



TETRA TECH

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MEMORANDUM

To: Martin Maner, CAW Watershed Director

From: Trevor Clements, Tt Director of Watershed Management Services

Cc: Scott Job

Date: January 11, 2008

Subject: Pulaski County Revised Conservation Design Analysis

Based on input from Pulaski County staff and stakeholders in developing potential subdivision regulation modifications, CAW requested that Tetra Tech perform an analysis exploring the impact of modified design requirements for the Conservation Approach under the adopted Lake Maumelle Watershed Management Plan. Specifically, CAW wants to know the impact of development in the Pulaski County portion of Critical Area B under the following revised lot design conditions:

1. Minimum lot size of 5 acres for both low and high sloped areas.
2. Maximum imperviousness of 10 percent.
3. All driving surfaces (roads and driveways) must be paved.
4. Two scenarios for open space requirements:
 - a. 30 percent undisturbed area for both low and high sloped areas.
 - b. Maximal open space requirements (all non-developed areas undisturbed, both low and high sloped areas), given the previous three constraints.

Tetra Tech performed the analysis using the SET to calculate site-scale loading rates for the two scenarios outlined above. After comparing the loading rates to the Critical Area B performance standards, Tetra Tech determined what (if any) mitigation would be required to offset loading rates in excess of the standards. Finally, using estimates of available developable land in Critical Area B low and high sloped areas in Pulaski County, Tetra Tech determined the maximum number of lots that could be built for each scenario.

During the analysis, the following assumptions were made:

- To be consistent with all previous analyses, Tetra Tech assumed that the developed portion of each lot would be one acre (i.e., house + driveway + maintained lawn = 43,560 sq ft). As a result, the maximum available open space was equal to 76% of the total site area (not 80% as one might expect). This is due to the assumption that development roads will occupy 5% of the site area, not included in the 5-acre lot area, and that a 100-acre development will have a net density of 19 lots.

- The analysis was performed separately for low sloped and high sloped areas – in other words, if any offsite mitigation was needed, it was assumed to take place from the same slope class (e.g., high-sloped areas would be mitigated using high-sloped undeveloped land.)
- Offsite mitigation did not include areas with slopes greater than 25 percent.

Results

In both scenarios, the low-sloped sites met the performance standards (Table 1). This means that by requiring paving of driveways and roads, the model is predicting that this requirement would offset the overall increase in imperviousness to 10 percent. Note, this presumes that driveways are designed such that they do not result in excessive roadside ditch gullyng that would end up causing similar impacts to runoff from gravel driveways with regard to sediment delivery.

Neither of the high-sloped sites met the performance standards (Table 1). The 30% undisturbed area high slope scenario exceeded all three performance standards, while the 76% undisturbed high slope scenario exceeded the TP and TSS standards.

Table 1. Determination of Whether Revised Designs Meet Watershed Plan Critical Area B Performance Standards

Scenario	PASS/FAIL
30% Undisturbed, Low Slope	PASS
30% Undisturbed, High Slope	FAIL
76% Undisturbed, Low Slope	PASS
76% Undisturbed, High Slope	FAIL

Acres of undisturbed area required to offset the excess loading for high sloped lands were calculated (Table 2) using the amount of undisturbed area needed to account for the additional loading, using the parameter needing the largest offset (TP in both cases).

Table 2. Required Mitigation Area to Offset Revised Designs

Scenario	Mitigation*
30% Undisturbed, High Slope	0.57
76% Undisturbed, High Slope	0.16

* Acres of mitigation per acre of development

For available developable land in Critical Area B in Pulaski County, Metroplan's March 2007 analysis of the State of Arkansas 5-meter DEM (dated 2006) was used (Table 3). Tetra Tech assumed this analysis represented the best available information about land surface slope and developable area given the significant increase in resolution over previously available data.

Table 3. Developable Land in Pulaski County Critical Area B, Based on Metroplan Analysis of State of AR 5-meter DEM

Slope Class	Acres
Low (0-15%)	15,520
High (15-25%)	5,426
Very High (>25%)	2,882

Based on the amount of available land in the low and high sloped categories, Table 4 shows the estimated maximum number of lots that could be built under the revised scenarios while meeting the overall loading

allocation for the Pulaski County portion of Critical Area B. The estimated maximum number of lots on the low slope areas remains the same as estimated for the current Watershed Plan recommended low slope designs: 2,949 lots. The number of lots for high slope areas does change, however. Under the existing Plan, the estimated maximum for high sloped areas is 532 lots. Developers can increase this maximum to 814 lots (i.e., accounting for land area from the Very High Slope category) by exercising a cluster option and increasing the amount of undisturbed land on the development parcel to provide the equivalent of 30 percent of low slope land, 50 percent of high slope land, and all of the area in the very high slope category. For comparison, under the revised design alternatives, the maximum number of houses on high slope would range from 658 to 890. This range is slightly higher than the 532 to 814 maximum number of lots for the existing Plan.

Table 4. Estimated Maximum Number of Lots that Could Be Built in Pulaski County Critical Area B Under Revised Designs

Scenario	Number of Lots
30% Undisturbed, Low Slope	2,949
30% Undisturbed, High Slope	658
Total:	3,606
76% Undisturbed, Low Slope	2,949
76% Undisturbed, High Slope	890
Total:	3,839

The 30% undisturbed area scenario would result in an estimated 1,965 acres of mitigation for high sloped land in Pulaski County for Critical Area B, while the 76% undisturbed area scenario would result in an estimate of 741 acres of required mitigation (Table 5). This land would need to be donated by developers (at the rates shown in Table 2) and placed into permanent conservation easement to ensure long term protection of the lake by meeting the load allocations via this mitigation.

Table 5. Total Required Mitigation Area to Offset Revised Designs

Scenario	Mitigation*
30% Undisturbed, High Slope	1,965 acres
76% Undisturbed, High Slope	741 acres

* Total acres of mitigation for number of lots developed - Table 3