## IX. NPDES STORMWATER MANAGEMENT CRITERIA

### A. OVERVIEW OF PERMIT REQUIREMENTS:

The enactment of the National Pollutant Discharge Elimination System (NPDES) Stormwater Permit regulations under the Federal Clean Water Act has brought requirements upon municipal separate storm sewer system (MS4) owners/operators for those portions their MS4 within defined urbanized areas. Implementation of Phase II of NPDES resulted in the Greater Lansing Area of Michigan being defined as an urbanized area. The Clinton County Drain Commissioner does have jurisdiction over a number of county drains that are recognized as MS4s within the Greater Lansing Urbanized Area per the 2010 Federal Census. As such, those portions of the county drains located within the urbanized area as depicted on the map (found on page 10) are subject to a NPDES permit.

Part I, Section A., 4., a, 4) of MDEQ's NPDES Permit entitled "Post Construction Water Control for New Developments and Redevelopment Projects" establishes the minimum post-construction requirements which a community must adhere to. The requirements are presented as necessary to the maximum extent practicable to maintain or restore stable hydrology in receiving waters by limiting surface runoff rates and volumes and reducing pollutant loadings from sites that undergo development or significant redevelopment. The permit establishes the following guidelines for the "minimum treatment volume standard and the channel protection criteria":

*a) The minimum treatment volume standard shall be either:*

*(1) One inch of runoff from the entire site, or*

*(2) The calculated site runoff is from the 90 percent annual non-exceedance storm for the region or locality …..*

*b) Treatment methods shall be designed on a site-specific basis to achieve the following:*

*(1) A minimum of 80 percent removal of total suspended solids (TSS), as compared with uncontrolled runoff, or*

*(2) Discharge concentrations of TSS not to exceed 80 milligrams per liter (mg/l).*

*A minimum treatment volume standard is not required where site conditions are such that TSS concentrations in storm water discharges will not exceed 80 mg/l.*

*b) The channel protection criteria established in this permit is necessary to maintain post-development site runoff volume and peak flow rate at or below existing levels for all storms up to the 2-year 24-hour event. "Existing levels" means the runoff volume and rate for the last land use prior to the planned new development or redevelopment. Where more restrictive channel protection criteria already exists or is needed to meet the goals of reducing runoff volume and peaks flows to less than existing levels on lands being developed or redeveloped, permittees are encouraged to use the more restrictive criteria than the standard requirements.*

The Clinton County Drain Commissioner's Office is providing these rules in recognition of the need for Post Construction Stormwater Runoff Controls consistent with the above guidelines. It shall be applicable in the following scenarios:

- Where a direct discharge occurs or is sought relative to the development/ redevelopment of a property and/or project for private, commercial, and public projects involving storm water runoff to one of the Clinton County Drain Commissioner's identified municipal separate storm sewer systems (MS4). See prepared map of "Lansing, MI urbanized Area within Clinton County – 2010 Census"
- Any development project pursuant to the following state statutes in which county drain commissioners/county drains have been specifically referenced: Platted developments pursuant to Section 105 (c) of Act 288 of the Public Act of Michigan of 1967, as amended (otherwise known as the "Plat Act"); Manufactured housing developments pursuant to Act 96 of the Public Act of Michigan of 1987, as amended (otherwise known as "The Mobile Home Commission Act"); Condominium developments pursuant to Act 59 of the Public Act of 1978, as amended (otherwise known as the "Condominium Act")
- Any development/redevelopment properties and/or projects to the extent that a local municipality requires that the Rules of the County Drain Commissioner be met as a requirement of its planning and zoning procedures in those instances **when** the resulting runoff from the property/project can reasonably be determined to flow to a Clinton County Drain Commissioner MS4 as a means of positive drainage outlet.
- Linear projects, such as roads, streets, and trails where resulting runoff from the project can reasonably be determined to flow to a Clinton County Drain Commissioner MS4 as a means of positive drainage outlet. Both new linear projects and linear projects that change the existing footprint (e.g., increase impervious surface) or offer new opportunities for storm water control (e.g., reconstruction to the subbase layer with a change in underdrainage) will be considered as development/redevelopment and be subject to post construction criteria. The Clinton County Drain Commissioner will first consider declaration from the representative road entity (county road commission, City or Village) of compliance with its own MS4 permit before requiring compliance with the Drain Commissioner's MS4 permit as only deemed necessary to ensure reasonable compliance with the Drain Commissioner's MS4 permit and reasonable protection of the Drain Commissioner's MS4 drain. Projects that do not disturb the underlying or surrounding soil (e.g., overlays), remove surrounding vegetation, or increase the area of impervious surface shall be deemed exempt.
- Projects undertaken by the Clinton County Drain Commissioner on identified MS4 county drain reaches within the urbanized area.

