewer (sanitary or storm), constructed of materials not meeting the specifications listed in the two categories above, or the materials are unknown	50	75	200
Sump pit			
Receiving other than household waste (footing drain, roof drain, etc.)	10	10	10
Receiving household waste (laundry, softener backwash, sink waste, etc.)	50	75	200
Surface water (lake, river, stream, pond, ditch, etc.)	10	75	200
Unfilled space below ground surface (except an approved basement, basement offset, or crawl space beneath single family dwelling)	10	10	10

**Comments:** Natural gas and liquid petroleum (LP) are not considered sources of ground water contamination because of the volatile gas nature of the fuels. If leaks occur, the gases escape into the atmosphere. Leaked gases do not migrate downward into the soil. Wells should be sufficiently isolated from natural gas lines or LP tanks to minimize the potential for damage to the lines or tanks during well construction or repair, trenching of water lines, etc., and to allow accessibility to the well.





## **SPILL CONTINGENCY PLAN**

**SITE NAME:**

**SITE ADDRESS:**

## 1.0 INTRODUCTION

The purpose of the Plan is to establish procedures to be implemented in the event of a release of Regulated Substances, as well as describe measures implemented to reduce the likelihood of such a release. For the purposes of this document, Regulated Substances are defined in the City of Kalamazoo Code of Ordinances Appendix A: Chapter 3, Section 3.5, The Wellhead Protection Overlay District, as including the following:

- (insert list when decided upon)

This facility is located within a City of Kalamazoo groundwater protection area. Uncontrolled releases of Regulated Substances within such areas have an elevated risk of compromising area drinking water. Therefore, the primary goal of this plan is to protect drinking water supplies located in the vicinity of this facility.

## 2.0 FACILITY INFORMATION

This facility is described as follows:

Facility Name:	
Street Address:	
Mailing Address:	
Facility Telephone Number:	
Facility Operator Name:	
Facility Operator Telephone Number:	
24-Hour Emergency Contact Person:	
24-Hour Emergency Telephone Number:	
Description of Facility Operations:	
SCP Preparer Name:	
SCP Preparer Title:	
SCP Preparer Affiliation:	
Original Date of SCP Preparation:	

### 3.0 REGULATED SUBSTANCE INVENTORY

The following is an inventory of Regulated Substance storage areas that includes all Regulated Substances stored at the site in containers exceeding either 10 pounds for liquids or 100 pounds for solids:

Storage Area	Regulated Substance	Type of Container	Typical Quantity in Storage Area	Maximum Quantity in Storage Area

#### 4.0 RELEASE POTENTIAL AND PREVENTION ANALYSIS

For each Regulated Substance contained in the inventory in Section 3.0, the Facility must document in the following table the potential causes of releases (spills, leaks, etc.) to the indoor or outdoor portions of the facility, both from storage areas and use areas. The Facility must also document measures initiated to help prevent a release of Regulated Substances (e.g., inspections, work practices, good housekeeping and training), contain a release (e.g., secondary containment or diversions from the outside environment) or minimize the environmental impact of a release. If different types of Regulated Substances have virtually identical storage, use, potential for release, potential destination of release and prevention measures, those substances may be listed together in the table.

Regulated Substance(s)	Storage/Use Area	Potential Types/Causes of Release in Area(s)	Potential Destination of Release (check all that apply)	Release Prevention or Minimization Measures
	Storage Areas:		<input type="checkbox"/> Storm Sewer Drain <input type="checkbox"/> Dry Well/Catch Basin <input type="checkbox"/> Surface Water <input type="checkbox"/> Floor Drain <input type="checkbox"/> Soil <input type="checkbox"/> Sump <input type="checkbox"/> Other:	
	Use Areas:		<input type="checkbox"/> Storm Sewer Drain <input type="checkbox"/> Dry Well/Catch Basin <input type="checkbox"/> Surface Water <input type="checkbox"/> Floor Drain <input type="checkbox"/> Soil <input type="checkbox"/> Sump <input type="checkbox"/> Other:	
	Storage Areas:		<input type="checkbox"/> Storm Sewer Drain <input type="checkbox"/> Dry Well/Catch Basin <input type="checkbox"/> Surface Water <input type="checkbox"/> Floor Drain <input type="checkbox"/> Soil <input type="checkbox"/> Sump <input type="checkbox"/> Other:	
	Use Areas:		<input type="checkbox"/> Storm Sewer Drain <input type="checkbox"/> Dry Well/Catch Basin <input type="checkbox"/> Surface Water <input type="checkbox"/> Floor Drain <input type="checkbox"/> Soil <input type="checkbox"/> Sump <input type="checkbox"/> Other:	
	Storage Areas:		<input type="checkbox"/> Storm Sewer Drain <input type="checkbox"/> Dry Well/Catch Basin <input type="checkbox"/> Surface Water <input type="checkbox"/> Floor Drain <input type="checkbox"/> Soil <input type="checkbox"/> Sump <input type="checkbox"/> Other:	
	Use Areas:		<input type="checkbox"/> Storm Sewer Drain <input type="checkbox"/> Dry Well/Catch Basin <input type="checkbox"/> Surface Water <input type="checkbox"/> Floor Drain <input type="checkbox"/> Soil <input type="checkbox"/> Sump <input type="checkbox"/> Other:	



