

**Observations and Comments on the  
Jefferson County Public Service District  
Flowing Springs / Cattail Run Wastewater Facilities Plan**

**Water Advisory Committee Report**

At the request of the Jefferson County Commission (October 23, 2003 meeting notes and personal communication to Joseph Hankins, WAC Chair), the Water Advisory Committee was asked to review and provide comments back to the County Commission on the Flowing Springs / Cattail Run Wastewater Facilities Plan (the “Cattail Run Plan”). Acting on a request by the Public Service District for County Commission support for the Cattail Run Plan prior to submission to state funding and regulatory review processes, the County Commission deferred support until review and comment could be provided by technical, municipal and planning resources in the county.

**Summary**

Citizens of Jefferson County have a reasonable expectation that responsible stewardship of common water resources and the planning and management of associated public infrastructure for supply and treatment will be held by local government. When faced with large investments in infrastructure or complex resource protection and planning initiatives, comprehensive answers and analysis should be made readily available to the public.

Currently the planning and management of water supply and treatment, aquatic resource stewardship, public health, land use and economic development is partitioned and stove-piped making broad, inclusive responsibility nearly impossible. In the review of the Cattail Run Plan it is strikingly clear that the mission and narrow responsibility of the Public Service District can create conditions at odds with the concerns of a far-reaching constituency of stakeholders. The Cattail Run Plan proposes a capital investment and long term environmental impact that will resonate for decades in Jefferson County. Independent of the final plan recommendations, a regularly voiced observation by reviewers is dissatisfaction with the depth and rigor of the analysis of current conditions, justifications, alternatives assessment, and environmental and economic impact; frustration at the lack of clear specific integration with the county comprehensive planning process; and the failure to develop a treatment plan that is innovative, best in class, and doesn't rely on a legacy of environmental subsidies beyond the county borders for long term operation.

The Public Service District has failed to make a convincing case, understandable to the existing general community and to the ratepayers directly impacted for the phased investment of tens of millions of dollars in construction, capital investment and long-term debt service. In some future final analysis the recommended option selected in the Cattail Run Plan may be found to be environmentally compatible, socially sustainable and economically viable. The complete basis for that conclusion is not found in the current plan documents. Proactive facilitation of greater input through citizen education, community outreach and technical collaboration will create clearer consensus on needs and outcomes, but will require more resource investment than the minimum communication standard approach to date.

## **General Observations**

### **Flowing Springs / Cattail Run Wastewater Facilities Plan**

One approach to examining the large amount of material provided in the Cattail Run Plan is to use as a guide two checklists provided by agencies to organize and assure appropriate analysis. The Facilities Plan Checklist provides an organizational structure to the document as a guide for consideration for funding by the State Revolving Fund. This checklist can be found at the beginning of the document and highlights a broad range of information, beyond engineering design, to be considered when assessing project viability. A second checklist, found in Section IX of the Cattail Run Plan is the Environmental Screening Checklist required by federal code for any project that will include federal dollars or impact any crosscutting federal interests or authorities. Both these checklists were designed to minimize the possibility that planned and or built projects will miss critically important issues or legal requirements that lead to unintended consequences. As designed, the screens are to be used as determiners of additional analysis or assessment. Dismissal of issues as not applicable or no impact should be highly conservative to avoid expensive delays or project stoppages later.

In the Facilities Plan Checklist, the Cattail Run Plan is indicated as an addendum to an existing Facility Plan. Also in the introduction the Cattail Run Plan makes reference to a previously authorized facilities plan for the entire county described as the County Wide Wastewater Study. The inference is that the Cattail Run Plan is part of a larger scheme and is a logical implementation of some fraction of the previous authorized plan. It is recognized that the PSD has previously developed county-wide wastewater studies (2000) and water supply studies (2002), however, the basis of those studies as broadly accepted plans for implementation is open to question. In addition, neither study is readily available to the public in a digital format that allows for easy reference and assessment for consistency with the Cattail Run Plan.

In the Facilities Plan Checklist numerous information sections Under Section II Current Conditions, as required by State Revolving Fund regulations, are marked as *not available/not applicable* when many of the issues seem to be both relevant and important to the analysis of the current project. Specifically Infiltration/Inflow analysis does not indicate that any of the PSD's existing service lines, those to be adopted under cooperative agreements, and the many customers that now or will operate under future proposed un-metered service agreements have ever been audited or inspected. Additionally, as the PSD will not be providing water supply service to much of the plan area this would be a place to discuss the issue of supply quantity as well. The characterization of homes not currently sewered is incomplete and difficult to assess with respect to existing homes with on-site systems that may be compelled to connect to new lines, existing homes that may not be compelled to connect and the specific condition of the on-site waste systems within the plan area. No effluent data is provided for existing plants or on-site systems that would be connected to the new plan system so no comparison can be made for the environmental trade-offs, positive or negative, in the elimination or consolidation of these existing discharges. Under the assumption of "sewer equivalency", permitted and properly operating on-site systems serving existing homes should not be viewed as temporary installations awaiting some final centralized permanent fix. Stream reaches are not identified by stream basin code readily available on state web sites.