**when** such projects disturb one (1) acre or more, including projects less than one (1) acre, that are part of a larger common plan of development or sale that would disturb one (1) acre or more.

While the Clinton County Drain Commissioner is not currently and does not anticipate becoming the owner or operator of any federal facility, it is recognized that post construction stormwater

runoff requirements for such facilities shall be in compliance with section 438 of the Energy and Independence and Security Act of 2007.

## B. WATER QUALITY

Hydrologic studies show that small-sized, frequently occurring storms account for the majority of rainfall events that generate stormwater runoff. Consequently, the runoff from these storms also accounts for a major portion of the annual pollutant loadings. Therefore, by treating these frequently occurring smaller rainfall events and a portion of the stormwater runoff from larger events, it is possible to effectively mitigate the water quality impacts from a developed area.

A water quality treatment volume (WQV) is specified to size structural control facilities to treat these small storms up to a maximum runoff depth and the "first flush" of all larger storm events. The Clinton County Drain Commissioner acknowledges the above indicated permit guidelines for the “minimum treatment volume standard” as it is considered the point of optimization between pollutant removal ability and cost-effectiveness. However, a minimum treatment volume standard is not required where site conditions are such that TSS concentrations in storm water discharges will not exceed 80 mg/l.

The Clinton County Drain Commissioner’s preferred practice for the providing WQV shall be one inch of runoff from the entire site. However, consideration will be given for use of the 90 percent annual non-exceedance storm when so desired by applicant, so long as it is determined in accordance with the MDEQ’s memo dated March 24, 2006 providing the 90 percent annual non-exceedance storm statics, which can be found at www.michigan.gov/documents/deq/lwm-hsu-nps-ninety-percent_198401_7.pdf .

Application of the WQV shall be via implementation of Best Management Practices (BMPs) to achieve reduction of Total Suspended Solids (TSS) to the maximum extent practicable and/or result in a TSS discharge concentration below the threshold of 80 mg/l as indicated in the above permit guidelines. Such BMPs shall be as recognized by the Low Impact Development Manual for Michigan, which can be found at www.swmpc.org/downloads/lid_manual_intro.pdf or other BMPs as presented by the applicant and acknowledged as suitable by the Drain Commissioner for the intended purpose.

The Clinton County Drain Commissioner encourages and may require the use of a treatment train to achieve water quality. A treatment train is a series of BMPs used in conjunction with one another to cumulatively treat runoff. Each BMP is chosen for its ability to remove or limit specific pollutants, and/or its ability to help regulate changes in hydrology. An example of a treatment train is parking lot runoff which outlets through a riprapped outlet, to a wet detention pond, which discharges to an infiltration basin. The riprapped outlet decreases the velocity of the water. The wet detention pond allows for settling of particles and biological uptake of nutrients. The infiltration basin removes some of the finest particles and provides infiltration.

The Clinton County Drain Commissioner will in those instances deemed appropriate consider the use of water quality flow (WQF) as an alternative to WQV for achieving water quality. WQF is the peak flow rate associated with the water quality design storm or WQV. WQF could

be utilized for some treatment practices such as grass drainage channels and proprietary treatment devices that are designed to treat higher flow rates, thereby requiring less water quality storage volume. In this approach, a stormwater treatment facility must have a flow rate capacity equal to or greater than the WQF in order to treat the entire water quality volume.

## C. CHANNEL PROTECTION

It understood that erosion is a normal aspect of river behavior. Channel function involves conveying water and sediment to larger water bodies. The objective of stormwater management is not to eliminate erosion but to maintain a level of stream erosion such that the channel can continue to fulfill its normal function. Too much control over streamflow may reduce the stream's ability to transport its sediment load resulting in a choking of the channel. Conversely, not enough control may result in too much erosive power causing the stream to erode its boundary and enlarge.

