4.0 Land Use and Development Policies

With ten jurisdictions in the planning area, a number of land use policies are in place, including comprehensive plans and zoning codes, to address planned and permitted development within the watershed. In addition, several existing regulations, policies and environmental initiatives have been considered in the development of this plan as described in Chapter 2. A key factor in implementing the Big Darby Accord Plan will be finding an approach to coordinating and enforcing current policies and new policies in a consistent manner to ensure the watershed is protected. This chapter describes the supporting policies that each jurisdiction will need to consider as they implement and pursue adoption of the Big Darby Accord Plan.

4.1 General Development Practices

Protection of Environmentally Sensitive Areas

The main goals of the Big Darby Accord planning effort are to preserve and protect areas that contribute the most to water quality, to protect them from degradation from development land uses and to improve the overall aquatic habitat within the Franklin County portion of the Big Darby watershed. To establish some priority to the protection of different environmentally sensitive areas, conservation tiers have been established based on best available data (see Section 3.1). These areas can be protected through policies and programs established by each jurisdiction and through land conservation efforts between the Accord and its partners.

- Tier I – floodplain, riparian corridors, in-stream habitat areas, wetlands, critical groundwater recharge areas, pollution potential zones
- Tier II – highly erodable soils, wooded areas greater than 3 acres
- Tier III – trails, habitat buffer areas, connectivity corridors

Green Building

Each jurisdiction should encourage development that meets the prerequisites identified within the Leadership in Energy and Environmental Design (LEED™). LEED™ encourages and accelerates global adoption of sustainable green building and development practices through the creation and implementation of universally understood and accepted standards, tools and performance criteria (USGBC, 2006). Guidelines for LEED™ for Neighborhood Design (LEED ND) are in draft form and should be encouraged for residential developments. If a development meets or exceeds identified LEED™ targets the jurisdiction should consider providing some type of financial incentive to the developer.

4.2 Environmental Components

Recommended polices related to the protection of the riparian corridor, floodplain and wetlands are described in the following sections.

4.2.1 Riparian Corridor Protection

Riparian corridor protection is essentially the establishment of a stream setback that, once implemented, precludes certain activities from occurring within a specified certain distance of all stream channels. The setback would apply to all changes in land use within the planning area. It may also apply as a retrofit to existing agricultural land uses under a prescribed incentive program. This plan assumes that the policy for riparian corridor protection applies to future development activities where the

Erosion and down-cutting along "Son of a Ditch" Tributary
Source: The Nature Conservancy/ Anthony Sasson

Improved stream corridor zone
Source: EDAW

Section Outline

Key Recommendations

- Adopt permitted, conditional and prohibited uses for open space areas based on Plan recommendations.
- Perpetual easements should be required for open space areas in conservation developments along stream corridor protection zones.
- All easements should be held jointly and in perpetuity by home owners association or local conservation group and either local jurisdiction or Franklin Soil and Water Conservation District.
- Jurisdictions should develop consistent guidelines for easement maintenance.
- Easement should have a 5 year staggered performance bond to ensure successful planting and design.
- Land areas associated with Tier 1, 2 and 3 resources may be counted toward the calculation of gross density of a development site.
- Development in proximity of regional trail system should be required to provide connections.
- Develop a regional trail along Big Darby and Hellbranch.
- Require 50% open space in all conservation developments and offer incentives for increases in open space.
- The location of open space in conservation developments should be dictated by environmentally sensitive resources in Tiers 1, 2 and 3.
- Open space in conservation developments should link to adjacent open space.
- At least 75% of the open space area in the conservation development should be contiguous.
- Development in conservation development should not front external roadways.
- Large lot development applicants should collaborate in lot layout and design.
- Large lot development should encourage that at least 50% of the site be place in conservation easement.
- The County should adopt proper legislation to review all development proposals that are greater than 5 acres in size.
- Establish an Open Space Advisory Council.
- The proposed mixed use Town Center should set a new standard for sustainable urban development.
- Brown and Prairie Townships should coordinate the development of new zoning for the Town Center area.
- The proposed Town Center should include a mix of housing types as well as commercial, retail, office, institutional and park uses.
- The stream corridor protection zone (SCPZ) shall be the greater of either the 100 year floodplain boundary, the calculated streamway (beltwidth) or a minimum of 100' setback from centerline of intermittent, perennial and ephemeral streams.
- The SCPZ should include designated wetlands and slopes exceeding 15%.
- Adopt permitted, conditional and prohibited uses for SCPZ based on Plan recommendations.
- Allow stream restoration as a permitted or conditional use within the SCPZ.
- Protect the integrity of wetlands and diminish their loss within the planning area.
- Mitigation of any filled wetland should occur in the Darby Accord Planning Area.
- The SCPZ used to compute gross density must be delineated on plan and on site and must be placed in a joint easement.
- Pursue acquisition along Clover Groff and Hamilton Run streams for stream restoration.

stream setback can be incorporated into the development process. The commonly applied terminology for the stream setback is Stream Corridor Protection Zone (SCPZ).

Determination of the Stream Corridor Protection Zone

There is consistency among the referenced policies and environmental initiatives with regard to establishing the width of stream setbacks. Research conducted cooperatively by The Ohio State University and the Ohio Department of Natural Resources (ODNR) determined the stream corridor necessary to accommodate stable stream channel geomorphology. The research examined the meander pattern of streams within Ohio and compared it to information for streams outside of the state, and related that physical condition to the watershed area of the stream. The research determined an equation for calculating a 'streamway', also referred to as a 'beltwidth'. The original streamway/beltwidth equation was used to determine the Tier 1 stream setback (riparian buffer) areas in the environmental sensitivity analysis, is referenced by the Hellbranch Overlay and the Ohio EPA's draft stormwater general permit, and is a consensus recommendation of the EAG.

Key Recommendations (continued)

- Stream setbacks should provide adequate area for restoration activities.
- Incentives should be considered to encourage regional stream restoration efforts.
- Explore wetland mitigation banking.
- Work with the farming community to implement BMPs.
- Post construction groundwater recharge rate must equal or exceed pre-development recharge rates (NPDES/OEPA permit).
- Groundwater recharge areas should be protected through binding conservation easements.
- All site development plans must include a Stormwater Pollution Prevention Plan (construction phase).
- A sediment settling facility must be provided with a goal of releasing a max of 45 mg/l of TSS for up to a .75" rainfall in 24 hours (construction).
- Water quality volume control is defined by OEPA draft permit & siting requirements should be developed as part of the site design.
- Stormwater treatment and BMP design criteria must meet water quality targets set by the OEPA TMDL for TSS, TN and TP.
- Non-structural BMPs should be evaluated as part of the conceptual site design process.
- Minimize directly connected impervious areas.
- Follow the 8 step BMP planning process to determine required level of BMPs for site development.
- Utilize BMPs as identified in the BMP toolkit or other appropriate practices to meet water quality targets and plan goals.
- All post construction BMPs require submission of a maintenance plan.
- Easements are required for all BMPs to provide access.
- Regional stormwater facilities in Town Center should be maintained by a public entity, and site level BMPs should be maintained by the homeowner or homeowner association with proper operation and maintenance plan.
- Available sewer capacity for Town Center is 5,000 equivalent dwelling units; additional capacity may be available in the future.
- Provisions for extension of sewer service have been developed by City of Columbus.
- Town Center will receive central sewer through extension of the Big Run Trunk sewer.
- The Hilliard growth area and LEED area will receive central sewer through extension of the Roberts-Millikin sub trunk sewer.
- Franklin County Sanitary Engineer is identified as candidate for owning and operating the central sewer lines in Town Center.
- Areas not receiving central sewer would receive sewer service through alternative community-based sewage treatment systems.
- New standards and regulations related to methods, application and regulation of both community based systems & on-lot systems that meet OEPA and Board of Health requirements must be developed & applied
- Franklin County Sanitary Engineer has been identified as candidate for owning and operating community based sewage treatment systems
- Limit the proliferation of single-lot sewage treatment systems and encourage alternative community based systems.

W - width of streamway/beltwidth
DA – drainage area in square miles

Original equation:

$W = 117 \times DA^{0.43}$
(for DA less than or equal to 16 square miles)
$W = 87 \times DA^{0.43}$
(for DA more than 16 square miles)

A more recent version of the equation is presented in the City of Columbus' revised Stormwater Drainage Manual. The final policy recommendation from the Accord is to apply the updated equation for determining the SCPZ, which is consistent with HWF recommendations.

Updated and recommended equation:

$W = 129 \times D.A.^{0.43}$
(for DA less than or equal to 16 square miles)

Note: Research related to the development of the streamway/beltwidth equation is on-going and is anticipated to result in changes to the equation. Further coordination with ODNR would be required to determine the suitability of a revised equation to conditions within the Accord planning area.

For watercourses meeting the definition of a stream channel, the SCPZ shall be the greater of the boundaries described below.

- The FEMA designated 100-year floodplain (see floodplain discussion below and in Section 4.7).
- The calculated streamway/beltwidth using the updated equation.
- A minimum of 100 feet extending from the centerline of the stream channel on both sides of the watercourse.

Presently the Ohio EPA is considering a change to the draft NPDES permit for the Big Darby Creek Watershed that would allow the SCPZ to be less than the width of a designated 100-year floodplain. This allowance applies only when stream restoration is to be performed along the specified reach of the watercourse. In this case, the physical modifications to the watercourse may redefine the SCPZ. Furthermore, it may provide opportunities for different land uses within the residual portions of the 100-year floodplain. This approach is a strong incentive for stream restoration and is recommended for use within the Accord planning area.

Ashy Sunflower
Source: Metro Parks/John Watts

Although there is an incentive for stream restoration, consideration should be given to the larger goals for restoration that are discussed in Section 3.6. Stream restoration activities within the planning area should be guided by a committee that understands the restoration needs in a regional context. Restoration activities that are not consistent with the larger goals throughout the planning area should not be encouraged.

Permitted, Conditional and Prohibited Uses

Permitted uses are allowed within the SCPZ without restrictions. Conditional uses may occur only after further consideration by the overseeing authority and may require the application of conditions to be met as a component of that activity. An example of such a condition would be mitigating activities to restore disturbed areas. Prohibited uses may not occur except if granted a variance or exception by the overseeing authority. The variance or exception process has not been developed; however, it is foreseeable that the process would include a multi-step evaluation intended to demonstrate that the use, if approved, would have no degrading impact to water quality and/or habitat within the stream channel and would require mitigation as in the case of a conditional use.

