HISTORIC

BATH

NORTH CAROLINA

COASTAL ZONE

INFORMATION CENTER

BATH

PLANNED VARIATIONS

332 H57 1984

TOWN OF BATH

BOARD OF COMMISSIONERS

Ray S. Brooks, Mayor
Mary Brooks, Bruce Tankard, Teeny Mason, Wilton Smith, Commissioners
Judy Edwards, Ira Hardy II, M.D., Former Commissioners
Bubs Carson, Town Administrator

PREPARED BY: THE BATH PLANNING BOARD

James R. Edwards, Chairman
Erma Tankard, Rachel Tankard, Guy Cutler, Helen Brooks, Ed Swindel

WITH TECHNICAL ASSISTANCE FROM:

Planning and Design Associates, P.A.
3515 Glenwood Avenue
Raleigh, NC 27612 (919) 781-9004

Terry W. Alford, President

Consultants: Rex H. Todd, AICP, Project Manager; James S. J. Wang, P.E., Wang Engineering; Gregory Miller, Graphic Designer; Debbi Wall and Janet Roberts, Word Processing.

The preparation of this plan was financed in part through a grant provided by the North Carolina Coastal Management Program, through funds provided by the Coastal Zone Management Act of 1972, as amended, which is administered by the Office of Coastal Zone Management, National Oceanic and Atmospheric Administration. The Town of Bath contributed cash and in-kind services.

February, 1984

PLANNED VARIATIONS OF THE PROPOSED WASTEWATER
TREATMENT SYSTEM
BATH, NORTH CAROLINA

I. Introduction

- A. Background
- B. Objectives
- C. Narrative Outline

II. The Empirical Case: The Bath Experience

- A. Variations within the first choice system.
  - 1. Constraints
    - a. Lack of Available Land
    - b. Lack of Funds
    - c. Lack of Certainty
  - 2. Responses to Constraints
    - a. Changing the Site
    - b. Changing the Source of Funds
    - c. Changing the Perceptions of the Project
- B. Variations outside the first choice system
  - 1. Changing the type of system itself: From subsurface to surface
    - a. Description
    - b. Constraints on the newly proposed system
    - c. Responses to major constraints
  - 2. Changing the service area: Local and District Options
    - a. Description
    - b. Constraints
    - c. Responses

III. The Hypothetical Case: Methodology for Other Coastal Communities

- A. Analyzing demand for Wastewater Treatment
- B. Analyzing Supply (Capacity) of Different Treatment Systems
- C. Targeting Constraints

IV. Summary Chart: Applying the methodology to the Bath Case

- A. Description
- B. Chart
- C. Conclusion

I. Introduction

A. Background

Wastewater treatment has been a problem for small communities for years. With reductions in EPA funding, lapse of many of the State's local DEM accounts for collection system, continued inadequate performance by individual septic tanks in coastal soils, and increasing costs of private cluster-type systems, the communities of the CAMA area face extensive searches for feasible community-wide wastewater systems.

The need for such a system in Bath, North Carolina was realized years ago, and in October 1981 took the form of a CAMA Land Use Plan which recommended investigation of alternative systems. Subsequently, CAMA funded revision of the Town's zoning ordinance, a feasibility study of conventional wastewater treatment systems, and a demonstration project on alternative systems appropriate for small coastal towns. The latter produced a design for a community-wide subsurface collection and treatment system within the town limits. However, just as the $726,641 in FmHA and DEM loans and grants from the plan (and its subsequent funding applications) were being awarded, the original site was pronounced unavailable by the Beaufort County Board of Education.

Thus, the search for a new site resulted not only in going beyond the city limits for a treatment site, but also in the design of a different system, this time a land based surface application system. As of this writing, the search continues for contingency sites and systems, in case the chosen solution does not meet the criteria for the State's permits. And, the search for sources of monies to cover the hook-up fees and find the key elements of a successful public referendum has begun.

B. Objectives

In service to the community as well as others in the coastal area, the following report will produce planned variations for the alternative wastewater systems for the one presented in the May 1983 CAMA Demonstration project. The objectives of this project are:

. To follow through on planning at a level of detail which will facilitate the development of financial packages for the proposed system at the Town Commons site (the surface system) and one contingency location.

. To evaluate the results of sensitivity analyses applied to each of the systems (that is, weighting the variables differently so as to produce different results for decision-making).

. To prepare the Town of Bath to make appropriate installation of a community-wide land based alternative wastewater treatment system (particularly in the event that the currently FmHA/DEM funded system fails to receive permits).

C. Narrative Outline

These objectives are addressed in this report in three parts. Part II presents the empirical case of Bath, North Carolina in which three variations of wastewater treatment systems were planned.

Part III presents a methodology which can be applied to hypothetical cases (or other actual cases) to assist in final selection of an appropriate system.

Part IV presents a summary chart which illustrates how the Bath situation helped shape the methodologies and how they in turn fit the Bath situation.

II. The Empirical Case: The Experience in Bath

A. Variations within the first choice system.

1. Constraints

The chosen system presented in the May, 1983 CAMA Demonstration Project as a subsurface system located within the Town's municipal limits immediately ran into constraints. These were:

- Lack of available land
- Lack of funds for amending loan and grant applications
- Lack of certainty by the community about the affordability of the system.

