

A Snapshot of Septic System Repair Funding in North Carolina:

A Comprehensive Catalogue of Policy Options and Funding Resources

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Executive Summary

The decision to provide loans and grants for low-income homeowners to replace failing systems is an emerging trend in North Carolina, due to high rates of septic system failures, the resulting degradation of surface and ground waters, and the inability of low-income homeowners to resolve the problem. Unless a septic repair program is in place, local regulators have limited options, such as the eviction of residents, or allowing the public health problem to continue. This Capstone provides a comprehensive catalogue of local government entities funding septic repair programs, and a companion catalogue of known organizational funding resources. A discussion of the administrative structure of local programs and the options made available to the homeowner reveal the challenges that local governments face in resolving this on-going public policy problem. This Capstone thus hopes to guide local discussions in program creation and to provide a policy resource for state legislators and officials.

Local governments across the state are becoming increasingly aware of the high rates of septic system failures within their territory, the resulting degradation of surface and ground waters, and the inability of their poorest homeowners to resolve the problem without assistance. An emerging trend in the nation, as well as the state, is the decision to provide loans and grants for low-income homeowners to replace failing systems. This paper is intended to serve as a resource for local government officials interested in providing a failing septic repair program by cataloging the programs in North Carolina, and analyzing some of the administrative difficulties local programs have encountered in creating such programs.¹ Research was conducted through ad hoc and structured phone and in-person interviews, as well as an extensive Internet search and literature review.

Background

In North Carolina, approximately half the population relies on septic systems to treat wastewater, compared to an estimated 25 percent of the nation.² Just as surprising, 33 percent of new housing, nationally, relies on septic systems.³ In light of North Carolina's population increase of 21 percent between 1990 and 2000,⁴ and the 40,000 new septic permits that are issued each year,⁵ septic systems will clearly constitute a significant portion of the state's wastewater infrastructure for the foreseeable future. This can be an advantage when sewer infrastructures are crumbling and replacement costs soaring.

The debt incurred installing sewer systems can be so expensive as to destroy the character of small communities forced to attract growth to pay for centralized service. In rural areas, "the distance between homes, the significant piping required to tie-in all the connections, and the inability to achieve economies of scale" often makes centralized sewer economically unfeasible.⁶ "According to Mike Hoover, Ph.D., North Carolina State University soil science professor...the collection network itself can account for 70 to 90 percent of the total construction cost."⁷ In addition, from 1981 through 1997, federal contributions for water and sewer development dropped from 43 to 17 cents on the dollar.⁸ EPA acknowledges that "[i]n many communities onsite and decentralized systems are the most appropriate, least costly treatment option, and they allow maximum flexibility in planning for future growth."⁹ Furthermore, "[c]entralized systems frequently result in large watershed transfers of waters, whereas decentralized systems when used effectively promote the return of treated wastewater within the watershed of origin," not to mention that the "relative costs of failure for centralized systems can be far greater, given that all wastewater is concentrated at a central location...."¹⁰

Yet, anywhere from 10 to 30 percent of onsite systems are estimated to be failing annually, which "can release pathogens and nutrients into the environment that may...reach surface waters either through groundwater flow or overland if there is a surface failure."¹¹ And failure rates as high as 72 percent have been documented, such as in the Rouge River National Demonstration Project.¹² More than half of the nation's septic systems are over thirty years old, and septic system failure is the second most frequently cited source of groundwater contamination.¹³ "The National Water Quality Inventory 1996 Report to Congress states that 'improperly constructed and poorly maintained septic systems are believed to cause substantial and widespread nutrient and microbial contamination to ground water.'"¹⁴ The State has acknowledged the importance of septic systems by regulating installation.¹⁵ "[t]he [North Carolina] General Assembly finds and declares that continued installation, at a rapidly and constantly accelerating rate, of septic tank systems...has a detrimental effect on the public health and environment through contamination of land, groundwater and surface waters."¹⁶ *What happens, then, if a homeowner cannot afford to pay for replacement of a failing septic system?*

Unless a septic repair program is in place, local regulators have limited options, such as the eviction of residents, or allowing the public health problem to continue. North Carolina places the responsibility of regular maintenance on any person who owns or controls a septic system.¹⁷ Violations carry administrative, civil, and criminal penalties.¹⁸ Once an Environmental Health Specialist (EHS) has written a notice of violation because the system is failing, the homeowner has thirty days to repair or replace it, unless otherwise notified. If the system is found to be unrepairable, it shall not be used, and may be secured to protect the health and safety of the public.¹⁹ The homeowner can appeal the interpretation and enforcement of the rules,²⁰ however, and the regulatory process can be costly to both the homeowner and the local government. Sometimes, the real problem may be the homeowner's inability to pay, or to obtain credit. He or she may be a social security or disability recipient, or unemployed.

