ATTACHMENTS

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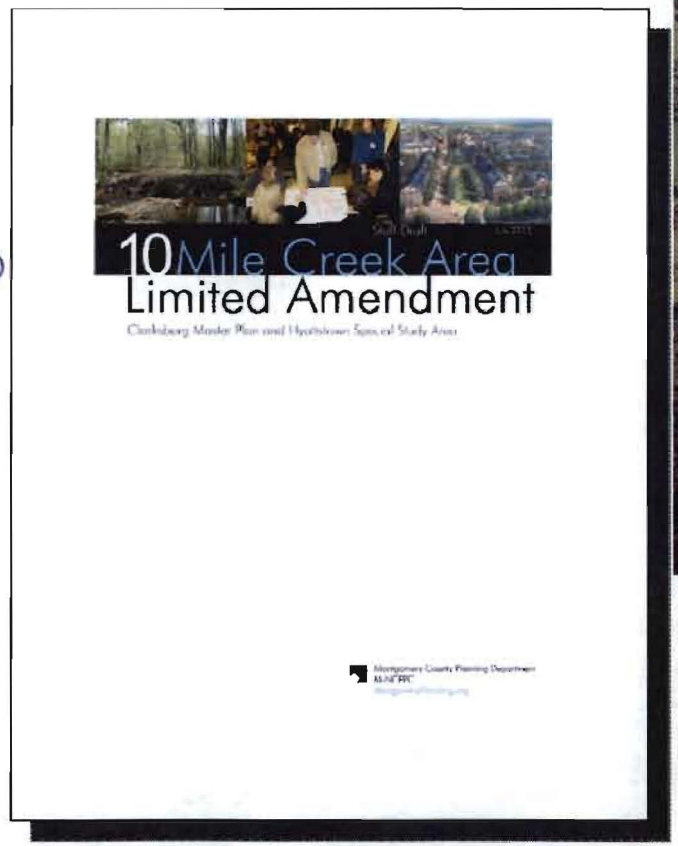
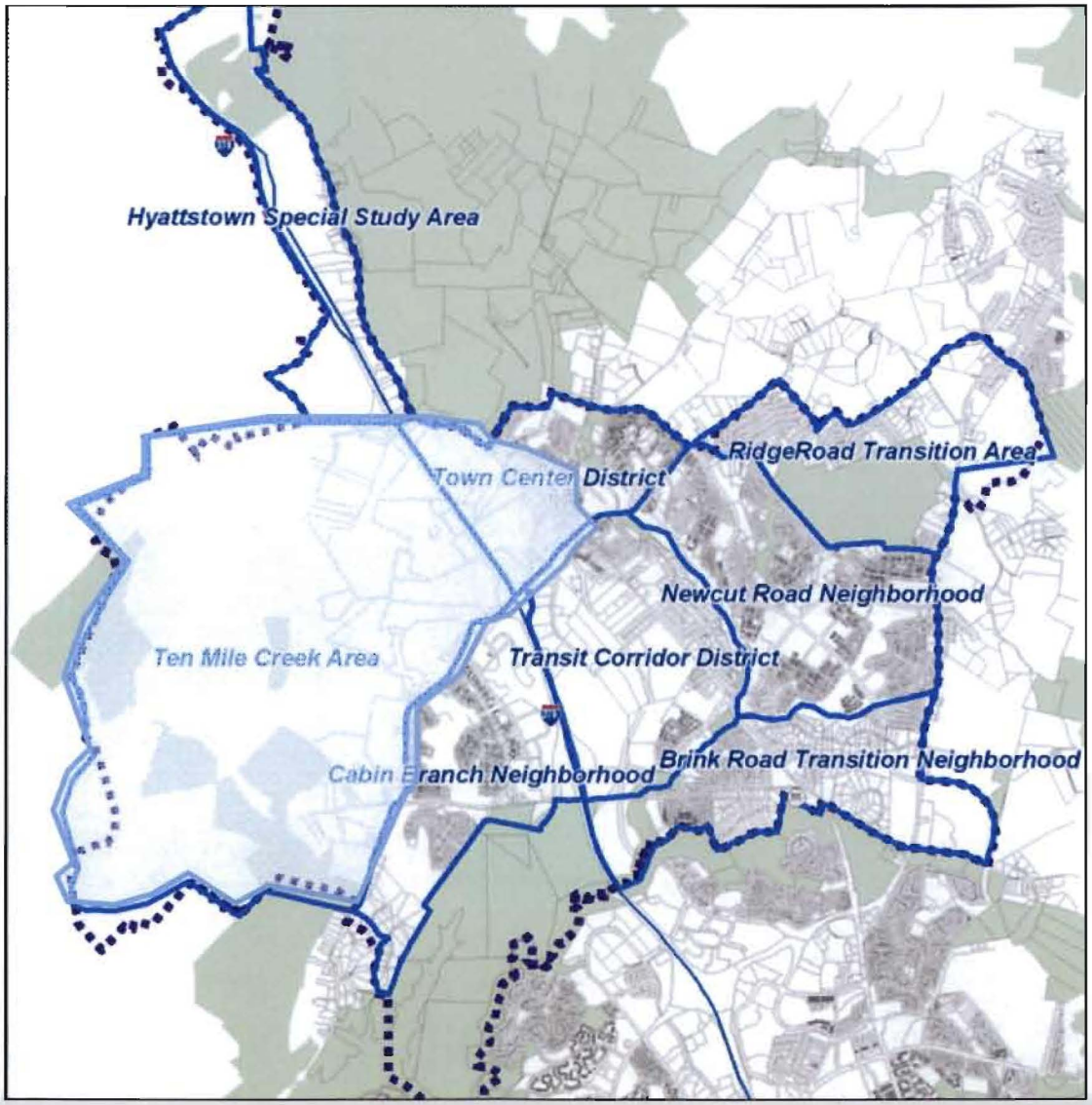


Clarksburg Limited Master Plan Slides for Council Packet

MONTGOMERY COUNTY PLANNING DEPARTMENT

Location of Limited Master Plan Area

- Town Center District extends to I-270
- Almost half of Town Center District is in the Ten Mile Creek watershed



Ten Mile Creek Watershed

Clarksburg Units, Households, Population

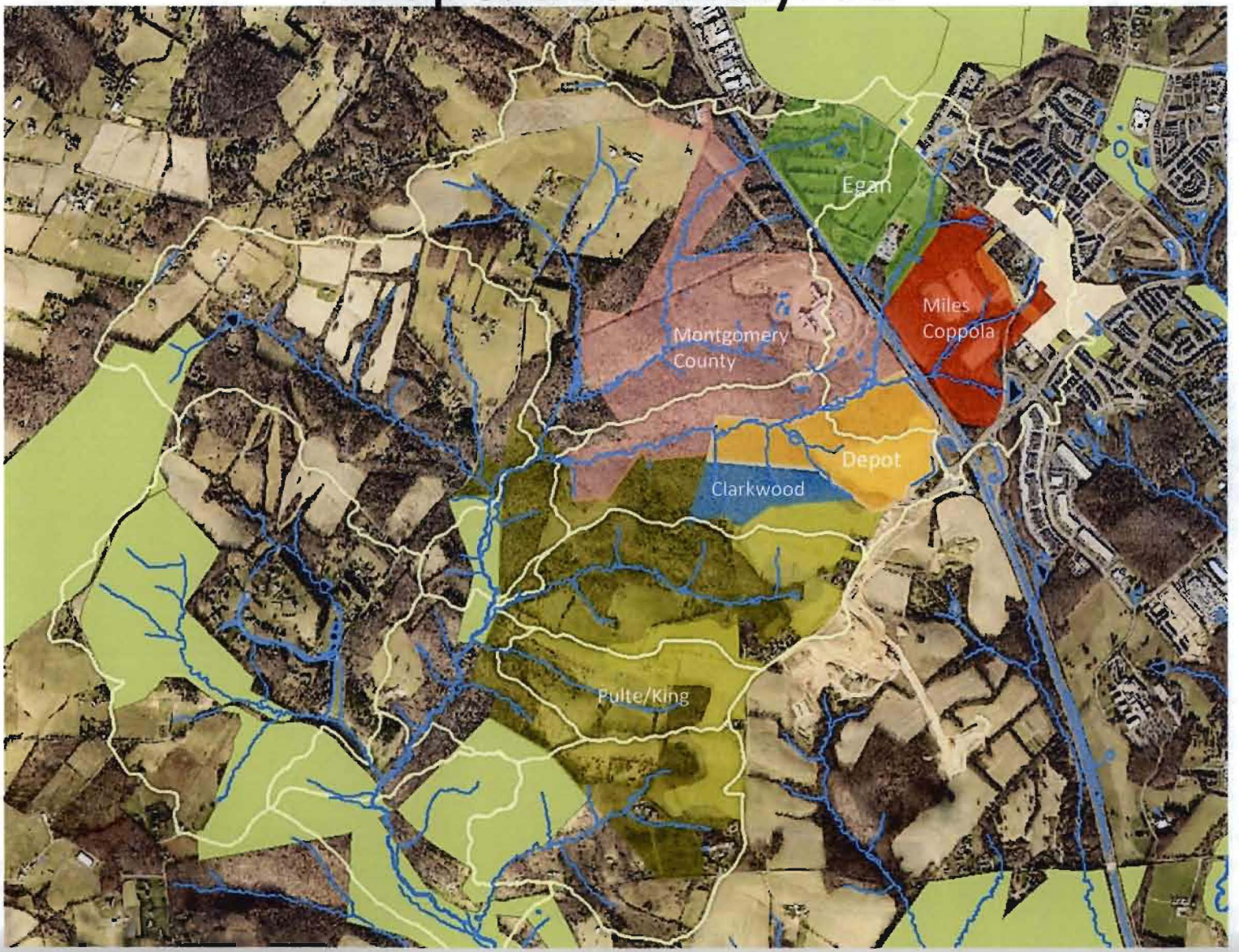
	units	estimated households*	household size*	population
2014 Clarksburg built units and population	6,556	6,265	3.28	20,549
2014 built plus approved development	10,465	10,000	3.28	32,800
1994 Plan end state development stages 1, 2, 3	12,920	12,347	3.28	40,498
Planning Board Draft Limited Amendment Stage 4*				
detached	539	515	3.46	1,782
attached	269	257	2.74	704
multi-family	850	812	1.82	1,478
total	1,658	1,584		3,964

Sources: Center for Research and Information Systems, Montgomery County Planning Department, September 2013; 1994 Clarksburg Master Plan; 2013 Planning Board Draft Limited Amendment

** Estimated households based on 4 percent vacancy rate; household size from US Census and Planning Department surveys. Planning Board Draft assumes 50 percent attached and 50 percent detached development for Pulte-King properties, all detached development for Egan-Mattlyn property and all multi-family development for Miles-Coppola properties.*

Sub Watersheds

Properties Analyzed



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Summary of Plan Proposals

	1994 Planning Board Draft	1994 Council Approved Plan	2013 Public Hearing Draft	2013 Planning Board Draft	Committee Recommendation
Egan	2-4 DU/acre (28%, ~300 units)	2-4 DU/acre (28%, ~300 units)	R200 (25%) (200 units)	R200 (25%) (200 units)	up to 3 du/ac (15% cap) (300 units)
Miles/Coppola	7-11 DU per acre (~400 units)	MXPD (26%) (~215 units; 470k sf)	CR (25%) (0.5 FAR; ~850 units; 1 mil sf)	CR (25%)(0.75 FAR; ~850 units, 2.1 mil sf)	CRT, up to 3 du/ac (15% cap) (279 units,~436K sf)
Fire Station	2-4 units/acre (12 units)	Build	Build	Build	No Build
Bypass	Build entire length (4 lanes)	Build entire length (4 lanes)	Build shorter (4 lanes)	Build shorter (4 lanes)	Build shorter 2 lanes)
Clarkwood	Rural (est. 5%) (7 units)	RE1/TDR (12.5%) (34 units)	No Dev	No Dev	No Dev
County Depot	Rural (est. 5%)	RE1/TDR & I-3	I-3 (8%)	I-3	No Dev
County Detention	Institutional (est. 5%)	Institutional (15%)	Institutional (4.5%)	Institutional (4.5%)	Institutional (4.2%)
Pulte	Rural (est. 5%) (107 units)	RE1/TDR (12.5%)(~800 units)	RNC (8% cap) (215 units)	RNC 1.0 (10% cap) (538 units)	RNC 1.0 (6% cap) (538 units)
Watershed Imp.	Est. 6-7%	9.8%	7.5%	8.0%	6.3%

Assumptions for Imperviousness Analysis

	2013 Public Hearing Draft	2013 Planning Board Draft	8% Reduced[1]	Scenario 5[2]	15/15/6%[3] Committee Recommendation
Egan	25%	25%	8%	20%	15%
Miles/Coppola	25%	25%	8%	20%	15%
Fire Station	Build	Build	No Build	Build	No Build
Historic Dist.	Build	Build	Build	Build	Build
Bypass	Build 4 lanes	Build 4 lanes	Build 2 lanes	Build 4 lanes	Build 2 lanes
County Depot	8%	RNC	No Dev	No Dev	No Dev
County Detention	4.5%	4.5%	4.2%	4.5%	4.2%
Pulte	8%	10%	8%	7%	6%
Impervious in LSTM110 , 111	8.4%, 11.1%	10.1, 13.8%	8.4%, 11.1%	7.5%, 9.7%	6.6%, 8.3%
Watershed Imp.	7.5%	8.0%	6.2%	6.8%	6.3%
			[1] 8% Pulte/ Egan/Miles-Coppola	[2] Tested by environmental consultant	[3]15% Egan/Miles Coppola, 6% Pulte

MONTGOMERY COUNTY PLANNING DEPARTMENT

Cumulative Imperviousness Estimates by Subwatershed

Subwater-shed	Existing Conditions	15/15/6%[1]	8%[2] Reduced	Public Hearing Draft	Planning Board Draft	1994 Plan
LSTM201	3.9%	6.5%	5.8%	7.5%	7.5%	10.8%
LSTM206	16.6%	23.6%	20.9%	28.2%	28.2%	33.2%
LSTM202	11.0%	15.9%	14.5%	20.5%	20.8%	25.0%
LSTM302	5.6%	8.3%	7.6%	10.2%	10.3%	13.0%
LSTM110	1.6%	6.6%	8.4%	8.4%	10.1%	15.1%
LSTM111	1.2%	8.3%	11.1%	11.1%	13.8%	14.1%
LSTM303B	4.7%	7.8%	7.5%	9.6%	10.0%	12.7%
LSTM112	2.5%	5.0%	5.8%	5.8%	6.6%	5.7%
LSTM304	4.2%	6.7%	6.5%	8.1%	8.4%	10.6%
Watershed	4.0%	6.3%	6.2%	7.6%	7.9%	9.8%

[1] 15% Egan/Miles Coppola, 6% Pulte

[2] 8% Pulte/ Egan/Miles-Coppola

Chronology of Actions Related to the Ten Mile Creek in Clarksburg
(Prepared by Planning Department Staff 1/9/14)

June 1993 - Planning Board Draft of Clarksburg Master Plan recommends 1 unit per 5 acres west of I-270 and medium density residential for most of Egan and Miles/Coppola properties.

June 1994 – County Council approves light industrial for both sides of I-270 near the 121 interchange with 2-4 units/acre for the properties further west and medium density residential for the remainder of the Miles/Coppola and Egan properties respectively. Staging added to the plan to assure that the decision of how to proceed in Stage 4 rested with the County Council after evaluating the impact of Stages 1-3 on Little Seneca Creek.

October 2005 – Sewer and Water Category Change Request received for Miles/Coppola. Deferral requested by the applicant.

2007 – Staging triggers were met for consideration of monitoring data.

2008 - Montgomery County adopts changes to the regulations to require Environmental Site Design (ESD) in conformance to the State Law.

January 2009 – Special Protection Area Annual Report for the monitoring year 2007 analyzes impact of development on Little Seneca Creek and other Special Protection areas. The report gives no definitive findings that will predict the impact of development on Ten Mile Creek.

May 2009 - Sewer and Water Category Change Request received for Pulte & King properties. Request returned due in part to the Council's decision to establish the Stage 4 *ad hoc* working group.

May 2009 – Pulte & King Water and Sewer Category Change application returned due in part to the Council's decision to establish the Ad Hoc Water Quality Working Group.

July 2009 – County Interagency Workgroup expresses concern about potential for impact on Ten Mile Creek and Planning Board reports to Joint T&E and PHED Committees that an amendment to the Master Plan is necessary, due primarily to the fact that construction was still in its active phase. Final protective measures were not yet in place and temporary impacts had not yet stabilized.

October 2009 – Council establishes an Ad Hoc Water Quality Working Group representing all the stakeholders and local agencies to "collect information on all new and pending State and Federal regulations regarding water quality, stormwater management, and sediment control; analyze how these new requirements could impact future development in Clarksburg, especially in Stage 4; seek input from Clarksburg stakeholders as to the methods they propose for minimizing development impacts on water quality in the Ten Mile watershed, and advise the Council on the steps necessary to preserve water quality in Stage 4."

May 2010 – ESD Regulations take effect in Montgomery County.

July 2010 - Sewer and Water Category Change Request received for Egan/Mattlyn properties. Action is delayed awaiting Council reaction to the Ad Hoc Water Quality Working Group report and the master plan amendment process.

July 2010 - The Ad Hoc Water Quality Working Group report results in split opinion where the majority (environmental, civic and agency representatives) recommended an examination of the land use options in a master plan amendment and the property interests and industry groups recommended moving ahead with development. Joint PHED and T&E Committee hear report results and take no action.

May 2012 – Special Protection Area Annual Report for the monitoring year 2010 reports a slowing of water quality degradation within the SPA and in certain areas, slight increases in water quality. However more time is needed to definitively assess the effectiveness of the water quality protection measures for newly developed areas.

October 9, 2012 - County Council requests the Planning Board to prepare an amendment to the Clarksburg Master Plan. Establishes a one year schedule and authorizes funds for environmental, transportation and economic studies.

July 25, 2013 – Planning Staff recommends RNC zoning on Pulte and King Properties at 1 unit per 0.4 acre with an 8% imperviousness cap. Egan is shown with R200 zoning and with a 25% imperviousness cap. Miles/Coppola zoning is shown with two options: Option 1 is a balanced mixed use option with a 25% imperviousness cap and with CR 0.5, C 0.25, R 0.25, H 75 zoning; Option 2 is mixed use, but with a more residential focus, with a 25% imperviousness cap and townhouses at 12 units to the acre.

October 25, 2013 – Planning Board transmits Planning Board Draft Plan to the County Executive and County Council. It recommends RNC zoning on Pulte and King Properties at 1 unit per acre with a 10% imperviousness cap. Egan is shown with R200 zoning and with a 25% imperviousness cap. Miles/Coppola is shown with a balanced mixed use option with a 25% imperviousness cap with CR 0.5, C 0.25, R 0.25, H 75 zoning.

Ten Mile Creek Limited Master Plan Amendment—Responses to Testimony on Technical Analyses (2/26/2014)

This summary of comments and responses was prepared by Planning Department staff. Technical responses regarding the Consultant analysis are explained in greater detail in the memorandum prepared by the consultants (attached).

Environmental Site Design

1. **Comment: The Planning Board has not been shown information that justifies a significant change from the 1994 master plan, and the analysis is not in a position to confirm that ESD regulations adopted by MDE and the County are incapable of protecting the water quality of Ten Mile Creek (TMC). (Pulte Group, Soltesz, NewFields, Geosyntec)**

Response: All streams in the County have been negatively impacted by human activity. But some relatively undeveloped watersheds, including TMC, are still in good to excellent condition compared with other streams. TMC is one of a number of high-quality streams used as reference streams to be compared with more degraded ones. This allows a comparison of changes in reference stream conditions that are not related to development impacts, such as climate change.

The State of Maryland and scientific literature recognize that even though ESD is an improvement over traditional methods, it cannot prevent all negative development impacts and that high-quality watersheds are best protected by limiting development and applying ESD. This is at the core of the recommendations.

ESD is now required and will be used for any new development in TMC. ESD is intended to mimic the hydrology of wooded land and to treat and infiltrate about 90% of the rainfall in an average year (up to the 1-year storm). Planning-level modeling done by the M-NCPPC consultant shows some potential impacts to stream hydrology for development under the 1994 Plan, and fewer potential hydrological impacts for a recommended reduced development footprint in subwatersheds 110 and 111, along with the protection of key forest resources.

ESD is intended to improve hydrological performance, but there is no expectation by state and local environmental agencies that it will prevent all negative impacts to stream biological health, particularly in high-quality watersheds.

Maintaining hydrology similar to wooded land for up to the 1-year storm is expected to significantly reduce the risks of stream channel erosion and sedimentation. Many pollutants in stormwater will be filtered and reduced by ESD practices. Exceptions to this are mobile pollutants such as road salt and nitrogen to an extent, which ESD practices will transmit directly to groundwater.

Stream biological health is highly related to the amount of disturbance in a watershed. As yet, there have been no watershed-scale studies that have assessed the biological impacts of ESD. Although ESD is

(11)

a significant improvement over older SWM practices, MDE has made no assumptions for ESD regarding specific biological responses or biological quality standards.

Although watershed-scale hydrologic modeling of ESD has been done in some parts of the Country, actual monitored responses to ESD on a watershed-scale, especially changes in stream biological health, are almost non-existent. This is confirmed in the scientific literature, along with the general expectation that even if ESD succeeds in mimicking the hydrology of wooded land, there will likely still be negative impacts to stream biological health, especially in sensitive, high-quality watersheds like TMC. These were important considerations that were factored into staff recommendations.

Development under the 1994 Master Plan in subwatersheds 110 and 111 may disqualify TMC from its current status as a reference stream based on selection criteria for reference streams in the County. However, the recommendations to reduce development footprint and impervious area, and enhance natural resource protection will serve to reduce the risk of losing TMC as a remaining a reference stream by reducing negative impacts to the stream's biology.

2. **Comment: Now that ESD is required, there is no need for any limit on development or impervious cover. ESD will prevent all negative impacts from development and will protect Ten Mile Creek. (Robert Kauffman, Pulte Group, Soltesz, NewFields, Geosyntec)**

Response: (See response to 1.) Based on State guidance and the scientific literature on ESD and development impacts to stream biology, maximizing the protection of natural resources, limiting development and limiting total imperviousness, combined with the use of ESD, remain important tools for watershed protection, especially in sensitive, high-quality watersheds.

3. **Comment: Because ESD better protects water quality than the water quality protection measures in place in 1994, there is no justification to recommend any land use changes at this time. (Gus Bauman, Robert Harris)**

Response: Because of ESD, water resource protection measures have indeed improved since 1994. But it is the opinion of the State and the scientific community that although ESD does a better job of environmental protection, it is not intended to be a remedy for all development-related environmental impacts, and there is no reason to believe that it will do so, especially in terms of stream biological health in high-quality watersheds. ESD was developed to improve site design and stormwater management by improving the hydrology of developed sites. But total environmental health depends on more than hydrology. There are almost no data on a watershed-scale that assesses the impacts of ESD on stream biology. Consequently, MDE made no assumptions regarding specific biology responses to ESD, and set no specific biological performance standards for ESD. The assumption is that ESD will reduce development impacts on stream biology, but to what degree is unknown and will vary on a case by case basis based on local conditions, as well as the quality of design and implementation. As a result, the State and the weight of scientific opinion in the literature recommend using an approach that combines protecting natural resources, limiting development and imperviousness, and using ESD as much as possible, especially in high-quality watersheds.

M-NCPPC Staff Analysis

4. **Comment: MNCPPC's application of the Countywide Stream Protection Strategy Score Change Estimate (CSCE) model predicts that water quality in the main stem of Ten mile Creek will remain "Good" even without accounting for the superior stormwater management systems related to ESD which are required by State regulations. (Pulte Group, Soltesz, NewFields, Geosyntec, Robert Harris)**

Response: The comment misses the fact that the category of "Good" covers a wide range of biological health score points, which corresponds to a wide range of biological quality (from almost Fair to almost Excellent). As a result, an unacceptable amount of biological degradation can still occur within the "good" range. Although the analysis only used stream biological health data from watersheds that use traditional stormwater management (which is the only data currently available), the point is that because ESD is still not expected to be able to mitigate all impacts to stream biological health, a more conservative approach to watershed protection is justified, especially in high-quality watersheds.

5. **Comment: The Planning Board's calculation of percent impervious area for purposes of impact analysis appears to be highly misleading because it averages application and effect of impervious area over substantial parts of the TMC watershed (e.g. west of the TMC main stem) that are not, in fact, likely to be impacted by Stage 4 development.(Ephraim King)**

Response: The analysis of percent impervious area conducted by M-NCPPC staff was done on both a cumulative subwatershed basis and the watershed as a whole. This approach has been in used for many years in previous master plan analyses including the Potomac Subregion and Upper Rock Creek Master Plans. It allows the analysis of headwater areas separately from the rest of the watershed as well as the incremental changes in percent imperviousness while moving downstream in the watershed. Cumulative imperviousness is a measure of all the inputs to the monitoring stations. By the time the analysis has moved downstream to the watershed outlet, the total area being studied is the entire watershed. This approach provides an understanding of the changes in percent impervious area on small, intermediate, and overall watershed scales.

Consultant Analysis

6. **Comment: The Planning Board's environmental analysis and recommendations to the County Council is based upon rainfall or design storm assumptions that significantly understate the likely amount and intensity of rainfall in TMC and, thus, substantially understate the water quality and aquatic habitat impacts that will occur as a result of Stage 4 development. Briefly, the Planning Board analysis assumes a 1 inch design storm for modeling flow, intensity, and related environmental impacts. (Ephraim King)**

Response: The hydrologic analysis done by the consultant was not based on assumptions that understate the likely amount and intensity of rainfall in TMC. The Maryland Department of the Environment has set the design storm for ESD to be the 1-year storm event. This storm equates to 2.6 inches of rain in a 24-hour period. This was the storm that was used by the consultant in its hydrologic modeling. Moreover, in addition to the 1-year storm, the consultant also modeled the 2-year design storm, which is equal to 3.2 inches of rainfall in a 24-hour period.

7. **Comment: The M-NCPPC's consultant's hydrologic model is too coarse, uses incorrect assumptions, and is not representative of the detailed site plan and specific ESD layouts possible on the sites, and does not support staff recommendations. (Pulte Group, Soltesz, NewFields, Geosyntec)**

Response: No level of hydrologic modeling can determine the effect of development on stream biological health. Because the principal environmental concern in TMC is its high-quality stream biology and its status as one of the few reference streams in the County, the question as to how much TMC would decline in stream biological health in response to development cannot be determined by hydrologic modeling. Hydrologic and other types of modeling and analysis, however, provide important information that is useful in assessing relative degrees of risk to biological health, and in comparing different scenarios. Because of this, staff used a combination of different approaches including hydrologic modeling, natural resources analyses, pollutant loading analysis and findings from the scientific literature, to assess the relative degree of risk to stream biological health, and to make recommendations accordingly.

Differences between the planning-level analysis done by staff consultants, and the much more detailed modeling done for the Pulte property are to be expected. For planning purposes it cannot be assumed that any one particular detailed stormwater concept will be implemented as part of a master plan level analysis. In addition, information at that level of detail is not available for all properties.

8. **Comment: The M-NCPPC consultant's existing condition model appears to grossly underestimate peak flow rates in subwatersheds 111 and 110. This fundamentally undermines the conclusion drawn by the M-NCPPC consultants in comparing between existing and proposed conditions models. (Pulte Group, Soltesz, NewFields, Geosyntec)**

Response: The actual peak flow rates in LSTM110 and LSTM111 are unknown, and predictions of peak flow rates under existing conditions are sensitive to various model algorithms and parameters, and can vary widely within the range of accepted modeling methods and parameter values. (See response to 9.)

But it is important to note that even if a more detailed hydrologic analysis shows that a specific site design and ESD layout can mimic the hydrology of wooded land, it doesn't mean that there will be no degradation of TMC and its tributaries, especially to their stream biology.

9. **Comment: Geosyntec compared M-NCPPC's consultants modeling results for both subwatersheds 110 and 111 with three other methods: 1) a USGS regression equation for ungauged watersheds in MD, 2) area-scaled continuous gauge data from the USGS gauge on TMC, and 3) Geosyntec's own modeling of the watershed. All three of these methods show significant departures from the values obtained by the M-NCPPC consultants.(Pulte Group, Soltesz, NewFields, Geosyntec)**

Response: Regression equations for hydrologic parameters are generally not very accurate, and are typically used as a very general guides in the absence of modeling results, and not for design purposes or for verification of detailed modeling results. Although Geosyntec provided no confidence intervals for their reported regression estimates using a USGS equation, review of the original USGS paper

indicates that the 95% standard error of prediction for peak flows is +/- 78% of predicted values. This confirms the low accuracy of the USGS regression equation for peak flows.

Area scaling to estimate hydrologic parameters is likewise known to provide only rough estimates, and again, is typically used as a general guide in the absence of modeling results—not as a confirmation of modeling results. The degree of area scaling done by Geosyntec (from a 4.5 mi^2 watershed to 0.33 mi^2 and 0.16 mi^2 watersheds) represents a significant extrapolation beyond the gauged data used, with increased and un-quantified uncertainty associated with the results.

Detailed hydrologic modeling using specific site plan designs and ESD practices is not appropriate for planning studies (see the response 8). Moreover, a USGS stream gauging station is located immediately adjacent to TMC in a small tributary that is very similar to subwatersheds 110 and 111 in size and land use. It would have made more sense to use the gauge data for the smaller tributary for comparison with 110 and 111, than the gauge on the much larger TMC watershed. Using the larger watershed for comparison purposes introduces more error.

10. **Comment: The proposed Pulte ESD design will reduce the peak flow rates during the 1 and 2-year design events below existing condition flow rates. (Pulte Group, Soltesz, NewFields, Geosyntec)**

Response: Although current baseflow in TMC is not what would occur if the entire watershed was forested, it is in a healthy equilibrium with the existing mix of forest and agricultural open land. As a result, the current high-quality stream biology and channel are adapted to the current hydrologic flow regime.

It is important, especially in high-quality watersheds, that ESD not significantly reduce or increase baseflow, or other key hydrologic parameters. If, as claimed, proposed ESD will reduce peak flow values below existing conditions, it would do so by increasing infiltration over existing levels.

If that occurs, then a corresponding increase in baseflows in TMC and its tributaries could result that could potentially be detrimental to stream biological health.

11. **Comment: In the case of subwatersheds 110 and 111, significant design work has already been completed by Soltesz for the Pulte property. It is possible to achieve stream protection using accurate existing conditions peak flows, reasonable infiltration rates, regulatory compliant recharge volumes, and appropriate ESD design assumptions. (Pulte Group, Soltesz, NewFields, Geosyntec)**

Response: (See responses to 1, 2, 3, and 9.) In addition, subwatersheds 110 and 111 are located just upstream of the County's reference monitoring station for TMC. Development in these subwatersheds under the 1994 master plan could potentially disqualify TMC as a County reference stream based on non-biological reference stream criteria, or because of subsequent biological decline. (See response 7). Moreover, there are various factors that could cause ESD to be less effective at reducing peak flows than predicted at the design stage. These include departures from standard assumptions regarding soil compaction, maintenance status, and storm peak timing.

12. **Comment: Infiltration rates used do not represent actual soil conditions found at the proposed subject property. (Pulte Group, Soltesz, NewFields, Geosyntec)**

Response: The M-NCPPC consultant's model used a consistent method across the TMC watershed, applying infiltration rates that are consistent with the soil types on the properties, along with considerations for infiltration alterations typical of post-construction soil conditions. This was the approach that was selected for planning-scale modeling to estimate impacts from all the proposed development scenarios, whereas site-specific details would normally be evaluated for specific developments during the development review process.

13. **Comment: The development scenarios as modeled are not consistent with local and state stormwater design requirements. (Pulte Group, Soltesz, NewFields, Geosyntec)**

Response: The current Micro Bioretention design used by Montgomery County does meet or exceed the minimum requirements of MDE as an ESD practice. All the assumptions used for ESD in the modeling were coordinated with the Department of Permitting Services and approximate, as much as possible, County stormwater regulations.

14. **Comment: Model configurations do not accurately represent the proposed stormwater practices. (Pulte Group, Soltesz, NewFields, Geosyntec)**

Response: The approach used in this effort utilizes generally accepted practices and assumptions, including conservative criteria about BMP routing that are typically assumed by DPS for comparable analyses. Basic assumptions were reviewed with Planning staff, DPS and DEP.

15. **Comment: The consultant's modeling for future pollutant loads ignores the impact of livestock currently maintained on the Pulte property and therefore underestimates the existing impact; by comparison, development of the site as planned by Pulte will significantly reduce Suspended Solids, Nitrogen, and Phosphorus pollutant loads. (Pulte Group, Soltesz, NewFields, Geosyntec)**

Response: Even with about 50% of land in agriculture in a sensitive watershed, TMC and its tributaries (except for the more urbanized LSTM 206) show good to excellent stream biology indicative of a high-quality watershed. So although agriculture does have impacts on watersheds and streams, it is clear that it does not impact stream health to the degree that urban land does. Modeling used 50% crops and 50% pasture (including livestock) as land cover for the agricultural portions of the watersheds.

Moreover, nitrogen does not significantly impact local (non-tidal) streams. Although agriculture contributes sediment loads (and some phosphorus—which binds to and is carried by sediment) to TMC and the Reservoir, those loads are relatively low, and are not having a large impact on the existing high-quality of TMC, its tributaries, or the Reservoir.

As a result, any reductions in nitrogen, phosphorus, or sediment that might occur from development would not be expected to have a significant beneficial effect on the biological health of TMC or the Reservoir. On the other hand, loadings of other pollutants associated with urban land, along with impacts to natural functions from land alteration within the development footprint could be expected to have negative impacts on a sensitive high-quality stream like TMC.

16. **Comment: The consultant's studies did not examine actual stream channel conditions resulting from extensive agricultural activities on the Pulte property nor did they consider the improvement to these conditions with development that would create additional forested area and, for the first time, establish appropriate stream valley buffers. (Pulte Group, Soltesz, NewFields, Geosyntec)**

Response: (See response 15) Long-term field observations in TMC and fieldwork undertaken by MCSDEP as part of their monitoring program and in support of the Limited Master Plan Amendment, show that the stream channels in the TMC watershed are predominantly in good condition, and do not show significant signs of instability or degradation. Although some of the highest headwater channels show some channel erosion and instability, it is not extensive. These observations are consistent with the high-quality stream habitat conditions and the high-quality stream biological health that have been documented in TMC over the years. To date, the stream biological health of TMC and its tributaries (except for LSTM 206) remains in the good to excellent range, including LSTM 110 and LSTM 111, which have a some stream reaches with no or inadequate buffers. The long-term biological monitoring of TMC therefore reflects the limited negative effects on stream health from the relatively small amount of existing channel degradation in TMC.

Establishing additional stream buffers and forested areas would help to reduce some of the negative impacts of development, but would not compensate for all of those impacts, nor would it increase the stability and quality of the stable and high-quality stream channels that predominate in TMC. Even using ESD, development could potentially have long-term negative impacts on stream channel conditions from storms greater than the ESD design storms, or from future undetected age-related decreases in ESD effectiveness. The riparian areas that would be reforested in development scenarios were modeled by the consultant as meadow, due to the long time required to establish mature healthy forests.

17. **Comment: The consultants admit that published studies for site-specific development projects reflect the benefits of ESD but inconsistently suggest that, because they found no studies of its use on an area-wide basis, the benefits have not been proven. (Pulte Group, Soltesz, NewFields, Geosyntec)**

Response: There is no inconsistency. A literature review conducted by the consultants cited studies that document the better performance of ESD practices over traditional stormwater management techniques, and utilized ESD practice performance criteria in their modeling. On the other hand, the consultants have maintained that because there are as yet no monitoring studies that document the effect of ESD, applied on a watershed-scale, on stream biological health, the ability of ESD to protect the biology of receiving streams from degradation has not been demonstrated.

18. **Comment: The consultant's model utilized to justify impervious caps is based on outdated studies and data collected prior to the State mandate for ESD measures. Models utilized to justify impervious area caps are not applicable to development practices using ESD. The use of impervious caps is an inappropriate and ineffective method of watershed protection and is arbitrary. (Pulte Group, Soltesz, NewFields, Geosyntec)**

Response: The literature review conducted as part of the TMC Master Plan Amendment process found that limiting impervious cover is still generally considered to be an important tool in conjunction with protecting natural areas, limiting development footprint, and ESD, in limiting negative impacts on

streams and stream biological health. The literature also indicates that this combined approach is especially important for limiting negative impacts to sensitive high-quality watersheds and streams.

The relationship between impervious cover and stream biological health documented in the scientific literature (e.g. The Impervious Cover Model (ICM) Schueler, 2009) is not intended to predict a specific stream biological condition based on a specific imperviousness level. What the relationship does show is a significant correlation between increasing imperviousness and decreasing stream biology. So although differences between various streams and watersheds may result in different degrees of degradation, in any particular watershed an increase in imperviousness would be expected to result in a long-term decrease in stream biological health, even though the stream may show some shorter-term up and down fluctuations in biology due to natural variability. Moreover, the ICM makes it clear that the degradation effect is especially noticeable in watersheds with low levels of impervious cover.

In addition to the ICM, the Planning Board also considered the results of a new Mid-Atlantic Piedmont-specific model called the Biological Condition Gradient (BCG) that has been recently developed through an interagency effort involving the Environmental Protection Agency, State Agencies, DEP, and experts from academia. The BCG that was developed uses Montgomery County data and supports and further refines the relationship between stream biological health and imperviousness.

Setting limits to impervious cover to help protect high-quality watersheds is guided by the results of scientific research. Setting a low imperviousness cap to provide a lower risk level to what is not only one of the highest quality watersheds remaining in the County but one that is known to be particularly sensitive to disturbance, is neither inappropriate nor arbitrary.

19. **Comment: The MNCPPC-developed watershed indicator model does not support Planning Board recommendations and was abandoned. (Pulte Group, Soltesz, NewFields, Geosyntec)**

Response: The "watershed indicator model" referred to is not actually a model, but was an early effort (March, 2013) to summarize in tabular form the preliminary results of the consultant's analyses. The consultant's analyses were based on a variety of approaches that continued to be refined over 2013 and were not abandoned. As the scenarios were refined and the analytical work continued, however, the earlier tabular approach to presenting the results was replaced in later documents with other ways to present the results.

The combined results of the different analyses done by the consultant (in conjunction with monitored stream biological data in TMC, and the weight of the scientific literature and expert opinion on watershed protection, stream biology, the effects of development on the environment, and ESD) do support recommendations that seek to protect TMC and its tributaries using an approach that combines maximizing the protection of natural resources, limiting development footprints and impervious cover, and using ESD.

20. **Comment: The geomorphological assessment conducted by the consultants is inadequate and inconclusive. (Pulte Group, Soltesz, NewFields, Geosyntec)**

Response: The consultants did not conduct a geomorphological assessment, but did use field data on the streams that was collected by DEP staff. Based on that data and the results of the hydrological modeling, the consultants made some inferences regarding the potential for future stream channel changes from post-development storms that would be uncontrolled by ESD.

These are reasonable inferences and are appropriate as part of a planning-level study. Again, this was only one aspect of an overall strategy that combined multiple analytical approaches, including quantitative methods that, when taken together and combined with other data and watershed science, support the recommendations.

21. **Comment: As part of the spatial analysis of natural resource disturbances, the effects of the loss on interior forest located on the Pulte/King property is overstated. (Pulte Group, Soltesz, NewFields, Geosyntec)**

Response: Likewise, in the case of the spatial analysis of disturbance to natural resources, the interior forest analysis was only one part of the spatial analysis, which looked at a variety of different natural resources. The loss of interior forest from development can be expected to have some degree of negative environmental impacts to TMC, but it cannot be viewed in isolation from the other impacts to natural resources that could occur under different development scenarios. Again, when the results of all the different analyses and other sources of data scientific knowledge are taken together, they support the recommendations.

22. **Comment: The spatial analysis does not account for site fingerprinting efforts required by ESD policy/law. (Pulte Group, Soltesz, NewFields, Geosyntec)**

Response: Detailed site fingerprinting is typically done at the site plan stage of development review, not at the master planning level. Nevertheless, the spatial analysis that was conducted did consider the likelihood of placing as much development as possible in already cleared areas. In spite of this, it was clear that the level of development in some of the scenarios would necessitate the removal of significant amounts of forested area including some interior forest.

23. **Comment: Per Montgomery County environmental regulations 15% slopes are only regulated as a sensitive environmental feature when they are either hydrologically connected to the stream system or are present within Highly Erodible Soils.(Pulte Group, Soltesz, NewFields, Geosyntec)**

Response: This is correct in most Special Protection Areas (SPA's). The Paint Branch SPA protects all 15% and greater slopes. Slopes of 15% or greater are considered steep slopes in all SPA wetland buffer determinations.

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Technical Memorandum

Prepared for:	Maryland-National Capital Park and Planning Commission
Project Title:	Limited Amendment to the Clarksburg Master Plan
Subject:	Draft Response to September 9, 2013 Geosyntec Letter
Date:	October 15, 2013
To:	Mary Dolan and Valdis Lazdins, Montgomery County Planning Department
From:	Biohabitats and Brown and Caldwell, a Joint Venture

Introduction

The purpose of this technical memorandum is to provide preliminary responses from Biohabitats and Brown and Caldwell, a Joint Venture, to certain technical comments raised by Geosyntec in the letter dated September 9, 2013 to the Montgomery County Planning Board entitled *Clarksburg Master Plan Limited Amendment – Ten Mile Creek Area.*

As an initial matter, it is our understanding that the purpose and scope of the Joint Venture modeling effort was to provide high level (planning level) modeling in conjunction with related assessments to assist the Planning Department in evaluating general impacts of development within the entire Ten Mile Creek watershed area. In this context, the modeling effort was appropriately limited, was based on area-wide assumptions, and its conclusions were consistent with other analyses (summarized in the July 2, 2013 report entitled *Ten Mile Creek Watershed Environmental Analysis in Support of the Limited Amendment to the Clarksburg Master Plan*) in concluding that the Ten Mile Creek Watershed area could be impacted by additional development.

As discussed previously, the planning level modeling approach used accepted modeling techniques along with various assumptions and inputs. More detailed modeling using data inputs representing site-specific conditions may be appropriate as part of a later development review process for a specific site design and stormwater management concept plan review. However, predictions made by any modeling approach will vary from actual post-development conditions due to a variety of factors (e.g., variations in site conditions, stormwater management approach, design parameters, and other variations at individual development sites). This is one of the key reasons that planning scale modeling with a margin of safety was an appropriate tool to use as part of the important land use decisions currently being considered in the Ten Mile Creek watershed.

In addition, although we have not conducted a detailed review of the Geosyntec modeling efforts for Pulte, and we express no opinion concerning the validity of any conclusions contained in its report, it is important to note that Geosyntec's efforts appear to relate only to the specific areas within the watershed (LSTM110 and LSTM111) where we understand Pulte proposes development. In turn, many of the concerns and questions raised by Geosyntec also relate to differences between planning level versus site-specific modeling efforts.

Discussion

For the purposes of this draft response, comments were categorized as those relating to the existing conditions models, and those related to the simulation of environmental site design (ESD). Other comments related to site-specific stormwater management design considerations have been addressed in the Planning Department's previous responses to questions and testimony.

Geosyntec Comment: Existing conditions model results are well outside of independent predicted results and norms for the area....The MNCPPC's consultant's model appears to grossly underestimate peak flow rates in LSTM110 and LSTM111.

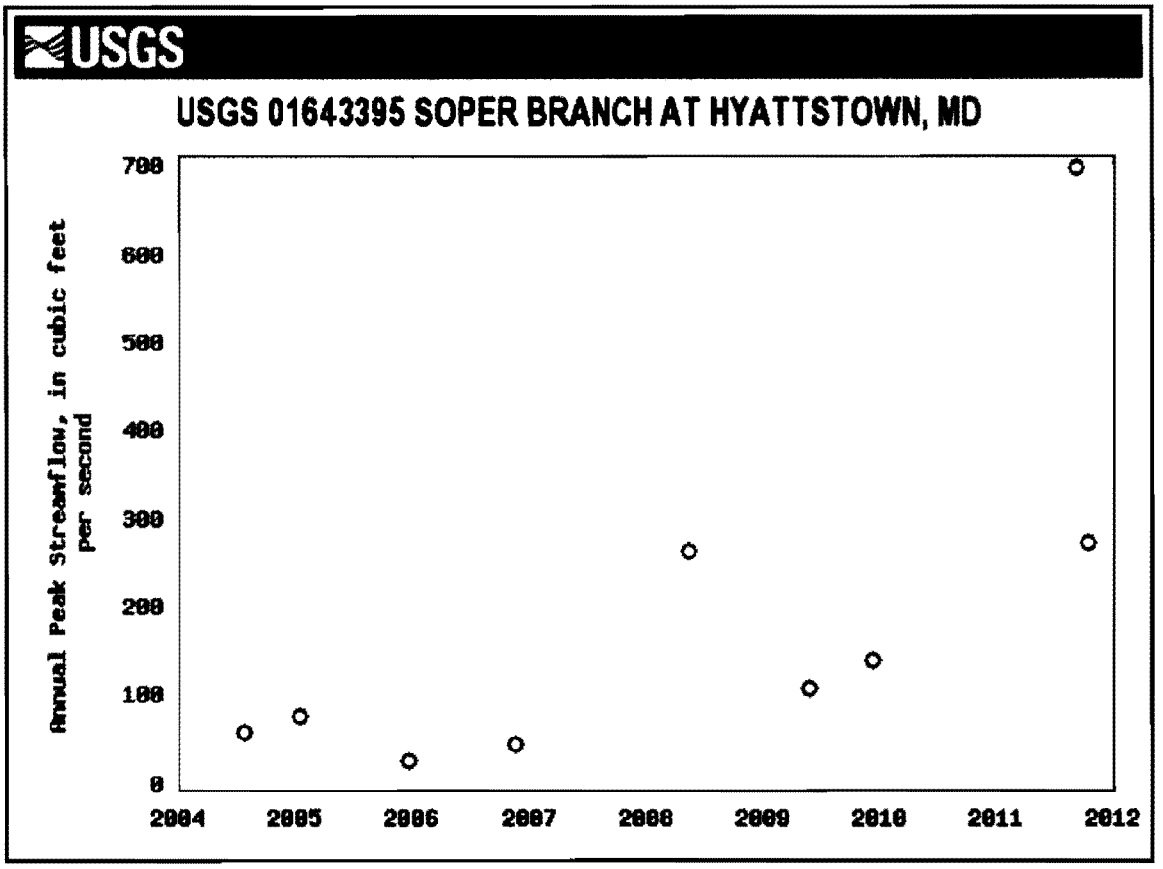
Response: We do not agree that the model grossly underestimated existing condition peak flow rates in LSTM110 and LSTM111.. Predicted peak flow rates are sensitive to various model algorithms and parameters, and can vary widely even within the range of accepted modeling methods and parameter values. The actual peak flow rates in LSTM110 and LSTM111 are unknown. Therefore, it is possible to arrive at different modeled predictions of peak flows under existing conditions. The Geosyntec comment letter cites three bases for comparison of predicted peak flows in LSTM110 and LSTM111:

1. USGS regression equations
2. Area-scaled continuous gage data from USGS gage 01644390—Ten Mile Creek Near Boyds, MD
3. Independent SWMM modeling

The USGS Regression Equation quoted by Geosyntec is several years old. USGS has updated the regressions and present data on the USGS stream statistics web site (http://streamstatsags.cr.usgs.gov/md_ss/default.aspx?stabbr=md&dt=130239302542270000). For a basin in the vicinity of the basins in question, this web site suggests a peak 2-yr flow of about 50 cfs for the 211-acre basin 110, which is greater than the value predicted by the Joint Venture but less than the value cited by Geosyntec. The Geosyntec model predicts peak 2-year flows twice the older USGS values and three times the more recent values.

Geosyntec used area-scaling from the Ten Mile Creek gage to validate their model results in continuous simulation noting that their model results were consistent with the area scaled peak flows during Tropical Storm Lee (9/8/2011). This gage is measuring flows from large areas of land use dissimilar to the largely undeveloped land uses found in LSTM110 and LSTM111 and a simple area scaling may be inappropriate. That aside, a better comparison may be achieved if the model outputs were contrasted with the full gage record so that smaller events nearer a one or two year occurrence could be assessed.

Much lower peak flows might be estimated if the area-scaling analysis used data from watersheds more similar in size and characteristics to LSTM110 and LSTM111. For example, the Soper Branch gage near Hyattstown, MD (01643395; (http://waterdata.usgs.gov/nwis/dv/?site_no=01643395&agency_cd=USGS&referred_module=sw) measures streamflows from an undeveloped watershed of about 750 acres. Application of the area-scaling method to this gage would result in peak 2-year streamflow estimates for the 211 acre LSTM110 of 30 to 40 cfs. This estimate was made by taking the 4th largest annual peak flow in the area-scaled 9-year record. This represents a rough estimate because the record is relatively short, but it reflects the characteristics of the watershed. The Soper Branch data are shown below.



Other methods of estimating the existing system peak flows are available. For example, the U.S. Fish and Wildlife Service (McCandless and Everett, 2002) has developed regional regression curves to estimate bankfull discharge and channel geometry for streams in the Maryland Piedmont. Bankfull discharges are relevant to the analysis because they generally correspond to events with a return frequency of 1-2 years (Rosgen, 1996). McCandless and Everett (2002) provide the following equation for estimating bankfull discharges in the Maryland Piedmont:

$$Q_{bkf} = 84.56\ (DA)^{0.76}$$

Where:

Q_{bnk} = bankfull discharge (cfs)

DA = drainage area (mi^2)

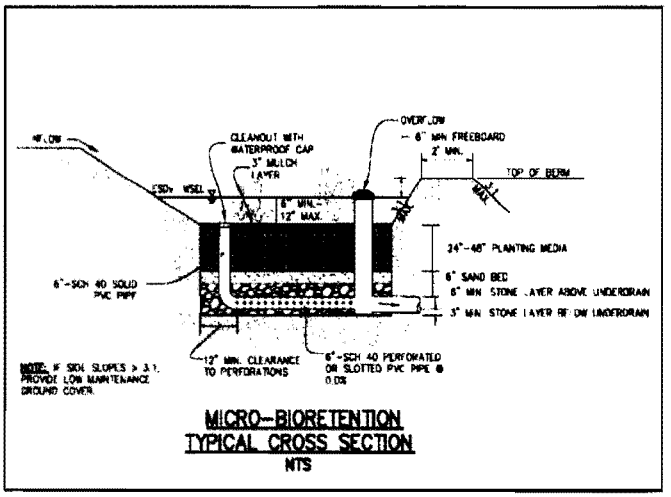
Application of this method to subwatershed LSTM110 and LSTM111 provides bankfull discharge estimates of 36 and 21 cfs, respectively. These values are significantly lower than Geosyntec's estimates of peak flows for the 1- and 2- year storms.

Some of Geosyntec's criticisms of the planning-level model are related to the use of the SCS method and specific runoff curve numbers. The SCS method is a widely-accepted approach for planning level hydrologic modeling, and the curve numbers used in the planning-level model are within the range of published values for the land uses and soil types present. The selection of different infiltration algorithms, parameters, or model configuration would indeed affect the prediction of peak flows. While it can be argued that the existing condition peak flows in the Joint Venture analysis should have been higher for modeling purposes, we are aware of no basis to accept the estimates cited by Geosyntec that are three or more times higher than alternative estimates. Most importantly, even using USGS values, the analysis would still have shown significant increases in peak flows resulting from development.

***Geosyntec Comment:* Infiltration rates do not represent actual soil conditions within the ESD...we do not believe MNCPPC's model is consistent with the descriptions in the MNCPPC Report and does not accurately represent the storage and infiltration occurring within ESD measures.**

Response: Geosyntec is correct that there are inconsistencies between the report and the manner in which ESD practices were actually modeled. However, these inconsistencies do not invalidate the ESD simulation, nor greatly affect the predicted peak flows. The following response clarifies the manner in which the ESD practices were modeled, and why these represent reasonable assumptions for a planning-level modeling analysis.

Future development runoff was estimated using a 100% impervious catchment representing impervious surfaces, and a pervious catchment using the same SCS technique as for the base condition for estimation of infiltration with a larger SCS curve number representing soil disturbance. The reduced undeveloped area was modeled using the same parameters as the existing condition runs. The runoff from these developed catchments was routed to two additional catchments (#4 and #5) to account for ESD controls as described below. The model attempts to simulate the County's micro-bioretention standard as shown below:



MICRO-BIORETENTION
TYPICAL CROSS SECTION
NTS

In these ESDs, storm inflow infiltrates through planting media and is collected in the underdrain for discharge. If the inflow exceeds the infiltration capacity of the planting media then excess flow is stored up to a specified depth before discharging out the overflow-largely bypassing the underdrain media.

Catchment #4 (Ponding Volume)

Runoff from the developed catchments is routed to catchment #4, which represents the volume available for ponding above the planting media. This catchment is configured with a total area equivalent to the expected area according to County standards. It was assumed to be 100% pervious area with Horton Infiltration and depression storage of 9-inches. Infiltration occurs to the planting media and excess flow that cannot infiltrate is stored up to a specified depth. The model specification of a 9-inch depression storage simulates the storage available above the planting media.

The 9-inch depression storage and Horton infiltration parameters were arrived at based on discussions with Montgomery County DPS and through consideration of public comments from previous Montgomery County Planning Board work sessions. The 9-inch depression storage value is the mid-point of the depression storage range noted in the County's Micro-Bioretention standard detail. Maximum and minimum Horton infiltration values were based on published values (Akan 1993) and can be found in the "XPSWMM Technical Reference Manual".

Catchment #5 (Directly Routed to Outlet)

In the model, outflow from catchment #4 was directed to catchment #5 for storage in the planting media and underdrain. As (incorrectly) described in the modeling report, this catchment represented storage in the filter media. As pointed out by Geosyntec, because this catchment was modeled as 100% impervious, no storage or infiltration occurred in catchment #5, and all flow to this catchment was directed to the outlet. This simulates the overflow of water from the ponding area into the outflow pipe as shown on the schematic above. An equivalent result would have been attained by directing the outflow from catchment #4 directly to the outlet.

Inclusion of catchment #5 with 100% imperviousness results in an increase in system outflow volume as noted by Geosyntec, due to the double-counting of rainfall on the ESD area. Once the infiltration and storage capacity of catchment #4 is exhausted, excess flow is directed to catchment #5 in the model where it runs off. This would not appreciably affect peak flow estimates, because the timing of these flows does not coincide with peak runoff flows from catchment #4. Infiltration at the bottom of the ESD in this configuration is simulated by the infiltration in Catchment #4 which is lost from the solution.

In summary, the manner in which catchment 5 was modeled did not greatly affect the peak flow predictions, which are largely controlled by the rate at which water is predicted to overflow the ponding area of catchment #4 into the outflow pipe. Infiltration from the bottom of the ESD is indirectly simulated by the infiltration in catchment #4. In permitting ESD, the County's assumption is that the underdrain allows water to freely flow from that structure once it reaches the underdrain. Under this assumption, it would not be proper for catchment #5 to include additional storage to account for water leaving the underdrain and entering the filter media or a stone reservoir. If the ESD practice were designed in a manner to cause the overflow to enter the stone reservoir (below the underdrain) prior to entering the underdrain, it would be appropriate to simulate the effect of some storage in the stone reservoir.

Conclusion:

The Joint Venture conducted its modeling for the Limited Master Plan using widely-accepted industry practices. The modeling approach, model parameters and assumptions were developed in collaboration with the Planning Department, Department of Environmental Protection (DEP) and Department of Permitting Services (DPS) to represent average watershed-wide conditions, as is appropriate for planning-level land use evaluations. Although Geosyntec questions the modeling results, model simulations are sensitive to selected algorithms and parameters, and model predictions may vary widely even within the range of accepted modeling methods and parameter values. And even if the Joint Venture estimate of existing condition peak flows had been higher based on USGS estimates, the analysis would still have shown a significant increase in post-development peak flow using the County's standard ESD details. Importantly, in concluding that the Ten Mile Creek Watershed could be impacted by additional development, the results of the Joint Venture modeling were consistent with the other environmental analyses and conclusions conducted and provided in support of the Limited Amendment to the Clarksburg Master Plan. .

References

Akan, A. O., 1993. Urban Stormwater Hydrology - A Guide to Engineering Calculations, Technomic Publishing Co., Lancaster, Pennsylvania, 1993, ISBN: 0-87762-966-6.

McCandless, T. and Everett, R. 2002. *Maryland Stream Survey: Bankfull Discharge and Channel Characteristics of Stream in the Piedmont Hydrologic Region*. U.S. Fish & Wildlife Service Chesapeake Bay Field Office. CBFO-S02-01.

Rosgen, D.L. (1996). *Applied River Morphology*. Wildland Hydrology Books, Pagosa Springs, Colo.

XP Solutions, Inc. 2012. XPSWMM Reference Manual. 1049 p.

Factors Used for Estimating Projected Imperviousness

Zone	Average Gross Tract Imperviousness
C-1	90.0%
I-3	80.0%
MXPD	35.0%
PD3	25.0%
PD-5	35.0%
PD-7	40.0%
PD9	40.0%
R200	**15.4%**
R200with sewer and water	**25.9%**
RC	**6.4%**
RDT**	5.0%
RE1	**12.4%**
RE-1/TDR*	**12.5%**
RE1 with sewer	**22.8%**
RE-2	**10.6%**
RE2/TDR	9.0%
RE2C	**18.8%**
RE2C with sewer and water	**11.1%**
RE2 with water only	**12.9%**
RNC with sewer and water	**8.9%**
RURAL	**6.4%**

*Based on Barnesley tract which is tightly clustered with significant open space.

**Imperviousness varies widely in this zone depending on the use and size of property

The estimates shown in bold were prepared between 1994 and 2003 based on built and approved subdivisions. Other estimates are from the Countywide Stream Protection Strategy in 1997.

Biohabitats
Brown and Caldwell
A Joint Venture

November 20, 2012

TASK ORDER No. 1

M-NCPPC Montgomery County Planning Department

TO:	Brown and Caldwell / Biohabitats, a Joint Venture
CONTRACT NO.:	
SUBJECT:	Clarksburg Master Plan Limited Amendment for the Ten Mile Creek Watershed

PURPOSE:

The Consultant will provide data and environmental analysis of the Ten Mile Creek watershed for development scenarios in support of the Clarksburg Master Plan Limited Amendment for the Ten Mile Creek Watershed. This information will be compiled and scientific information and recommendations will be clarified so that documents can be understood by the lay reader.

SCOPE:

A. Data Discovery

The Consultant will review existing data and reports provided by the Planning Department and Montgomery County Department of Environmental Protection (DEP). This will include DEP monitoring data; data collected by Planning from other sources (e.g., Clarksburg Monitoring Partnership, Audubon Naturalist Society, Maryland Department of Natural Resources, U.S. EPA, USGS, etc.); draft NRI/FSD submittals; GIS data; and field data collected by Planning Department and DEP staff.

The Consultant will prepare digital maps using available data illustrating the following features:

- Geology
- Soils
- Topography
- Topology
- Morphology
- Surface Water (streams, wetlands, ponds)
- 100-year floodplain and stream buffers
- Vegetation cover
- Rare and unique plant communities
- Rare, Threatened and Endangered Species
- Historic and cultural sites
- Federal, State and County resource protection areas
- Infrastructure (sanitary sewer, water, cable, roads, electric, transmission, etc.)
- Biological Monitoring and Habitat Index Scores for SPA stations

- Water temperature
- Geomorphology

The Consultant will review the draft maps for completeness and accuracy and summarize baseline watershed conditions. Field plans for collecting additional data will also be developed, if deemed necessary by the Planning staff. The Consultant will also participate in a kick off meeting with Planning Department and other agency staffs.

Deliverables:

- Maps/data and summary of environmental conditions
- Participation in kick off meeting
- PowerPoint slides of existing conditions

B. Data Collection

The Consultant will conduct limited field investigations to supplement existing data and verify watershed conditions. The focus of these investigations will be to identify priority areas for conservation (e.g., spring seeps, forested areas, wetlands, and tributaries), potential restoration and enhancement of resources and localized impacted areas (e.g., I-270 stormwater runoff, impacts from agriculture). Field investigations under this task may extend over several months in support of additional data needs identified during Task C. Also included is the preparation of several representative stream cross sections, if currently unavailable. The Consultant will not conduct monitoring or sampling.

It is assumed that the physical condition of Ten Mile Creek (e.g., bank stability, embeddedness, etc.) will be characterized by Planning and DEP staff from available data or during their limited field investigations. Planning and DEP staff will also conduct a synoptic flow study.

Deliverables:

- Electronic copies of all field notes, data collection forms, and analysis spreadsheets
- GIS layers, as edited or new information
- Recommendation for additional field work

C. Analysis

C.1 Spatial Watershed Analysis

Using the spatial data compiled as part of Task A, the Consultant will define attribute characteristics that have the potential to either influence the landscape's ability to recover from disturbance, or that are critical to long term ecological stability and integrity. These may include:

- Soil characteristics (e.g., highly erodible soils, highly permeable soils, shallow soils)
- Steep slopes
- Seeps and springs

November 20, 2012

- Streams (perennial and intermittent) and wetlands (+regulatory buffers)
- 100-yearfloodplain
- Rare and unique plant communities and corresponding buffers
- Rare, threatened and endangered species habitat and corresponding buffers (based on existing data or data collected by Planning and DEP staff)
- Federal, State and County resource protection areas
- Public recreation features
- Sensitivity of streams to channel erosion and enlargement

A series of maps will be generated which the Consultant will overlay to determine the landscape's ecological stability and integrity and its ability to support development. This analysis will help delineate potential development and resource protection zones.

The Consultant will prepare a GIS map illustrating this analysis, with supporting maps and a brief memo documenting the methodology used to prepare the suitability boundaries. Colored maps will include:

- Ecological Attributes Inventory Maps
- Ecological Conditions Analyses Maps
- Development Suitability and Resource Protection Map
- Constraints and Opportunities Map

The Consultant will also analyze trends in biological and habitat data for similar Special Protection Area (SPA) watersheds within Montgomery County. This analysis will help inform anticipated impact projections of development on Ten Mile Creek. The consultant, in conjunction with Planning and/or DEP staff, will select monitoring stations within existing SPAs that meet the following criteria:

- Whose watershed size is similar to that of Ten Mile Creek
- Who have numerous years of monitoring data pre and post construction (min five years pre construction and three years post construction)
- Whose land use pre construction was similar that of Ten Mile Creek
- Whose records are complete in that they contain the habitat data sheets and individual IBI metric scores
- Whose underlying geology is similar to that of Ten Mile Creek
- Where a stream gauge is located nearby in order to ascertain the affects of hydrology on the macroinvertebrate population and whose period of record extends back to the earliest macroinvertebrate sampling event that is being analyzed

Comparisons will be made to trends of IBI scores pre and post construction to determine if negative effects can be attributed to the development within the watershed. The consultant will evaluate overall IBI score trends as well as trends within the individual IBI metrics pre and post construction. Habitat assessment data sheets will also be evaluated from the same biological monitoring stations to determine pre and post construction trends in overall, and individual metric, scores. Due to the infrequent nature of fish sampling at biological monitoring stations, as well as the intermittent nature of

headwater streams, FIBI scores and metrics will not be evaluated. However, the presence of insectivorous fish may be analayzed to determine effects on insect populations from predation. In addition to evaluating biological monitoring data for sites in developed watersheds, the consultant will also make comparisons to trends in nearby reference sites.

C.2 Summary of Current Data Regarding Watershed Responses to Development using ESD/LID

The Consultant will identify and assess other studies that document the impacts of development on drainage basins using ESD/LID. Also included will be a summary of the current state of knowledge - including a comparison of typical instrumented or monitored watershed responses to development using traditional stormwater management BMPs. Potential parameters include analyzing changes to erosion/sediment control, reforestation and storm water management regulations and new laws that were not in place during the development of Special Protection Areas. The assessment will also include new state requirements that set additional standards and limit grading to 20 acre increments.

This analysis should seek to characterize the potential difference between past studies of imperviousness to stream health and the potential impacts of the same level of imperviousness under the new regulations. The Consultant will collect data through the NPS listserve and professional contacts, and a literature review.

C.3 Development of Watershed Protection Toolbox for Construction and Post-Construction Phases

The Consultant will describe the major types of watershed protection measures and strategies that could be used to preserve ecological resources in the Ten Mile Creek watershed. This information will be compiled primarily to support the development of land use scenarios in Task C.4. The following types of measures may be included:

- Parcel/site/ development scale (e.g., enhanced ESD beyond that defined and required in the MD Design Manual, vertical construction, etc.)
- Stage 4 scale (e.g., stream buffers, ecological covenants, residential pollution prevention, etc.)
- Watershed scale (e.g., forest conservation, stream buffers, agriculture management)
- Seasonal protections (migrations, spawning, etc.)

C.4 Analysis of Land Use Scenarios

The Consultant will evaluate scenarios developed jointly with Planning Department and agency staff. They will be provided to the Consultant in GIS format to evaluate potential impacts on Ten Mile Creek. The number of scenarios and degree to which each is analyzed will be determined by agreement between the Planning Department and the Consultant based on the analysis tools used. Time consuming analyses will be limited to key scenarios that will act as sensitivity tests for a range of scenarios.

For each scenario, the Consultant will conduct the following evaluations:

- Annual pollutant load analysis using the Watershed Treatment Model
- Hydrologic analysis evaluating the range of peak discharges and runoff volume within the Ten Mile Creek area at the subwatershed and watershed scale
- Landscape corridors and patches
- Estimate of natural land cover lost and restored (or enhanced)
- Estimate of agricultural land affected
- A comparison of the development scenarios to the Spatial Watershed Analysis results including likely impacts to the landscape and other resources identified

The Consultant will summarize the results of these analyses and will develop inferences on regarding the potential responses of Ten Mile Creek to proposed development under ESD/LID in terms of hydrology, stream channel response, water quality and biology. The Consultant will also evaluate the effectiveness of ESD practices given local conditions.

C.5 Comprehensive Assessment Report

The Consultant will produce a final report that documents all analyses and identifies potential impacts to Ten Mile given the different development scenarios and potential enhancements to watershed protection. This should include recommendations about options for balancing the effects of development and environmental protection of Ten Mile Creek.

Deliverables:

- Comprehensive Assessment Report

D. Public Outreach

The Consultant will provide technical support to the Planning Department throughout the process. This shall include:

- Attendance at weekly progress meetings (in person or teleconference)
- Attendance at three work sessions with Planning, Parks and County staff
- Attendance at three public meetings
- Attendance at three Planning Board work sessions
- Attendance at one public hearing
- Attendance at one County Council session

The Consultant will also prepare PowerPoint, graphics and maps in support of the process. Planning will schedule and organize all meetings, including reproduction and distribution of meeting materials.

The Consultant will provide expert testimony if authorized as an additional service.

Biohabitats
Brown AND Caldwell

November 20, 2012

Deliverables:

- Attendance at all meetings by one Consultant staff member

TASK ORDER SCHEDULE:

See attached MS Project Gantt Chart and associated Project Calendar.

COMPENSATION:

The Commission shall compensate the Consultant for Basic Services performed under this Task Order based on the hourly rates contained in the Contract for a not-to-exceed amount of $XXX. The County will not pay any mark-up or fees on Other Direct Costs (ODC). This not-to-exceed compensation amount is fixed for the duration of the Task Order unless changed by a Task Order Amendment.

Payments for Services shall be made monthly in accordance with the terms and conditions of the Contract. Below is a fee summary for the not-to-exceed amount.

TOTAL FEE SUMMARY	Total Fee
A. Data Discovery	$ 22,880.34
B. Data Collection	$ 21,909.68
C. Analysis	$ 123,390.15
D. Stakeholder Outreach	$ 31,809.44
	$ 199,989.61

Biohabitats
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Technical Memorandum

Prepared for:	Maryland-National Capital Park and Planning Commission
Project Title:	Limited Amendment to the Clarksburg Master Plan
Subject:	Draft Response to September 9, 2013 Geosyntec Letter
Date:	October 15, 2013
To:	Mary Dolan and Valdis Lazdins, Montgomery County Planning Department
From:	Biohabitats and Brown and Caldwell, a Joint Venture

The Master Plan Amendment allows different levels of impervious cover on different properties within the same watershed. What was the basis of the Planning Board's decision to have varying levels of imperviousness?

All land use plans are based on a rational organization of land uses to promote appropriate densities and uses that achieve a vision for a community. This inevitably results in more intense uses and higher densities on properties that are located closer to the center (or centers) of a community. Such an approach allows for a concentration of uses near a downtown or commercial center and community amenities.

Evaluation of appropriate land uses for the Ten Mile Creek watershed rests on the idea that the "vision" put forth in the 1994 Master Plan remains valid. That vision is based on the interplay among the ten policies articulated in the Plan's Vision for the Future. The thrust of those policies is the creation of a clearly defined community that would include land uses ranging from agriculture in the western parts of Clarksburg, to employment areas along the Corridor Cities Transitway.

Clarksburg is evolving, based on the vision and the ten policies, from a rural crossroads into a vibrant corridor town. Whole communities, like Arora Hills, Clarksburg Village and Clarksburg Town Center, have been planned, designed, built and occupied. More than 6,500 housing units have been built; another 4,000 have been approved. A significant new community is underway on the west side of I 270 in Cabin Branch. Stores, restaurants and other services are available to Clarksburg Village residents, and the retail portion of the Town Center is in the planning stages. While challenges remain, particularly in providing employment and transit opportunities, Clarksburg is emerging as the defined community outlined in 1994.

The amount of existing imperviousness in the subwatersheds and the existing stream biological health conditions of the subwatersheds were also considered. All of the subwatersheds with proposed development under Stage 4 of the 1994 Plan contain headwater streams.

The 1994 Plan recognized that areas under consideration for non-residential development lay in a part of the Ten Mile Creek watershed that is east of I-270 and considered part of the Town Center District. The Plan notes that: "This environmental concern was considered during the Plan process and less constrained locations for the Town Center were evaluated. However, the advantages of locating the Town Center near the historic district in terms of fostering community identity and reinforcing the traditional center of Clarksburg are equally important Plan objectives. To help address environmental concerns, the Plan shows reduced densities for parcels closest to the headwaters of Ten Mile Creek." (p 42)

The subwatershed within the Town Center District (LSTM 206) is the most upstream of these headwater subwatersheds. It has both the highest level of existing imperviousness (16.6%) and the lowest (Fair) biological stream health condition. Even if no development was permitted on the properties in this subwatershed, it is unlikely that stream conditions would improve given the current levels of imperviousness and the existing and proposed transportation infrastructure. Projected imperviousness levels would likely cause additional impacts to water quality, but it would still likely remain in a Fair condition rating.

Land use recommendations in the current Planning Board Draft limited amendment for the Ten Mile Creek watershed reflect acceptance of the 1994 vision and the recommended use of imperviousness caps represent a further effort to reduce environmental impacts, while furthering Plan goals. East of I

270, the recommended limits recognize the continued importance of "fostering community identity and reinforcing the traditional center of Clarksburg....". Achieving a balance among community building and environmental goals meant that setting an imperviousness limit was an appropriate response to increased awareness of environmental sensitivity, but that limit had to be high enough to encourage development that could meet the important community building objective. Because the proposed zoning could result in a wide range of impervious percentages, the Board felt that an imperviousness limit was a way to assure a limit on the potential environmental impact.

West of I 270, the limits recognize the generally high water quality of the subwatersheds and the generally lower intensity of development recommended for the area in the 1994 plan. The 1994 plan also recommended increasing protection by including substantial areas beyond the stream buffers as "private conservation area." The plan clearly states that these areas should remain undeveloped and be afforested. The subwatersheds west of I 270 have much lower levels of existing imperviousness and much higher stream biological health conditions compared with LSTM 206. One of these subwatersheds was recently identified as having almost the highest stream health that can be expected in the County. Two of the three subwatersheds on the Pulte and King properties flow into Ten Mile Creek just upstream of the monitoring station where the County has been measuring this as a reference stream (a high-quality benchmark against which other streams in the county are judged. For these reasons, the Board recommended a lower imperviousness level and cap for the developable properties within these subwatersheds. The Board determined that a 10 percent imperviousness limit on the Pulte and King properties could sufficiently protect water quality and stream biological health in particularly sensitive subwatersheds, while allowing single-family residential development in keeping with the 1994 Plan's objective, creating a low density housing resource in this part of Clarksburg. Much stricter limits were recommended on county properties to provide further protection for the creek and important forest interior habitat.

Has the Planning Board required different imperviousness levels for different properties within the same watershed in the past?

The Upper Rock Creek Environmental Overlay Zone effectively requires different levels of imperviousness in the Upper Rock Creek Special Protection Area. Because the zone's regulations apply specifically to development served by community sewer service, they result in an eight percent limit on development using community sewers and no limit on development using septic systems. Similarly, the zone's exemption for development in industrial or commercial zones results in no limit on imperviousness for such projects.

In addition, the Functional Master Plan for the Patuxent River Watershed, and more recently in the Burtonsville Crossroads Master Plan, required different imperviousness levels for different areas. In both cases, the lower imperviousness levels for the designated areas were considered important in limiting future development-related degradation to important natural resources.

MONTGOMERY COUNTY PLANNING BOARD
THE MARYLAND-NATIONAL CAPITAL PARK AND PLANNING COMMISSION

OFFICE OF THE CHAIR

January 2, 2014

Councilmember Roger Berliner
Chair, Transportation, Infrastructure, Energy & Environment Committee
Montgomery County Council
Stella B Werner Office Building
100 Maryland Avenue, 6th Floor
Rockville, Maryland 20850

Dear Chairman Roger Berliner:

In reply to the questions raised in your letter of December 12, 2013, I have the following responses:

1. **Why is Ten Mile Creek important to our County and/or to the region?**

   Ten Mile Creek is one of three remaining larger reference streams in the western portion of Montgomery County. The reference streams here are unlike those in the eastern part of the County because of differences in the underlying geology and soils. Having a number of reference streams in both parts of the County is important because it provides a more scientifically sound basis for assessing stream degradation from human activities, as opposed to stream changes due to local variations in watershed physical, hydrologic, or weather-related factors.

   As development has continued and extended into certain reference stream watersheds, the "best in the County" quality of some of those streams has declined to the point where many are no longer considered to be reference streams by DEP. While such streams may still exhibit "good" stream quality, they can no longer be considered in the "best in the County" category. If Ten Mile Creek degrades enough, the County will have lost another "best in the County" stream, leaving only two larger-sized reference streams in the western portion of the County. This will make it more difficult to assess degradation in other streams in this part of the County.

   According to a report by a panel of 17 technical experts in stream ecology, benthic macroinvertebrate and fish community assessments, Ten Mile Creek is one of the two most highly rated streams in Montgomery County. The experts included scientists from Montgomery County, the State of Maryland, the University of Maryland, the University of Maryland at Baltimore County, the Interstate Commission on the Potomac River Basin and U.S. EPA.

   Ten Mile Creek is also important to the County and the Washington metropolitan region because it is part of the Little Seneca Reservoir watershed. While Little Seneca

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Reservoir is not a direct source of local or regional drinking water, it does provide water that can be released in times of severe drought to help maintain minimum flows in the Potomac River. The much larger William Jennings Randolph Reservoir, in western Maryland, is another important source of release water during droughts.

2. **Ten Mile Creek has been referred to as a "reference stream". What is a "reference stream" and what qualifies a stream for this designation?**

Reference streams are those that show a high level of biological quality. While this places them in the highest stream quality category, it does not mean they are pristine, or show no degradation due to human activity. There are no pristine streams left in the County, but reference streams represent the highest County standard and provide a scientifically sound basis to compare them with more degraded streams, in order to better assess stream degradation from human activities. It is important to have a number of different reference streams to be able to understand changes in stream conditions due to local variations in watershed physical, hydrologic, or weather-related factors, as opposed to human activity-related factors.

All of the County's reference streams were selected through an interagency effort in the early 1990s using land use and biological monitoring data. Because of geological and soil differences between the eastern and western portions of the County, two sets of reference streams were identified based on geography. Watersheds that met screening criteria indicative of very high stream quality conditions were selected for detailed field assessments. The assessments located the stream segment in each candidate reference watershed that showed the best biological conditions. Once identified, these segments were designated as the reference reaches for the stream, and monitoring stations were established for them. However, since being designated, development has degraded the biological quality of some reference stream watersheds. As a result, they no longer cluster together with the other reference streams that have maintained their biological quality. When this happens DEP removes their designation as a County reference stream.

3. **What should our County's goal be with respect to the quality of Ten Mile Creek?**

The County is required to meet State water quality standards in all of its water bodies, comply with all Total Maximum Daily Loads (TMDLs) issued by the State, and prevent degradation of all State-designated Tier II streams. Ten Mile Creek and the Little Seneca Reservoir currently meet water quality standards, have no TMDLs, and no Tier II designation. Ten Mile Creek, however, is important to the County as a high-quality reference stream which will be negatively impacted by any new development.

While not officially adopted, it is the County's general policy to maintain or improve the quality of all its waters, although planned development in many parts of the County will further degrade some of its subwatersheds. For example, additional development in the I-270 corridor will affect the Seneca, Muddy Branch and Watts Branch watersheds. However, much of the County's new growth is focused on redevelopment. Converting previously developed land that lacks stormwater management will trigger new

stormwater requirements, resulting in improved conditions. In addition, the County is continuously improving older stormwater facilities in priority watersheds.

It is also important to answer this question in the context of the 1994 Clarksburg Plan, since it identified policy concerns that emerged following the completion of the 1968 Clarksburg and Vicinity Master Plan. Among many other policy statements identified in the introduction to the 1994 Plan are numerous references to environmental concerns, including:

Page 2 - "The critical importance of protecting environmental...resources."

Page 4 – "The streams, which flow to Little Seneca Lake, generally have good water quality; continuing the good health of these streams is a key concern of the Plan."

Page 6 – Included among the ten key policies for Clarksburg is: "This Plan recommends that Clarksburg's natural features, particularly stream valleys, be protected and recommends that Ten Mile Creek and Little Seneca Creek be afforded special protection as development proceeds."

Based on these and other statements in the 1994 Plan it would be reasonable to conclude that the County's goal should be to protect the quality of Ten Mile Creek. But the Plan also recognized, on page 12, the potential conflict between directing..."the major portion of Montgomery County's future growth to the Urban Ring and the I-270 Corridor" and protecting environmental resources in Clarksburg.

The 1994 Plan attempted to clarify that issue by stating: "Both the General Plan Refinement throughout the Environmental Goal [p. 70-73] and the 1992 Planning Act urge protection of sensitive areas. Addressing these two factors has been a challenge throughout the planning process. The balance struck by the Clarksburg Plan is to propose a transit-oriented town scale development largely east of I-270." (1994 Master Plan p. 12)

So the goal of protecting Ten Mile Creek in the 1994 Plan was offset by more intense development east of I-270. However, that tension should not negate the importance of protecting the quality of Ten Mile Creek – it merely suggests that a balance be reached, that also accommodates development.

4. **What was the basis of the Board's conclusion that our Council had requested you to "balance" issues pertaining to the environment and "community building"?**

Although Council members made a variety of statements at the session when the Council directed us to prepare this Plan Amendment, several common themes came through clearly: limit the geographic scope to the Ten Mile Creek watershed and do not consider other areas in Clarksburg; preserve the overarching visions of the 1994 Clarksburg Plan while protecting stream quality; and base planning recommendations on science. In light of the relatively small geographic area covered and our sense of the Council's direction,

the Board did not believe it appropriate to significantly modify the universal underpinnings of the 1994 Plan, many of which broadly apply to all of Clarksburg.

The planning principles for all of Clarksburg include its development as a corridor town, with a transit-oriented Town Center located in an area that was known to include the Ten Mile Creek watershed. The 1994 Plan established that development should ..." be staged to address fiscal concerns and be responsive to **community building and environmental objectives** (emphasis added)." (1994 Master Plan p. 14) Based on such an approach, which took into consideration the dual goals of protecting the fragile environment of Ten Mile Creek and creating the community identity envisioned in the Plan, the Planning Board sought a balance between environmental concerns and "community building" goals.

5. **If the Board had understood that the Council's request was primarily motivated by environmental concerns, would that have changed your recommendation, and if so, in what respects?**

It is not possible for me to say whether this would have changed the Planning Board's recommendation. The Board has five members who held varying views on the elements of this plan, resulting in lively discussions at our work sessions. I cannot say what the ultimate result of the debate would have been in a context different from the one that took place.

6. **What does "community building" mean precisely? In my judgment, it appears that what the residents of Clarksburg seek most of all is the fulfillment of the promise of the Town Center. Do you agree with that statement? How, in your judgment, would further development of phase four properties assist with "community building?"**

The idea of community building in Clarksburg is rooted in the interplay among the ten visions that are the foundation of the 1994 Master Plan. Those visions—a *Town Scale of Development*, protection of *Natural Features*, creation of a *Greenway Network*, development of a *Transit System*, a clearly defined *Hierarchy of Roads and Streets*, a sensitively designed *Town Center*, *Transit- and Pedestrian-Oriented Neighborhoods*, provision of *Employment* opportunities, *Farmland Preservation*, and *Staging* of development—enable Clarksburg's evolution from a rural crossroads into a Corridor Town. The visions are described on pages 15 to 36 of the 1994 Plan.

The thrust of these policies is creation of a clearly defined community that would include land uses ranging from agriculture in the western parts of Clarksburg to employment along the proposed Corridor Cities Transitway. While the Town Center is an important

component of community building in Clarksburg, all ten visions, working together, are needed to "complete" Clarksburg. Civic activities, such as a library, and nearby transit service would draw residents to the Town Center from the neighborhoods, where retail nodes would include grocery shopping and other routine needs. Community building was to be managed by a Staging plan that would balance provision of needed civic infrastructure with the pace of development, with a particular focus on early development of the Town Center and the need to undertake significant environmental monitoring before allowing development in the Ten Mile Creek watershed.

Development in stage four contributes to community building by providing opportunities for additional housing, commercial office and retail uses east of I 270, and by providing housing west of I 270 that helps create a transition from the Town Center west to the Agricultural Reserve. Each of these opportunities supports a vision of the 1994 Plan, and their interaction contributes to a complete Clarksburg.

7. **What was the basis of the Board's decision to override the staff recommendation with respect to the Pulte property?**

When the staff draft was presented to the Planning Board, certain members of the Board were concerned that the recommendations for the Pulte/King properties did not sufficiently support the goals of a complete Clarksburg, and that they represented such a significant departure from the density recommendations of the 1994 Plan as to be inequitable to property owners. As an exploratory effort, the Board asked staff to identify alternative ways to configure development on the property to minimize environmental impact while increasing residential yield to a level that would be closer to the level recommended in the 1994 Plan. This resulted in staff presenting the Board with a series of options regarding zoning, density and imperviousness limits. The Board chose the option that we felt was the best balance between protecting the sensitive natural resources in the Ten Mile Creek watershed and preserving the vision of the 1994 Master Plan.

8. **What impact would the staff's recommendation have on the quality of Ten Mile Creek if adopted?**

Staff's recommendations would result in the retention of more open space, a smaller development footprint, less grading and soil compaction, less forest impact, fewer impacts to steep slopes, significantly lower impervious cover in LSTM 110 and LSTM 111, and a somewhat lower overall Ten Mile Creek watershed imperviousness. As a result, impacts to Ten Mile Creek would be expected to be less, lowering the risk of reducing the biological quality of the Creek to a point where its status as a reference stream could be lost. This is especially the case because the confluences of LSTM 110 and LSTM 111 are just upstream from the monitoring station for Ten Mile Creek where

the status of the reference stream is monitored. Because of their close proximity to the reference monitoring reach, reducing future impacts to these subwatersheds is important in reducing the risks of degradation in the reference reach. In this case it is impossible to accurately predict the response of stream biological integrity to additional development. As a result, one can only speak in terms of lowering or increasing the risk of stream degradation.

Although Ten Mile Creek will likely remain in the "good" stream quality category under the proposed development, given the very high-quality nature and sensitivity of the stream's biology, in the opinion of State biologists there is still a significant risk of a level of degradation sufficient to lose its status as a reference stream. The staff draft recommendations also pose a risk, although it is a lesser risk.

9. **Does the addition of approximately 400 single family homes on the Pulte property, more than the staff had recommended, have a meaningful impact on "community building," particularly given the fact that there are more than 4,000 homes that haven't been built pursuant to authorizations in Phases 1-3?**

The concept of community building does not solely consider the number of units built or approved in Clarksburg. As noted above in the response to question six, the concept involves the interaction of ten master plan visions. West of I 270, creating housing between the more intensely developed Town Center District and the low-density residential and agricultural lands to the west establishes a land use transition that plays an important role in creating a complete Clarksburg. The Limited Amendment's recommendation for the Rural Neighborhood Cluster Zone on the Pulte-King properties allows creation of that housing resource while providing significant amounts of undeveloped open space to help protect water quality in the Ten Mile Creek watershed. It is the *zone* that meets the goals and objectives of the Clarksburg Master Plan, rather than any specific number of units.

10. **Does the Planning Board believe that a major retail center approximately ¾ of a mile from Town Center complements Town Center, and if so, in what ways?**

The Planning Department recently hired an economic development consultant to address that very question: determining whether the Town Center would benefit from a retail outlet center located near the I-270/MD 121 interchange. However, given the compressed schedule for the master plan, it was not completed in time to be reviewed by the Planning Board.

According to the consultant, "Outlet mall development in Clarksburg will dramatically increase consumer choice for local residents, especially for soft goods, apparel and accessories and home products, assuming the conventional mix of outlet retailers for projects of this type. While such development will displace some of the demand for traditional neighborhood local serving retailing, **there is also the potential for regional**

destination shoppers (many times the volume of what Clarksburg alone would generate) to patronize non-outlet mall retailing, with each source of demand more or less offsetting the other. The increased drawing power of an outlet mall will attract support and retail tenants that would not otherwise be supportable in a market the size of Clarksburg" (emphasis added).

The two product types, a more neighborhood-serving Town Center and a major retail outlet center..."function very differently from each other:

a) There is virtually no crossover in terms of food sold for home consumption, or for a wide range of convenience services.

b) While there are some parallels in soft goods (i.e. socks, cosmetics) that are typically part of a local serving grocery or drug store, the differences in shopping experiences associated with picking up these kinds of items as part of other purchases, and as they represent only a fraction of traditional neighborhood general merchandise sales, mutes the impact of non-grocery items on the economic viability of neighborhood supermarket and drug stores.

c) Neighborhood based dedicated clothing stores, considered unlikely to begin with given the size and locational characteristics of Clarksburg, will have more difficulty competing, as outlet malls typically are based on well known brands at discounted prices. Neighborhood clothing stores do not enjoy the same advantages of bulk purchase and corporate connections to secure manufactured goods/past season products at deep discounts.

d) Typical outlet malls include limited food offerings (usually in a food court configuration) primarily as a tool to retain consumers on-site in order to increase overall spending, as expenditures typically correlate with amount of time spent at the center. Freestanding restaurant offerings, not a core use in outlet malls, represent the most potential intermixing between serving both outlet / neighborhood sourced demand.

e) Entertainment uses serving local residents (i.e. movie theaters) are less likely as part of the outlet center mix, particularly if reliant strictly on local based demand, and may or may not be an additional element in some future outlet mall setting."

11. **What was the Planning Board's recommendation regarding the intensity of use on the Miles-Coppola property in 1994 (prior to the Council's actions) and how does that compare with what the Planning Board is recommending in this plan?**

The Planning Board Draft of the 1994 Plan recommended residential development on the approximately 100-acre Miles-Coppola properties. It recommended development at nine to 11 units to the acre on the central and southern developable portions of the property, and seven to nine units to the acre on the northern developable portion, for a total of 416 dwelling units. The current Planning Board Draft recommends mixed-use development in the CR Zone at an overall density of 0.75 Floor Area Ratio (FAR) on the hundred acres. Each CR zone classification is followed by a sequence of symbols, CR, C, R, and H, and

related numbers. The number following the CR is the maximum total FAR, the number following the C is the maximum non-residential FAR, the number following the R is the maximum residential FAR, and the number following the H is the maximum building height in feet. The precise designation for the Miles-Coppola property is CR 0.75, C 0.5, R 0.5, H 75. For the Miles Coppola properties, an FAR of 0.75 equals about 3.2 million square feet of development. A project that maximized commercial development could achieve 2.1 million square feet of commercial space; the remainder, another million square feet, would yield 850 units at 1,250 square feet per unit.

12. **If an outlet mall or other retail were to proceed on the Cabin Branch property, is there need for more retail on the Miles-Coppola property to serve the residents of Clarksburg? Has the Board had a retail analysis performed, and if so, could you please provide a copy of that analysis?**
What is the relative commercial viability of the two proposed retail outlet centers? What were the results of the consultant report which examined the issue?

Both questions are quite similar and the following attempts to answer both. In addition, the consultant's findings will be transmitted to the County Council for review.

Outlet Malls

"Based on market demographics, current industry trends, and locational considerations, Clarksburg is a very strong candidate for outlet mall retailing. The two outlet proposals, backed by leading national sponsors of such development, are resounding endorsements."

"Over the past few decades outlet malls have morphed into a highly structured breed of retailing. It is one of the few retailing concepts that it still in a growth mode. Retailers and branded product manufacturers have expanded their merchandizing lines to incorporate specifically targeted marketing strategies suited to co-locating in high profile locations overseen by major, specialized retail developers. The contemporary prototype outlet center is fairly simple, and universal:

- 80 to 100+ stores, comprised of mostly nationally or regionally recognized specialty vendors
- 4,000 sf average store size
- 350,000 sf to 500,000 sf overall size
- easy access highway served site
- typically a lower cost, suburban edge location
- regional and transient market capture (not at all neighborhood oriented)
- internal orientation
- lots of surface parking, but not designed for quick in and out access to stores
- located / configured to maximize multiple store shopper patronage (and not non-shopper use)

- limited if any table service restaurants (idea to keep people shopping); sometimes have pad sites for free-standing food services on out parcels
- typically located in isolation from competing outlet centers (though with exceptions)"

"That Clarksburg has been now targeted by the two leading outlet mall developers (Simon and Tanger, in partnership with local master developers) is an entirely natural and understandable focus. But for proximity to Montgomery County, most all submarkets ringing the Washington metropolitan region have an existing or planned outlet or equivalent center. These include the older and/or much larger Mills centers (Potomac Mills and Arundel Mills), a new Tanger outlet mall opening in Oxon Hill in Prince George's County near Alexandria, an existing Premium Outlets (Simon) in Leesburg, an additional planned center in western Fairfax County, and proximate centers further afield in Maryland in Hagerstown and Queenstown (smaller example)."

"With a Clarksburg outlet facility, currently underserved consumers, reaching well beyond the borders of Montgomery County stand to benefit, as will the tenant vendors, and for that matter, the tax collectors that will not only see some inflow of retail expenditures, but some reduced outflow of Montgomery County resident shoppers. Barring some national or other extraordinary influence, the question is not whether an outlet center will come to Clarksburg, but rather, which one?"

"The developers of both proposed retail outlet centers have indicated that there is demand for only one such commercial enterprise in the immediate area. The consultant sees no reason to refute or test this claim. There is little taste on anyone's part (developer, tenant or for that matter consumers) for essentially duplicated co-existing malls: the market for such is limited by the simple fact that there are only so many profile credit tenants to go around. While there is limited precedent for dual locations, (one being outside St. Louis, Missouri and another in San Marcos, Texas), it is rare for two major centers to go ahead at the same time in close proximity to each other. (Interestingly, the competing Simon and Tanger sponsors have actually co-ventured in at least one instance.)"

"The core composition and use of an outlet mall is almost the complete opposite of neighborhood serving retailing. The vendors, and with some narrowly defined exceptions, the product lines, would never normally be found in a neighborhood shopping center dominated by food and convenience related merchandizing. The outlet patronage is coming from a widely extended region, intent usually on making substantial purchases spanning multiple stores over a considerable period of time, the converse of the typical neighborhood in-and-out kind of shopping venture."

13. **Several of the fundamental underpinnings of the original Clarksburg master plan have not and seem unlikely to materialize in the near to mid-tem future including Clarksburg serving as a major employment center and having sufficient transit options. What impact, if any, should that have on our deliberations regarding the scope of development that should be permitted in Phase 4? What is the relevance of the vision of the 1994 Plan in today's market?**

    Clearly, all of the elements of the 1994 Plan vision for Clarksburg have not been completely realized for a number of reasons. These include the recent downturn in the economy and housing market, major shifts in office employment, and the lack of significant transit service on the I-270 corridor. However, the vision for Clarksburg should be viewed in its totality, as the interrelationship between the ten key policies that are represented in the 1994 Plan, and not just a few select components.

    While the questions about gaps in fulfilling the vision for Clarksburg and the vision's relevance in today's market are important, they are more relevant when viewing all of Clarksburg. The Planning Board was charged with a focused look at Clarksburg - one that pays attention to just the Ten Mile Creek watershed and not the entire Planning Area. Such a perspective must assume that all of the policies making up the vision for Clarksburg remain important, intact and relevant. While the questions posed about the future Clarksburg are important and should be asked, they should also be answered within the context of a more global view of the Clarksburg Planning Area.

14. **Testimony was given stating concerns regarding the impact of degradation of Ten Mile Creek on the aquifers in the area. Did the Board review that issue, and if so, what conclusions did the Board reach, and what technical support did the Board receive on this issue, if any?**

    The Board heard the same concerns at its Ten Mile Creek public hearing. In compiling public testimony and responses for the Board regarding this issue, staff consulted groundwater and hydrogeology specialists in the Department of Permitting Services and the Maryland Geological Survey.

    The staff response pointed out that in the fractured rock aquifer in Montgomery County, groundwater, like surface water, generally flows in response to surface topography, and mimics the flow patterns of surface streams within a watershed. This means that groundwater flows on the east side or the west side of the creek mainstem will flow to the creek, but not across the mainstem to the other side of the watershed. As a result, even if impacts to groundwater from stormwater infiltration practices do occur on the east side of TMC, they should not affect the existing wells on the west side of TMC, much less the other portion of the Piedmont Sole Source Aquifer, which includes many watersheds that are all hydrogeologically separated from TMC.

The proposed new development will be on public water and sewer, which will replace well and septic systems of the existing rural properties east of the TMC mainstem, reducing any current groundwater impacts from the removed septic systems. In addition, ESD requirements will serve to infiltrate stormwater, which will greatly reduce negative impacts to groundwater flow levels compared to traditional stormwater practices.

The Planning Board concurred with the staff response on this issue.

15. **In your testimony, you noted that the safety of drinking water is assured by the region's water treatment facility. However, the WSSC testimony argued that "water treatment alone is not a panacea for delivering safe water and that a multi-barrier approach is needed to protect water at every step of its trip from source to faucet, with source protection as its first step." Do you believe that the Board's plan adequately addresses what WSSC describes as the "first step" in the safety of our water supply?**

Yes. The Planning Department has long recognized the vital importance of source water protection in safeguarding our drinking water supply, and has worked with WSSC in the general plan and area master plans for many years to accomplish this goal. This is especially true in the case of potential impacts to the region's drinking water supply reservoirs, such as the Patuxent Reservoirs. Drinking water supply reservoirs are the most critical and require the highest level of attention in minimizing potential impacts.

It is important to note, however, that as DEP and the Interstate Commission on the Potomac River Basin (ICPRB) have pointed out, the Little Seneca Reservoir is not an emergency drinking water supply. It is a water body designed to provide water that can be released in times of severe drought to help maintain minimum flow requirements in the Potomac River. Another important source of release water to maintain minimum flow in the Potomac in times of drought is the much larger Jennings Randolph Reservoir, which is located in western Maryland.

Little Seneca Reservoir, however, is still an important component in the overall regional water system and needs to be protected, so taking the "first step" of source protection was an important factor in the draft Ten Mile Creek Plan recommendations. The Planning Board recognized that any increase in developed area within a watershed will result in increased impacts to receiving water bodies, so an approach was taken that recommended significantly less development in Ten Mile Creek than was recommended in the 1994 Clarksburg Master Plan, along with reduced development footprints, higher retention of open space, greater forest retention, less grading and soil compaction, fewer impacts to steep slopes, significantly lower impervious cover in LSTM 110 and LSTM 111, and a significantly lower overall Ten Mile Creek watershed imperviousness.

Furthermore, reviews by environmental staff from DEP, WSSC, and ICPRB of the recommended future development in Ten Mile Creek, along with an accompanying pollutant loading analysis, indicated no significant concerns regarding potential

development-related reductions in surface or groundwater flows to the reservoir, or in increased loadings of nitrogen, phosphorus, and sediment. Technical staff from these agencies indicated that because of the reservoir's limited role in a much larger system, proposed development in the reservoir watershed does not threaten the region's drinking water supply, nor would potential additional pollution loadings from the proposed development cause it to fail to meet State Water Quality Use standards for drinking water reservoirs. DEP reiterated this position at one of the Planning Board's worksessions on the Ten Mile Creek Draft Plan. At that worksession, DEP staff stated that if Ten Mile Creek is protected, the reservoir will be protected for its intended purpose. They further indicated that the proposed actions in the draft plan that protect resources from over-development, combined with the use of ESD where development does occur, would serve to protect Ten Mile Creek.

At the September 26, 2013 Board worksession, WSSC staff reiterated that the reservoir currently meets State water quality standards, and emphasized that the reservoir should be protected from sediment and nutrient inputs from new development. To do this, WSSC staff stated the importance of protecting the reservoir watershed through sound land use planning and management, limiting new impervious cover, protection of natural resources, providing environmental buffers, and the use of ESD. This was precisely the approach taken in developing the Ten Mile Creek Planning Board Draft Plan recommendations.

16. **The reservoir has already been degraded by sediment due to development around Germantown, resulting in three fore bays that limit sediment being more than half full. How much more sediment does the Board project will be added to the reservoir as a result of development in Stage 4?**

The Little Seneca Reservoir has not been significantly degraded by sediment. In the case of the fore bays, their intended purpose is to capture sediment before it enters the reservoir proper. They have been effectively performing this function for 30 years without yet needing to be dredged. The reservoir can hardly be considered to be significantly degraded because the fore bays are doing their job. To this can be added the results of the most recent sedimentation accumulation study by the Maryland Geological Survey, which reports very little sediment accumulation in the reservoir outside of the fore bays, with only about a 3% loss of reservoir capacity as of 2010.

The studies also show that at current sedimentation rates, the fore bays should have decades of service left before they will need dredging. Future increases in sediment inputs, however, could shorten the time for the fore bays to fill in. But since the proposed development in Ten Mile Creek is much less than the existing development around Germantown and will use ESD, which was not used in the earlier Germantown development, significant increases in sediment contributions to the reservoir are not expected.

17. The Council heard testimony regarding the possibility of algae blooms in the reservoir. Fresh water algae blooms are generally the result of an excess of nutrients which enter watersheds from runoff. Did the Board consider this issue, and if so, could you provide the Board's conclusions with respect to it?

The levels of nutrients that result in algae blooms are generally those that exceed water quality standards for drinking water reservoirs. The Board did not consider this issue because it did not need to in view of the current high water quality of the reservoir, the results of the pollutant loading analyses which indicate low additional potential loadings from new development, and expected future low sedimentation rates (which will continue to limit phosphorus contributions from sediment). These factors are consistent with the reservoir continuing to meet water quality standards (see responses to questions 15 and 16). As long as the reservoir continues to meet water quality standards, there should be no significant levels of algae growth in the reservoir.

I hope this information is helpful to the joint committees' consideration of the Limited Amendment to the Clarksburg Master Plan.

Sincerely,

Françoise M. Carrier
Chair, Montgomery County Planning Board

cc:
Montgomery County Councilmembers
Montgomery County Planning Board Members
The Honorable Isiah Leggett
Bob Hoyt, Director, Department of Environmental Protection
Marlene Michaelson, Council Staff

ADDENDUM

PHED/T&E Committees #1
January 13, 2014

From: Boucher, Kathleen
Sent: Friday, January 10, 2014 4:31 PM
To: Levchenko, Keith
Cc: Michaelson, Marlene; (Mary.Dolan@mncppc-mc.org); Hoyt, Bob; Lake, Dave; Edwards, Stan; Shofar, Steven; Curtis, Meosotis; Van Ness, Keith; Gary Gumm (ggumm@wsscwater.com)
Subject: Ten Mile Creek - DEP Response to Council Staff and CM Berliner Questions
Importance: High

Dear Keith,

In your email below you requested that the Planning Board, WSSC and DEP respond to a list of questions relating to the Little Seneca Lake reservoir and potential impact on drinking water of development in the Ten Mile Creek watershed. You also referenced a letter from Councilmember Berliner to Planning Board Chair Françoise Carrier, which outlined a number of questions regarding the Planning Board's recommendation for the Limited Master Plan Amendment and asked WSSC and DEP to respond to those questions as well.

In order to avoid duplication and confusion regarding the responses from three separate agencies, we have reviewed the attached responses provided by the Planning Board and WSSC and have developed a response that outlines areas of concurrence and provides additional input from DEP where appropriate.

Please let me know if you have any further questions after you review this response.

Kathleen Boucher
Chief Operating Officer
Department of Environmental Protection
240-777-7786

I. COUNCIL STAFF QUESTIONS

Questions 1, 2, 3, 4, 6, 7, 8, 9, and 11.

DEP Response:

DEP concurs with the responses provided by WSSC.

Question 5

What is the current estimated imperviousness of this acreage?

DEP Response:

Based on GIS data maintained by DEP to implement the Water Quality Protection Charge, the total acreage in the drainage area for Little Seneca Lake is 13,544 acres and approximately 13% of this area is impervious surface.

Question 10

To what extent would the scale of development being debated in the Stage 4 Limited Master Plan Amendment have a significant impact on the Little Seneca Lake Reservoir or drinking water quality from the Potomac River in general? To what extent would the alternative levels of development that have been suggested (ranging from no additional development to the Planning Board recommendations to the increased levels of development requested by property owners) result in differences in the quality of WSSC drinking water?

DEP Response:

In response to Question 11, WSCC stated the following: "WSSC has seen modeled data for development in the Ten Mile Creek watershed that suggests that adverse water quality impacts in that sub-watershed would probably not be significantly changed from current conditions. Changes in Ten Mile Creek, if they occur as modeled, are not likely to be substantially distinguishable from the cumulative water quality condition in the entire Lake, which (as noted in A.7) is currently not impaired."

DEP has reviewed the same modeling data referenced by WSSC in its response and agrees, based on this data, that it is unlikely that the "incremental" development proposed for the Ten Mile Creek watershed will significantly impact the water quality of Little Seneca Lake. DEP notes, however, that this is a different question than the question of how development scenarios would impact water quality in the Ten Mile Creek tributaries and main stem. DEP also notes that the modeling data relating to development scenarios in the Ten Mile Creek watershed are only one component of the data that would be necessary to evaluate a different but related issue – i.e., how do the cumulative impacts of development throughout the entire Little Seneca Lake watershed impact the reservoir?

Question 12

Please describe the factors that underlie your conclusions on questions #10 and #11. For instance, could a particular level of increased imperviousness in the Ten Mile Creek watershed tip the balance in the Little Seneca Lake catchment area?

DEP Response:

WSSC's response to Questions 10 and 11 indicate that they are based on WSSC's analysis of the environmental models evaluated by the Planning Board regarding the impact of projected increases in nitrogen, phosphorous and sediment loads on the Little Seneca Lake resulting from different development scenarios. DEP's responses are based on the same models. The available scientific data does not allow DEP to identify a specific level of imperviousness that would "tip the balance" of water quality in Little Seneca Lake – viewed from the perspective of whether the changes in water quality would impact the reservoir's intended uses. In general, the more imperviousness the greater the potential impact to water quality. Again, the question of how development activities impact the reservoir is a different question than the question of how development activities impact Ten Mile Creek's tributaries and main stem.

Question 13

If specific levels of development in the Ten Mile Creek area would result in significant impacts on water quality, what options should the County consider to reduce or mitigate these impacts?

DEP Response:

As mentioned above in our responses to Questions 10 and 11, the question of how development impacts water quality in the reservoir is a different question than the question of how development impacts the water quality of Ten Mile Creek's tributaries and main stem. We concur with WSSC's conclusion that the incremental impacts of the various development scenarios modeled by the Planning Board are not likely to adversely impact the water quality of Little Seneca Lake. However, the different development scenarios do pose a risk of impacting water quality in Ten Mile Creek's tributaries and main stem. In addition to minimizing the amount of impervious surfaces, there are a number of other options that could help to reduce or mitigate impacts on water quality, including:

- All of the recommendations included on pages 19-21 of the Planning Board's report on its recommended Limited Master Plan Amendment.

- Establishing conservation management plans in all areas located outside the limits of disturbance in the Ten Mile Creek watershed.

- In addition to the Planning Board's general recommendation to require wide buffers around streams and to maintain natural topography and vegetation where possible (particularly forests in headwater areas), overall performance of Environmental Site Design (ESD) could be improved by promoting a more even flow from bioretention facilities. In this respect, riparian buffer areas should be treated as a critical component of stormwater management. Every effort should be made to promote more even distribution of flow from ESD facilities along the entire range of forested or meadow buffer areas.

- The new 20-acre limit on grading established by State law may provide additional mitigation during construction but State law allows grading of additional areas to proceed once 50% of the 20 acres is "stabilized." Optimizing the success of improved stormwater control measures needs to focus on source reduction rather than best management practices (BMPs) for treatment. Source reduction is by far the best BMP.

- Soil decompaction needs to be incorporated as practical to address effects due to both construction and prior agriculture or other activity, but without disturbing vegetation to be saved on soils that might have had prior compaction effects. DEP's experience suggests there may be cases where collecting, stockpiling and reusing local topsoil generates more sediment than it saves. It may be better to compost amend whatever soil is left on the ground to start topsoil generation, and minimize the amount of grubbing early in a project to leave whatever root mat and organic content was in place for as long as possible.

Question 14

Do you believe additional research or analysis is needed to sufficiently answer any of Questions #10 - #13?

DEP Response:

DEP's responses to Questions 10-13 are based on its review of available modeling data regarding the incremental impact of development scenarios in the Ten Mile Creek watershed on Little Seneca Lake. Former Councilmember

Scott Fosler, former Planning Board Chair Royce Hansen, former DEP Director John Menke and numerous other environmental and water resource advocates have called for further review and analysis of those impacts before Council takes action on the Planning Board's recommended Limited Master Plan Amendment. More specifically, they have called for a study that evaluates the cumulative impacts of all existing and proposed development in the entire Little Seneca Lake drainage area before action on the Limited Master Plan Amendment.

These advocates note that the headwaters of the Little Seneca Lake reservoir and the reservoir itself are located in three different master plan areas within the County -- Germantown, Clarksburg-Hyattstown and Boyds. As a result, they stress that the impacts of development in all three master plan areas on the reservoir have never been fully evaluated as a part of the County's master plan process. They argue that, before further development is approved, an appropriate study should be conducted to assess the cumulative impacts of development – both existing and proposed – within the Little Seneca Lake drainage area. They cite best practices for protecting "source water" that are being implemented throughout the country and argue that this kind of study is needed in order to identify any steps that must be taken by the County over the long-term to protect the reservoir's water quality and its intended use as source water for the region during drought situations.

DEP agrees that these stakeholders have identified a very important policy issue but is uncertain at this point in time as to the appropriate scope of such a study or whether the study should be conducted prior to approval of the Limited Master Plan Amendment. DEP will continue to evaluate this issue as the PHED Committee worksessions move forward. We note that the advocates have referenced a variety of best practices being used by water utilities across the country to protect source water and it would be helpful to learn more from WSSC about its long-term plans for protection of the reservoir in general and, more specifically, whether WSSC believes that a study of the cumulative impacts of existing and proposed development on the reservoir is appropriate at this time.

II. LETTER FROM COUNCILMEMBER BERLINER

DEP agrees with all of the Planning Board's responses to the questions posed by Councilmember Berliner and also has the following additional comments on Questions 1 and 2.

Question 1

Why is Ten Mile Creek important to our county and/or to the region?

DEP Response:

DEP agrees with the Planning Board's response but also has some additional comments regarding the importance of Ten Mile Creek.

Ten Mile Creek is a "headwater" system in which the majority of the tributary streams are small and spring fed. Abundant springs and seeps supply the cold and clean groundwater necessary to maintain high aquatic diversity. The fracture fault geology that is unique to this part of the County has influenced the stable shape of the stream channels, how the groundwater flows through the underlying layers of rock and how the springs and seeps are maintained. Land use activities that impact any of these factors can negatively impact the high aquatic diversity that they support.

Ten Mile Creek is located within an area of thin, rocky soils that is geologically different than the areas that surround other streams in most parts of the County. Relative to most streams in the County, stream beds in the Ten Mile Creek system contain smaller amounts of silt or clay and larger numbers of flat thin rocks of greenstone and Ijamsville schist. The surface area on these flat thin rocks and the absence of large amounts of silt or clay make it an ideal environment to support diverse benthic (living on the bottom) macroinvertebrate communities. Streambeds with more silt or clay or other types of rock material are less friendly habitats for the benthic organisms that are a key indicator of a healthy

stream and make it more difficult for them to thrive. Land use activities that increase the amount of silt or clay in the stream beds can negatively impact the ability of benthic organisms to thrive.

Question 2

Ten Mile Creek has been referred to as a "reference" stream". What is a "reference stream" and what qualifies a stream for this designation?

DEP Response:

A reference stream is a stream that has the best natural habitat within a certain geographic range. In this case, Ten Mile Creek is a reference stream within Montgomery County for its Piedmont Region. Reference streams are identified as having "least impaired" habitats based on a specific set of factors including low imperviousness and high vegetated cover in their drainage areas and high stream bank and channel stability. These streams potentially support "least disturbed" aquatic communities and are used as a comparative "reference" for assessing the integrity of more impaired County streams. The reference stream program that was developed for Montgomery County is based on the framework outlined in the *Technical Guide for Developing an Index of Biotic Integrity* (George Gibson, 1996).

From: Levchenko, Keith
Sent: Thursday, December 19, 2013 11:43 AM
To: Lake, Dave; Dolan, Mary; 'Gumm, Gary'
Cc: Michaelson, Marlene; Faden, Michael
Subject: Ten Mile Creek questions regarding drinking water issues

To: Dave Lake (DEP)
Gary Gumm (WSSC)
Mary Dolan (Planning Board staff)

One issue that Council Staff is reviewing as part of the Stage 4 Limited Master Plan before the Council is the potential impact on drinking water quality from development in the Ten Mile Creek Watershed since the watershed drains into the Little Seneca Lake Reservoir.

An opinion piece in The Washington Post from November 15 (see below) from several former County officials argues that development should be drastically reduced and/or further studied to better understand the potential impacts on the Little Seneca Lake Reservoir before opening up the Stage 4 area for development. These concerns were echoed by a number of speakers at the Council's public hearings on December 3 and 5.

Below is a list of questions that I think would help Council Staff assess this issue. Councilmembers have asked for written responses from WSSC and DEP and would welcome any comments from the Planning Board staff as well. Council Staff would like to receive your responses by January 3 so that the information can be incorporated into the Council Staff packet for the first committee worksession taking place on January 13.

1. Please provide a brief history of the creation of Little Seneca Lake, including the reasons the lake was built, its proposed function, and the agreements that guide water releases from the lake.

2. Please explain the specific circumstances under which reservoir water is used, when this has happened, and exactly what happens during these events.

3. Was the lake ever considered as a direct emergency water source (i.e. direct withdrawals from the lake) as opposed to releases from the dam to allow increased flow into the Potomac River? If so, please describe how this direct use would work. How would the water be treated? How would it be delivered to regional customers? Given the capacity of the

lake (4.0 billion useable gallons of water according to what I've read), how long would that water supply be able to serve the WSSD and the region?

4. How much acreage is within the Little Seneca Lake drainage area (i.e. drains directly into the lake or from water sources that drain into the lake)?

5. What is the current estimated imperviousness of this acreage?

6. What proportion of the total acreage that drains into Little Seneca Lake is from the Ten Mile Creek Watershed?

7. What is the condition of the reservoir right now? How does your agency evaluate the condition of the reservoir? How does development in the watershed affect the quality of the reservoir itself and the quality of the water in the reservoir? What are your agency's major concerns (if any) with regard to the water quality of the reservoir? Sediment? Pollutants?

8. How far does water released from the Lake flow to reach the Potomac River? How far upstream from the Potomac Water Filtration Plant does the released water enter the Potomac River? At its greatest potential release during a severe drought, what proportion of Potomac River water at the Potomac Water Filtration Plant intake would be from the reservoir?

9. Given Queston #8, does the released water make up a sufficient portion of the Potomac River water at a given time to have a significant impact on drinking water quality? How much does the water quality of the Lake affect Potomac River water quality and drinking water quality at the Potomac Water Filtration Plant?

10. To what extent would the scale of development being debated in the Stage 4 Limited Master Plan Amendment have a significant impact on the Little Seneca Lake Reservoir or drinking water quality from the Potomac River in general? To what extent would the alternative levels of development that have been suggested (ranging from no additional development to the Planning Board recommendations to the increased levels of development requested by property owners) result in differences in the quality of WSSC drinking water?

11. Comparisons to Watts Branch's impact on Potomac River water quality have been made, with some contending that WSSC is considering a mid-river intake at least partly because of reduced water quality closer to shore as a result of the degradation of Watts Branch's water resulting from upstream development. To what extent would increased development in the Ten Mile Creek watershed raise similar questions?

12. Please describe the factors that underlie your conclusions on questions #10 and #11. For instance, could a particular level of increased imperviousness in the Ten Mile Creek watershed tip the balance in the Little Seneca Lake catchment area?

13. If specific levels of development in the Ten Mile Creek area would result in significant impacts on water quality, what options should the County consider to reduce or mitigate these impacts?

14. Do you believe additional research or analysis is needed to sufficiently answer any of Questions #10 - #13?

Also, On December 11, T&E Committee Chairman Berliner sent a memo (attached) which included a list of questions to Planning Board Chair Carrier. We would like DEP and WSSC to respond in writing by January 3 to these questions as well.

Thanks,

Keith Levchenko
Senior Legislative Analyst
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Montgomery County rolls the dice with the region's water system

By John Menke, Scott Fosler and Royce Hanson, Published: November 15

Anyone who lives in the D.C. region and relies on clean drinking water to live — in other words, everyone who lives in the D.C. region — needs to be aware of a debate that's about to come to a head in Montgomery County.

A proposal to amend the land-use plan for the Clarksburg area, in the northern part of the county, is set to be taken up by the county council in December. This proposal may endanger the integrity of the water system for metropolitan Washington by permitting millions of square feet of commercial and office development and the construction of hundreds of residences alongside the headwaters of Ten Mile Creek, the last undeveloped tributary of Little Seneca Reservoir.

As former Montgomery County officials, each of us was involved in the creation of the reservoir and its designation as a key component of the water system for metropolitan Washington. It supplanted massive and ill-conceived alternatives, including a proposal to place some 16 dams on the Potomac River that would have inundated most of the C&O Canal and destroyed the character of the river basin. Regional leaders discovered that in the event of a drought, with an appropriate regional system of interconnected local water supplies, Little Seneca Reservoir alone could sufficiently augment the flow of the Potomac until water released from another, larger reservoir reached intakes in the river.

This new regional water supply system, with Little Seneca Reservoir at its core, was formalized in the 1982 Water Supply Coordination Agreement, signed by the region's major water utilities in Maryland, Virginia and the District and the Interstate Commission on the Potomac River Basin.

But the integrity of that system is now threatened. The development blueprint approved by the county Planning Board in October concedes that development of any scale would degrade Ten Mile Creek; the only questions are by how much and what effect would this have on the reservoir. We don't know the answers to these questions because no comprehensive study has been carried out. Notably, the Planning Board's professional staff recommended a level of development well below what the board approved — and even that lower intensity involved significant risk. The board then increased the level of development recommended by its staff by 50 percent east of Interstate 270 and 300 percent west of the highway. No justification for this level of damage is offered in the plan.

To approve such expanded development without a careful, professional and independent analysis of its impact on this critical water resource would constitute an abandonment of the stewardship responsibilities that the county exercises for the 4.3 million people whose water is drawn from the Potomac.

We have walked in the shoes of planners and council members and understand the difficulty of making decisions that are certain to disappoint some interested parties. We share responsibility for the present problem because 30 years ago, when we proposed and acquired land for the reservoir and helped to negotiate the agreements for its role in the regional system, we should have taken stronger action to ensure its protection. But we did not anticipate that future planning boards and county councils would consider massive development along the headwaters of the reservoir without first carefully studying the damage it could do to the region's water supply.

We believe the responsible course for the Montgomery County Council to take at this point is to drastically reduce the proposed density and impervious-surface limits in the Clarksburg amendments. Better yet, reject the plan and remand it to the Planning Board for reconsideration after a thorough, independent analysis.

John Menke was a member of the Montgomery County Council from 1974 to 1978 and later served as director of the county Department of Environmental Protection. Scott Fosler served on the county council from 1978 to 1986. Royce Hanson was chairman of the Montgomery County Planning Board from 1972 to 1981 and 2006 to 2010.

Rationale for Development Levels

Department of Environmental Protection

February 27, 2014

In evaluating the appropriate level of development in the different subwatersheds within the Ten Mile Creek watershed, a number of different environmental factors were considered. These factors include:

- Present water quality
- Amount of existing impervious surface,
- Proposed amount of additional impervious surface,
- Percent change in impervious surface,
- Percentage of environmentally sensitive organisms

Present Water Quality

DEP has been conducting water quality monitoring throughout the County and specifically in Ten Mile Creek since 1995. The results of this monitoring are analyzed using the index of biological integrity or IBI. The IBI for a particular stream reach is based on the type of macroinvertebrates and fish identified at the monitoring station for that reach. (see DEP Monitoring Program attachment for more information). . IBI scores have been determined for 11 subwatersheds within the Ten Mile Creek watershed. Conditions in less developed subwatersheds like 110/111 have ranged from good to excellent since DEP began monitoring. Conditions in 206, which has had the highest level of development in the Ten Mile Creek watershed, have ranged from poor to good. Because LSTM 110 and LSTM 111 have higher existing water quality they are considered higher priorities for protection.

In addition to the IBI, DEP has worked with the Environmental Protection Agency to begin the development of a biological condition gradient (BCG) to evaluate streams in the County and also to compare them to other watersheds in the piedmont of Maryland. Four of the stations used in the development of the BCG are from Ten Mile Creek. Seventeen regional experts rated these streams using the draft BCG criteria. The draft BCG indicated that LSTM 110 is a stream comparable to some of the best watersheds in the Piedmont region of Maryland (see attachment on BCG).

Amount of Existing Impervious Surface

The relationship between the amount of impervious surface and water quality was first documented in 1998 (CWP, 1998) and has since been reaffirmed in a number of different studies (Schueler et al., 2009; Freeman et al., 2007; Dodds et al., 2010; Hidenbrand et al., 2010; Hogan et al., 2013; Utz et al., 2011; Walsh et al., 2005;) (see Existing Impervious attachment). The less impervious surface within a watershed the more likely that water quality health will be maintained close to predevelopment conditions. This is consistent with DEP monitoring results that show a strong relationship between imperviousness and stream health. This is illustrated in Ten Mile Creek where the subwatershed with

the highest imperviousness (206) exhibits the poorest IBI scores . There are other stressors that impact streams, but impervious surface remains the primary 'yardstick' used to relate stream health with development impacts.

Proposed Amount of Additional Impervious Surface

Greater impervious surface reduces the opportunities to avoid sensitive stream resources, , and changes the natural recharge characteristics of the land from a diffuse network of infiltration to a point source system that does not function as before. On land with significant changes in elevation like that found in Ten Mile Creek, the effect of additional impervious surface is magnified by the necessary cut and fill required to achieve slopes suitable for development. SPA stormwater best management practices (BMPs) were designed to function in a distributed way (multiple, different BMPs, often connected in a series and used to detain stormwater; increase infiltration to groundwater; and increase the removal of nutrients, sediment, and other contaminants). The new Environmental Site Design structures are a continuation of a distributed system; there are just more of them and they serve a smaller drainage area. The amount and the location of imperviousness surfaces changes the landscape permanently and changes the receiving streams, often in ways not fully anticipated or well understood until after the development is completed. By then, it is too late to fully undo what has occurred to the stream

Percent Change in Impervious Surface

Based on the work done by Shueler and others, watersheds are more sensitive to changes in impervious surface levels at lower impervious levels. The change in water quality between 1.2% and 6% impervious surface (313%) for LSTM 110 is significantly greater than the change in water quality that would occur between 16.6% impervious and 23.6% impervious (42%) for LSTM 206. The sensitive species that designate a watershed as having excellent water quality disappear at very low levels of impervious surface. Watersheds with very low impervious levels like LSTM 110 (1.6%) and LSTM 111 (1.2%) are more sensitive to changes in impervious surface than watersheds like LSTM 206 (16.6%) and LSTM 202 (11%) which already have existing impervious surface and are already showing signs of degradation. The location of the impervious area is critical in minimizing the impacts to the stream, placement of the developed land has to be carefully thought out so as to maximize the distance from small headwater streams (see Magnitude of Change attachment).

Percentage of Environmentally Sensitive Organisms

Using the DEP monitoring data the percentage of organisms that are considered sensitive can be calculated. Sensitive organisms in LSTM 110 and LSTM 111 were over 60%. Sensitive organisms in LSTM 201 and LSTM 206 were 44% and 22% respectively reinforcing the conclusion that LSTM 110 and LSTM 111 are more sensitive and require more protection.

Biological Condition Gradient

The Biological Condition Gradient (BCG) is an assessment tool that shows an ecologically-based relationship between the stressors affecting a waterbody (the physical, chemical, biological impacts) and the response of the aquatic community. The tool can be adapted or calibrated to reflect specific geographic regions and waterbody type (e.g., streams, rivers, wetlands, estuaries, lakes).

The County first developed an Index of Biotic Integrity in 1998 as a way to rate and compare local streams. Each index was split into narrative categories of ' excellent', 'good', 'fair' and 'poor' were used. Local officials and the public understood and accepted this concept. Soon, however, people began to describe streams as 'high' good or 'low' excellent and began to ask what would be needed to improve streams from 'poor' to 'good'. A better tool was sought that would present a more refined and detailed assessment of streams and their response to land use change (Figure 1). The BCG is considered to be that tool and a pilot evaluation was sought to see how the BCG would rate streams representing a wide range of conditions. In addition, the Limited Master Plan Amendment for Ten Mile Creek began. The 1994 Master Plan describes Ten Mile Creek as 'sensitive' and 'fragile', the BCG was studied to see if it could be used to better define these characteristics.

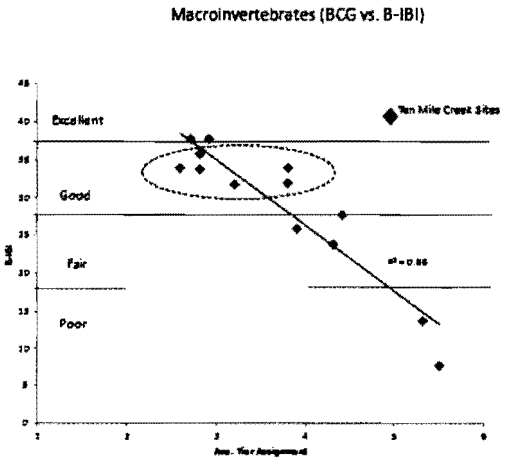


Figure 1. Ability of the BCG to Separate Different IBI Levels

In March 2013, the MNCPPC and Montgomery County convened a panel of 17 regional scientists with expertise in stream ecology. The purpose of this meeting was to develop and test a preliminary BCG model for assessment and interpretation of the biological condition of streams within the County and for several stations within Ten Mile Creek. Results of this workshop were shared with the Planning Board during the April 11, 2013 worksession on the Clarksburg Limited Master Plan for the Ten Mile Creek Watershed.

The BCG development was described as an effort to more clearly understand and describe Ten Mile Creek in the context of the range of stream quality for streams in Montgomery County using a nationally-recognized standard, the Biological Condition Gradient.

On September 24 – 26, 2013 work continued on the BCG with Montgomery County convening a second expert meeting with a larger number of sites for analysis and with an expanded group of experts, including scientists from the states of Virginia, Pennsylvania and Delaware. This meeting developed a more robust, in-depth analysis of stream sites within the piedmont to refine the model and develop an approach for quantification of the model.

Draft decision rules to consistently quantify the site assessments were developed and considered by experts to be applicable to the larger Piedmont region.

Four of the 11 TMC monitoring stations were used in the development of the model. One headwater site within the TMC Watershed (King Spring-LSTM110) was identified as a high quality stream (Tier 2-) with taxa comparable to State of Maryland Sentinel Sites. Impervious cover for these sites was at 3% or below. Three other TMC sites with impervious cover ranging between 4 and 11% were rated between Tier 3 and Tier 4 (lower condition).

The BCG has not been used to represent the overall condition of Ten Mile Creek, but 4 Ten Mile Creek stations have been used in the development of the BCG for the County. One station (LSTM110) was identified as a high quality stream (Tier 2-) with taxa comparable to State of Maryland Sentinel Sites, Three other TMC sites with impervious cover ranging between 4 and 11% were rated between Tier 3 and Tier 4 (lower condition) (Figure 2).

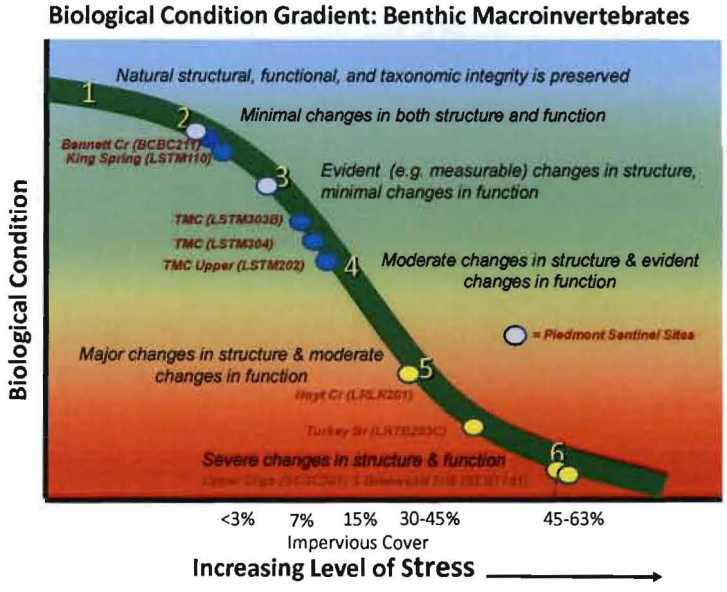


Figure 2. Comparison of the 4 Ten Mile Creek Stations used in the BCG Development.

Ten Mile Creek - Background

- Environmental studies undertaken as part of the 1994 Clarksburg Master Plan indicted that "the Ten Mile Creek watershed has the greatest constraints for development." The Plan noted:

> *"Existing sampling data, aquatic biota surveys, and field observations indicate that Ten Mile Creek has good water quality that supports a diverse environmental community. The combination of relatively healthy streams, existing wetlands, significant woodlands, and diverse land cover help provide valuable habitats. At the same time, steep slopes and poor soils limit the opportunities for development. Of the Little Seneca sub-basins, Ten Mile Creek is the most prone to environmental degradation from development."*

- Ten Mile Creek is a "headwater" system, where the majority of the streams are small and spring fed. It is located within an area of thin, rocky soils. The abundance of springs and seeps supply the cold and clean groundwater necessary to maintain this high aquatic diversity.

- Most of the Ten Mile Creek has maintained 'excellent' to 'good' stream conditions since 1995. It's ability to maintain this stream condition over time; during record droughts, floods and other impacts is due to the many healthy subwatersheds that make up Ten Mile Creek today. It is only as healthy as the sum of its parts – each tributary is important. It is a fragile and sensitive watershed in that this important balance of tributary functions can be easily disturbed.

- The watershed currently is characterized by overall very low impervious and high forest cover.

The Department of Environmental Protection's Stream Monitoring Program

<u>General</u>

- The Department of Environmental Protection (DEP) conducts a variety of stream monitoring and assessment activities throughout the County. In addition, DEP partners with experts from the U.S. Geological Survey (USGS), the U.S. Environmental Protection Agency (EPA), the Maryland Department of the Environment (MDE), the University of Maryland, and others on a variety of monitoring efforts to understand the condition of the County's streams and the effect of development on stream health.

- DEP's primary tool for stream assessment is biological monitoring. Aquatic organisms have specific habitat, stream flow, and water quality requirements in order to survive. Some are very sensitive and require high quality stream conditions to survive while others can survive in a wide range of stream conditions. Careful monitoring and comparison of streams affected by different levels of development helps identify the difference between the effects of natural conditions (drought, flooding) and those caused by development (e.g., mass grading, sedimentation, and increases in impervious surface. Streams in Special Protection Areas (SPAs) are monitored every year. DEP began stream monitoring within three SPAs, Clarksburg, Piney Branch, and Upper Paint Branch, in 1995 and within the Upper Rock Creek SPA in 2004.

- DEP also conducts geomorphologic assessments of County streams, including several in the Clarksburg SPA. The geomorphology of a stream refers to its shape, pattern, and physical composition. A stream's geomorphology will change in response to changes in the timing and amount of storm runoff that enters the stream.

- In conjunction with the USGS, DEP collects stream hydrology (flow) data at several locations in the County. Conversion of watersheds to urban areas has been shown to have major effects on stream hydrology as a result of vegetation removal; stream channel modification; loss of headwater streams, springs, and seeps; and increases in impervious area. The effects of these hydrologic changes are most severe in headwater streams.

- Changes to the natural landscape, in addition to increased impervious cover, will significantly affect the health of streams. Light Detection and Ranging, commonly known as LiDAR, provides an excellent tool for documenting such changes. LiDAR is a remote sensing method used to collect topographic elevation information at very high resolutions. LiDAR imagery, provided to the County by EPA's Landscape Ecology Branch, has been utilized to document the changes to the natural landscape to supplement the data collected via biological, geomorphologic, and hydrologic assessments.

- A variety of monitoring has been undertaken in the County to assess the performance of sediment control (SC) and stormwater management (SWM) best management practices (BMPs). Since 1994 SPA developers have been required to perform BMP monitoring. This data has been used by DEP and the Department of Permitting Services (DPS) to assess the performance of particular BMPs in specific situations in order to guide future permitting activities. Another significant effort to monitor BMPs has been undertaken by the Clarksburg Monitoring Partnership (CMP), a consortium of local and federal agencies, as well as universities. The CMP provides a collaborative approach to monitor stream ecosystem changes resulting from the transition from agricultural to medium and high density residential, commercial, and industrial land uses. The CMP has concentrated their resources on Clarksburg because of the opportunity to conduct long-term monitoring of a broad array of BMPs to evaluate the hydrologic and geomorphologic effects of development on a previously undeveloped landscape.

Ten Mile Creek Monitoring

- The range of benthic macroinvertebrate index of biotic index scores is shown in Figure 1. With the exception of the tributary draining the Miles Coppolla property (LSTM206) and the tributary LSTM201, most tributaries have been within the excellent to good range. The width of the individual boxes for each monitoring station show how wide the score ranges have been over time. The narrower the width, the more consistent the scores have remained. This is very important when the scores show a consistent range around the excellent category (ex. LSTM 110, LSTM303b).

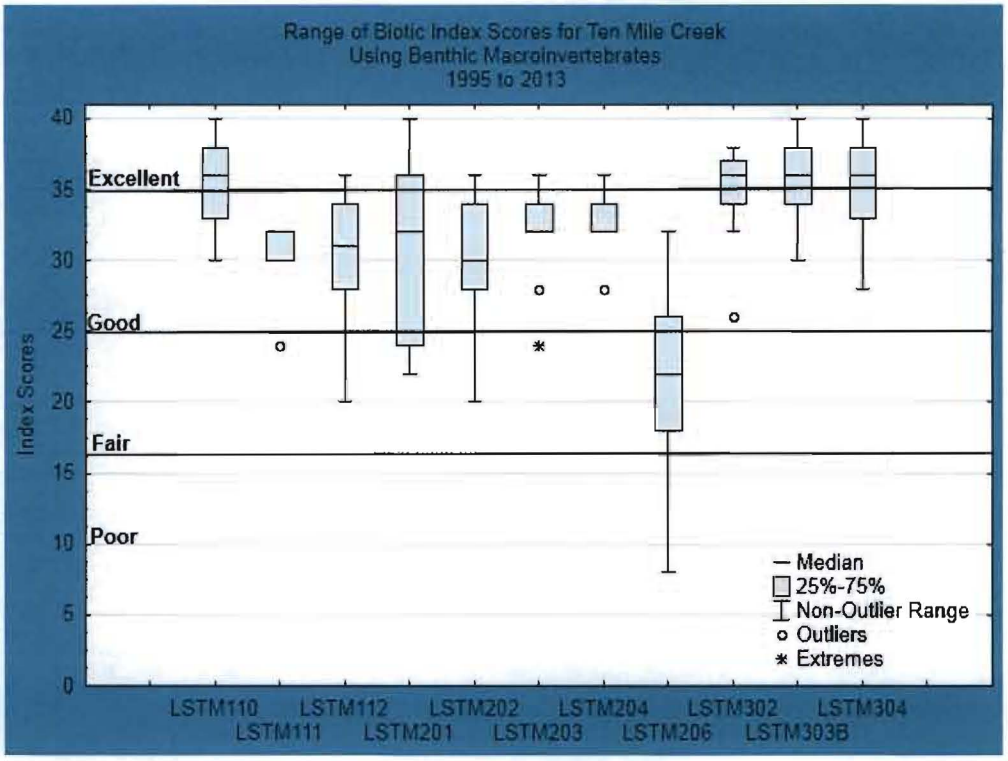


Figure 1. Range of Biotic Index Scores for Ten Mile Creek Monitoring Stations, 1995 to 2013.

- 2013 Stream conditions for Ten Mile Creek using benthic macroinvertebrates (and fish in the larger stream areas) are mapped in Figure 2.

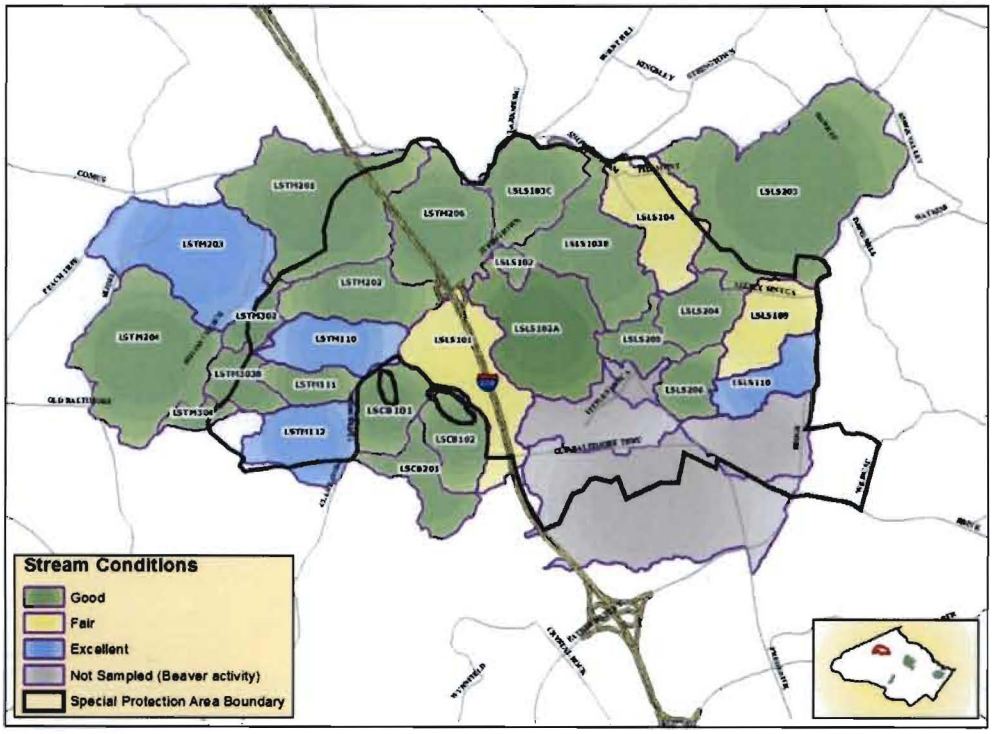


Figure 2. Stream Conditions in Ten Mile Creek and Little Seneca Creek, 2013.

- Five USGS stream flow gauges have been installed in the Clarksburg SPA to capture hydrologic data. These gauges have been in place since 2004. With 10 years of data, stream flow statistics can now be calculated for these 5 gauges. Two additional USGS stream flow gauges have been recently installed in Ten Mile Creek, although they have not been in place long enough to provide comparable hydrologic statistics to the original five gauges. In addition, two rain gauges have been in operation in the Clarksburg SPA since 2004. Both the rain gauges and flow gauges are set to record in 5 minute intervals so rapidly changing conditions in headwater streams can be compared to detailed rainfall data.

- LiDAR has documented significant changes to the natural landscape in the Clarksburg SPA. Image 1, taken in 2002, recorded the pre-construction topography of the area. Before construction activities began, the landscape consisted of gently to moderate rolling slopes and land use was predominantly farmland. The small streams draining this area can be seen in the middle of the image. Springs and seeps can be observed at several headwater areas of this stream. Surface runoff would be conveyed into the stream through natural drainages and ephemeral stream channels. Groundwater recharge was conveyed through the existing springs and seeps to maintain the base flow of the stream. Overall imperviousness was low, allowing for stormwater infiltration into the ground.

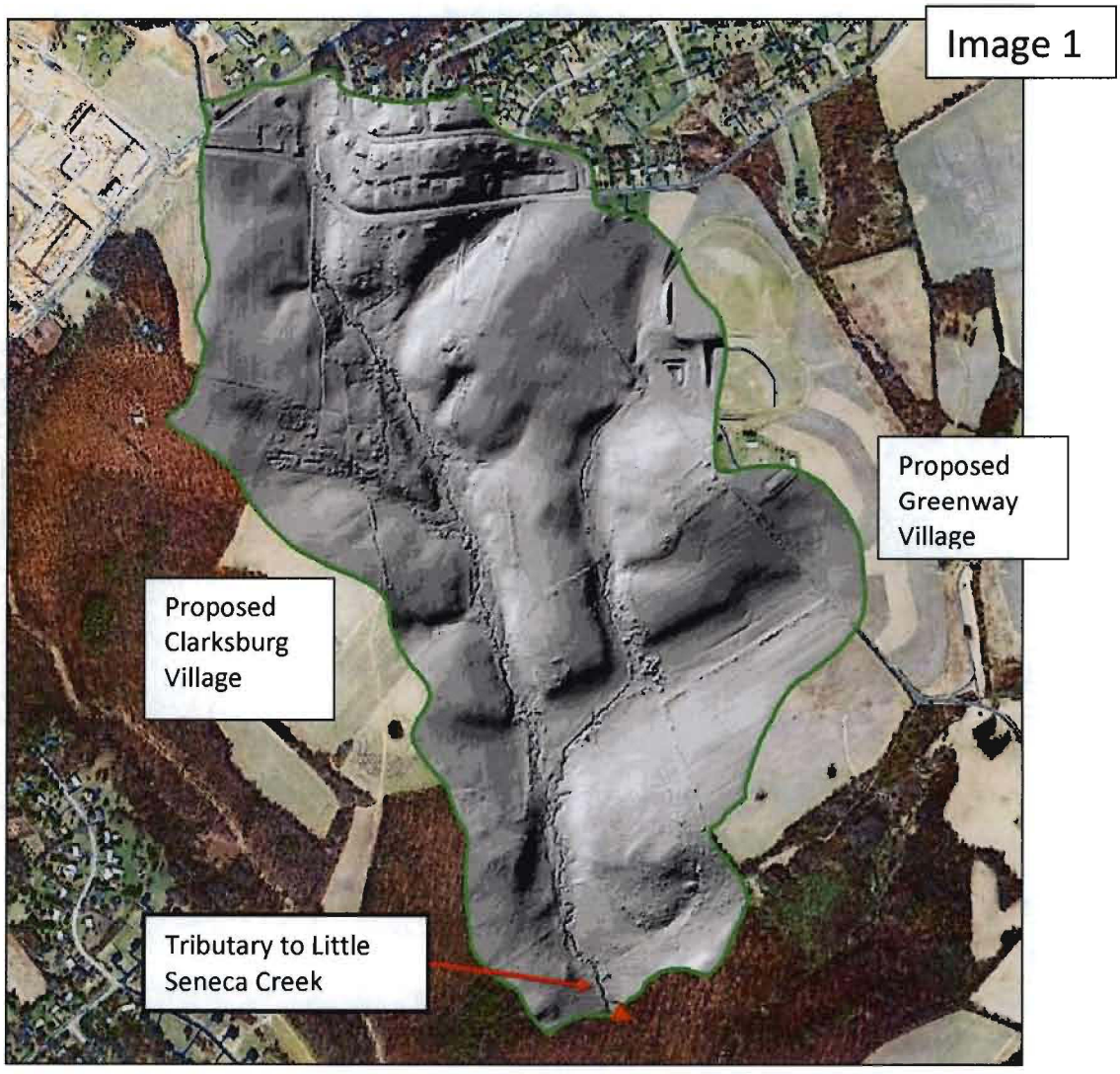


Image 2, taken in 2004, documents changes that occurred to the topography and natural drainage patterns from the cut and fill required to grade the site for approved lots, roads, and utilities. The road grade requirements of 4% maximum slope directly influence the cut and fill necessary to balance the developer's onsite excavation and avoid the cost of importing soil. This massive movement of soil can have lasting effects on the water quality due to changes in the basic flow regime of surface water and groundwater. On the east side (Greenway Village), distinct cut lines along the limits of disturbance document the new elevations graded into the development. The rolling topography was smoothed and leveled, altering the natural drainage patterns. Newly installed SC BMPs can be seen installed at the lower elevations of the new topography with some of the BMPs sited at the heads of springs and seeps. An unanticipated effect was also recorded in this imagery sequence. Sewer service is provided to the developments through gravity fed lines and several segments of the sewer line required blasting. The fill from these segments are shown to have subsided after completion of the line. The proximity of the sewer lines running parallel to the stream has the potential to intersect groundwater recharge to the stream.

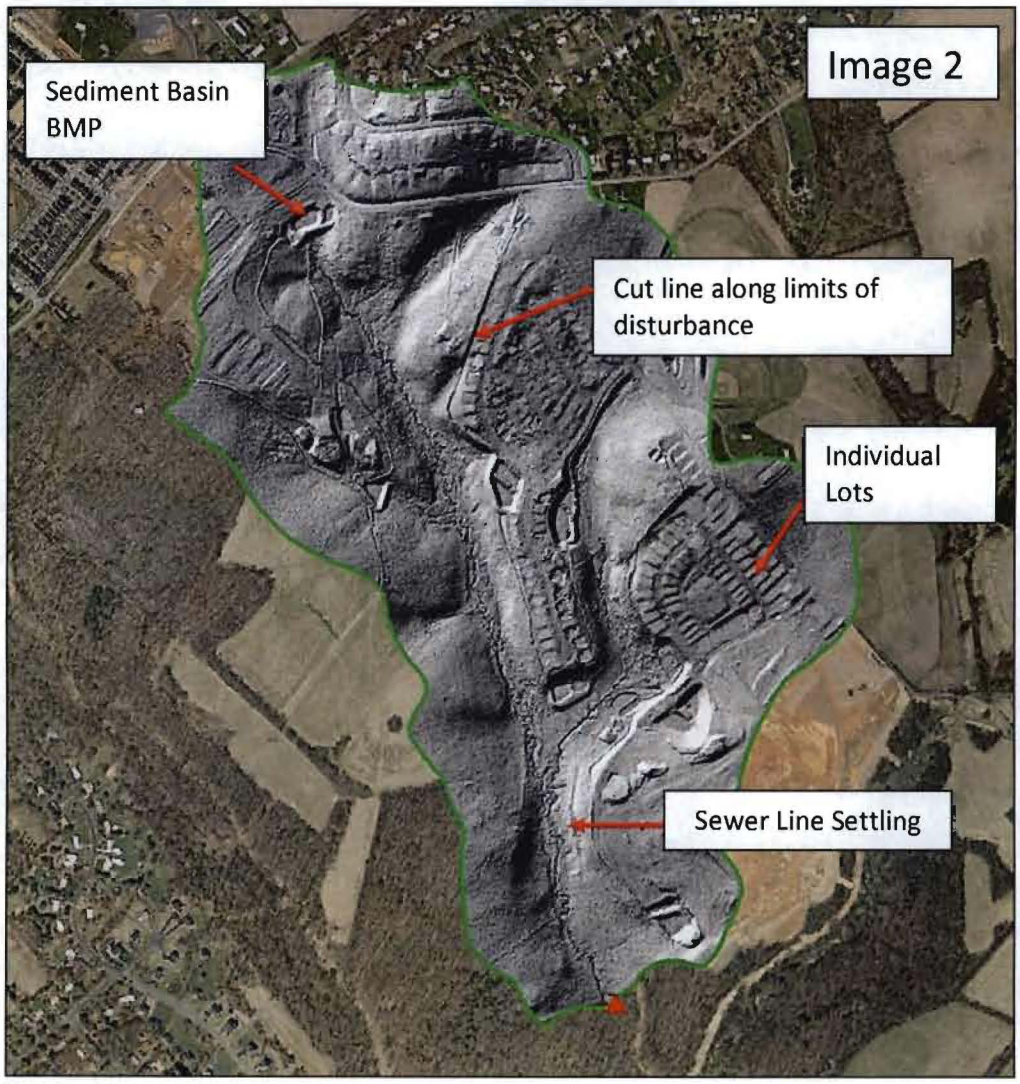
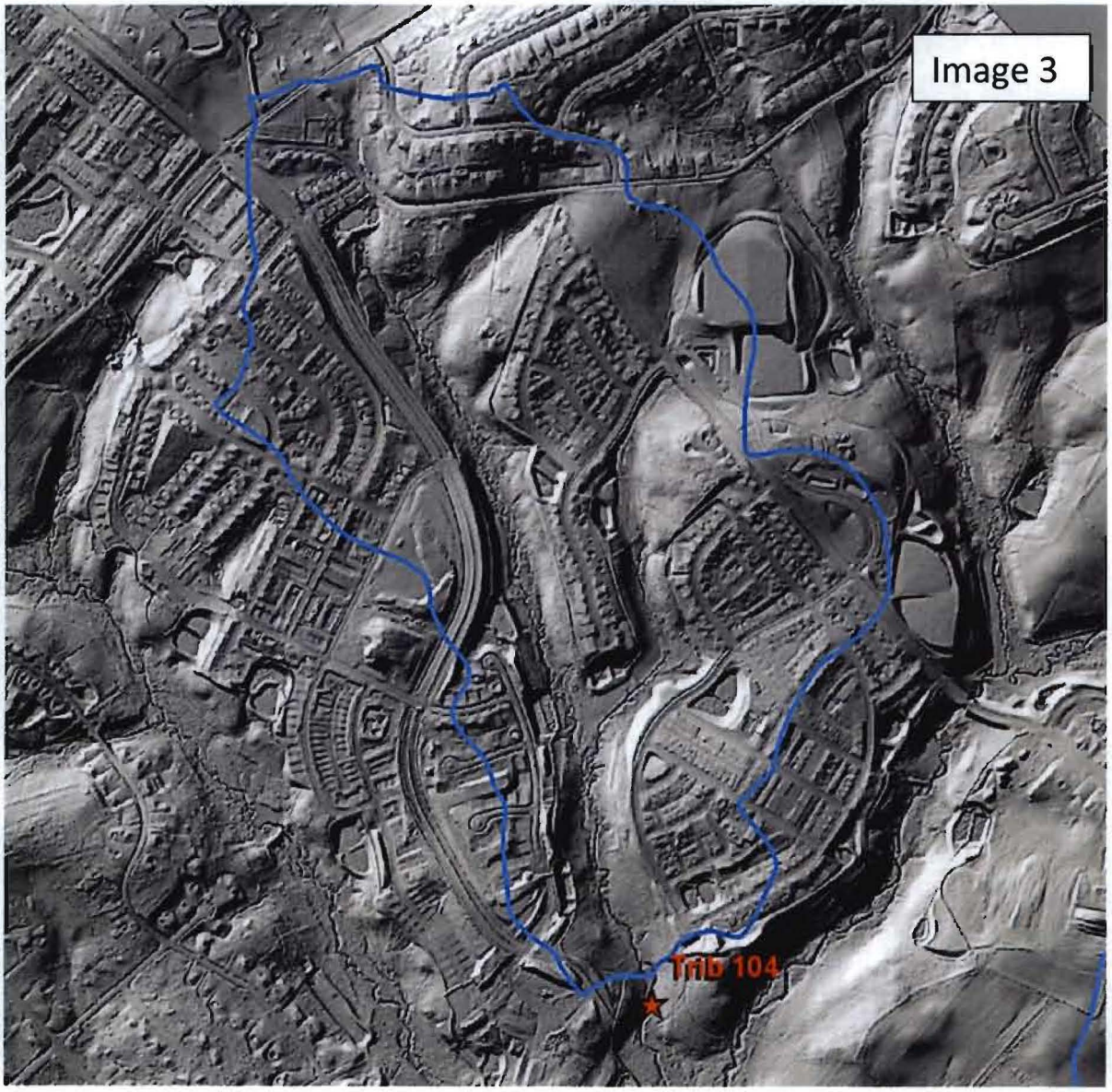


Image 3 shows the development through 2007. Final grades can be seen throughout the site as the rolling topography has been cut, graded, smoothed, and leveled. Snowden Farm Parkway, a major connecting road, is seen in the middle of the image, bordering the headwater stream for much of its length. Grading for the parkway and SC BMPs bisect the natural drainage patterns on the left side of the image, potentially affecting the springs, seeps, and recharge areas on this side of the stream. Newly-defined channels across the floodplain from the SC BMPs are shown in the 2004 and 2007 images. The natural drainage patterns on the right side of the image have been eliminated, and runoff from the new impervious surfaces is redirected into the storm drain system. The overall topography, natural drainage patterns, and natural infiltration have been altered due to the cut and fill requirements necessary to meet the density requirements of these neighborhoods and the diversion of most of the stormwater runoff into stormwater inlets and drains.



What is the "Right" Level of Development?

- DEP's monitoring programs, as well as a number of other analyses around the country, have established the basic relationship that the greater the level of imperviousness, the greater the harm to the health of the watershed (please refer to the attached literature as examples). However, these programs have not resulted in a formula that can accurately predict the specific effects associated with specific levels of imperviousness.

- DEP fully concurs with the Council staff recommendations provided in the Committee packet of January 28, 2014. 'Staff believes the Council must be cautious. If the Council is overly conservative, and later learns that additional development is possible without harming the environment (and provides other public benefits), it can always revisit the zoning and add additional development capacity. If the Council is not conservative enough and development significantly compromises water quality, it will likely be impossible to reverse this decision. "

Existing Impervious

Existing Impervious Cover

- **The impervious cover model** (***Figure 1***) was developed and refined by the Center for Watershed Protection (CWP, 2008) and is the result of dozens of studies across the Country.

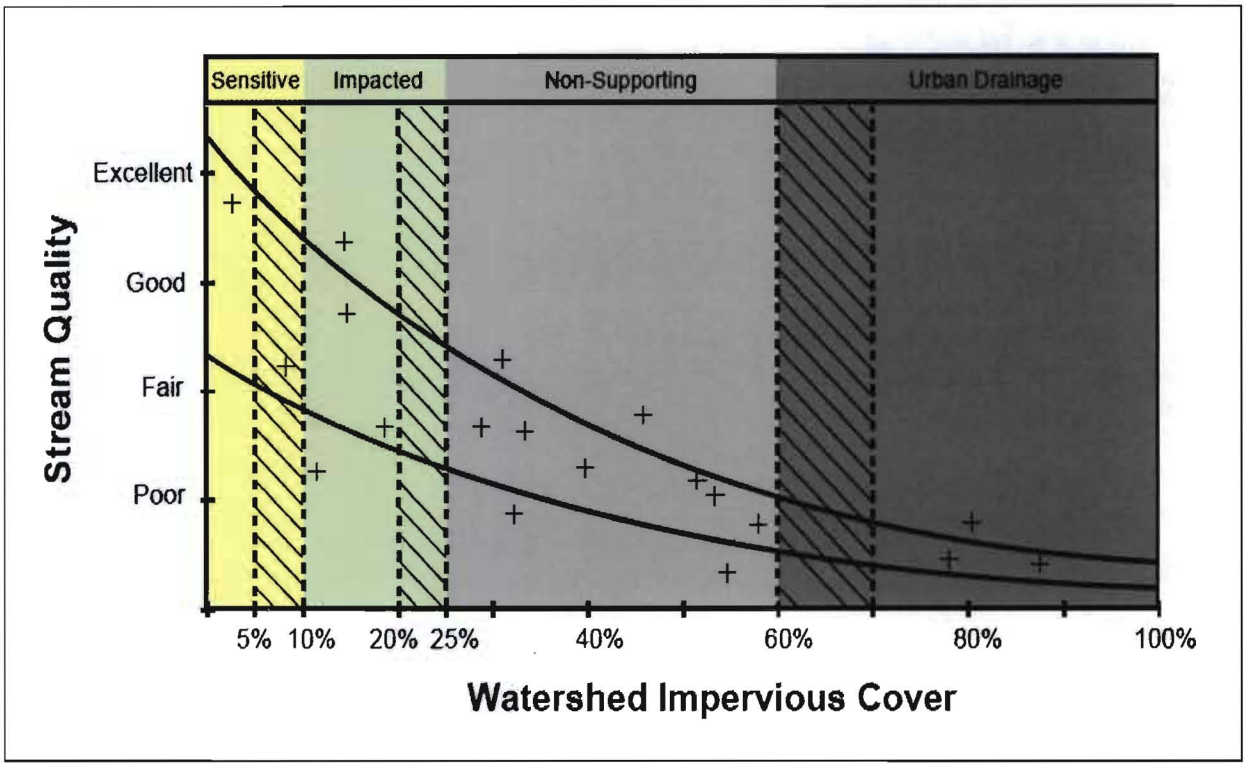


Figure 1 – Impervious Cover Model (CWP, 2008)

- Note that the line from 0 to 10% is steeper than from 10% to 25% and there is a transition from 5 to 10% where "sensitive" changes to "impacted".
- **Subwatersheds 110 and 111:** The excellent stream quality and existing low impervious levels place the 110/111 subwatersheds at the top of the slope in the "sensitive" category.
- **Subwatersheds 201 and 206:** The lower stream quality and higher existing impervious levels place the 201/206 subwatersheds in the "impacted" category.
- There is a greater risk of environmental impact going from 0% to 10% imperviousness. The drop at the lower levels of imperviousness is very sudden with the first onset of an increase in impervious cover.
- Many studies (***see list of literature***) show this drop to be quite sharp before leveling out at a much lower stream quality. This was described in detail by Matthew Baker from the University of Maryland, Baltimore County.
- Once an excellent quality stream is degraded, it is very difficult to recover even with extensive (expensive) restoration efforts. DEP is not aware of any instance of a once-excellent stream recovering to original conditions following development disturbance.

- Note the current existing impervious levels for the different Ten Mile Creek watersheds, and how much they are increased by the various impervious options discussed (***Figure 2***).

Cumulative Impervious Estimates

Sub-Watershed	Existing Conditions	15/6 Option	8% Reduced	Council Staff	Public Hearing Draft	Planning Board Draft	1994 Plan
LSTM201	3.9%	6.5%	5.8%	6.5%	7.5%	7.5%	10.8%
LSTM206	16.6%	23.6%	20.9%	23.6%	28.2%	28.2%	33.2%
LSTM202	11.0%	15.9%	14.5%	16.1%	20.5%	20.8%	25.0%
LSTM302	5.6%	8.3%	7.6%	8.4%	10.2%	10.3%	13.0%
LSTM110	1.6%	6.6%	8.4%	8.4%	8.4%	10.1%	15.1%
LSTM111	1.2%	8.3%	11.1%	11.1%	11.1%	13.8%	14.1%
LSTM303B	4.7%	7.8%	7.5%	8.2%	9.6%	10.0%	12.7%
LSTM112	2.5%	5.0%	5.8%	5.8%	5.8%	6.6%	5.7%
LSTM304	4.2%	6.7%	6.5%	7.0%	8.1%	8.4%	10.6%
Watershed	4.0%	6.3%	6.2%	6.6%	7.6%	7.9%	9.8%

Figure 2 - Cumulative impervious estimates based on subwatersheds and entire watershed, provided by Planning Staff

Magnitude of Change

- Because the 110 and 111 subwatersheds are more sensitive, it is more environmentally preferable to minimize increases to existing impervious levels as much as possible. Even a 6% impervious cover will result in a 300% to almost 600% increase over existing levels. The need to exercise caution in the final decision for Ten Mile Creek is very evident as once made, environmental damage may be 'minimized' but not undone.

Magnitude of Change from Existing Impervious

Sub-Watershed	15/6 Option	8% Reduced	Council Staff	Public Hearing Draft	Planning Board Draft	1994 Plan
LSTM201	67%	49%	67%	92%	92%	177%
LSTM206	42%	26%	42%	70%	70%	100%
LSTM202	45%	32%	46%	86%	89%	127%
LSTM302	48%	36%	50%	82%	84%	132%
LSTM110	313%	425%	425%	425%	531%	844%
LSTM111	592%	825%	825%	825%	1050%	1075%
LSTM303B	66%	60%	74%	104%	113%	170%
LSTM112	100%	132%	132%	132%	164%	128%
LSTM304	60%	55%	67%	93%	100%	152%
Watershed	58%	55%	65%	90%	98%	145%

Figure 3 – Magnitude of change from existing imperviousness for the different Ten Mile Creek watersheds and various options discussed

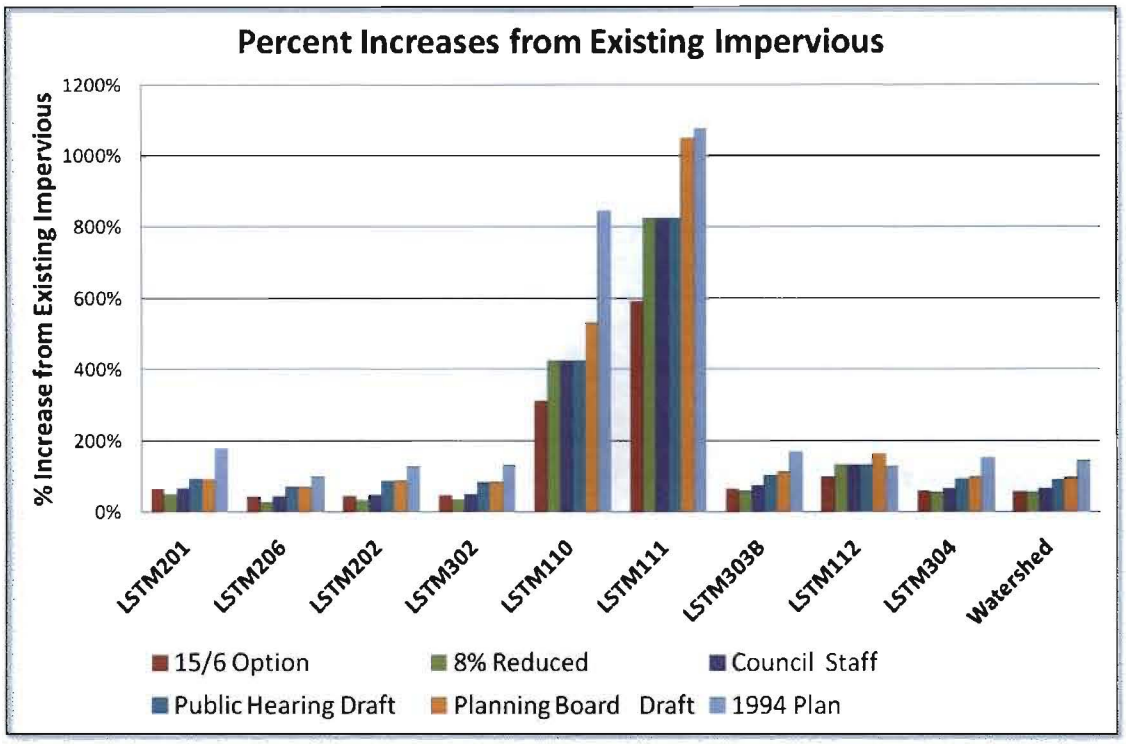


Figure 4 – Percent Increases from Existing Impervious in Ten Mile watersheds for Various Impervious Cover Limit Options

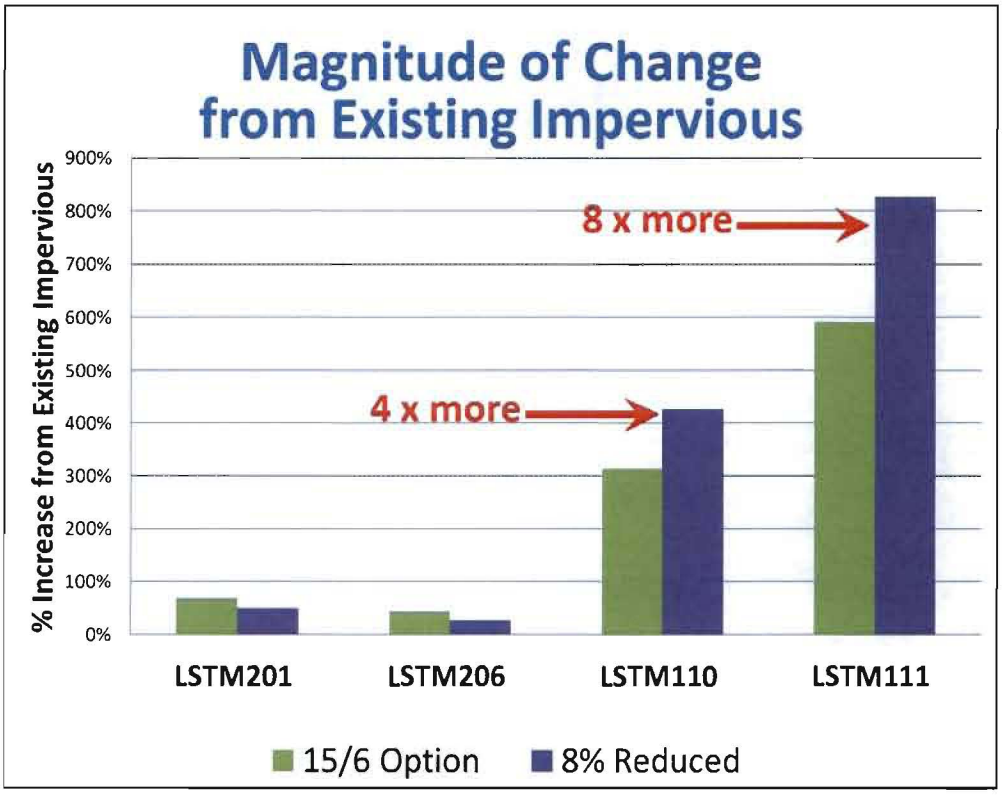


Figure 5 – Percent increase in imperviousness from existing conditions, showing just the four subwatersheds of interest and the two primary options discussed

Applying Environmental Buffers & Development Scenarios
(Prepared by Montgomery County Department of Environmental Protection)

Scenario 1

Scenario 1 applied the Environmental Guidelines and the Clarksburg Master Plan recommendations (M-NCPPC) to create the environmental buffer. A baseline buffer was applied to both streams (175 ft) and wetlands (25 ft). The 175 ft stream buffer was used per the recommendation on page 144 of the Clarksburg Master Plan. The 25 ft wetland buffer is the minimum buffer defined in the Environmental Guidelines.

The baseline buffer was extended when necessary to include steep slopes and erodible soils per the Environmental Guidelines (***Table 2***).

Table 2 - M-NCPPC Environmental Guidelines (Jan 2000). Summary of specific guidelines for use IV, first and second order streams used in this project.

Stream Buffers		
Feature	**Buffer Extended to**	**Notes**
Steep Slopes and Erodible Soils	Include entire steep slope (>25%) or entire extent of erodible soils	If either steep slopes (>25%) or erodible soils occurred within 200 ft of stream (i.e. "hydraulically connected"), buffer was extended to include entire extent of steep slope or erodible soil.
Wetlands (in SPA)		
Feature	**Buffer Extended to**	**Notes**
Steep Slopes and Erodible Soils	75 to 125 ft	If either steep slopes (>15% for SPA) or erodible soils occurred within 100 ft of the wetland, buffer was extended to include the entire extent of steep slope or erodible soil, up to the maximum of 125 ft.

Scenario 2

A 200 ft stream buffer was used instead of 175 ft and the buffer was extended to include all >15% slopes instead of just >25%, as well as all ephemeral streams.

Ephemeral stream locations were estimated using desktop analysis of the following information:

1. known location of intermittent streams,
2. LiDAR,
3. contours,
4. aerial photos, and
5. anecdotal observations from DEP scientists.

Scenario 3

The Scenario 2 buffer was expanded to include a limited forested area in addition to the forest interior. Priority protection was applied to forest that was contiguous and/or near hydrologic features.

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Appendices to MNCPPC Planning Board Report
Ten Mile Creek Plan Amendment - Retail Issues and Analysis
December 2013

Background

Bolan Smart Associates, in conjunction with Retail Development Strategies, was asked to assist MNCPPC in considering retail related aspects of the limited Amendment to the 1994 Clarksburg Master Plan and Hyattstown Special Study Area for the Ten Mile Creek Watershed. The primary issues revolve around the possible market implications concerning two proposed outlet malls and the prospects for local retail development in Clarksburg.

A recent development plan amendment for the Cabin Branch Neighborhood south of the Ten Mile Creek subarea received a recommendation of approval from the Planning Board. The Cabin Branch amendment includes a proposed outlet center located adjacent to the southwest corner of the I-270 / Clarksburg Road interchange. This amendment is in the midst of final review through a Hearing Examiner process, after which it is subject to approval or denial from the Montgomery County Council.

A second outlet center is being considered as an option for the Miles-Coppola property that lies just to the east of I-270 north of the Clarksburg Road interchange. The Miles-Coppola site, located at the eastern edge of the Ten Mile Creek limited amendment planning area, is within the part of Clarksburg known as the Town Center District. It is the closer of the two proposed outlet centers to the planned Clarksburg Town Center retail development parcel. Option 1 of the proposed Ten Mile Creek amendment received preliminary approval from the Planning Board in October 2013, and is now undergoing further review.

Though MNCPPC nor the consultant expect that more than one of the two competing outlet destination centers will actually go forward, it is not the intent of this analysis to question or validate the prospects of two centers virtually co-locating in Clarksburg, or to weigh the possible relative advantages of either proposed site. The focus of consideration is instead on the potential impact on realizing long-planned neighborhood serving retail in Clarksburg.

Approach

The consultant has been charged with addressing a series of questions intended to help inform the public land use planning process. The approach is to build on an understanding of past and present planning assumptions complemented by selected points of independent research and validation. Retail demand and potential sources of supply are profiled based on general indicators and correlated to provide order-of-magnitude measures of implications for development. The analyses are not meant to presume what should constitute specific retail center tenant composition or configuration considerations, but do reflect differences in consumer behaviors corresponding to outlet retail formats as opposed to more conventional resident-serving retail projects.

Summary

1. ***Is there demand for outlet mall use at a Clarksburg location?*** Based on market demographics, current industry trends, and locational considerations, Clarksburg is a very strong candidate for outlet mall retailing. The two outlet proposals, backed by leading national sponsors of such development, are resounding endorsements.

2. ***How will outlet mall development impact the Clarksburg retail marketplace?*** Outlet mall development in Clarksburg will dramatically increase consumer choice for local residents, especially for soft goods, apparel and accessories and home products, assuming the conventional mix of outlet retailers for projects of this type. While such development will displace some of the demand for traditional neighborhood local serving retailing, there is also the potential for regional destination shoppers (many times the volume of what Clarksburg alone would generate) to patronize non-outlet mall retailing, with each source of demand more or less offsetting the other. The increased drawing power of an outlet mall will attract support and retail tenants that would not otherwise be supportable in a market the size of Clarksburg.

3. ***How will outlet development compete with neighborhood retail?*** The two product types function very differently from each other:

   a) There is virtually no crossover in terms of food sold for home consumption, or for a wide range of convenience services.

   b) While there are some parallels in soft goods (i.e. socks, cosmetics) that are typically part of a local serving grocery or drug store, the differences in shopping experiences associated with picking up these kinds of items as part of other purchases, and as they represent only a fraction of traditional neighborhood general merchandise sales, mutes the impact of non-grocery items on the economic viability of neighborhood supermarket and drug stores.

   c) Neighborhood based dedicated clothing stores, considered unlikely to begin with given the size and locational characteristics of Clarksburg, will have more difficulty competing, as outlet malls typically are based on well known brands at discounted prices. Neighborhood clothing stores do not enjoy the same advantages of bulk purchase and corporate connections to secure manufactured goods/past season products at deep discounts.

   d) Typical outlet malls include limited food offerings (usually in a food court configuration) primarily as a tool to retain consumers on-site in order to increase overall spending, as expenditures typically correlate with amount of time spent at the center. Freestanding restaurant offerings, not a core use in outlet malls, represent the most potential intermixing between serving both outlet / neighborhood sourced demand.

   e) Entertainment uses serving local residents (i.e. movie theaters) are less likely as part of the outlet center mix, particularly if reliant strictly on local based demand, and may or may not be an additional element in some future outlet mall setting.

4. ***Has the neighborhood retailing environment in Clarksburg changed since the initial master planning visioning of the early 1990s?*** There are a number of influences on local retailing that have shifted over the past 20+ years:

   a) A prominent national trend has been the increase in demand for food prepared outside of the home (restaurant, take away, and prepared foods in grocery stores), in effect strengthening the base for local dining. Home meal replacement (take out and dining out) spending in the greater Washington DC region is among the highest levels in the United States, due in part to the number of dual income households (both working) and limited time available for meal preparation.

   b) Concepts of walkable mixed-use neighborhoods in suburban settings have become more firmly established (though not without some important reality checks regarding size and configuration), reinforcing some of the Clarksburg vision for a mixed-use community from decades past.

   c) Online shopping has eaten away at some of the demand for general retailing, but with relatively minor implications for the majority of neighborhood based retailing. While annual rates of growth for online shopping have continued to show significant increases over succeeding years, in total dollar volume, online purchases are estimated to represent only about 8% of total U.S. retail sales, with over 90% of retail expenditures still made in stores.

   d) Of major significance to Clarksburg is the lack of substantial growth in local employment, which was expected to help provide demand for local serving retail space (in particular daytime support for food service and general shopping goods).

   e) The as yet undetermined timing of rapid transit (CCT) is another consideration in comparing the vision of 1994 for Clarksburg with today's dynamics, though in the consultant's view, the status of the CCT is only of secondary significance in terms of retail (or employment) related impact.

   f) Finally, while the above factors have altered some the finer grained composition of contemplated neighborhood retailing, by far the single most significant change affecting Clarksburg has been the vastly expanded amount of retail space provided nearby at Milestone, most recently represented by the addition of a new Wegmans supermarket anchored shopping venue.

5. ***How does the existing and planned supply of neighborhood retail match up with potential demand?*** The short answer is that there may be too much overall potential neighborhood oriented supply by a factor of perhaps 20 to 30 percent, but not too much to see significant additions. The 1994 Clarksburg Master Plan included shopping centers in the Town Center District, the Cabin Branch and New Cut Road neighborhoods. With approximately 140,000 square feet of retail space currently built, combining the 2013 opening of the 109,000 square foot Clarksburg Village Center (New Cut Road), plus a sprinkling of other existing space, there is suggested demand for upwards of another 80,000 to 100,000 square feet of nearer-term neighborhood oriented retail space, including a potential grocery store component. Longer-term could see added demand for a further 50,000+ square feet. (See page 7 for detailed representation.)

6. ***Does the mix of housing and commercial development to be approved for the Ten Mile Creek and the Cabin Branch Plan Amendment areas impact retail viability?*** In relatively small proportions (compared with the total Clarksburg build out), changes in the number of planned residential units and their location does not convey significant impacts on the

potential for overall planned neighborhood retailing in Clarksburg. On balance, more rooftops help, but other factors can weigh in as well. One-for-one contrasts between single family and multifamily units can be important: single family homes in the Clarksburg marketplace, due to family size, household age and income, tend to account for substantially higher per unit levels of demand for neighborhood based retailing. While the nearer-term equation for office or flex industrial type commercial development is fairly contained by limited demand, hotel and destination based retail (i.e. an outlet mall) are variables that can add more immediately to the general level of activity in Clarksburg.

7. ***How may the proposed changes that may reduce the square footage devoted to a future neighborhood-serving retail center in Cabin Branch (yet including the addition of an outlet center) impact the shopping patterns for future residents west of I-270 and corresponding retail demand elsewhere in Clarksburg?*** The proposed cap of 484,000 square feet of retail space for Cabin Branch, of which 50,000 to 120,000 square feet could be defined as neighborhood retail, represents a potential reduction in the amount of traditional neighborhood type retail space being provided compared with the 1994 Master Plan (which originally provided for 120,000 square feet). This possible change has been represented by the current master developer of the Cabin Branch subarea to exclude a full size grocery store. Given the proximity of Milestone – in particular Wegmans – plus access to other Clarksburg retailing locations, neither may there be a particularly strong perceived need on the part of future residents, nor may a full size grocer be attracted to a possible Cabin Branch location. One scenario could be that if the choice for Cabin Branch is between a plan that includes: (a) an outlet mall and explicitly no grocery store, and; (b) a plan that defaults back to a possibly grocery store anchored neighborhood center, the benefit from going with an outlet mall may be to better underpin the grocery store prospects for Clarksburg Town Center (and support for Clarksburg Village). The related impacts of having possibly competing restaurants east and west of I-270 can be viewed in two ways, one where outlet mall destination users are not likely to patronize offerings east of I-270 if alternative options are present, and a second view being that the distance / barrier separating say the Clarksburg Town Center east of Route 355 and the Cabin Branch location more or less divides the market into two.

8. ***How might the CR zoning contemplated for the Miles-Coppola parcel impact the retailing landscape in Clarksburg?*** One of the features of the CR zoning is flexibility to build to different future market demand. While this can serve Clarksburg well, allowing for residential and commercial uses to evolve over time, the question of impact on the broader Clarksburg retailing environment could rest on what kind of retail development could occur on the Miles-Coppola property. Under the assumption that the proposed CR zoning would not permit "competing" neighborhood retailing, and as proffered by the current developer interest not to build a supermarket, then the flexibility offered by the CR zone could reinforce demand for off-site neighborhood retailing. This potential, however, may need to be qualified. Given that a Miles-Coppola location for an outlet mall would be quite proximate

to the planned but as yet unbuilt Clarksburg Town Center, the specifics of site planning for the Miles-Coppola property, in particular the inclusion of non-food court restaurants and possible non-traditional outlet mall retail spaces, could be important variables impacting the market prospects for these same uses at the Town Center site.

Evolving Retail Context

Retailing is in a constant state of change. New demands and merchandizing concepts come and go, such that over the period of a decade or more, the retail landscape can evolve considerably. Land use planning and development decisions, on the other hand, tend to be cast at fixed points in time that, while perhaps premised on prevailing best practices, may or may not be appropriate or achievable over the longer term. Add to this uncertainty of timing in a growth market, and you have Clarksburg.

So into Clarksburg's mix of a prescriptive approach to land use planning, significantly less employment uses than anticipated, changed retailing concepts and much expanded nearby supply, comes along not one, but two, major destination outlet mall proposals. What are policy makers to make of this opportunity and possible impact?

Outlet Malls

Over the past few decades, outlet malls have morphed into a highly structured breed of retailing. It is one of the few retailing concepts that it still in a growth mode. Retailers and branded product manufacturers have expanded their merchandizing lines to incorporate specifically targeted marketing suited to co-locating in high profile locations overseen by major, specialized retail developers. The contemporary prototype outlet center is fairly simple, and universal:

- 80 to 100+ stores, comprised of mostly nationally or regionally recognized specialty vendors
- 4,000 sf average store size
- 350,000 sf to 500,000 sf overall size
- easy access highway served site
- typically a lower cost, suburban edge location
- regional and transient market capture (not at all neighborhood oriented)
- internal orientation
- lots of surface parking, but not designed for quick in and out access to stores
- located / configured to maximize multiple store shopper patronage (and not non-shopper use)
- limited if any table service restaurants (idea to keep people shopping); sometimes have pad sites for free-standing food services on out parcels
- typically located in isolation from competing outlet centers (though with exceptions)

That Clarksburg has been now targeted by the two leading outlet mall developers (Simon and Tanger, partnering with local master developers) is an entirely natural and understandable focus. Except for being proximate to Montgomery County, most all submarkets ringing the Washington metropolitan region have an existing or planned outlet or equivalent center. These include the older and/or much larger Mills centers (Potomac Mills and Arundel Mills), a new Tanger outlet

mall in Oxon Hill in Prince George's County near Alexandria, an existing Premium Outlets (Simon) in Leesburg, an additional planned center in western Fairfax County, and proximate centers further afield in Maryland in Hagerstown and Queenstown (smaller example).

With a Clarksburg outlet facility, currently underserved consumers in and around Montgomery County stand to benefit, as will the tenant vendors, and for that matter, the tax collectors that will not only see some inflow of retail expenditures, but some reduced outflow of Montgomery County resident shoppers. Barring some national or other extraordinary influence, the question is not whether an outlet center will come to Clarksburg, but rather, which one?

The developers of both proposed retail outlet centers have indicated that there is demand for only one such commercial enterprise in the immediate area. The consultant sees no reason to refute or test this claim. There is little taste on anyone's part (developer, tenant or for that matter consumers) for essentially duplicated co-existing malls: the market for such is limited by the simple fact that there are only so many profile credit tenants to go around. While there is limited precedent for dual locations, (one being outside St. Louis, Missouri and another in San Marcos, Texas), it is rare for two major centers to go ahead at the same time in close proximity to each other. (Interestingly, the competing Simon and Tanger sponsors have actually co-ventured in at least one instance.)

The core composition and use of an outlet mall is almost the complete opposite of neighborhood serving retailing. The vendors, and with some narrowly defined exceptions, the product lines, would never normally be found in a neighborhood shopping center dominated by food and convenience related merchandizing. The outlet patronage is coming from a widely extended region, intent usually on making substantial purchases spanning multiple stores over a considerable period of time, the converse of the typical neighborhood in-and-out kind of shopping venture.

Despite their highly distinct respective natures, is there any evidence of compromised co-existence of neighborhood and destination outlet malls? Based on a limited survey of other regional examples of outlet oriented locations, the consultant finds no clear association between outlet retailing and undermined neighborhood retailing. To the contrary, where there is an actual proximate neighborhood exhibiting market growth, the different retailing venues most often do co-exist, evident in patterns of retail concentrations and continued retailer interest.
Turned the other way, there is certainly no evidence that outlet malls are impacted negatively by the presence of local serving retail. They in fact can be seen as benefiting from some measure of locally anchored eating facilities, service stations and the like. The regional drawing power and broader market orientation of outlet mall vendors is such that they invariably are new entrants into the local existing marketplace, and not at all inhibited by the usual need for local retailers to see roof tops before committing to construction.

In terms of customer impact, the differences between outlet and neighborhood centers is skewed significantly by the sheer size of the patronage. The volume of customers (and to some extent of the shopping hours) is at a whole different level for outlet malls compared with neighborhood supported venues. To illustrate:

400,000 sf outlet mall @ $500 psf annual sales = $200M gross sales / $100 per patron expenditure = 2M visits

With such volumes of destination shoppers, the vast majority of whom will be coming from outside of Clarksburg, what might be their propensity to support non-direct outlet mall retailing? An illustration suggesting an off-site potential demand for 10,000+ square feet, comprised primarily of partial demand for food service and some convenience items, could be something like the following:

$2.50 psf off-site demand x 2M potential visits = $5M sales / $400 psf in supported neighborhood space = 10,000 sf

Neighborhood Serving Retail

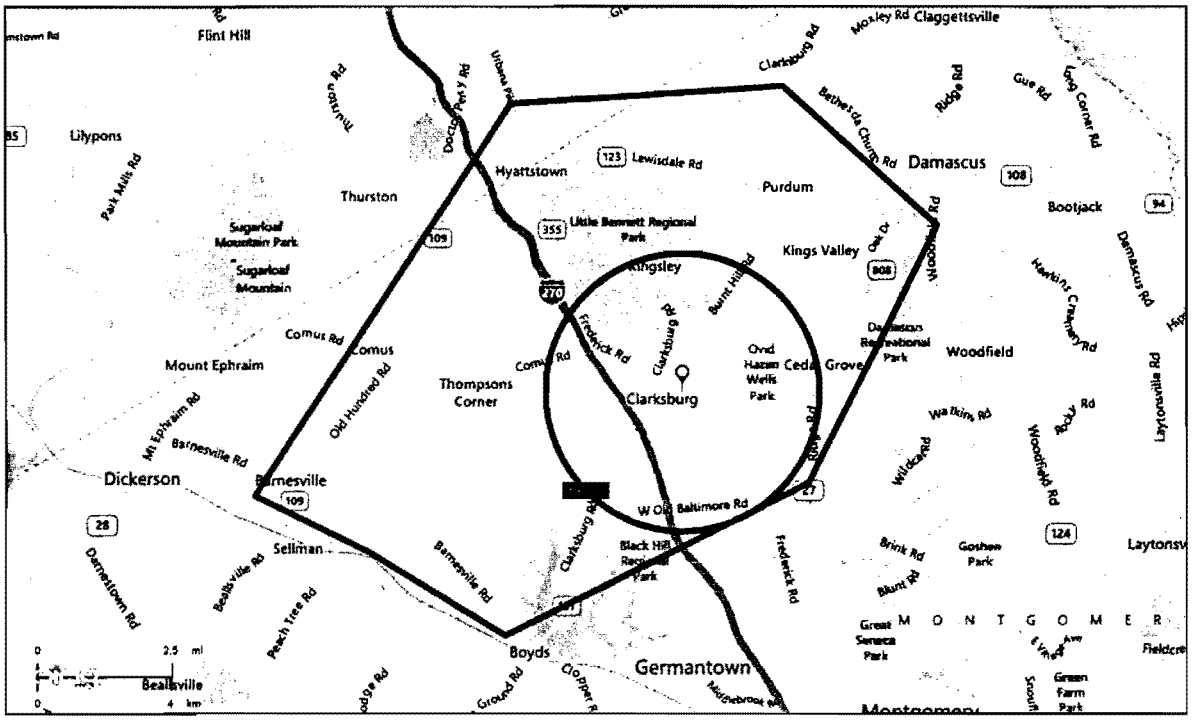
Clarksburg / Hyattstown Plan Area Assumptions

- 1994 Master Plan – projected 14,930 residential units
- as of late 2013, a total of 6,500 residential units built (of 10,500 units approved since 1994)
- average residential deliveries from 1996 to 2013 of 300 units per year
- projected future average annual construction of 300 to 500 units added per year
- projected buildout 2030+ @ 90% of potential capacity
- Cabin Branch subarea – zero current; 2,886 residential units at buildout
- Ten Mile Creek – zero current; 1,690 residential units at buildout (600 west / 1,100 east of I-270)
- 1994 Master Plan – up to 10,311,000 sf. of commercial space (depending upon level of transit)
- as of 2013, 850,000 sf of commercial space has been built (of 3,536,073 sf approved since 1994)
- limited near to medium-term projected added employment
- CCT / Observation Drive extended through to Milestone post 2020
- one outlet center to open by 2016/18 (350,000 to 400,000 sf)

Primary Local Trade Area

The consultant has defined a retail trade area that more or less includes the primary geographic area of support for the combined Town Center District, the Cabin Branch and New Cut Road shopping centers' locations. The estimated trade area is heavily influenced by the combination of road linkages and the location of a full array of retail offerings, primarily concentrated immediately to the south in Germantown, and to lesser extents to the east in Damascus, north in Urbana, and in a very minor way, west in Poolesville. While the indicated trade area extends well east and west of the formal Clarksburg / Hyattstown Planning Area, much of the added territory is comprised of preserved low density rural and open space land uses. Of the approximately 48 square miles within the defined zone, virtually all of the future growth is forecast to occur within the immediate Clarksburg Planning Area. (See accompanying map and Demographic Highlights table.)

Clarksburg Neighborhood Serving Retail Trade Area



Clarksburg Trade Area Demographic Highlights 1990 - 2018

Demographic Characteristic	1990	2000	1990-2000 Change	2010	2000-2010 Change	2013	Projected 2018	2013-2018 Growth
Population	8,645	9,853	1,208	23,469	13,616	26,710	32,000	5,290
Population % Change			14.0%		138.2%			19.8%
Median Age	33.1	37.1	12.1%	35.6	-4.0%	36.1	36.5	1.1%
Associate Degree or Higher 25+ yrs	39.8%	49.3%		58.9%		61.7%		
Households (HH)	2,821	3,369	548	7,246	3,877	8,169	9,950	1,781
HH % Change			19.4%		115.1%			21.8%
% Family Households	85.6%	80.8%	308	83.6%	3,337	83.6%	83.5%	890
Average HH Size	3.06	2.92	-4.6%	3.14	7.5%	3.18	3.12	-1.9%
% HH Homes Owner Occupied	85.8%	86.0%	477	88.1%	3,390	88.1%	85.0%	980
Average HH Income						$141,859		
Median HH Income						$117,391		

Sources: 2010 U.S. Census, ESRI and Bolan Smart Associates, 12/2013

Neighborhood Demand Factors

A series of industry factors have been applied to the demographic characteristics identified for the defined primary trade area to estimate market demand for generic neighborhood serving retail space. For baseline forecasting, a conservative assumption regarding future growth is assumed (30,000 person near-term population). The principal demand variables include:

a) the amount of neighborhood based retail space that is typically supported by this demographic (10 sf per person).

b) the amount of other demand that is present (estimated at 15% of the per person demand derived from a limited amount of employment – at least for the foreseeable future – and transient sources).

c) a capture factor (65%) estimating how much consumer expenditure can stay within the trade area versus being spent elsewhere.

d) adjustments for the probable impact of an assumed major contemporary outlet mall being located in the middle of the primary trade area (10% of net local neighborhood oriented demand being redirected to an outlet mall; 10,000+ square feet of implied off-site neighborhood demand generated by outlet mall patrons).

The assumption that is perhaps the most subjective of the above demand factors is the judgment regarding how much neighborhood based demand can potentially be captured at local stores, estimated in this case as ranging between 60% and 70% (65% for baseline computations). Obvious to understanding the shopping propensities of Clarksburg residents, workers and related potentially "captive" consumers, is the overwhelming predominance of commuting patterns directed southward down 1-270. Clearly the majority of the working age population in Clarksburg is passing by, if not through, large-scale and diversified concentrations of nearby retail repeatedly during the course of an average week. This fact means that any projection of neighborhood capture of potential demand must be approached cautiously, a concern all the more magnified by the recent opening of Wegmans, widely viewed as a regional market game changer. (Offsetting the southward shopping orientation, to a small degree, is the presence of local public schools central within the trade area, including the Clarksburg High School.)

Baseline Neighborhood Demand (2018)

Near-term population (2018)	30,000 persons	(25,000 existing, 43,000 @ build out)
Gross local demand	350,000+/- sf	(10 sf per person neighborhood retail plus 15% other)
Net local demand	230,000+/- sf	(65% capture)
Deduct for outlet capture	(23,000) sf	(10% of net neighborhood demand provided at outlet)
Outlet induced demand	10,000 sf	(see page 7)
Total neighborhood demand	220,000+/- sf	

Potential Future Neighborhood Demand (2030+, with adjustments for assumed more employment and importantly, a larger base of retail supply offering more consumer choices)

90% of buildout	39,000 persons	
Gross local demand	450,000+/- sf	(10 sf per person neighborhood retail plus 20% other)
Net local demand	295,000+/- sf	(70% capture)
Deduct for outlet capture	(29,000) sf	(10% of net neighborhood demand provided at outlet)
Outlet induced demand	10,000 sf	(see page 7)
Total neighborhood demand	275,000+/- sf	

Neighborhood Retail Supply

Existing

Clarksburg Villages	109,000 sf grocery anchored	
Clarksburg Highlands	18,000 sf (Stringtown Rd)	
Other Clarksburg	8,000 sf	
Total:	135,000 sf	

Planned / Future

Clarksburg Town Center	135,000 sf	(50,000 sf grocer, other)
Cabin Branch	50,000 to 120,000 sf	(non-grocer) (484,000 sf including outlet mall)
Miles-Coppola	TBD	(assume retail restricted regardless if includes outlet)
Total:	185,000+ sf	

Total Existing and Planned	320,000+ sf

Implications for Neighborhood Retail

- Enough near-term unmet demand for an additional 80,000 to 100,000+ sf
- Demand for additional grocery supply
- Minor potential net loss to outlet mall of local retail (i.e. 20,000 to 30,000 sf)
- Longer-term potential for an additional 50,000 sf, for a total increase of 130,000 to 150,000+ sf

10 Mile Creek Area Limited Amendment
Questions and Answers Regarding Little Seneca Lake and Drinking Water Quality

Below is a set of questions that were sent to DEP, Planning Board Staff, and WSSC earlier on December 19, 2013. WSSC and DEP staff provided written responses. Planning Board Staff indicated that WSSC and DEP were the appropriate entities to respond to this set of questions.

1. **Please provide a brief history of the creation of Little Seneca Lake, including the reasons the Lake was built, its proposed function, and the agreements that guide water releases from the Lake.**

   WSSC Response: The Little Seneca Lake was built as part of a regional water supply plan to ensure that there are both adequate amounts of water available for the Washington Metropolitan Area's consumption and agreed upon Potomac River flow-by requirements during drought events in the region. The Lake was created by the construction of a dam on Little Seneca Creek. It was built to provide short-term supplemental flow to the Potomac River during periods of drought and it also provides a recreational amenity for the public. The Lake is located in Black Hill Regional Park. Fishing and boating facilities are available at the park.

   The Lake was completed in 1984 and the water supply dam is operated by the WSSC. The water supply resource is shared with the Washington Aqueduct (WA) and Fairfax County Water Authority (FCWA).

   The surface area of the Lake is 505 acres. The average depth is 24.7 feet with a maximum depth of 68 feet. The water supply capacity of the Lake is 3.9 billion gallons.

   Releases from the Lake are driven by the Water Supply Coordination Agreement (WSCA) of 1982 which includes the Low Flow Allocation Agreement (LFAA) of 1978 by reference. The parties to the LFAA agreement are the USA (represented by the Corps of Engineers), the State of Maryland, the Commonwealth of Virginia, FCWA, WSSC, and District of Columbia. The WSCA governs the operation and releases from the Lake. The parties of this agreement are the USA (again represented by the Corps of Engineers), FCWA, WSSC, District of Columbia, and Interstate Commission of the Potomac River Basin (ICPRB). The cost sharing and operating expenses of the Lake are covered by the Little Seneca Lake cost sharing agreement of which the parties are the District of Columbia, WSSC, and FCWA. There is also an inter-agency agreement between WSSC and the Maryland-National Capital Park and Planning Commission that allows for recreational usage of the Lake.

   DEP Response: DEP concurs with the responses provided by WSSC.

2. **Please explain the specific circumstances under which reservoir water is used, when this has happened, and exactly what happens during these events.**

   WSSC Response: Little Seneca Lake water is used when there is a drought event and predictions indicate that the requirements of the LFAA will not be met. The agreement requires that the projected flow in the Potomac at Little Falls is not less than 100 MGD plus a 30 MGD safety factor after the supply withdrawals of FCWA, WSSC and WA have been made. When flow levels are

projected to be below this level, a release is made and water from the Lake is released to the Potomac via Little Seneca Creek to ensure that the LFAA requirements are honored.

In brief the release rules are:

Little Seneca Release Rule:

Little Seneca Lake release decisions are based on hourly flow projections at Little Falls in coordination with ICPRB. These projections are calculated using data from recent and projected utility withdrawals from the River, flows measured at the Little Falls gage, and flows measured at other upstream gages. When projected flow at Little Falls (after withdrawals) drops below 100 MGD (plus the 30 MDG margin of safety), releases from Little Seneca Lake are used to make up the difference. There is no predetermined targeted release rate or volume. Each release is independent and based on the conditions and projections prompting the release. The release rate and volume can be varied on an hourly basis and should be just large enough to keep flow-by just above 100 MGD plus the margin of safety.

Balancing Jennings Randolph and Little Seneca

During drought operations, the use of Jennings Randolph and Little Seneca Lake should be balanced in relation to their storage capacity. The release from Jennings Randolph will be greater than the release from Little Seneca Lake. This ensures that Little Seneca Lake storage remains available to account for short-term unexpected changes in conditions, such as spikes in demand.

There have been water supply releases from Little Seneca Lake in two years: 1999 (22 MG) and 2002 (976 MG). These releases were each for one day only. By comparison, releases from Jennings-Randolph during these same two events were 3,049 MG and 5,106 MG respectively.

DEP Response: DEP concurs with the responses provided by WSSC.

3. **Was the Lake ever considered as a direct emergency water source (i.e. direct withdrawals from the Lake) as opposed to releases from the dam to allow increased flow into the Potomac River? If so, please describe how this direct use would work. How would the water be treated? How would it be delivered to regional customers? Given the capacity of the Lake (4.0 billion useable gallons of water according to what I've read), how long would that water supply be able to serve the WSSD and the region?**

WSSC Response: No, this has not been considered due to the regional requirements of its operation and utilization. The Lake was constructed to provide water that could be released to the Potomac in case of low flow events. There is no consideration underway for this potential change in purpose.

DEP Response: DEP concurs with the responses provided by WSSC.

4. **How much acreage is within the Little Seneca Lake drainage area (i.e. drains directly into the Lake or from water sources that drain into the Lake)?**

WSSC Response: According to data made available to WSSC by Maryland DNR, the watershed area upstream of the Little Seneca Lake Dam is 18,531 acres. This includes the sub-watersheds of the three major tributaries, Little Seneca Creek, Cabin Branch and Ten Mile Creek.

DEP Response: DEP concurs with the responses provided by WSSC.

5. **What is the current estimated imperviousness of this acreage?**

   WSSC Response: This question is best left to the storm water authority to answer.

   DEP Response: Based on GIS data maintained by DEP to implement the Water Quality Protection Charge, the total acreage in the drainage area for Little Seneca Lake is 13,544 acres and approximately 13% of this area is impervious surface.

6. **What proportion of the total acreage that drains into Little Seneca Lake is from the Ten Mile Creek Watershed?**

   WSSC Response: According to data made available to WSSC by Maryland DNR, the sub-watershed area of the Ten Mile Creek is 4,801 acres and represents approximately 25.9% of the entire Lake watershed.

   DEP Response: DEP concurs with the responses provided by WSSC.

7. **What is the condition of the reservoir right now? How does your agency evaluate the condition of the reservoir? How does development in the watershed affect the quality of the reservoir itself and the quality of the water in the reservoir? What are your agency's major concerns (if any) with regard to the water quality of the reservoir? Sediment? Pollutants?**

   WSSC Response: WSSC conducts water quality monitoring three times per year (spring, summer, fall) and tests for nutrients (nitrogen and phosphorus), algae, sodium chloride, dissolved oxygen, water clarity and other physical and chemical parameters. The data obtained by WSSC since 2010 are very similar to data obtained prior to 2001, from which MDE determined in 2006 that the Lake was not impaired and did not qualify for a Total Maximum Daily Load. Accordingly, we infer that the more recent data demonstrate that the Lake is currently meeting State water quality standards for water supply reservoirs. WSSC does not evaluate quantitatively the impact of development; however, based on studies by the Center for Watershed Protection and others, we are aware that both urban development and agriculture can affect water quality by increasing sediment loadings in the tributary streams draining to the Lake, and by increasing nutrient and pollutant loads (e.g., sodium chloride). WSSC's objective for Little Seneca Lake at this time is maintaining sufficient capacity to achieve its original purpose of supplementing Potomac River flow. Over time sediment inflow can reduce storage capacity, although such capacity loss as of 2010 was a very modest 0.1% loss per year, which by comparison is about half of the rate of infill in the Patuxent Reservoirs.

   DEP Response: DEP concurs with the responses provided by WSSC.

8. **How far does water released from the Lake flow to reach the Potomac River? How far upstream from the Potomac Water Filtration Plant does the released water enter the Potomac River? At its greatest potential release during a severe drought, what proportion of Potomac River water at the Potomac Water Filtration Plant intake would be from the reservoir?**

WSSC Response: Using measurements from the GIS system, the distance that water from the Lake flows to reach the Potomac River is approximately 11.8 miles. Once the water is released, it mixes with water from other tributaries en route to the Potomac River. The point the water enters the Potomac is approximately 5.25 miles upstream of the Water Filtration Plant. There is not an accurate way to make a determination as to what percentage of water in the River is from the Lake release, but using the available tools, an ICPRB-derived estimate based upon periodic measurements made over the course of the previous two releases suggests that the Little Seneca Lake releases ranged from 1% to 17% of Potomac River flow on the days of the release, with an average of approximately 7%.

DEP Response: DEP concurs with the responses provided by WSSC.

9. **Given Question #8, does the released water make up a sufficient portion of the Potomac River water at a given time to have a significant impact on drinking water quality? How much does the water quality of the Lake affect Potomac River water quality and drinking water quality at the Potomac Water Filtration Plant?**

   WSSC Response: Releases from the Lake occur only during periods of low Potomac River flows to increase the quantity of water in the River and are not intended to improve water quality in the River. For this reason, information concerning water quality at the Potomac WFP intake during releases compared to water quality under normal conditions has not been measured or recorded. However, the water in the Lake is currently presumed to be of a higher quality than the River due to a lack of mixing and other naturally occurring phenomena of the River though Lake characteristics vary somewhat throughout the year. Therefore, the effect on water quality in the River will be dependent upon the condition of the Lake and of the River at the time of the release and the weather conditions leading up to and at the time of the release.

   DEP Response: DEP concurs with the responses provided by WSSC.

10. **To what extent would the scale of development being debated in the Stage 4 Limited Master Plan Amendment have a significant impact on the Little Seneca Lake Reservoir or drinking water quality from the Potomac River in general? To what extent would the alternative levels of development that have been suggested (ranging from no additional development to the Planning Board recommendations to the increased levels of development requested by property owners) result in differences in the quality of WSSC drinking water?**

    WSSC Response: This is not a question that WSSC has the knowledge to answer and is best left to those looking at the development, the amount of storm water runoff associated with the development and the measures used to manage that runoff and maintenance of related facilities.

    DEP Response: In response to Question 11, WSSC stated the following: "WSSC has seen modeled data for development in the Ten Mile Creek watershed that suggests that adverse water quality impacts in that sub-watershed would probably not be significantly changed from current conditions. Changes in Ten Mile Creek, if they occur as modeled, are not likely to be substantially distinguishable from the cumulative water quality condition in the entire Lake, which (as noted in A.7) is currently not impaired."

(89)

DEP has reviewed the same modeling data referenced by WSSC in its response and agrees, based on this data, that it is unlikely that the "incremental" development proposed for the Ten Mile Creek watershed will significantly impact the water quality of Little Seneca Lake. DEP notes, however, that this is a different question than the question of how development scenarios would impact water quality in the Ten Mile Creek tributaries and main stem. DEP also notes that the modeling data relating to development scenarios in the Ten Mile Creek watershed are only one component of the data that would be necessary to evaluate a different but related issue – i.e., how do the cumulative impacts of development throughout the entire Little Seneca Lake watershed impact the reservoir?

11. **Comparisons to Watts Branch's impact on Potomac River water quality have been made, with some contending that WSSC is considering a mid-River intake at least partly because of reduced water quality closer to shore as a result of the degradation of Watts Branch's water resulting from upstream development. To what extent would increased development in the Ten Mile Creek watershed raise similar questions?**

WSSC Response: WSSC has seen modeled data for development in the Ten Mile Creek watershed that suggests that adverse water quality impacts in that sub-watershed would probably not be significantly changed from current conditions. Changes in Ten Mile Creek, if they occur as modeled, are not likely to be substantially distinguishable from the cumulative water quality condition in the entire Lake, which (as noted in A.7) is currently not impaired. The infrequent releases of water from Little Seneca Lake are combined with water from other Seneca Creek tributaries (Great Seneca Creek, Dry Seneca Creek) before reaching the Potomac River 5.25 miles upstream of the water plant intake (as noted in A.8). Flow from the entire Seneca Creek watershed (with or without contribution from Little Seneca Lake) probably mixes in the Potomac River and would not cause reconsideration of the mid-channel intake, which is a modification contemplated specifically in relation to Watts Branch. The confluence of the Watts Branch and the Potomac River is just upstream (approximately 1,500 feet) of the Potomac Water Filtration Plant intake.

DEP Response: DEP concurs with the responses provided by WSSC.

12. **Please describe the factors that underlie your conclusions on questions #10 and #11. For instance, could a particular level of increased imperviousness in the Ten Mile Creek watershed tip the balance in the Little Seneca Lake catchment area?**

WSSC Response: With the exception of the mid-River intake addressed as part of question #11, Questions 10 – 11 deal with the impact of development – a topic where WSSC is not the authority.

DEP Response: WSSC's response to Questions 10 and 11 indicate that they are based on WSSC's analysis of the environmental models evaluated by the Planning Board regarding the impact of projected increases in nitrogen, phosphorous and sediment loads on the Little Seneca Lake resulting from different development scenarios. DEP's responses are based on the same models. The available scientific data does not allow DEP to identify a specific level of imperviousness that would "tip the balance" of water quality in Little Seneca Lake – viewed from the perspective of whether the changes in water quality would impact the reservoir's intended uses. In general, the more imperviousness the greater the potential impact to water quality. Again, the question of how development activities impact the reservoir is a different question than the question of how development activities impact Ten Mile Creek's tributaries and main stem.

(90)

13. If specific levels of development in the Ten Mile Creek area would result in significant impacts on water quality, what options should the County consider to reduce or mitigate these impacts?

WSSC Response: WSSC is not the authority on the impact of varying development schemes on the quality of Ten Mile Creek and also is not the authority on storm water runoff mitigation techniques and their potential results.

DEP Response: As mentioned above in our responses to Questions 10 and 11, the question of how development impacts water quality in the reservoir is a different question than the question of how development impacts the water quality of Ten Mile Creek's tributaries and main stem. We concur with WSSC's conclusion that the incremental impacts of the various development scenarios modeled by the Planning Board are not likely to adversely impact the water quality of Little Seneca Lake. However, the different development scenarios do pose a risk of impacting water quality in Ten Mile Creek's tributaries and main stem. In addition to minimizing the amount of impervious surfaces, there are a number of other options that could help to reduce or mitigate impacts on water quality, including:

- All of the recommendations included on pages 19-21 of the Planning Board's report on its recommended Limited Master Plan Amendment.

- Establishing conservation management plans in all areas located outside the limits of disturbance in the Ten Mile Creek watershed.

- In addition to the Planning Board's general recommendation to require wide buffers around streams and to maintain natural topography and vegetation where possible (particularly forests in headwater areas), overall performance of Environmental Site Design (ESD) could be improved by promoting a more even flow from bioretention facilities. In this respect, riparian buffer areas should be treated as a critical component of stormwater management. Every effort should be made to promote more even distribution of flow from ESD facilities along the entire range of forested or meadow buffer areas.

- The new 20-acre limit on grading established by State law may provide additional mitigation during construction but State law allows grading of additional areas to proceed once 50% of the 20 acres is "stabilized." Optimizing the success of improved stormwater control measures needs to focus on source reduction rather than best management practices (BMPs) for treatment. Source reduction is by far the best BMP.

- Soil decompaction needs to be incorporated as practical to address effects due to both construction and prior agriculture or other activity, but without disturbing vegetation to be saved on soils that might have had prior compaction effects. DEP's experience suggests there may be cases where collecting, stockpiling and reusing local topsoil generates more sediment than it saves. It may be better to compost amend whatever soil is left on the ground to start topsoil generation, and minimize the amount of grubbing early in a project to leave whatever root mat and organic content was in place for as long as possible.

14. Do you believe additional research or analysis is needed to sufficiently answer any of Questions #10 - #13?

(91)

WSSC Response: WSSC believes that others studying the impact on the environment are better able to discern if more effort is needed to address these Questions.

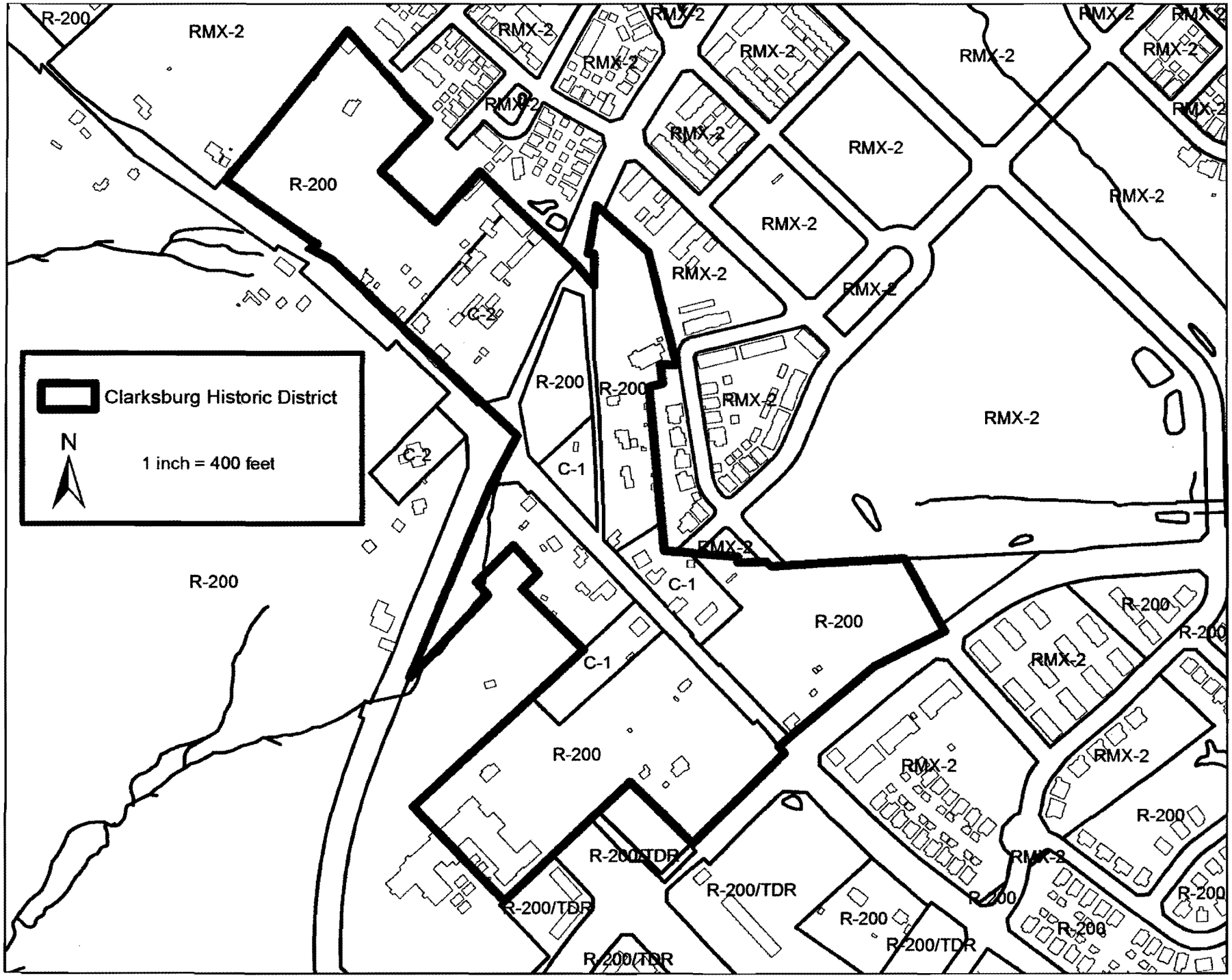
DEP Response: DEP's responses to Questions 10-13 are based on its review of available modeling data regarding the incremental impact of development scenarios in the Ten Mile Creek watershed on Little Seneca Lake. Former Councilmember Scott Fosler, former Planning Board Chair Royce Hansen, former DEP Director John Menke and numerous other environmental and water resource advocates have called for further review and analysis of those impacts before Council takes action on the Planning Board's recommended Limited Master Plan Amendment. More specifically, they have called for a study that evaluates the cumulative impacts of all existing and proposed development in the entire Little Seneca Lake drainage area before action on the Limited Master Plan Amendment.

(NOTE: Council Staff has attached at the end of this document the abovementioned opinion piece that appeared in the Washington Poston on November 15, 2013 authored by Mr. Fosler, Mr. Hansen, and Mr. Menke.)

These advocates note that the headwaters of the Little Seneca Lake reservoir and the reservoir itself are located in three different master plan areas within the County -- Germantown, Clarksburg-Hyattstown and Boyds. As a result, they stress that the impacts of development in all three master plan areas on the reservoir have never been fully evaluated as a part of the County's master plan process. They argue that, before further development is approved, an appropriate study should be conducted to assess the cumulative impacts of development – both existing and proposed – within the Little Seneca Lake drainage area. They cite best practices for protecting "source water" that are being implemented throughout the country and argue that this kind of study is needed in order to identify any steps that must be taken by the County over the long-term to protect the reservoir's water quality and its intended use as source water for the region during drought situations.

DEP agrees that these stakeholders have identified a very important policy issue but is uncertain at this point in time as to the appropriate scope of such a study or whether the study should be conducted prior to approval of the Limited Master Plan Amendment. DEP will continue to evaluate this issue as the PHED Committee worksessions move forward. We note that the advocates have referenced a variety of best practices being used by water utilities across the country to protect source water and it would be helpful to learn more from WSSC about its long-term plans for protection of the reservoir in general and, more specifically, whether WSSC believes that a study of the cumulative impacts of existing and proposed development on the reservoir is appropriate at this time.

Circles 93 – 102 are duplicated materials elsewhere in this packet and have been removed.


Clarksburg Historic District
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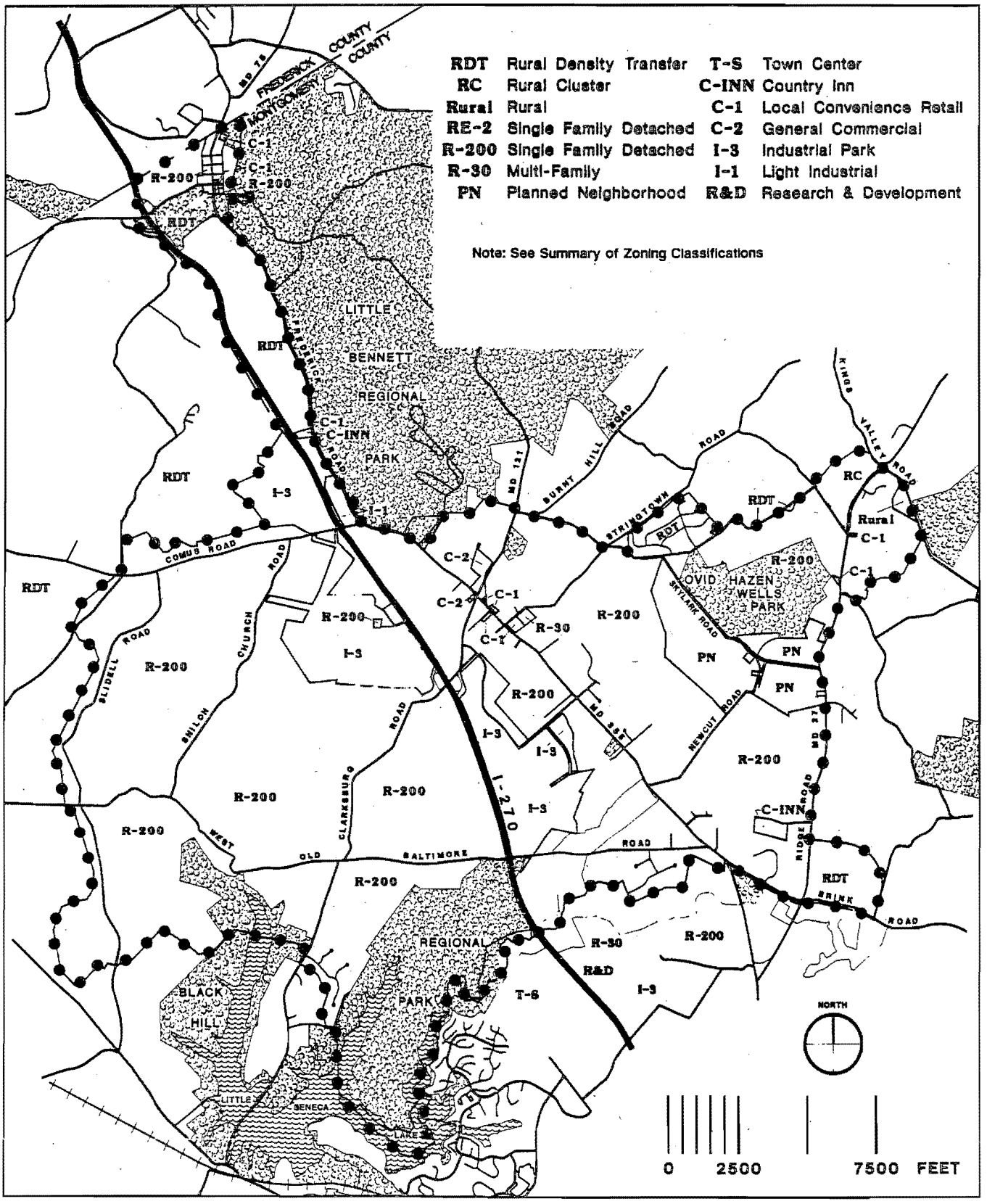
R-200
RMX-2
C-1
C-2
R-200/TDR
MD 121

103

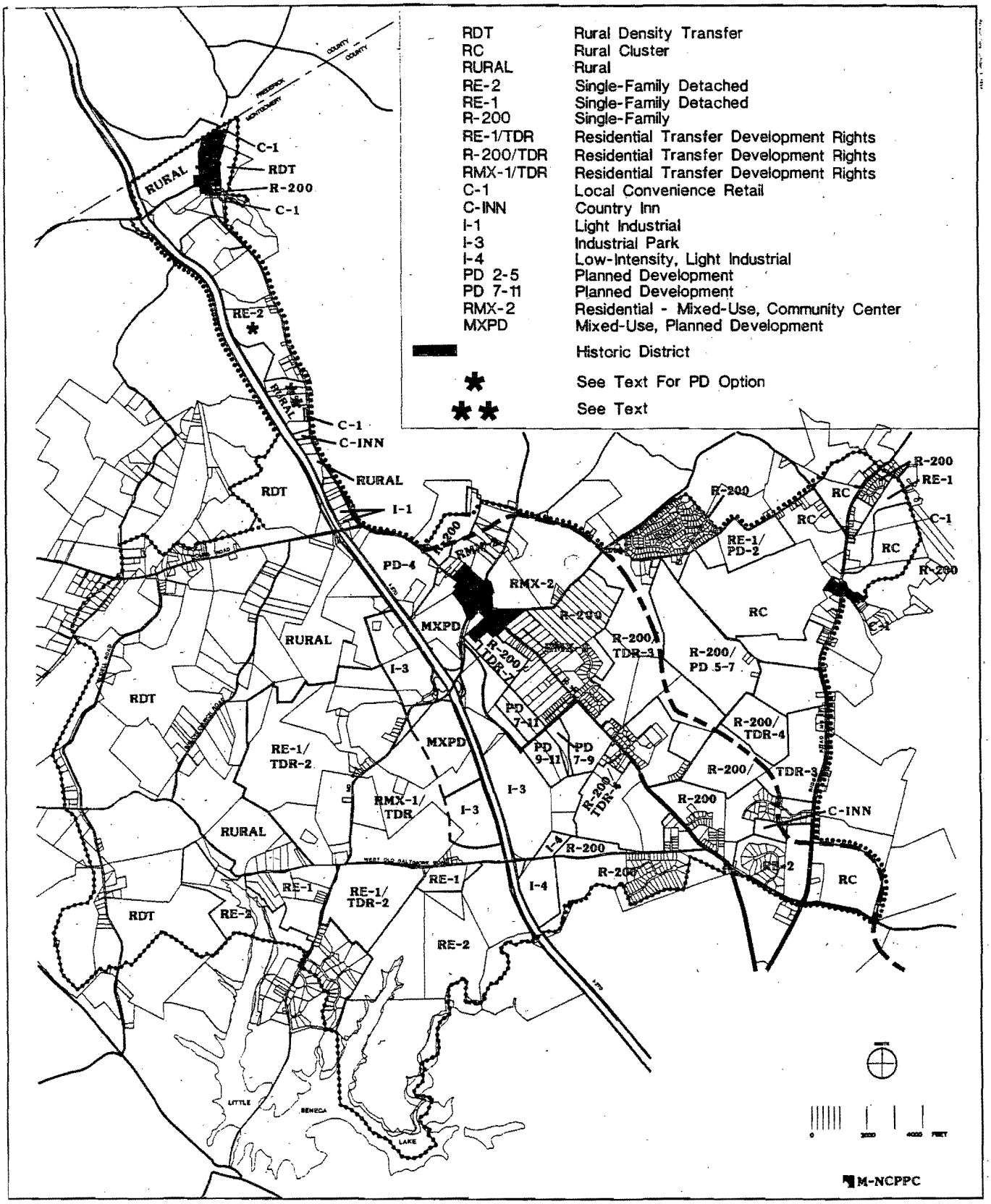
Existing Zoning (as of 1993)

Figure 37



Zoning Plan

Figure 38

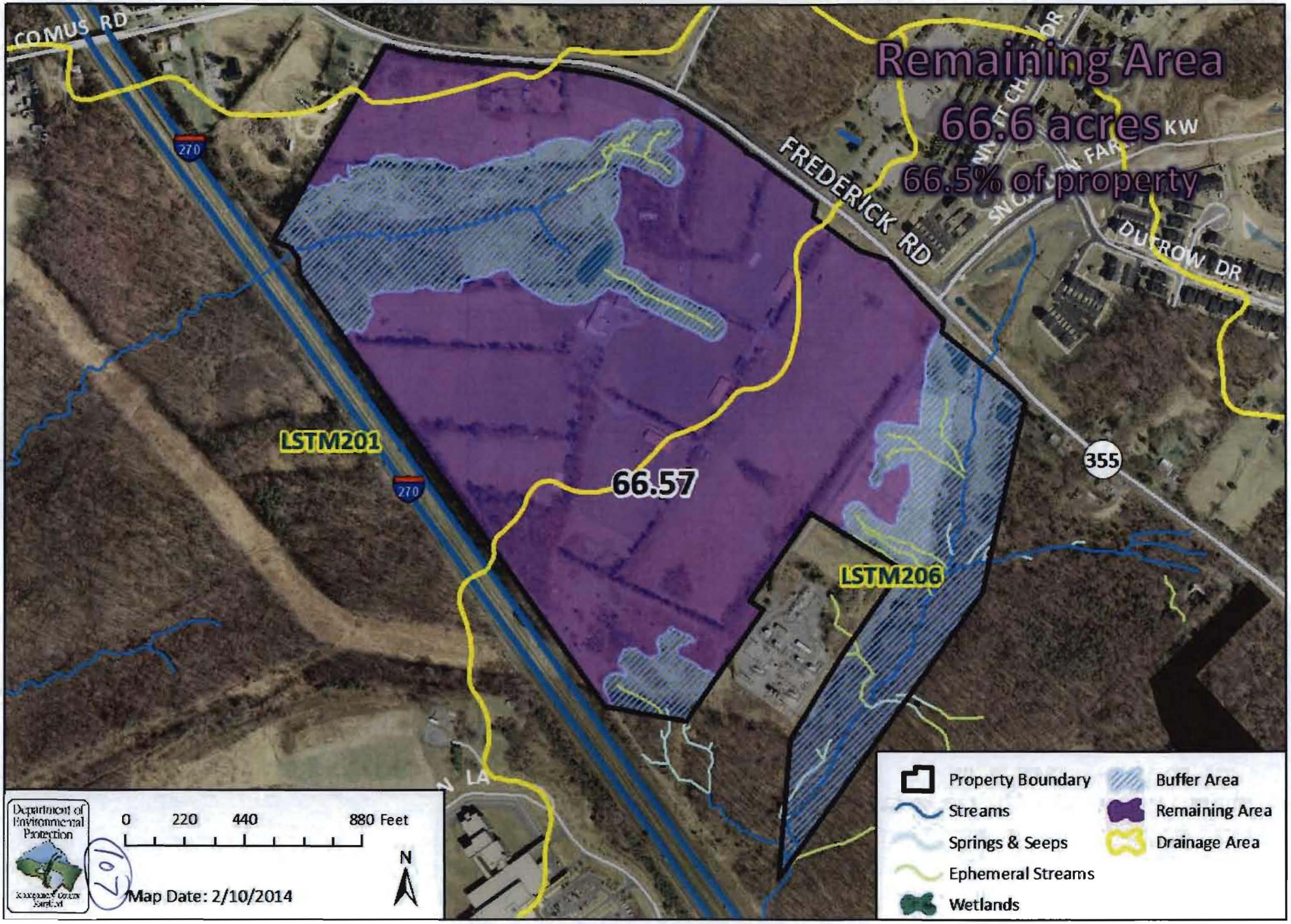


Egan

Environmentally Sensitive Areas

Egan
Environmentally Sensitive Areas

Level 3

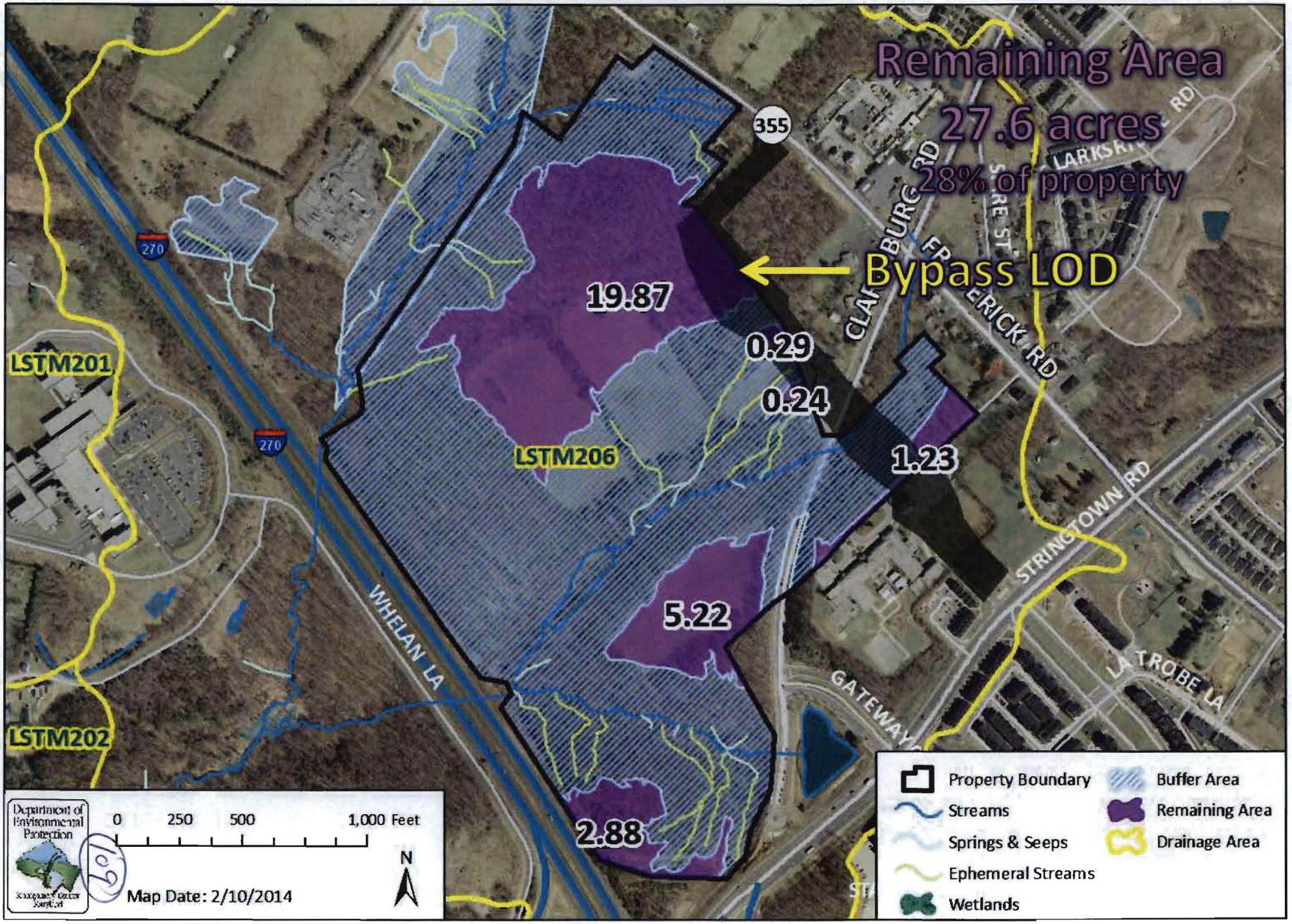


Miles Coppola

Environmentally Sensitive Areas

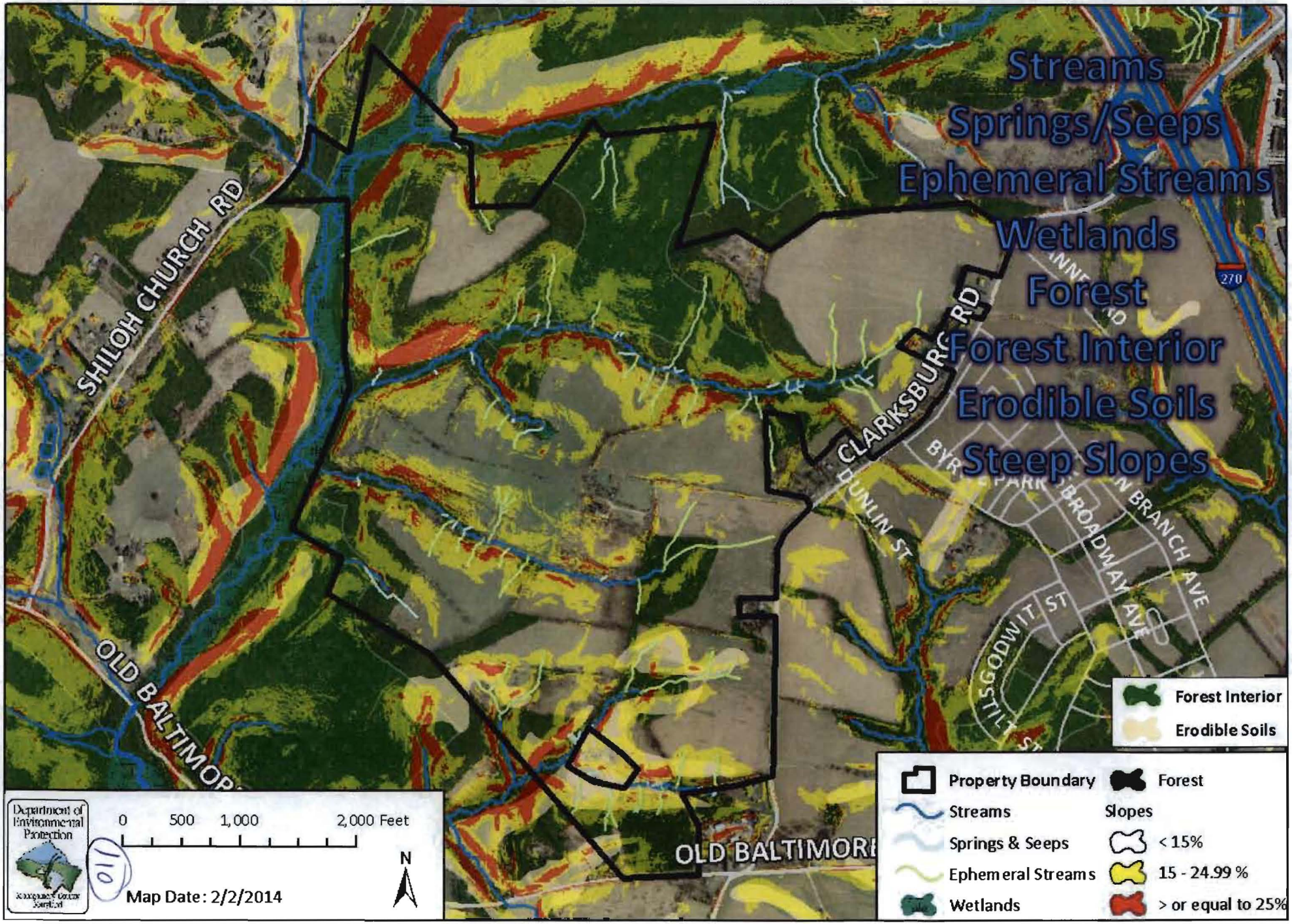
Miles Coppola
Environmentally Sensitive Areas

Level 3



Pulte/King

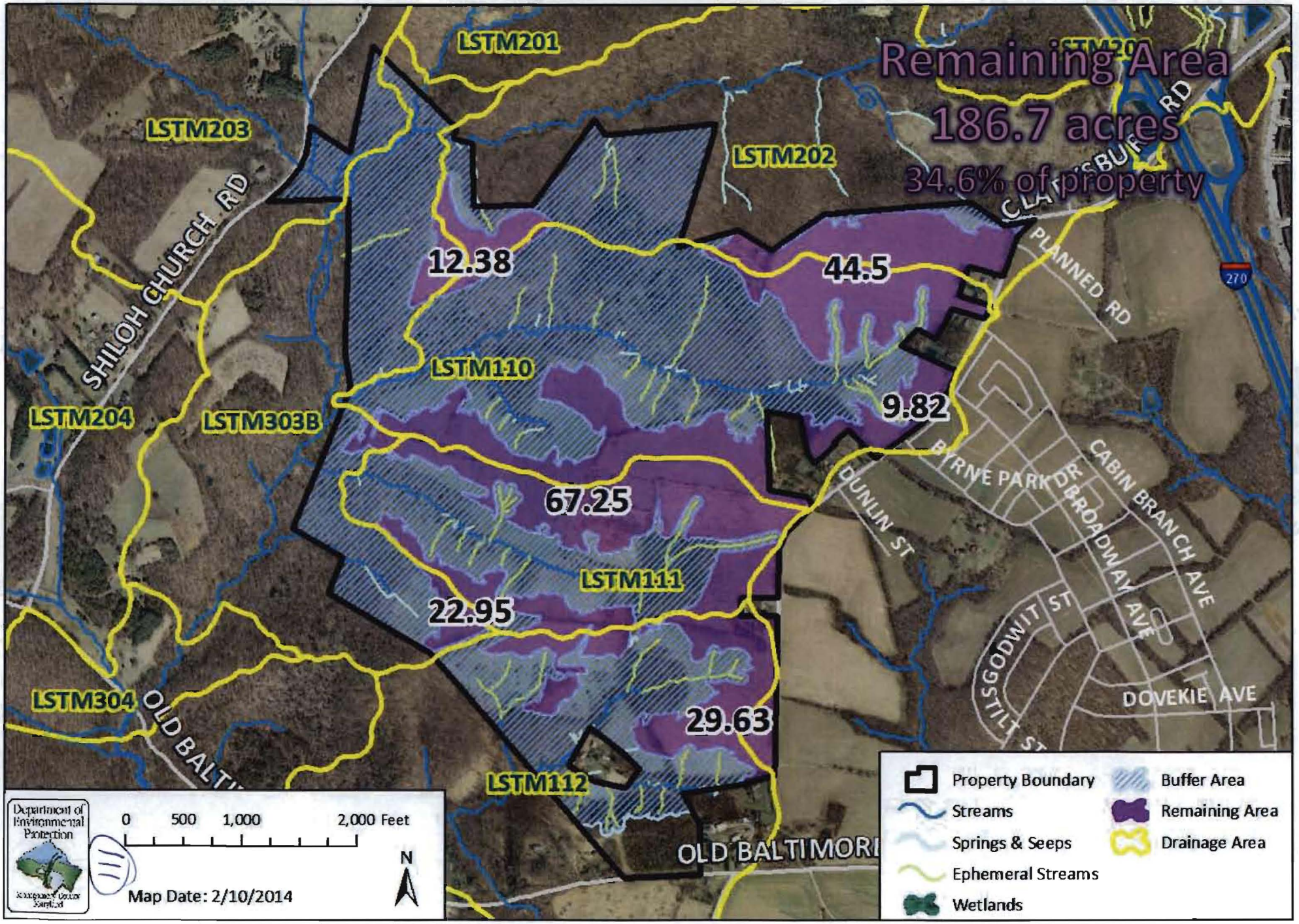
Environmentally Sensitive Areas



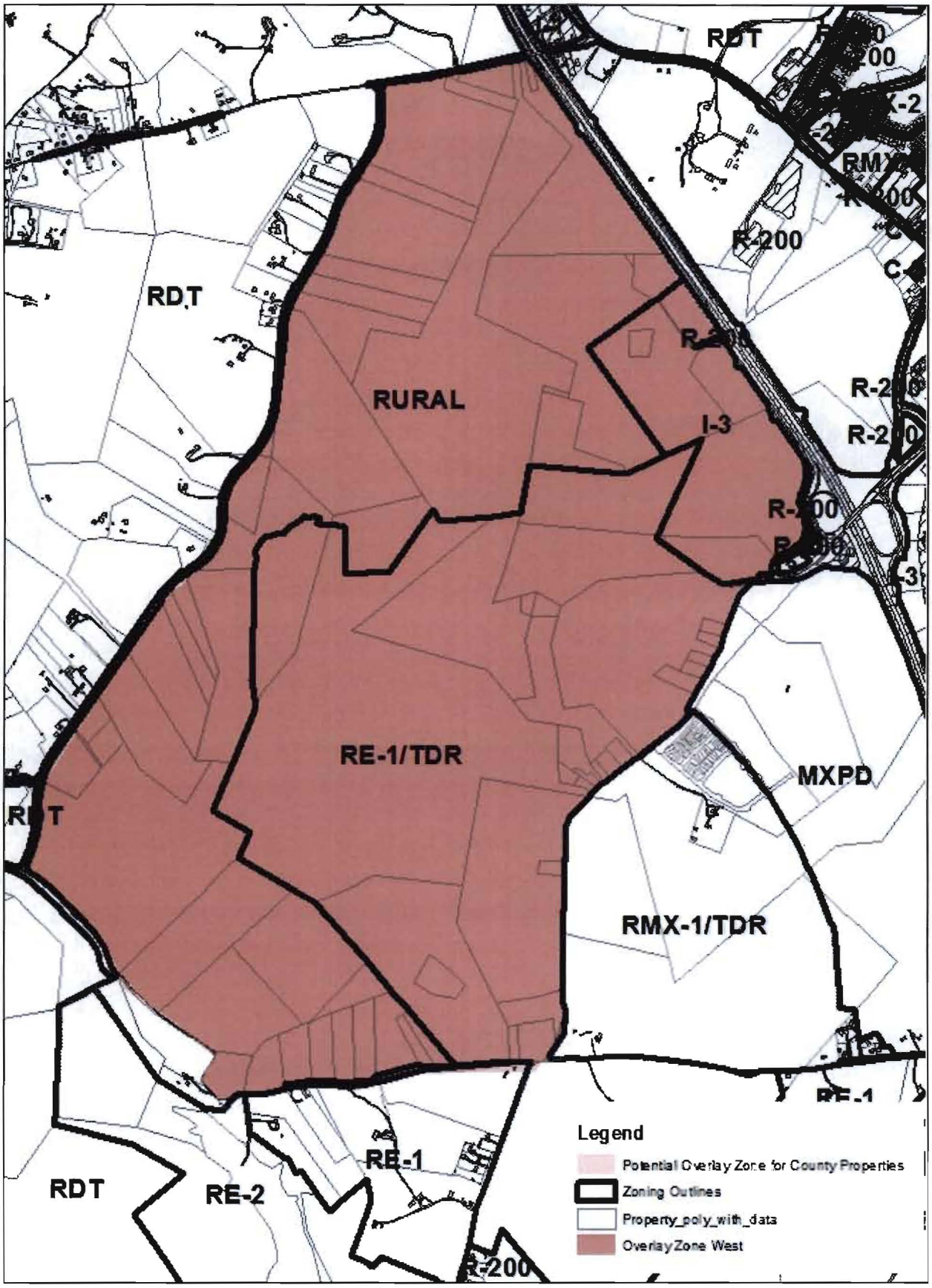
Pulte/King

Environmentally Sensitive Areas

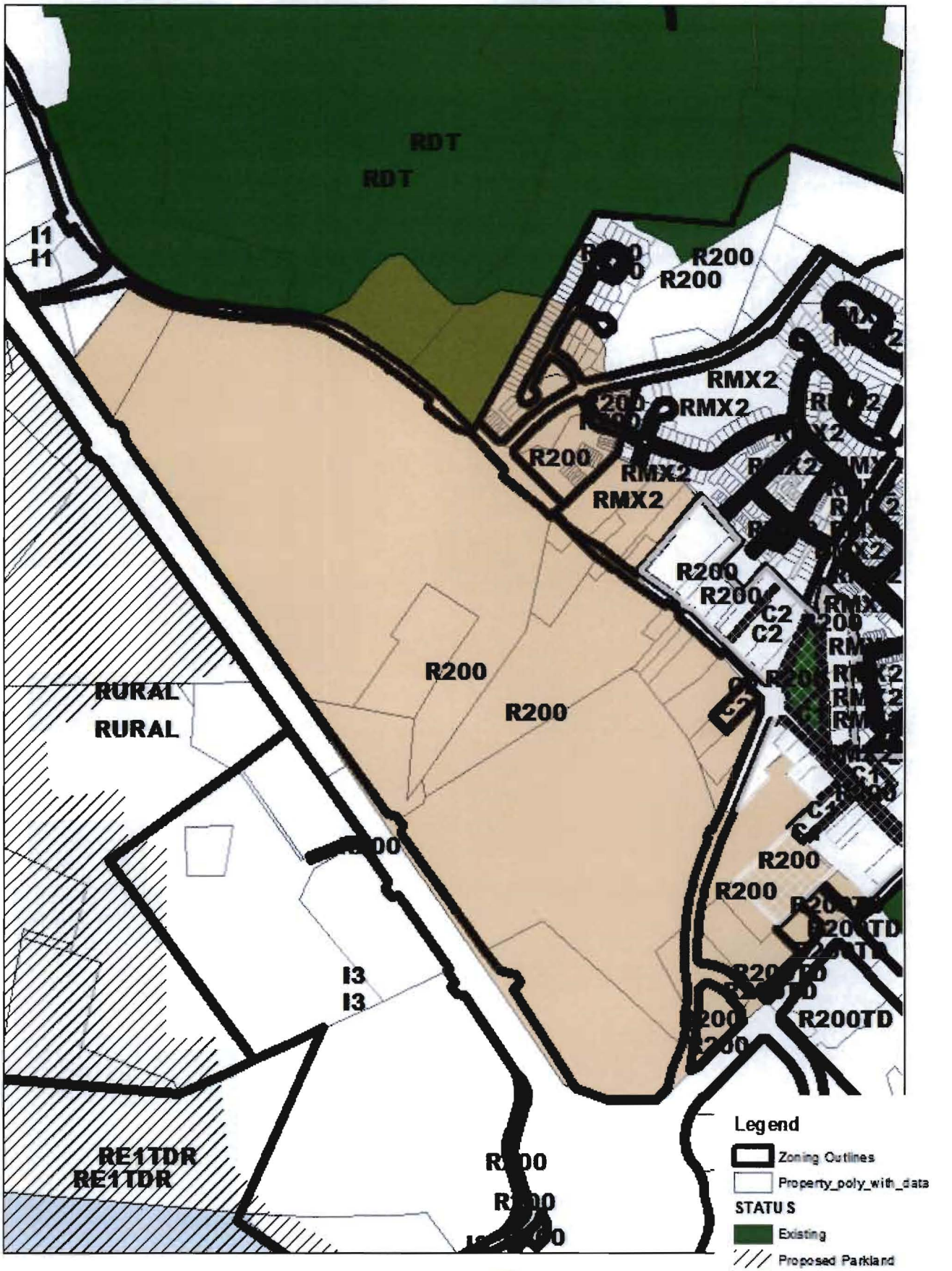
Level 3



Potential Overlay ZoneWest Side of I-270



Potential Overlay Zone East Side of I-270



PHED/T&E Committees #1
January 21, 2014

MEMORANDUM

January 17, 2014

TO: Planning, Housing, and Economic Development Committee
Transportation, Infrastructure, Energy & Environment Committee

FROM: Keith Levchenko, Senior Legislative Analyst

SUBJECT: Ten Mile Creek Area Limited Master Plan Amendment to the Clarksburg Master Plan and Hyattstown Special Study Area.

Councilmembers should bring their copy of the Plan to the meeting

This is the Planning, Housing, and Economic Development (PHED) and Transportation, Infrastructure, Energy & Environment (T&E) Committees' third joint worksession on the Planning Board Draft of the Ten Mile Creek Area Limited Amendment to the Clarksburg Master Plan and Hyattstown Special Study Area (hereafter referred to as the Ten Mile Creek Amendment).

At this worksession, the Committees will hear from WSSC with regard to the potential impacts of development in Ten Mile Creek on the Little Seneca Reservoir (and drinking water quality in general), and will hear from DEP staff regarding Ten Mile Creek Amendment's water and sewer related recommendations (including the implications for the Clarksburg Historic District).

Little Seneca Reservoir and Drinking Water Impacts

The Little Seneca Reservoir is a regional facility operated by WSSC. The water supply resource is shared with the Washington Aqueduct and the Fairfax County Water Authority. The reservoir was built as part of a regional water supply plan to ensure adequate amounts of water are available in the Potomac River during severe drought conditions. Little Seneca Creek, Cabin Branch, and Ten Mile Creek all drain into the Little Seneca Reservoir (see maps on ©1-2).

Washington Suburban Sanitary Commission Staff Craig Fricke, Planning Group Leader, Engineering and Construction and Martin Chandler, Senior Scientist, Environmental Group will provide a primer on the Little Seneca Reservoir: why it was created, how it works, what condition

it is in, and whether the various Ten Mile Creek development scenarios raise any significant concerns by WSSC regarding the reservoir or drinking water quality in general.

Carlton Haywood, Executive Director of the Interstate Commission on the Potomac River Basin (ICPRB) will also be available at the meeting to discuss the Little Seneca Reservoir's place within regional water supply planning and operations.

An opinion piece in The Washington Post from November 15 (see ©12-13) from several former County officials argued that planned development in the Ten Mile Creek area should be further studied to better understand the potential impacts on the Little Seneca Reservoir. The concerns raised in the opinion piece were echoed by a number of speakers at the Council's public hearings on December 3 and 5.

These concerns had previously been raised at the Planning Board's hearings on the Ten Mile Creek Amendment in September 2013. Planning Board staff discussed these issues with WSSC and DEP staff and provided responses to the Planning Board testimony (attached on ©3-4). The response to potential reservoir impacts from Ten Mile Creek Development includes the Planning Board Staff conclusion that:

> *"WSSC environmental staff has reviewed the M-NCPPC consultant modeling results and has informed M-NCPPC staff that, based on the modeling results, the potential level of new development in the TMC (Ten Mile Creek) scenarios poses no significant threat to the water quality or quantity of the LSR (Little Seneca Reservoir)..."*

In mid-December, Council Staff transmitted a number of questions to WSSC and DEP staff regarding the reservoir (and drinking water impacts in general). These questions and the responses are attached on ©5-11. Notably, DEP's response to Question #10 notes its agreement with WSSC writing:

> *"DEP has reviewed the same modeling data referenced by WSSC in its response and agrees, based on this data, that it is unlikely that the "incremental" development proposed for the Ten Mile Creek watershed will significantly impact the water quality of Little Seneca Lake."*

However, DEP later notes in its response to Question 14 that a study of the cumulative impacts on the reservoir would be worthwhile:

> *DEP agrees that these stakeholders have identified a very important policy issue but is uncertain at this point in time as to the appropriate scope of such a study or whether the study should be conducted prior to approval of the Limited Master Plan Amendment. DEP will continue to evaluate this issue as the PHED Committee worksessions move forward. We note that the advocates have referenced a variety of best practices being used by water utilities across the country to protect source water and it would be helpful to learn more from WSSC about its long-term plans for protection of the reservoir in general and, more specifically, whether WSSC believes*

that a study of the cumulative impacts of existing and proposed development on the reservoir is appropriate at this time.

DEP staff will be available at the meeting to clarify this study concept and whether DEP or the Executive have an opinion yet on whether the Ten Mile Creek Amendment should be deferred pending the outcome of such a study.

Water and Sewer Service to Serve Properties in the Ten Mile Creek Amendment Area

Dave Lake, Manager, Water and Wastewater Management, Department of Environmental Protection (DEP), will provide a summary of general water and sewer planning assumptions for the Ten Mile Creek Amendment properties (see map on ©14). Mr. Lake will also summarize the options and issues for providing sewer service to the Clarksburg Historic District.

Page 40 of the Ten Mile Creek Amendment (see ©17) provides background and recommendations regarding the provision of public water and sewer to areas in Stage 4.[1] As noted in the Ten Mile Creek Amendment, the Ten Mile Creek watershed has no receiving sewers downstream of the Stage 4 area. Therefore, wastewater will need to be pumped out of the watershed into existing systems serving Stage 3 areas (such as Cabin Branch or Little Seneca Creek).

In order to minimize the construction of multiple sewerage systems to serve individual properties in Stage 4, the Limited Master Plan recommends that WSSC develop a comprehensive Stage 4 sewerage plan. The goal of this plan would be to build a "logical, efficient, and environmentally responsible sewerage system for Stage 4..."

It is likely that any sewer dependent development west of I-270 (such as the Pulte property) would require a pump over solution to Cabin Branch. The properties east of I-270 (Miles-Coppola and Egan) would likely share another pumping station that would also pump over to Cabin Branch or Little Seneca Creek. Developers would be required to build all necessary on-site infrastructure (including pump stations), as well any off-site infrastructure to transport wastewater to Cabin Branch. The pump station(s) would be required to be sized to accommodate all existing and future planned development expected to utilize the pump station.

Clarksburg Historic District Sewer

Background

The Clarksburg Historic District is located at the intersection of Clarksburg Road and Frederick Road (see map on ©18). The entire Historic District falls within the planned water and sewer envelope. Most of the properties in the Historic District are within the Ten Mile Creek

[1] The water and sewer recommendations in the Limited Master Plan amendment assume that public water and sewer would be required (and approved) to meet the development goals presumed in the Limited Master Plan Amendment. If the Council were to reduce the zoning density on one or more properties to 1 acre lots or greater, then Water and Sewer Plan policies presume service would be provided with on-site systems.

watershed, although there are several properties on the southeast edge that are in the Little Seneca drainage area. These properties can be served by main extensions originating from existing or planned mains serving other developments (such as Town Center) without any capital program sewer projects required for service.

For the Historic District properties in the Ten Mile Creek Watershed, WSSC and DEP concur that these properties are best served by a future sewerage system constructed in the Stage 4 area (Ten Mile Creek). However, these properties could also be served by a separate smaller pump station that would pump wastewater over to Town Center (in the Little Seneca Creek watershed). If Stage 4 were to later build out on sewer (with a pump station on the Miles-Coppola property, for instance), WSSC and DEP concur that the pump station dedicated to the Historic District should be abandoned and wastewater redirected to the larger Stage 4 pump station.

2008 Sanitary Survey Results and Public Health Problem Area Designation

In 2008, DEP and DPS staff reviewed permit records and site characteristics and documented public health problems in the area and placed properties in the Historic District into "high," "medium," and "low" concern levels. Seventy-eight percent of the properties reviewed fell into either a high or a moderate concern level. The combination of aging septic systems on relatively small lots, and the additional requirements that go with new and/or replacement systems, resulted in the Department of Permitting Services concluding that on-site systems were not a viable long-term solution for the Historic District. Based on these results, the Executive recommended designating the Historic District a public health problem area. **The Council later approved this designation in October 2008.**

This designation has two main benefits for property owners in the Historic District. First, if and when sewer extensions are built, property owners will be eligible for a public health hazard subsidy from WSSC, which can help to partially defray the costs to property owners of extending sewer. Second, the designation allows for expedited service if and when property owners apply to WSSC for construction of main extensions.

Cost Issues

The longstanding issue with serving the Historic District is not approval for sewer but rather the cost to extend sewer. Working with WSSC, DEP staff has estimated an order of magnitude cost for independently serving the Historic District of $2.6 million, including: a new pump station ($1.4 million), 8 inch gravity sewer ($970,000), and force main ($210,000). Under current WSSC financing policies, the applicant (i.e., all property owners seeking to connect at the time the extension is done) must pay the "deficit" cost of the extension.[2] In addition, each property owner must pay substantial on-site costs, including: connection fees, SDC charges, and private plumbing costs.

[2] "Deficit" costs are calculated as the cost to build a water or sewer extension minus the estimated total front foot benefit revenue to be collected by WSSC from the new connections to the extension.

With new developments or redevelopments, extensions are often built and paid for by the developer. The developer can recoup these costs through subdivision and sale of additional properties and/or more intense use of the existing property. However, in the case of the Historic District, property owners have existing uses that are not expected to change drastically when sewer service is provided. Even if the costs are divided among most or all of the Historic District property owners requiring sewer, the costs for extending sewer, under current policies, are prohibitive.

If the Historic District sewer extension were to wait until a pump station in Stage 4 were built, then the cost for a separate pump station would be avoided and overall costs would be reduced by more than half. There has also been some discussion that a Stage 4 developer could potentially build some portion of the additional sewer infrastructure needed for the Historic District. However, WSSC, DEP, and Planning Board staff do not believe there is an existing regulatory hook that would require a developer to build off-site extensions to serve other properties.

From a policy standpoint, the County has an interest in seeing the Historic District sewered. The properties are included within the planned sewer envelope and a sewer extension will provide more flexibility for property owners to improve their properties consistent with the 1994 Master Plan intent for the Historic District.[3] Also, given that the area has been identified as a public health problem area, there is also a public interest in permanently addressing any failing septic systems or systems at risk of failure.

The County also has a direct land use interest in the area, since the County owns several contiguous parcels in the Historic District for a future Clarksburg fire station. A sewer extension will be required to serve the new Fire Station. The Approved FY13-18 capital project (see ©19-20) pushed the fire station project out beyond six years but assumed that the County would participate financially in a sewer extension project to serve the Historic District as well as the fire station property. The PDF language requires that an equitable cost-sharing arrangement be worked out with affected property owners before the project moves forward.

In his FY15-20 Recommended CIP, the County Executive recommends $28.4 million for the new fire station, with construction to be completed during FY20 (project description form attached on ©21). The cost to extend a pressure sewer to serve the fire station only is included in the project, with a notation that alternative approaches are being explored.

The issue of extension costs has been a long-standing issue with broader implications than just the Clarksburg Historic District. Basically, the costs an applicant must pay to extend sewer can be so prohibitively high that even property owners with failing septic systems are deterred (and make do with temporary solutions such as holding tanks).

[3] The Ten Mile Creek Amendment (see excerpt on ©2-3) includes a zoning change (to Commercial/Residential Neighborhood (CRN) for the Clarksburg Historic District). This change is intended to provide property owners more options to rehabilitate properties while remaining consistent with the intent of the 1994 Master Plan's historic preservation goals.

Montgomery County has been seeking to address this problem through collaboration with WSSC and staffs from both Montgomery and Prince George's Counties for a number of years.[4] The issue was recently discussed by the Bi-County Infrastructure Working Group (with some potential policy changes discussed) and later presented at a recent WSSC Commissioner meeting.

List of Attachments

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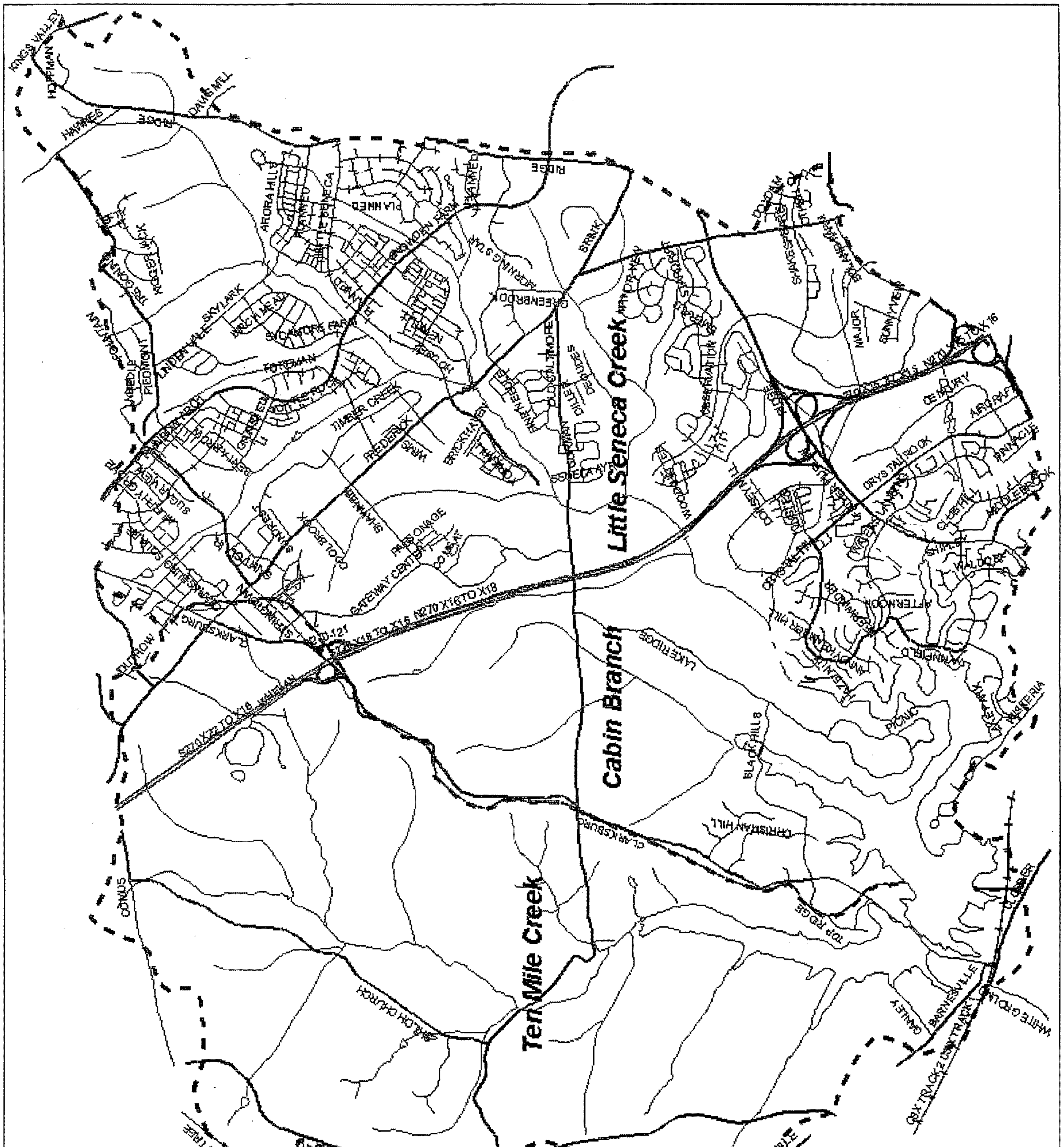
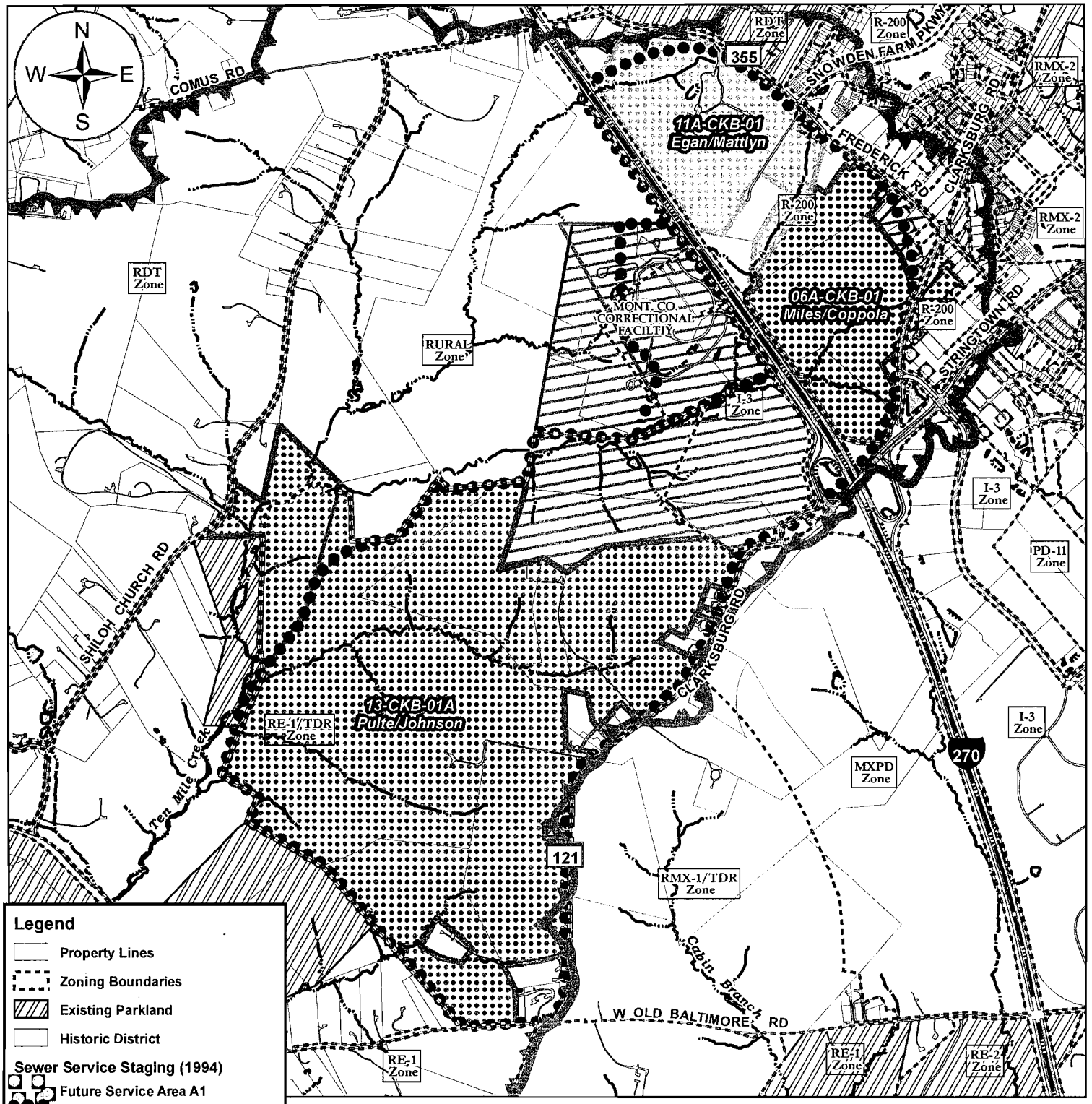
[4] Council Staff has previously suggested several areas that need to be considered with regard to improving the current extension cost policies:

- First, a better allocation of costs between the direct beneficiaries of the extensions should be considered. The current process allows "free riders" to connect to extensions later, while the deficit costs are paid only by the initial applicant(s). The creation of special districts to finance these extensions may be a way to ensure costs are spread appropriately.
- Second, new financing approaches need to be considered that provide more financing flexibility to applicants. For instance, a lien on a property could allow some or all of the repayment of deficit costs to be deferred until the future sale of the property.
- Third, the public benefit gained (whether direct or indirect, as discussed above) from some extensions may warrant consideration of the use of other revenue sources (such as County or WSSC resources) to help defray the extension costs currently borne by applicants.


Little Seneca Creek
Cabin Branch
Ten Mile Creek
CLARKSBURG
FREDERICK
GATEWAY CENTER
PARSONAGE
TIMBER CREEK
SKYLARK
SYCAMORE FARM
FOREMAN
GREENBROOK
LAKE RIDGE
BLACK HILLS
CHRISMAN HILL
TOP RIDGE
COMUS
SHILOH CHURCH
PEACH TREE
SUGAR RIDGE
BARNESVILLE
AFTERNOON
PICNIC
SHAKESPEARE
MAJOR
SUNNY VIEW
CENTURY
PINNACLE
MIDDLEBROOK
ROBEY
HAWKES
RIDGE
PLANNED
PIEDMONT

Comprehansive Water and Sewer Plan Map:
Ten Mile Creek Master Plan Amendment - Clarksburg Development Stage 4 WSCCR Cases



Legend

- Property Lines
- Zoning Boundaries
- Existing Parkland
- Historic District

Sewer Service Staging (1994)

- Future Service Area A1
- Future Service Area C

Stage 4 Category Change Requests

- 06A-CKB-01 (Miles/Coppola)
- 11A-CKB-01 (Egan/Mattlyn)
- 13-CKB-01A (Pulte/Johnson)
- County-Owned Sites
- CKB MP Development Stage 4
- Ten Mile Creek Watershed

0 0.25 0.5 0.75 1

Scale (Miles)

Montgomery County, Maryland
Draft 2013 Comprehensive Water Supply and Sewerage Systems Plan

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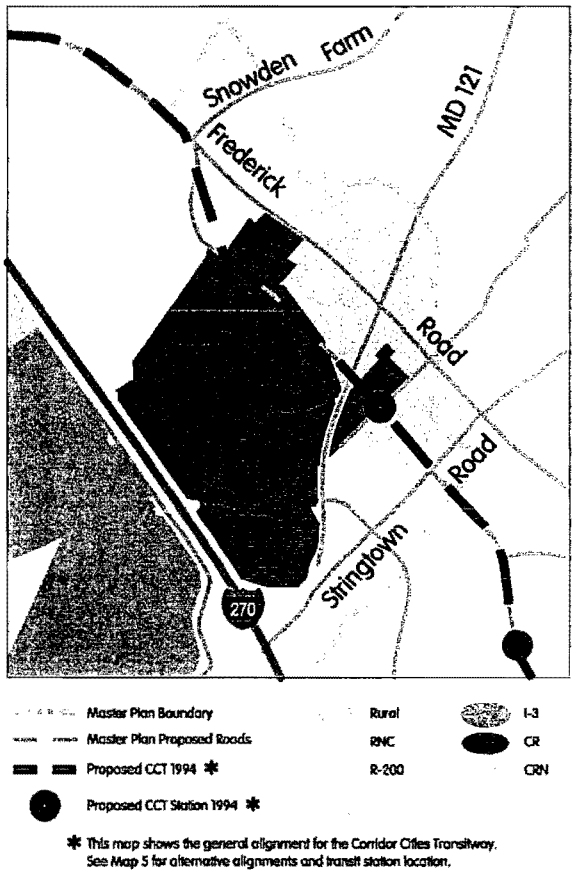
- The Commercial Residential Zones offer an opportunity to balance a mix of uses for each development area, while providing significant amounts of housing and commercial uses that would help implement the 1994 Plan's vision for a complete corridor town. Development on the properties should nonetheless employ Environmental Site Design techniques and preserve undeveloped open space to reduce imperviousness. Should optional method development occur, construction of the MD 355 Bypass should be considered a priority as a major public benefit.

- This Plan Amendment recommends CR 0.75, C 0.5, R 0.5 H 85 for these properties. Maximum building heights of 85 feet are appropriate in the portion of the properties nearer I-270, and in areas along MD 121 closest to the I-270 interchange, where buildings will be less visible from the Historic District and Town Center. Development closest to the Historic District should be compatible with building heights in the Historic District, but not exceed 45 feet. There should also be a transition in heights on the Miles/Coppola properties, from the areas designated for lower building heights to those where taller buildings are envisioned.

Clarksburg Historic District and Vicinity



The majority of Clarksburg's Historic District lies within the Ten Mile Creek watershed (see Map 9). The district straddles MD 355 from its intersection with Stringtown Road to west of its intersection with MD 121. The 1994 Plan identified the historic district as a focal point of the Town Center, encouraging sensitive and appropriate infill development in the district as an important component of the Plan's objectives for the Town Center. The Plan includes a series of design guidelines that are designed to retain the identity of the historic district by reinforcing building scale and historic building patterns—structures close to the road, deep back yards, and expanses of nearby green space—that characterized the original settlement. The Plan recommended renovations of existing buildings that would allow both residential and smaller scale commercial activities, like shops and offices. To protect the district, the Plan recommended reduced building heights and residential zones in the immediately adjacent areas, and recommended relocation of MD 355 to carry through trips away from the Historic District.

The existing zones in the district—convenience and general commercial (C-1 and C-2) and one-family residential (R-200)—are not adequate to accomplish the 1994 Plan's historic preservation goals, particularly the idea of accommodating residential and light commercial uses across the entire district. The Commercial

Residential Neighborhood (CRN) Zone allows densities and building heights tailored more precisely to the Plan's land use objectives for the district, while supporting the Plan's recommendation to protect the scale and character of the historic district. It also allows property owners the flexibility to rehabilitate properties for a variety of potential uses, making renovation more attractive.

Although it is not in the Historic District, the area between the Miles-Coppola properties and existing MD 355 is also appropriate for the CRN Zone. This area—nine parcels totaling about 10.5 acres—is in the C-2 and R-200 zones. The County plans to build a new Clarksburg Fire Station on two of the parcels, and the remaining parcels are vacant, or improved with small homes or businesses. The CRN Zone would allow redevelopment that would complement Historic District development across MD 355 and create a consistent physical setting along the road.

Recommendations

- This Plan Amendment recommends CRN 0.25, C 0.25, R 0.25 H 35 for the portion of the historic district within the Amendment boundary. It should be noted that the proposed revision of the Zoning Ordinance includes language exempting from density calculations those historic resources that are recommended for preservation and reuse in the applicable master plan. Contributing resources in the Clarksburg Historic District shown on the Master Plan for Historic Resources would be eligible for the exemption.
- Design guidelines set out for the Historic District in the 1994 Plan remain in place and should be used to direct infill development. In addition, infill or new development must adhere to district-specific guidelines found in the Master Plan for Historic Preservation.
- This Plan Amendment recommends CRN 0.25, C 0.25, R 0.25 H 35 for the area between the Miles Coppola properties and existing MD 355.

Transit Station

The 1994 Plan shows a transit station where the MD 355 Bypass intersects Redgrave Place. The Plan recommends residential uses near the station at a scale sympathetic to the adjacent historic district, enabling local residents to walk to the transit stop. Clarksburg Elementary School is currently located in the area proposed for the station and the Plan recognizes that the school would remain for a number of years before its eventual relocation or replacement. It is important that the transit station maintain a strong pedestrian connection to the Town Center via Redgrave Place.

Recommendations

- Maintain the transitway to Clarksburg and in the vicinity of the Miles-Coppola properties, where it could serve primarily residential and employment uses, as well as development east of MD 355 and west of MD 121.
- Two alternative alignments for the Bypass are also shown and should be studied as part of a facility plan when the Miles-Coppola properties develop (see Map 9). The facility plan should study the need for the full 150-foot ROW for the bypass considering potential modifications to the design of the Corridor Cities Transitway. If an alternative alignment is chosen, the transit station location should retain a pedestrian connection to Redgrave Place and fulfill the intent of the 1994 Plan to connect the Town Center with the Historic District.

Water and Sewer Service

The 1994 Master Plan recommended the provision of public water and sewer service in the Stage 4 area of Clarksburg based on its initial zoning recommendations. This Plan Amendment continues to recommend public services to support the planned development for Stage 4. Specifically, public water and sewer service is recommended for the area identified as "Future Service Area C" in the 1994 Plan, which includes Stage 4, to support planned development densities, including recommended cluster development. The provision of public sewer service will help to reduce the potential for existing and future septic systems to impact the watershed. Public and individual water supply and wastewater disposal service in the master plan area is recommended to be provided in a manner consistent with the service policies included in the County's *Comprehensive Water Supply and Sewerage Systems Plan*. Properties within the Plan Area not already receiving public service or recommended for public service are expected to use individual, on-site water supply and/or sewerage systems (wells and septic systems).

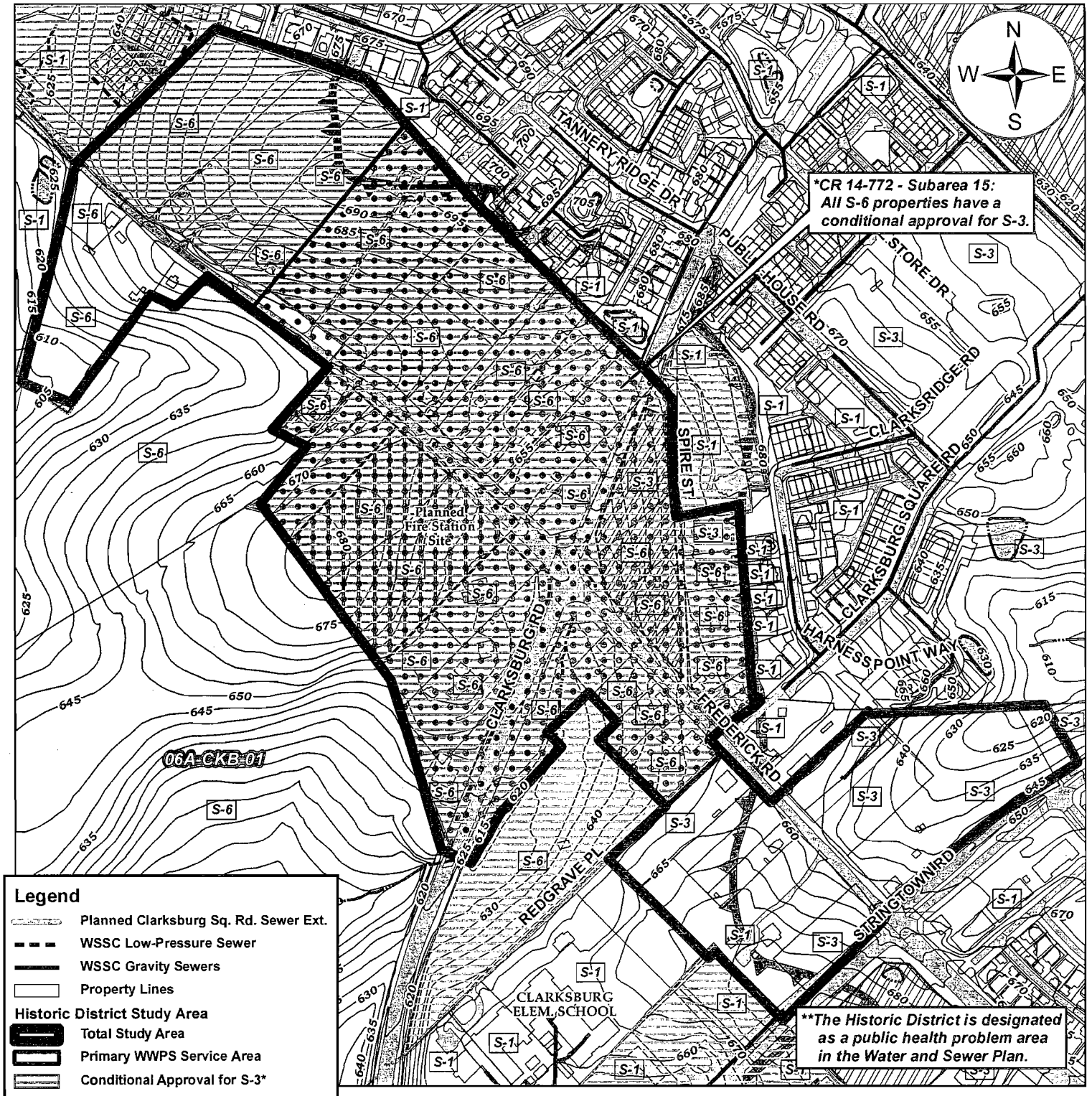
The Ten Mile Creek watershed has no receiving sewers downstream of the Stage 4 area. Wastewater flow from the majority of Stage 4/Future Service Area C will need to be pumped out of the watershed into sewerage systems serving adjacent Stage 3 development. The *Clarksburg Stage 3 and 4 Area Facility Plan*, prepared for the Washington Suburban Sanitary Commission (WSSC), anticipated the need for planned Stage 3 area sewerage facilities to accept and handle pumped wastewater flows from Stage 4. Environmental concerns and competing development interests within Stage 4 could result in individual proposals for several wastewater pumping facilities scattered throughout the sewer service area. To minimize infrastructure operation and maintenance needs, and to create a logical, efficient, and environmentally responsible sewerage system for Stage 4, this amendment recommends WSSC's coordination of a comprehensive Stage 4 sewerage facility plan, with the participation of all major Stage 4 development interests. If necessary, this requirement should be incorporated into service area category change approvals for the Stage 4 sites.

The lack of public sewer service, needed to replace aging septic systems, has hampered improvement and redevelopment of the Clarksburg Historic District, an integral part of the Town Center. The County is investigating the design and construction of a public sewerage system to serve the historic district. If this sewerage system is constructed ahead of other Ten Mile Creek development, it would include a small, interim pumping station and force main tying into the Town Center system. This interim station and force main would be removed from service when gravity sewer service becomes available from the Miles-Coppola property. Planning and development of the Miles-Coppola project sewerage system will need to include, at a minimum, a gravity main extension to accept wastewater flows from the historic district.

Recommendations

- Approve amendments for public water and sewer service for the Stage 4 area (Future Service Area C) of Ten Mile Creek in the County's Water and Sewer Plan. Include a requirement for a comprehensive Stage 4 sewerage system facility plan. WSSC service and financing policies will require construction of needed water and sewer facilities as part of the development process by the property owner.
- Locate sewer main alignments and pumping station sites to minimize, as feasible, disturbance of environmental buffers and forested areas.
- Provide sewer service to the Historic District as part of the Stage 4 development, including at a minimum, the removal of interim wastewater pumping facilities in favor of gravity sewer service.

Sewer Service Area Category Map:
Ten Mile Creek Master Plan Amendment - Clarksburg Historic District



Legend

- Planned Clarksburg Sq. Rd. Sewer Ext.
- WSSC Low-Pressure Sewer
- WSSC Gravity Sewers
- Property Lines

Historic District Study Area

- Total Study Area
- Primary WWPS Service Area
- Conditional Approval for S-3*
- Sewer Catagories
- Topography (5 ft. c.i.)
- Existing Parkland
- Ten Mile Creek Watershed
- Clarksburg Historic District**

Stage 4 Category Change Requests

- Miles-Coppola Project (06A-CKB-01)
- Egan/Mattlyn Project 11A-CKB-01)
- County-Owned Sites

0 200 400 600 800 1,000

Scale (Feet)

Montgomery County, Maryland
Draft 2013 Comprehensive Water Supply and Sewerage Systems Plan

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Approved FY13-18 CIP

Clarksburg Fire Station -- No. 450300

Category	**Public Safety**	Date Last Modified	**May 14, 2012**
Subcategory	**Fire/Rescue Service**	Required Adequate Public Facility	**No**
Administering Agency	**General Services**	Relocation Impact	**None.**
Planning Area	**Clarksburg**	Status	**Preliminary Design Stage**

EXPENDITURE SCHEDULE ($000)

Cost Element	Total	Thru FY11	Est. FY12	Total 6 Years	FY13	FY14	FY15	FY16	FY17	FY18	Beyond 6 Years
Planning, Design, and Supervision	3,374	462	291	125	125	0	0	0	0	0	2,496
Land	1,660	1,660	0	0	0	0	0	0	0	0	0
Site Improvements and Utilities	6,514	2	42	2,413	84	2,329	0	0	0	0	4,057
Construction	9,811	0	0	0	0	0	0	0	0	0	9,811
Other	5,577	4	0	0	0	0	0	0	0	0	5,573
Total	**26,936**	**2,128**	**333**	**2,538**	**209**	**2,329**	**0**	**0**	**0**	**0**	**21,937**

FUNDING SCHEDULE ($000)

G.O. Bonds	26,366	2,128	333	1,968	209	1,759	0	0	0	0	21,937
Intergovernmental	570	0	0	570	0	570	0	0	0	0	0
Total	**26,936**	**2,128**	**333**	**2,538**	**209**	**2,329**	**0**	**0**	**0**	**0**	**21,937**

DESCRIPTION

This project provides for a new Fire and Rescue Station in the Clarksburg area and the purchase of associated apparatus. Also, the project will provide a connection to the Washington Suburban Sanitary Commission (WSSC) sanitary sewer system for the fire station and for properties along MD 355 within the Clarksburg Historic District. The new facility will be located at 23420 Frederick Road, Clarksburg. The new station will be constructed in accordance with square footage specifications of the prototype Program of Requirements (POR) for a Class I Fire Station. A Class I Fire Station is approximately 22,600 gross square feet and includes apparatus bays, dormitory and support space, personnel living quarters, administrative offices, and a meeting/training room. This station will include offices for a Battalion Chief, a Police satellite facility, additional space for the Upcounty Regional Services Center and personal protective equipment storage totaling 2,589 square feet. On-site parking will be provided. Fire/Rescue apparatus to be purchased for this station includes an aerial truck, a tanker and a brush truck.

ESTIMATED SCHEDULE

The fire station planning and design is complete through the design development stage. The final design and construction of the Clarksburg fire station is deferred beyond six-years due to fiscal capacity. Funds for the design and construction for the sewer extension required to serve the fire station and the Clarksburg Historic District are included in FY13 and FY14.

COST CHANGE

Previously funded costs are for land and partial design costs for the fire station up to the design development phase. FY13-18 project costs represent preliminary cost estimates for the sewer extension only. Costs and funding reflected on this PDF will be revised after the County completes a cost-sharing agreement with the affected property owners in the Clarksburg Historic District and finalizes the scope of work with WSSC.

JUSTIFICATION

A new station will be necessary in this area due to the present and projected population density for the Clarksburg area. Clarksburg is expected to increase from a few thousand residents to more than 25,000. The Clarksburg Town Center is envisioned to include a mix of housing, commercial, retail, recreation and civic uses with the Clarksburg Historic District as the focal point. Residential areas include the Newcut Road neighborhood, the Cabin Branch neighborhood, the Ten Mile Creek area, the Ridge Road transition area, the Brink Road transition area, as well as projected residential development in the Transit Corridor District and the Gateway Center.

In addition, the property for the fire station and the surrounding properties are not connected to the sanitary sewer system; with failing septic systems, they do not meet modern wastewater disposal standards. Therefore, this project also includes the design and construction of the sanitary sewer connection for the fire station and 38 surrounding properties. This will help keep the Clarksburg Historic District a viable community, promote rehabilitation of existing structures, and allow for limited development that is consistent with the adopted master plan. This sanitary sewer connection was based on the 2010 WSSC report "Sewer Facility Plan for Historic Clarksburg."

This project is recommended in the Fire, Rescue, Emergency Medical Services and Community Risk Reduction Master Plan approved by the County Council in October 2005 and the Montgomery County Fire and Rescue Service Station Location and Resource Allocation Work Group, Phase I Report, "Need for Upcounty Fire-Rescue Resource Enhancements, October 14, 1999. Development of this facility will help Montgomery County meet the NFPA 1710 Guidelines.

OTHER

Unexpended appropriation for the design and construction of the fire station has been removed. The County Council will consider a future appropriation request for the design and construction of the sewer extension once the County Council and County Executive have agreed upon a cost-sharing agreement for the sewer extension with the affected property owners. This agreement should equitably allocate the sewer extension costs between the County and the

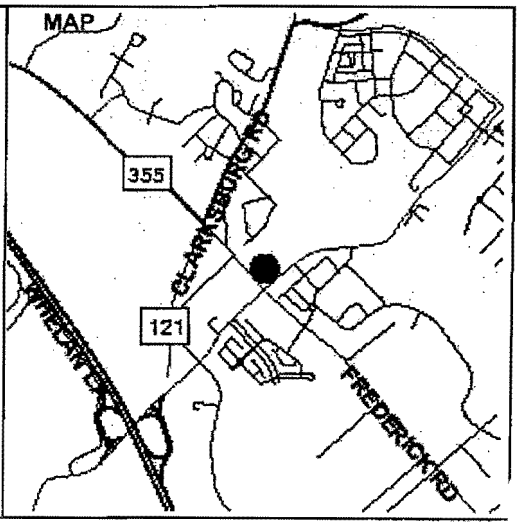
APPROPRIATION AND EXPENDITURE DATA

Date First Appropriation	FY03	($000)
First Cost Estimate Current Scope	FY13	4,999
Last FY's Cost Estimate		3,952
Appropriation Request	FY13	-726
Appropriation Request Est.	FY14	1,047
Supplemental Appropriation Request		0
Transfer		0
Cumulative Appropriation		3,952
Expenditures / Encumbrances		2,893
Unencumbered Balance		1,059
Partial Closeout Thru	FY10	0
New Partial Closeout	FY11	0
Total Partial Closeout		0

COORDINATION

Montgomery County Fire and Rescue Service
Department of Police
Upcounty Regional Services Center
Department of General Services
Department of Permitting Services
Department of Technology Services
M-NCPPC
State Highway Administration
WSSC

MAP



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private property owners who will benefit from the extension. The property for the fire station will require a sewer category change prior to the issuance of permits. Contributions reflect a planning level estimate of a WSSC health hazard subsidy for which Clarksburg Historic District property owners would be eligible for construction of new sanitary sewer mains.

OTHER DISCLOSURES

- A pedestrian impact analysis will be performed during design or is in progress.

Clarksburg Fire Station (P450300)

FY15-20 CIP
CE Recommended

Category	Public Safety	Date Last Modified	1/6/14
Sub Category	Fire/Rescue Service	Required Adequate Public Facility	No
Administering Agency	General Services (AAGE29)	Relocation Impact	None
Planning Area	Clarksburg	Status	Preliminary Design Stage

	Total	Thru FY13	Est FY14	Total 6 Years	FY 15	FY 16	FY 17	FY 18	FY 19	FY 20	Beyond 6 Yrs
EXPENDITURE SCHEDULE ($000s)											
Planning, Design and Supervision	3,867	712	1	3,120	0	0	0	1,962	574	584	34
Land	1,663	1,663	0	0	0	0	0	0	0	0	0
Site Improvements and Utilities	4,728	2	0	4,726	0	0	0	0	2,660	2,066	0
Construction	11,572	0	0	11,572	0	0	0	0	6,613	4,959	0
Other	6,579	5	0	6,574	0	0	0	0	5,165	1,409	0
Total	**28,409**	**2,382**	**1**	**25,992**	**0**	**0**	**0**	**1,962**	**15,012**	**9,018**	**34**
FUNDING SCHEDULE ($000s)											
G.O. Bonds	28,409	2,382	1	25,992	0	0	0	1,962	15,012	9,018	34
Total	**28,409**	**2,382**	**1**	**25,992**	**0**	**0**	**0**	**1,962**	**15,012**	**9,018**	**34**

APPROPRIATION AND EXPENDITURE DATA (000s)

Appropriation Request	FY 15	0
Appropriation Request Est.	FY 16	0
Supplemental Appropriation Request		0
Transfer		0
Cumulative Appropriation		3,226
Expenditure / Encumbrances		3,115
Unencumbered Balance		111

Date First Appropriation	FY 03	
First Cost Estimate		
Current Scope	FY 15	28,409
Last FY's Cost Estimate		28,709

Description

This project provides for a new Fire and Rescue Station in the Clarksburg area and the purchase of associated apparatus. The new facility will be located at 23420 Frederick Road, Clarksburg. The new station will be constructed in accordance with square footage specifications of the prototype Program of Requirements (POR) for a Class I Fire Station. A Class I Fire Station is approximately 22,600 gross square feet and includes apparatus bays, dormitory and support space, personnel living quarters, administrative offices, and a meeting/training room. This station will include offices for a Battalion Chief, a Police satellite facility, additional space for the Upcounty Regional Services Center and personal protective equipment storage totaling 2,589 square feet. On-site parking will be provided. Fire/Rescue apparatus to be purchased for this station includes an aerial truck, a tanker and a brush truck.

Estimated Schedule

The fire station planning and design is complete through the design development stage. Design to begin in FY19 with construction in FY19-20.

Cost Change

Previously funded costs are for land and partial design costs for the fire station up to the design development phase. Cost is added for completion of the design and construction of the project.

Justification

A new station will be necessary in this area due to the present and projected population density for the Clarksburg area. The Clarksburg population is expected to increase from 13,766 in 2010 to almost 40,000 by 2025. The Clarksburg Town Center is envisioned to include a mix of housing, commercial, retail, recreation and civic uses with the Clarksburg Historic District as the focal point. Residential areas include the Newcut Road neighborhood, the Cabin Branch neighborhood, the Ten Mile Creek area, the Ridge Road transition area, the Brink Road transition area, as well as projected residential development in the Transit Corridor District and the Gateway Center. This project is recommended in the Fire, Rescue, Emergency Medical Services and Community Risk Reduction Master Plan approved by the County Council in October 2005 and the Montgomery County Fire and Rescue Service Station Location and Resource Allocation Work Group, Phase I Report, "Need for Upcounty Fire-Rescue Resource Enhancements, October 14, 1999. Development of this facility will help Montgomery County meet the NFPA 1710 Guidelines.

Other

Project only includes cost to provide sewer service to the station. Alternative approaches to providing sewer service to the historic district are being explored.

Disclosures

A pedestrian impact analysis will be performed during design or is in progress.

Coordination

Montgomery County Fire and Rescue Service, Department of Police, Upcounty Regional Services Center, Department of General Services, Department of Permitting Services, Department of Technology Services, M-NCPPC, State Highway Administration, WSSC, Special Capital Projects Legislation [Bill No. 07-06] was adopted by Council May 25, 2006 and reauthorization will be requested prior to construction.

OFFICE OF THE COUNTY EXECUTIVE
ROCKVILLE, MARYLAND 20850

Isiah Leggett
County Executive

MEMORANDUM

February 27, 2014

TO: Craig Rice, President
Montgomery County Council

FROM: Isiah Leggett, County Executive

SUBJECT: Ten Mile Creek

On February 11, 2014, the Planning, Housing and Economic Development (PHED) and the Transportation, Infrastructure, Energy and Environment (T&E) Committees jointly made recommendations regarding future development of the Ten Mile Creek area of Clarksburg. I support these recommendations. This memorandum outlines my rationale for this position.

The 1994 Clarksburg Master Plan envisioned a new community concentrated around the Clarksburg Historic District, and recognized the importance of protecting the sensitive environmental features of the area. The 1994 Plan outlined a geographically staged development approach, with the fourth and final stage being potential development in the environmentally vulnerable Ten Mile Creek watershed. Decisions on development in Ten Mile Creek were to be delayed until a certain level of development occurred in the first three stages of the plan and were also to follow analyses conducted by the Department of Environmental Protection (DEP) on the impact to water quality of these earlier stages of development. The 1994 Plan directed Council to review the water quality analysis prior to making any decisions on potential development in Ten Mile Creek and provided Council the option of taking "land use actions as are deemed necessary" to ensure development in Ten Mile Creek was consistent with the overall visions of the 1994 Plan to build the Clarksburg community and protect the area's sensitive environmental resources.

In October 2012, with my support, the County Council directed the Planning Board to undertake a limited amendment to the 1994 Clarksburg Master Plan to determine whether development should be allowed to proceed in Ten Mile Creek under the zoning in the 1994 Plan or whether a re-balancing of the land use goals envisioned in the 1994 Plan for the Ten Mile Creek subwatersheds was in order given the results of an environmental analysis.

Since adoption of the 1994 Clarksburg Master Plan 20 years ago, development has not occurred as originally envisioned in the 1994 Plan, and over the course of seven work

sessions, the Committees heard from a number of experts about how current development compared to the development projected in the 1994 Plan with respect to population, housing, commercial activity, and employment opportunities.

Importantly, environmental scientists from DEP, state and federal environmental agencies, and local universities provided information to the Committees on the environmental resources in Ten Mile Creek, the current condition of the watershed, and the effects of previous development in Clarksburg on water quality. DEP provided a detailed analysis of the individual subwatersheds that would be affected by development, including the documentation of existing environmental features of each area and the potential effects of development on each subwatershed. Several fundamental conclusions can be drawn based on the analyses of these experts:

1. There is a relationship between the amount of imperviousness created by development in a watershed and the environmental health of the watershed. As a general rule, more imperviousness leads to greater environmental degradation of the watershed.
2. This degradation effect is more pronounced in areas with low levels of preexisting imperviousness. The negative effect of small increases in development activity in these areas is relatively much more significant than the effects that occur in areas with a greater amount of preexisting development. Sensitive aquatic species and critical environmental habitat in essentially undisturbed watersheds are affected by small increases in imperviousness. Once a certain level of imperviousness occurs, the most sensitive species and critical habitat is significantly affected and the habitat and sensitive species are lost.
3. In those areas where impervious levels are such that the most critical habitat and sensitive species have already been compromised, small amounts of additional imperviousness will have a lesser effect.
4. The exact points at which these transitions occur (e.g., the level of imperviousness at which the most critical habitats are affected) is complex and site specific, and therefore it is preferable to act cautiously since it is difficult, and likely not possible, to restore these habitats once they are lost.

The environmental information provided by DEP and other experts clearly leads to the conclusion that the level of imperviousness must be reduced from what was discussed in the 1994 Plan on all subwatersheds in Ten Mile Creek. This reduction, however, must be balanced against the need to achieve other land use goals for the Clarksburg community as well as maximizing development potential for the property owners in the Ten Mile Creek watersheds.

1. LSTM 110/LSTM 111 – These subwatersheds have the lowest current level of imperviousness in Ten Mile Creek at 1.6% and 1.2%, respectively, and are of the

highest quality. Although the Committees' recommended approach would increase the level of impervious surface on these properties from existing levels by more than 300% and 500%, respectively, the relatively low level of existing imperviousness would still, in the views of the environmental experts, provide an opportunity to maintain the high quality conditions of the streams in these vulnerable subwatersheds. The Plan should provide the property owners of these subwatersheds with the greatest development potential possible that is consistent with the land use goals for Clarksburg within the 6% imperviousness cap.

2. LSTM 201/LSTM 206 – These subwatersheds have greater levels of existing development, and some environmental features in these areas have already been affected by development and agricultural activities. In particular, portions of LSTM 206 were affected by earlier stages of Clarksburg development, and the overall level of existing imperviousness is the highest in the Ten Mile Creek watershed at 16.6%. Under the Committees' recommendations the level of imperviousness in these subwatersheds would increase from existing levels by 67% and 42%, respectively. Although less than recommended in the 1994 Plan, this level of imperviousness would allow development that would contribute to the vision of the Clarksburg community focused around the Clarksburg Historic District.

3. County Properties – In order to protect Ten Mile Creek, it is appropriate for the County to scale back development as well. As I have previously communicated, the County will forego development on the 128 acre County/Clarkwood site that had been previously identified as a potential site of a bus depot, and will not move forward with any expansion to impervious area at the County Correctional Facility. Finally, I have committed to revisiting the proposed location of the Clarksburg Fire Station in LSTM 206 to determine if an alternate location outside of the Ten Mile Creek watershed can be identified consistent with providing Clarksburg with appropriate public safety protection.

I congratulate the Committees for conducting the thorough and comprehensive review envisioned in the 1994 Master Plan and again, support the recommendations made for development in the Ten Mile Creek watershed.

c: Joy Nurmi, Special Assistant to the County Executive
Bonnie Kirkland. Assistant Chief Administrative Officers
Bob Hoyt, Director, Department of Environmental Protection
Kathleen Boucher, Chief Operating Officer, DEP
Marc Hansen, County Attorney

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February 27th, 2014

Montgomery County Council
Attn: Marlene Michaelson, Administrator
100 Maryland Ave
Rockville, Maryland 20850

To the Council:

At the request of Administrator Michaelson, I am writing to elaborate on my testimony before the Council's Transportation, Infrastructure, Energy, and Environment committee earlier this month. The purpose of this letter is to provide a written explanation of the rationale on which I based my comments. I will address several specific issues before the Committee: (1) whether impervious cover is a reasonable basis for understanding the impacts of development; (2) what scientists have learned about how we measure biological responses and detecting change along gradients of increasing disturbance; (3) what we know about the relationship between different levels of land development and stream ecosystem response; and (4) what we have learned from studying various forms of Low Impact Development (LID) and Environmental Site Design (ESD) in Montgomery County, Maryland.

Impervious Cover as an Index of Development

The first comprehensive syntheses of ecological consequences in urban streams are less than 20 years old (Schueler 1994, Booth and Jackson 1997, Paul and Meyer 2001). Since that time, there have been several updates to the original review (Meyer et al. 2005, Walsh et al. 2005b, Wegner et al. 2009) with the next update to be developed this May prior to the Joint Aquatic Sciences Meetings in Portland, Oregon. In particular, Walsh et al. (2005b) summarized the growing recognition that urban streams (broadly defined as those streams that drain urban centers, industrial lands, or med-high density residential landscapes) suffer from a widespread "syndrome" of effects associated with land development. These effects include (but are not limited to) alteration of the natural water flow regime (surface and subsurface), altered rates of erosion and fine sediment transport, increases in dissolved material (potentially including both organic and synthetic contaminants), and a notable decline in sensitive biotic taxa (e.g., fish, macroinvertebrates, and algae). Early reviews all noted the strong association between the effects of the urban stream syndrome and degree of watershed imperviousness (Booth 2005, Schueler et al. 2009).

More recently, scientists have experimented with refining geographic measures of urbanization that include a more comprehensive set of impacts than "just" impervious cover. For example, Walsh et al (2005a) defined "effective impervious area" as imperviousness directly connected to streams by engineered drainage. Cuffney and

Falcone (2009) developed a Metropolitan Area Normalized Urban Intensity Index (MA-NUII) that attempted to modify estimates of developed land by both housing and road density. Whereas both of these refinements sound reasonable in theory, in practice investigators have yet to demonstrate that they perform better for detecting the effects of land development than simple maps of impervious cover. Instead, investigators have largely found that such modifications may be somewhat more effective in certain regions than in others (Detenbeck et al. 2013). However, because these modifications are simply augmentations of impervious cover, they are often statistically indistinguishable. What does seem clear is that impervious cover (or road crossings, or dense development) near to streams seems more detrimental than impervious cover further away from streams and other sensitive areas (King et al. 2005, Van Sickle and Johnson 2008, Detenbeck et al. 2013).

Another issue is the relation between estimates of impervious cover derived from 30m satellite data and county-level data. Estimates of the USGS National Land Cover Dataset (NLCD) relative to county level data in Maryland suggest two things: (1) a general underestimate of imperviousness by satellite data across most levels of imperviousness of approximately 5% (Greenfield et al. 2009, Smith et al. 2010), (2) that levels of imperviousness <10% were estimated *more accurately* than the rest of the range (Smith et al. 2010). In general, depending on the type of imperviousness used our experience in Maryland suggests satellite-derived estimates of low levels of impervious cover underestimate values <5% by between 25% and 50%. For example, 3% derived from satellite could be reasonably interpreted as ~3.75%-4.5% in county level data.

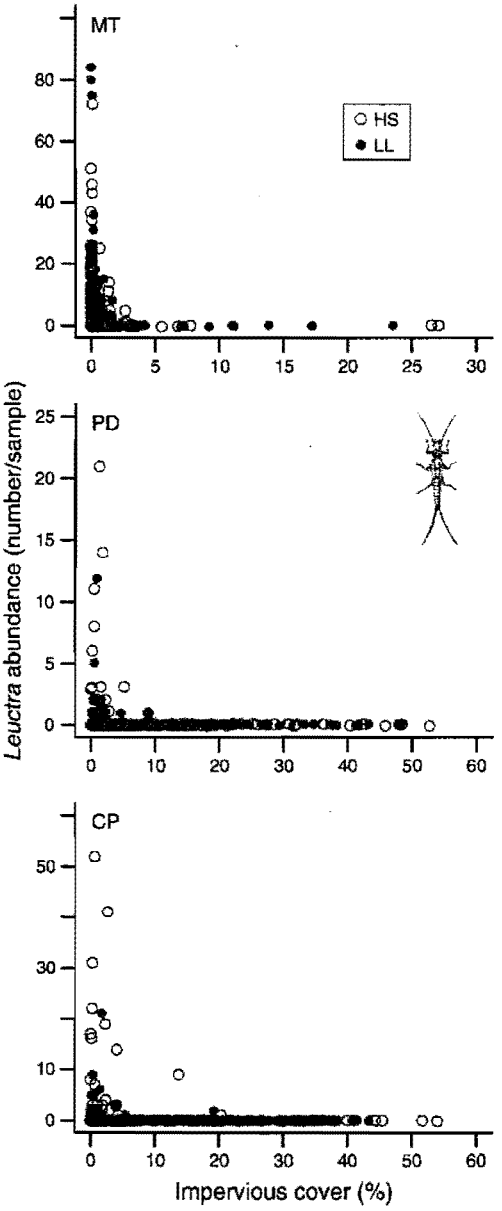
Take Home Message: It is critical to remember that it is not necessarily the impervious cover *per se* that causes observed degradation—imperviousness is certainly a part of the syndrome but it is also the strongest, most detectable indicator available for the many correlated and contributing factors associated with urbanization.

Detecting and Measuring Biotic Change

In their meta-analysis, Walsh et al. (2005b) were the first to emphasize uncertainty in the form of biological responses to urban development. Prior to that point, many biotic analyses had been performed using indices of biotic integrity that, due to their limited value range, *necessarily* generated smooth response curves. Around the same time, King et al. (2005), Walsh et al. (2005a), and Walters et al. (2005) all demonstrated strong non-linear effects (i.e., a zone of excessively large change in response to an incremental increase in development) of urban development on biotic communities using responses other than indices. More detailed analysis since then has demonstrated that biotic responses to urban gradients in eastern streams, and indeed throughout the United States, are rarely smooth or linear (Utz et al. 2009, Baker and King 2010, Hildebrand et al. 2010, King and Baker 2011, King et al. 2011, Qian et al. 2012, Detenbeck et al. 2013). Indeed, King and Baker (2010) pointed out that there are very good reasons to expect non-linear responses to anthropogenic environments that depart from conditions experience by biota in their evolutionary history. Whereas there are methodological differences, all of the aforementioned studies agree that low levels (i.e., <10%) of watershed impervious cover cause greater degradation in biotic communities than higher (>20%) levels.

A complication in interpreting studies of biotic responses to urbanization has to do with whether abundance (counts) or occurrence (presence-absence) data are used to derive estimates of change, and whether the analysis methods are designed to detect *resistance* or *exhaustion* thresholds (Cuffney et al. 2010). Detection of resistance thresholds often involves abundance data and investigators are concerned with detecting changes relative to undisturbed or pre-disturbance patterns (King and Baker 2014). Exhaustion thresholds

usually involve occurrence data and investigators are often more concerned with detecting the absence of particular species. In rare cases, investigators consider both levels of response. The former analysis is most likely useful for detecting change relative to background conditions from which population resilience and recovery may be possible, the latter is mostly useful for detecting levels sufficient to alter a population beyond its ability to recover on its own. The following figure from King et al. 2011 shows the abundance response of a particular stonefly (Leuctra sp.) to impervious cover in small, high slope streams (HS) and large, low-slope streams (LL) throughout mountain, piedmont, and coastal plain physiographic regions in Maryland:



What this figure illustrates is the dramatic changes in the abundance and occurrence pattern associated with incremental increases in watershed impervious cover. It is difficult to tell whether this stonefly shows resistance to impervious cover or whether it proceeds quickly to exhaustion once its population declines (e.g., apparently Leuctra is able to persist at higher levels of imperviousness in some CP streams). Such responses are not

at all uncommon among sensitive macroinvertebrates, yet some aggregate indices may have trouble representing such declines.

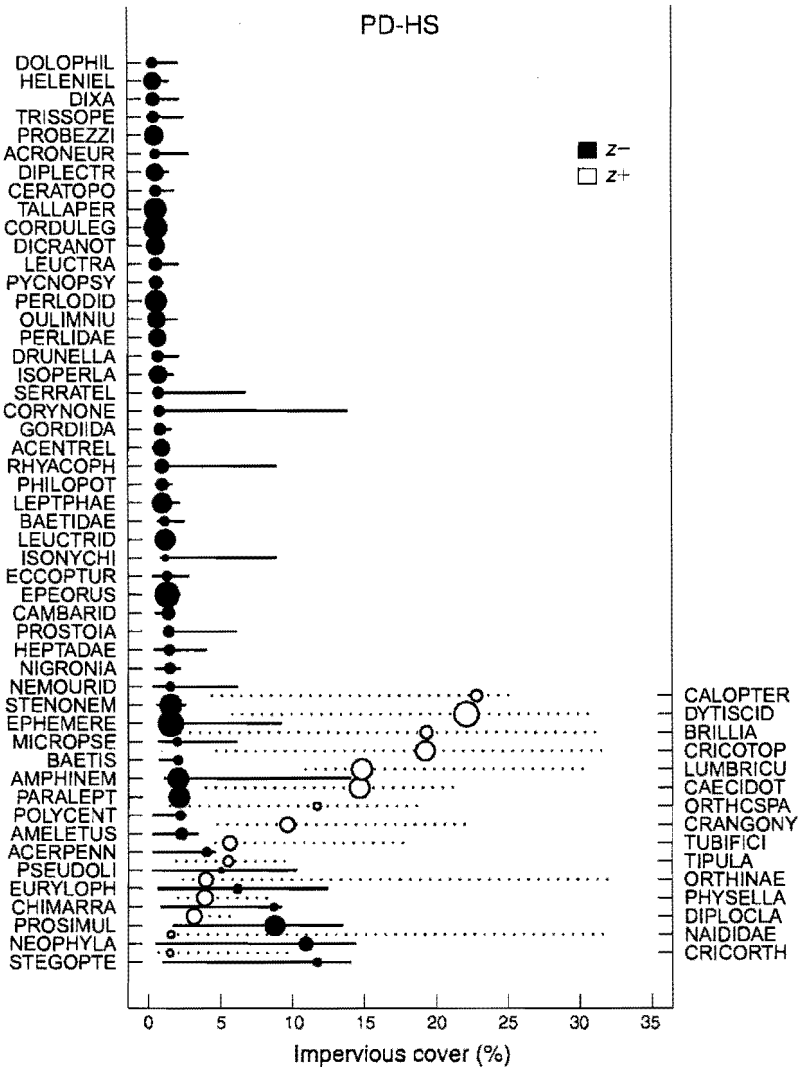
Baker and King (2010), King and Baker (2010), and Detenbeck et al. (2013) show that some aggregate biotic metrics have trouble detecting change precisely. For this reason, investigators have increasingly relied on greater specificity in terms of species guilds, taxonomic groups, or other form of biotic summary that integrates detailed knowledge of species life history (Baker and King 2013). Relatively new analytical approaches used as reference for my testimony such as The Biological Condition Gradient (BCG; Davies and Jackson 2006) and Threshold Indicator Taxa Analysis (Baker and King 2010) reflect an improved ability to detect change based on more detailed biological information and collectively, these results and others suggest that the smooth decline often associated with imperviousness (e.g., Schueler et al. 2009, Cuffney et al. 2010) is probably insensitive to the rate at which biotic change actually occurs.

Take Home Message: Biotic responses to impervious cover are nonlinear, and change is greatest at low levels of land development. Recent emphasis on resistance thresholds versus exhaustion thresholds obtained by increasing biological detail and distinguishing different responses has provided new insight when compared to studies that rely solely on aggregate indices. The indices are not wrong, but may not reveal precisely at what level of disturbance large changes in their component biotic populations occur.

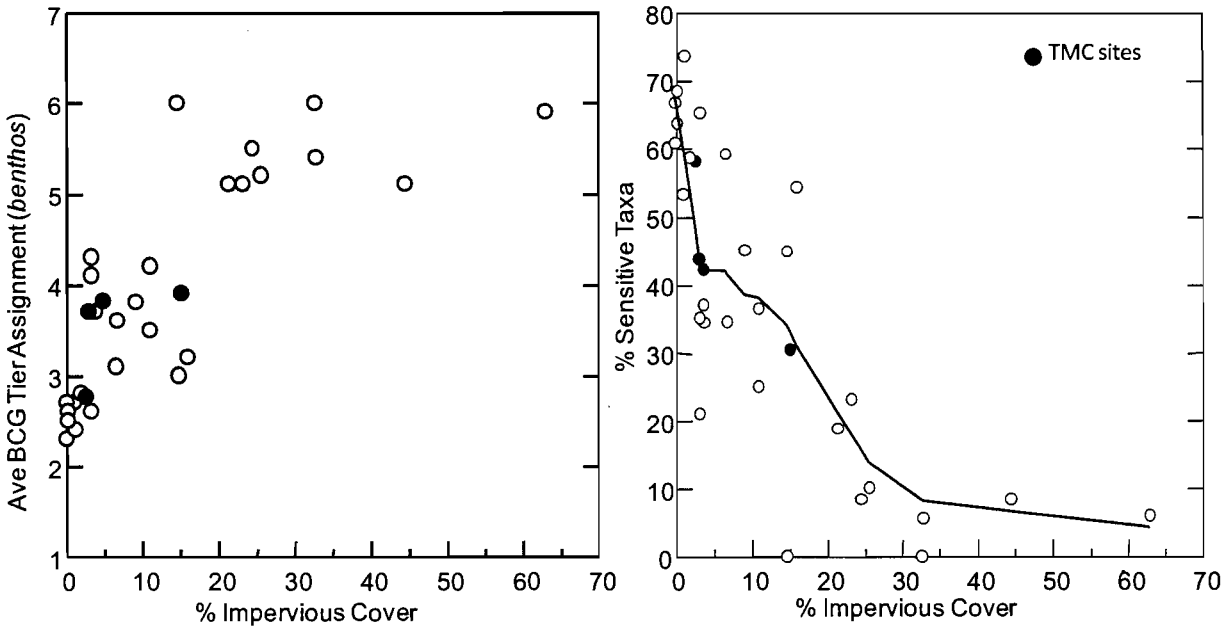
Biotic responses at different levels of development

The most recent and intensive analyses by independent research teams since the last urban stream synthesis (i.e., Utz et al. 2009, King et al. 2011, Qian and Cuffney 2012, Detenbeck et al. 2013) ALL agree that biotic responses to incremental increases in impervious cover are sharpest and most dramatic at levels <5% impervious cover, and often less so between 5-10%. At levels above ~10% watershed impervious cover, there is greater variation, and thus less certainty about how biota in different streams with different interacting effects respond.

With the understanding that individual watersheds can respond differently and idiosyncratically depending on a host of factors, it is worth noting that studies specific to Maryland's Piedmont (Utz et al. 2009, King et al. 2011) are part of this result. A quick glance at the results from King et al. 2011 for smaller, high gradient streams should make the reasons for this consistent result abundantly clear to even the casual observer:



This graph depicts the greatest change in abundance and occurrence that could be robustly detected from the Maryland Biological Stream Survey dataset. On the left are species and other taxonomic groups that decline in abundance (sensitive taxa; filled circles) in response to impervious cover. On the right are those that increase in abundance (tolerant taxa; open circles). The circles indicate the level of impervious cover and their size reflects the magnitude of the change. Horizontal lines indicate uncertainty (greater for rare or variable species) about where the change occurs. The first thing that is apparent is a difference in number from left to right. Fully 25% of nearly 200 organisms sampled across 405 Piedmont streams declined in response to impervious cover. This decline is reflected in the Biotic Condition Gradient established by US-EPA working in concert with MGC-DEP explicitly for Montgomery County and context for Ten Mile Creek. Below are some of the results of the BCG:



The left graph shows a progression from "minimal changes to structure and function" (BCG Tier 2) to "evident change in structure, minimal changes in function" (BCG Tier 3) to "moderate changes in structure, evident changes in function" (BCG Tier 4). There are formal narrative criteria for Tiers 5 and 6, but from a biological perspective they are so altered as to be unrecognizable...a wholesale transformation. The increase in scatter along this graph from 5-20% reflects both temporal and spatial variability during reorganization of the biotic community in response to various perturbations associated with development as well as the challenge in interpreting the response. There is little difficultly, however, to interpreting the biological signals at levels in excess of 20%.

The right graph tracks the % of taxa identified beforehand by a team of experts as "sensitive" in the stream samples with a smoothed trend line. Note both the strong agreement between the story told by King et al. 2011 and the BCG results—using two independent methods with different data sets from Maryland's Piedmont. Below 5% imperviousness, streams are generally in reasonably good condition; above this level, there is substantial variation in how streams respond watersheds but their tends to be a rapid decline in condition (Ten Mile Creek examples tend to be on the low end, indicating a potential for greater sensitivity to development than other streams). At levels >20% imperviousness, there is relatively little response to incremental amounts of development, and beyond 25% all sensitive taxa seem to have declined and all tolerant taxa seem to have increased. It is worth noting that though a few sensitive taxa may occur at high levels (>20%) of impervious cover, taxa richness (overall #) often decreases too, so percentages may be inflated by just a few sensitive individuals, and it is rarely clear whether their presence is persistent and meaningful or simply the last vestiges of an unsustainable population. There is enough variation around all these levels to create some uncertainty about expected change at certain levels of imperviousness, but the data are sufficiently consistent to warrant reasonable confidence about different rates of change expected among those watersheds with <5% imperviousness, those watersheds with 5-20%, and those watersheds with >25% imperviousness.

Take Home Message: In order to keep streams in good condition, any ecologist will tell you to keep impervious cover under 5% by as much as possible to minimize risk. However, when I was asked whether 6% or 8% or 12% was best for the Pulte property

(LSTM 110 and 111) and the streams that drain it, the evidence is clear that due to their status among the best examples of stream condition in the County, restricting levels as close to 5% as possible stands the best chance (with LID, ESD, and development at or near the divide and away from stream channels) of protecting the valuable natural resource they represent. When asked about the choice of going from existing 16% to either 21% or 24% in LSTM 206 associated with the Miles-Coppola and Egan properties, the evidence suggests that proceeding from 16% to >20% will cause real and substantial degradation to the stream, but there is little evidence to suggest that 24% will produce substantially greater degradation than 21% imperviousness. Although the data does show changes at these levels, the variation is so great from stream to stream that there is far less confidence about conditions at any specific level in excess of 20%.

Results from recent study of temporal trends and BMPs in Little Seneca Creek

With so much focus in the planning meetings on distinguishing between different levels of impervious cover, several key points came up that I believe are worth further emphasis. First, although many of the studies documenting the impacts of impervious cover for streams have involved "older" forms of land development prior to existing regulatory standards, there is little evidence to support the notion that newer forms have succeeded in adequately protecting aquatic resources. There is strong evidence that engineered solutions have been quite effective at modifying flow patterns and the hydrologic response to certain storm events, there is also encouraging evidence that efforts to mitigate or reduce the sediment loads to streams during development have been modestly successful as well. However, despite these successes, neither have been enough to prevent further degradation in stream condition.

Part of the reason that BMPs have yet to fully protect streams is that no BMP can adequately address all of the stresses that urbanization implies for a watershed. Instead, BMPs have focused on the most obvious linkages, often presenting unexpected consequences and new environmental problems as often as solutions. For example, one consequence of extensive efforts to mitigate storm water in the Little Seneca has been *increases* in nitrate concentrations. This does not bode well for the County's TMDL obligations. In attempting to understand the complex linkages between watersheds and stream biota, science has not yet discovered a simple comprehensive cure for the symptoms of land development.

Another concept that sometimes gets lost in planning is that land development causes *progressive degradation*. By this I mean that perturbation occurs during land clearing and construction, but also following completion in the way the entire hydrologic system response to extreme events that overcome design specifications. BMPs have focused on limiting peak flows, but no BMP has unlimited capacity, droughts are also exacerbated by development, and no BMP fully addresses the cumulative and accumulating chemical impacts associated with continued human activity and land use (e.g., further construction, retrofits, repairs, road salting, fertilization, toxics). Despite the detailed plans discussed at the meetings I attended, no one addressed the impacts caused by further development of the historic district nor were implied plans to construct a Clarksburg bypass through the headwaters of Ten Mile Creek brought to bear on these decisions. Given nearby source populations, stream biota may maintain population numbers in the face of this degradation for a time and resist collapse, but if a goal of the Council is to preserve the integrity of the watershed these considerations should raise concern.

Take Home Message: Despite the repeated promise of BMPs and ESD, no development is without substantial risk of degradation in both the short and long term, and best conceived as a chronic and occasionally acute stress on aquatic communities.

I hope this letter is helpful in the Council's deliberations.

Submitted respectfully,

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