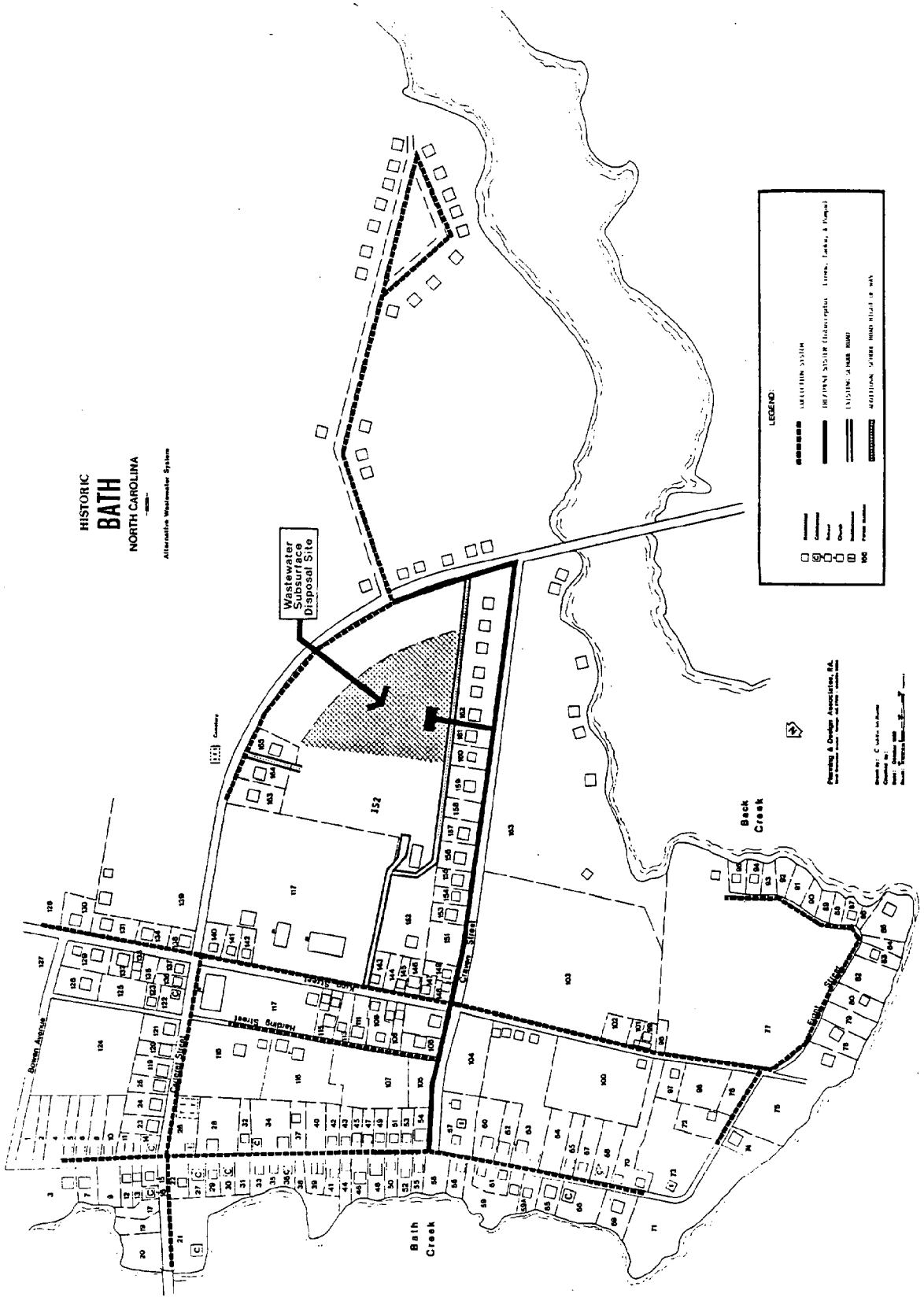
In this section, the nature of these constraints will be discussed. The proposed responses to these constraints is presented under the next section, (Part E, Responses to Constraints).

a. Lack of Available Land

In the Bath situation, the land assumed available for the treatment site suddenly became unavailable.

The Beaufort County School Board, which owns parcel 152 (see Exhibit A) voted not to lease that property because the Union School (grades 1-12) now located in Bath does not meet the campus acreage requirements set forth by the NC Department of Public Instruction and the addition of even a compatible use (like subsurface wastewater treatment) would not improve that situation. Additionally, the long-range plans of DPI and the Beaufort County Board included the conversion of the Union School to a K-8 school, which would reduce the population from 800 to about 560 and drastically reduce the site area requirements for parking and athletic field space.

Exhibit A


HISTORIC
BATH
NORTH CAROLINA
Alternative Wastewater System
Wastewater Subsurface Disposal Site
LEGEND:
Back Creek
Bath Creek
Bowen Avenue
Harding Street
Craven Street
Eight Street
Planning & Design Associates, P.A.

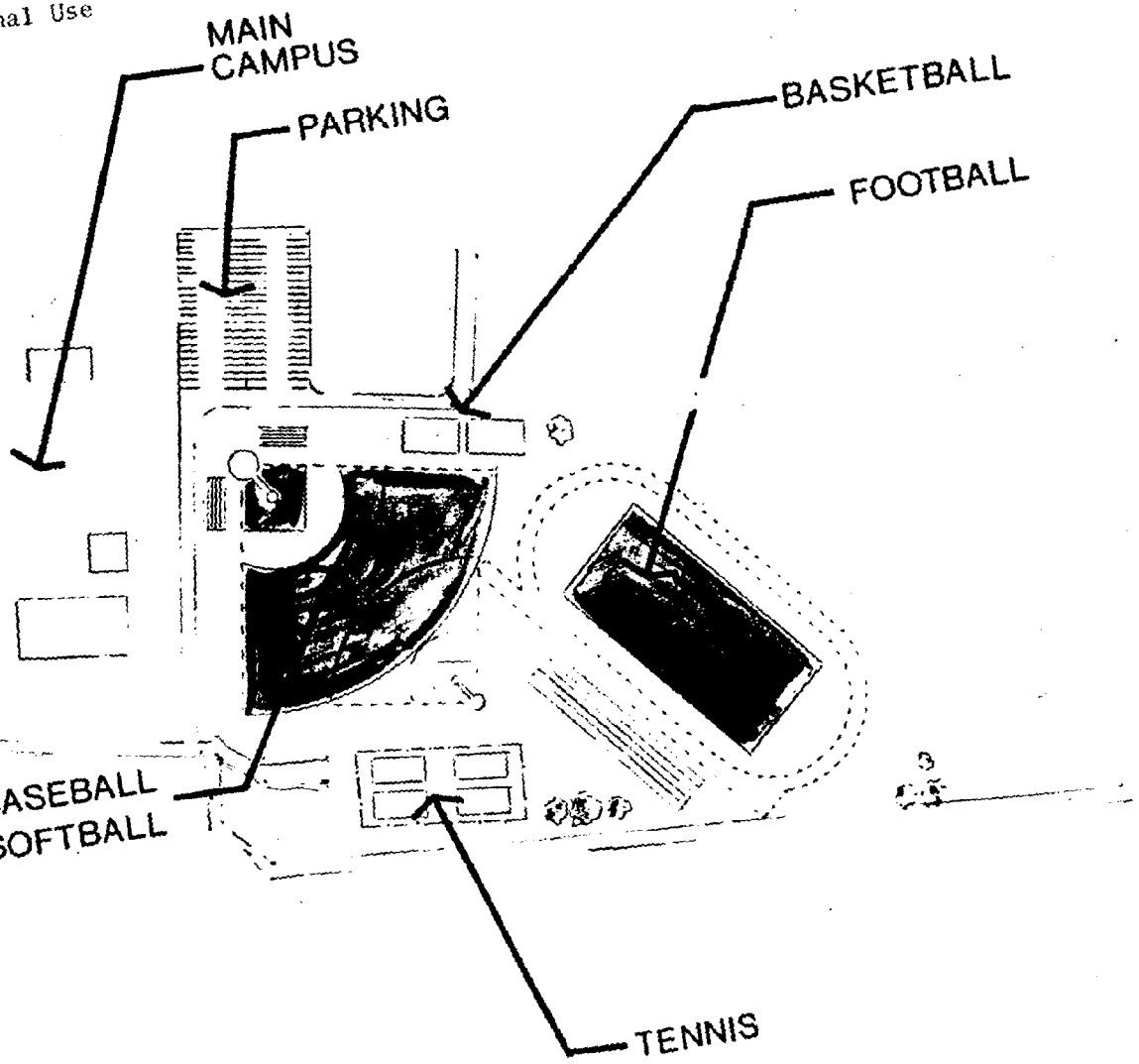
The athletic fields presented to the County Board of Education (See Exhibit B) are compatible with a subsurface wastewater treatment site. However, the land in Lot 152 had been originally purchased for building purposes, and the Board wanted to protect the buildable capacity of the land (a use which is not compatible with co-use of subsurface wastewater treatment). This situation was confounded earlier as the owners of parcel #103 and parcel #163 (See Exhibit A) were unwilling to lease their properties for the town's use as a subsurface wastewater treatment site.

b. Lack of Funds with which to Apply for Loans and Grants

The second constraint most active upon the May, 1983 proposed subsurface system was realized when the additional costs of re-applying to FmHA and DEM for loans and grants were incurred.

