Chapter 5 - Master Plan and Zoning Ordinance Analysis

5.1 Introduction

Land use patterns and water quality are directly linked. As the amount of pavement and number of buildings (or impervious surface) increase in a watershed, the more water quality and the physical structures of water features (lakeshores, stream beds, etc.) are negatively impacted. Fortunately, planning tools are available to minimize the impact development can have on water features.

5.1.1 Checklist Review

This section of the NEW watershed management plan analyzes the effectiveness of current planning documents of the communities in the NEW. A checklist was used by a planning consultant that evaluates how well community Master Plans (Plans and Policies in the checklist) and Zoning Ordinances (Development/Redevelopment regulations in the checklist) preserve and protect natural features. The checklist includes the following topics: Storm Water Management, Impervious Surface Reduction, Land Conservation and Development Techniques, Erosion and Sedimentation Control, Sanitary Sewer Planning and Infrastructure, Groundwater, Greenways, Wetland Preservation, Woodland Preservation, Stream Corridors and Flood Plains, Watershed Issues, and the Development Review Process. The checklist was completed for all communities within the watershed that have planning documents, whether or not they are required to obtain a storm water permit. Completed checklists are included in the Resource Directory (CD).

Questions for each topic were worded to point to the desired action for water resource protection. A "yes" means that the community has effectively addressed this topic. For example, the question, "Do you regulate storm water in your community," indicates that regulating storm water is a positive action that helps to protect surface water from runoff pollution. Therefore, the more "yeses" on the checklist, the more effective a community's planning documents are at water resource protection.

Once the checklists were finished by the planning consultant, each community was given the opportunity to review the responses and amend them if needed. The results were then evaluated to determine the strengths of current regulation and possible opportunities to fortify the planning tools, which are discussed below. Note that not all communities chose to review the initial draft of the checklist and provide comments. Therefore, the recommendations below are based solely on the consultant's interpretation of the planning documents available.

5.1.2 Considerations

While communities may be quite successful in convincing developers to create designs that meet the communities' desires for environmental protection, the developer is under no legal obligation to do so unless the idea or concept has been translated into a requirement in the Zoning Ordinance. Therefore, the following suggestions, if adopted, should be written into the community's planning documents. Note that Planned Unit Developments (PUDs) are the exception, as under this mechanism, the community has the discretion to ask for additional items that are not expressly required by the zoning ordinance.

If a community is interested in implementing any of the suggestions in the following section, it is important that the regulation, standard, or guideline fit within the context of the existing ordinances. Therefore, while model ordinance language can be used as a starting point, the ordinance should be

thoroughly reviewed and modified as needed by the elected and appointed officials, and any appropriate planning and legal consultants, before adoption is considered.

5.2 Land Use Planning Recommendations – Summary

Each community within the NEW is unique, and has unique water quality issues. However, the checklist review reveals some issues where most, if not all, communities could improve how their planning documents address the key components of water quality – natural feature preservation, storm water impacts and storm water management – and provide guidance in how they want them handled in the future. The following summarizes the top land use planning recommendations reflected in the individual community document reviews.

5.2.1 Urbanized Areas

The following recommendations are targeted to the urbanized portions of communities within the watershed. Note that some communities are completely urbanized, and some only partly urbanized. These recommendations are intended for "urbanized areas," whether they occupy the whole community or just a small portion of a community.

Master Plan:

1. **Black River, Lake Huron and the St. Clair River.** The current environmental status and threats to the major water resources in each community should be included in the Master Plan. In particular, this information should be included in community plans that have the Black River, Lake Huron and the St. Clair River within their boundaries. The environmental status of the river or lake, the condition of its shores, and the quality of its waters needs to be discussed. Identifying areas to protect, and areas where the resource could be improved will create guiding principles for the Master Plan. Environmental data is available from this watershed plan.

2. **Impact of Storm Water on Water Features.** Discuss the impact storm water has on natural features, such as wetlands, streams and larger water features. Include the impacts of increased water ***quantity*** into these systems (flashy flows, stream bank erosion, loss of riparian vegetation, degraded aquatic habitat, etc.), and impacts of poor storm water ***quality*** (phosphorus, automobile fluids, sediments, heavy metals, sanitary waste from septic systems, waterfowl, and pets, etc.).

3. **Goals and Policies to Improve Water Quality and Reduce Runoff.** The information presented in the Plans (environmental condition of water features, and problems caused by storm water runoff) should then be addressed through goals and policies of the Master Plan. For instance, the Master Plan goal could work toward reducing the amount of impervious surfaces, and if possible, increasing infiltration. Another goal could be to reduce sediments in runoff (many pollutants bind to sediments and find their way to surface water via runoff). The philosophy of how storm water should be handled in new developments and/or redevelopments could be included. Also, ideas for retrofitting methods for reducing storm water runoff could be discussed, particularly methods for residential areas that involve and educate residents about storm water.

Development/Redevelopment Regulations

1. **Adopt a Riparian Buffer Ordinance/Program.** Vegetation along a stream or river buffers the water from runoff, protects the stream banks from erosion, and provides suitable habitat for aquatic wildlife. A buffer ordinance for new development or redevelopment projects could

require that riparian vegetation be established or maintained to provide these benefits. A community outreach program could educate water-front land owners on maintaining or retrofitting vegetative buffers on their properties.

2. **Revise or Adopt Storm Water Management Regulations.** While the group of communities that wrote this plan agreed that watershed-wide, standardized storm water regulations would be the best solution to storm water runoff problems, each community could adopt its own regulations if this doesn't happen quickly. Revising or writing a new storm water ordinance and/or engineering design standards for storm water systems should reflect a new philosophy about minimizing the amount of storm water a development generates, that any resulting storm water should be infiltrated, if possible, and that any discharge from a site should be treated before being released. For standards currently in place in Oakland County, see www.springfield-twp.us/plan.htm. Under "Design and Construction Standards," click on "Standards Document."

3. **Reduce Impervious Surfaces and Increase Infiltration.** Develop methods to reduce the amount of impervious surfaces on new or redeveloping properties, such as shared parking with reduced number of required spaces, parking lot islands that double as infiltration areas, and narrower required roadway cross-sections. Also included could be methods to reduce the amount of storm water reaching the storm systems, such as prohibiting downspout connections to the storm system, and encouraging rain gardens on residential properties.

5.2.2 Rural Areas

Some communities have rural areas that are currently under development pressure, or will be in the near future. As described above, the following recommendations are for "rural areas," whether that encompasses an entire community, or just part of a community.

Master Plan:

1. **Natural Feature Preservation.** Discuss the importance of preserving natural features in both development proposals and by the community through acquisition. Reasons to justify natural feature preservation should include nature's role in storm water management and protecting water resources through naturally-vegetated buffers. One way to do this is through a chapter in the Master Plan called a *Natural Areas Plan*. This plan uses an overlay system to identify important natural areas within a community – on an ecosystem basis – and then proposes actions the community can implement to protect these areas in perpetuity. For an example Natural Areas Plan, see www.springfield-twp.us/documents/masterplan.pdf.

2. **Storm Water Best Management Practices.** Use the Master Plan to encourage the use of Best Management Practices (BMPs) for storm water systems in new development and redevelopment projects. This discussion could include standards such as:
   a) Minimize grading and clearing
   b) Use above-ground storm water systems to encourage infiltration
   c) Reduce the amount of storm water generated by limiting impervious surfaces
   d) Use native vegetation in storm water facilities to uptake storm water and filter pollutants.

3. **Wetlands Protection.** Wetlands have a very specific role in storm water management and flood control. These features should get special treatment in a community's Master Plan so that future problems can be avoided. The Master Plan should call for the protection of all wetlands on an "ecosystem" basis in the Master Plan. This approach would describe wetlands as the basin itself, the upland areas that surround the wetland, and the water source that sustains the wetland.

Development/Redevelopment Regulations

1. **Require Natural Feature Protection.** Require protection of natural features (based on information in the Natural Areas Plan) to the greatest extent possible in the site plan review process. A specific statement to this end should be part of the standards for site plan review.

2. **Revise or Adopt Storm Water Management Regulations.** See discussion above under "urbanized areas."

3. **Adopt Provisions that Protect Wetlands.** Protecting wetlands can be done in several ways. A specific wetlands ordinance can be adopted, based on the rules outlined by the state that allow communities to protect wetlands less than five acres in size. Also, wetlands can be protected by employing broader "natural feature" protective language, which would include any natural feature such as wetlands, woodlands, steep slopes, stream corridors, lakes, ponds, and the like.

5.3 Planning Document Analysis – Phase II Communities

5.3.1 Burtchville Township

Master Plan - Strengths

Preservation of natural features and open space is prominent in the community's Master Plan. The Plan encourages developments whose design maintains the Township's character and natural features, and has a specific goal to require developers to preserve natural features as integral parts of their developments. The Master Plan also has goals to preserve natural features on recreation properties. To assist in implementing these goals, the Plan describes several techniques that could be used, including land acquisition, conservation easements, open space agreements, and rural clustering.

Important background information about natural features is also included in the Master Plan. This data is critical to preservation because a community can only preserve features that it knows about and values. Wetlands, woodlands, and floodways are discussed in the plan, as well as the important benefits these features provide. Riparian vegetation, or plants that grow next to streams and lakes, is also considered important in the Plan.

Other topics in the Plan that support preservation of natural features and open space include infill development, agriculture, and sanitary treatment. The Master Plan gives priority to vacant parcels in existing subdivisions or along the lake shore, rather than encourage "green field" development. The Plan also describes the Township's agricultural assets and has goals and techniques in the document to help preserve agricultural lands. Lastly, the Plan discusses sanitary sewer planning, and identifies a sewer boundary. It also calls for conducting a Sewage Disposal Study to determine various alternatives to septic systems. Because of the predominant soil conditions in the Township, and the impact poorly maintained septic systems have on water resources in the watershed, it is recommend that this study be undertaken, if it hasn't already.