A detailed discussion of permitted, conditional and prohibited uses within the SCPZ is provided within the EAG final report, Appendix 9-3 of the draft revised 208 Plan and in the policy recommendations provided by the HWF. Given that extensive documentation, a detailed discussion of those uses is not presented here; however, general descriptions are provided below.

- Permitted Uses: passive recreation, vegetative enhancement, and arterial street crossings.
- Conditional Uses: stream bank stabilization, public utilities and non-arterial streets (Notes: the City of Columbus' Stormwater Drainage Manual allows for wetland mitigation and enhancement of existing wetlands to occur within the SCPZ. While there is no precedent for this in the reference materials described above, it is suggested that the SCPZ policy account for certain stormwater BMPs to occur within this area as a conditional use. These BMP's, such as grassed or enhanced swales, should only be allowed where they are necessary to facilitate an outlet to the receiving stream channel.)
- Prohibited Uses: grading activities and land uses commonly associated with a development process and land application of waste water effluent.

It is recommended that activities related to stream restoration be considered either a permitted or conditional use within the SCPZ. Designation as a conditional use would give the overseeing authority the ability to review stream restoration proposals and establish and apply conditions for consistency related to restoration activities within the larger planning area.

Other Considerations

Other recommended policies related to SCPZ are described below.

- Area set aside within the SCPZ may be used in computing gross site density associated with a development.
- The extent of the SCPZ must be clearly delineated and labeled on all zoning, platting and engineering documents associated with a development. The location of the SCPZ must be delineated in the field during construction and permanently designated in an aesthetically

harmonious fashion (often interpreted as intermittent split rail fencing with appropriate signage).

- The SCPZ must be platted as a 'reserve' area, not included within any individual platted lots and placed in a permanent easement held jointly by an established homeowners association (residential) , land conservation group (501c3), or other property ownership (commercial) and either the local jurisdiction or FSWCD. A planting plan and management plan should be developed for the easement that outlines a program for planting the easement and the regular inspection and maintenance of the dedicated SCPZ easement.
- Enhancement of a degraded riparian area in the form of planting of appropriate vegetation may be required or could be implemented under an incentive program.

Application of the Stream Setback Requirement

The stream setback requirement applies to all perennial, intermittent and ephemeral streams, as defined by the US Army Corps of Engineers. When determining the setback boundaries, the following considerations must be accounted:

- The boundaries of the 100-year floodplain should be interpreted using the published 100-year flood profile and the best available topography along the watercourse. The use of published flood hazard information, including 100-year flood elevations or flood boundaries, should include any Letters of Map Correction (LOMC) issued by FEMA that include revisions to that information. LOMCs include Letters of Map Revision (LOMR) and Letters of Map Amendment (LOMA).
- The width calculated from the streamway/beltwidth equation is a total width including both sides of the stream. The mapping of this width along the watercourse should reflect the current meander pattern of the stream channel and may not be uniformly distributed on both sides.
- The SCPZ should be extended to include designated wetlands and slopes that exceed 15-percent where those features begin within the established SCPZ.

Exceptions Within the SCPZ

The draft NPDES permit for the Big Darby Creek watershed contains provisions related to mitigation for any impacts that may occur within the specified stream setback area. Furthermore, state and federal permitting guidelines related to impacts to perennial, intermittent and ephemeral streams require a suitable mitigation. In both instances, the provisions would result in restoration to riparian buffer areas and/or stream channel restoration that vary depending on the extent of the proposed impact. Section 3.6 provides information regarding the mitigation process and how it can be used to generate beneficial restoration within the Accord planning area.

Areas within the Town Center are likely to be a higher density of development and may encounter difficulties when applying the SCPZ to all stream channels, particularly ephemeral streams. In recognition of the importance of the Town Center to the economic viability of the General Land Use Plan and the need to generate beneficial opportunities for stream restoration within the planning area, it is proposed, as an exception to the stated criteria that the Accord permit impacts to those channels within the Town Center area where avoidance is not practical. When impacts to stream channels corridors occur, both the NPDES permit for the Big Darby Creek watershed and state and federal permitting guidelines for mitigation should be followed with the intent of contributing to stream restoration opportunities within the Accord planning area.

4.2.2 Wetland Preservation and Mitigation

One objective of the Darby Accord Plan is to preserve existing wetlands to the extent possible. Identification of existing wetlands within the planning area was limited by existing information available through the National Wetland Inventory. The actual determination of jurisdictional wetlands within the planning area must occur as part of any development process, wherein a verified delineation should be required. As stated within the SCPZ policy recommendations, any wetlands at least partially within the SCPZ is included within and wholly protected under the provisions of the SCPZ.

For wetland areas not protected by the SCPZ, the U.S. Army Corps of Engineers and the Ohio EPA have anti-degradation requirements related to jurisdictional wetlands. Under Section 404 of the Clean Water Act, the Corps of Engineers can require a permit for fill of a jurisdictional wetland. Depending on the size of the wetland fill, the requirement may be for a Nationwide Permit (NWP) or for an individual permit, including a Section 401 permit from the Ohio

Wetland
Source: EDAW

EPA, which requires mitigation for the loss of wetland area. Mitigation is typically in the form of replacement wetland acreage within a larger watershed area. Whether a delineated wetland is preserved or impacted by development activity on a site, policies should protect the integrity of wetlands and diminish their loss within the planning area.

- All delineated wetlands should be properly documented and shown on zoning, platting and engineering documents associated with the development process.
- Site development design should ensure that adequate hydrology is maintained to any preserved wetland under the post-construction condition; however, the wetland cannot be used as part of the stormwater management scheme for a development. Preserved wetlands should be adequately delineated in the field and protected from stormwater runoff during construction.

Verification of any required permitting for wetland fills must be provided as a condition of final approval of the site development plan. Due to the length of time commonly associated with an individual permitting process, some consideration may be given to allowing a demonstration that the permitting process is substantially complete.

Mitigation of any filled wetland areas should occur within the planning area and incentives can be provided. Allowing wetland mitigation to occur within the SCPZ or within converted (from agriculture) or preserved conservation open space that is part of the Accord planning area should be considered.

At Serenbe, a conservation development in the hill country of Georgia, 70% of the land is protected in open space.
Source: EDAW

4.3 Open Space

The Accord jurisdictions should work cooperatively to permanently protect Tiers 1, 2 and 3 areas. The protection of these areas will be made possible through adopted policies as well as programs and new funding sources that will be created by the Accord. Efforts to protect land must be coordinated across jurisdictions and among agencies that are already working in the planning area such as ODNR, Metro Parks and FSWCD.

The identification of environmentally sensitive resources should be a requirement for all development proposals as part of a development review checklist that is further described in Section 5.0. Development plans and proposals should demonstrate the protection of resources to the maximum extent possible. The location of open space on any development site, such as a conservation development that sets aside 50% of the site, should be dictated by the location of environmentally sensitive features within the tiers and the topography and features of the land. Development should be permitted within the Tier areas, subject to all zoning, subdivision regulations, permitting and environmental standards set forth in this Plan and other regulatory requirements such as those issued by the Ohio EPA.

Permitted uses within open space areas should first consider environmental regulations described in earlier sections that may prohibit certain uses in stream corridor protection zones or wetlands.

- Permitted Uses: passive recreation including trails, vegetative enhancement, reforestation, removal of damaged or diseased trees, stream bank stabilization/restoration, public utilities, non-structural best management practices, minor disturbances related to the construction of the permitted use, land application of waste water effluent (outside SCPZ or wetlands)
- Conditional Uses: active recreational uses limited to multi-purpose fields, playgrounds
- Prohibited Uses: grading activities and land uses commonly associated with a development process, development

Land Acquisition

The Accord should support Metro Parks, FSWCD, The Nature Conservancy, NRCS, ODNR and others in their efforts to acquire and protect land. The Accord General Land Use Plan and conservation tiers should in no way limit or hinder conservation efforts of other organizations for lands that may be outside the tiers. To implement the plan and help protect water quality

goals, Accord jurisdictions should target acquisition efforts to Tiers 1 and 2. Elements within these areas that include:

Tier 1

- Floodplain
- Riparian Zones
- Wetlands
- Critical groundwater recharge areas
- Pollution potential zones

Tier 2

- Highly erodable soils
- Wooded acres greater than 3 acres

Open Space Advisory Council

The Accord should establish an Open Space Advisory Council to provide guidance for land acquisition, funding and other conservation efforts. The Advisory Council should include representatives from Metro Parks, Franklin Soil and Water Conservation District, The Nature Conservancy, ODNR, OEPA, NRCS, OSU Extension and the local affected jurisdictions. Consideration can also be given to including interested land owners and local conservation organizations. Members on the Advisory Council should have a role in land ownership and/or oversight in the Accord planning area. The Accord and Open Space Advisory Council should organize a series of roundtable discussions to encourage dialogue among residents about the benefits of land conservation and to encourage participation in programs. This effort should emphasize the value of open space and can be coordinated to educate property owners about best management practices.

Easements

To ensure that open space areas are properly maintained and managed over the long-term and to ensure continuity of care between property owners, easements should be created for the open space areas that are part of any conservation-style development and along SCPZs. Easements can provide economic benefits to property owners. For larger lot developments that occur outside of conservation developments, local jurisdictions should encourage at least 50% of the site be placed in a conservation easement to ensure proper care and natural vegetative features.

All easements should be held jointly and in perpetuity to allow for perpetual inspection and enforcement. Appropriate parties for the joint easements include Home Owners Associations, qualified conservation groups (501c3), local governmental entities, or the Franklin Soil and Water Conservation District.

Appropriate uses for the open space, maintenance requirements, and overall treatment of the easement should be stipulated in the easement agreement. A 'double' easement will allow access to the site for inspection, enforcement, and monitoring of the open space and enforcement of easement requirements. In the event the party responsible for maintenance of the open space easement fails to maintain all or any portion in reasonable order and condition, the appropriate governing body should assume responsibility for its maintenance and should enter the premises to take corrective action, including the provision of extended maintenance. The costs of such maintenance should be charged to the homeowners association, or to the individual property owners that make up the homeowners association and may include administrative costs and penalties. Such costs should become a lien on all subdivision properties.

