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during the summer months last year. "That anomaly could skew the data to the low side," he said.

Hands Across the Lake (HAL), an environmental group of residents who live primarily in the Brandermill and Woodlake communities, which have the most frontage on the reservoir, is also disputing the latest .009 milligrams figure. "It's a highly suspicious number," said HAL Co-chair Tom Pakurar. "I think the data got screwed up, and the county needs to run the data supplied by the water treatment plant to see if they come up with the same statistics."

The report from Addison-Evans Water Production & Laboratory Facility, the Chesterfield County Department of Utilities and Department of Environmental Engineering and KCI Technologies wasn't all good news, however. It also reported 13,445 pounds of phosphorous in the reservoir, the second highest total since 1992.

Last year, the county's environmental engineers said the reservoir should not exceed 25,000 pounds of phosphorous runoff per year and at build-out of already approved zoning, the county would be 4,000 pounds over the maximum recommendation. That forecast is what many developers are complaining about.

When evaluating the 2006 data, the .009 milligrams per liter finding is more significant than the overall poundage of phosphorous because that's the measurement the county uses to monitor runoff into the reservoir. According to the 2006 report, the milligrams per liter measurement is "the most reliable and accurate method to track" the health of the reservoir.

#### Upper Swift Creek Plan

Developers welcomed the report's findings since the proposed Upper Swift Creek Plan includes tough new water quality standards that could drastically limit the amount and type of development allowed in the reservoir's watershed.

"The data report is good news for the reservoir," said Dave Anderson, a partner with Roseland Development Company.

The company's Roseland project with 5,140 homes and 1.5 million square feet of office and retail space goes to the planning commission for review later this month. Roseland would drain to the reservoir and have to comply with existing or new standards, if adopted, to meet water quality requirements.

Roseland officials recently announced their project will not be able to meet the requirement of "no net increase in phosphorous runoff" or .16 pounds of phosphorous runoff per acre annually contained in the Upper Swift Creek Plan.

Like other developers, Roseland believes the phosphorus requirement is too demanding, and they question if the ordinance revision is even needed.

"We need to be careful about changing ordinances because it may not solve anything," said Anderson.

The 2006 data "doesn't reduce our need to make sure that some of our assumptions we're asking the county about in its [water quality] modeling doesn't fit its conclusions," Anderson added.

"It's going to be very difficult to meet the no net increase requirement," acknowledged Flanagan, "but developers can pay a prorata fee to the county to remove existing phosphorous."

Even the planning commission has questioned if the phosphorus requirement is attainable, especially for commercial property. The commission voted not to recommend approval of the plan to the board of supervisors in August after several commissioners questioned if the modeling data could accurately forecast future phosphorous loads in the reservoir. Months earlier, Chairman Dan Gecker asked to see the raw data for himself.

Last month, the board agreed to defer all rezonings in the watershed or development

that drains to the reservoir until its Oct. 24 meeting when presumably it will decide what to do with the proposed Upper Swift Creek Plan.

The revised land use plan has been over four years in the making. The plan area starts at the route 288/360 intersection and extends eight miles west, including the western Route 360 corridor.

In addition to placing limitations on phosphorus runoff, the plan also sets aside 4,900 acres as a deferred growth area - meaning no development can occur in that area until sometime in the future. Some property owners in that area strenuously object to the provision, saying the plan violates their property rights.

The plan also reduces the amount of acreage for residential development in the watershed by 8,560 acres while increasing the amount of commercial acreage by 2,260 acres.

#### Opposing viewpoints

Some county officials and environmentalists say the tough standards included in the proposed plan are needed to protect the reservoir as a future source of drinking water. The reservoir currently provides about 25 percent of the county's drinking water.

"HAL supports the no net increase in phosphorous in the amendment," said Pakurar.

"The [2006] water quality report is based on the existing pattern of development," explained Planning Director Kirk Turner. "The revised ordinance [in the proposed Upper Swift Creek Plan] is for the protection of the reservoir at build-out in the watershed. According to the information provided by our consultant CH2MHill, the measures are necessary to protect water quality."

But some disagree with how CH2MHill arrived at its recommendations in the plan.

"There needs to be a peer review of the Swift Creek Reservoir model, which appears to have a deficiency because it doesn't account for the turnover of water by the treatment plant and flowing out the spillway," argued John Jordan, president of Jordan Consulting Engineers. "That's a serious shortfall. We have also repeatedly asked the county to look at aeration systems that are used in reservoirs elsewhere. It is unwise to approve an ordinance change when the model is in question. It's premature and hasn't been thought out."

Jeff Collins, president of Townes Site Engineering, agrees. He served on the watershed committee in the mid-1990s that recommended the current ordinance requiring developers to limit development to .22 pounds of phosphorous per acre per year for residential and .45 pounds for commercial development to keep the in-lake phosphorous below .05 milligrams per liter.

"There's a rush to judgment on the proposed standards," said Collins. "Going to the .16 standard seems excessive and would heavily impact economic development. The 2006 report indicates the current standards are working well. The field monitoring that supplies [phosphorous] data is important, not the modeling [of what might happen in the future]. The modeling lacks accuracy."

#### Other possible actions

One option to reduce existing phosphorous levels is to dredge Ashbrook Lake, a shallow lake surrounded by the Ashbrook community off Route 360 that drains to the reservoir.

Dick McElfesh, director of environmental engineering, said he's hired an outside firm to provide an estimate on what it might cost to dredge Ashbrook Lake. "We should have an answer by next month," he said. "Our first goal is to correct the flood plain. The lake is very shallow, and we have to determine how much, on a cost effective basis, we need to dredge." Presumably, developers would have to pay for that remedy.

Another way to reduce the phosphorous levels is to retrofit BMPs (ponds that collect runoff) in existing developments.

Chesterfield also plans on implementing an education plan for citizens, hoping for their cooperation to lower phosphorous runoff. Fertilizing lawns contributes considerably to the phosphorous problem.

### Phosphorous data on the Swift Creek Reservoir

| Year | Phosphorous milligrams/liter* | Phosphorous in pounds** | Annual rainfall*** |
|------|-------------------------------|-------------------------|--------------------|
| 2006 | .009                          | 13,445                  | 57.53              |
| 2005 | .021                          | 3,715                   | 35.36              |
| 2004 | .026                          | 8,019                   | 55.23              |
| 2003 | .035                          | 15,376                  | 62.46              |
| 2002 | .021                          | 3,477                   | 35.52              |
| 2001 | .030                          | 5,859                   | 30.34              |
| 2000 | .030                          | 6,168                   | 40.78              |
| 1999 | .030                          | 8,048                   | 47.37              |
| 1998 | .030                          | 9,221                   | 48.08              |
| 1997 | .030                          | 5,976                   | 35.97              |
| 1996 | .005                          | 10,060                  | 53.36              |
| 1995 | .006                          | 4,750                   | 39.80              |
| 1994 | .002                          | 6,755                   | 44.57              |
| 1993 | .002                          | 11,100                  | 47.44              |
| 1992 | .002                          | 4,653                   | 41.25              |

\*County ordinance mandates phosphorous levels cannot exceed more than .05 milligrams per liter.

\*\*County guideline recommends not more than 25,000 pounds annually.

\*\*\*Rainfall in inches. Generally, more rainfall increases the amount of phosphorous. Average annual rainfall for the past 20 years is 42.3 inches.

Developers have also been briefed by county staff on low impact design methods to reduce phosphorous runoff. For future residential developments, lot sizes could become smaller to allow for more open space. Developers could be encouraged to reduce the amount of impervious surfaces - rooftops and driveways - so water could seep into the ground naturally and not become runoff. That could mean homes with two or more stories might be favored because they have less surface area. Rooftop rain from downspouts could be redirected away from streets to areas where it could penetrate the soil. Curb and gutter streets would be out in favor of natural

grass ditches along neighborhood streets. Sidewalks would be less likely because of runoff.

Built in 1974 with many natural yards, McElfesh has cited Brandermill, currently Chesterfield's largest planned community, as a model for the future. But homes built there later in the 1980s had more traditional grass yards.

Open space, natural yards without grass and BMPs have kept the runoff to the .012 level in Brandermill. "Trees and bushes are far more efficient than BMPs," said Pakurar. "Brandermill could become the poster child for Chesterfield's future."



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