Master Plan - Opportunities

A defining feature of the Township is its lakeshore property adjacent to Lake Huron. All Township residents have the opportunity to enjoy the lake at four public beaches. The Master Plan does not discuss the lake, or its environmental status. Because this is such an important feature to the community's character and life style, the Plan should have a detailed description of the lake's water quality, shoreline

conditions, and storm water runoff quality reaching the lake. Much of this information can be obtained in this watershed management plan.

While the Master Plan has descriptions of natural features, and goals to protect these features, adding maps that locate natural features in the Township would strengthen the existing information. Maps would also help the Planning Commission better determine specific parcel's capacity to support development. The County has natural feature data in their Geographic Information System (GIS) that the community could use, including wetlands, watershed boundaries, woodlands, stream corridors, floodways, lakeshore protection areas, and soils showing areas unsuitable for septic systems.

Groundwater recharge areas could also be mapped (information provided by the State), to help protect drinking water wells from contamination or draw down. A map showing the sanitary sewer boundary would also help to strengthen these goals in the Master Plan. Another map that would help to guide development according to the Township's wishes is a map of prime agricultural lands. This could indicate to farmers that their property could be considered for the farmland preservation tools discussed in the Master Plan.

Storm water is an important topic that should be included in a community Master Plan. Two main topics the Plan should cover include storm water quality and storm water quantity. The Plan could discuss protecting the quality of storm water runoff by using Best Management Practices (BMPs). In new construction, BMPs would be site design techniques, and in developed areas, BMPs would be retrofitted into the existing facilities. Minimizing storm water runoff is another important topic. This can be done through natural feature protection, increasing infiltration where possible, and reducing impervious surfaces.

A few other areas where the Master Plan could be strengthened include groundwater, wetland, and stream corridor protection. Because Township residents depend on groundwater for their drinking water, the Plan should specifically state that groundwater is important to the health, safety and welfare of the community. Then the Plan should call for protection of groundwater resources. While the Plan does discuss State of Michigan wetland protection extensively, local wetland protection goals could be expanded on in the Plan. Lastly, stream corridor protection could also be added, including a potential pathway plan that includes stream corridors. This way, both preservation of the stream's vegetation and a recreation amenity could be achieved.

Zoning Ordinance – Strengths & Opportunities

It is common practice to update a community's Zoning Ordinance after a Master Plan update. The Township has many opportunities to translate the goals for natural feature and water quality protection in its Master Plan to regulations, standards, and guidelines in its Zoning Ordinance.

A main focus of water quality protection is managing storm water off of new developments and in re-development projects. A storm water management ordinance that includes specific design criteria for storm water facilities and Best Management Practices (BMPs) would help to improve the quality of storm water runoff, and minimize the quantity of runoff. Site design requirements could include vegetated buffers along drainage ways and lakeshores, limiting grading and clearing, prohibiting direct discharge into natural waterways without pre-treatment, minimizing impervious surfaces, and encouraging infiltration where possible. Additional guidelines include keeping storm water above ground to encourage evapotranspiration, evaporation, and infiltration, use of native vegetation in storm water facilities, and requirements for monitoring and maintaining the system.

There are many ways the Township could reduce impervious surfaces (and in turn, storm water runoff). In parking regulations, the Township could incorporate flexibility in parking requirements and allow fewer spaces if warranted, require planting islands in parking lots, allow shared parking facilities (with reduced number of spaces for each use), provide small-car spaces, and use landscape islands in parking lots for infiltration areas. Allowing clustered developments also helps to reduce impervious surfaces by reducing the amount of roadway needed to serve residences. Clustered homes with relaxed side and front yard setbacks also require less pavement for driveways. This development technique leaves a significant portion of the site in open space, which could be protected in perpetuity through conservation easements.

Master Plan goals of protecting natural features could be accomplished in several ways. Specific natural resource ordinances, such as a wetlands ordinance, a woodland/tree ordinance, or a stream/floodplain protection ordinance are all topics that should be considered. Local wetlands ordinances protect important wetlands that otherwise have no State protection (wetlands that are less than five acres in size). Woodlands and tree ordinances often protect existing stands of trees, and require replacement if protected trees are removed. A stream/floodplain ordinance could be designed as an overlay district that adds specific protections to streams or floodplains that traverse many zoning districts. An important protection in the overlay district is to protect or create a riparian buffer zone next to a stream or lake where no building or clearing is allowed. The buffer provides significant protection of the water feature itself (shorelines, stream beds, aquatic habitat, etc.) as well as the water quality flowing overland to the feature.

The Site Plan Review process also offers a community opportunity to protect water features while guiding development practices. The Zoning Ordinance could specifically require developers to preserve natural features, making them an integral part of their design (as stated in the Township's Master Plan). The site plan regulations could also require that all existing natural features be shown on the site plan, and that storm water BMPs are shown in detail so that they can be evaluated for effectiveness.

5.3.2 Clyde Township

Master Plan – Strengths

The main emphasis of the Master Plan is to preserve the Township's rural character – including natural features – without unduly restricting development. This is communicated through the community's vision statement in the Master Plan. It states that future residential growth should be planned to minimize impacts on natural features, wildlife habitat, and open space. It also states that special measures should be taken to protect the Township's natural features, such as the Black River, Mill Creek, Port Huron Game Area, and Beard's Hills as well as other natural features. The Township is also concerned about mining operations, and states that these types of uses should not be situated close to sensitive natural features.

The Plan has goals, objectives, and strategies (actions) that work toward protecting natural features. For example, one strategy strives to "Update the Zoning Ordinance to include provisions that will maximize the preservation and protection of the woodlands, wetlands, agricultural land, and open space in the Township as development occurs." There are also several land use categories that preserve open space, although do not specifically mention natural feature preservation as a purpose. These include Rural Agriculture, Rural Transitional, and Low-Density Residential. There is also an "Open Space" land use category, the intent of which is to preserve natural features to the maximum extent possible.

The Plan does a good job in describing and identifying (mapping) the Township's existing natural features, including soils, wetlands, woodlands, floodplains, watersheds, streams, and prime agricultural

lands. These features are described as important to the community and call for their preservation. The Plan identifies and locates on a map the Port Huron State Game Area, explaining that this is an attractive amenity that influences development patterns. It is also described as the largest contiguous forested area in Michigan's thumb, which clearly identifies it as a major, regional, resource.

While economic viability of agriculture in the Township is not discussed in the Master Plan, the Plan describes this land use as one that covers much of the Township and helps to define its character. The Plan also addresses sanitary sewerage planning, identifying and mapping a sewer service area in the Plan. The Master Plan also indicates where soils that are unsuitable for septic systems are located throughout the Township. All this information helps the Trustees and Planning Commission understand the land's capability to support development, guiding them in decisions regarding zoning and development potential.

Master Plan – Opportunities

While the Master Plan includes many important details that will help the Township preserve natural features, a few more topics could be included to help the community go even further. In relation to this watershed plan, a topic that could be added to the Master Plan is the community's philosophy regarding storm water management. Storm water can have a significant impact on the quality of natural systems. Therefore, a discussion about the importance of storm water, its quality and quantity reaching receiving streams, and how it can be managed (through Best Management Practices or BMPs), should be included in the Master Plan. Preservation of natural features can also be based on these features' ability to help in storm water management. Two related topics that should also be discussed are erosion and sedimentation control and minimizing impervious surfaces. The Township can adopt goals and policies to help keep siltation out of streams and lakes, and to reduce the amount of pavement in new developments.

While many different natural features are discussed in the Master Plan, groundwater is not. Because groundwater is the main source of drinking water for much of the Township, the Master Plan should indicate the importance of groundwater, and call for its protection. Groundwater recharge areas could also be mapped (from State information) and added to the Plan. To go even further with natural feature protection, wetlands could be protected on an "ecosystem" basis. This means that not only the wetland itself is preserved, but the upland areas surrounding the wetland (naturally-vegetated buffer), and source of water for the wetland are also protected. Existing wetlands throughout the Township could also be evaluated as to their suitability to store storm water. Lower-quality wetlands could be identified for storm water storage, while high-quality wetlands could be protected from the negative impacts of storm water.

To protect surface water quality, the important environmental functions of stream corridors should be discussed in the Master Plan. While the Plan has a strategy for establishing buffer zones around water features, the functions or reasons behind requiring the buffer (storm water filtration, wildlife habitat, etc.) should be discussed as well. The environmental status (water quality, corridor conditions) of the Black River should also be directly addressed in the Master Plan.

The Master Plan calls for exploring opportunities for non-motorized pathways throughout the Township. A Greenway Plan could be developed that uses stream corridors, in part, to preserve vegetation along the stream, protect wildlife corridors, and create a recreation amenity as well.

Zoning Ordinance – Strengths & Opportunities

The Township has incorporated many ways to preserve open space in their Zoning Ordinance. Open space helps to manage storm water by preserving the infiltration capacity of the soils. Clyde has an Open Space Zoning District, the intent of which is to encourage recreational uses of an outdoor nature that will take full advantage of land in its natural state. Other districts that encourage open space include Residential Agricultural and Suburban Farm districts. The ordinance also allows Lot Size Averaging, Cross-District Averaging, and Clustering for single-family residential uses. Also allowed are Subdivision Open Space Plans (plat clustering), and Open Space Preservation Option (clustering by right). These techniques allow reductions in setbacks and lot sizes, and modifications to other district regulations that work together to preserve open space and reduce impervious surface. The Open Space Preservation Option requires that the open space be maintained in its natural state and be protected through a conservation easement. Because the Township encourages agricultural uses, preservation tools in the agricultural districts should be added to the ordinance requirements where possible.

Another way the Township reduces impervious surfaces is through their parking requirements. They allow flexibility in the number of parking spaces for uses that warrant less parking than the ordinance requires. The ordinance also requires landscaping islands within the parking lot pavement. Additional options the Township may want to consider include encouraging shared parking lots (where the number of spaces is reduced for each use), requiring some spaces with smaller dimensions for small cars, and allowing the use of landscaping islands in the parking lot for storm water infiltration areas.

