NVPDC's Dog Park BMP Pilot Project

Making the connection between dog waste and bacteria contamination in streams

Project Sponsor: Northern Virginia Planning District Commission

Contact Person: Don Waye, Senior Water Resources Planner

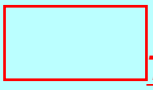
Proposed Timeline: October 1, 1999 – September 30, 2001

Figure 1. Photo courtesy of Seattle Public Utilities, from their surface water quality outreach campaign.

Abstract

NVPDC proposes a six (6) phase project to address the fecal coliform pollution problem in a portion of a high priority impaired watershed in a heavily urbanized portion of Northern Virginia. Phase 1 is Planning and Design. This includes: (a) developing siting criteria and design/management features to be used in dog parks to minimize bacteria runoff; and (b) developing and applying a decision

matrix to rank the presumed effectiveness of proposed criteria and feature for reducing bacteria runoff. A regional steering committee led by NVPDC will gather and review information to support these tasks. In Phase 2, this committee will determine the best site or sites for the dog park BMP pilot(s) within the Four Mile Run/Pimmit Run watershed. Phase 3 entails monitoring the runoff water quality and existing level(s) of dog park usage. In Phase 4, BMP design features would then be added to selected dog park(s). Follow-up monitoring of water quality and dog park usage will be done in Phase 5 to determine project effectiveness. Lastly, in Phase 6, NVPDC staff will document project findings and "lessons learned" in a practical "how-to" manual to facilitate Dog Park BMPs elsewhere. The report will also include a standardized design worksheet for dog park BMP development and a checklist for BMP plan reviewers.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Introduction

Fecal coliform contamination is the biggest cause of stream impairment in Virginia, accounting for 53% of all impaired stream segments, according to a June 1998 draft report by Virginia DEQ and DCR. Urbanization is one factor that seems to lead to increased bacteria levels in streams. The proposed project attempts to reduce fecal coliform loadings within the highly urbanized Four Mile Run/Pimmit Run watershed in Northern Virginia that is listed as an impaired stream system.

With 8500 people per square mile, the Four Mile Run watershed is the most heavily urbanized in Northern Virginia. With so much competition for land use in this watershed, it is little wonder that Four Mile Run violates the Commonwealth's standards of fishable/swimmable use for bacteria contamination (Virginia DEQ, 303(d) Total Maximum Daily Load Priority List Report, May 1997). Further, according to the 1994, 1996, and 1998 (draft) 305(b) reports to U.S. Congress, Four Mile Run is ranked as "high priority" for total NPS pollution by DCR.

In recent years, no less than five groups have performed fecal coliform monitoring of Four Mile Run: Virginia DEQ, NVPDC, Fairfax County Health Department, Arlington County Department of Environmental Services, and the League of Women Voters. All have found consistently unsafe levels of fecal coliform bacteria (over 200 MPN) in every tributary monitored in the Four Mile Run watershed. Overall, since 1990, approximately 500 fecal coliform (count) samples have been taken from Four Mile Run and its tributaries. Approximately 50% of these samples have been determined to be over the State and Federal governments' threshold of safe (30 day geometric mean less than 200 colonies per 100 milliliters of water as a "most probable number"—MPN). Many counts exceed 1000 MPN. *(Data sources for information expressed in this paragraph came from NVPDC; Metropolitan Washington Council of Governments; Fairfax County Health Department; Arlington County; and Virginia DEQ; among others. Original data available upon request.)*

By far, the predominant land uses in this watershed are high and medium density residential. The watershed, and the adjoining Pimmit Run watershed (lumped together under the same hydrological unit) reached build-out long before the era of BMP mitigation for new developments.

Human contact with streams contaminated with bacteria can result in staph infections, outbreaks of dysentery and typhoid and other serious illnesses. Dr. Chuck Gerba, a biologist with the University of Arizona, has identified over 100 diseases associated with bacteria from animal waste.