It is generally recognized and accepted by the Clinton County Drain Commissioner that an increase in erosive forces is one of the potential consequences of urbanization and uncontrolled runoff. Channels, drains, streams, etc. have an innate ability to tolerate some variability in the influx of sediment and water. This threshold varies with the resistance of the boundary materials and type, density, and distribution of riparian vegetation. However, it has been found that at levels of watershed imperviousness above about 10%, stream channels become unstable and begin eroding. Channel enlargement in urban areas is well documented. The degree of enlargement is a function of the magnitude of the change in the sediment-flow regime and the resistance of the boundary materials.

Both the peak discharge flow rate and volume are lower in the typical hydrograph for natural predevelopment conditions than the corresponding typical hydrograph for watershed areas post-development. This is the difference in stormwater being able to seep into the ground with slow release to surface water over an extended period of time versus stormwater that turns into surface runoff more expediently enters the receiving waterbody.

Adoption of peak flow attenuation, where stormwater is detained so that the post-developed peak flow does not exceed pre-developed peak flow, has become standard to try to mitigate post development stormwater runoff impacts. However, the analysis of this practice on a watershed-wide basis has found that it may not effectively maintain stream peak flows from pre-developed conditions due to a shift in the timing and duration of the peak flows coming from attenuated development sites throughout the watershed. Attenuation also does little to mitigate increased frequency of runoff to a waterbody resulting from development that increases the imperviousness of a watershed above a given threshold. Also once a channel starts to become unstable is innate capacity to absorb a change in the flow regime becomes diminished, consequently increasing the needed degree of control to return it to a stable system.

The Clinton County Drain Commissioner recognizes that a design methodology that could overcome the limitations of the traditional attenuation approach is preferable and necessary to better ensure channel stability. However to be practical for routine application such methodology needs to be relatively simple and universally applicable while providing a reasonably

comprehensive characterization of the fluvial system. As such, the Clinton County Drain Commissioner acknowledges the above indicated permit guidelines for "channel protection".

The Clinton County Drain Commissioner does further reserve the right to enforce a more stringent discharge limit in the event that it is readily determinable that the receiving drainage infrastructure's capacity would be burdened or if there is reasonable knowledge that the receiving drainage structure is already burdened to the point of not being able to provide effective drainage.

Thus, the channel protection criteria involves both a peak flow attenuation and runoff volume mitigation requirement based on the 2-year, 24-hour storm event. As such, the resulting discharge following development/redevelopment of any site, much be maintained equivalent to that of the prior development conditions or less for up to and including the 2-year, 24-hour event. And any additional runoff volume that is created as a result of development /redevelopment of that same site, must be mitigated for without a concentrated discharge to a receiving drainage way. Acceptable means for mitigating any additional runoff volume shall be in accordance with the following priority listing to the maximum extent practicable:

- Minimizing impervious surface areas by following Low Impact Development principles for the layout of the site and the incorporation of green roofs, permeable paving, etc.
- Decentralization of stormwater management by dispersing runoff flows across the site. Utilize sheet drainage to divert runoff towards the largest percentage of available greenspace areas possible and utilize grading, swales, underdrains, etc.to route excess water from these areas towards one or more ultimate points of discharge.
- Infiltration, evaporation, retention and/or reuse (i.e. for landscape irrigation)
- Extension of the pre-developed condition time to peak (concentration) – when all additional runoff volume cannot readily be mitigated, then the majority of all runoff from the site managed to hold the runoff on the site as long as practical to maximize the opportunity for infiltration, evaporation, etc. This can include measures such as extended detention and the under-draining of a wide assortment of stormwater storage features, including constructed wetlands.
- Creation of compensating floodplain area or regional detention may be considered in those instances where additional runoff volume cannot readily be mitigated and the site is positioned such that effective floodplain volume or regional detention is feasible. Appropriate MDEQ permits must be obtained.

The Clinton County Drain Commissioner, as for water quality, encourages and may require that channel protection criteria be met by the use of a treatment train approach to BMP implementation.

While it is recognized that certain site factors such as underlying soils, compaction and/or pollution of soils from prior land uses, a high ground water table and others can and will impact the ability to mitigate additional runoff volume on any given site, these factors shall be used in the determination of a reasonable means for achieving required mitigation rather than as any nullification of it. As such, the burden falls to the developer to provide due diligence in determining the nature of these factors for any given site and then justifying appropriate means for mitigation.