Storm water is a relatively new topic to consider in a Zoning Ordinance. However, the Phase II permitting process has put the spotlight on this subject. To address storm water, the Township may want to consider developing a storm water management ordinance. This ordinance would detail specific design criteria for storm water facilities, as well as provide guidance in how storm water should be regarded. For instance, the ordinance could require that Best Management Practices (BMPs) be used where possible, that these BMPs would be above ground (rather than underground), that direct discharge of storm water to wetlands, streams, or other surface waters would be prohibited without pre-treatment, and that the storm water systems be regularly monitored and maintained. The ordinance would communicate a different philosophy about storm water – that it isn't a waste product to be drained away as quickly as possible – but a valuable resource that should be returned to the ground, or treated on-site before it reaches surface waters. Other criteria that could be included are limiting land disturbance and grading, maintaining a vegetated buffer to infiltrate storm water, minimizing impervious surfaces, encouraging the use of infiltration devices, and requiring use of native vegetation in storm water facilities such as detention/retention basins.

To address the preservation goals and policies in the Master Plan, the Township may want to consider adopting several natural feature preservation ordinances. A local wetlands ordinance would build on state protection of wetlands. The local rules would protect wetlands smaller than five acres in size, which constitutes many of the remaining wetlands in the watershed. A woodlands/tree ordinance would protect stands of trees, and could require one-for-one replacement if protected trees are removed. Another way to achieve natural feature protection is through an overlay zone. The overlay zone simply places additional protections on features regardless of the underlying zoning. So, an overlay zone that protects stream corridors could be applied to a stream in any district. The overlay zone could include a buffer requirement adjacent to streams, and specific setbacks from wetlands or other surface waters.

The site plan review process is another area where the Township could strengthen its environmental protection efforts. During the review process, the Township could require that the developer preserve natural features to the greatest extent possible, show all natural features on the site plan, and show BMPs in details to ensure that they will have the desired effect.

5.3.3 East China Township

Master Plan – Strengths

The Township within the NEW is somewhat developed, including both industrial and residential land uses. This urban environment poses considerable challenges to improve water quality and minimize the quantity of storm water reaching surface waters. However, the Townships Master Plan discusses several topics that are important in regards to managing storm water. The Plan describes the three rivers within the Township (Belle, Pine and St. Clair), and encourages protection of floodplains to ensure preservation of natural features and limit damage to personal property. Floodplains are also mapped, which provides an important guide to future development. Soils are also described in the Plan, identifying the soil types that have limiting factors for septic systems.

The Plan also states that open space within neighborhoods is desirable and should be strongly encouraged. Open space should promote preservation of natural features, and provide open space linkages to other neighborhoods. Linkages are also planned through development of pedestrian/bike pathway system, which could connect East China Township with other community pathways, such as the Bridge-to-Bay Trail.

Master Plan – Opportunities

This watershed management plan provides the municipalities within the NEW environmental data regarding some of the rivers that flow through their communities. East China has the Belle, Pine and St. Clair rivers traversing the Township. Environmental data from this management plan about the St. Clair River's watershed, water quality status, and riverside conditions should be incorporated into the community's Master Plan. Based on this information, goals and policies can then be added to the Master Plan that will work toward improving water quality and habitat along the river's edge.

A discussion about storm water should also be added to the Master Plan. Its management is important to the health, safety and welfare of the residents, and proper management of storm water *quality* and *quantity* should be addressed through the Plan's goals and policies. These could include goals to minimize impervious surfaces, encourage the use of storm water Best Management Practices (BMPs), and pre-treatment of any storm water exiting the site.

In relation to sanitary system planning, the Township's Master Plan has information on their sanitary facilities, including a map of existing sanitary lines. Additional information about the future plans for this system, including goals and policies about phasing out septic systems within the Township, could be added to guide desired future development or re-development. Included with this could be maps indicating unsuitable soils for septic systems, helping to direct future construction of sanitary lines. Encouraging in-fill development would also limit the need to sanitary facilities across the Township.

While the Township's natural features have been impacted by development, remaining wetlands and woodlands should be inventoried and mapped in the Master Plan. These features still provide important benefits to residents, such as storm water infiltration and storage, and should be protected to the greatest extent possible. The first step in doing this is to recognize them in the community's Master Plan, and call for their protection in its goals and policies. The planned pedestrian/bicycle pathway system in the Master Plan could be expanded to connect to these natural features, providing a recreational path and wildlife habitat corridor as well.

Zoning Ordinance – Strengths & Opportunities

Unlike many communities within the NEW, East China currently has regulations that fully detail specific design criteria for storm water facilities. It also strives to reduce impervious surfaces by requiring landscaped islands in parking lots and allowing shared driveways.

The Subdivision Open Space Option and the Planned Neighborhood Development District (PND) are intended to preserve open space and natural features. These development choices also provide flexibility in site design criteria by allowing relaxed side and front yard setbacks. They also require less pavement through shorter roads and driveways, reducing the amount of storm water generated by the development.

The community participates in the National Flood Insurance Program, and has ordinance language protecting floodways from undesirable development. Site plan review requirements in the Township also protect natural features by requiring that they are shown on all site plans, including trees that are 6" dbh or greater. The Township also requires pre-construction meetings and monitors construction of storm water, sanitary, and water systems to ensure compliance with the approved site plan.

Similar to the Master Plan, a community should address storm water management through their development regulations. The Township currently has requirements for storm water facilities that fully detail specific system design criteria. These could be expanded to retrofit techniques that consider both water quality and quantity for both development and re-development projects. Amendments to the design criteria could communicate a new philosophy about storm water – that it isn't a waste product to be drained away as quickly as possible – but a valuable resource that should be returned to the ground, or treated on-site before it reaches surface waters. For instance, the design criteria could require that storm water Best Management Practices (BMPs) be used where possible, prohibit direct discharge of storm water to wetlands, streams, or other surface waters without pre-treatment, and require that storm water systems be regularly monitored and maintained. Other criteria that could be included are maintaining or creating a vegetated buffer next to waterways or water features to infiltrate storm water, minimizing impervious surfaces, encouraging the use of infiltration devices where possible, and requiring use of native vegetation in above ground storm water facilities.

The amount of storm water entering existing systems could also be reduced by prohibiting the connection of downspouts to the storm water system and footing drains to the sanitary system.

The parking ordinance could be expanded to allow flexibility in the number of spaces required if warranted, encourage shared parking where the number of required spaces for each use is reduced, require some spaces of small dimension for small cars, and encourage using landscape islands for storm water infiltration.

Open spaces typically function better as an environmental unit if they are large in size. In districts that require open spaces, these regulations could also require that adjacent open spaces be consolidated into larger units, be maintained in a natural condition, and be protected by a conservation easement. Other natural feature protection mechanisms that the Township may want to consider include a local wetlands ordinance that preserves wetlands that are less than five acres in size, and/or a woodland/tree ordinance that protects stands of trees or individual specimens. This flows directly from current regulations that requires developers to locate trees 6" dbh or greater on site plans. Lastly, the Township may want to consider requiring a naturally-vegetated buffer along waterways or at the edges of other surface water features. The buffer protects the water quality by filtering out pollutants from runoff, the river/stream bed from erosion, and provides desirable aquatic and terrestrial wildlife habitat.

Lastly, the site plan review process could be even more comprehensive if developers were required to preserve natural features to the greatest extent possible. To ensure that this requirement is legally enforceable, a statement to this end should be added to the zoning ordinance.

5.3.4 Fort Gratiot Township

Master Plan – Strengths

Natural feature preservation is a cost effective way to protect water quality within a community. The Fort Gratiot Master Plan does a good job communicating to development professionals their vision for preserving natural features in the Township. It calls for encouraging development that can be assimilated into the community while preserving natural features. In fact, it calls for requiring developers to preserve natural features as part of development.

Similarly, the Plan has many open space objectives involving preservation of natural features, and providing access to these features by residents. Two main objectives include preserving open space and adequate recreation opportunities in the Township and promoting stewardship of our environment. They do this, in part, through their Future Land Use Plan, which designates areas along the Black River and most of the beaches (other than lakefront residential lots) along Lake Huron as open space. The Master Plan also provides different types of conservation methods, including land acquisition, conservation easements, open space agreements, and rural clustering. The Plan specifically names two parcels adjacent to Lake Huron for acquisition.

Wetlands, floodplains, and prime agricultural lands have been identified and mapped in the Plan. The environmental benefits of wetlands, woodlands, and floodplains are also discussed, including how they help with storm water management and infiltration. Farmland preservation techniques (P.A. 116, and agricultural zoning techniques) are explained in the Plan and their use is encouraged.

Another strength of the Master Plan is that it includes information on how residents receive drinking water, and dispose of their sanitary wastes. Sanitary sewer planning is outlined through objectives for the system and for areas outside a designated sewer boundary (called the urban/rural boundary). Objectives include encouraging large-lots and on-side disposal systems where sewer extensions are not foreseeable; install sewer and water facilities only where planning and zoning won't be compromised by their use; and establish a planned boundary for urban development where sewer and water will not be extended during the planning period. The Master Plan also identifies soils in the Township that are suitable and unsuitable for septic systems.

Lastly, the Master Plan encourages infill development (over development in "green fields"), and discusses the development of a non-motorized transportation path, or greenway.

Master Plan – Opportunities

There are several water quality topics that could be added to the Master Plan. Storm water management is the most significant of these. Issues that should be addressed include the importance of storm water runoff; how the *quality* and *quantity* of runoff impacts lakes, streams, and rivers; the goals and objectives the community has regarding improvements to runoff quality/quantity; and encouraging the use of Best Management Practices (BMPs) to deal with storm water runoff. Additional issues include minimizing the amount of impervious surfaces in new development and re-development projects to reduce runoff, prohibiting connections between downspouts and the storm water system, and reduction of soil erosion into area waterways. The Master Plan could also cite "reduction in storm water" or "improvement to water quality" in its reasons for preserving natural features.