Section I Introduction of the Cattail Run Plan provides a cursory over-view of the justification, authority and current conditions for the project planning area. Specifically (Page I-2) the plan notes that *the primary objective of the study is to provide a safe and healthy environment for the existing residents and wildlife in the study area.* The text repeatedly associates economic growth and potential for future community welfare with adequate infrastructure planning and investment in environmental protection, certainly it is difficult to argue with that contention. Problems occur however when the logical argument is extended to the Cattail Run Plan improvements as the specific means to *economic and ecological superiority.* Such statements are absent supporting documentation or context here or in Section VI- Environmental Considerations.

The Introduction continues to justify the plan as consistent with the current Jefferson County Comprehensive Plan but makes no reference to the existence of a well documented, reviewed and publicly available draft Comprehensive Plan revision. While the draft Comprehensive Plan is not adopted it is close to a final version. The recent revisions were driven particularly by community recognition that growth, environment, land use and planning issues were not adequately addressed in the decade old 1994 Comprehensive Plan. As the PSD indicates a strong interest and commitment to the sustainable future of Jefferson County, it is unfortunate that the themes found in the most recent Comprehensive Plan document would not be referenced in the Cattail Run Plan analysis.

The Introduction continues with the observation (I-2) that the planned Cattail Run facilities would replace a number of septic systems and 11 existing package treatment systems. *Many of these systems have a limited life span that may require costly maintenance or replacement.* All wastewater facilities require maintenance and ultimately replacement or upgrade to meet new technological requirements. The proposed new Cattail Run plant is no exception. Package plants have been installed in the past as a stop-gap measure until centralized sewer can provide a “final” solution. If distributed systems had been installed with the objectives of long-term capital and operational efficiency rather than the least-cost quick fix, the economic analysis would look quite different.

The Introduction (I-3) also fails to recognize that the environmental impact of on-site septic systems, package plants and the Charles Town treatment plant on small receiving streams is a function of the treatment technology applied and effluent quality achieved. As waste load volumes increase with no increase in effluent quality, then larger assimilation capacity must be sought in the receiving environment. There is no fundamental technological reason treatment plants of a range of sizes or advanced on-site treatment systems cannot produce exceptional effluent quality if adequately designed and operated to do so. We recognize the operational and technical efficiencies of larger scale treatment plants but also note that three fourths of the first cost of such projects is generally found in collection or disposal piping. An alternative to finding a larger wastewater gutter for larger wastewater flows is to improve the quality of the effluent to equilibrate the environmental loading. The increased costs of smaller distributed plants with advanced technology can be offset by the reduced costs of the localized collection systems.

We are in agreement that small receiving streams and the karst terrain of Jefferson County are vulnerable to contamination and environmental degradation. We are in agreement that the current level of wastewater treatment technology is often inadequate to protect public health and environmental integrity and certainly is not adequate if scaled to the increased loadings projected by growth estimates, apart from whose projections are used.

In Section II Current Situation (II-1) the Cattail Run Plan reviews the mix of wastewater treatment systems used by existing County households and businesses. The text reports information from Region 9 that provides an estimate of 14,606 housing units in the county and a proportion of housing units split by public sewer or on-site disposal. Although not indicated, this table is apparently based on 1990 numbers repeating a consistent practice of using out-of-date information when better numbers are readily available. A table from the 2000 census web page was even included in the plan as justification for the calculation of 2.54 persons per household. The 2000 Census data indicates 17,623 housing units in the county and reasonable estimates based on new building permits in the last three years would put the households with on-site disposal systems approaching 11,500.

It has been estimated that areas with more than 40 septic systems per square mile can be considered to have the potential for contamination problems (Canter and Knox, 1986), even in communities with adequate soils and management systems in place to assure proper operation. Jefferson County at 211 square miles now averages over 50 septic systems per square mile with vulnerable karst geology and generally poor soils. Current subdivision regulations in Jefferson County allow a well and septic system to be placed on a 40,000 square foot lot, resulting in something on the order of 690 septic systems per square mile. There is growing understanding in the community that this intensity is not sustainable and will require a sacrifice of the groundwater commons of the county to maintain.

The Cattail Run Plan invests significant effort in making a case for an increased number of *failing* septic systems that the Jefferson County Health Department recognizes as additional justification for centralized waste treatment need. There are a number of conflicting studies, conflicting analyses, letters and professional opinions argued and presented. There is no contemporary study that provides an academically credible failure rate or even a consistent definition of system failure for Jefferson County. There is no spatially tied inventory of installed on-site systems that are permitted and there are some systems that pre-exist 1970 era regulations and are not recorded at all. The management program through the Health Department for existing on-site waste treatment systems is only a plan of opportunity on property transfer or financing. There is no on-going requirement for periodic inspection or pumping of septicage.

We certainly agree that *failing or failed* on-site systems are a problem and where they occur a solution must be found to protect public health and the environment. A larger problem is to understand that even properly operating and installed conventional septic system technology provides very limited primary waste treatment and through sheer density of installations can create an environmental threat. Conventional septic systems are not designed to remove and sequester nitrogen, phosphorous, chlorides or a range of other dissolved contaminants from household disposal. A large fraction of the contaminants that are water-soluble will

eventually move from the leach field soils to greater depths and intersect the ground water at the boundary of the epikarst land surface and the saturated soil zone. Soil-based on-site treatment in the form of the familiar septic system is the single largest wastewater treatment infrastructure in the county, approaching or likely over 2 million gallons per day discharge into the ground (11,500 septic systems x 178 GPD per EDU  $\approx$  2.05 MGD, a conservative calculation).

Given the large number of existing on-site systems and the addition of several hundred new systems per year, there is clearly a range of performance quality. As there are areas of the county where low densities, good soils and contemporary prescriptive standards are in place, on-site septic disposal systems will likely remain an appropriate and cost effective “sewer equivalency” practice in the near term. With the potential addition of an on-site waste system management service and barring a change in the qualifying conditions, septic systems or preferably more technologically advanced on-site disposal systems may continue to be a preferred and safe alternative in large areas of the county.

Background material provided in Section II and throughout the document is inconsistent in its description of issues within and outside the proposed service area. This format tends to exaggerate the need for hookups within the service area. For instance, on pages II 2-9, areas are listed that would benefit from public sewerage. However, many of those locations are not in the proposed service area. The background material should be focused on the need within the defined service area for each phase to allow the reader a clearer picture of the needs being serviced under the proposal. The document goes from generalized background material to conclusionary recommendations with very little description of the actual basis for the analysis. A better description of the analysis should be provided.

The Jefferson County Health Department has identified on a number of occasions (DeHaven letter April 1999 and many other communications) areas of the county that present a concern and would likely benefit from public sewer systems including the area along Route 45 west of Shepherdstown; the general area encompassing Leetown, Middleway and subdivisions extending toward the Opequon; the Blue Ridge Mountain and Keyes Ferry area and the Halltown to Millville area.

The Cattail Run Plan does generally address the Halltown and Millville area needs by planning collection lines in the area. However, substantial additional investment on the part of existing property owners will be required to connect voluntarily or as required by PSD regulation. Nowhere in the Cattail Run Plan is an estimate provided for the privately borne cost to the homeowner or commercial customer for the hook up for drop lines across private property and for the cost of permanently decommissioning the existing on-site waste treatment system as required by the state’s Division of Groundwater Protection and Injection Well Control Program. It is disappointing that existing and well-known on-site system problem areas will not receive any direct resolution from the initial phase of the Cattail Run Plan without substantial additional investment outside the scope of the proposed project funding.

We believe that a well-conceived and responsible plan would specifically assess and target clusters of the oldest septic systems, the smallest lots, the problem soils and the most vulnerable riparian areas. In addition the plan should provide for an enabling subsidy through grants or other mechanisms to hook up properties and properly decommission abandoned septic systems in the common interest of public health and environmental quality. The Cattail Run Plan appears rather to have optimized the existing customer count per collection pipeline mile without regard to the widely disparate actual need for centralized sewer service within that existing potential customer base.

On page II-3, the Cattail Run Plan notes the presence of four sites with reportedly high levels of radon-22 gas present in the sampled groundwater. No connection to the Plan is apparent or offered. We would note that the real estate industry frequently tests for the presence of radon on property transfer and that radon gas is frequently present in similar geologies across a broad region.

In Section III Future Situation, there is general discussion again about population projections at the county level and speculation about growth issues. There is no discussion that is specific to the Cattail Run Plan service area.

We would note that projecting growth in the county is a complex and speculative game, dependent on many factors that are controllable or not controllable at the local level. Multiple projections are presented that vary by over thirty percent in the high and low projections for county population by 2020. We believe that development should be sustainable in meeting the needs of the present without compromising the future, and should be based on capacity limits established by natural resource capabilities and infrastructure.

In the Section III text repeated justifications are drawn based on the 1994-96 Comprehensive Plan with no reference to the existence of an advanced revised draft of that document that will become controlling within the time horizon of the Cattail Run Plan review.

In Section IV- Alternatives, the Cattail Run Plan discusses 21 options considered by the PSD and the engineering consultant Pentree, Inc. The section also provides a limited discussion on technology option choices. A number of reviewers commented that the analysis presented in this section was disappointingly brief and failed to make a convincing case for consideration, adoption or elimination of either technology choices or location alternatives. Specifically the analysis presented failed to note the existence of innovative implementations within the county (Tusawilla Hills near zero discharge to surface water design that is three decades old, Prospect Hall onsite wetland disposal system, a USEPA NODP V demonstration site of recirculating sand filters and peat filter alternatives at The Freshwater Institute) and failed to fully leverage in-state resources available through the National Environmental Training Center for Small Communities, the National On-site Demonstration Program and the National Small Flows Clearinghouse located in Morgantown.

In the Alternatives discussion there is no real commitment to discussion of the implications of a No Action Alternative. While the PSD and the engineering firm may not consider this a realistic option, the community needs to be presented with a realistic discussion of this

outcome complete with hard numbers and implications. A rigorous consideration of this alternative would bring home some outcomes not considered in the plan and potentially help bring consensus to community understanding of the issues.

In Section IV Alternatives (IV-1) there is a brief discussion of the location of the wastewater plant locations that opens with the statement: *Since the Shenandoah River is the major drainage systems for the study area, it is desirable to place a plant near its mouth.* We believe that the predisposition by the engineering consultant for large conventional centralized systems utilizing the assimilation capacity of large receiving water flows leads to this conclusion with very little analytical rigor of the full scope of options available.

Nowhere in the Cattail Run Plan is there recognition by the consultant that the controlling driver for wastewater treatment technology is rapidly shifting to interstate compacts and regional planning concerns for watershed quality and loading (CBF, 2003). Independent of any specific location within either Potomac or Shenandoah direct drains, the impact of the plant, the impact of new loads projected and the impact of existing loads replaced by any proposed project will be measured as part of the Chesapeake Bay accounting system.

As a Headwaters Partner since 2002, West Virginia is currently developing Tributary Strategies that are driven by modeling efforts from the Chesapeake Bay Program. Current cap load allocations project percent reductions from 2001 estimated base loads of nitrogen, phosphorus and sediments to meet Bay Compact objectives for 2010 loadings to the Bay.

**Table 1** Cap Loading Allocations for West Virginia drainages to the Chesapeake Bay based on May 2003 Headwaters States Agreement. These numbers are the basis for the current Tributary Strategies Development process to create implementation plans for meeting cap goals by 2010.

County	Bay Basin	Total N Cap in annual pounds	% Reduction from 2001 base load
Berkeley	Potomac	721,723	28
Grant	Potomac	601,322	33
Hampshire	Potomac	746,956	32
Hardy	Potomac	703,904	40
Jefferson	Potomac	489,407	39
Mineral	Potomac	441,750	30
Morgan	Potomac	313,135	25
Pendleton	Potomac	692,587	34
Preston	Potomac	2,437	24
Tucker	Potomac	978	20
Monroe	James	33,236	17
West Virginia Total		4,747,435	33

As background Jefferson County was "credited" with starting out at 970,450 TN pounds in 1985 and through BMP implementation, changes in land use and other practices has reduced to the current 796,789 pounds loading in 2001. However, the model predicts that we will backslide to 826,115 TN annually if we don't implement additional best practices and measures. The entire purpose of the Bay Tributary Strategies process is to engage

stakeholders in developing a plan to get to the target number by 2010 by committing to additional reduction strategies. When faced with new loads we need to more than offset them with reductions elsewhere. There are equivalent numbers for sediment (15% reduction to 31,379 tons cap load per year) and total phosphorus (2%9 reduction to 42,568 pounds cap load per year) for Jefferson County.

The relevance of this discussion to the Cattail Run Plan is that certainly, and sooner rather than later, the minimum water quality effluent treatment requirements from will be driven beyond the immediate considerations of the assimilation capacity of the receiving water (the Waste Load Allocation calculated by WVDEP) to considerations of downstream limits beyond the immediate sub-basin reach. We believe that this will drive the waste treatment design approach to the very limits of best available technology performance. Consideration or commitment to anything less may well saddle ratepayers with expensive performance upgrades within the horizon of initial cost recovery planning and may also threaten economic growth limits imposed after a potential federal 2010 TMDL implementation for the entire Chesapeake Bay region.

In the existing Cattail Run Plan we note that the consultant based costs in the option selected on an SBR plant with tertiary capabilities. We would suggest that full consideration be given to pricing options that include even more advanced waste treatment technologies such as biological nutrient reduction (BNR), nutrient reduction technology (NRT) and the capability of delivering effluent total nitrogen at or near 3 mg/l. We encourage additional consideration of MBR plant technology. We encourage comparison of all treatment approaches with a metric of projected N and P loading per EDU to the Bay, including decentralized or distributed solutions.

Recognizing that advanced technology may come with additional cost when compared with lesser performing standards it is important to keep a full accounting of benefits, especially where pollutants may be prevented from entering the regional Bay commons. There may be real dollars found in offset credits, regional water quality trading initiatives, social perception benefits, secondary economic impacts of preferred business re-locations, higher property values and quality of life issues that can be calculated and added to the balance sheet. As the PSD is interested in *economic and ecological superiority* (I-2), the full calculation set will be required for fair analysis.

Also discussed in Section IV (IV-8) is the issue of water reclamation and recycling under the headings Sewage Effluent Recycling and Irrigation with Treated Wastewater Effluent. Water reclamation is an emerging technology with more of a proven track record technologically than from the public perception side. Many of the limitations here are those of acceptance at the regulatory level. As Jefferson County will largely depend on relatively abundant groundwater supplies for the foreseeable future, reclamation for direct potable supply is less attractive, although an argument could be made that reclaimed water may well be a more consistent, controlled and cost effective raw water supply option than say the Potomac River. What is probably more interesting is the opportunity for reclaimed water use for industrial process, agricultural, or non-potable commercial use. Why wash your cars, water your Christmas trees, mix your cement or irrigate your golf course with costly made drinking

water? Wastewater effluent that is reclaimed and utilized is not directly discharged thus preserving waste loading permit reserves, wastewater and drinking water plant treatment capacity, nutrient allocation cap space and potable made water costs. Imagine the perceived value to a new homeowner, soccer coach, industrial park tenant (making recycled paper board?), or even the natural resource manager interested in minimum in-stream flow preservation when presented with the opportunity to open the valve on the purple pipe non-potable line at substantial discount off the blue pipe potable water prices. As the regulated quality of effluent discharges increases, the value of the effluent for alternative uses increases as well. At some point the water is too good to throw away. Water reclamation should not be dismissed as something they do in the arid West or only in California. It is a real, viable and increasingly appealing opportunity that deserves serious consideration. If wastewater treatment plants were distributed nearer to source generation, the piping back of reclaimed water would be an easily recovered cost, especially if small diameter non-potable force reclamation mains could be installed when the gravity sewer lines are installed.

Just as an observation, if wastewater plant effluent nitrate-nitrogen levels were reduced to state-of-the-art 3 mg/l, that is arguably less nitrate-nitrogen than is present in many of the private drinking water wells in Jefferson County today.

Section IV – Alternatives contains a table (IV-9 Table 9) that ranks the non-monetary factors associated with waste treatment plant technology approaches. While the consideration of such factors is appreciated, no real rigor or even definitions are provided so the reader can understand how the rankings were scored. It may well be that different stakeholders would have different ranking outcomes.

An observation about the proposed collection system plans is the lack of fidelity to following the contours of the sub-basin drainages and working within the naturally occurring watersheds. We believe it is in the long-term interest of sustainable development in Jefferson County to recognize and work to coordinate planning of wastewater, water supply, storm water management, wildlife habitat, recreation corridors, transportation and overall economic development in ways that respect these natural corridors and maximize the opportunity for coincident parallel green infrastructure protection. Like much of the current land use planning and zoning in the county, the Cattail Run Plan and the Alternatives illustrated evolve on two-dimensional maps with data layers that largely consider structures, transportation and large land blocks for development to the diminishment of the importance of the natural systems in place. There is an opportunity to utilize gravity and to utilize natural drainage patterns as the core determiner of common sense utility infrastructure development and leverage that public investment to enhance the opportunities for riparian buffer protection and appropriate low impact land use planning. The lack of linkage to a collaborative overall comprehensive planning approach leads the Cattail Run Plan to forced optimization of factors that are not in the best future interest of a sustainable community.

Section IV does contain itemized cost estimates and diagrammatic schematics for some of the alternatives and it is expected that the engineering consultant would have strength in developing this information.

Section IV also contains a continued discussion of the negative attributes of conventional septic systems ending with *septic system overflow is human waste, which can carry diseases and odors which may attract flies. Neighbors must rely on each other to ensure that their community is not endangered by failing systems.* We would suggest that the septic system management situation in Jefferson County is not quite as bleak as this although it could be improved. More importantly, we remind the consultant that much more serious environmental problems can occur much faster with a leak in a sewer line or worse a force main rupture.

Section IV provides brief paragraphs characterizing the twenty-one Alternatives considered but no information is provided that allows the reader any critical discrimination ability to rank or assess the appropriateness of one over another or understand how the consultant came to decisions in recommending Alternative 6S.

Section V Plan Selection and Public Participation describes the minimum requirement of a public hearing and Class II legal notice and indicates that *An overhead projector will be used to clearly show photographs, charts and explanations for the projects.* Anyone that attended the Public Hearing at Wright Denney might contest that even this minimum communication standard was met. We note that the consultant understood Public Participation in this section to mean only how user charges would be calculated. We believe that the purpose of the section in the Facilities Plan outline was intended to demonstrate the process for gaining public consensus and understanding of the plan. We would note that this entire section in the Cattail Run Plan is three quarters of one page.

Section VI Environmental Information contains much information that is simply lifted from pervious county-wide study plans and is not specifically refreshed to examine the issues within the feasibility plan service area. We have no argument with the restated objective of the study *to provide a safe and healthy environment for existing residents and wildlife in the study area.* We recognize that adequate wastewater infrastructure is an essential component of a healthy, sustainable community but we continue to be concerned that the PSD takes the position that wastewater service can only be defined as centralized, large-scale systems.

We agree with the general contention that soil types and karst geology in Jefferson County present serious and critical challenges to the installation of conventional septic systems. Default dependence on conventional septic systems as the primary waste treatment service in the county will inevitably be limiting and will become increasingly difficult to manage sustainably if installation density increases. The importance of the karst terrain in determining the natural carrying capacity and conditions for all aspects of water resources is inarguable and a key focus of the Water Advisory Committees interests.

We do not believe it is useful to engage in arguments over percent failures of all septic systems as failure and performance have not been defined and there is no credible study to resolve the issue (there should be, but that is another topic). Whether the failure rate is 2%, 4.95% or 6.27%, the reality is that within any unmanaged, distributed system there will be failures and malfunctions. One could argue that expectations of performance should be similarly rigorous for a centralized collection system and a wastewater treatment plant. A

wastewater plant that operates at 95% rating of days with no excursions beyond permitted limits is probably rated a success. It would be interesting to know how many of the Berkeley Sewer PSD's one hundred fifty plus force main lift stations are operable on any given day. Zero risk of failure and one hundred percent operational reliability are very expensive concepts to implement.

What is important is that when potential problems are identified, how is the response proposed specifically targeted to resolve it. The Cattail Run Plan fails in that it argues for the likely general existence of problems and failures in on-site systems in the county, then fails to deliver specifically focused and targeted solutions. Specifically in the proposed Alternative 6S, the 932 existing households proposed for new centralized wastewater service (personal communication to Joseph Hankins on inquiry to PSD, 10/31/2003) are not characterized or surveyed in a way that leads the reviewer to conclude that provision of service is critical in this area. It would be helpful and appropriate to demonstrate that within the service area proposed there are X households with on-site septic systems at X density and at X age or inspection state and that X percentage of these households could be served by the proposed plan and the environmental benefit is X pounds of nitrogen removed at X cost per pound of N removed. In addition it should be recognized that at a budgeted cost of ~\$23,000 per EDU, as proposed in the Cattail Run Plan, there are many options for resolving these *existing* on-site system problems for less capital and operational investment.

We agree with the Cattail Run Plan contention (VI-5) that the Jefferson County Health Department should have additional resources for monitoring on-site and wastewater treatment systems. In addition we suggest that the PSD consider adopting the concept of "sewer equivalency" and recognize all wastewater implementations in the county as a management and service opportunity, rather than dividing the county into haves and have-nots for centralized sewer service.

On page VI-6, the Cattail Run Plan makes reference to USGS calculated rate of recharge of 80 mg/d (~7.9 in/year).. Hobba, et.al. (1972) estimated 85% of stream baseflow (~9 inches/year) in Jefferson County came from ground-water discharge interpreted as the annual recharge. Kozar , et.al. (1990) calculated 11 inches/year in the North Fork Long March Run and 7 inches/year in Bullskin Run. The Plan doesn't cite specific source material within the text but in a later page in the document, the statement is made that there is 9.5 inches of recharge in Jefferson County. Apparently this number was derived by averaging 7.9 and 11 inches/year, although the basis for the number was not stated.

Discussion about the average recharge spread across the county tends to overemphasize the available water resource at any one point within the county. Groundwater supply pumpage is not distributed equally across the county. The resource could be stressed locally by heavy pumpage, reduction in recharge through a change in the surface land use and imperviousness, by inter-basin transfers, or any of a number of other activities. The overall effect of large centralized collection system with forced main pumping across tributary sub-basins is the creation of a new man-made hydrology that may accelerate dewatering of the local epikarst zone and the saturated diffused flow aquifer and may reduce in-stream flows and normal artesian spring flows. In addition, even modest reductions in the recoverable water table

volume may result in increased concentration of contaminants from other sources, increased losses to groundwater from “losing” streams, and accelerated sinkhole subsidence. We recognize this is a complicated area requiring more study, modeling and information to understand the long-term sustainable implications of infrastructure planning. We do not believe the current Plan provides any reassurance in the quick dismissal of the issue or observations that *the project will not cause a significant amount of water to be transferred from one sub-basin to another* (VI-8).

On page VI-7, the Cattail Run Plan makes reference to USGS reports of contamination in wells and springs infers a connection to failing septic systems. While we agree that septic systems generally may be part of the problem, no data is presented that specifically links the issues other than generalized literature comments. The most recent published data (Kozar, et.al., 1991) indicate that 37 of 70 samples (53%) within the county contained fecal coliform contamination. During the same study, 70% of the samples were contaminated with fecal streptococcus. However, upon evaluation of the ratio of fecal coliform to fecal streptococcal bacteria, it was concluded that the vast majority of the bacterial contamination was associated with animal waste (thirty four of thirty-eight samples.) Additionally, in the same study, it was found that of 70 sites sampled, 18 exceeded the MCL of 10 mg/l nitrate nitrogen for drinking water. Of those 18 sites, 14 were located on cattle, dairy, or hog farms, where animal manure is produced and applied to fields. In a related and more recent study in Berkeley County (Mathes, 2000) examining the relationship of bacteria found in wells relative to the location of septic systems, 62 per cent of the wells contained total coliforms, 32 percent of the wells contained *E. coli* and 30 per cent of the wells contained fecal coliforms. No apparent correlation was detected between septic system density in a five-acre circle surrounding each well and bacterial concentration. The absence of a correlation doesn't prove the absence of an effect by septic systems but there is no proven relationship either. Most likely such studies point to the general difficulty of specifically tracing contamination in diffused flow karst aquifers with multiple natural and anthropogenic sources of contamination.

On page VI-7 the text indicates *The karst geology of Jefferson County endangers the groundwater supply*. We don't find the statement to be sensible or supportable in that the natural geology can't cause the problem, only our failure to recognize vulnerability and provide protection for anthropogenic activities.

On page VI-7 the text indicates that implementation of the Plan *provides desperately needed relief to receiving streams now being adversely affected within the area analyzed*. No supporting documentation is provided.

On page VI-7 the text indicates that the project will have *no avoidable adverse impacts, mitigative measures will be taken* to limit impacts and that there will be *no irreversible or irretrievable commitments of resources*. No supporting documentation or explanation is provided for any of these concepts. We would note that questions of construction, maintenance and management standards for waste treatment systems developed in a karst terrain have been raised repeatedly in the community. There have been no identified additional concerns or practices suggested by the PSD or the consulting engineer other than

piping around sinkholes as they are identified during construction. On page VI-8 the text indicates that *best practice procedures* will be submitted with construction plans.

On page VI-8 the Plan incorrectly indicates that the county is an “unclassifiable” category. In fact the county is now classified as a “non-attainment” air shed requiring the development and implementation of mitigative measures. Air quality will be affected by this project directly and indirectly. Impacts of overall increased development and changes in land use allowed by the presence of wastewater treatment cannot be ignored. If the plant is using activated suspended growth process that require aeration there will be tremendous gas exchange that will have an impact on carbon dioxide, methane, SO<sub>x</sub>, VOCs and nitrogen emissions. Ultraviolet treatment for disinfection often generates localized ozone.

There is no discussion in Section VI or elsewhere in the report or the management plan for biosolids and sludge disposal that will be generated by the plant. In an email (personal communication from John Tuggle, Pentree 11/10/2002 to Joseph Hankins) the following calculation:

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*SLUDGE:*

*Design BOD assumption is 0.17 lbs./capita/day for municipal wastewater.*

*Sludge production is approx. 75% of BOD with secondary treatment.*

*(0.17)(.75)= 0.123 lbs/capita/day sludge*

*With tertiary treatment an additional 10% of the BOD in sludge production is estimated to be produced during treatment.*

*(0.17)(.85)= 0.146 lbs/capita/day sludge*

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At 1.0 MGD for the first phase, then the plant would serve 5617 EDUs and 14,269 persons and generate ~ 2000 pounds of dry weight sludge per day. Since sludge is conservatively only 20% dry weight, that is about five tons of sludge per day or ~1800-1900 tons of wet weight sludge per year. There is no approved landfill in Jefferson County to handle this sludge disposal and sustained land application of sludge in a karst terrain would be complicated. This material would have to be exported out of the county.

There is also a need for a facility in Jefferson County to handle the septage material pumped from septic tanks on cleaning or service. Disposal of this material is a problem. Although it is often land applied after lime stabilization by permitted operators, a preferred solution would be a centralized disposal site. In response to an inquiry for plans to include in the Cattail Run Plant design septage disposal the following response (personal communication from John Tuggle, Pentree 11/10/2002 to Joseph Hankins) was received:

*Septage may be received by a conventional wastewater treatment plant in limited amounts after significant screening. A holding and dosing facility with a screen such as manufactured by Lakeside Equipment Inc. are normally required. Septage may require additional pretreatment or upsized equipment and basins in the main plant. The liquid is usually high in BOD content and therefore produces additional sludge processing requirements.*

No commitment to plan for septage disposal was made although the PSD has made clear their concern about septic system impact on the environment.

**Table 2** Waste load allocation information provided for the proposed Cattail Run Waste Water Treatment Plant discharge into Cattail Run/Shenandoah outfall (personal communication from John Tuggle, Pentree 10/31/2003 to Joseph Hankins)

Parameter	Allowable Waste Load (30 Day Average)		Proposed SBR Plant Design 1.0 MGD with Filtration (Phase I) Discharge	
	mg/l	lbs/day	mg/l	lbs/day
Ultimate BOD	64.61	905.78	15	125.10
5 Day BOD	30.0	420.61	5	41.70
Ammonia Nitrogen	4.29	60.15	4	33.36
Suspended Solids	30	420.61	5	41.70
Phosphorus	NA	NA	2	16.68
Dissolved Oxygen	6		6	

Table 2 information provides some insight into the distinction between a waste load allocation limit and what the expected performance of a modern SBR plant as proposed in the report might be able to provide. Note that the WV DEP did not provide any waste load allocation limits for phosphorus. According to John Tuggle *The selection of the SBR treatment method was made because the technology is widely utilized in West Virginia and the incorporation of tertiary filtration was incorporated to help comply with future discharge requirements of the Chesapeake Bay region.*

**Table 3** Daily and annual loading of the Shenandoah for the operation of the proposed Cattail Run Waste Water Treatment Plant (personal communication from John Tuggle, Pentree 10/31/2003 to Joseph Hankins)

SBR Plant Design 1.0 MGD with Filtration (Phase I) Discharge		per EDU per day	per EDU per year	per Person per day	per Person per year
Parameter	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day
Ultimate BOD	125.10	0.0223	8.1277	0.0088	3.1999
5 Day BOD	41.70	0.0074	2.7092	0.0029	1.0666
Ammonia Nitrogen	33.36	0.0059	2.1674	0.0023	0.8533
Suspended Solids	41.70	0.0074	2.7092	0.0029	1.0666
Phosphorus	16.68	0.0030	1.0837	0.0012	0.4267

Ultimately the numbers provided in Table 3 might be used to calculate the offset for the nutrient loadings per capita for personal waste loads that no longer go to septic systems or package plants. Utilizing efficiency differences and assimilation factors it would be possible to create a mass balance that may indicate that one treatment option is “better” for the Bay than another. It is quite possible that the superior performance and scalability of a large modern plant will win out in that analysis. That work should be completed.