Figure 2. The Four Mile Run Watershed in Northern Virginia. The smaller Pimmit Run watershed is north of, and contiguous
with, the Four Mile Run watershed, and shares the State's Hydrologic Unit Code #02070010-A12. (map source, NVPDC)

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Making the connection between dog waste and bacteria contamination in streams

A 1993 EPA report (Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, EPA-840-B-93-001c) cites that:

> *Pet droppings have been found to be important contributors of NPS pollution in estuaries and bays where there are high populations of dogs. Fecal coliform and fecal streptococcal bacteria levels in runoff in several drainage basins in Long Island, New York, can be attributed to the dog population (Long Island Regional Planning Board, 1982). ...Eliminating or significantly reducing the quantity of pet droppings washed into storm drains and hence into surface waters can improve the quality of urban runoff. It has been estimated that for a small bay watershed (up to 20 square miles), 2 to 3 days of droppings from a population of 100 dogs contribute enough bacteria, nitrogen, and phosphorus to temporarily close a bay to swimming and shellfishing.*

Dr. Mansour Samadpour is a molecular biologist with the University of Washington in Seattle. As the nation's leading pioneer on the use of genetic testing to trace bacteria contamination in streams

to host animals, he has been involved in more studies of this type than any other researcher. He believes that unscooped dog waste is an extremely significant source of E. coli contamination in urban streams in the United States (personal communication, 1998). He is the lead researcher for two studies of urban watersheds in the Pacific Northwest. In Seattle's heavily urbanized Pipers Creek watershed, genetic testing results strongly suggests that sanitary sewer lines or failing septic systems are not the cause of the stream's high bacteria levels (Pipers Creek Bacteriological Source Tracking Investigation, City of Seattle, 1993). Further, nearly 20% of the bacteria isolates that could be matched with host animals were matched up with dogs. Cats and ducks also accounted for a significant share of the matches. The study's primary recommendation was to "include pet awareness and education programs" with the following elements:

- Encouraging residents to clean up after their pets and to properly dispose of such wastes that may be deposited in their yards, streets and parks

- Posting signs in local parks describing the problem and urging cleanup and proper disposal of pet wastes.

The second study examined bacteria sources in a mixed use, but urbanizing, watershed (Little Soos Creek Microbial Source Tracking, King County, Washington, 1995), and discovered that "cows and dogs were the greatest contributors... to stream fecal coliform contamination." The study recommends that dog owners be encouraged "to reduce the time their animals are allowed to freely roam unattended and make an effort to dispose of dog fecal material properly."

Because of the absence of significantly sized lakes or ponds within the Four Mile Run watershed and the relative abundance of good lake and pond habitat just beyond it, the duck and goose population within this watershed is very small. Owing to its ultra-urban, built-out landscape, there are no cow or horse pastures in this watershed. Thus, dogs, cats, and possibly humans are the chief suspected sources of bacteria contamination. At this time, squirrels, rats, raccoons and other urban wildlife are suspected to account for lesser contributions of bacteria in streams. In the Four Mile Run watershed, the population density of dogs is estimated at 800 per square mile, and is greater in both average individual size and sheer numbers than the estimated population density of outdoor-roaming cats. Thus, dogs are the leading candidates for Four Mile Run's bacteria contamination. This, along with the human source question, is NVPDC's starting hypothesis for its proposed genetic testing of the Four Mile Run watershed.

In the 20 square mile Four Mile Run watershed, NVPDC staff has estimated that over 5000 pounds of solid fecal waste are deposited in the watershed daily by dogs alone (NVPDC staff memo, December 7, 1994; Washington Post, *Creek Pollution Pinned on Pooches*, 6/8/98, p. D1). This works out to a ton of solid waste generated by dogs each day for every eight (8) square miles of drainage! While much of the dog waste is picked up, much also remains behind. Although local pooper scooper regulations require pet waste to be picked up virtually everywhere except an owner's private property, the regulations are largely unenforced and often disregarded. Further, visual evidence abounds that even once pet waste is picked up and bagged, some bags are intentionally discarded down storm drains!

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Coordinating this Project with Proposed Genetic Matching of Stream Bacteria with Host Animals

In February 1998, NVPDC submitted a proposal to Virginia DEQ's 604(b) grant program titled *Bacteria Source Identification in Urbanized Stream Systems*. This project was designed to positively identify the extent to which dogs contribute fecal coliform bacteria to streams within the Four Mile Run watershed. Indeed, the study's opening hypothesis was that dogs contributed significantly to bacteria contamination in Four Mile Run. Other hypotheses have been established to refine our level of knowledge based on the results of the first round of hypothesis testing. The project began on July 1, 1999, with funding from both DEQ and local organizations.