While the natural feature descriptions in the Master Plan are extensive, additional language about how the community wants to protect these features could be considered. For instance, the Plan describes woodland resources in the Township, but an inventory and map showing where the woodlands are located would strengthen the case for woodland protection. Similarly, wetland protection could be expanded by calling for *local* wetland protection in the Plan, and encouraging protection of wetlands on an ecosystem basis. This means that the wetland itself, as well as the surrounding uplands and the water source for the wetland is protected. Also, since wetlands have already been inventoried and mapped, they could be classified for their suitability to store storm water. The lower-quality wetlands could then be identified as possible storm water storage areas, while the high-quality wetlands could be preserved.

Stream corridors could also be called out for protection. This could be done in conjunction with the Township's goal to develop a bicycle path system. The path system could identify important natural areas and connect these areas, along the stream corridor, to create a transportation passage for both people and wildlife.

Zoning Ordinance – Strengths and Opportunities

The Township's Zoning Ordinance currently requires several activities that help to protect natural water features and water quality. It has regulations that direct the design of storm water systems that include inspection requirements. The Zoning Ordinance also works to reduce impervious surfaces by requiring a landscaped island in parking lots of a certain size. Soil erosion is regulated by Township standards, and the community requires a soil erosion plan during the site plan review process. Developers are also required to show existing natural features on the site plan. This assists the Planning Commission and Township Board in reviewing a site plan for natural feature preservation.

The modern approach to storm water management is to treat storm water as a valuable resource that should be returned to the ground, or if necessary, treated before being discharged into lakes and streams. The Township's storm water standards provide requirements for design of storm water systems, but could be expanded to treat storm water quality, and if possible, reduce the amount of storm water generated by a new development. In changing the approach to storm water management, performance standards could be added to the regulations to reach these new goals (quality and quantity). Standards could include limiting land disturbance and grading, minimizing impervious surfaces, and encouraging the use of infiltration devices if possible. Best Management Practices (BMPs) could also be required, including above-ground vs. underground systems (to encourage evaporation, evapotranspiration, and infiltration), pre-treatment before storm water is discharged into streams and lakes, native vegetation in storm water facilities, stream- and lake-side buffers, and regular monitoring and maintenance.

Minimizing impervious surfaces can be done in several ways. Parking requirements can be flexible to allow the Planning Commission to approve less parking if warranted by the proposed use. The Township could also encourage "shared" parking, allowing fewer spaces per use than in a lot that was not shared. Small car spaces could be required as a certain percentage of all parking lots. And parking lot landscape islands could be used as infiltration devices. Clustering is another method to reduce the amount of impervious surface (roads and driveways). Allowing cluster subdivisions consolidates development in one part of a site, therefore requiring less roads and possibly shorter driveways. Cluster developments also keep the remainder of the site in a natural condition, retaining its storm water infiltration capabilities. The natural areas could also be consolidated with adjacent open spaces, and protected by a conservation easement.

The Master Plan provides good evidence of the natural features still present in the Township. To further protect these features, the Township may want to consider ways to protect wetlands, woodlands, and

stream corridors. A local wetlands ordinance protects wetlands that are less than five acres in size and adds to protections afforded by the State. The Township currently has provisions for replacing trees that are marked on a site plan "to remain" but are removed during construction. However, a more comprehensive woodlands/tree ordinance could keep development out of wooded portions of a site, encouraging preservation of this important resource. An overlay district could be used to protect stream corridors, the adjacent riparian vegetation as a buffer, and floodplains. The overlay approach can be applied to just streams and floodplains as additional restrictions to the underlying zoning. Therefore, the zoning of a parcel can remain, and the overlay district is simply added to any requirements of the district.

Lastly, the site plan review requirements outlined in the Zoning Ordinance could require developers to preserve natural resources to the greatest extent possible, as stated in the Township's Master Plan. The site plan review process could also require that Best Management Practices (BMPs) be shown on the plans in detail so that their effectiveness can be sufficiently evaluated.

5.3.5 Kimball Township

Master Plan – Strengths

A key goal of Kimball Township's Master Plan is to preserve natural features, and guide development in a way that conserves environmentally sensitive areas. This goal is backed up by objectives. Coordinating development and natural feature preservation is beneficial to watersheds, as maintenance of natural features is the most efficient way to manage storm water. Preserving natural features is particularly important to the community along the Pine and Black rivers where recreational opportunities and rich, wooded floodplains exist. The Implementation chapter of the Master Plan includes descriptions of several tools that can be used to preserve open space and agricultural lands, such as land trusts, purchase of development rights, conservation easements, and state farmland protection programs.

The Master Plan also discusses and maps the areas within the Township that are currently served by water and sewer systems, and potential future areas for these systems. The Plan directs development to these areas, and calls for land outside the "urban" area to be agricultural, recreational, or maintained in its natural state. Zoning decisions are guided by this information.

Important natural features, such as wetlands, woodlands, and floodplains, are inventoried and mapped in the Plan. The document goes on to describe the importance of preserving wetlands and woodlands, and the environmental benefits they provide the Township. The Master Plan also acknowledges the importance of floodplains and states that, wherever possible, future development within these flood hazard zone boundaries should be discouraged. Maintaining undisturbed buffers around wetlands and other environmental systems is also a goal of the Plan.

Master Plan – Opportunities

The Phase II storm water permits have made many municipalities aware of the connection between land use and storm water runoff. The topic is now being added to community Master Plans. Issues that should be addressed include the importance of storm water runoff; how the *quality* and *quantity* of runoff impacts lakes, streams, and rivers; the goals and objectives the community has regarding improvements to runoff quality/quantity; and encouraging the use of Best Management Practices (BMPs) to deal with storm water runoff. Additional issues include minimizing the amount of impervious surfaces in new development and re-development projects to reduce runoff, and reduction of soil erosion into area waterways. The Master Plan could also cite "reduction in storm water" or "improvement to water quality" in its reasons for preserving natural features.

Having an inventory of the natural features in a community strengthens arguments for protecting these features. While Kimball's Master Plan does a good job at this, additional information could be added to identify and map stream corridors, and recognize the importance of riparian vegetation, calling for its protection. Information from this Watershed Management Plan describing the Black River's environmental status (water quality and stream bed condition) could be added to the Master Plan as well. Wetlands could also be categorized regarding their suitability for storm water storage. Lower-quality wetlands could be used in this way, where higher-quality wetlands would be set aside for preservation. The environmental benefits of floodplains could also be described, and watershed boundaries included in the Plan. One way to expand the Township's discussion of public utilities is to map groundwater recharge areas, and discuss the importance of groundwater and its protection since so much of the Township is dependent on wells. Groundwater information is available from the state. Soils that are unsuitable for septic systems could also be added to this section, and used in future zoning decisions.

The Master Plan has objectives for retaining productive agricultural lands, and maintaining agricultural zoning that discourages development of non-ag land uses. However, prime or unique agricultural lands in the Township have not been identified and mapped in the Master Plan. To support zoning decisions for agricultural uses, more information about agriculture as an industry, and the Township conditions that allow this industry to continue should be added to the Plan.

Zoning Ordinance – Strengths & Opportunities

The site plan review criteria require as many natural features be preserved as possible where they help control discharge of storm water. Storm drainage and storm water management plans are also required to be submitted for site condominium developments. Pre-construction meetings are also required, as is construction inspection.

The Township's parking requirements work to reduce impervious surfaces by allowing flexibility in the number of spaces required if warranted by the proposal. Private roads, allowed by the Township, can also be designed to standards other than the County's if roadway design will preserve natural features on the site.

The Open Space Preservation district in the Zoning Ordinance requires preserving a minimum of 50% of open space, and protecting it through a conservation easement.

While storm water is regulated through a development ordinance, this ordinance has not been officially adopted by the Township. To ensure that the ordinance is legally enforceable, the Township must go through the adoption process. Phase II requirements create an influential reason to adopt such provisions. Standards that could be added to the ordinance that address storm water quality and quantity include minimizing land disturbance and grading, maintaining a naturally-vegetated buffer strip next to streams, wetlands, or other environmental features, minimizing impervious surfaces, and encouraging the use of infiltration devices. Other standards to consider include requiring above-ground storm water Best Management Practices (BMPs) to encourage evaporation, evapotranspiration, and infiltration, prohibiting direct discharge of storm water to surface water without pre-treatment, using native plants in storm water facilities, and requiring that storm water systems be regularly monitored and maintained.

Additional ways the Township could minimize impervious surfaces in developments include requiring a landscape island in parking lots, encouraging shared parking lots where the number of spaces required per use is reduced, requiring some smaller spaces for compact cars, and encouraging developers to use parking lot landscaped islands as infiltration devices. Clustering provisions also help to reduce impervious surface, but can do a better job if setback requirements and lot size requirements are flexible and can be reduced if warranted. These provisions could be added to the Township's current Open

Space Preservation district. This district could also be modified to require that open spaces created be consolidated with adjacent open spaces, creating larger undeveloped areas.

Other ordinances that the Township may want to consider include a local wetlands ordinance, a woodlands/tree protection ordinance, and some kind of specific protection for stream corridors. A local wetlands ordinance could protect wetlands less than five acres in size that would otherwise not be preserved under state law. A woodlands/tree protection ordinance could require preservation of forests and individual trees, and require replacement if trees labeled to remain are removed. Stream corridors, and their adjacent vegetation, could be protected through an overlay district. This type of ordinance is "over laid" onto the specific natural feature to be preserved regardless of the underlying zoning of the parcel, and adds a layer of protection for that feature.

While the current site plan review provisions provide good protection for natural features, additional tools could be added. For instance, requiring that natural features be shown on all site plans will help the Planning Commission consider the full impact of a development proposal. Also, the review provisions could require that BMPs be shown in sufficient detail that they can be reviewed for effectiveness.