On page VI-8 the text notes that there are *no water supply intakes downstream of the proposed discharge points within West Virginia regulatory boundaries*. While that statement may be technically correct we would note that the Shenandoah is used recreationally for direct human contact swimming, rafting, tubing, kayaking and fishing. The reach of the river directly above and below this outfall is one of the most heavily used recreational waters in the state. Additionally, there are very large drinking water intakes downstream on the Potomac River that are clearly relevant and should not be dismissed as being beyond *West Virginia regulatory boundaries*. We would also note that in today's world of increased homeland security concerns, any large facility will have tremendously elevated security compliance needs that may not be factored into traditional engineering cost estimates from past designs. We would strongly suggest that an audit of additional Homeland Security compliance needs be added to current cost estimates for all options.

In Section IX Environmental Screening Checklist explanations (probably in the form of a more adequate analysis) are needed for many of the entries on the checklist at the end of the report. The report indicates that more "no" responses support the viability of the project. Yet, several of the questions are couched in negative terms, so that a *no* answer taken in the fuller context could be considered to mean *yes*.

The responses to at least two of the questions on the checklist seem spurious at best. The responses are negative to questions of whether vacant land will be subject to increased development pressure and of whether any threatened or endangered species might be impacted. These are examples of areas where additional analyses, explanation, or justification for the responses are needed.

### **Literature Referenced**

Canter, Larry W and Knox, Robert C. 1985. Septic tank system effects on ground water quality. Chelsea, Mich. Lewis Publishers. xx, 336 p ISBN 0873710126 Also available from the National Technical Information Service, Springfield Virginia 22161, as PB84-244441. Price codes: A17 in paper copy, A01 in microfiche. EPA Report No. EPA-600/2-84-107, June 1984. 381 p, 27 fig, 53 tab, 122 ref, 5 append. EPA Cooperative agreement CR-806931.

CBF. 2003. Sewage Treatment Plants: The Chesapeake Bay Watershed's Second Largest Source of Nitrogen Pollution. The Chesapeake Bay Foundation, October 29, 2003.

Mathes, Melvin. 2000. Relation of bacteria in limestone aquifers to septic systems in Berkeley County, West Virginia. USGS Water-Resources Investigation Report 00-4229.

## Materials Reviewed

For the purposes of this report, observations and comments address information presented or made available by the PSD or it's contracted engineering firm Pentree, Inc. as follows:

- 1) Request to County Commission for Support of Wastewater Treatment Plant October 23, 2003. Three page summary of notes and presentation highlights by PSD to County Commission in request of support.
- 2) Jefferson County Flowing Springs / Cattail Run Facility Plan prepared for the Jefferson County Public Service District October 6, 2003. A binder-bound copy of this plan was made available to Joseph Hankins on October 24 by the PSD office. A complete photocopy of the plan was assembled and the original returned to the PSD. This photocopy was made available at the Freshwater Institute office in Shepherdstown for extended review by WAC members. In the interest of enhancing accessibility, certain sections of the plan and plan maps were scanned to digital image files and made available to WAC members as needed.
- 3) West Virginia Infrastructure and Jobs Development Council Preliminary Application for Flowing Springs / Cattail Run Wastewater Facilities Plan October 16, 2003. A binder-bound copy of this submission was made available to Joseph Hankins on October 31 along with two 11x17 map copies of Alternate 6.
- 4) Plan map of Alternate 6 without Elk Branch October 6, 2003. Two 11x17 color copies were made available to Joseph Hankins on October 31.
- 5) Flowing Springs / Cattail Run Wastewater Treatment Plant Options (no date). A photocopied two-page table summarizing all alternates, costs, customers and comparative ranking matrix. A similar color copy was presented during the Public Meeting October 27<sup>th</sup> and during the information session Nov 4<sup>th</sup>.
- 6) Transparencies for Flowing Springs Facilities Plan Public Hearing (no date). Photocopies of the transparencies presented during the Public Hearing at Wright Denney October 27<sup>th</sup>.
- 7) Current Status of Developments by Sue Lawton (7/22/03). A color two page table summarizing over 11,000 EDU's and the status of two-dozen development projects currently on the radar screen for the PSD. This was distributed during the information session on Nov 4<sup>th</sup>.
- 8) Public Hearing on Flowing Springs / Cattail Run Facility Plan, Wright Denney School, Charles Town, WV October 27, 2003. Public hearing and comments at 7 PM meeting.
- 9) Joint Information Session for Jefferson County Planning Commission and Water Advisory Committee, Charles Town Library Public Meeting Room, November 4, 2003. Information, question and answer session by PSD and Pentree, Inc for the two groups. Also certain comments made by Mr. Ed Burdette (Project Engineer, WV DEP Division of Water and Waste Management, Water Permitting and Engineering Branch).