The estimate for preparing the FmHA and DEM applications (plus a CDBG application) was estimated to be $10,500.

Proposed Recreational Use
for Parcel 152
(See Exhibit A)



Proposed to be simultaneously used for subsurface wastewater treatment.

Exhibit B

c. Lack of Certainty by the Community

Since the type of system may change again, and the detailed studies are reimbursable only after a referendum passes, the town has a low median family income profile, and many of the septic tanks in town are fairly new and well operating, uncertainty as to the passage of the referendum has become a constraint. At the December, 1983 Town Council meeting, it was estimated that there was a 50/50 chance of the referendum passing, given the communities current level of awareness and acceptability.

Other factors which influence the ability of the community to pay, or its willingness to do so, arise from the fact that 70 of the households of the community's total (160) are estimated to qualify as low and moderate income persons under the Small Cities Community Development Block Grant program guidelines. This presents considerable constraint, and in the words of one of the Town Council members, indicates that there may be considerable difficulty passing the referendum unless the funds are made available to finance the hook-up fees of at least the low and moderate income persons. Other preferences are for no one in the community to pay a hook-up fee, since monthly costs of the new system will already create additional expense for wastewater service to everyone in the community.

Additionally, homes which are near the water's edge will require an individually owned and maintained pump. This extra cost became an issue of discussion at the January 17 meeting of the Bath Lions Club and the Bath Fire Department.

2. Responses to Constraints

a. Changing the Site

When the feasibility of using the school site appeared dim, the following work was undertaken to exhaust all possibilities of success in obtaining that site, before moving on to another alternative:

- identification of special problems (there was a pocket of quicksand in the site which would have raised construction costs)
- meetings with the principal of the school to gather detailed information on the school's treatment demand and current capacity to treat wastewater. (The school did have overflow/seepage problems in wet months among its five septic tanks.)
- special presentations before the local committee by the Planning Board Chairman and one by the Consultant before the Town Council members.
- letters of information to the local school committee explaining the technical details (capacity, design, etc.) aspects of the proposed system.
- letters of information, and presentations using charts and handouts to the Beaufort County Board of Education on two occasions
- discussion with planners at the Department of Public Instruction.

b. Finding funds with which to re-apply for loans and grants.

Fortunately, in the Bath situation, the Town Council financed a portion (66%) of the costs of preparing the first iteration of applications to FmHA and DEM. This is rare in small towns, with the consulting planners and engineers usually being asked (or volunteering) to prepare the lengthy application forms themselves. It speaks well for the commitment of the Bath Town Board to solve this community problem.

Under the FmHA guidelines, part of preparing the Preliminary Engineering Report (PER) is allowed as a reimbursable cost. Thus, the Bath project allocated $2,000 of the cost of the PER to the FmHA loan/grant package as reimbursable.

The estimate for preparing the FmHA/DEM applications (plus a CDBG proposal) was determined to be $10,500. The percentage of this real cost covered by the town and by the PER allowance was $6,000, allowing the remaining $4,500 to go uncovered since preplanning expenses are not reimbursable by either FmHA or DEM.

c. Changing the Perceptions of the Project.

As referenced above, the third constraint took the form of uncertainty about the referendum.

This constraint caused the consultant to propose a "community information and involvement program" in order to disseminate the facts of the community wastewater system concept (and alternatives). This was not fully paid for by the town...in fact the Town Council was able, given other expenses, to contract to pay for only the out-of-pocket reimbursable expenses of the consultant (not his time) doing the work.

The community information and involvement program was designed to determine information needs of the community regarding the proposed wastewater treatment system and to address those needs through presentations to civic groups. See attached example survey (Exhibit C) sent to the civic clubs to determine information needs and presentation dates (See Exhibit D for list of Bath Civic Clubs).

The survey and discussions with the Town Council produced the attached fact sheet (see Exhibit E) which was used as a basis for developing presentations and hand-outs regarding the referendum (pending). A roster of the electorate in the town of Bath was also compiled for distribution of the information or potentially for a well-timed "straw ballot" or survey to be conducted by the Town Council.

Exhibit C

Please complete and return in envelope provided by Dec. 5, 1983

PLANNING & DESIGN ASSOCIATES, P.A.

Referendum Questionnaire

me of Organization Bath Vol. Fire Dept Firemen Assoc

Officers of Organization Charles Edwards SK Pres 923-2041

Jim Edwards

Heber Latham 923-7181

Leon Wingate, CM Cartwright

Person who completed questionnaire Charles Edwards Phone # 923-2041

Meeting date Every Thurs. Time 7:30 PM

Meeting place Bath Fire Station

How many members? 25 Active? 15

How many members live in Bath or Springdale Village? 10

Would your group be interested in having a short program with a question and answer period on waste water treatment systems proposed for Bath sometime before mid-Feb. 1984? Yes

Preferred date in Dec. _____ Jan. 12th Feb. _____

Does your group have any suggestions on how to best educate the affected citizens of the area about the proposed waste water treatment system, cost, bonds, voting, etc.?

Answer at Meeting

Enclosed is a list of groups in the Bath area which have received this questionnaire. Do you know of any other groups in the area that may be interested in receiving the questionnaire?

Your suggestions please: _____

Would any of your members be interested in an organized trip to and tour of a facility which is similar to one of the systems proposed for Bath? There is one in operation in Shallotte, NC in Brunswick County. (This system is about twice the size that Bath would need, but it would give good insight of how the system works, smells, looks, etc.) If you know of interested parties please list them: Answer at Meeting

Should your group decide not to have a program, or if your group does not have enough members that would be affected by the system to justify a separate presentation, there will be an open forum for the general public with a question and answer period. We will notify you of this meeting so that you can help us to spread the word.

We thank you for your time and help.