5.3.6 Marine City

Master Plan - Strengths

Marine City is planning to update its Master Plan in the near future. The City stated in their response that many topics in the checklist will be included in the revised document. This review is based on the current Master Plan, but will hopefully give some ideas and guidance about information to be included in the new Master Plan language.

The current plan describes the recent process the City has gone through to separate its sanitary sewer and storm sewer lines. All City residents are served by sanitary and water systems, and no septic systems or wells exist in the City. In addition, the Master Plan has several objectives that address the adequacy of sewers in the City. The Plan encourages infill development in developed areas of the City where public sewer and water are available. Specific areas for infill development have been identified in the Plan's Future Land Use chapter.

The Capital Improvement portion of the Master Plan discusses the City's desire to increase the walkability of the community, citing a sidewalk improvement system. This section also talks about the recent completion of a portion of a "riverwalk" system along the St. Clair River. The Master Plan calls our construction of bicycle paths in specific locations, and recommends that the City continue developing its portion of the Bridge-to-Bay trail.

The Plan recognizes the importance of the Belle and St. Clair Rivers in the City's history and character. It also describes the parks and land uses along the river corridors, including an MDNR boat launch and a Road Commission storage facility (road aggregate, sand and de-icing salt) on the St. Clair River, and the City's transient boat dock and boat refueling facility on the Belle River. The City also has plans for two new parks along the St. Clair River. The Master Plan recommends that the City designate some land along the Belle River for a future marina.

Another topic that supports regulations to protect water quality is a woodlands inventory in the City's Recreation Master Plan.

Master Plan – Opportunities

As stated above, The City plans to cover many of the following topics in the updated version of their Master Plan.

Since the inception of Phase II, storm water has risen in importance as a Master Plan topic. Issues that should be considered in a Master Plan include a discussion of the impact storm water can have on natural water systems, the importance of storm water management to the health, safety and welfare of residents, and changes to the *quality* and *quantity* of storm water as a community is developed or redeveloped. Master Plan goals and objectives could include encouraging developers to use storm water Best Management Practices (BMPs), tie natural feature conservation to the preservation of existing storm water infiltration, call for minimizing impervious surfaces in development projects, and address how existing properties can divert storm water from the existing drainage system.

Another topic related to development is open space preservation. The idea that development or redevelopment and environmental preservation can be mutually achieved should be conveyed in the Master Plan. And the use of conservation easements or other tools to perpetually preserve open space could be encouraged. In the same vein, bicycle paths could be used to provide recreation and non-motorized transportation, but could also be used to connect natural areas and preserve or restore native vegetation along streams, a logical place to locate a bicycle path. The pathway with its vegetated edges would also create a wildlife transportation corridor between natural areas.

Additional natural resource information could also be included in the revised Master Plan. Mapped inventories of wetlands, woodlands, stream corridors, flood plains and watershed boundaries could help the City in its land use and zoning decisions. It would also aid during the site plan review process. Wetlands could be analyzed to determine if they are suitable for storm water storage. Lower-quality wetlands could be incorporated into the storm water system, where higher-quality wetlands could be set aside for preservation. The woodlands information in the Recreation Master Plan could be easily copied into the City's Master Plan. Also, environmental descriptions and information about water quality and shoreline conditions in the St. Clair River could be transferred from this watershed plan into the Master Plan. For all natural features, their importance, the environmental functions they perform, and the community's desire to preserve these functions should be expressed in the Master Plan document. This provides the philosophical basis for zoning regulations.

Zoning Ordinance – Strengths & Opportunities

Several topics in the Zoning Ordinance work to regulate or reduce storm water runoff. The City's site plan review criteria state that natural resources should be preserved by developing in a manner which will not detrimentally affect or destroy natural features. The site condominium standards also require that natural features be preserved wherever possible, and site plans are required to show natural features for review. Features such as wetlands, woodlands, streams, and floodplains provide many storm water management benefits. The City also regulates the design and construction of storm water systems during the site plan review process, and charts progress of construction to ensure the finished product is in compliance with the approved site plan.

Provisions in the Zoning Ordinance also help to minimize the amount of impervious surface, or reduce the amount of flow discharged into natural waterways. For example, the City allows reduced number of spaces if a parking lot is shared by uses that don't overlap in operating hours. Parking lots are also required to have landscaped islands. The City allows private roads as well, which can be built to minimize the amount of clearing and grading. The City also prohibits connecting down spouts to the

storm water system, encouraging property owners to allow storm water from their roofs to infiltrate the ground.

Marine City also has specific zoning ordinances for particular natural features, including trees and floodplains. The tree ordinance requires a developer to inventory existing trees of 6" caliper or greater, and indicate those trees to be preserved, and the method of protection during construction. The landscaping ordinances also require that existing vegetative cover, groups of trees, or individual trees with a caliper of 6" or greater shall be preserved to the maximum extent practical. If any trees labeled to remain are cut down, they shall be replaced. In a similar fashion, floodplain requirements protect floodplains from undesirable development or damage.

After a community updates its master plan, changes should also be made to the zoning ordinance to reflect the new plan. The next few paragraphs provide some recommended ideas.

Regarding storm water, the existing storm water provisions could be amended to add specific design criteria to reduce the amount of storm water generated by new development or redevelopment projects, and treat any storm water leaving the site before it reaches a natural waterbody. The amended standards could also require a naturally-vegetated buffer strip adjacent to water features, limit land clearing and grading, minimize impervious surfaces, encourage the use of infiltration devices, require storm water Best Management Practices (BMPs) where possible, use native vegetation in storm water facilities, and require regular monitoring to ensure the system continues to operate as designed.

Minor changes to the parking lot requirements could help to reduce impervious surfaces. Currently shared parking is allowed. To further use this concept, shared parking could be encouraged, and fewer spaces be allowed than required per use if warranted. Smaller dimensioned spaces could also be required to provide some parking for compact cars. Landscaped islands in parking lots could also be used as infiltration devices.

Currently, the City does not have a cluster or open space zoning district, but open space requirements could be added to existing zoning districts. Also, a Planned Unit Development (PUD) district could be considered as another way to provide flexibility and creativity on parcels with natural features. This planning tool allows for reduced setbacks, reduced lot sizes, and other methods that could preserve wetlands and woodlands, and reduce the amount of pavement in a development.

Specific natural feature preservation ordinances that the City could consider include a wetlands ordinance, or a natural feature preservation overlay district. The stand-alone local wetlands ordinance protects wetlands less than five acres in size and that are not covered by state regulations. An overlay district could cover other natural features as well, such as stream corridors, and necessitate additional protections to the specific feature no matter what the underlying zoning. Such a regulation could include a naturally-vegetated buffer along stream corridors.

Lastly, the site plan review process could be strengthened even more by requiring that storm water BMPs are shown on the site plan in sufficient detail that they can be reviewed for effectiveness. Also, while pre-construction meetings are encouraged by the City, they could be a required element of the construction approval process. These meetings would help to ensure the City's desires for natural feature preservation and storm water management are clear before ground is broken.

5.3.7 Marysville

Master Plan – Strengths

The City of Marysville's Master Plan discusses several topics that are important to water resource protection and watershed planning. The Future Land Use plan talks about preserving open space as a goal for one level of residential development. Policies in the Plan also encourage cluster housing arrangements that preserve open space and natural features. Another policy calls to amend the Zoning Ordinance to provide greater incentives for preservation of open space.

The Transportation Plan has several objectives and policy statements supporting greenways and non-motorized pathways. It calls for creating a link with the Bridge-to-Bay Trail, constructing eight-foot wide paths, requiring developers to install path segments, and developing and maintaining a path system along Gratiot. Wetlands are inventoried and mapped in the Master Plan, which describes natural features as important. The Plan also inventories and maps woodlands on a "Visual Impressions" map in the Plan.

Master Plan – Opportunities

Like most communities in the NEW, the City could consider discussing storm water and its management in the Master Plan. Specific messages could acknowledge the importance of storm water management to the health, safety and welfare of residents, and include goals to reduce and minimize the amount of storm water runoff generated by developed properties, and to treat any storm water runoff before it is directed to natural waterbodies. The Master Plan could also encourage the use of Best Management Practices (BMPs), infiltration devices, native vegetation in storm water facilities, and minimize impervious surfaces. Another idea is to relate natural feature preservation to storm water management, as preserving existing natural features is the most cost-effective method of runoff control.

Another consideration for the Master Plan is to address specific natural features in more detail. The importance of wetlands, woodlands, river/stream corridors, and floodplains to the health, safety and welfare of residents could be acknowledged in the Master Plan, along with the environmental benefits they provide, and policy statements calling for their protection and preservation. Ecological information about the water quality and shoreline conditions of the St. Clair River should be added to the Plan as well. This information, at least in part, could be taken from this watershed management plan.

Wetlands could also be categorized as to their suitability for storm water storage. This could be accomplished as part of the efforts to create a wetland bank, that will eliminate wetlands as an impediment to industrial development. Lower-quality wetlands that are protected by the state could be mitigated by the wetland bank, while higher-quality wetlands could be set aside for preservation. While wetlands and woodlands have already been inventoried and mapped, stream and river corridor information could be added to the wetlands map. A discussion and map of the watersheds in Marysville could also be considered. Having detailed environmental information in the Master Plan guides planning decisions and makes everyone more aware of the importance of these features for the City's overall well-being.

Related to natural feature preservation, the City's greenway plan could be expanded to include stream corridors, or create naturalized pathways between open areas. This would provide an aesthetically pleasing recreational corridor for residents, as well as a wildlife transportation corridor.