Septic Repair and Replacement Programs in North Carolina

Several entities in the state, such as Councils of Government (COG), regional Health Districts, various counties, a township, and a state agency, have initiated programs to provide funding for homeowners with failing septic systems, motivated by serious public health concerns. (Appendix A.)

For example, the *Albemarle Regional Health Center* (ARHC) established a program that provides funding for ten neighboring estuarine and coastal counties. ARHC was motivated by failure rates as high as 30 percent, attributable to poor soils, unsuitable siting of systems, and a preponderance of elderly, low

income homeowners. Without the Clean Water Management Trust Fund (CWMTF) grants, many of these homeowners might have had to move to nursing homes as Medicaid recipients. Instead, once the systems are repaired or replaced, participants are automatically enrolled in ARHC's management program.²¹ One of the first community-wide management entities, the program requires annual system inspections.²²

Similarly, the *Unifour Failing Septic Repair Program* began as the result of a particularly high rate of failing septic systems in the densely populated, unincorporated areas of Alexander, Burke, Caldwell, and Catawaba counties, as well as concerns about bacteria in the region's 303d listed streams.²³ The fourth largest MSA in North Carolina, 63 percent of the region relies on septic systems. The program is administered by the Western Piedmont Council of Governments (COG), which had originally submitted grant proposals to CWMTF for sewer system extensions in the region. CWMTF voiced concerns about the secondary impacts of sewer extensions, recommended a failing septic system repair program instead, and provided funds for homeowner grants and loans, but not program administration.

In 1996, the General Assembly voted to create the *Wastewater Discharge Elimination Program* (WaDE), a Department of Environment and Natural Resources (DENR) project, to identify and eliminate straight pipes and failing septic systems in watersheds statewide.²⁴ Several factors motivated the decision, including the 1990 U.S. Census revelations that 49,000 North Carolinians had self-reported straight-piping, and reports of very high fecal coliform levels along the Ivy River in Buncombe and Madison counties,²⁵ which were tracked to animal lots and straight pipes from households. WaDE's team surveys door-to-door in targeted public water supply and recreational watersheds, and provides funding for local health departments for issuing repair permits and final repair inspections for failures revealed by the survey. WaDE also collaborates with regional COGs and low-income housing rehabilitation agencies to repair failing septic systems and replace straight piping in up to twenty-six western counties. "By partnering with [COGs and rehab agencies], the On-site Wastewater Section is able to channel state or federal funds to individual homeowners for septic system repairs."²⁶

Program Administration

A local government interested in establishing a failing septic repair program must decide: *who administers the program? Who will be the banker?* Staff time will be required to meet with homeowners and assist them through the application process, to confirm credit histories and income levels, to cut checks and receive and track payments, write grants and prepare reports, and deal with delinquencies. A variety of administrative configurations have been tried in North Carolina.

Nags Head's program relies on water user fees to generate a pool of local resources, which is appropriated annually. A dedicated staff member, the Coordinator for the Septic Health Initiative, administers all aspects of the program, including negotiating with contractors and handling the repair or replacement entirely, at the homeowner's request. All homeowners are eligible for the low-interest revolving loan fund, as long as property taxes are current. The program can cut off water to the home for nonpayment of a loan, but has never had to resort to the measure. Payments, including the interest, go back into the township's general fund.²⁷

Revolving loans are intended to ensure a dedicated source of funding into the future, as recipients repay their obligations, others may borrow. While relatively few homeowners need to take such loans, making it an expensive option for each program to offer, it may ultimately be less expensive than pursuing homeowners through the regulatory process. State law does not prohibit local governments from operating a revolving loan fund,²⁸ although they may wish to avoid the administrative, in-house labor.

Madison County's program relied on the non-profit Center for Community Self-Help to administer low-interest loans, but the cost of administering each loan was a third of the principal and interest. The program also had to contend with additional costs associated with installing septic systems in steep terrain, and the local health department hired a staff member to pre-qualify homeowners. Considering the low number of loans actually issued, this was an expensive program.²⁹

Banks and credit unions are typically unwilling to undertake loan programs in an affordable fashion because the loans are too small and high-risk to be viable. But COGs and housing rehabilitation agencies possess both the experience and the infrastructure to issue low interest loans and grants to low-

income homeowners without crippling administrative fees. COGs can also make homeowner eligibility decisions, removing the process from the regulatory sphere altogether. By providing services on a regional basis, programs are more flexible, and costs can be shared with other organizations in rehabilitating homes and septic systems.³⁰

In Rutherford, McDowell, and Polk counties, the Isothermal Community Planning and Development Commission is the contact for both homeowner and contractor. The Commission verifies the invoices, prepares requisitions, serves as a monitoring site visit representative, and prepares annual and quarterly reports. But the county writes the checks and is reimbursed by Rutherford County's Community Development Block Grant (CDBG) administered by the Division of Community Assistance (DCA). The program only offers three-year deferred forgivable loans for homeowners below the county income median, but loans are available to landlords for rental properties, at a higher percentage.³¹