Exhibit D

ORGANIZED GROUPS IN AND AROUND BATH

AND CONTACT PERSON

Mrs. Betty Slade, President
Bath High School P.T.O.
Bath High School
Bath, NC 27808

Mrs. Louise Tankard, Program Chairperson
Historic Bath Garden Club
Main Street, Route 1
Bath, NC 27808

Mr. Kelly Gurganus, President
Bath Lions Club
Route 1
Bath, NC 27808

Mrs. Judy Belote, President
Heritage Book Club
Route 1, Blackbeards View
Bath, NC 27808

Mr. Gary Duncan, Pastor
Bath Christian Church
Bath, NC 27808

Mrs. Jenny Worrall, President
Colonial Book Club
Route 1, Bayview
Bath, NC 27808

Mrs. June Wallace
Old Towne Book Club
Route 1, Bayview
Bath, NC 27808

Mr. Starly Stell, President
Bath Ruritan Club
Route 1
Bath, NC 27808

Mr. Thad Tankard, Jr., Chairman of the Board
Bath United Methodist Church
Route 1
Bath, NC 27808

Mrs. Jack Gilliam, Warden
St. Thomas Episcopal Church
Route 1, Blackbeard's View
Bath, NC 27808

Mrs. Becky Tuten
Bath Athletic Boosters Club
P. O. Box 57
Bath, NC 27808

Mr. Charles Edwards, President
Bath Volunteer Fire Department
Route 1, Springdale Village
Bath, NC 27808

FACT SHEET

Through its Planning Board and Town Council, the Town of Bath has been working on obtaining funds with which to construct an appropriate wastewater treatment system for the community.

Intensive study has shown that land-based systems (either subsurface or irrigation-type surface systems) are more appropriate than systems which discharge into the creeks. Final selection between these land-based systems and their location will depend upon scientific engineering tests and state permit decisions.

Bath has been awarded $726,641 in loans and grants with which to construct an appropriate system:

FmHA (Farmers Home Administration)	$217,000	loan
FmHA (Farmers Home Administration)	419,000	grant
DEM (N.C. Division of Environmental Mgmt.)	90,641	grant
Total Funds	$726,641	

In order to get the $509,641 in grants, the townspeople (registered voters) must pass a bond referendum (date to be determined), thereby doing two things:

a. Authorize the Town to issue general obligation bonds in the amount of $217,000

b. Authorize the Town to levy taxes sufficient to cover the bonds if the system is not self-sufficient

The following are some important facts about the system:

1. It is designed to have a capacity of 40,000 gallons per day, or to handle about 400 people (about twice Bath's 1980 population).

2. It will serve the Town of Bath and Springdale Village. Because of N.C. law, only the registered voters in the Town however, will vote in the referendum.

3. Its monthly cost depend on the type of user you are (residential, commercial, or institutional) and the amount of water you use each month. In order to make the system more affordable to residential users, the water system rates and the new sewer system rates are proposed to be combined to provide BOTH WATER AND SEWER at the following low rates:

Type of Users	Rate per Month
Residence	$12.00 minimum, plus $5.00 per 1,000 gallons over 2,000 gallons
Commercial	Flat rate of $6.00 per 1,000 gallons
Institutional (or other user on larger than 3/4" meter)	Flat rate of $7.50 per 1,000 gallons

Systems of similar scale usually cost $15.00 per month for sewer alone. This would normally mean that the minimum user would have a water bill of $7.50 and a sewer bill of $15.00, for a total of $22.50.

For the proposed system in Bath, we are restructuring the rates for both systems to offer the minimum user both water and sewer for $12.00 per month. For the 120 households in Bath that use less than the minimum (2,000 gallons per month) this will be like getting sewer for $4.50 per month. But this minimum price does largely depend upon conservative use of water.

4. Other costs include a one-time hook-up fee between $300 and $450 per household. Estimated $300 per household if all hook-ups are done at one time by one contractor, or up to an estimated $450 if each hook-up is undertaken individually. Currently there are 70 households in Bath that qualify as low and moderate income and which can ill afford this hook-up cost. The Town Council and its consultants are working to raise the $31.500 (that is 70 x $450) to pay those costs. Those who are able to pay will be asked to pay the fee themselves. However, if all users (150) get free hook-ups, this would require outside funding from $45,000 to $67,500.

5. While many of you have septic tanks in good working order, many of your neighbors do not, and yours won't function perfectly forever. Because of this reason and the fact that the system will be feasible only if everyone connects, it is recommended that the town adopt a mandatory hook-up policy.

6. The system will take about 18 months to build once the funds are in hand.

7. A local, trained person will operate and maintain the system with supervision of an engineer.

8. The system will accommodate residential and commercial development which will, over time, provide additional revenues from operation. This shall allow stable prices (mostly costs) for the service to individual users.

Please remember that wastewater treatment is a community problem. The referendum provides an opportunity for Bath to pull together on this important issue.

The referendum will be on the question of whether the town will authorize the balance of bonds as they are needed to cover the construction costs. It is not a vote for or against a particular type of system.

So, as you think about your monthly costs of the combined water and sewer service, think of the opportunity it will provide in your community.

We hope these facts are helpful. If you have questions, please contact members of the Planning Board or Town Council, or their consultants at Planning & Design Associates (Terry Alford, 781-9004) or Wang Engineering (Jim Wang, 467-4536).

In response to the call for funds with which to pay for hook-ups and thereby improve the acceptability of the proposed system(s) to the community, a letter writing campaign was undertaken. (See Exhibit F for a sample letter sent to Congressman Walter B. Jones regarding the hook-up fees. In addition to this letter, the Mayor sent letters to Senators John East and Jesse Helms, and to the Chairman of the Beaufort County Commissioners, Mr. Ledrue Buck, and Governor Jim Hunt.)

Exhibit F

HISTORIC BATH
OLDEST TOWN IN THE STATE
BATH, NORTH CAROLINA 27808

January 9, 1984

The Honorable Walter B. Jones
United States Congressman
U. S. Congress
Washington, DC 20510

Dear Congressman Jones:

Historic Bath, the oldest incorporated town in the State of North Carolina has an urgent problem upon which we need your assistance.

We've had a long standing need for adequate wastewater treatment, but our small population and the fixed incomes of many of our elderly citizens have prohibited us from building a conventional system. After much work, we have been awarded funds from the Farmers Home Administration and the State to construct a land application wastewater treatment system. However, this involves two types of costs that may make it impossible for our town to afford the system, even with the loans and grants.

The first cost will be an average monthly payment of $15.00 per household to pay back the FmHA loan. Since the town is now on individual septic tanks (with no monthly cost), this presents a sharp increase to 70 low and moderate households, most of which are elderly.

The second and more important cost is a one-time hook-up fee of $450 per household. For the 70 low and moderate income households in town (about 70% of our households), this makes the system too expensive.

We are searching on all fronts for funds to cover the hook-up fees for these 70 households (a total of $31,500). Time is critical, since we face a public referendum for general obligation bonds in March. The Community Development Block Grants Small Cities Program cycle does not start until April 16, and the hook-ups are not an allowable cost under the FmHA or State Clean Water Bond programs. We are contacting the Beaufort County Commissioners, but their involvement in a single town is highly unlikely.

So, we come to you for help in locating federal funds to cover the hook-ups of the 70 families who are about to fall through the cracks of the bureaucracy. The remainder of our households that are able to pay are ready to deliver the vote.

With your assistance, we can pass the March referendum, and North Carolina can see its oldest municipal citizen have adequate wastewater treatment facilities. We believe this is important to the State as part of its tourist industry, as well as to us, the residents of Bath.