Zoning Ordinance – Strengths & Opportunities

Through its Zoning Ordinance, the City currently has provisions that work to minimize impervious surfaces, and thus reduce storm water runoff. The ordinance language requires that landscape islands be placed within parking lots, mitigating the impact of a large expanse of pavement. The rules also allow shared parking (reduced number of spaces per use), if the operating hours of each use do not overlap. The Open Space Plat provisions and One-Family Clustering Option allow reduced lot dimensions, and reduced front and side yard setbacks. Such provisions minimize the amount of pavement necessary to access the properties.

A main focus of water quality protection is managing storm water off of new developments and in re-development projects. A storm water management ordinance that includes specific design criteria for storm water facilities and Best Management Practices (BMPs) would help to improve the *quality* of storm water runoff, and minimize the *quantity* of runoff. Site design requirements could include vegetated buffers along drainage ways and lakeshores, limiting grading and clearing, prohibiting direct discharge into natural waterways without pre-treatment, minimizing impervious surfaces, and encouraging infiltration where possible. Additional guidelines require using storm water Best Management Practices that keep storm water above ground to encourage evapotranspiration, evaporation, and infiltration, use of native vegetation in storm water facilities, and requirements for monitoring and maintaining the system.

Other ways the City could minimize impervious surfaces is to allow more flexibility in applying the parking regulations to individual development proposals. If warranted, the Zoning Ordinance could give the Planning Commission the authority to allow fewer spaces than required by the ordinance. The parking regulations could also require some smaller spaces for compact cars, and encourage developers to use parking lot landscape islands as infiltration devices.

Natural area preservation is another topic that could be strengthened in the City's Zoning Ordinance. The City could consider a local wetlands ordinance that protects high-quality wetlands less than five acres in size. A woodlands ordinance could be adopted that requires protection of woodland resources, and replacement if removed. Stream and river corridors (and floodplains as well) could be protected through an overlay district, where additional protections for these features is "over laid" all zoning districts where the features exist. These provisions could require a naturally vegetated buffer adjacent to streams. A community program (rather than a "requirement") could also be initiated to encourage river or stream bank property owners to maintain their vegetated buffers, or restore some vegetation along the river or stream to help filter storm water that runs off their property into the river or stream. Runoff often carries sediments, fertilizers, and automobile fluids or oils, causing water pollution.

Another option is to expand the open space and clustering provisions by requiring that open space created by these development techniques are consolidated with adjacent open spaces, if available. The ordinance could also require that open spaces be maintained in their natural condition and be preserved through a conservation easement or other technique.

Lastly, the site plan review requirements could include additional provisions to protect water resources. For instance, developers could be required to preserve natural features on the site to the greatest extent possible. Site plan requirements could include showing all natural features existing on the site, and that Best Management Practices (BMPs) be shown in sufficient detail to allow review for effectiveness. Pre-construction meetings and project review during construction also help to ensure that the project is built per the approved plan.

5.3.8 Port Huron Township

Master Plan – Strengths

The Master Plan has several policy statements that help to protect water resources. It has a goal to implement an existing Storm Drainage Plan to solve existing storm water drainage problems and anticipate future needs. It also calls for preserving natural features for aesthetic qualities and preserving land along the Black River in particular for access. The Plan also calls for using recreation areas as a way to preserve natural features. The Land Use Plan designates floodable areas along the Black River as open space for drainage protection and possible recreation purposes.

In addition to policy, the Plan describes the Black River area, with its floodplains, as a very important natural resource. Woodlands and scenic areas surround the Black River. The Plan states that the importance of the River area is evidenced by new development being attracted here.

Another important topic to water quality, sanitary sewer planning, is addressed by the Township's Master Plan. Due to the poor soils in the Township, sewerage was entering drains and rivers from septic tanks. The Township has resolved this problem by connecting new sanitary lines in the developed portion of the Township to the City of Port Huron's system. However, the Plan identifies future extension of sewerage as a challenge due to cost. The Plan does have goals for the future of the system, including adding sewage lines to accommodate development in the Township, and to stage installations to provide efficient growth and revenues to pay for the system.

Master Plan – Opportunities

This community is one of the few that discuss the impacts of storm water in their Master Plan. To expand on this topic, areas where storm water is a problem could be identified and mapped in the Plan, and issues relating to storm water *quality* and *quantity* could be acknowledged and addressed. Another concept that strengthens storm water as a high-priority topic is relating the impacts of storm water to the health, safety, and welfare of residents through flooding, drinking water quality, and other problems. Goals and policies could also be added that encourage the use of storm water Best Management Practices (BMPs) to minimize, collect and treat storm water. Natural feature protection could also relate to storm water management through preservation of existing infiltration qualities.

Because preservation of natural features is a cost-effective way to manage storm water, additional details could be added to the Master Plan to form a solid basis for preservation ordinances. Maps of existing wetlands, woodlands, stream corridors and floodplains, and watershed boundaries could be compiled using data from the County. Everyone in the development process knowing where these features are is the first step in effective protection. The Master Plan could then go on to discuss the ecological and social benefits these features provide residents. A goal to protect the features while accommodating development could also be considered. Data from this watershed plan could also be incorporated regarding the ecological status of the Black River.

Soils also impact water quality, both through erosion and sanitary sewer treatment. Because so many toxins enter surface water by attaching themselves to soil particles, soil erosion is considered the most significant water pollutant. A goal to minimize soil erosion problems in an effort to protect surface waters could be added in the Master Plan. The future of septic systems in the Township will be short-lived; however, a plan to eliminate them completely could be discussed in the Master Plan in an effort to eliminate bacterial contamination from streams and lakes. Identifying and mapping areas of the Township that have suitable and unsuitable soils for septic systems will assist in planning land use and future sanitary lines.

The Township may have an opportunity in the future to create a pathway system that connects to other recreational pathways in the region. These pathway, or "greenway," systems allow communities to connect their natural areas together, and to connect with their neighbors. The paths can also be located along streams, a natural corridor, which provides the chance to protect the riparian buffer along the stream. In addition to a pleasant recreation trail, this setting would also provide a wildlife transportation corridor.

Zoning Ordinance – Strengths and Opportunities

The Township's current Zoning Ordinance has several provisions that help to minimize impervious surfaces. The Planning Commission can reduce required parking by 20% in a Planned Development District. The Zoning Board of Appeals also has the authority to reduce required parking based on the proposed parking demand. Parking lots are also required to have interior landscaped islands.

Open space preservation is handled through land use districts as well as other development techniques. To allow a Single Family Cluster development, a parcel must contain natural assets that would be preserved or enhanced through clustering. This district requires that at least 15% of the parcel be dedicated to common open space. Another district, the Planned Development District, requires 350 square feet of open space per dwelling unit, providing a minimum of 10,000 square feet of open space. Both districts allow flexibility in setback widths and lot sizes. The cluster provisions also suggest deed restrictions or covenants that run with the land to maintain the open space. Regulations in the One-Family zoning districts also intend to promote development that preserves the physical characteristics of the land and natural environment to the maximum extent possible. The Zoning Ordinance also allows lot or unit dimensional averaging, allowing the "average" lot size and/or widths to meet the minimum dimensions.

Regarding soils and soil erosion, the Zoning Ordinance states that construction shall not cause soil erosion, and requires a soil erosion permit from the County before construction can begin. Sedimentation control is also required in quarries, crushing and batch plants so that soils do not leave the property via water.

Natural feature preservation ordinances include provisions for trees and floodplains. The landscaping requirements require replacement if any trees labeled to be retained on a site plan are removed during construction. Intended results of the grading regulations include protection of trees during grading operations. Current ordinance regulations protecting floodplains list permitted uses. Grading rules also prohibit placement of fill in floodplains and water courses without appropriate approvals.

The Township's site plan review process includes a general statement that an applicant shall remove surface water without impacting its neighbor or overwhelming the storm system. Site plan review requirements include showing the location of existing drainage courses and drains, and the location, size, and type of existing trees five inches or greater in diameter. The regulations also allow the Planning Commission to request any additional information. Regulations for condominiums require more information, including wetlands, wetland buffers, floodplains, tree stands, unusual slopes, streams and water drainage areas.

Areas where the Township's Zoning Ordinance could be expanded include storm water management, minimizing impervious surfaces, and increasing natural feature protection. More detailed storm water guidelines and/or requirements could be added to more fully address the impact storm water has on the built and unbuilt environments. These guidelines could include fully detailed storm water design criteria, requirements for maintaining or creating a naturally-vegetated buffer along streams or other water features, limiting land disturbance and grading, minimizing impervious surfaces and encouraging use of

infiltration devices. The storm water guidelines could also include requiring the use of Best Management Practices (BMPs) where possible that keep storm water above ground (to take advantage of evapotranspiration, evaporation and infiltration), prohibiting discharge of storm water without pre-treatment, encouraging the use of native vegetation in storm water systems, and requiring regular monitoring and maintenance of storm water facilities.

To assist developers in minimizing impervious surfaces, the Township could encourage shared parking lots, where the number of spaces for each use is reduced, require some small spaces for compact cars, and encourage the use of landscaped islands as infiltration devices.

Existing clustering provisions could be expanded to require that open space in a new development is consolidated into larger units with any adjacent open spaces. Another protection is to require that open spaces be managed in a natural condition.

The Township could also consider specific ordinances for natural feature preservation. For instance, a local wetlands ordinance could protect wetlands less than five acres in size. A stream protection technique, such as an overlay district, could protect stream corridors throughout the Township without changing the zoning designation of existing properties. Additional requirements, such as a naturally-vegetated buffer, would be added to parcels that contain streams, floodplains, or other water features.

Lastly, the site plan review process could require developers to preserve natural features to the greatest extent possible, preserve existing drainage patterns, and show BMPs in sufficient detail to allow review for effectiveness. Pre-construction meetings and charting progress of a construction project could also assist the Township is ensuring natural features are protected and storm water systems built according to the approved site plans.