If this project proceeds as expected, results of the first round of testing should be available by late Summer 1999. For this reason, and under the advice of Virginia DCR's NPS Grants Coordinator, NVPDC has proposed a six month delay for the start and end of this proposal over the timetable presented in NVPDC's original pre-proposal. By delaying the project start date from April 1 to October 1, 1999, NVPDC and the State will avoid incurring costs on a project that is attempting to solve a potential non-issue. Specifically, if the results of the genetic test reveal that dogs are not a significant source of bacteria contamination in streams, then this proposed project will not go forward, and thus no Section 319 funds will be expended. If, however, genetic testing indicates that dogs are a significant source of bacteria contamination in the Four Mile Run watershed, then this project will proceed. (The question of significance will be answered by Dr. George Simmons, the biologist with Virginia Tech responsible for performing NVPDC's proposed DNA fingerprinting in Four Mile Run, in consultation with NVPDC's Dog Park BMP Steering Committee and Virginia DCR project staff.) If genetic testing is not performed, or results are unknown or inconclusive by September 30, 1999, NVPDC will consult Virginia DCR on whether or not to proceed with this project.

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Why a Dog Park BMP Pilot Will Make a Difference

In the September/October 1998 issue of EPA's *Nonpoint Source News-Notes*, it was reported that Los Angeles County used the emerging discipline of psychographics to survey residents there on attitudes, habits, and receptivity to change regarding nonpoint source pollution issues. The study, conducted by L.A. County DPW's Environmental Division, pinpointed dog owners as a group that rated high in both the category of generating nonpoint pollution and the category of likeliness to change habits to improve the environment.

Here in Northern Virginia, dog parks have already proven to be popular, regularly drawing dog owners and pet-sitters from nearby localities (*Dog Parks Receive High Barks*, Washington Post,

11/19/98, p. VA-1; *Dog Owners Push for More Public Park Land for Pets*, Potomac News, 11/1/98; *Dog Owners Want More Space for Pets*, Fairfax/Arlington/Alexandria/Prince William Journals, 10/23/98; *Unleash the Hounds: Local Dog Owners Demand Room for Fido to Run*, Washington Times, 10/13/98, p. C1). In theory, a properly sited and managed dog park should:

- cut down on pet waste that is not picked up—especially in public areas;
- encourage pet owners to become more responsible through civic "peer pressure";
- increase awareness of the health impacts associated with pet waste left on the ground or in storm drain inlets, thus possibly decreasing these activities.

Many dog owners in Northern Virginia use community dog parks to exercise their dogs off-leash and to socialize. While many of these dog parks are informal and unofficial, in Arlington and Alexandria, at least a few have official designation (Arlington has 7 official dog parks; Alexandria has approximately 15 suitable, identified dog parks). While Fairfax County does not officially recognize dog parks per se, the phenomenon of dog walkers gathering in common areas is an observed reality. Further, the Fairfax County Park Authority is proceeding with plans to develop a pilot dog park which could pave the way for many more in the County in the near future.

However, official or de facto, these dog parks are commonly situated in public parkland, and often stream valley parks in particular. Neither official nor unofficial dog parks have traditionally been sited or designed with water quality protection in mind. In many urbanized portions of Northern Virginia, the dog parks are too small for the concentration of dogs during their heaviest periods of usage, and as a result quickly become devegetated and, alternately, muddy and dusty. Many are not fenced to keep the dogs within a protected area. All these factors conspire to create a conflict between existing dog parks and stream water quality.

Glencarlyn Dog Park at confluence of Upper Long Branch and Four Mile Run

Figure 3. Existing dog park alongside a tributary to Four Mile Run

That said, NVPDC staff and others have observed firsthand that officially designated dog parks in Arlington and Alexandria are surprisingly free of pet waste. This is especially true in dog parks where fencing, signage, trash cans and pooper scooper bags have been provided as design amenities. Many dog walkers have commented to NVPDC staff, the press and others that these parks foster socialization among neighbors and that positive peer pressure plays a significant role in keeping dog parks free of pet waste. Thus, it is believed that if well designed and managed dog parks are allowed to proliferate across urban areas, the positive behavior of picking up after pets is likely to spread. Some groups of dog walkers have organized to informally or formally adopt specific dog parks and keep them clean and well maintained. It follows, therefore, that encouraging greater use of these facilities will improve water quality by reducing fecal coliform loading in the greater watershed. Further water quality benefits may be realized when BMP design features are

incorporated into these dog parks. These may include the following:

- Siting dog parks out of swales, steep slopes, streams and beaches;
- Providing vegetated buffers of prescribed widths between dog parks and waterways, swales, storm drain inlets, gulleys and steep slopes;
- Adding pooper scooper stations with free sanitary "pick-up" bags and proper receptacles;
- Incorporating public outreach elements like signage and informational brochures into and around the dog park;
- Potentially adding vandal-resistant receptacles (pooch potties) connected to sanitary sewer lines for discarding pet waste, or Paris-style pooch potties (see Paris Finally Gets the Poop: New French Program Aims to Clean Up After the City's Dogs, Washington Post, 11/15/98, p. A-46);
- Rimming the downslope edge(s) of dog parks with conventional BMPs that show promise at removing bacteria (e.g., infiltration-dependent facilities).