Thank you for your help. If you have questions, please call our Project Engineer (Jim Wang, 919-467-4536) or our Project Manager, Rex Todd (919-781-9004).

Yours truly,

Ray S. Brooks

Ray S. Brooks, Mayor

RT/jr

B. Variations outside the First Choice System

1. Changing the type of system itself

a. Description

Because the May, 1983 subsurface system had reached an impass, alternative systems were examined. Since the availability of land was the major constraint, that factor was the key element of the search in considering alternatives.

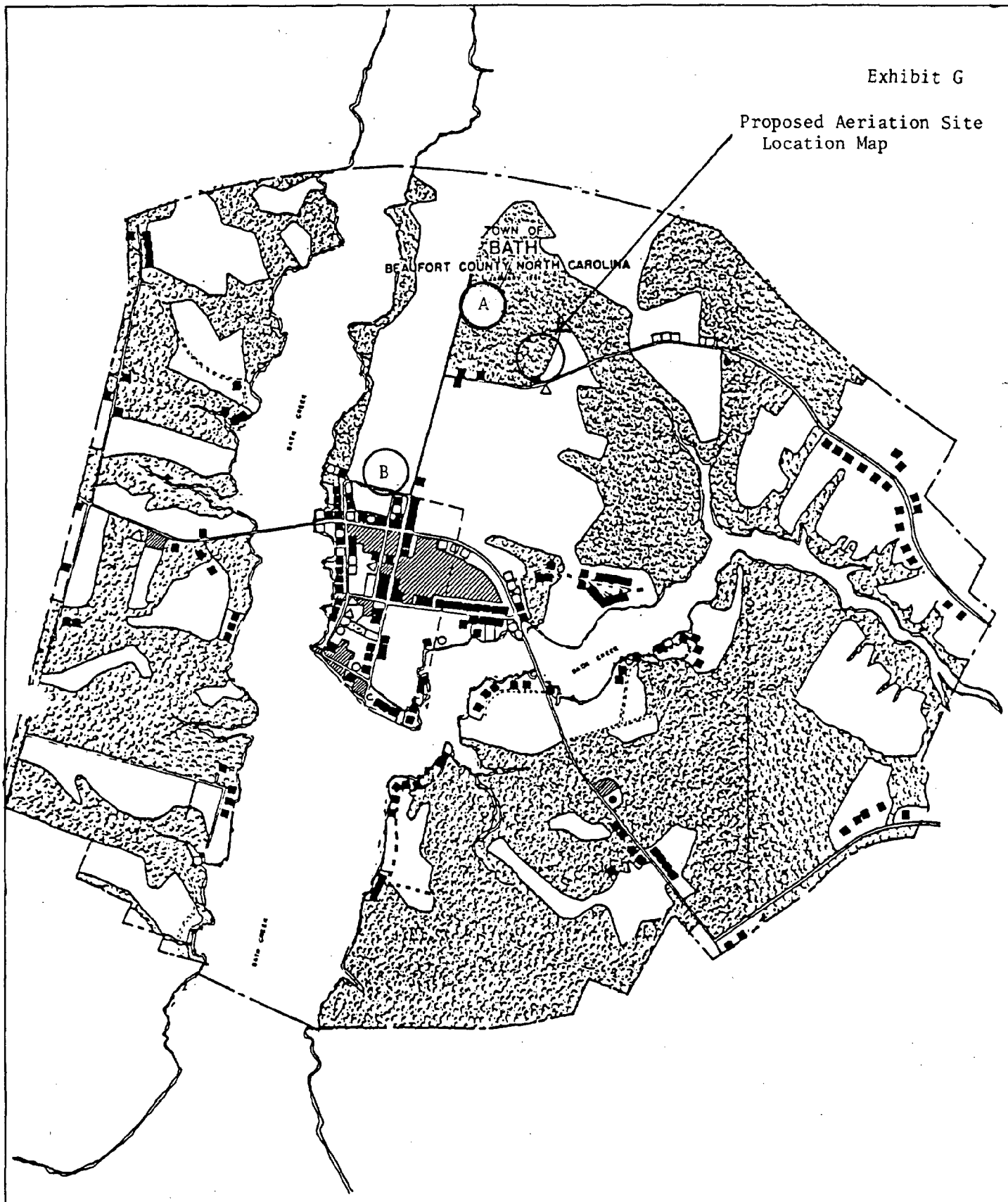
Discussion was made with the owner of parcel 124 (see Exhibit A) regarding purchase or lease of that site, though the area was too small to handle all 40,000 gallons of capacity projected to be needed. This land is probably still available, if it can be combined adequately with adjacent property.

Informal discussions were with the owner of lot 127 (which is across Bowen Drive from 124) regarding the residential and commercial development on that lot. It was found that commercial development is inconsistent with the Bath Land Use Plan, but discussions are still underway regarding other options on this site.

Thus, the Town Commons, an area shown on Exhibit G (Location Map) and Exhibit H (Site Map) became the location of the most available land in the community. This land, as any other site, brought with it technical considerations. These were so pronounced that they dictated a change in type of system, switching the proposal from a subsurface to a surface (irrigation) type system. See Exhibit I for the amended Preliminary Report which had to be prepared and submitted to FmHA and DEM.