5.3.9 City of Port Huron

Master Plan – Strengths

The City's Master Plan has goals and policies that are important to storm water management. While they are not specifically included in the Master Plan to address storm water, they address it nonetheless. The Master Plan calls for preserving public and private recreation areas and open space, enhancing and expanding park and recreation facilities, minimizing paved surfaces and maximizing green space and landscaping in commercial areas, and creating a unified community-based open space system by requiring and planning open space areas in new development and redevelopment projects. Another objective states that the City wishes to focus on acquiring public waterfront access to link the regional Bridge-to-Bay Trail with the City.

Specific references to storm water include a description of the City's efforts to separate sanitary and storm lines. The Plan goes on to say that the City's storm water discharges into the St. Clair and Black Rivers is conducted through Best Management Practices (BMPs). The Master Plan also identifies storm water facilities as being critical to the continual operation and success of the City.

The Master Plan talks extensively about how the Black and St. Clair rivers are integral to the City's character and economic vitality. It discusses the future vision for both riverfronts, including a continuous walkway along the Black River, and redevelopment of industrial properties along the St. Clair River for office and recreational uses, maintaining the riverfront as public open space.

Other topics that impact storm water management include infill development, sanitary sewer systems, and greenways. The Master Plan discusses infill development extensively, and encourages it in all

districts. The appendix to the Master Plan includes many infill opportunities. The existing sewer system is mapped, however it is not included in the Master Plan. Greenways and pathways are discussed in many chapters of the Plan. The Transportation chapter has a goal to create a non-motorized pathway/greenway system throughout the City, linking together key areas including the entire waterfront as an extension of the Bridge-to-Bay Trail. The Plan provides a Pathway Plan for future development. The Commercial chapter discusses creating pathways to connect green space to neighborhoods. The Public Facilities chapter talks about linking neighborhoods, parks and other facilities through open space. The Plan also discusses using the waterways as a form of transportation.

Master Plan – Opportunities

As mentioned above, storm water management (reducing the quantity of storm water, improving the quality of storm water) could be added as a policy statement under many of the goals in the Plan. For instance, a goal for parkland and open space development could be associated with preservation of storm water infiltration areas. The Master Plan could also discuss the City's desires for how storm water should be treated in development and re-development projects. Storm water management techniques (such as Best Management Practices (BMPs)) could be added to the discussion about the City's storm water system. The Plan could also go further with goals to minimize impervious surfaces, indicating that an important reason to do so is to reduce the amount of storm water generated by a project.

Another area where the City could consider amending its Master Plan involves natural features. This watershed management plan includes information about the environmental conditions of the Black and St. Clair Rivers. This information should be incorporated into the Master Plan, including specific goals and policies that address these conditions, and possibly encouraging riverfront property owners to establish or protect vegetated buffers. The location and importance of floodplains would be a natural extension of this topic, including a map (in the Master Plan) and goals for floodplain protection. Another related topic would be expanding the Pathway Plan to include connections between natural areas (particularly along streams/rivers) to create a transportation corridor for wildlife. This makes natural areas more accessible which increases residents' awareness and desire for preservation. Lastly, watershed boundaries, and applicable goals and policies from this watershed management plan, should be considered for inclusion in the City's Master Plan.

Zoning Ordinance – Strengths & Opportunities

The City regulates the construction of storm water systems through the site plan review process. It requires that all plans include storm water discharge calculations and proposed treatment devices if applicable. The City then reviews the storm water system for discharge quantity from that site.

Impervious surfaces are minimized through parking regulations and street design criteria. The ordinance allows reductions in the number of spaces required in a parking lot if existing off-street parking facilities within 300' of the site have unused capacity. Landscaped islands are also required within parking lots of 20 spaces or more. Streets are designed according to AASHTO (American Association of State Highway and Transportation Officials) standards, which generally allow more flexibility in road design (smaller right-of-way and pavement widths) than County standards.

Additional storm water regulations and standards could be added to the City's existing rules to help reduce quantity and improve quality of storm water runoff. Examples include limiting land disturbance and grading, maintaining vegetated buffer strips adjacent to streams, rivers or other sensitive natural features, minimizing impervious surfaces, and encouraging use of infiltration devices. The ordinance language could also encourage the use of storm water Best Management Practices (BMPs) to keep storm water controls above ground (to take advantage of evaporation, evapotranspiration, and infiltration),

prohibit direct discharge of storm water into surface water features without pre-treatment, encourage native vegetation in storm water facilities, and require periodic monitoring and maintenance of storm water systems.

Impervious pavement could be reduced even further if the City allowed shared parking lots with fewer spaces than required by each use. Some small spaces for compact cars could also be required/encouraged. And developers could be encouraged to use parking lot landscape islands as infiltration areas.
Other assorted regulations could include adoption of a cluster or open space ordinance that provides applicants with flexibility in lot sizes and setback requirements. To reduce the amount of storm water reaching the rivers, the City could prohibit connecting downspouts and footing drains to the storm system. The City could also combine this requirement with education or other program about rain gardens, rain barrels, and other infiltration methods available to home owners.

The City states that both the Black and St. Clair Rivers are critical to its success. A key to helping reduce pollutants that enter these waters are naturally-vegetated buffer areas along the shoreline. While this approach wouldn't work everywhere, having some portion of each parcel planted with native vegetation will filter pollutants from runoff (fertilizers, heavy metals from automobile fluids, pet and wildfowl feces, etc.), as well as help to stabilize stream banks and shade the water for aquatic wildlife.

While the City does not have a relatively large amount of natural areas, site plan review requirements could still be used to help preserve what currently exists today. Developers could be required to preserve natural features and a site's natural drainage patterns to the greatest extent possible. The City could also require that natural features are shown on a site plan, making the development's impact on these features clear to the reviewing body. BMP techniques could also be required in sufficient detail on the site plan so that their effectiveness could be properly assessed.

5.3.10 St. Clair Township

Master Plan – Strengths

Conserving natural features is the most cost effective way to manage storm water. St. Clair Township's Master Plan discuses the community's philosophy regarding natural feature preservation. It states that the community should develop with minimal or no impacts on the natural features. One of the overall goals of the Plan is to develop in a harmonious pattern with the natural environment. The Natural Features chapter in the Plan identifies land most suitable for development, and land most suitable for recreation-conservation, and includes specific policies for natural area preservation. Objectives for residential and industrial development also strive to be compatible with the environment.

Regarding other natural resource information, the Plan provides an inventory and map of wetlands, woodlands, and floodplains in the Township. Policy statements identify woodlands as important wildlife habitat and they benefits residents by moderating climate, protecting watersheds from erosion, and improving air quality. Floodplains are discussed in a similar fashion, and the Plan states that development in flood prone areas must be carefully managed to balance economic gain from increasing flood hazards.

The Master Plan addresses sanitary sewer planning and has conducted a Wastewater Needs Study. While this study most likely includes significant detail regarding sanitary planning in the Township, a summary and a map of the sewer area district in this report could be included in the Master Plan to guide future planning. The Master Plan identifies areas suitable and unsuitable for septic systems based on

soils information. The Plan states that septic systems should be discouraged in areas with sensitive soils. The Township also uses this information to determine zoning of parcels within the community.
Soils information has also been used to identify and map prime agricultural lands. The Master Plan has goals to preserve agriculture in the Township, and describes parcels enrolled in the Farmland and Open Space Preservation Act (PA 116).

Master Plan – Opportunities

The Township could consider adding storm water management to the Master Plan as a topic of discussion. Stating the importance of storm water, the impacts it can have on natural and human resources, and that it should be effectively managed are all essential ideas to convey. Goals and policies should be considered to reduce the amount of storm water generated by new and existing development, to improve the quality of runoff, minimizing impervious surfaces, increase infiltration, and encourage the use of Best Management Practices (BMPs). Goals to conserve natural features can also be tied to preserving storm water infiltration. Another related topic to protecting water quality is the importance of erosion control, given that many pollutants enter streams and lakes through soil erosion.

While the Master Plan currently has some natural feature details, other topics that could be added include groundwater, the importance of wetlands, stream corridors, and watershed boundaries. Many residents are served by public water supply, but many have individual wells. Groundwater information (available from the state) could be inventoried and mapped, and policy statements about its importance and goals to protect it added to the Master Plan. Calling for groundwater protection should be tied to preserving the health, safety and welfare of residents. Wetlands are currently identified and mapped, but a discussion about the important benefits they provide, and a policy or goal calling for their protection could be added to the Master Plan. Ensuring that buffers are maintained or created around these sensitive features could also be a policy of the Master Plan. The discussion of stream corridors could be expanded to describe the streams' water quality and stream bed conditions. The importance of streams could be stated, along with policies for their protection. Lastly, watershed boundaries could be mapped and provided in the Master Plan.

The Township has planned for a pedestrian pathway/greenway through the Zoning Ordinance, called the Range Road Overlay District. To provide a policy basis for this regulation, the Master Plan could describe the Township's vision for pathways in the community. Part of this could include connecting natural areas and use stream corridors as part of the pathway system. Including these features in a recreation facility would help preserve them, and make residents more aware of the unique features in their community.

Zoning Ordinance – Strengths and Opportunities

The Township's Zoning Ordinance is strong in provisions for open space preservation. There is a Planned Unit Development (PUD) and Open Space Preservation Option that encourage the conservation of natural resources. One condition for a PUD approval is that the design provides long-term protection of natural resources. PUD provisions allow greater density; however, natural resources must be preserved to the maximum extent feasible. The Open Space Preservation Option's purpose is to preserve open space areas, particularly those with significant natural features. This option does not provide for an increase in density, and requires that at least 50% open space be protected in perpetuity. Both options allow for reductions in minimum lot sizes. The ordinance requires that open space connection be designed to permit the potentially continuous interconnecting of open space areas in one development with open space areas in other developments. It also requires that protective covenants be provided to protect the open space over time. Preservation of natural features is also discussed in the Rural district, which allows agriculture.

The Range Road Overlay District is another method where natural features are considered. This district promotes alternative means of transportation through the development of non-motorized pathways and preservation of natural resources. It states that natural features, including woodland and wetlands, provide important ecological and aesthetic functions along the corridor.