In Buncombe County, WaDE has brought together the Land of Sky COG, CWMTF funding, USDA Very Low-Income Housing Repair Loans and Grants, and Mountain Housing Opportunities, Inc., a local non-profit housing rehabilitation agency that uses funds from DCA. This program collaboration repaired 13 septic systems in nine months, in addition to the homeowners' peripheral needs—such as indoor plumbing—to accompany the new septic system, by dividing the need according to the organizations' priorities. Land of Sky COG staff qualify applicants, track each project through to health certification, pay the invoice, and report to WaDE; the COG is then reimbursed.³² This Region B COG program will expand into Henderson, Transylvania, and Madison counties, thus eliminating the need for separate administrative efforts in the region.

WaDE's collaborative efforts are enhanced by its ability to take advantage of economies of scale in writing multiple grant proposals and leveraging funds with regional scope. Other states with variations on state-wide funding programs include: Massachusetts, Washington, Delaware, Minnesota, Michigan, Wisconsin, Pennsylvania, Maryland, Rhode Island, Ohio, Kentucky, Virginia and West Virginia.³³

Federal and State Funding for Local Programs

Next, local governments must ask: *where will the money come from?* In North Carolina, five sources of subsidized federal and state funding have been utilized for repair and replacement of failing septic systems. (Appendix B). Funders have different application and reporting deadlines, and differing priorities, so leveraging funds can be complicated, and goals can be hard to mesh. Most importantly, the available funding doesn't cover all needs, as most funding is targeted to economically distressed rural communities³⁴ and for protection of surface waters. The five sources are:

The Community Development Block Grant (CDBG), administered through North Carolina's Department of Commerce, Division of Community Assistance (DCA), is probably the largest contributor of septic repair funds in the state.³⁵ However, housing must be brought up to code in all respects.³⁶

The Clean Water Management Trust Fund (CWMTF) provides state-funded grants for pollution prevention and remediation of surface waters, or straight pipe elimination. Utilized by most failing septic programs in the state, funding is prioritized with respect to distance from surface waters.³⁷

Clean Water Section 319(h) Grants are federal funds with a forty percent state match, issued through the Department of Water Quality (DWQ), North Carolina's leading nonpoint source agency. These funds are intended, primarily, for the thorough evaluation of the entire watershed of any 303d listed stream,³⁸ especially if the watershed area is known to have failures or straight pipes.³⁹

USDA Rural Development, Very Low-Income Housing Repair Loans and Grants (Section 504), offers direct, low-interest home improvement loans to low-income, rural homeowners. Funds can be used for basic repairs, installing essential features, or removing major health and safety hazards.⁴⁰

Southeast Rural Community Assistance Program (SERCAP), offers low-interest loans to low-income, rural communities for wastewater, housing and community development activities.⁴¹

The Appalachian Regional Council (ARC) collaborated with CWMTF, CDBG, WaDE, and others, to demonstrate the establishment of a failing septic tank and straight piping elimination program for a single county and for multi-counties. The model provided can be implemented by local government entities. However, ARC is not an ongoing source of funding for failing septic repair programs.⁴²

Another option may eventually materialize: the *Clean Water State Revolving Funds* (CWSRF) or *Drinking Water State Revolving Funds* (DWSRF) are federally funded grants to states, which can be targeted to the state's particular environmental needs.⁴³ The grants, along with the twenty percent state match, provide low-interest loans to local governments. To date, neither CWSRF nor DWSRF funds have been used for failing septic replacement programs in North Carolina. Legislation may be required to ensure it is a state priority.⁴⁴ Thirteen states have used State Revolving Funds (SRF) for failing septic programs,⁴⁵ including Massachusetts, Maine, and Delaware. Maryland has a direct deposit program⁴⁶ and Pennsylvania's local banks process direct SRF loans to homeowners; California, Minnesota, Washington, Ohio, West Virginia, and Virginia, provide SRF loans to local programs, which loan to homeowners.⁴⁷

Local Funding for Local Programs

Alternatively, local governments can create or find local revenue sources. Nags Head has the only municipally-run program in the state, and it is the only program that derives its funds entirely from its water meter accounts. A narrow barrier island, and a tourist-centered township, Nags Head did not want its character to change as a result of the economic challenges associated with centralized sewer. A group of local citizens formed the Septic Health Committee and spent three years discussing a series of town-wide programs designed to improve septic performance "while maintaining acceptable surface and ground water quality—as well as controlling the density of developed land by promoting the use of [septic] systems."⁴⁸ This town of 4400 homes, many of which are rental properties owned by absentee homeowners, created a voluntary program that includes incentives for septic system inspections and maintenance, an extensive water monitoring component, and community-wide education, in addition to a revolving loan fund available to all homeowners with failing systems.