Regulated Substance(s)	Storage/Use Area	Potential Types/Causes of Release in Area(s)	Potential Destination of Release (check all that apply)	Release Prevention or Minimization Measures
	Storage Areas:		<input type="checkbox"/> Storm Sewer Drain <input type="checkbox"/> Dry Well/Catch Basin <input type="checkbox"/> Surface Water <input type="checkbox"/> Floor Drain <input type="checkbox"/> Soil <input type="checkbox"/> Sump <input type="checkbox"/> Other:	
	Use Areas:		<input type="checkbox"/> Storm Sewer Drain <input type="checkbox"/> Dry Well/Catch Basin <input type="checkbox"/> Surface Water <input type="checkbox"/> Floor Drain <input type="checkbox"/> Soil <input type="checkbox"/> Sump <input type="checkbox"/> Other:	
	Storage Areas:		<input type="checkbox"/> Storm Sewer Drain <input type="checkbox"/> Dry Well/Catch Basin <input type="checkbox"/> Surface Water <input type="checkbox"/> Floor Drain <input type="checkbox"/> Soil <input type="checkbox"/> Sump <input type="checkbox"/> Other:	
	Use Areas:		<input type="checkbox"/> Storm Sewer Drain <input type="checkbox"/> Dry Well/Catch Basin <input type="checkbox"/> Surface Water <input type="checkbox"/> Floor Drain <input type="checkbox"/> Soil <input type="checkbox"/> Sump <input type="checkbox"/> Other:	
	Storage Areas:		<input type="checkbox"/> Storm Sewer Drain <input type="checkbox"/> Dry Well/Catch Basin <input type="checkbox"/> Surface Water <input type="checkbox"/> Floor Drain <input type="checkbox"/> Soil <input type="checkbox"/> Sump <input type="checkbox"/> Other:	
	Use Areas:		<input type="checkbox"/> Storm Sewer Drain <input type="checkbox"/> Dry Well/Catch Basin <input type="checkbox"/> Surface Water <input type="checkbox"/> Floor Drain <input type="checkbox"/> Soil <input type="checkbox"/> Sump <input type="checkbox"/> Other:	
	Storage Areas:		<input type="checkbox"/> Storm Sewer Drain <input type="checkbox"/> Dry Well/Catch Basin <input type="checkbox"/> Surface Water <input type="checkbox"/> Floor Drain <input type="checkbox"/> Soil <input type="checkbox"/> Sump <input type="checkbox"/> Other:	
	Use Areas:		<input type="checkbox"/> Storm Sewer Drain <input type="checkbox"/> Dry Well/Catch Basin <input type="checkbox"/> Surface Water <input type="checkbox"/> Floor Drain <input type="checkbox"/> Soil <input type="checkbox"/> Sump <input type="checkbox"/> Other:	

Regulated Substance(s)	Storage/Use Area	Potential Types/Causes of Release in Area(s)	Potential Destination of Release (check all that apply)	Release Prevention or Minimization Measures
	Storage Areas:		<input type="checkbox"/> Storm Sewer Drain <input type="checkbox"/> Dry Well/Catch Basin <input type="checkbox"/> Surface Water <input type="checkbox"/> Floor Drain	<input type="checkbox"/> Soil <input type="checkbox"/> Sump <input type="checkbox"/> Other:
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	Use Areas:		<input type="checkbox"/> Storm Sewer Drain <input type="checkbox"/> Dry Well/Catch Basin <input type="checkbox"/> Surface Water <input type="checkbox"/> Floor Drain	<input type="checkbox"/> Soil <input type="checkbox"/> Sump <input type="checkbox"/> Other:

## 5.0 RELEASE RESPONSE PROCEDURES

The Facility must identify procedures to be followed in the event of release of a Regulated Substance. These procedures must take into account both minor releases, which pose no danger to health or the environment and can be handled by trained employees in the immediate vicinity of the release, and for significant releases that have one or more of the following characteristics:

- The spill cannot be contained safely by site personnel.
- Sufficient resources are not available at the site to contain the spill.
- The spilled material has entered the site drain system (sanitary or storm) and cannot be contained.
- The spilled material has entered site soils or a vegetated area.