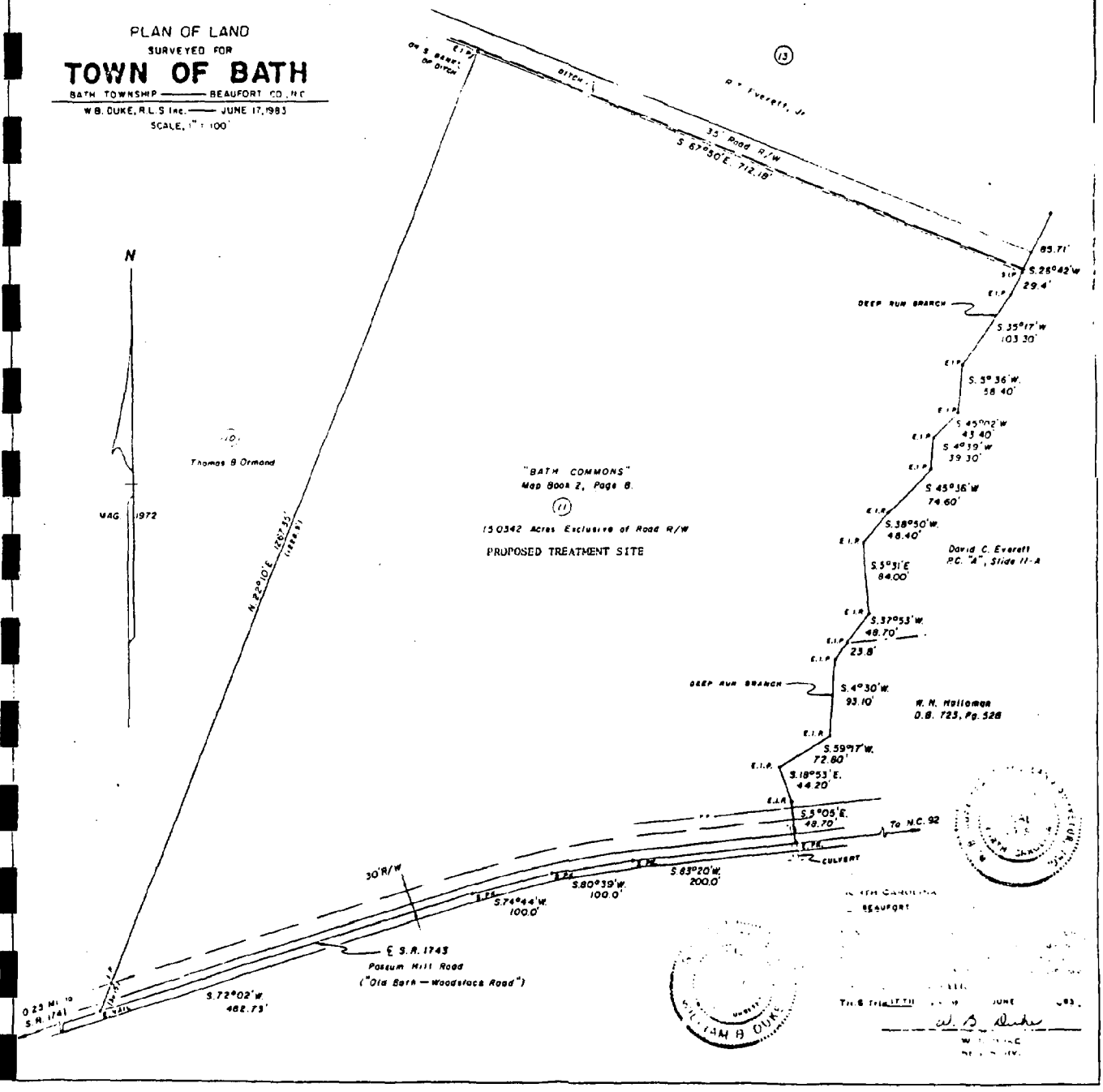
Exhibit G

Proposed Aeriation Site
Location Map



A, B Alternative Sites

Exhibit II-B-11



b. Constraints on the newly proposed system.

The following constraints are acting upon the selective alternative as of this writing:

- additional cost ($64,000) of running the system out to the Town Commons site. (Total cost of the previous system (May, '83) was $665,291, was compared to the revised price (see Exhibit I1) of $726,691, rendering the alternative $61,400 more expensive.)
- there was a lack of ready access to records of ownership of the land, since the site was last owned by the town (clearly) in 1914 when it was about 60 acres, and had been allocated to various families over time without clear title.
- a special survey was determined to be needed for the treatment site to determine boundaries and ownership, costing $1,500.
- funds to cover fees of amending the original PER were not available from the town, nor were funds to undertake any further amendments to the PER if the system on the Town Commons fails to receive the necessary permits from NRCD, etc.
- the costs of preliminary engineering and evaluation studies, estimated at a cost of $16,500 (see Exhibit I2) are reimbursable only after successful public referendum, preventing access of information which is really fundamental to the success of the referendum: that is, what is the final proposed system, and what will be its monthly costs?

- without the aforementioned engineering information, rumors have taken hold regarding the irrigation type land application system, despite public presentations that the spray will be pre-treated with chlorine before dispensing it onto the land.
- the Town Commons site itself appears environmentally sensitive, even though the degree of sensitivity is unknown. This may lead to (forced) selection of another site, for which the total costs could vary considerably.
- Programs to leverage the hook-up fees are not available, except for the unrealistic approach of folding the hook-up costs into the FmHA loan, which in this case would have several undesirable effects:

    - The principal of the loan would raise from $217,000 to $248,500.
    - The Town would have to own the entire system, from each house to the pipes in the street, requiring an easement to be acquired in every yard in town. This would place an incredible legal and administrative burden on the Town staff. It would create undue expense upon the tax base, since expenses to cover extensive operation and maintenance costs would be the Town's burden, and these revenues would likely come from taxes (or increased user charges).

PRELIMINARY ENGINEERING REPORT
LAND AERIATION LOW-PRESSURE WASTEWATER TREATMENT SYSTEM
TOWN OF BATH

A. Area to be served: The area to be served by the proposed wastewater system includes all commercial and residential users and Bath High School (inside the Town limits), and a small adjacent subdivision east of Bath. The service are is shown on Exhibit 4, IA2 of the April 12, 1983 Preapplication already submitted.

B. Existing Facilities: There are 186 septic tanks in the service area to treat the wastewater, out of which 83 septic tanks are in inadequate or marginal condition. Five septic tanks are used by the Bath High School. Two are in inadequate or marginal condition. Often the school has to send students home early each day to avoid the overload of septic tanks. Some residents and businesses have received warnings from the Beaufort County Health Department due to the bad conditions of septic tanks.

C. Proposed facilities and services:

1. General Description: A low pressure sprinkler land application system is proposed to treat the wastewater being collected from the service area. Featuring two stabilization lagoons, this is the most cost-effective method for treating wastewater on the wooded disposal site. This type of system is widely used for the treatment of wastewater by small municipalities and has been recommended in coastal North Carolina as an alternative to conventional tertiary systems which endanger surface water supply or are more costly to construct.

2. Land: The land required for the low-pressure sprinkler land application system is about 5 acres plus 1 acre as a buffer, totalling 6 acres. The land is located north of the Town of Bath on Possom Mill Rd. on a site known as the "Town Commons". It is surrounded on the north, west and east by private farm land and on the south by Possom Mill Rd. (See amended Exhibit VI. 3. F attached).

3. Rights: The land is owned by the Town of Bath.

4. Collection System: The minimum of 8" line is to be used for the collection system. A minimum flow velocity of 2 ft. per second will be maintained in the wastewater collection pipes to prevent the accumulation of solids in the sewer lines. The design capacity is 40,000 gpd which is expected to be reached in 20 years.

5. Treatment facilities: The low pressure sprinkler land application system is proposed to treat the wastewater with the design capacity of 40,000 gpd. The land requirement is calculated to be 5 acres with the loading rate of .18 gpd/sq. ft. There will be a set of two-stage lagoons to stabilize the organics and to allow sedimentation of the solids. Then the liquid will be pumped through the sprinkler system to be disposed on the designated land surface for further treatment. The natural ground cover and soil of this site will provide physical, chemical and biological treatment and purify the liquid adequately before it is naturally discharged to the surface and subsurface water.

6. Costs: The initial construction and annual operation and maintenance costs are shown on the attached supplement, pages 1 - 4 (pages 1 and 2 were updated 7/14/83 and pages 3 and 4 remain as submitted on April 12, 1983).