Local community assistance organizations are also potential sources of septic repair funding for low-income homeowners. Visit WaDE's website for a list of community assistance organizations available in each county⁴⁹ to guide individuals and agencies to possible funding sources in their area.

Program Communication

Finally, local governments might ask: *what other resources can this program produce?* Educating homeowners and maintaining a dedicated database of septic systems that could be compiled into a state resource are two important concomitant benefits of a failing septic repair program.

"Conventional septic systems are designed to operate indefinitely if properly maintained. However, because most household systems are not well maintained, the functioning life of septic systems is typically twenty years or less."⁵⁰ In North Carolina, septic system failure is most frequently attributed to age, poor soil conditions, roots, hydraulic overloading, lack of maintenance, poor system siting, design, or installation, high water table, seasonal soil wetness, and abuse, such as driving over the lines, or excessive use of cleaners.⁵¹ These problems can be directly related to lack of consumer information or interest as to the maintenance needs and life expectancy of systems. In a recent survey of Chesapeake Bay residents, for instance, 12 percent did not even know where their septic system was located.⁵²

Often, developers install the systems and the homeowners, who never see the system, never give it a thought—until the system fails. Homes may change hands before that happens, and new homeowners have even less information, in terms of age and hydraulic capacity, than the previous owners, because septic systems are rarely inspected at realty closings. Massachusetts, Arizona, and Louisiana have inspections linked to an operating permit.⁵³ Seven states indicated that one or more counties within the state had some type of inspection requirement,⁵⁴ including several Michigan counties bordering the Great Lakes.⁵⁵ Public outreach, training, and educational materials are thus vital in controlling septic failures.⁵⁶

Nags Head takes septic health education so seriously that the township's Coordinator for the Septic Health Initiative visits each fifth grade elementary class to discuss the 'dos and don'ts' of septic health. Homeowners are provided with septic owner's manuals, and realtors are issued educational packets for use in rental cottages. These packets include door hangers, decals, and brochures explaining what not to flush. The program is also extensively publicized through the town newsletter, the government access channel, civic function signage, and mass mailings twice a year. Nags Head surveyed

town residents, discovering that 66 percent of program participants had gained an understanding of the basic functions of their septic systems, and 94 percent would sign up for the program again.⁵⁷ The town will also conduct an evaluation of the program's effectiveness with regard to local water quality.⁵⁸

Recommendations: Commit, Collaborate, Communicate

EPA's Report to Congress identified five major barriers to the successful implementation of decentralized wastewater technologies, including misinformation and limited public knowledge about [septic] systems; legislative and regulatory constraints; lack of system management; existing engineering practices; and restricted access to funding.⁵⁹ Until the state addresses the problem holistically, local septic repair and replacement programs can provide homeowners with much needed information and funding, and inventory databases created in the process may provide the first step to effective system management.

Local governments that choose to collaborate with WaDE benefit in several ways, including administrative funding, community education and outreach, and watershed inventories. Unfortunately, this option is currently limited to twenty-six western counties.⁶⁰ WaDE's expansion into a state-wide program would be an effective way to ensure that all North Carolina homeowners have access to funds—at consistent rates and equal opportunities—for the repair or replacement of failing septic systems.

In the meantime, WaDE's collaborative program provides a model for the rest of the state. Partnerships with COGs, community assistance organizations, and multiple governmental entities leverage both funding and administrative staff time. However, since the complexity of collaborative funding from local, state and federal sources requires dedicated staff time in addition to that needed for daily program management, a single source may suffice for counties with limited resources.

Local revenues may provide an additional pool of resources; however, care must be taken, as these fees can be regressive, placing a bigger financial burden on just those homeowners most likely to need assistance. Still, local control is assured, as is funding, when the community commits to a program.

Local commitment is crucial regardless of the source of funding. Communities that have begun such programs are typically motivated and affected by unique internal pressures. Nags Head's program began with citizens concerned about the overall character of their town, and was quickly an accepted and appreciated community resource. In Madison County, however, an imposed program met strong local resistance, which had to be accounted for and overcome. Originally, it was considered necessary to survey every home to avoid the appearance of bias, and homeowners were wary of local officials offering funding. As its CWMTF grant neared completion, nearly half a million dollars had yet to be spent. The local health director and board of health, unwilling to lose funds for area homeowners, enlisted the aid of community representatives to encourage homeowners to make use of the program. This outreach made the difference, because in just four months, the balance was spent.⁶¹

Conclusion

This paper is not intended to be an in-depth evaluation of failing septic repair programs. Instead, by cataloguing the programs in the state—and highlighting some of the administrative decisions that must be faced—this paper may be helpful in guiding local discussions and in providing a policy resource for state legislators and officials.