Maintenance of Open Space Areas

All jurisdictions should adopt consistent guidelines for the maintenance and care for privately held open space lands or land held within easements. These guidelines should be developed in coordination with Open Space Advisory Council. Overall, it is the desire that open space in conservation subdivisions is managed such that the recharge rate is maintained or improved. If onsite infiltration is infeasible, or if open space is inadequate to maintain this infiltration rate, mitigation with off site infiltration may be allowed.

To encourage the proper and most ecologically beneficial conversion of denuded areas to areas with native vegetation and plantings, developers should be required to work with Franklin Soil and Water Conservation District and the local jurisdiction to develop a planting plan for any open space easement. The planting plan should be submitted at the time of application and should identify appropriate native plants, soil requirements and water requirements for the open space area.

Developers should be required to plant the initial cover and should be subject to a 3 year performance bond too ensure a successful outcome followed by a 2 year bond at a reduced rate to ensure maintenance procedures are followed. The performance bond will be released upon inspection by the local jurisdiction. The use of stewardship fees should also be considered as a way to cover administrative, inspection and legal costs associated with perpetual enforcement of easements. FSWCD has developed a stewardship fee model that should be consulted for applicability.

Furthermore, as part of the planting plan, the applicant should submit a long-term management plan that provides for the following:

1. Allocates responsibility (easement) and guidelines for the maintenance and operation of the open space and any facilities including ongoing maintenance and long-term capital improvements;
2. Cost estimates and staff requirements for maintenance, operation and insurance for the easement and identification of funding sources;
3. Provides for any changes to the plan to be approved by the local governing body; and
4. Provides for future enhancement of the plan and allows for stream restoration activities.

4.4 Conservation Development

Conservation development is the recommended land use approach for new development in areas outside the Town Center, in the Hilliard growth area, and in select locations along the eastern border of the City of Columbus. Conservation development will provide increased opportunities to protect important natural resource features and water quality, provide opportunities to reduce costs related to best management practices through natural applications and provide opportunities for the application of approved community wastewater treatment technologies. A minimum parent tract size of 20 acres of contiguous land is suggested for conservation developments in the rural and Hilliard growth areas.

Local ordinances must facilitate conservation-style development. Accord jurisdictions should work together to develop an (overlay) zoning classification for conservation development areas consistent with the General Land Use Plan map. It is recommended that Brown, Prairie and Pleasant Townships work together with the County to develop an overlay ordinance that could be applied to all three jurisdictions to address the rural conservation development land use category. The City of Hilliard should create a conservation development zoning district that parallels the rural conservation overlay but is oriented to 1 unit per acre. Collaboration among the jurisdictions will ensure continuity and consistency in application and provide property owners and developers with more clarity. At a minimum, the conservation development zoning should address:

- Purpose and Authority
- Definitions
- Requirements for clustering
- Designation and treatment of open space
- Regulations for open space
- Permitted land uses and residential densities
- Minimum acreage requirements
- Bonuses/Incentives
- Requirements for easements, maintenance and oversight of open space
- Provision of underground utilities
- Other development standards (setbacks, signage, trees)

It is strongly recommended that the Accord jurisdictions discourage conventional subdivisions, which are inconsistent with the goals of this plan, by building in flexibility and incentive opportunities with conservation development. In addition, conservation developments should strive to provide a mix of residential options and housing types.

Character

Conservation developments should celebrate the rural character of the watershed. Housing types should be varied within developments and encourage creativity to meet the needs of mixed incomes. Dwelling units should not be permitted to front along any existing external roadway.

Design and Open Space Requirements

Development potential of any conservation development will need to take into consideration environmental site conditions, required best management practices, environmental policies and the availability of on-site sewer and water. Development should minimize site disturbance and promote the efficient use of land.

	Open Space Preserved	Land Conserved Acres	Land Developed Acres	Bonus Density	# of Lots or Units
Rural Area 100 acres	50%	50	50	Zero	20
	60%	60	40	15%	23

Figure 4.1 Example Rural Conservation Development Area Incentives
Source: EDAW

Development in these areas must be designed using a cluster approach with a minimum of 50% of the gross area of a development site set aside as natural open space. This concept is commonly associated with and promoted by Randall Arendt in a book entitled "Rural by Design." At least 75% of the open space within a conservation development (based on gross area of the site) should be a contiguous tract. (OEPA 208 Plan). The open space should adjoin any neighboring areas of open space, other protected areas and non-protected natural areas that would be future candidates for protected open space. The contiguity requirement may be waived if the use of the open space in another fashion is necessary to achieve important ecological protection or to maximize ecological benefit.

Any area of natural open space that is proposed to be disturbed during construction or otherwise not preserved in its natural state should be shown on development plans and should be restored with vegetation that is compatible with the natural characteristics of the site.

Density
Greater open space set asides are encouraged in all conservation development areas by a sliding scale approach that allows the gross density to rise if the net area consumed by development is reduced. Appropriate density increases must consider impact on local utilities and should be evaluated on a case by case basis.

When considering density incentives, it is recommended that the maximum increase of units be limited to a 10-15% increase over the gross permitted density. Additional density bonuses may be appropriate in the rural areas if the development proposal can demonstrate it meets requirements for community-based sewage treatment. Figure 4.1 shows how a density bonus can be applied.

Accord jurisdictions should consider offering incentives for applicants that agree to complete stream restoration. The method for stream restoration should be consistent with Accord Plan recommendations and should be encouraged on a regional scale where maximum benefit can be achieved.

Impervious Surfaces
Overall, impervious surfaces within conservation developments should be minimized through design and application of low impact development techniques. Accord jurisdictions should review subdivision regulations to ensure built in flexibility to allow for appropriate reductions in road width requirements, parking and driveways. Roadways in conservation developments should consider widths of no more than 18 to 20 feet to reduce impervious surfaces and encourage the slowing of traffic. If homes are provided with garages and driveways roadways should not be required to provide for on-street parking. Common driveways should also be encouraged. Other reductions in impervious surfaces may be achieved through the elimination of curbing or application of pervious surfaces for sidewalks, driveways and pathways and flexibility in turning radii. General street design guidelines should allow flexibility.

The design of conservation developments should be flexible to reserve the best available soils on the site for sewage treatment purposes (Arendt, 1994). In addition to meeting proper regulations and standards, community based sewage systems will require dedicated land area to function, and will have other design impact considerations that will need to be factored into development processes.

4.5 Rural Development

Large lot development is defined for the purpose of this Plan as exceeding 20 acres per unit. This style of development is currently permitted throughout the planning area and will continue to be permitted, subject to applicable regulations and standards. Current regulations also allow for lot splits of less than 20 acres. It is recommended the County adopt proper legislation to review all development proposals that are greater than 5 acres in size. This measure would create an opportunity for the County to discuss potential incentives and alternatives to conventional development, including conservation development.

If there are multiple applications for large lot developments or smaller lot splits in a concentrated area, the local jurisdiction, or county, should coordinate the developers and identify an agreeable approach to achieving the conservation areas in a contiguous manner and providing shared driveways and internal access roads to eliminate frontage lots on external roadways. It is strongly recommended that large lot owners maintain at least 50% of their home site as a conservation easement with natural, vegetated landscape such as prairie grasses to minimize the application of fertilizers and improve infiltration capability.

Homes on large lots should incorporate a range of best management practices at the unit level including rain gardens, native plantings and pervious pavements as well as native landscaping.

Large lot developments will most likely require on-site septic systems and will be subject to regulations regarding the inspection and monitoring of those systems. Lot design and layout will be impacted by the approach to on-site treatment.

4.6 Town Center

Policies related to the development of the Town Center are intended to provide basic guidelines. As a priority, development of the Town Center should minimize impacts to any existing environmental features that currently exist in the area and strive to set a new standard for sustainable urban development.

Master Plan
The Accord jurisdictions should immediately and jointly pursue the completion of a Town Center Master Plan.

The portion of the Town Center that falls within Prairie Township is already zoned at densities that could support higher density residential development. However, the goal of the Town Center is to promote a mix of uses including parks and open spaces, a mix of residential housing types, commercial and office. To maximize the presence of adequate infrastructure, the Town Center should encourage development at high densities. As part of the master planning process, Prairie and Brown Townships should jointly develop zoning regulations that allow for this mixed use Town Center. Section 5.0 describes the recommended steps and considerations for completing a joint master planning process for the Town Center.

Development Capacity of the Town Center
The level of growth in the Town Center will be dependent on both the ultimate sewer capacity as well as the success of the Big Darby Accord in discouraging development in conservation areas and focusing it in the Town Center. For these reasons, the Town Center should be developed in a series of phases related to the extension and capacity of centralized sewer. Planning for sewer capacity should consider the long-term needs of the Town Center and should be designed to allow the Town Center to grow over time as improvements to the sewer system are funded and completed and the ability to meet water quality standards is demonstrated.

Detailed phasing of the Town Center should be addressed as part of the master planning effort. However, based on the proximity to existing sewer lines, Phase 1 should include areas along West Broad Street. Later phases should extend to I-70 where it would be appropriate to locate more regionally oriented uses that have access to I-70 via a new interchange.

Character
The organization of the Town Center should reflect traditional Town Center practices and recommendations of the Big Darby Accord Town Center general design standards described below. Town Center development should have the following characteristics:

- A mix of uses both horizontally and vertically
- A mix of residential housing types including affordable housing
- Pedestrian orientation/ADA Accessible
- Quality streets
- Well organized public spaces, including formal and informal parks
- Architectural variety and interest
- Energy efficiency and sustainable design
- Maximization of density

The Town Center should accommodate uses and densities that allow for transitions from the high density Town Center to the low density rural character surrounding the Town Center, as described in Section 3.0.

Town Center Land Use
Policies related to defined land use types in the Town Center should be further developed in the Master Plan process. The overall goal for the Town Center is to create a dynamic community with a high quality of life for residents and visitors.

Mixed-Use Development
Mixed use development should be encouraged particularly along the major pedestrian oriented streets. Mixed-use includes retail on the 1st floor with either office or residential uses above. Mixed-use

development should include continuous retail uses along key streets with generous pedestrian areas to encourage walking.

Individual Lot Commercial Development
Individual lots should adhere to an established streetscape plan. Town Center jurisdictions should establish a street hierarchy and accompanying street typology to dictate the form of individual sites. This will result in a street of consistent and strong character. All buildings located along the public roadway in the Town Center should meet all standards established for the street including build-to lines, pedestrian access, architecture and use.