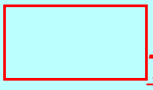
This list is meant to be illustrative rather than comprehensive. It should be added that pollution prevention (P2), is likely to play an important role in a dog park BMP, and that structural measures like infiltration trenches may not be necessary. One hypothesis is that proper siting (away from problem drainage areas) and design/management elements (like fencing, signage, sealed and lined trash cans, and continually stocked scooper bags), coupled with vegetated buffer(s), are likely to provide sufficient, if not redundant, water quality protection. If true, then it may be possible to retrofit many existing dog parks for relatively little cost. This is of no small relevance in light of the fact that most dog parks are located on public parkland, making private funding non-mandatory and unlikely.

Research is currently lacking on the use of BMPs to mitigate against bacteria runoff, and the best approach is likely to include pollution prevention. (One manifestation of the P2 approach to minimize bacteria runoff is EPA's support of, and Virginia's requirements to, perform dry weather storm drain monitoring in urban areas subject to Phase 1 Municipal Storm Sewer System, MS4, permits, specifically to trace illicit storm drain connections.) Based on NVPDC's analysis of Fairfax County's fecal coliform data, bacteria levels are even higher in ponds than in streams (probably due to the lack of shade and higher surface temperatures, which promote bacteria growth, found in ponds). For this reason, infiltration BMPs and vegetated buffer strips are believed to mitigate best against bacteria runoff (at least in non-karst regions), both by providing filtration. Ultimately, the question of whether or not to include a conventional structural BMP into the dog park design will be decided by a regional steering committee that includes NPS experts of diverse perspectives.

Also, recognizing that a goal is to attract as many dog walkers as possible to maximize the potential benefit of the pilot BMP dog park(s), the park(s) should, above all, be aesthetically pleasing and convenient destinations. Because the efficacy of this type of BMP hinges on changing human

behavior (by encouraging people to pick up after their pets), and spreading this new behavior to others, aesthetics is considered an important BMP design feature.

The point of this proposed project is to demonstrate that even great densities of dogs, such as are found in urban and suburban landscapes, can be managed without negatively impacting water quality. This proposal takes the approach that increasing the opportunity for responsible dog walkers to "lead by example" through neighbor-to-neighbor encouragement, may be the most effective long-term strategy.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Goals and Objectives of Proposed Project

The goal of this project is to determine if fecal coliform levels in an ultra-urban, high priority watershed can be reduced by implementing a dog park BMP. While this demonstration project is anticipated to have a localized benefit that may only be noticeable immediately down-site of any pilot BMP sites, it is anticipated that information garnered from this project will demonstrate the efficacy of this new type of BMP.

To meet these objectives, and to measure potential water quality benefits, NVPDC proposes a six (6) phase project to address the fecal coliform pollution problem in a portion of a high priority impaired watershed in a heavily urbanized portion of Northern Virginia. Phase 1 is Planning and Design. This includes: (a) developing siting criteria and design/management features to be used in dog parks to minimize bacteria runoff; and (b) developing and applying a decision matrix to rank the presumed effectiveness of each proposed criteria and feature for reducing bacteria runoff. A regional steering committee led by NVPDC will gather and review information to support these tasks.

In Phase 2, this steering committee will determine the best site or sites for the dog park(s) within the Four Mile Run/Pimmit Run watershed (HUC# 02070010-A12). Phase 3 entails monitoring baseline water quality, existing levels of dog park usage and compliance with pooper scooper laws. In Phase 4, BMP design features would then be added to selected dog park(s). Follow-up monitoring of water quality, dog park usage and pooper scooper law compliance will be done in Phase 5 to determine project effectiveness.

Lastly, in Phase 6, NVPDC staff will document project findings and "lessons learned" in a practical "how-to" manual to facilitate Dog Park BMPs elsewhere and a checklist for BMP plan reviewers. The manual will also include sections on BMP design features of dog parks, estimating pollutant load reductions by implementing some or all of these features, and frank discussions of watershed coverage, size, siting and NIMBY issues. Reviewers will include steering committee participants, local stakeholders, and Virginia DCR staff.