Notes

¹ This paper is not exclusive, in that other programs and administrative challenges may exist, however, it is a comprehensive snapshot of failing septic repair programs in North Carolina.

² From North Carolina's Nonpoint Source Management Program, Onsite Wastewater Systems' home page, available at: http://h2o.enr.state.nc.us/nps/What_is_NPS/OWS.htm. As of 2000, that is approximately 1,750,000 North Carolina homes. Source U.S. Census Bureau: State and County QuickFacts. Data derived from Population Estimates, 2000 Census of Population and Housing, 1990 Census of Population and Housing, Small Area Income and Poverty Estimates, County Business Patterns, 1997 Economic Census, Minority- and Women-Owned Business, Building Permits, Consolidated Federal Funds Report, 1997 Census of Governments, available at:

<http://quickfacts.census.gov/qfd/states/37000.html>. “In large communities (those with more than 10,000 people) almost 93 percent of the housing units are connected to a public sewer. . . about 61 percent of housing units in small communities use a septic tank or cesspool for wastewater disposal.” States with large numbers of small community housing units using outhouses/privies are: Kentucky (55,764), Pennsylvania (47,902), Missouri (46,223), and North Carolina (45,461).” US Census data on small community housing and wastewater disposal and plumbing practices, available at: www.epa.gov/OWM/mab/smcomm/factsheets/census/index.htm.

³ EPA’s Voluntary National Guidelines for Management of Onsite and Clustered (Decentralized) Wastewater Treatment Systems, Executive Summary, p. 3, at: www.epa.gov/owm/mtb/decent/download/guidelines.pdf.

⁴ Source U.S. Census Bureau, North Carolina State and County Quick Facts, available at: <http://quickfacts.census.gov/qfd/states/37000.html>.

⁵ Report on the Proper Maintenance of Septic Tank Systems in Accordance with Section 13.5 of HB 1160 (Clean Water Act of 1999), Submitted by the North Carolina Commission for Health Services to the Environmental Review Committee, North Carolina General Assembly, March 15, 2000, at: www.deh.enr.state.nc.us/oww/Maintenance.PDF.

⁶ EPA’s report addressing the Congressional House Appropriations Committee’s request on the benefits of decentralized alternatives compared to centralized systems, at: www.epa.gov/OWM/mab/smcomm/rtc/mast2.pdf.

⁷ Emerson, Harriet, *Are Onsite Systems a Viable Option?* Small Flows Quarterly, Volume 2 Number 2, Spring 2001.

⁸ Crews-Klein, Jean, *Clean Water, Our Livelihood, Our Life, A Report on the North Carolina Water and Sewer Initiative*, Rural Economic Development Center, available at: <ftp://ftp.denovo.net/rural/CleanWaterReport99.pdf>.

⁹ Response to Congress on Use of Decentralized Wastewater Treatment Systems, available at: www.epa.gov/OWM/mab/smcomm/rtc/mast2.pdf.

¹⁰ *Id.*, p. 6.

¹¹ North Carolina Nonpoint Source Management Program, Onsite wastewater systems website, available at: http://h2o.enr.state.nc.us/nps/What_is_NPS/OWS.htm.

¹² EPA’s report addressing the Congressional House Appropriations Committee’s request on the benefits of decentralized alternatives compared to centralized systems, p. 3, at: www.epa.gov/OWM/mab/smcomm/scpub.htm.

¹³ EPA’s Management Handbook, *Voluntary National Guidelines for Management of Onsite and Clustered (Decentralized) Wastewater Treatment Systems*, p. 10, Office of Water, Office of Research and Development, March 2003, at: www.epa.gov/owm/mtb/decent/download/guidelines.pdf.

¹⁴ *Id.*, p. 4.

¹⁵ NCGS § 130A-333 – 345 (2004).

¹⁶ § 130A-333.

¹⁷ Laws and Rules for Sewage Treatment and Disposal Systems, April 2002, North Carolina Administrative Code, 15A NCAC 18A .1961 (2002), available at: www.deh.enr.state.nc.us/oww/Rulelaw/2002_Rules.htm.

¹⁸ *Id.*, 18A .1968. See also the North Carolina DWQ’s Groundwater website: <http://gw.ehn.state.nc.us/>.

¹⁹ *Id.*, 18A .1961(l).

²⁰ *Id.*, 18A .1965.

²¹ Per conversation with Ralph Holloway, Albemarle Regional Health Center.

²² Hoover, Mike, NCSU Soil Science Professor and Extension Specialist, *Choices for Communities: Wastewater Management Options for Rural Areas*, June 1998, North Carolina State University (NCSU).

²³ Conversation with Mike Struve, Western Piedmont Council of Government, Hickory, North Carolina.