Large Scale Commercial Development
Large scale developments that may include a 'big box' anchor store and outparcels should not be isolated developments. They should relate to and connect to all other development in the Town Center and adhere to the established street hierarchy and typology. Vehicular and pedestrian connections should be made on all sides of the development to reduce traffic pressure. The building arrangement should be well organized and any internal circulation efficient and effective. Pedestrian amenities should be provided throughout the site.

Large Footprint Buildings
To achieve good design for a large footprint building, careful attention to siting and architecture is critical. Efforts should be made to minimize the mass of the building by breaking up any building façades. Vertical elements should be incorporated to break up the length of each face and horizontal elements should be used to reduce the building massing. Fenestration detail, recesses, extrusions, windows, pitched roofs, step backs, etc., can be utilized.

Residential Subdivisions
A variety of residential units should be available throughout the Town Center, including multi-family and single family. It is recommended a portion of the housing units in the Town Center be affordable units. Multifamily units should be arranged in a traditional fashion with traditional building types, either in townhomes or apartment buildings in the H, U or I form or a donut form where residential units surround a parking structure. Single family homes should also be traditional in architecture, scale and siting but allow for creativity and uniqueness. Garages should not dominate the façade; alleys should be provided at the rear to allow garages to locate behind a house.

Design Standards
The following are recommended design standards for the Town Center.

Site Design
Site design will be the greatest contributing factor to the eventual quality of life in the Town Center.

Build-to lines should be established to create a built edge along any public roadway. This will contribute to the street character and organize the development. All buildings should address all public roadway and have strong relationship with the primary roadway. The front door of a building should be accessible by pedestrian walkways.

Parking, Circulation and Access
Parking should not be a dominating land use in the Town Center and internal circulation should be well organized. Parking requirements should be flexible; on street parking spaces on public roadways should count toward parking requirements and shared parking should be strongly encouraged.

The building presence on a primary roadway should not be dominated by pavement. Parking should be placed behind buildings or in parking structures where feasible. Curb cuts should be limited on primary roadways for vehicular and pedestrian safety.

Any parking associated with a large footprint building should be minimized by reducing the paved areas, incorporating low impact development options (such as pervious pavement, swales, etc.) and integrating landscape islands, or other means. Parking ratios should be established as part of the master plan process.

Street Design
All roads within the Town Center should adhere to an established hierarchy based on the type, amount of traffic and proximate uses. A streetscape plan should be created as part of the master plan to establish the typology for all roads and address sidewalk width, lawns, street trees, distance from building to curb, relationship of the building to the street, etc. Alleys should be located behind all developable parcels to provide rear access locations. Pervious materials should be considered for alleys. Streetscape improvements should be enumerated and required as part of each development.

Connections
Strong, safe and attractive pedestrian and bicycle connections should be created throughout the Town Center. Pedestrian and car conflict points should be avoided and pedestrians should be able to safely maneuver from the street to any building door. Direct connections from sidewalks to

buildings should eliminate the need to navigate through a parking lot to access a building.

Five foot sidewalks should be the minimum width for any sidewalks within the Town Center. Increased sidewalk and street widths may be required to accommodate bicycle facilities. Design and construction of sidewalks should consider a variety of options including impervious materials. A multiplicity of vehicular connections should be made throughout the Town Center whenever possible to help relieve traffic congestion and connect neighborhoods. There should be no isolated developments.

Landscaping
Landscaping and vegetation will be a necessary element for achieving the overall goals of the Accord plan related water quality. Vegetated and natural areas reduce impervious surfaces and can provide benefits for stormwater management. Landscaping should be required within all setback areas abutting an existing or planned public right-of-way and be required in all off-street parking areas in order to visually break up large areas. Landscaped areas may serve many functions and should be integrated into the overall stormwater management plan where applicable.

Screening
Screening should be required for parking, all utilities, dumpsters, mechanicals and other building necessities from all sides.

Buildings
Building types within the Town Center should vary. All buildings should have a strong presence on a primary street. Building details should be traditional in nature and incorporate natural materials that evoke architectural interest and variety to achieve design goals – faux storefronts and thin facades above rooflines should not be permitted. Multi-story buildings and pitched roofs should be encouraged. Green roofs and other sustainable design elements (LEED) should be encouraged.

Public Spaces
Well organized and well designed public spaces will be essential for the success of the Town Center. Not only should the preferred location of public spaces be designated, a hierarchy should be established so that all public space needs are met, passive and active, formal and informal. Leisure trails should provide connections within and out of the Town Center.

4.7 Stormwater Management

Development in Accord planning area will need to meet a new standard of quality in order to meet the water quality goals of the Ohio EPA and of this Plan. Stormwater management policies for the Big Darby Accord Plan are tied to maintaining and improving water quality and the aquatic life use attainment within planning area watercourses. Stormwater management requirements will become applicable as development applications are submitted and reviewed.

Better Site (Low-Impact) Design Principles for Stormwater Management
It is recommended that better site design practices, as defined in Section 3.0, be incorporated into local zoning ordinances, planning policies and/or subdivision regulations within the Accord planning area. Further investigation is required to determine the nature of the changes that will need to be made to the current ordinances, regulations and policies used by the various jurisdictions to oversee the development process. To simplify this process, a single set of policies, rules and regulations should be developed that is unique to the Accord planning area and can be administered throughout the entire area.

4.7.1 Stormwater Quantity Control
The recommended detention (quantity) controls are adapted from the City of Columbus' recently revised Stormwater Drainage Manual. The criteria represent an approach to stormwater detention referred to as the critical storm method.

- The runoff volume from a site during a 1-year, 24-hour storm event is calculated for pre- and post-development conditions. The critical storm for sizing the stormwater detention facilities is then determined based upon the percent increase in runoff volume due to the proposed development (pg. 3-3 of City of Columbus Stormwater Drainage Manual).
- Runoff from storm events less than or equal to the critical storm calculated event is to be released from the development site at a rate no greater than the peak runoff during the 1-year event under pre-developed conditions.
- Stormwater detention facilities are to be sized so that the peak runoff during the 100-year storm event with the post-developed condition is released at a rate less than or equal to the peak runoff from a 10-year storm under pre-developed conditions.

4.7.2 Groundwater Recharge Criteria
Evaluation of the post-construction groundwater recharge rate from the structural and non-structural best management practices (BMPs) within the developed area is required as part of the Ohio EPA's draft NPDES permit.

The draft permit requires that the post-construction groundwater recharge rate must equal or exceed the pre-developed recharge rates, as defined within the permit. It is recommended that recharge areas include areas such as low elevation undisturbed hydric soils, floodplains and riparian corridor areas. An equation and table to be used for calculation of the annual average groundwater recharge rates from various land uses and soil groups is included in the draft version of the NPDES permit. Furthermore, the draft permit recommends that the groundwater recharge (infiltration) areas be protected through binding conservation easements that identify a third party management agency, such as a homeowners/condominium association, political jurisdiction or third party land trust. The implementation of ownership of groundwater recharge areas may vary depending on the chosen practice for meeting the requirements.

If the determined post-development recharge rate is less than the pre-development rate, two options are available:

1. Additional land within the planned development can be converted to a land use with higher recharge potential. This area should be part of the conservation open space that is part of the development site or allocated off-site open space areas that are required to achieve the proposed development density in non-conservation development areas. In this scenario, the groundwater recharge areas would be allocated within land that is likely to be held in public trust as part of the open space component of the Accord planning area.
2. A portion of the runoff from a development can be directed to a stormwater BMP that promotes infiltration. Implementation of infiltration-based BMPs must take into account soil suitability and the potential for groundwater pollution. In this scenario, the groundwater recharge facility would most likely be owned by and the responsibility of the property owner or homeowners association. A majority of the soils within the Accord planning area have characteristics not suitable for implementation of infiltration practices. For most of the "filtering" BMPs discussed in Section 4.8, it is assumed that an underdrain system will be necessary; however, even those systems provide an advantage toward promoting the interaction of surface flows and the shallow aquifer that is a contributor to a sustained stream base flow condition.

4.7.3 Stormwater Quality Control

Recommended policies related to addressing water quality are associated with stormwater runoff criteria stipulated by the Ohio EPA's draft NPDES permit for the Big Darby Creek watershed, including the specific criteria for the portion of the watershed contained to Franklin County. The Ohio EPA is currently in the process of re-visiting some of those criteria, and some of the specifics of those policies may be changed in the final version of the permit; however, when final, the permit will be a mandate for all development within the watershed. The various components of the NPDES permit as they pertain to water quality are listed below. Each of these was discussed in detail in Section 3.

Construction Phase Stormwater Control

All development site plans must include a Stormwater Pollution Prevention Plan (SWPPP) that contains details and specifications for runoff, erosion and sediment control measures that will meet the requirement of the permit. For sediment control, specifically, a sediment settling facility must be provided that has a measurable goal of releasing no more than 45 mg/l TSS for up to a 0.75 inch rainfall in 24 hours. The size of the disturbed project area (greater than or less than 5 acres) may determine the type and size of sediment settling facility required. For sites smaller than 5 acres, other measures of sediment control than a settling facility are permitted; however, the likelihood of obtaining the target rate of TSS becomes reduced.

Post-Construction Performance Goals

The TMDL report for the Big Darby Creek defines allowable release rates in kilograms per year for the pollutants of concern within the Accord planning area in addition to defining a percent removal for each of those pollutants from the existing conditions within the watershed. For example, within the Hellbranch Run watershed, the required percent reduction in the existing TSS and TP load within the watershed is 95% and 81%, respectively. There are separate values for percent pollution reduction presented in the TMDL for other areas within the Accord planning area; however, it is anticipated that a performance goal related to post-construction water quality will be adopted that is uniform throughout the planning area. Presently, the Ohio EPA is contemplating a numerical pollutant load requirement that would apply to stormwater runoff released from a development site rather than percent removal efficiency as defined in the TMDL. The pollutant load number, likely in milligrams per liter, would allow for a quantifiable measure of success simplifying the design and

monitoring process related to implementing BMPs.

Furthermore, this plan includes requirements for monitoring of individual site developments to determine compliance within an established performance goal. Chapter 5 discusses the implementation of the monitoring program and its associated performance bond.

Water Quality Volume
The water volume criteria contained within the Ohio EPA's draft permit will be the determining requirement for the design of stormwater BMPs sufficient to meet the drawdown times also stipulated in the permit. Calculations prepared as part of a development site design would need to be prepared demonstrating that the BMP feature is capable of providing the storage volume and has an outlet structure adequately sized to meet the drawdown time criteria.

4.7.4 Floodplain Management

The determination of the extent of the 100-year floodplain boundary is described in conjunction with establishing the SCPZ (Section 4.2). Within that section, it is generally established that a FEMA-designated 100-year floodplain can serve as the limits of the SCPZ. The protection of the 100-year floodplain from encroachment due to fill placement is regarded as a measure to both provide an adequate riparian buffer along significant watercourses within the planning area and to also address flooding concerns along those watercourses.

As mentioned in Section 4.2, the Ohio EPA is considering a provision within their changes to the draft NPDES permit for the Big Darby Creek watershed that would allow the SCPZ to be less than the extent of the 100-year floodplain if stream restoration occurs along that reach of the channel. Given this consideration and the discussion of existing floodplain regulations under Sec. 3.7, the criteria listed below are recommended.

Floodway Encroachment
Stream restoration activities along degraded stream channels that are FEMA-studied will certainly involve grading/filling within the designated floodway. In order to permit this activity, it is recommended that the established minimum standards of the NFIP be followed, requiring a determination through a technical analysis of the impact of the activity on 100-year flood elevations. The same criteria apply to any proposed bridges or culverts involving components within the floodway. It is possible that a CLOMR will be required from FEMA before the local jurisdiction can issue a permit for these activities. Given the recommended SCPZ criteria, no other activities are anticipated that would require floodway encroachment and the application of these criteria.

Floodplain Filling
The contemplated changes to the NPDES permit for the Big Darby Creek will leave residual floodplain areas outside of the SCPZ that could be filled for development purposes. Should fill be allowed within the 100-year floodplain under this condition, it is recommended that documentation be provided with the permit application demonstrating there will be no loss of floodplain storage. The documentation should consist of volume (of fill and excavation) calculations and a certification from a registered professional engineer that the calculations accurately reflect the proposed activity.

4.8 Stormwater Best Management Practices

As recognized in the Columbus Stormwater Drainage Manual, stormwater management, particularly in the area of stormwater *quality* management, is an evolving science. Therefore, it will be important to review stormwater policies when updating this plan as science, technologies, industry and design will likely evolve. Information within this section has been compiled from a number of resources including the Ohio Department of Natural Resources (ODNR), the Hellbranch Watershed Forum (HWF), the Darby Creek Watershed Task Force, the City of Columbus Stormwater Drainage Manual, the United States EPA, the Northern Virginia BMP Handbook, the City of Olympia, Washington Stormwater Manual and the Chesapeake Bay.

Best Management Practices (BMPs) are structural or non-structural practices, management practices, or a combination of these techniques, that when used in solitude or in combination, minimize the impacts of agricultural or urbanized land uses on water quality by removing or reducing pollutants.

BMPs are most commonly associated with post-construction storm water management techniques that treat runoff from a development site *after* construction is completed. BMPs capture and treat pollutants found in runoff and manage the frequency, volume and energy of the runoff so that water resources are not degraded (ODNR). Historically, storm water ponds were used to reduce downstream flooding because they detain water and release it at a slower rate while also allowing settling of sediments (ODNR). The application of BMPs as a way to protect stream and water quality in addition to stormwater flow control provides an added benefit to the watershed.

BMPs have been categorized to focus on those techniques most commonly used for residential development. The application of BMPs is typically associated with an entire residential development or subdivision. The BMPs discussed herein span watershed level applications and individual property applications. The actual design of a BMP typically falls into one of three categories: structural, non-structural or management/ policy related.

The Hellbranch Watershed study reviewed BMPs and similarly categorized them based on type:

> *The most common examples of structural BMPs include extended detention dry ponds, wet pond, and infiltration trenches. Some non-structural BMPs, which may be used in conjunction with structural controls, include street cleaning, vegetative buffer areas, grassed swales and fertilizer application control. Some BMPs such as ponds and swales, are generic features often provided in contemporary developments; however, unless they were designed as BMPs, they may be ineffective at removing pollutants from the stormwater runoff. BMPs have specific design and construction criteria and maintenance requirements that must be adhered to in order to achieve the reported pollutant removal efficiencies (Hellbranch Watershed Pollutant Modeling report, March 2005).*

Pollutant removal processes vary considerably among BMPs. Due to differences in these removal processes, identifying target constituents is crucial for optimum BMP selection. Most BMPs are effective at removing large particles, while well-vegetated basins and infiltration methods are more suited for removal of fine sediments and dissolved constituents. Dissolved contaminants require long residence times, high soil-water contact, and the opportunity for vegetative uptake (Hellbranch Watershed Pollutant Modeling report, March 2005). Combining BMPs can often result in a more efficient and effective treatment system. For example, a BMP system may incorporate a structural facility in combination with grassed swales, vegetative buffer areas, marsh vegetation or other nonstructural BMPs in order to achieve the desired storage volume and site coverage requirements. At times, non-structural BMPs may be required or desirable in order for the structural BMP to operate at maximum efficiency. Because BMPs must slow down or temporarily detain the stormwater runoff in order to achieve the desired pollutant removal efficiencies, BMPs also provide a measure of water quantity control as well. The extent to which peak runoff rates are reduced varies depending on the type of BMP applied.

4.8.1 BMP Planning Process

As part of the preliminary planning process for development within the planning area, decisions will need to be made regarding the types of BMPs that will be utilized on each site. Information was compiled to help both developers and plan reviewers in determining the appropriate BMPs for a site. The information presented here is not meant to be exhaustive or exclusive; other BMPs not listed here may be acceptable, but they will require additional review and documentation to ensure that the goals of the Big Darby Accord are being met.

Limited performance and design information is presented here; this

information should only be used for determining which BMPs should be selected for a site to meet the appropriate design criteria. It is the responsibility of the site designer to identify the specific design criteria necessary to complete the design of the BMP and present it to the reviewer. Much of the information presented here is adapted from the State of Minnesota's *Stormwater Design Manual*, November 2005.

Green roofs, pervious pavement and rain water harvesting (e.g. rain barrels, lot level rain gardens, dry wells) are not primary BMPs, and should not be considered part of the required treatment train for a development. The implementation of these particular BMPs will allow the designer to decrease the amount of impervious cover on a site, which can have an impact on the design of the other BMPs specified.

The summary information presented in Figure 4.2 and Section 4.8.3 includes an overview of information on design criteria, benefits and limitations as well as the mechanism by which the BMP functions, the pollution removal efficiency (in percent removal), site design factors such as maximum drainage areas tributary to the BMP, depth to the water table, and the scale at which each BMP is most effective (development level versus lot level). Filtration practices, as described below, include grass channels, dry swales, wet swales and filter strips. Infiltration practices, as described below, include infiltration basins, infiltration trenches, dry wells, and underground detention. Filtration devices and hydrodynamic devices are proprietary systems that are available from multiple manufacturers, and evidence of independent testing of the performance of these devices should be required prior to development plan approval.

BMP Selection Considerations

Selection considerations presented here are aimed largely at water quality control but do not remove the requirement for a development site to control the quantity of stormwater runoff from their site.

Non-structural BMPs, which reduce the volume and peak flow of stormwater runoff from a development site, should be evaluated as part of the conceptual site design process. The benefits to both the developer and the community from incorporating non-structural BMPs is reduced runoff, reduced pollutant load for BMP treatment, reduced cost for drainage infrastructure, and reduced long-term site maintenance. Several approaches, discussed in detail as part of "Better Site Design" principles (Section 4.7) include methods to reduce impervious areas and to increase infiltration through placement of grass buffers and swales.

Minimizing the directly connected impervious area requires a change in land development design philosophy. Traditional land development practices do not focus on water quality concerns but rather promote runoff from the site to a curb and gutter stormwater conveyance system. This practice concentrates runoff quickly, resulting in large peak runoff rates during small storms.

The first step of planning for stormwater management BMPs within a development begins with the collection of data on the local receiving waters and information regarding pollutants of concern within the downstream watershed area. The OEPA has already compiled this information for the planning area in the Big Darby Creek TMDL report, however, it is possible that information exists for individual development sites and it is suggested that the developer review all available resources to determine if additional data exists for their site.

The following BMP planning process can then be used by both developers and by reviewers to select appropriate BMPs that address both the proposed development and the pollutants of concern listed in the TMDL or any other documentation that may become available in the future.

Step 1. Determination of whether development is large or small development

If a development disturbs five or more acres of land or is part of a larger common plan of development or sale that will disturb five acres of land, the BMPs chosen for the site must either be capable of treating the larger drainage area, or the site must be split up into smaller, distinct sub-watersheds such that the BMP limitations noted in the summary table are not exceeded.

Step 2. Determine whether or not development site is tributary to a regional stormwater management facility.

It is anticipated that parts of the planning area, particularly the town center area, will develop in such a manner that regional stormwater management facilities will serve as part of the BMP treatment train for multiple developments. If a development site is located within an area that is tributary to one of these regional facilities, it is likely that the on-site BMPs for the development will have to meet a different pollutant removal efficiency that has been previously specified, as the regional

facility will meet a portion of the required control for the area. The removal efficiency required at the site level would then be determined on a case by case basis.

If a development site is not tributary to a regional management facility, the responsibility of meeting the target pollutant removal efficiencies must be accomplished within the site.

Step 3. Determine site conditions related to stormwater runoff

The site conditions that a developer must determine include runoff volume, peak flow rates and water quality considerations. The stormwater runoff conditions should be calculated for both the pre- and post-development condition such that the controls necessary for the post-development condition may be tailored to meet the requirements outlined in other sections of this document. It is during this step that the developer should determine the post-development pollutants that are likely to be present to assist in BMP selection.

Step 4. Determine the need for oil control BMPs.

Oil control BMPs should be applied to sites likely to generate high concentrations of oil due to high traffic turnover or the frequent transfer of oil and gas. The following urban area land uses should be considered as high use sites requiring oil control BMPs: railroad yards; fueling stations; vehicle maintenance and repair sites; construction businesses; industrial machinery and railroad equipment maintenance areas. If the proposed development is likely to generate excessive concentrations, an oil control BMP should be selected. BMPs which control the oil content in runoff include oil/water separators, catch basin inserts, and manufactured systems.

Step 5. Determine if infiltration is practical for pollutant removal.

Infiltration BMPs are effective alternatives for both treating stormwater runoff and for addressing groundwater recharge. The effectiveness and applicability of infiltration BMPs is dependant upon local soil properties. Factors which determine if infiltration is practicable include soil type, location and depth to bedrock, the water table, presence of impermeable layers, and proximity to wells, foundations, septic tank drainfields, and unstable slopes. Soil types which are appropriate for infiltration BMPs include coarse sand to loamy sandy deposits. Infiltration practices can also be used in clayey soils with the use of an underdrain system, connected to the stormwater conveyance system for the site. It is recommended that infiltration BMPs be preceded by a pretreatment facility such as a pre-settling basin to reduce the sediment load entering the infiltration BMP. Infiltration BMPs include infiltration basins, infiltration trenches, and bio-infiltration swales. If infiltration is considered a practicable BMP for the site, a pre-treatment BMP and infiltration BMP should be selected and sited within the proposed development.

Step 6. Determine level of phosphorous control required.

The need for phosphorous control is outlined in the TMDL for the Big Darby Creek watershed. The level at which phosphorous control is needed will be dependent on the type of development proposed and whether or not the site is tributary to a regional facility that may provide some phosphorous removal. BMPs that reduce the phosphorous content in runoff include large wet ponds, wetland systems, media filtration and manufactured systems. The site suitability and design criteria for each BMP should be reviewed to determine compatibility of the BMP with the specific development site.

Step 7. Select BMP application based on suitability to site

The factors a designer should consider as part of this step include the items discussed previously, and also include the size of the runoff area, the final appearance of the BMP and the functionality of the BMP. Information presented in Figure 4.2 details both the runoff area that each BMP is best suited to treat as well as the functionality of the BMP. The attached BMP summary information also has photographs of fully developed BMPs, so that developers can determine whether or not a specific BMP will visually fit within the overall site plan.

Step 8. Final Site Design and Layout

Following the selection and location of stormwater BMPs on the site, the developer should proceed to the final layout and design of the development. The development design must comply with all local zoning ordinances as well as with all Accord development policies and the Draft NPDES Permit for Construction Activities.

Final Review and Approval.

The developer must then submit the finalized stormwater management plan and report and development plan to the reviewing authority.

4.8.2 System Ownership and Maintenance

The long-term inspection and maintenance of the stormwater control facilities is critical to continued performance.

The NPDES permit for the Accord planning area requires submission of a maintenance plan for all post-construction BMPs. These plans are to be provided to the owner/operator of the site (including homeowners associations) prior to the completion of construction activities. A description of the funding mechanism must be included in the maintenance plan to ensure all BMPs are maintained in perpetuity.

For the planning area, maintenance of the stormwater facilities will be divided into these two basic categories:

1. On-site systems (bioretention cells, swales, filter strips etc.)
2. Detention systems (detention/retention basins or constructed wetlands).

Accord representatives have suggested that all on-site systems will be maintained through the owner or homeowners associations and all detention basins and constructed wetlands will be maintained by a public entity (county, community authority, municipality, township, etc.). Regardless of the ownership specified during the planning process, an easement will be required for all BMPs such that the public entity may gain access to ensure and facilitate maintenance as necessary.

The Town Center concept promotes regionalization for stormwater management facilities. These regional facilities would be maintained by a public entity. Any site level BMPs required in this area will be maintained by the development site owner or homeowners association.

If it is determined that a BMP is not to be publicly owned and maintained, the developer of a site should be required to submit an operation and maintenance report that details, at a minimum, who is responsible for maintenance of the facility, the frequency and type of maintenance that will be required for the facility and the method of reporting this information. Other details of the operation and maintenance of the facility may be required at the discretion of the reviewing authority. If it is determined that the responsible party is not meeting the goals of the operation and maintenance report, the public entity will have the ability to access the BMP through the required easement and perform maintenance required. There are several mechanisms for recouping the cost of this activity from the site owner/operator. Use of the performance bond (included in the discussion of monitoring) or assessments should be considered.

4.8.3 BMP Toolkit

Example of Green Roof
Source: Low Impact Development Center

Example of Pervious Pavement Blocks, Washington, DC
Source: Low Impact Development Center

Example of Pervious Pavement Application in Residential Area
Source: Low Impact Development Center

Green Roofs

Design Criteria

- Structural load capacity is a major factor in determining whether the green roof is "extensive" or "intensive"
- Vegetation selection is based on numerous factors including, growth depth, microclimate, irrigation and maintenance
- A leak detection system is recommended to quickly detect and locate leaks
- Modular products can increase installation and repair efficiency

Benefits

- Reduce, delay and cool stormwater runoff
- Insulate buildings and lower energy consumption and costs
- Provide habitat for birds and insects
- Increase longevity of traditional roofing systems by protecting from ultraviolet rays
- Reduce carbon dioxide levels and heat island effect

Limitations

- Cost is higher than traditional roofing systems – can be significant for retrofits
- Leaks can cause significant damage and can be hard to locate and repair without detection system
- Conditions can be harsh for vegetation establishment
- Maintenance needs can be higher than traditional roofing systems

Pervious Pavement

Design Criteria

- Pervious pavement is typically used in low traffic areas including overflow parking areas, emergency vehicle lanes, and pedestrian areas
- In-situ soils should have field-verified minimum permeability rates greater than 0.3 in/hr. Contributing runoff from offsite should be limited to a 3:1 ratio of impervious area to pervious pavement area
- The selected systems load bearing surface should be suited to maximum intended loads
- Design storms should be infiltrated within 48 hours

Benefits

- Good for highly impervious areas – particularly parking lots
- Reduces need for other storm water BMPs by reducing runoff
- Construction costs of some systems are less than traditional paving
- Soil-enhanced turf systems resist compaction, increase infiltration, and provide soils for healthier vegetation

Limitations

- Construction costs of some systems are more expensive than traditional paving
- Use depends on infiltration rates of underlying soils
- Maintenance costs are higher than conventional paving
- Not recommended for high traffic areas because of durability concerns

Rain Water Harvesting

Design Criteria

- The system should be watertight, have a smooth interior surface, be located on level and stable ground, have a tight-fitting lid, good screens on the inlet and outlet and have an emergency overflow device
- To prevent the breeding of mosquitoes, empty the water in less than 5 days or place a fine screen over all openings
- Material can withstand the pressure of water over long periods of time
- Disconnect and drain rain barrels and cisterns in the winter to prevent freezing and deformation of the rain water harvesting system

Benefits

- Protects water supplies by reducing use during peak summer months
- Mimics the natural hydrology of the area by infiltrating a portion of the rain water falling on the site
- Reduces volume of storm being delivered to downstream waterbodies
- Results in cost savings by reducing municipal water bill

Limitations

- Not suitable for the following roof types: tar and gravel, asbestos shingle and treated cedar shakes
- Depending on the design, requires a certain amount of operation and maintenance
- Proprietary systems can be expensive

Chemical and Biological Treatment

Design Criteria

- Properties of water to be treated (pH, sediment concentration, etc.)
- Level of treatment desired
- Requirements for discharge of treated water to receiving water bodies
- Type of facility required or present
- Pre-treatment or secondary treatment requirements
- Maintenance and monitoring requirements of the system

Benefits

- Quickly removes suspended clays and silts
- Can be used as pre-treatment to remove suspended sediments prior to infiltration
- Can help project meet stringent water clarity and sediment bound pollutant removal standards
- Suitable for cold climates

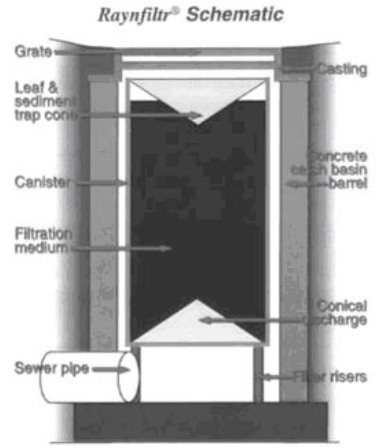
Limitations

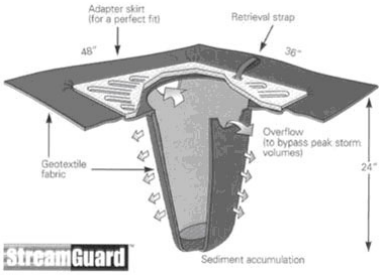
- Ongoing operation and maintenance of the chemical addition system may be required
- Monitoring may be required to determine the impact on downstream resources
- A pond or sediment collection area is necessary downstream of the treatment site for settling out the flocculants
- May require permitting from OEPA for discharge
- Expensive to build and operate

Example of Rain Water Harvesting
Residential rain barrel — Stillwater, MN

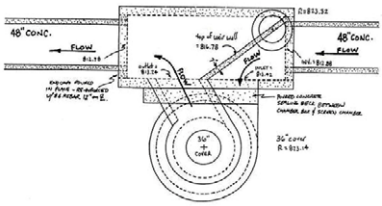
Example of Chemical and Biological Treatment
Tanners Lake alum injection facility — Oakdale, MN

Example of Rain garden
Source: EDAW





Examples of Filtration Devices
Proprietary systems used as examples only, NOT an endorsement



Example of Hydrodynamic Device
Courtesy of Minneapolis Public Works Department

Filtration Devices

Design Criteria
- Pollutants of interest for reduction
- Desired removal efficiency
- Design flow for volume, site constraints on size, desired location of treatment unit
- Pre-treatment requirements
- Installation and maintenance costs, life of unit

Benefits
- Units are typically underground or within existing structures and do not consume much site space
- Filtration devices can be customized to reduce a specific pollutant of concern
- Can often be easily incorporated into fully developed sites
- Can be used for pre-treatment prior to infiltration practices
- Relevant for use on industrial sites because filters can remove pollutants such as metals and oils

Limitations
- Efficiency has not been widely tested
- Each type of unit has specific design constraints and limitations for use
- Can be more costly than other treatment methods
- Treatment may be greatly reduced if frequent maintenance is not conducted
- Subject to freezing in cold climates

Hydrodynamic Devices

Design Criteria
- Expected flow rates
- Pollutants of concern
- Desired removal efficiencies
- Site constraints for size
- Installation and maintenance costs, life of unit
- Need for accessory structures

Benefits
- Units are typically underground and do not consume much site space
- Can often be easily incorporated into fully developed sites
- Can be used for pre-treatment prior to other practices
- Suitable for cold climates if installed below frost line

Limitations
- Each type of unit has specific design constraints and limitations for use
- Treatment may be reduced if frequent maintenance is not conducted
- May not meet local standards when used alone
- Generally good for solids and litter, but much less effective for other common pollutants

Bioretention

Design Criteria

- Infiltration requires suitable soils
- Minimum 10-foot setback and located down grade from home foundations
- Best applied to drainage areas with relatively flat slopes (5%)

Benefits

- Can be very effective for removing fine sediment, trace metals, nutrients, bacteria and organics (Davis et al. 1998)
- Provides many additional environmental (habitat, improves air quality, urban micro-climates), social (creates a unique sense of place), and economic benefits (reduces development and maintenance cost, greater lot yield, increases property values)
- Well suited for high impervious areas
- Reduces runoff volume
- Flexible design, affording many opportunities for creativity

Limitations

- Susceptible to clogging by sediment; therefore maintenance and pretreatment is necessary to maintain effectiveness
- Not effective for large drainage areas (use multiple structures, closer to source of runoff)
- Space consumption (5%-10% of drainage area)

Filtration Practices

Design Criteria

- Ensure adequate space for filtration system
- Some installations require 2-6 feet of head
- Removal potential of the key pollutant
- Parent material and potential for ground water contamination

Benefits

- Good for highly impervious areas with low sediment/high pollutant load (e.g. urban land use and retrofit scenarios)
- High pollutant removal rates
- May be used in a variety of soil types
- Good for treatment of hotspots because it can be isolated from ground water if contamination concerns exist

Limitations

- Higher maintenance requirements
- Some installations (media filters) have higher construction costs
- Potential to cause odor problems
- Minimal treatment of soluble nutrients
- Potential for nitrification in media filters where anaerobic conditions exist

Example of Bioswale Planting
Source: EMH&T

Example of Filtration Practices
Public Library, Alexandria, VA
Source: EDAW

Example of Infiltration Practices
Infiltration trench,
Lino Lakes City Hall — Link Lakes, MN

Example of Infiltration Practices
Underground storage and infiltration,
Bradshaw Celebration of Life Center — Stillwater, MN

Example of Stormwater Pond
Source: EDAW

Example of Stormwater Pond
Source: EDAW

Infiltration Practices

Design Criteria
- Contributing drainage area
- Underlying soil types
- Depth to the water table, bedrock or other impeding layer
- Proximity to buildings, drinking water supplies, karst features, etc.
- Source of stormwater runoff

Benefits
- Reduces volume of stormwater runoff
- Increases groundwater recharge
- Improves surface water quality
- Provides thermal benefits (e.g. to cold water fisheries)
- Mimics pre-development hydrology

Limitations
- Unusual construction considerations
- Potential for groundwater contamination
- Tendency to lose effectiveness over time due to clogging – if not properly constructed and maintained
- Not recommended for areas with steep slopes
- May require landscaping: consideration should be given to periods on inundation and drought

Stormwater Ponds

Design Criteria
- Irregularly shaped with a minimum length to width ratio of 1.5:1
- Permanent pool volume to 1800 cubic feet per acre draining to pond
- Permanent pool depth 3-foot minimum, 10-foot maximum at deepest points
- Extended detention (ED) storage sufficient to treat water quality volume
- Pre-treatment required (sediment forebay sized at 10% of pond area recommended)
- Stabilized emergency overflow and energy dissipation at all outlets

Benefits
- Able to effectively reduce many pollutant loads and control runoff flow rates
- Relatively straightforward design procedure
- Potential wildlife habitat and aesthetic or recreational enhancement
- May be used as temporary sedimentation basin during construction

Limitations
- Relatively large space requirement
- Tends to increase water temperature and may cause downstream thermal impact
- Potential for nuisance insects or odor
- Problematic for areas of low relief, high water table, or near surface bedrock
- Possible safety concerns

Stormwater Wetlands

Design Criteria

- Water budget should be calculated to ensure proper drainage area and to ensure that wetland conditions can be maintained.
- Minimum length to width ratio of 2:1 should be maintained during low flow or baseflow conditions.
- Minimum of 35% of the total wetland surface area should have a depth of 6 inches or less; 10% to 20% of surface area should be deep pool (1.5 to 6 feet deep)
- Constructed wetlands require about 2% to 4% of the area that drains to them.
- Thermal effects of discharged waters from stormwater wetlands on receiving bodies of water should be considered.

Benefits

- Good suspended solid and annual nutrient removal
- Provides good wildlife habitat and aesthetic value
- Low maintenance costs
- Provides ground water-surface water interface

Limitations

- Requires more land than other practices
- Requires careful design and planning to ensure wetland hydrology is maintained
- Water quality behavior can change seasonally

Example of Stormwater Wetland
Stillwater, MN

Minnesota BMP images were taken from the State of Minnesota Stormwater Design Manual, *November 2005*

Figure 4.2 Structural BMP Summary

Structural BMP Summary Information

BMP As defined in the Minnesota Stormwater Manual (November 2005)	Scale of Use			Management Suitability[1]			Water Quality Attributes of BMPs[1]								Filtering Capability of BMP (%)[1]						Limiting Design Parameters[1]						
	Watershed	Development	Individual Lot	Water Quality[2]	Recharge Volume[3]	Detention Capability	Infiltration	Screening/Filtration	Temp. Control	Settling	Evaporation	Transpiration	Soil Adsorption	Biological Uptake	TSS	Total P	Total N	Metals	Pathogens	Toxins	Drainage Area	Max. Slope	Min Depth to Bedrock	Min Depth to Water Table	SCS Soil Type	Freeze/Thaw Suitability	Potential Hotspot Runoff
Green Roofs			X	High	Low	NA		X	X		X	X	X	X	90	100	20	80	65	NA	Rooftop	NA	NA	NA	NA	Good	Suitable
Pervious Pavement			X	High/Med	High/Med	NA	X	X	X			X	X	X	NA	80	80	90	NA	NA	NA	2%	3 ft	3 ft	A, B	Good	Suitable
Rain Water Harvesting			X	High	High/Med	NA	X	X	X	X	X	X	X	X	100	100	100	100	100	100	Rooftop	NA	NA	NA	NA	Poor	Suitable
Chemical & Biological Treatment		X		High	NA	NA				X			X	X	Varies	Varies	Varies										
Filtration Devices		X		X	NA	NA		X							Varies			Varies									
Hydrodynamic Devices (Manufactured Systems)		X		X	NA	NA		X		X					Varies			Varies									
Bioretention		X		Med/High	High	Low	X	X	X	X		X	X	X	85	60	50	95	35	80	2 Ac Max, 1 Ac Imp.	20%	3	3	A, B (C & D w/under drains)	Good	Suitable
Filtration Practices Grass Channels Dry Swales Wet Swales Filter Strips		X	X	High	Med/Low	Low	X	X			X	X	X	X	85	50	35	50	35	80	5 Ac	20%	3	3	A, B, C, D	Poor-Good	Suitable
Infiltration Practices Infiltration Basin Infiltration Trench Dry Wells Underground Systems		X	X	High	High	Low	X	X	X			X	X	X	95	65	50	95	NA	NA	1/5/50 Dry well/Trench/Basin	20%	3	3	A, B, C, D	Poor-Good	
Stormwater Ponds	X	X		Med	Low	High				X	X			X	80	40	30	60	70	80	25 Min	25%	0	0	C, D (A & B require liners)	Poor	
Stormwater Wetlands	X	X		High	Low	High		X		X	X	X	X	X	75	40		40	75	85	10-25 Min	25%	3	3	A, B, C, D	Good	Yes

1. Adapted from the State of Minnesota Stormwater Manual, November 2005
2. Water Quality targets rainfall events that deliver the majority of the stormwater pollutants at the site.
3. Recharge targets rainfall events that create little or no runoff but produce most of the annual groundwater recharge at the site.

4.9 Utilities

4.9.1 Centralized Sewer

Centralized sewer service will be provided to both the designated Town Center and the proposed Hilliard growth area that resides within the City of Hilliard's contract service area. Hilliard's current contract service area is north of Roberts Road and extends west of Alton and Darby Creek Road. These central sewer systems would eventually discharge to a larger sewer system that is owned and operated by the City of Columbus. Current capacity limitations exist within the central sewer system. Additional central sewer capacity may be made available over time as improvements to the overall system are completed. Decisions regarding the allocation of any future capacity would need to be determined.

Centralized sewer service will also be provided to the LEED area east of Alton and Darby Creek Road. Capacity exists for approximately 1,400 equivalent dwelling units in this area. Central sewer service may also be provided in a manner consistent with the Accord general land use plan to some sites closer to the existing system that were previously annexed or are zoned for development.

Town Center

The Town Center will receive sewer service through the extension of and connection to the Big Run Trunk Sewer. Presently, the trunk sewer terminates near Broad Street at the eastern edge of the Accord planning area. The City of Columbus has suggested that service would occur in a manner similar to other contracted satellite communities within the central Ohio area, such as Hilliard. Without the area being annexed to Columbus, the local authority would own and maintain the sewer lines that extend or connect to the Big Run Trunk Sewer and then contract to the City of Columbus for treatment.

The Franklin County Sanitary Engineer, recognized as a Designated Management Agency (DMA) within the Regional Facility Planning Area (RFPA) that includes the Accord planning area, has been identified as a candidate to act as the local authority responsible for owning and operating the sewer lines in this area. As noted previously, there is a recognized sub-Regional Facility Planning Area that overlaps with the Town Center (Lake Darby Estates). If they are not, themselves, responsible for providing the sewer service within that area, then a formal agreement with Ohio American Water would be required under the 208 plan to allow the local authority to have that responsibility. A review of the provisions of the draft revised 208 plan and coordination with the Ohio EPA is necessary to determine the requirements related to establishing the Franklin County Sanitary Engineer as the recognized DMA for this area and address any issues related to the establishment of a sub-Regional Facility Planning Area or "satellite community" designation associated with the Town Center.

Based on an analysis of available capacity within the Big Run Sanitary Trunk Sewer line, the City of Columbus currently estimates the sewer capacity available to the Town Center area is 5,000 equivalent dwelling units. Additional capacity in the trunk sewer may be made available over time as improvements to the overall system are completed. Because this area would remain unincorporated, the City has requested that the local authority adopt and implement certain provisions, some of which are listed below. These provisions would become policy associated with the Accord planning process. The detail of these provisions and the possibility of other provisions are still being developed.

- The local authority must adopt the Big Darby Accord Plan
- The local authority must show evidence of adequate public service related to fire and safety to serve the development areas.
- The planning process must incorporate a provision for a component of affordable housing stock within the Town Center.
- The planning process considers environmentally sound mechanisms for providing wastewater treatment applications in areas of their RFPA that are not going to be served by central sewer systems.

The phasing of development within the Town Center will facilitate the initial extension of the trunk sewer to within proximity of the Town Center development area. It is possible that the local authority will have to develop a funding mechanism that would assist with the initial cost of extending the trunk sewer line, which would then be reimbursed as additional development occurs.

Hilliard's Growth Area

The Hilliard growth area will receive sewer service through the extension of and connection to the Roberts-Millikin Sanitary sub-Trunk Sewer. Presently, the sub-trunk sewer terminates east of Alton-Darby Creek Road and north of Roberts Road. Several smaller sewer lines extend from the sub-trunk sewer to other areas within Hilliard and within proximity to the extended contract service area; however, these were designed for local capacity only and some of these extensions include pump

stations. An analysis of the available capacity of this sewer line determined sufficient capacity exists within the Accord planning are for an additional 2,000 equivalent dwelling units.

Hilliard will likely annex this area as development occurs and, therefore, the development and associated sewer service will be subject to the provisions of Hilliard's service contract with the City of Columbus.

LEED Area

The Accord general land use plan designates an area east of Alton and Darby Creek Road and south of Roberts Road, known as the LEED area, for development at approximately 3 dwelling units per acre, in addition to an area of mixed use. The LEED area may be annexed by Columbus and is designated to receive central sewer service via the Roberts Millikin sanitary subtrunk. The capacity for this area is approximately 1,400 equivalent dwelling units, although the mixed use development will include non-residential uses.

Additional Central Sewer Areas

The Columbus central sewer system may also have additional capacity for some areas closer to the existing system, currently annexed or zoned for development and able to be served, in a manner consistent with the Accord general land use plan.

4.9.2 Non-centralized Sewer

A substantial part of the planning area is identified for rural conservation development. These areas are removed from where central sewer service is planned; therefore, these development areas would need to be served by an alternative community-based treatment system or would have household sewage treatment systems (HSTS) (also referred to as household sewage disposal systems). Presently, there is a proliferation of HSTS within the rural areas of the planning area and concerns have been raised regarding the operation and performance of these systems, particularly with regard to home aeration systems.

Section 2.2 references committees working on technical and regulatory issues pertaining to sewage treatment in non-central sewer areas (referred to as working groups). The technical committee has developed preliminary recommendations for alternative wastewater systems that are included in Appendix F.

Community-based Alternative Sewage Treatment Systems

The intent of these systems would be to collect sewage from a combined area for treatment, including land application of effluent, avoiding a direct discharge to any watercourse. The working groups (referenced in Section 2.0) discussing these systems have identified the Franklin County Sanitary Engineer as a candidate to be the local authority that would own and operate these systems. As with the issue of the central sewer systems elsewhere in the Accord planning area, the issues related to the provisions of the 208 Plan must be investigated to establish which are applicable to this arrangement. The working groups have identified the described approach to be the preferred method of wastewater treatment service for those areas that are not intended to be served by centralized wastewater treatment systems under the following conditions:

- The technology applied is appropriate. Land application, or drip irrigation, systems have various applications and the state-of-the-art is being sought in terms of meeting a high degree of certainty that the systems will provide a long-term and cost-effective solution to sewage treatment.
- The management and operations are effective, and regulatory oversight is sufficient. The working group recommends that the systems would be acceptable if they are publicly owned and operated, they are installed in compliance with an Ohio EPA *Permit to Install*, and they are operated in compliance with an acceptable Ohio EPA *Permit to Operate*. The Ohio EPA does not currently have a *Permit to Operate* mechanism for these systems. The Ohio EPA will be publishing proposed rules to create this mechanism in the near future. The working groups propose that these rules must adequately address the criteria listed below.
  1. *Effluent limitations*
  2. *Monitoring requirements*
  3. *Operator qualifications*
  4. *Siting criteria, considering field tiles, soil types and isolation distance*
  5. *Storage of effluent*
  6. *Application rates/conditions for both spray and drip irrigation*

  Upon issuance of the proposed Ohio EPA rules, the working groups propose to review and determine if all stipulated provisions have been adequately provided.

On-lot Systems

Although it is intent of the Accord Plan to limit the circumstances under which a single-lot sewage treatment system would be required, it is anticipated that some low-density development will continue to occur that is not part of community-based systems. As such it is anticipated that future home sewage treatment systems (HSTS) applications are likely. Current rules and regulations pertaining to permitting and oversight of these systems are inadequate.

Maintenance and care of these systems by individual homeowners is a concern and has likely resulted in malfunctioning systems that, collectively, are a contributor to water quality degradation within the Accord planning area.

The working groups discussed in Section 2.2 are considering this issue, standards and regulations governing these systems. Currently, these systems are under the authority of the Franklin County Board of Health and would remain under that authority. The Ohio Department of Health *Ohio Sewage Treatment and Disposal Rules* will become effective January 1, 2007. These rules contain most of the elements necessary for regulation, oversight and management of the alternative wastewater treatment and disposal systems proposed for consideration by the Darby Accord. These necessary elements are listed below.

1. Soil absorption criteria and site evaluations
2. Demonstration of competency in the performance of soil and site evaluators, septage haulers, designers, and installers
3. Responsibility (homeowner) for proper siting, design, installation, monitoring and operation/ maintenance
4. Oversight of the county Board of Health (BOH) by the Ohio Department of Health (ODH) on compliance with the new rules
5. Criteria related to subdivision development with HSTS
6. Installation Permit requirements
7. Operation Permit issued by BOH for all new HSTS
8. Requirements for on-going monitoring, operation, maintenance of HSTS by homeowners
9. Adequate separation from limiting soil conditions (e.g., seasonal high water table, etc.) to allow for treatment in the soil profile to protect human health from disease causing organisms in groundwater and surface water
10. Standards for bacteria, BOD5, and TSS, and enabling local government to establish nutrient reduction standards (e.g., nitrate, phosphorous, etc.)
11. Criteria for the installation of gradient drains (installed around the entire HSTS) and interceptor drains (installed upslope of a 'Wisconsin Mound' system)
12. HSTS design standards to protect human health and surface flow and groundwater
13. Installation inspection requirements of new HSTS
14. Education of the homeowner on the operation and maintenance of HSTS
15. Mandatory service contracts for drip distribution or any HSTS with a "pre-treatment" component approved by ODH
16. Mandatory one-time 18 month inspection of all new HSTS after effective date of rule

The Franklin County BOH intends to rescind their current rules and enforce the minimum State rules by the effective date of those rules. The working groups recommend for consideration by the Accord the adoption of the following local BOH rules by the effective date of the State Rules:

- Require mandatory monitoring, operation and maintenance service contracts in accordance with manufacturer's recommendations or BOH operational permit requirements for all new HSTS.
- Consider the establishment of an Operational Permit Program for all existing HSTS not regulated by such permit (e.g., septic tank and leach field type systems) and, further, for the Operational Permit to include the requirement for monitoring, operation and maintenance service contracts.

The technical committee addressing the issue of HSTS is determining recommendations on HSTS design standards. These recommendations will consider issues related to designing for curtain drains, the acceptable minimum depth to seasonal high water table, pre-treatment applications and whether to recommend household irrigation systems or lagoons.

4.10 Transportation

With the Town Center being the heart of development within the Big Darby Accord, it is imperative that a more detailed transportation plan be defined for the immediate area. Since the transportation plan has a significant influence on the appearance, character and vitality of the area, it must provide for safe, convenient and efficient movement of vehicular, pedestrian and bicycle traffic within and adjacent to the Town Center.

When an overall master plan is developed for the Town Center, traffic engineering and transportation studies should be undertaken as various land-use and urban design plans are considered. Through this process, traffic volumes can be projected and assigned to the roadway systems. Based on analyses of the projected link and intersection volumes, roadway needs in terms of number of lanes can be determined. The roadway cross-section needs can then be married with the desired street character (such as open ditch or curb and gutter, median, tree lawn, sidewalk, bike path, etc.) to identify desired right-of-way widths. Guidelines should also be established regarding access management for streets and roadways within the Town Center to maintain the integrity and mobility function of the roadway system – particularly along the

conceptual north-south spine road connecting US 40 with I-70.

Over time it will be important for the Accord jurisdictions to further consider long-term transportation implications of the plan for the broader planning area. A regional traffic study would help direct infrastructure investments. It could also provide guidance as local jurisdictions work with development proposals to ensure that proper access is provided and necessary improvements are made to the surrounding roadway system to ensure a minimum level of service. Regional traffic studies have been undertaken in Franklin County on several occasions with the multi-jurisdictional Northwest Traffic Study being a recent nearby example.

4.11 Trails and Greenways

The Accord should support efforts to develop regional and local trail systems that link parks and open spaces. Development of a regional trail along both the Big Darby and Hellbranch Run within dedicated easements should be pursued in coordination with developers, land owners and Metro Parks. In addition, the Accord should support the development of a trail along the existing rail corridor that extends from Columbus to the Big Darby.

The design and construction of greenways and trails should be a required improvement for all development plans that are within proximity of a regional trail and considered for smaller site developments. Developers should be required to provide and construct these amenities during the site development. The local jurisdiction should provide flexibility to meet this requirement evaluating whether it could satisfy any adopted parkland dedication requirement. The network of greenways and trails throughout the planning area should link neighborhoods with one another, with schools, parks and other natural areas.

Public and private trails should be developed for river access and the enjoyment of nature. Trail specifications include:

Paved Trails

- Trail surface: (hard) asphalt or concrete
- Trail width: minimum 10′ - maximum 12′
- Clearing width: maximum 20′ (clearing width not included as part of setback)
- Distance from the edge of the stream: minimum 300′
- River access points may be developed but must be unpaved
- Private trails should not have crossings and crossings on public trails are a conditional use and should be permitted only if they are part of a comprehensive trail plan

Unpaved Trails

- Trail surface: (soft) compacted gravel or approved natural surface
- Trail width: minimum 5′ - maximum 12′
- Clearing width: maximum 20′ (clearing width not included as part of setback)
- Distance from the edge of the stream: minimum 200′
- River access points may be developed