Mitigation of additional runoff volume must always be done with reasonable consideration for ensuring the public's health, safety and welfare. Of specific concern is that such mitigation does

not create: frequent localized flooding of structures and critical infrastructure; nuisance drainage near habitable structures and/or other areas where uses other than storm water management are intended on any regular basis; or unduly favorable conditions for vectors, such as mosquitos.

The Clinton County Drain Commissioner makes no specific exclusion from the channel protection criteria for any waterbody within the identified urbanized area.

Appropriate determination of the runoff volume and rate for the last land use prior to the planned new development or redevelopment is a key in satisfying the channel protection criteria. The Clinton County Drain Commissioner will consider the most recent land use condition to represent the pre-development state and give due consideration of its runoff character in comparison to the proposed post-development state.

Stormwater management quantification for channel protection is determined by calculating the existing ("pre-development") and post-development runoff volume and rate for the 2-year and smaller storm events. The method is described in the Department of Environmental Quality (DEQ) publication Computing Flood Discharges for Small Ungaged Watersheds, dated July 2003 (updated June 2008) and available at, http://www.michigan.gov/documents/deq/lwm-scs_198408_7.pdf . If the post-development volume or rate exceeds the existing volume or rate, then appropriate controls or design changes shall be implemented to make the 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.

Acceptable sources of rainfall data for calculating runoff volume and peak flow rate are the Rainfall Frequency Atlas of the Midwest, Huff & Angel, National Oceanic and Atmospheric Administration (NOAA) Midwest Climate Center and Illinois State Water Survey, 1992 available at www.sws.uiuc.edu/pubdoc/B/ISWSB-71.pdf , or NOAA Atlas 14 Precipitation Frequency Estimates, NOAA National Weather Service, Hydrometeorological Design Studies Center, available at http://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=mi .

The Natural Resources Conservation Service (NRCS) Curve Number (CN) method is a widely used method used for calculating runoff volume and is described in Computing Flood Discharges for Small Ungaged Watersheds stated above. The recommended model for most project sites is TR-55 available from the NRCS at: http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/water/?cid=stelprdb1042901 . This model can be used to calculate both volume and rate. TR-55 uses the CN method to calculate volume of runoff and the unit hydrograph method to calculate peak rate. Although TR-55 is a relatively simple model to run, some training in hydrology is recommended. Other more complex models such as HEC-HMS available from the U.S. Army Corps of Engineers, Storm Water Management Model (SWMM) available from EPA and the Source Loading and Management Model (SLAMM) may be needed to evaluate larger and more complex sites and require more hydrology experience to set up. The model will be run once for the existing site condition and again for the post-development site condition.

The runoff must be calculated for both the impervious and pervious areas of the project site and then added together. The calculations can be organized in a spreadsheet or table such as the "Calculations for Stormwater Runoff Volume Control spreadsheet that is available at

www.michigan.gov/documents/deq/wb-storm-MS4-RunoffVolume_331235_7.xls . This spreadsheet shall be utilized by the Clinton County Drain Commissioner as the base calculation form in determining required channel protection quantity.

The peak runoff rate is a function of runoff volume and time of concentration (Tc). Tc is the time it takes a drop of water to move from the hydraulically most distance point in a watershed to a downstream point in the watershed. For the purposes of the calculation, the development project site represents the watershed. In general, if the runoff volume is controlled as described previously (in Runoff Volume above) and the Tc of the existing project site is maintained or increased for the developed condition, then the peak runoff rate will also be controlled. As project sites increase in size, however, the movement of water through them becomes more complex. Project sites that propose change to more than ten acres or have one acre or greater impervious area or have more than 50 percent impervious cover for the project site should not assume that if volume and Tc are controlled that peak runoff rate will be controlled.

If the Tc of the existing project site is not maintained or if the project site size criteria described above is exceeded, then the rate of runoff for the existing project site should be determined and compared to the rate of runoff for post-development. Calculating the rate of runoff requires the use of a hydrologic model. The recommended model for most project sites is TR-55 available from the NRCS at:
http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/water/?cid=stelprdb1042901 .

As with runoff volume, the model will be run once for the existing site condition and again for the post-development site condition.

More detailed descriptions of methods to determine both runoff volume and rate can be found in Chapter 9 of the Low Impact Development Manual for Michigan available at:
http://www.semcog.org/LowImpactDevelopment.aspx .

A specific, detailed discussion of the Unit Hydrograph method for calculating peak rate and the CN method for calculating volume is explained in the document Computing Flood Discharges for Small Ungaged Watersheds available on the DEQ's website at:
http://www.michigan.gov/documents/deq/lwm-scs_198408_7.pdf .

## D. SITE SPECIFIC CONSIDERATIONS

The Clinton County Drain Commissioner recognizes that certain site specific conditions are pertinent in applying NPDES Stormwater Management Criteria. These include:

1. Sites with heightened environmental considerations such as areas of known soil and/or groundwater contamination.
2. Hot Spot sites where there is the potential for significant pollutant loading such as fueling stations, commercial vehicle maintenance & repair, auto recyclers, recycling centers, scrap yards, etc.

For these identified more critical sites, the Clinton County Drain Commissioner will apply special consideration for what constitutes appropriate BMPs to achieve stormwater management criteria. More specifically:
For those sites with heightened environmental considerations, infiltration BMPs to be utilized must be deemed as not to exacerbate the existing environmental impact(s) on the site. Such determination will occur through coordination with MDEQ staff and obtaining subsequent permits as may be necessary.

For Hot Spots, utilization of a greater treatment train extent on the site to provide the opportunity for isolation and/or containment of possible pollutants as well as the selection and placement of BMPs on the site to minimize the potential that pollutants will get introduced to underlying soils or groundwater will be necessary.

E. OFF-SITE MITIGATION/PAYMENT IN LIEU

The Clinton County Drain Commissioner recognizes that development or redevelopment of a site or project could come with significant limitations to achieving NPDES Stormwater Management Criteria. As such, the following provisions are provided to give due opportunity to those development/redevelopment sites where reasonable demonstration has been provided that post construction criteria cannot be achieved within the limits of the site:

1. The Drain Commissioner will generally honor Off-Site Mitigation (but not Payment in Lieu) programs that a local municipality (City, Village, Township, etc.) or public agency (county road commission, MDOT) has established under its own NPDES storm water permit so long as undue impact does not result to a receiving MS4 county drain(s).
2. Or Off-Site Mitigation and potentially Payment in Lieu may be accommodated for a given site or larger development area/region through a county drain petition in accordance with P.A. 40 of 1956, as amended, that results in adequate post construction criteria being met for the involved MS4 county drain reach(es) serving the site/area with due consideration in the application of the associated drain special assessment. Note that the Drain Commissioner does not have discretion to ensure that a petitioned project will be found necessary to accommodate a proposed site/area.

F. SITE PLAN REVIEW

Development/redevelopment projects are subject to review and approval by the Clinton County Drain Commissioner to determine compliance with NPDES Stormwater Criteria. The applicant will need to submit appropriate plans, calculations and a Drain Use Permit Application along with required review fees. Achievement of the criteria based on the submitted plans and calculations will be documented on the Drain Commissioner's Post-Construction Control Stormwater Runoff Program (PCCSRP) Summary Sheet, which shall be attached as the final page of the submitted Drain Permit prior to its issuance. Correspondingly, issuance of approval correspondence will accompany the Drain Permit to signify compliance with the NPDES Stormwater Criteria. This process will occur

independently by the Drain Commissioner's Office as well as in coordination with a local municipality's planning and zoning process as the given development/redevelopment project warrants.

Requirement for such review and approval is predicated upon section 423 of Public Act 40 of 1956 as amended, particularly subsections 1, 6 and 10 restraining the discharge or connection of sewage or waste mater to a county drain. Failure to comply with such provisions subjects the offender to penalties both per section 602 as well as subsection 10 of section 423. Neither connection nor discharge to a county drain for a project is allowable prior to issuance of a Drain Permit. Either proceeding prior to the issuance of the Drain Permit and/or connection or discharge to a county drain in a manner not consistent with the Drain Permit and/or approval correspondence is not allowable. The Drain Commissioner will upon discovery of such require that the connection or discharge be promptly terminated and/or ceased until the Drain Permit has been issued or actions are taken to bring the project back in line with the Drain Permit and approval correspondence as acknowledged in writing by the Drain Commissioner.