²⁴ Stiles, Nikki, *Flushing Out the Straight Pipes*, 3 Small Flows Quarterly 4, Fall 2002, available at: www.nesc.wvu.edu/nsfc/sfq_fall02/pg18.html.

²⁵ *Id.* Other factors included Governor Jim Hunt’s goal of eliminating straight piping in western North Carolina by the end of the decade, and the 1995 Year of the Mountains summit, where state leadership focused on issues specific to western North Carolina.

²⁶ Jeter, Bill, Department of Environment and Natural Resources, Onsite Wastewater Section Chief, Decentralized List Serv comment, March 3, 2004. Sign up for the list serv at: www.epa.gov/OWM/mtb/decent/index.htm.

²⁷ Conversation with Todd Krafft, Coordinator for the Septic Health Initiative, Nags Head, North Carolina.

²⁸ Conversation with David Lawrence, William R. Kenan, Jr. Professor of Public Law and Government, School of Government, the University of North Carolina, Chapel Hill.

²⁹ “If there’s enough land suitable for a septic tank and drainage field downhill from one of those houses, a conventional septic system can be installed for about \$2,000. But if wastewater has to be pumped uphill, the cost can easily reach \$8,000 or more. This explains why punitive measures against straight-piping have been loosely enforced. Local officials know that even \$2,000 is beyond the means of many families. Who would tell cash-

strapped people—more often than not, elderly—that they had to sell or abandon their home or family farmstead because of a housing code violation?” Baldwin, Fred, *Cleaner Water: North Carolina’s Straight Pipe Elimination Project*, Appalachia, September-December 1999, available at: www.arc.gov/index.do?nodeId=1277.

³⁰ See Land of Sky Council of Government’s website, at: www.landofsky.org/links/nc_cogs/default.htm.

³¹ Conversation with Teresa Spires, Isothermal Community Planning and Development Commission.

³² Conversation with Karen Kienha, Land of Sky COG, Buncombe, North Carolina.

³³ EPA Report, *The Clean Water State Revolving Fund: How to Fund Nonpoint Source and Estuary Enhancement Projects*, July 1997. Kentucky Pride program website, available at: www.kypride.org/newsept.htm.

³⁴ Economically distressed counties map, North Carolina Rural Economic Development Center’s website, available at: http://www.ncruralcenter.org/databank/trendpage_Poverty.asp. Notice that while Durham and Orange counties are not considered economically distressed, more than a quarter of the population in each county pays more 30% of their income for housing, considered burdensome by U.S. Census Bureau standards; see:

www.ncruralcenter.org/databank/trendpage_Housing.asp.

³⁵ Conversation with Terrell Jones, WaDE Program Manager, Onsite Wastewater Section, Division of Environmental Health, North Carolina Department of Environment and Natural Resources.

³⁶ From CDBG website: <http://www.ncdca.org/cdbg/>.

³⁷ From CWMTF website: www.cwmtf.net/guide.html.

³⁸ Section 303(d) of the Clean Water Act (CWA) requires states to develop a list of waters not meeting water quality standards or which have impaired uses. Listed waters must be prioritized, and a management strategy or total maximum daily load (TMDL) must subsequently be developed for all listed waters. North Carolina DENR DWQ Modeling and TMDL unit home page, available at: http://h2o.enr.state.nc.us/tmdl/General_303d.htm. A TMDL or Total Maximum Daily Load is a calculation of the maximum amount of a pollutant that a water body can receive and still meet water quality standards, and an allocation of that amount to the pollutant’s sources. See:

www.tmdls.net/basics/general.htm.

³⁹ From DWQ website: <http://h2o.enr.state.nc.us/admin/applications.html>.

⁴⁰ From USDA Rural Development 504 Loan and Grant website: www.rurdev.usda.gov/nc/504rep.htm.

⁴¹ From SERCAP website: www.southeastrcap.org/, and conversation with Sherman Pennix, Loan Program Officer, April 5, 2004.

⁴² Conversation with Sara Stuckey, Appalachian Regional Council representative, April 7, 2004.

⁴³ *How the CWSRF Program Works*, available at: www.epa.gov/owm/cwfinance/cwsrf/basics.htm.

⁴⁴ EPA went so far as to recommend federal grant and loan coordination for nonpoint source financing in its 1997 CWSRF report. “Section 319 of the Clean Water Act provides for nonpoint source pollution control grants. However, the grant funds are limited compared to the funding that is available through the CWSRF program. Coordinated use of grant funds and CWSRF loans can make critical nonpoint source control projects more affordable.” *The Clean Water State Revolving Fund, Practical Approaches to Improving Pace*, EPA-832-R97-004, Sept 1997, p 7.

⁴⁵ Report to Congress, *Paying for Water Quality: Managing Funding Programs to Achieve the Greatest Environmental Benefit*, US EPA Office of Water, July 2003, p. 19, available at: www.epa.gov/OW-OWM.html/cwfinance/cwsrf/rte0703.pdf.

⁴⁶ Maryland’s Linked Deposit Program at: www.mde.state.md.us/programs/waterprograms/wqip/wqip_ldeposit.asp.

⁴⁷ EPA’s report addressing the Congressional House Appropriations Committee’s request on the benefits of decentralized alternatives compared to centralized systems, p. 28: www.epa.gov/OWM/mab/smcomm/rte/mast2.pdf. California uses part of its State Revolving Fund (SRF) for nonpoint source control, and “permits the establishment of substate revolving funds that can provide funding to private individuals to finance new onsite septic systems....” *A State and Local Guide to Environmental Program Funding Alternatives*, EPA 841-K-94-001 January 1994. Massachusetts and Maine have funded the replacement of failed systems with CWSRF; Delaware is using CWSRF to provide incentives to repair failing systems. *Protecting Drinking Water with the Water State Revolving Fund*, EPA 832-F-00-001. In addition, Ohio, Pennsylvania, and Minnesota have all created programs that make low-interest loans available to individuals in need of upgrading or replacing their septic systems. *Funding Decentralized Wastewater Systems Using the Clean Water State Revolving Fund*, EPA 832-F-99-001, June 1999.

⁴⁸ Town of Nags Head web site, Septic Health Initiative, <http://nagshead.govoffice.com/index.asp?Type=NONE&SEC={F43EBE1E-2B2D-4F36-8182-0544F0BEEAD1}>.

⁴⁹ Funding sources for agencies: USDA Rural Development Offices, Contact Points for the 504 Loan and Grant program, available at: www.deh.enr.state.nc.us/oww/Wade/USDA_offices.PDF; and funding sources for individuals by county, www.deh.enr.state.nc.us/oww/Wade/Funds_Individuals.PDF.

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- ⁵⁰ Decentralized Systems Technology Fact Sheet, EPA, 932-F-99-075, September 1999, available at: www.epa.gov.owmitnet/mtb/septicfc.pdf.
- ⁵¹ *Summary of Onsite Systems in the United States*, p. 252, National Small Flows Clearinghouse, 1993.
- ⁵² National Menu of Best Management Practices for Storm Waters Phase II, Septic System Controls, available at: http://cfpub1.epa.gov/npdes/stormwater/menuofbmps/pdf/small_files/sec-6_3.pdf, p.49.
- ⁵³ Lindsay, Lorene and Aiton, Michael, *NODP Update: Inspection of Onsite Systems*, NSFC Small Flows Quarterly, Fall 2002, Volume 3, Number 4, p.12.
- ⁵⁴ Some states, including Michigan, Minnesota, Florida, and Massachusetts have such legislation or have attempted to legislate septic inspections prior to closing.
- ⁵⁵ Falvey, Cathleen, *Michigan Counties Adopt Onsite System Inspections to Protect Great Lakes*, Small Flows Quarterly, Summer 2002, Vol. 3, No. 3.
- ⁵⁶ National Menu of Best Management Practices, Septic System Controls, available at: http://cfpub1.epa.gov/npdes/stormwater/menuofbmps/pdf/small_files/sec-6_3.pdf. Septic system educational materials to provide homeowners are available from EPA and National Small Flows Clearinghouse (NSFC), for little or no cost. NSFC's Product Guide may be downloaded from: www.nsfv.wvu.edu.
- ⁵⁷ Nags Head Septic Health Initiative power point presentation prepared for the 2003 Onsite Conference at North Carolina State University; survey results at 95% confidence level.
- ⁵⁸ Conversation with Todd Krafft; the Nags Head Septic Health Program evaluation will occur in 2004-2005.
- ⁵⁹ Report to Congress, Paying for Water Quality: Managing Funding Programs to Achieve the Greatest Environmental Benefit, US EPA Office of Water, July 2003, available at: www.epa.gov/OW-OWM.html/cwfinance/cwsrf/rtc0703.pdf.
- ⁶⁰ WaDE's mandate includes Clay,* Cherokee,* Graham, Swain, Macon, Haywood,* Transylvania,* Buncombe, Henderson, Rutherford, McDowell,* Polk, Burke, Caldwell, Catawaba, Alexander, Cleveland, Wilkes, and Watauga. Counties with an asterisk are not operating a failing septic repair program. Conversation with Terrell Jones. Contact WaDE for more information: www.deh.enr.state.nc.us/oww/Wade/wade.htm.
- ⁶¹ Madison County has provided a few loans itself since the CWMTF funding ended in July 2003. But there are an estimated 300-400 homeowners still in need; 75 homeowners actually signed a waiting list. Conversation with Buck Wilson, Madison County Health Department Director.