D. Cost estimate: (See attached supplement, pages 1 and 2 updated)

E. Annual Budget:

1. See attached supplement, page 3.
2. See attached supplement, page 4.

F. Maps: See Exhibit 4, IA2 for Service Area and Exhibit VI.3.F for population distribution and treatment site.*

G. Construction Problems: Sub-soil conditions will be investigated to determine the extent to which they will increase the construction cost of lagoons. Similarly, construction and operating costs may be increased in order to prevent run-off from the site into Bath Creek which reaches near the site on the east. The Town herein requests that the contingency line item in the construction budget (page 3 of the PER), now set at 8%, be increased to 15% to cover such unforseen costs.

H. Conclusions & Recommendations: Inadequate wastewater treatment has been a problem in Bath for many years. The Town Board, Planning Board, Local School Committee and the citizenry are committed to making this land application system a success. They recommend its funding wholeheartedly.

* These Exhibit references related to the original grant application document submitted to FmHA and the Division of Environmental Management.

SUPPLEMENT TO PRELIMINARY ENGINEERING REPORT
(SEWAGE FACILITY)

CONSTRUCTION COST ESTIMATES
(List All Major Items)

SEWAGE COLLECTION

1320	LF	8"	Sewer Pipe	@ 15		204,303
	LF	10"	Sewer Pipe	@		
	LF	12"	Sewer Pipe	@		
	Ea.		Standard Manholes	@		
15	Ea.		Drop Manholes	@ 2500		37,500
	Ea.		Lift Stations	@ LS		
	LF		Force Mains	@		
	Ea.		Service Taps	@		
	TOTAL CONSTRUCTION COST (Round to nearest thousand dollars)					241,800

SEWAGE TREATMENT: (Include all items to which EPA will grant)

	LF	8"	Interceptor Pipe	@		
5088	LF	12"	Interceptor Pipe	@ 20		101,760
	LF	18"	Interceptor Pipr	@		
	LF	24"	Outfall Sewer Pipe	@		
5	Ea.		Lift Station	@ LS	$7000	35,000
200	LF	8"	Force Mains	@	$ 19	3,400
			Treatment Plant	@ LS		155,090
2	ea.		low pressure pumps	@	$4000	8,000
	TOTAL CONSTRUCTION COST (Round to nearest thousand dollars)					303,250

Above prices are current through 1984

PROJECT COST ESTIMATE

	Collection	Treatment	TOTAL
Construction	241,800	303,250	545,050
Land & Rights		20,000	20,000
Legal & Adm.	7,520	8,480	16,000
Engineering 11.4%	29,204	32,932	62,136
Interest	39,000	-0-	39,000
Equipment	N/A	N/A	N/A
Contingencies	24,180	20,325	44,505
TOTAL PROJECT COST	341,704	384,987	726,691

PROJECT FINANCING PLAN

	Cash Contrib. by Appl.	Clean Wat. Bond Grant	Other Grant*	FmHA Loan (GO Bonds)	Total
	0	96,247	0	630,444	726,691
(Collection Facility)					
	0	0	0	0	0
(Treatment Facility)					
	0	96,247	0	630,444	726,691
TOTAL FUNDING	0	96,247	0	630,444	726,691

*Identify source of grant.
Do not assume any FmHA Grant.

Existing Indebtedness:
(This facility only)

Purpose	Amount Owed	Amortization Period	Amount of Installment
	N/A		

Sewer rates may be expressed as a percentabe of the water bill or as a straight cost per 1,000 gallons of water consumed.

EXISTING RATE SCHEDULE (water only)

First	5,000	gallons @	7.50	Min.	
Next	5,000	gallons @	1.25	Per 1,000 gal.	
"	any additional	gallons @	1.00	" " "	
"		gallons @		" " "	
All Over		gallons @		" " "	

PROPOSED RATE SCHEDULE (wastewater only, residents*)

First	5,000	gallons @	20.80	Min.	
Next	any additional	gallons @	4.16	Per 1,000 gal.	
"		gallons @		" " "	
"		gallons @		" " "	
All Over		gallons @		" " "	

*commercial rates are 150% of the residential rates.

USE AND INCOME ESTIMATES
(According to proposed rate schedule)

SEWER:

Benefited Users (All users with 3/4 x 5/8 meters)

	Existing	New	Total				
				users @		gal.	$
	resid.	120	120	users @	2,000	gal.	$ 2,496
	resid.	13	13	users @	8,690	gal.	$ 470
	commercial	16	16	users @	13,700	gal.	$ 1,368
				users @		gal.	$
				users @		gal.	$
				users @		gal.	$
TOTAL	0	149	149	users @	3,843	gal.	$ 4,334

Non Benefited Users (All users with larger than 3/4 x 5/8 meters)

	Existing	New	Total				
	0	1	1	users @	65,000	gal.	$ 406
				users @		gal.	$
				users @		gal.	$
				users @		gal.	$
TOTAL	0	1	1	users @	65,000	gal.	$ 406

TOTAL = $ 4,740 x 12 = $ 56,880 Annually

BUDGET FOR COMPLETED FACILITY

	Actual (Fiscal Year Ending 19)	Estimated (Completed Facility)	
Income:			
Sewer Charges	N/A	56,880	
Adv. Tax		N/A	
Other		N/A	
TOTAL		56,880	
EXPENSES:			
Salaries			
Supt. & Clerk		3,600	
Labor		2,911	
Soc. Security Tax		210	
Office Exp. (Supplies, Postage, Heat, Electricity, Telephone, Equipment, etc.)		500	
Bond & Insurance		400	
Audit		100	
Testing-St. Reg. Agy.		360	
Chemicals		100	
Transportation		300	
Electricity		2,400	
Supplies		100	
Maint. & Repairs		600	
Miscellaneous		419	
Bulk Treatment Charges		N/A	
Debt Service			
Existing		N/A	
Proposed Addition		44,436	(P&I)
TOTAL		56,436	
BALANCE AVAILABLE		444	

FLOOD PLAIN INFORMATION

Is any part of project located in a flood plain area? NO If project is in flood area, is applicant eligible for National Flood Insurance? N/A

Exhibit VI.3.F

Population Distribution
and Treatment Site Location

SECTION D - ADDITIONAL ENGINEERING SERVICES

In addition to the foregoing being performed, the following services may be provided UPON PRIOR WRITTEN AUTHORIZATION OF THE OWNER and written approval of FmHA.

1. Site surveys for water treatment plants, sewage treatment works, dams, reservoirs, and other similar special surveys as may be required. (Topographic survey, $1,500).
2. Laboratory tests, well tests, borings, specialized geological, soils, hydraulic, or other studies recommended by the ENGINEER. Feasibility Study of the site; capacity & permit application & approval ($10,000)
3. Property surveys, detailed description of sites, maps, drawings, or estimates related thereto; assistance in negotiating for land and easement rights.
4. Necessary data and filing maps for water rights, water adjudication, and litigation.
5. Redesigns ordered by the OWNER after final plans have been accepted by the OWNER and FmHA, except redesigns to reduce the project cost to within the funds available.
6. Appearances before courts or boards on matters of litigation or hearings related to the project.
7. Preparation of environment impact assessments or environmental impact statements.
8. Performance of detailed staking necessary for construction of the project in excess of the control staking set forth in Section A-12.
9. The ENGINEER further agrees to provide the operation and maintenance manual for facilities when required for $ 5,000.