Other zoning provisions work to protect water resources. For instance, the Township has the flexibility to reduce the number of spaces in large parking lots (over 100 spaces). It also allows shared lots where the hours of operation do not overlap, and require landscaped islands in parking lots. Setbacks and buffers are applied to composting facilities, protecting surface waters from runoff. An isolation distance of 500' is required from any surface water, and the setback must be maintained in a natural state. Composting facilities are also prohibited in floodplains.

The site plan review process has several positive provisions for water quality. It requires developers to preserve natural features to the greatest extent possible, and requires natural features on a site to be shown on the site plan for review.

A main focus of water quality protection is managing storm water off of new developments and in re-development projects. A storm water management ordinance that includes specific design criteria for storm water facilities and Best Management Practices (BMPs) would help to improve the *quality* of storm water runoff, and minimize the *quantity* of runoff. Site design requirements could include vegetated buffers along drainage ways and lakeshores, limiting grading and clearing, prohibiting direct discharge into natural waterways without pre-treatment, minimizing impervious surfaces, and encouraging infiltration where possible. Additional guidelines require using storm water Best Management Practices that keep storm water above ground to encourage evapotranspiration, evaporation, and infiltration, use of native vegetation in storm water facilities, and requirements for monitoring and maintaining the system.

To address the preservation goals and policies in the Master Plan, the Township may want to consider adopting several natural feature preservation ordinances. A local wetlands ordinance would build on state protection of wetlands. The local rules would protect wetlands smaller than five acres in size, which constitutes many of the remaining wetlands in the watershed. A woodlands/tree ordinance would protect stands of trees, and could require one-for-one replacement if protected trees are removed. Another way to achieve natural feature protection is through an overlay zone. The overlay zone simply places additional protections on features regardless of the underlying zoning. So, an overlay zone that protects stream corridors could be applied to a stream in any district. The overlay zone could include a buffer requirement adjacent to streams, and specific setbacks from wetlands or other surface waters.

Relatively simple ways to minimize impervious surfaces is to require some small parking spaces for compact cars, and encourage developers to use landscaped islands as infiltration devices.

5.3.11 City of St. Clair

Master Plan – Strengths

In relation to storm water management, preservation of natural features is a very cost effective method to ensure runoff doesn't become a problem. The City's Master Plan calls for conserving limited natural resources in relation to residential development on vacant land. The document, "The Future of St. Clair – Beyond the Impossible Dream," also has a goal for environmental protection and beautification. To support preserving natural features, the Master Plan also discusses the City's desire for infill

development, which guides development away from "greenfields," and into sections of the City that are already urbanized.

As limiting runoff helps to protect water resources, sanitary sewer planning also achieves this goal. The Master Plan describes the City's efforts to separate storm and sanitary lines, which has had an immediate and positive effect on water quality in the St. Clair River. The Plan also delineates and maps the sewer service area, including all the facilities (manholes, pipes, etc.) in the system. Lastly, the Plan ties effective sanitary sewer planning to the health, safety and welfare of residents, an important basis upon which regulations can be made.

Greenway planning is included in the checklist because of the potential for preserving natural areas and riparian corridors through construction of recreational trails. While there is not an actual greenway plan in the Master Plan, the City talks about considering a bike/pedestrian trail system, and a riverwalk along the Pine River. These ideas also discuss connecting natural areas through greenways and connecting the City to neighboring communities.

The Master Plan also identifies important goals for waterfronts. One goal is to designate riverfront conservation areas on vacant parcels to conserve floodplains. These areas have been mapped, but only identify parcels along the Pine River (and outside the Northeastern Watersheds).

Master Plan – Opportunities

Like many communities within the NEW, the City of St. Clair does not use the Master Plan to talk about the importance of storm water management, and the concepts of minimizing impervious surface and maximizing infiltration to reduce runoff. However, an appropriate place for the City of St. Clair to communicate its visions for better water quality in the St. Clair and Pine rivers is in its Master Plan. For an urbanized environment, retrofit solutions will be necessary, and many will include education of and participation by residents and current property owners. Examples include a program to disconnect downspouts from the storm system, or help residents install rain gardens to improve infiltration of storm water.

Some concepts to consider include the importance of storm water runoff, its impact on surface water quality and stream and river shorelines, and how the City wants to improve these effects. The use of storm water Best Management Practices (BMPs) could be discussed, or added as a goal. BMPs should work to reduce the amount of runoff in new development, re-development, and possibly by current development with retrofit solutions. Ways to impervious surfaces and increase infiltration would minimize storm water runoff. BMPs should also be used to reduce water pollutants by filtering storm water before it reaches a stream, river, lake or wetland. Lastly, sediments role in delivering pollutants to water features should be discussed, and goals and policies to improve erosion control in the City could be considered.

The current discussion about greenways could be expanded to strive for riparian preservation through construction of the pedestrian trail. Another purpose of the trail could be to provide a wildlife transportation corridor between natural areas. The trail plan could be coordinated with natural feature inventories, such as wetlands, woodlands, and stream corridors, to ensure the remaining features in the City are protected. The inventories could also be the basis for goals and policies in the Plan to preserve these areas, and recognize the importance of the functions they provide, particularly storm water management. Environmental information about the water quality and shoreline conditions of the St. Clair River should also be included in the Master Plan, along with appropriate goals from this watershed management plan for future improvements. Watershed boundaries could also be added.

Zoning Ordinance – Strengths and Opportunities

The City has current ordinances that help to minimize impervious surfaces. First, they allow the reviewing body flexibility in the number of parking spaces required for a development. If the use warrants less parking than required by ordinance, they have the ability to approve fewer spaces. Secondly, parking lots of a certain size are required to be planted with trees. This replaces some impervious pavement with soil and plants that absorb rain water. Thirdly, the City has jurisdiction over construction of its roads, and can therefore design roads to minimize pavement and right-of-way widths. This helps to reduce the necessary grading and clearing, leaving plants in place to manage storm water.

One zoning district, Planned Unit Developments (PUDs), allow for flexibility in site design that results in long-term protection/preservation of natural resources. This district also allows for smaller setbacks and lot widths and sizes, helping to minimize the amount of roadway and driveways necessary to access each lot. Trees and floodplains are also protected by individual ordinances. If trees are to remain on a site plan, and they are cut down, then the ordinance requires these trees are replaced. The floodplain regulations coordinate with the City's participation in the National Flood Insurance Program.

A unique provision of the City of St. Clair is to require a grading plan for single-family and two-family home construction to ensure that storm water runoff doesn't pose a problem for existing adjacent structures.

The site plan review process also help to protect water features by requiring that all natural features be shown on a site plan, and that a pre-construction meeting is held to ensure the developer is aware of areas to be protected.

A main focus of water quality protection is managing storm water off of new developments and in re-development projects. A storm water management ordinance that includes specific design criteria for storm water facilities and Best Management Practices (BMPs) would help to improve the *quality* of storm water runoff, and minimize the *quantity* of runoff. Site design requirements could include vegetated buffers along streams and rivers, limiting grading and clearing, prohibiting direct discharge into natural waterways without pre-treatment, minimizing impervious surfaces, and encouraging infiltration where possible. Additional guidelines require using storm water Best Management Practices that keep storm water above ground to encourage evapotranspiration, evaporation, and infiltration, use of native vegetation in storm water facilities, and requirements for monitoring and maintaining the system.

Impervious surfaces could be further minimized in parking lots by encouraging shared parking between uses, allowing less parking than each use requires individually. Allowing a certain number of spaces with smaller dimensions for compact cars would also help to limit pavement. Landscape islands in parking lots could also be used as infiltration devices, lessening the amount of rainwater that runs off the parking lot into the storm system.

While the current PUD provisions work to protect natural features from development, they could be strengthened by requiring that the open space be consolidated with any adjacent open spaces in neighboring developments. This creates a larger unit of open space which functions better environmentally. Also, requiring open spaces to be managed in a natural condition, and protecting the open spaces with a conservation easement or other method will sustain its ability to infiltrate runoff into the future.

The City may also want to consider a wetlands ordinance, and/or an overlay district to protect riverside vegetation. A local wetlands ordinance protects wetlands that are less than five acres in size, the limit for state protection. Stream corridors could be covered by an overlay district, which adds additional

protections to the stream and adjacent buffer area to all zoning districts. The underlying provisions still apply. Another possibility is requiring the developer to maintain or create a stream side vegetated buffer. "Riparian" or streamside vegetation filters overland flow from adjacent properties, stabilizes stream banks, and shades the aquatic habitat in the stream. In addition to zoning regulations, the City could encourage stream and riverside property owners to establish at least a partial vegetated buffer along the water's edge. Many lake communities have begun this practice and have seen improvements in water quality and lakeshore conditions.

Lastly, developers could be required to protect natural features to the maximum extent practicable in all developments, not just PUDs. The City could also require that storm water BMPs be provided on the site plan in sufficient detail so that their effectiveness can be properly evaluated before construction.

5.4 Planning Document Analysis – Non-Phase II Communities

Some watershed communities in St. Clair and Sanilac counties are not required to obtain a Phase II permit at this time. The St. Clair County communities include Brockway, Grant, Greenwood, and Kenockee Townships, and the City of Yale. Buel, Freemont, Speaker and Worth Townships are the non-participating communities in the Sanilac County portion of the watershed. Checklist reviews were completed for the communities with planning documents, and are included in Appendix L.

While these communities are not currently required to address storm water management, it would be prudent to consider this issue before future development possibly causes problems with runoff and water quality. In addition, as these communities develop, they will eventually become covered by the storm water program, and be required to participate. This document will assist them in preparing for this time.

The checklist questions indicate desirable actions for water resource protection. Therefore, each community should review their checklist to determine areas where they could address storm water management and water quality issues. In addition, the non-phase II communities should consider the overall planning recommendations at the beginning of this chapter.