INTERNAL EMERGENCY CONTACTS	
Primary Emergency Contact:	Phone Number: Responsibilities:
Secondary Emergency Contact:	Phone Number: Responsibilities:
24-Hour Emergency Contact:	Phone Number: Responsibilities:
<i>Other Onsite Personnel Contacted</i>	
Name:	Phone Number: Responsibilities:
Name:	Phone Number: Responsibilities:
Name:	Phone Number: Responsibilities:
Name:	Phone Number: Responsibilities:
EXTERNAL EMERGENCY CONTACTS	
Police Department:	Phone Number:
Fire Department:	Phone Number:
Hospital:	Phone Number:
Ambulance Service:	Phone Number:
City of Kalamazoo Environmental Division	??
City of Kalamazoo Wastewater Treatment Plant	269-337-8157
MDEQ Kalamazoo District Office	269-567-3500
MDEQ 24-Hour Pollution Emergency Alert System	800-292-4706 (for MDEQ-reportable spills)
National Response Center	800-424-8802 (for EPA-reportable spills)
Spill Response Contractor:	Phone Number:

**EMERGENCY RESPONSE PROCEDURES**

Internal Notification Procedures (chain-of-command):

Procedures to be followed for a minor release:

Procedures to be followed for a significant release:

Facility Evacuation Procedures:

Local, State and Federal Environmental Agency Emergency Notification Procedures:

**EMERGENCY SPILL RESPONSE EQUIPMENT ONSITE**

Type:

Location:

Type:

Location:

Type:

Location:

Type:

Location:

Type:

Location:

Type:

Location:



## 7.0 EMPLOYEE TRAINING

The facility must train all employees who handle Regulated Substances or work in the vicinity of Regulated Substance storage or use areas. Thus, the following groups of employees and/or individuals will be trained on the release procedures outlined in the previous section. This training will take place within one month of the completion of this SCP and then annually. In addition, all new hires requiring training will receive the training within one month of hire. A training log is available as Appendix A.


## 8.0 SCP UPDATES

The SCP must be updated every two years or when any of the following occur:

- There is a change in ownership at the facility.
- The use, storage or types of Regulated Substances at the facility change.
- Changes, structural or otherwise, are made at the facility that will affect the anticipated flow direction or final destination of any release from a Regulated Substance storage or use area (e.g., regarding the property, paving, building additions, additional structural controls).

An SCP Update Log is provided as Appendix B.

## 9.0 SCP AVAILABILITY

The SCP is stored onsite in the following locations:


**APPENDIX A – SCP ANNUAL TRAINING LOG (COPY AS NECESSARY)**


TRAINER:	DATE:
TRAINEE SIGN-IN:	

**APPENDIX B – SCP UPDATE LOG**

<b>DATE:</b>	<b>UPDATED BY:</b>	<b>REASON:</b>

# STORMWATER WORKSHEETS



UNIFORM STORMWATER STANDARD 1: WATER QUALITY TREATMENT VOLUME WORKSHEET	
Applies to development/re-development Sites $\geq 1/2$ acre and parking lots with $\geq 20$ parking spaces and/or exceeding a 6,000 square-foot area ("larger parking area").	
Developer must treat first 1-inch of stormwater runoff to remove 80% of total suspended solids (TSS) and any other identified pollutant of concern. One-inch of runoff also equals the 90% non-exceedance storm, based on the closest weather station (Gull Lake).	
	Result
1. Calculate the <i>volume</i> of one inch of stormwater runoff, multiply area contributing runoff (ft <sup>2</sup> ) by 1/12 foot (0.083).	ft <sup>3</sup>
The Rational Method Equation will be used to calculate BMP design flow rates: $Wq = CIA$ , where: C = Runoff Coefficient; I = Rainfall Intensity (inches per hour); A = Drainage Area (Acres)	
2. Calculate Area (A) of site in square feet and divide by 43,560 ft <sup>2</sup> .	acres
3. Calculate rainfall intensity in inches/hours by using 1.44 inches/hour (1-year/30 minute storm).	1.44 inches/hour
4. Calculate Runoff Coefficient by using a weighed average that is based on the appropriate percentage of different surface types existing at the site. Runoff Coefficient ranges for various ground cover are shown in the table below.	
5. Use the Rational Method Equation: $Wq = \text{Area (acres)} \times 1.44 \text{ inches/hour} \times \text{Runoff Coefficient} =$	ft <sup>3</sup> /sec (treatment volume)
<b>Simplified Table of Rational Method Runoff Coefficients (C)</b>	
Surface Cover	Runoff Coefficient, c
Lawns	0.1
Forest	0.15
Cultivated land/gardens	0.25
Meadow	0.3
Asphalt streets and parking lots	0.9
Brick streets	0.8
Roofs	0.9
Concrete streets and parking lots	0.9
6. List and provide a Figure showing the locations of all proposed BMPs to the meet Water Quality Treatment Volume.	BMP Treatment Volume (ft <sup>3</sup> )
Manufactured Treatment Device (MTD) (e.g. Hydrodynamic Separators) [See MTD WORKSHEET]	
Constructed Wetland	
Wet Ponds/Retention Basins	
Extended Detention/Dry Pond	
Vegetated Filter Strip	
Vegetated Filter Swale	
Constructed Filters	
Vegetated Roofs	
Other (List)	
Total Treatment Volume (ft <sup>3</sup> ):	
If Treatment Volume $\geq$ 1-inch volume for project site, Uniform Stormwater Standard 1 is met.	
7. A signed Stormwater Best Management Practices Operations & Maintenance Agreement between the City and the Landowner or Designee is required (City Form provided).	
PROJECT NAME:	
PROJECT ADDRESS:	DATE:

**UNIFORM STORMWATER STANDARD 2: CHANNEL PROTECTION VOLUME WORKSHEET**



Applies to development/ra-development Sites ≥ 1 acre.

	Result
1. Calculate pre-development stormwater runoff volume.	ft <sup>3</sup>
2. Calculate post-development stormwater runoff volume.	ft <sup>3</sup>
3. Difference in pre and post development stormwater runoff volume.	ft <sup>3</sup>

If post-development stormwater runoff volume is ≤ pre-development stormwater runoff volume, Uniform Stormwater Standard 2 is met (#4 and #5 below are not necessary).

If post-development stormwater runoff volume is > pre-development stormwater runoff volume, appropriate controls/BMPs or site design changes have to be implemented to make post-development runoff volume and rate ≤ the pre-development levels for all storms up to the 2-year, 24-hour event, or 2.37 inches.

4. Calculate the volume of 2.37 inches of stormwater runoff by multiplying area contributing runoff (ft <sup>2</sup> ) by 0.2 feet.	ft <sup>3</sup>
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5. List and provide a Figure showing the locations of all proposed BMPs to meet the Channel Protection Volume.	Protection Volume (ft <sup>3</sup> )
Bioretention (e.g. rain gardens)	
Vegetated Filter Strip	
Vegetated Filter Swale	
Vegetated Roof	
Infiltration Basin	
Infiltration Trench	
Subsurface Infiltration Bed	
Dry Well	
Level Spreader	
Pervious Pavement	
Capture/Reuse	
Other (List)	
<b>Total Protection Volume (ft<sup>3</sup>):</b>	

If Protection Volume ≥ 2.37 inches for project site, Uniform Stormwater Standard 2 is met.

6. A signed Stormwater Best Management Practices Operations & Maintenance Agreement between the City and the Landowner or Designee is required (City Form provided).

PROJECT NAME:

PROJECT ADDRESS:

DATE:



**MANUFACTURED TREATMENT DEVICE WORKSHEET**

**Applies to projects that propose the use of Manufactured Treatment Devices (MTDs).**

1. All MTDs must be verified by the New Jersey Corporation for Advanced Technology (NJCAT) and certified by the New Jersey Department of Environmental Protection (NJDEP).

2. The NJDEP 50% Certified TSS Removal Rate approximates 80% TSS reduction for the Kalamazoo area (the required TSS removal rate).

3. All MTDs are based on treatment flow rates. The required MTD flow rate will be determined by the completion of the Uniform Stormwater Standard 1: Water Quality Treatment Volume Worksheet.

4. The MTD shall be designed to treat 100% of the flow without bypass at the calculated water quality treatment flow rate.

5. The storm pipe shall be designed at a 10-year storm event.

6. The MTD shall have the capacity to handle the designed 10-year storm pipe flows without losing floatables or sediment.

**7. MTD Selection Details**

Result

Selected MTD Manufacturer(s)

Selected MTD Manufacturer Model(s)

Selected MTD Water Quality Treatment Flow Rate(s) (cfs)

Cummulative MTD Water Quality Treatment Flow Rate

Total BMP Treatment Flow Rate from Water Quality Treatment Volume Worksheet

Required Water Quality Treatment Volume from Water Quality Treatment Volume Worksheet

8. A signed Stormwater Best Management Practices Operations & Maintenance Agreement between the City and the Landowner or Designee is required (City Form provided).

PROJECT NAME:

PROJECT ADDRESS:

DATE: