Ten Mile Creek

Pulte Homes Response to MNCPPC
Ten Mile Creek Limited Master Plan Amendment Presentations

April 17th, 2013

NewFields

POINTS FOR CONSIDERATION

- Environmental Site Design is required by law to specifically address the effects of development on Maryland waters
- Data supporting the Biological Condition Gradient within the Pulte property (LSTM110 and 111) is not available
- The use of the Impervious Cover Model is not an appropriate management tool
- Impacts associated with Hydrology and Hydraulics (H&H) are overestimated

NewFields

ENVIRONMENTAL SITE DESIGN (ESD)

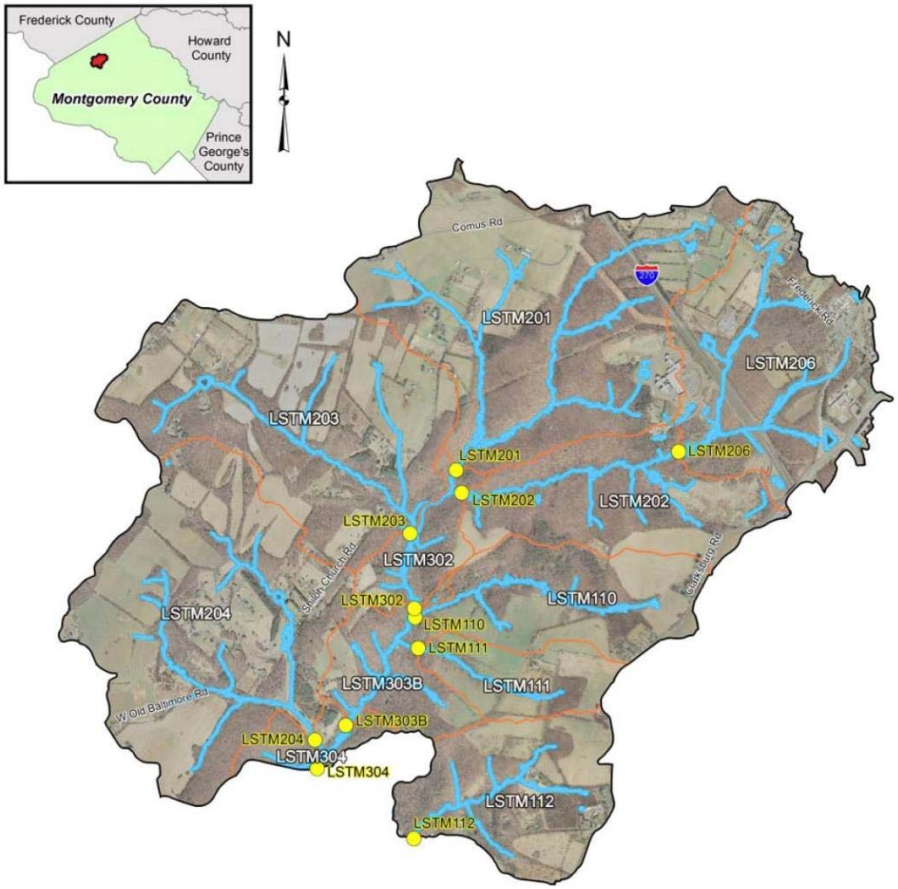
- Stormwater Management Act (SWMA) of 2007 requires ESD and defines it as:
  - 'using small-scale stormwater management practices, nonstructural techniques, and better site planning to mimic natural hydrologic runoff characteristics and minimizing the impact of land development on water resources' *emphasis added*
- Development of ESD requirements was a multi-year process led by Maryland Department of the Environment (MDE)
- In 2010, Montgomery County DEP conducted a study to determine how to implement ESD to the Maximum Extent Practicable (MEP)
- The 2007 SWMA represents a significant improvement over historical control measures.

EXAMPLES OF ESD APPLICATIONS

- State Highway ICC project
  - 70 individual bioswales installed in Paint Branch SPA at 21 sites
  - Studied systems have met or exceeded design goals with respect to retention and temperature management

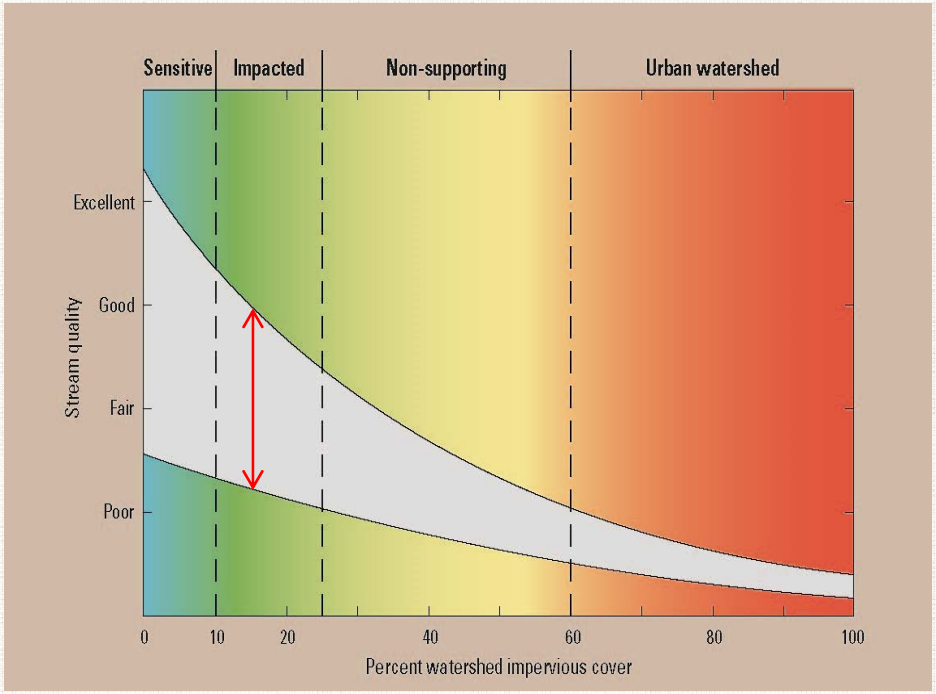
LSTM Biological Condition Gradient

- The data utilized in deriving the BCG have not been provided and the conclusions have not been peer reviewed.
- There is no record of fisheries surveys within the Pulte development areas 1994 to 2010.



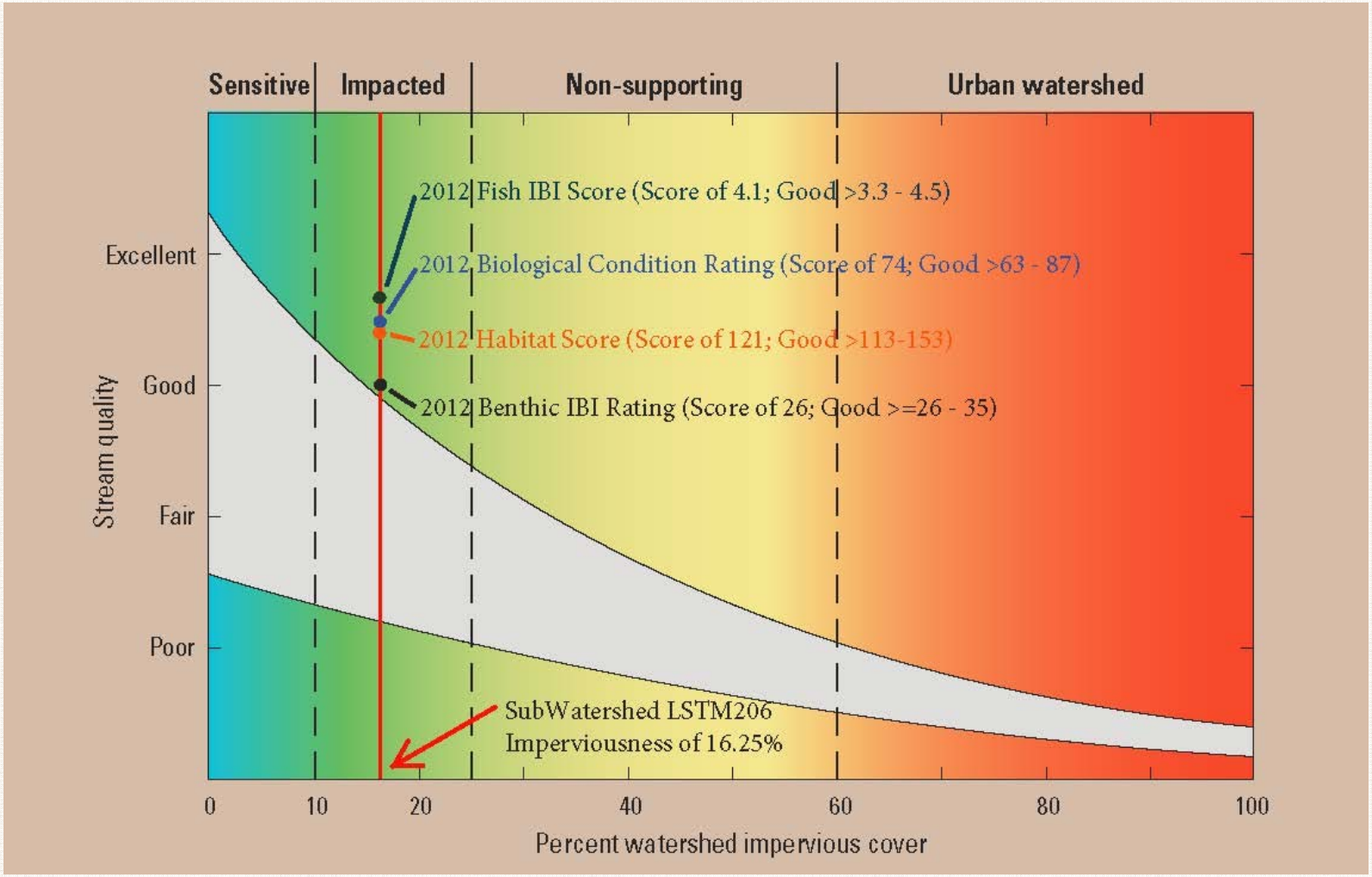
The Impervious Cover Model (ICM) is not an appropriate management tool for Ten Mile Creek

- Attempts to correlate effect levels / stream quality with varying degrees of watershed imperviousness
- Does not consider the effect of Environmental Site Design practices



Relationship between Total Impervious Cover and Stream Quality - Modified From Schueler et al. (2009)

WATERSHED EAST OF I-270, HISTORIC DISTRICT



WHY DOESN'T THE ICM APPLY TO SITES DEVELOPED USING ESD?

- The ICM was developed using data from traditional, non-ESD watersheds
- Total impervious cover is rarely the most important or only predictor of stream health
- Factors include:
  - Location and Connectivity of Impervious Areas
  - Number of Road/Stream Crossings
  - Percent of Stream Buffer in Forest Cover
- Ten Mile Creek by Pulte Homes will
  - Disconnect SW from direct discharge to stream
  - Requires only 1 stream utility crossing
  - Provide 100% of riparian area as forest

STAFF'S SUMMARY AND CONCLUSIONS ARE INCONSISTENT

Table 2. Summary of 1994 Master Plan Scenario Analysis

Subwatershed	Watershed Indicator				
	Hydrology	Geomorphology (inferred from H&H Analysis)	Pollutant Loading	Natural Resource Disturbance (per Spatial Analysis)	OVERALL
LSTM110	Significant	Significant	Low	Moderate	Significant
LSTM111	Significant	Significant	N/A	Low to Moderate	Significant to Moderate
LSTM112	Low	Low	N/A	Low	Low
LSTM201	Low	Low	Low	Low to Moderate	Low to Moderate
LSTM202	Moderate	Moderate	N/A	Low to Moderate	Moderate
LSTM203	N/A	N/A	N/A	N/A	N/A
LSTM204	N/A	N/A	N/A	N/A	N/A
LSTM206	Low to Moderate	Low to Moderate	Significant	Significant	Moderate
LSTM302	Low	Low	Moderate to Significant	Low	Moderate
LSTM303B	Moderate	Moderate	Low to Moderate	Low	Moderate
LSTM304	Low to Moderate	Low to Moderate	N/A	N/A	Low to Moderate

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GEOMORPHOLOGY IMPACTS CANNOT BE INFERRED FROM H&H

- The determination of the potential for geomorphological changes requires site specific and extensive data analysis.
- The assignment of 'significant' geomorphic changes without these calculations is inappropriate and not based on sound science.

HYDROLOGIC & HYDRAULIC (H&H) MODELING CONCERNS

- Concerns with Both Models presented by MNCPPC environmental consultants:
  - Unclear as to sizing and total volume assumed within each model
  - Model 1 assumption that soil media will be fully saturated represents an infrequent scenario. Does not represent a typical ESD hydrologic response.
  - Model 2 does not include effects of groundwater infiltration amongst ESD devices. If included, would significantly alter model response.
- The two models should not be characterized as depicting the range of hydrologic response of an ESD stormwater management system.

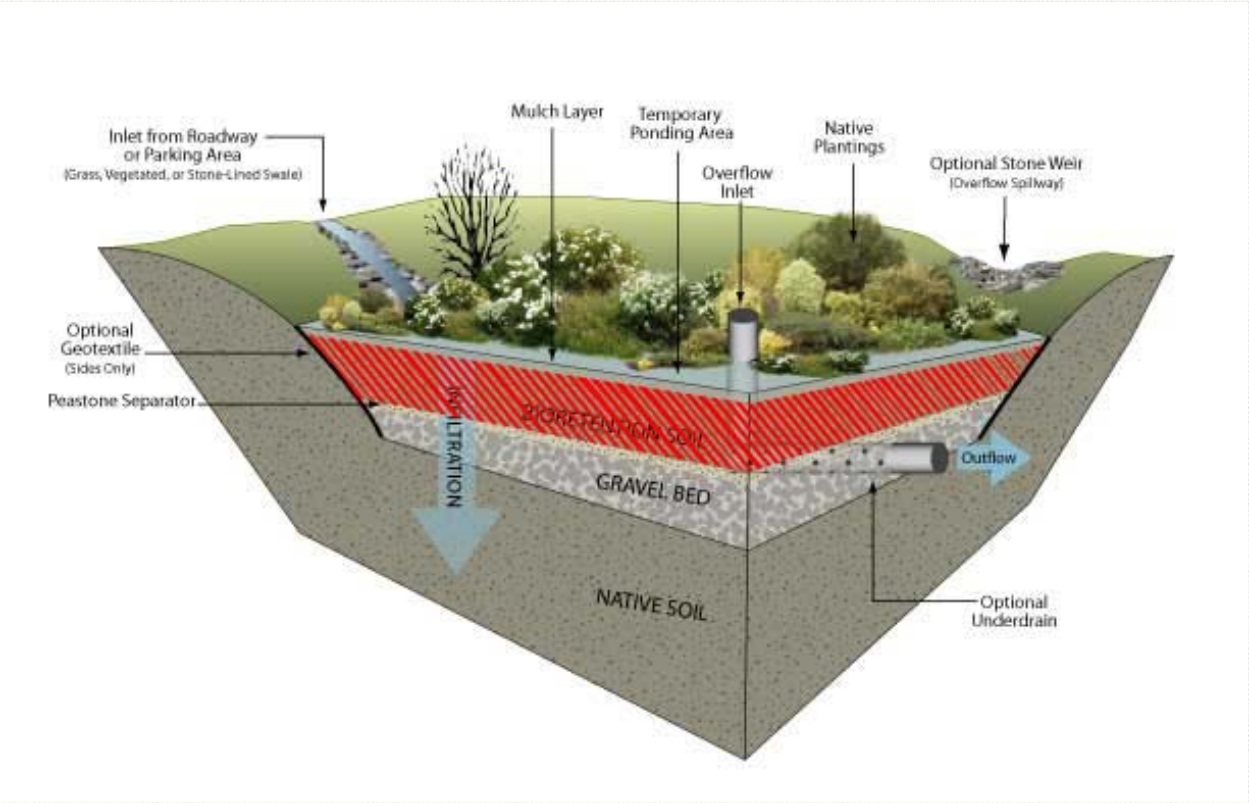
PULTE HOMES AT TEN MILE CREEK
ESD DESIGN DATA & SUMMARY

- ESD planning techniques and practices are based on capturing and retaining enough rainfall to replicate runoff characteristics similar to "woods in good condition".

- The P_E target is a target rainfall amount used to determine storage requirements of the ESD system. The P_E target is determined for each study point and is based on soil characteristics and proposed impervious cover.

- Per Pulte Homes at Ten Mile Creek Preliminary Water Quality Plan
  - 73 study points were identified.
  - 614 ESD devices are proposed.
  - Provided P_E of 1.8";meeting MDE requirements.
  - Total volume provided = 680,000 ft^3 or 15.6 Ac-ft.

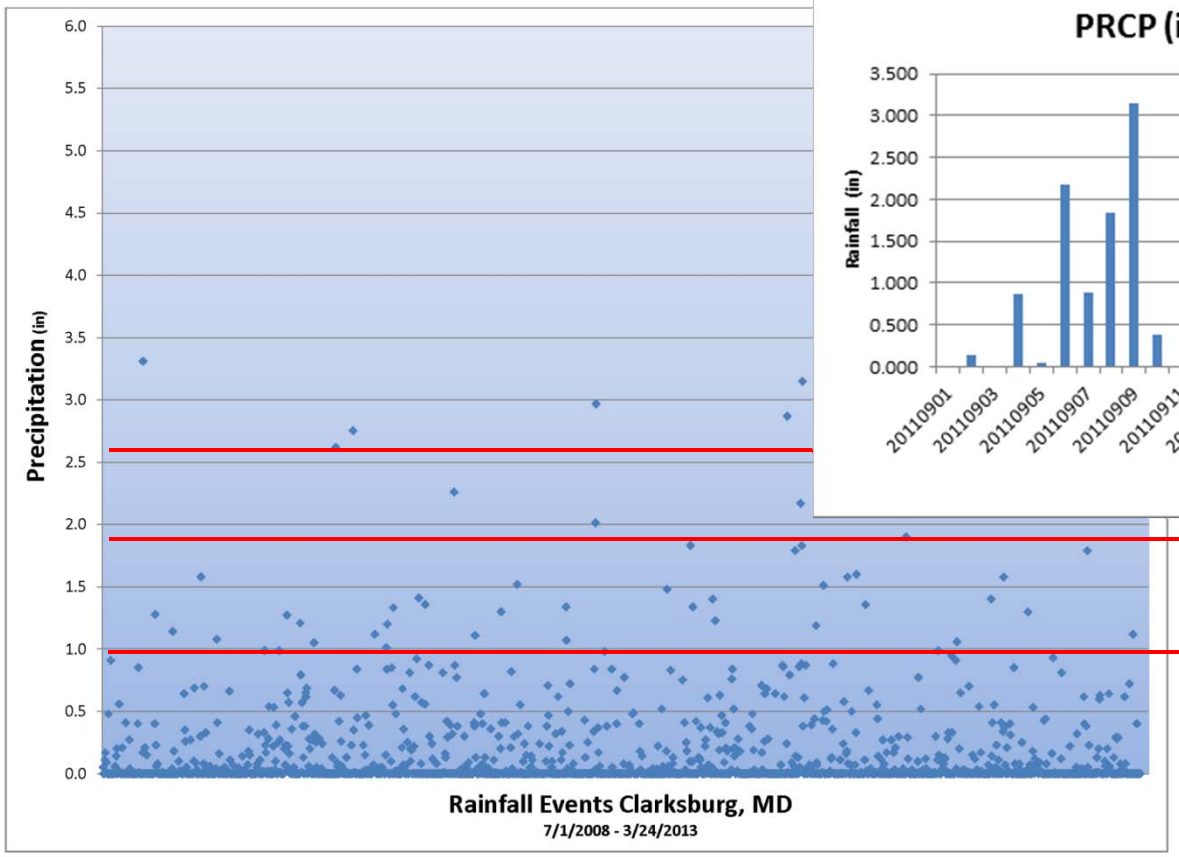
MNCPPC Model 1
Micro bio-retention Assumptions

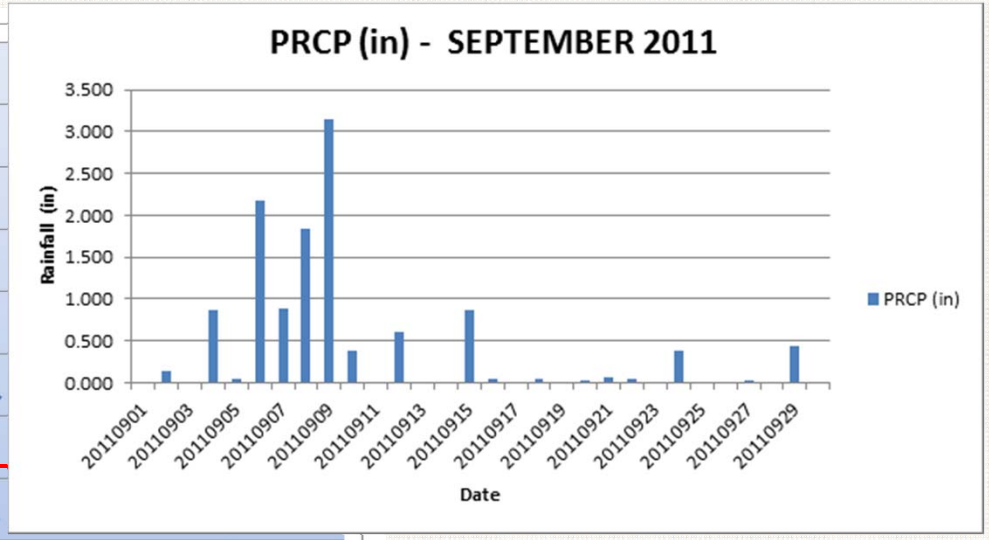


- 6” Ponding
- Minimum sized depth of 2’
- Saturated Condition within soil media
- HSG reduced by one category
- Underdrains placed above stone reservoir and discharge to surface waters

- Saturated Condition excluded volume within soil media from the model
- Volume within soil media represents 60-75% of the facilities overall volume in typical configuration

RAINFALL DATA
CLARKSBURG MONITORING STATION





PE = 1.8”

Saturated Condition* = 1.0”

* Amount of rainfall required to saturate a minimum sized representative micro bio-retention filter

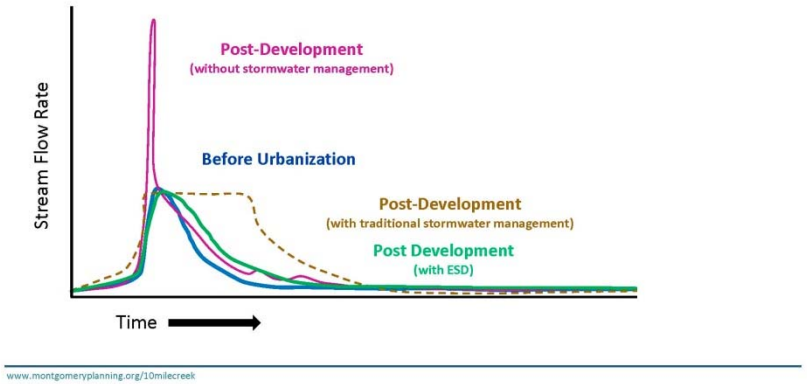
- The saturated condition of the ESD planting media during a 1-yr or 2-yr storm would have been met **only 1 time in 1586 rain events** in the last 5 years.

MNCPPC Model 1 Hydrograph Comparison

Slide #36

10 Mile Creek Area Limited Amendment

Change in Volume and Rate Affects the Hydrograph

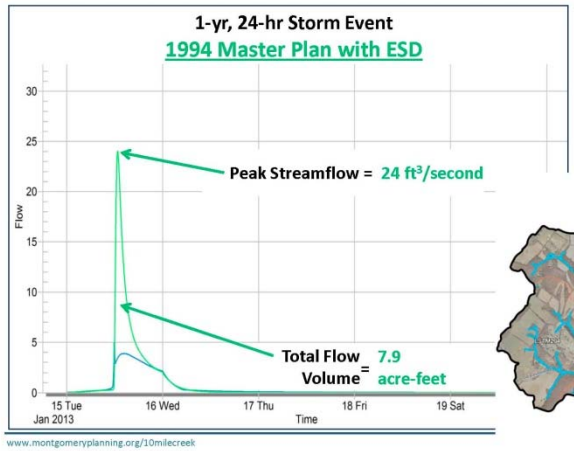


Accepted Theoretical Stormwater Hydrograph

Slide #68

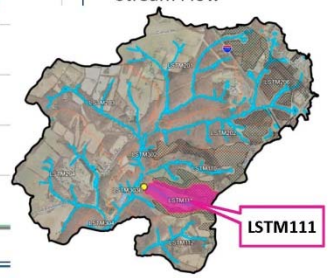
10 Mile Creek Area Limited Amendment

Example: Sub-basin with Significant Hydrology Response (LSTM111)



1994 Master Plan:

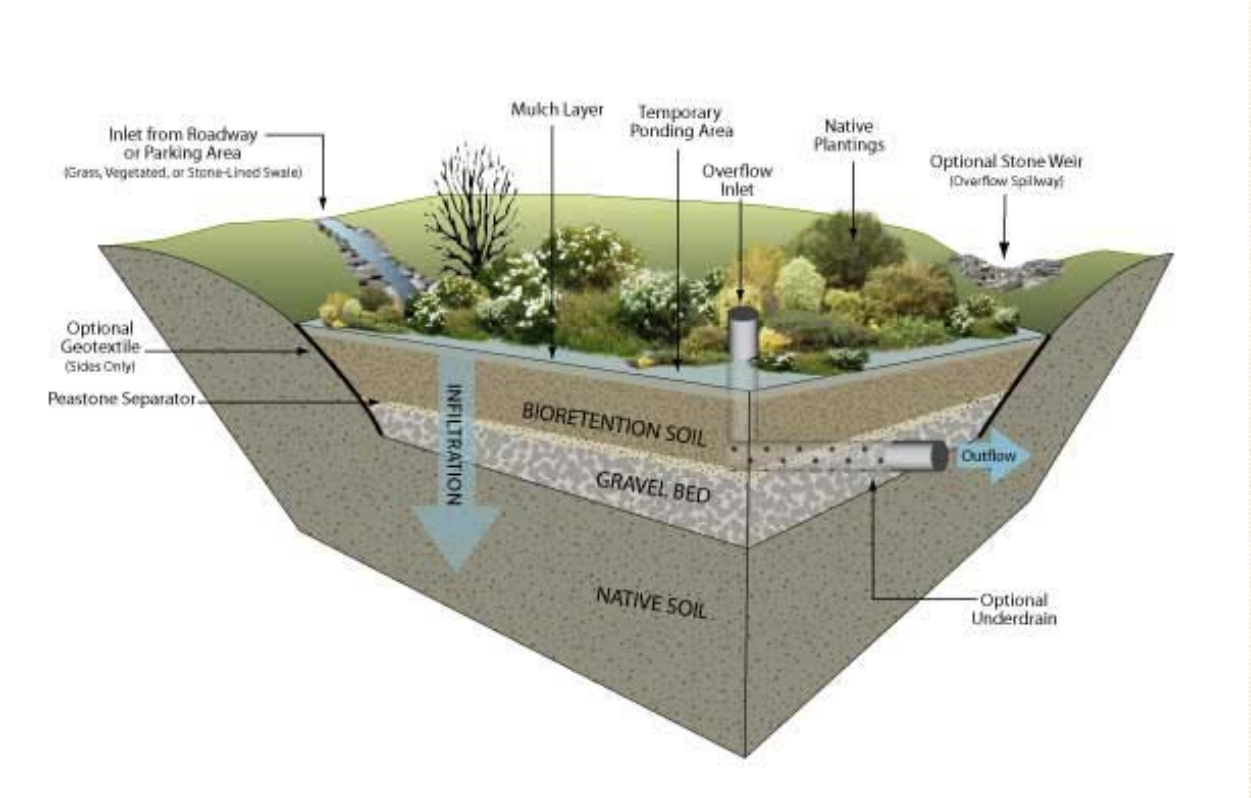
- 14.6ac Imp cover (14%)
- +84% Increase in Total Stream Volume
- +378% Increase in Peak Stream Flow



LSTM II0 Model 1 Hydrograph
Planning Board Work-session March 14, 2013

- LSTM II0 in Model 1 Hydrograph mimic the post-development (w/o SWM) hydrograph due to the saturated condition assumption.
- Saturated condition effectively removes the majority of storage volume for stormwater runoff