Bibliography

- Baldwin F. (1999). Cleaner Water: North Carolina's Straight Pipe Elimination Project. *Appalachia*. Retrieved January 7, 2004 from: www.arc.gov/index.do?nodeId=1277.
- Crews-Klein J. (1999) Clean Water, Our Livelihood, Our Life, A Report on the North Carolina Water and Sewer Initiative, Rural Economic Development Center, Retrieved February 17, 2004 from: <ftp://ftp.denovo.net/rural/CleanWaterReport99.pdf>.
- Economically distressed counties map. North Carolina Rural Economic Development Center. Retrieved March 10, 2004 from: http://www.ncruralcenter.org/databank/trendpage_Poverty.asp.
- Emerson H. (2001) Are Onsite Systems a Viable Option? *2 Small Flows Quarterly* 2.
- EPA. (1997). The Clean Water State Revolving Fund. How to Fund Nonpoint Source and Estuary Enhancement Projects.
- EPA. (1997). The Clean Water State Revolving Fund. Practical Approaches to Improving Pace. 832-R97-004.
- EPA. (1999). Decentralized Systems Technology Fact Sheet. 932-F-99-075. Retrieved March 10, 2004 from: www.epa.gov.owmitnet/mtb/septicfc.pdf.

EPA. (1999). Funding Decentralized Wastewater Systems Using the Clean Water State Revolving Fund. 832-F-99-001.

EPA. (2004). How the CWSRF Program Works. Retrieved February 27, 2004 from: www.epa.gov/owm/cwfinance/cwsrf/basics.htm.

EPA. (2003). Voluntary National Guidelines for Management of Onsite and Clustered (Decentralized) Wastewater Treatment Systems. Management Handbook. Retrieved March 11, 2004 from: www.epa.gov/owm/mtb/decent/download/guidelines.pdf.

EPA. (1999). National Menu of Best Management Practices for Storm Water Phase II. Septic System Controls. Retrieved March 16, 2004 from: http://cfpub1.epa.gov/npdes/stormwater/menuofbmps/pdf/small_files/sec-6_3.pdf.

EPA. (2002). Onsite Wastewater Treatment Systems Manual. 625-R-00-008.

EPA. Protecting Drinking Water with the Water State Revolving Fund. 832-F-00-001.

EPA. (2003). Protecting the Sources of the Nation's Drinking Water: Opportunities for Action. National Source Water Protection Conference materials. Washington, D.C.

EPA Report to Congress. (2003). Paying for Water Quality: Managing Funding Programs to Achieve the Greatest Environmental Benefit. Retrieved February 25, 2004 from: www.epa.gov/OWM.html/cwfinance/cwsrf/rtc0703.pdf.

EPA. (1997). Response to Congress on Use of Decentralized Wastewater Treatment Systems. Retrieved January 23, 2004 from: www.epa.gov/OWM/mab/smcomm/rtc/mast2.pdf.

EPA. (1994) A State and Local Guide to Environmental Program Funding Alternatives. 841-K-94-001.

Falvey C. (2002). Michigan Counties Adopt Onsite System Inspections to Protect Great Lakes. *3 Small Flows Quarterly* 3.

Financing Alternatives for Maryland's Tributary Strategies. Report from the Governor's Blue Ribbon Panel. Innovative Financing Ideas for Restoring the Chesapeake Bay.

Heath M., Solberg P., & Wicker W.J. (1979). Regulation and Management of Septic Systems. Triangle J Council of Governments.

Hoover M. (1998). Choices for Communities. Wastewater Management Options for Rural Areas. North Carolina State University.

Lindsay L, & Aiton M. (2002). NODP Update: Inspection of Onsite System. *3 Small Flows Quarterly* 4.

National Drinking Water Clearinghouse and the National Small Flows Clearinghouse. (1996) The Benefits of Water and Wastewater Infrastructure.

National Small Flows Clearinghouse. (1993). Summary of Onsite Systems in the United States.

North Carolina Commission for Health Services. (2000). Report on the Proper Maintenance of Septic Tank Systems in Accordance with Section 13.5 of HB 1160 (Clean Water Act of 1999). Submitted to the Environmental Review Committee, North Carolina General Assembly. Retrieved March 10, 2004 from: www.deh.enr.state.nc.us/oww/Maintenance.PDF.

Olson K., Chard B., Malchow D., & Hickman D. (2002). Small Community Wastewater Solutions. A Guide to Making Treatment, Management and Financing Decisions. University of Minnesota.

Stiles N. (2002) Flushing Out the Straight Pipes. 3 *Small Flows Quarterly* 4. Retrieved March 10, 2004 from: www.nesc.wvu.edu/nsfc/sfq_fall02/pg18.html.

U.S. Census Bureau. (1990 & 2000). State and County Quick Facts. Population and Housing. Retrieved March 11, 2004, from: <http://quickfacts.census.gov/qfd/states/37000.html>.