The Regional Dog Park BMP Steering Committee for this project will be composed of interested and

qualified staff from many or all of the following organizations:

- NVPDC
- Virginia DCR
- Arlington County Parks (DPRCR)
- Arlington County Department of Environmental Services
- Alexandria Parks
- Alexandria Health Department
- Alexandria Transportation & Environmental Services
- Animal Welfare League of Alexandria
- Fairfax County Park Authority
- ArlingtonDogs
- Possible additional representation from Fairdogs (another Arlington-based citizens group) or citizens groups from Alexandria and Fairfax County

This Steering Committee may expand somewhat to allow representation from other health departments, animal welfare leagues or government agencies with purview within the study watershed. Nearly all of the agencies or groups listed above have provided letters of support for this proposal. Additionally, verbal support has been provided by Alexandria Parks, with a formal letter to follow shortly.

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Monitoring and Evaluation

Monitoring and evaluation are paramount components of this pilot project. The project will be monitored both before and after implementation of the pilot BMP(s). The entire efficacy of this pilot will be evaluated and documented as the project's final task.

Baseline monitoring (Phase 3) and post-implementation monitoring (Phase 5) will be conducted in at least three ways:

1. Where an existing dog park has been upgraded to BMP standards, project personnel will conduct "before" and "after" counts of dog park usage. A goal of this study is to show that BMP features like fencing will be perceived as amenities to the dog walking community and will attract more usage.

2. Project personnel will conduct fecal coliform counts immediately downstream of the implementation site(s) before and after implementation of the pilot BMP(s).

3. Project personnel will determine compliance with pooper scooper laws before and after BMP project implementation by conducting pet waste pile counts. NVPDC staff anticipates that this will entail visual surveillance of pet waste piles not only in the designated pilot area(s), but also along main dog walking routes nearby.

Project staff will strive to ensure that a statistically significant amount of monitoring will be conducted in all three areas. Further, steps will be taken to in a way that maximizes scientific validity of comparisons between baseline and follow-up data. For instance, warm weather park usage or coliform counts will not be compared with cold weather data. Baseline and follow-up monitoring procedures, time periods and sampling frequencies will be identical, but during back-to-back years. Further, a QA/QC plan will be generated and followed wherever warranted. At the very least, a QA/QC plan will be submitted to the State for fecal coliform monitoring. Sufficient project budget has been set aside to ensure that all monitoring goals are achievable. The Dog Park BMP Steering Committee will determine specific sampling frequencies for all three types of monitoring.

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Information/Education and Public Participation

Information, education and public participation are all important components of this project. Limited public participation will begin with the formation of the Dog Park BMP Steering Committee, as it will include representation from citizen groups active in dog park issues. It will be conspicuously absent during baseline monitoring (Phase 3), however, so as not to influence its outcome. (i.e., If dog walkers know they are being monitored for compliance with pooper scooper laws, they might be more inclined to pick up after their pets.) Because issues surrounding dog parks have been in the Northern Virginia press quite frequently in recent months, NVPDC staff has little doubt that this project will be in the public eye. For this reason, selection of any pilot BMP sites will be held as confidential until baseline monitoring has been concluded. Once the demonstration site(s) have been selected, the local governments may conduct public hearings, although this is unknown at this time.

Beyond this, NVPDC staff will look for opportunities to use the press as an ally to educate the public about the study objectives. To date, contributions by NVPDC staff in press stories on dog parks and the environment have been 100% positive and has helped build support for this proposal's objectives. The sampling of articles presented in the Attachments section of this proposal provides evidence of this.

Interested members of the general public will be encouraged to provide input and comment as this project progresses. Further, NVPDC staff has already made contact with several official and unofficial citizens group that have coalesced to advance the cause of dog parks. Indeed, a groundswell of grassroots support for dog parks seems to be growing locally, nationally and even internationally, as recent press articles show. NVPDC staff is tracking this movement via press clippings and keeping informed of the steps taken by its member localities and various organizations which serve their citizens.

Since an element of this BMP involves changing human behavior, educating the dog walking community and the general public is key to overall project success. Toward this end, public education features like signage will be built into any pilot BMP(s). A small kiosk or signboard on the

dog park fence will encourage people to pick up after their pets and may briefly describe the benefits of doing so. To spur this positive behavior, free pet waste bags will likely be provided in conveniently located dispensers. Sealed, lined trash cans with odor control features are also likely components of any pilot dog park BMP.

Finally, draft project documentation (Phase 6) will undergo limited public review and comment period. The steering committee, as well as any citizen in the metropolitan Washington, DC region that has expressed a strong interest in this project, will be encouraged to review project documentation. Availability of the final report will be advertised via NVPDC's public outreach activities like its agency newsletter and this website.

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Generalized Budget

Requested Grant:	$57,920
Local Match:	$40,357
TOTAL Project Budget:	***$98,277***

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