MNCPPC Model 2
Micro-bioretention Assumptions

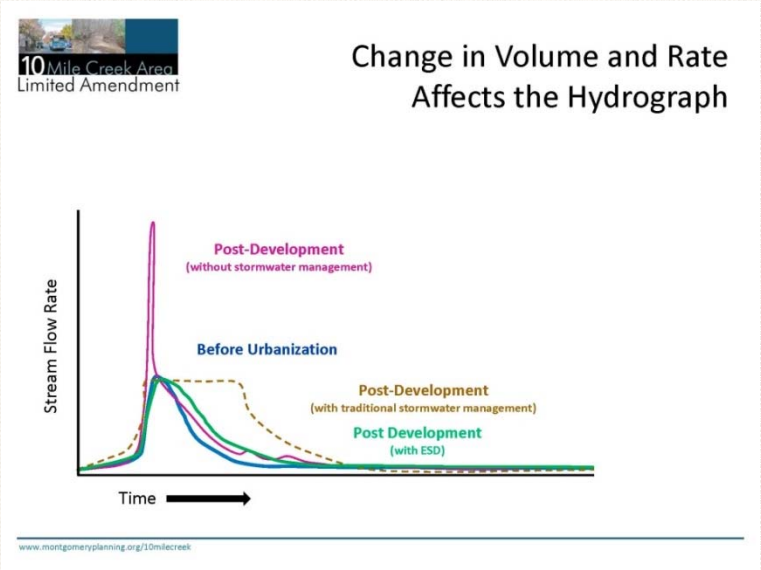


- 8” Ponding
- Minimum sized depth of 3’
- Maximum infiltration rate of 2”/hr and a minimum infiltration rate of .25”/hr with a decaying rate of 0.0015”/sec
- Constant infiltration rate of .025” /hr was used to represent the infiltration from the soil
- HSG reduced by one category
- Underdrains placed above stone reservoir and discharge to surface waters

- Ponding and media depth assumption have changed but it is still unclear as to overall volume assumption and whether the volume changed between the models
- Extremely low infiltration rate below system results in little to no groundwater infiltration within model response.

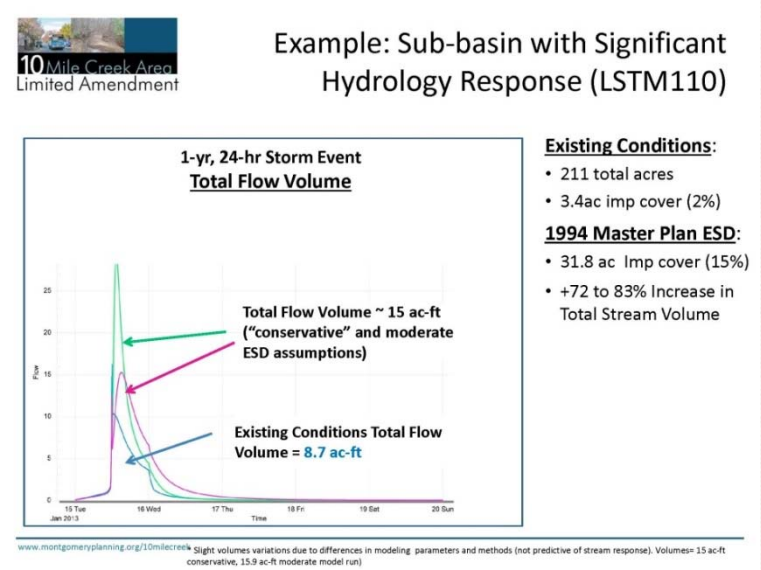
MNCPPC Model 2 Hydrograph Comparison

Slide #36



Accepted Theoretical Stormwater Hydrograph

Slide #51



LSTM II0 Model 1 Hydrograph
Planning Board Work-session April 11, 2013

- Peak lowered due to the removal of saturated condition assumption.
- Total flow volume for LSTM 110 approximately same value under both models due to the assumption of an infiltration rate from soil media of .025"/hr; effectively providing no volume reduction via groundwater recharge
- Inclusion of volume reduction within the model would result in a hydrograph with a lower peak and narrower curve; similar to existing conditions/accepted post development (with ESD) hydrograph.

H&H Analysis Review Conclusions

- Model 1 assumptions represent an extreme condition and should not be considered as part of "an expected range of response" from an ESD system.
- Model 2 assumptions excludes one of the key benefits to an ESD system; which is volume reduction via groundwater infiltration.
  - With this exclusion a representative range has not been presented.

Staff's Summary and Conclusions are Not Supported By Data

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