## G. LONG TERM OPERATION & MANAGEMENT

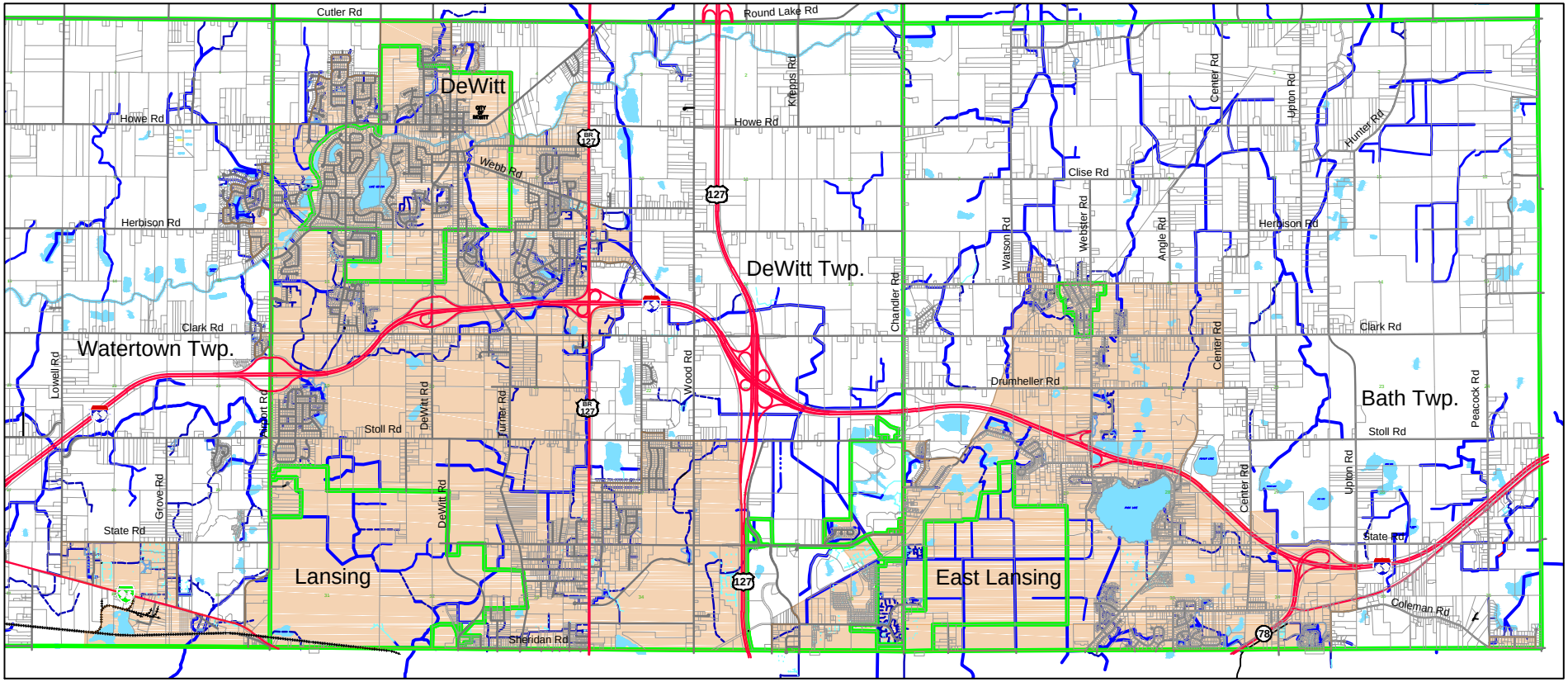
The Clinton County Drain Commissioner acknowledges that achieving the goals of the NPDES Stormwater Criteria requires that all stormwater management BMPs/systems implemented for development/redevelopment must be properly operated and managed in perpetuity. As such, one of the following mechanisms must be applied to all sites/projects to provide for long term operation and management:

1. Establishment of the requisite BMPs/system as a county drain, or otherwise turned over to another MS4 entity.
2. Execution of a legally binding agreement in a format acceptable for recording with the appropriate "Register of Deeds" that defines specific responsibilities of the property/project owner/operator and rights of the Clinton County Drain Commissioner to determine appropriate due diligence by the owner/operator of his/her responsibilities. See attached "Private Maintenance Agreement".

CC-Phase II Urbanized Area 2010.pdf

# Lansing, MI urbanized Area within Clinton County

## 2010 Census




Regulated Area (2010 Census)

Minor Civil Division

Lake/River

County/Intercounty Drain - Open Channel

County/Intercounty Drain - Enclosed

Main Road

Local Road

N

0 1 2

Scale in Miles

Source: Urban Areas derived from "Lansing, MI Urbanized Area 2010 Census" map
Basemap from Clinton County Drain Commissioner's Office (2015)