Payment for the services specified in this Section D shall be as agreed in writing between the OWNER and approved by FmHA prior to commencement of the work. Barring unforeseen circumstances, such payment is estimated not to exceed $ 16,500. The ENGINEER will render to OWNER for such services an itemized bill, separate from any other billing, once each month, for compensation for services performed hereunder during such period, the same to be due and payable by OWNER to the ENGINEER on or before the 10th day of the following period.

c. Responses to major constraints.

The following is a range of responses which have been considered in response to the aforementioned constraints, primarily the hook-up costs. This format of playing-out the cost and other consequences of each can provide considerable insight into decisions facing the Town Council and the electorate.

1. Municipal borrowing.

Loan of revenue sharing from the County. Under N.C. statute, any form of borrowing by a government obligates the government to repay from its general fund (and its revenue base is taxes). Thus, a referendum is required.

2. Existing Town Budget.

Capital reserves in the water fund account are not available, as the water system currently operates at a deficit. Thus, other fund balances within the town budget were considered.

On June 30, 1982, there was $5,000 of Fund Balance "designated for subsequent years budget" and $8,176.92 "undesignated". The revenue sharing entitlement was $3,968.17. These funds, if not already spent or designated for FY 1983, could go for paying down part of the hook-up fees.

3. Tax increase.

The Town could raise the tax rate to establish a revolving loan fund to be administered by a non-profit organization established for the purpose of loaning funds to the low- and moderate income home owner who cannot afford connection costs. Low interest could be charged so they could afford the payback and funds could be allocated to others. When fully paid back, the fund could be used to match other community development projects on a revolving loan fund basis.

4. CDBG

The Town could write a Community Development Block Grant, though under different terms than initially thought. From discussions with John Downs and Gregg Warren of NRCD, the community could take the following approach, though it is highly uncertain how the project would point out (that is, rate):

- Identify a target area of housing rehabilitation needs, probably bathroom replacements, roofs, etc., containing 45 houses at an average rehabilitation cost of $6,620, rendering a rehabilitation budget of $297,900, budget administration at 13.29% or $39,600. The hook-up fees of $67,500 (based on 150 users at $450 each) would come from the 20% local option. The total amount of the CDBG application would need to be $405,000.

  Problems with this approach are that in order to rate well under CDBG, houses have to be in a tight cluster (target area), be 80% low- and moderate income, and the 20% local option would have to benefit at least 50% low- and moderate income persons. The program is highly competitive; applications are expensive to write; and funds for reimbursing their preparation are not available except through writing a Development Planning Grant, postponing the availability of the $405,000 another grant cycle (year).

5. Philanthropy.

While once a major form of raising community development funds, the use of this mechanism has waned. There are, however, several well-to-do persons in Bath (and certainly several who currently dock their craft at the marina) who could be approached for a sizable tax deduction of $31,500 over a ten year period to finance the hook-ups of low- and moderate income persons.

6. Leveraging Private Development.

In places where there are inadequate systems, new wastewater systems typically stimulate development. Projections may be constructed to show the likely "build-out" of new development stimulated by the new wastewater treatment capacity, and proformas written to determine the taxes generated upon that development. If the revenue goal is spread over a number of years (say 5 or 10), this method could provide the necessary funds with which to finance a hook-up fund. This could negate the need for increasing the current tax base or undertaking other interim measures (like CDBG). It is important to remember, however, that this is a speculative option, since development may or may not occur to the extent or at the time preferred.

One example is offered below:

Currently Bath's tax rate for ad valorem taxes is 20 cents per $100 valuation. Discussion with residents indicates that the current valuation is about 33% of market value.

Thus, if the revenue objective is to raise $31,500 in ten years from new development, the new development would have to generate $3,150 per year. This would require a development of $4,725,472.50 (($6,300 (target) divided by .20 (tax rate per $100 valuation) times 100 divided by .3333 (ratio of valuation to market value) = market value of development required to raise $3,150 per year. $3,150 per year times 10 years renders the original target of $31,500.) This amount of revenue could be generated at the existing tax rate from 60 single family houses (and lots) selling for $80,000 each. Doubling the tax rate to 40 cents would, of course, raise on the sale of 30 such houses and lots.

Similarly, to generate $67,500 over 10 years at the current tax rate, development would have to generate $6,750 per year and have a market value of $10,126,012.60 (arithmetic identical to that for the $31,500, starting with $6,750 however). This amount could be generated at the existing tax rate from 126 single family houses (and lots) selling for $80,000. Doubling the tax rate to 40 cents would, of course, raise this much on the sale of 63 such houses and lots.

8. Varying monthly user fees.

This alternative involves combining the debt service of the water system (existing) with that of the wastewater system (proposed) and developing a new rate structure favoring low income households.

The following four scenarios present variations on the cost of providing water and sewer services under different rate structures:

Scenario 1 - shows that the FmHA grants allow a $12 minimum monthly charge to pay off the $217,900 loan.

Scenario 2 - shows that with a low interest loan but no grant, a minimum monthly charge of $22 is required to pay back $727,000 low interest loan.

Scenario 3 - shows that a conventional loan for the $727,000 would require a minimum payment of $31.00 per month.

Thus, the strategy in Table 1 (accepting the grants and loans) is the preferred variation.

Scenario 1 extended - shows the fluctuations in monthly costs for hypothetical variations in family size and amount of water usage.

Scenario (1). The Acceptance of FmHA/DEM loans and grants.

With the approved grants from FmHA and N. C. State DEM of $510,000, FmHA loan of $217,000 of 7 1/8% interest rate for 40 years, the total annual cost of P & I for the loan and O & M cost for wastewater system is $28,683 per year. The monthly water and sewer costs are calculated as:

TABLE 1

	Less than 2000 gal./ Month	More than 2000 gal./ Month	No. of Users	Projected Sub-total fee/month
Residents	$12	$5/1000 gal	133	2,031
Commercial		$6/1000 gal	16	1,315
Institution on larger than (3/4"x5/8") meter		$7.5/1000 gallons	1	488
			Total	$3,834

$3,834 per month or $46,008 per year of water and sewer fee is projected to be raised, out of which $28,683 will be paid for sewer cost and $17,325 will be paid for water cost.

Scenario (2). Using a low interest loan, but no grant.

Assuming a total loan of $727,000 at 7-1/8% interest rates for 40 years, the total P & I for loan and O & M costs will be $67,010 per year. The total water and sewer costs will be $84,335 per year. The monthly water and sewer costs were calculated as:

TABLE 2

	Less Than 2000 gal./ Month	More Than 2000 gal./ Month	No. of Users	Projected sub-total fee/month
Resident	$22	$9.17/1000 gallons	133	$3,723
Commercial		$11.00/1000 gallons	16	2,410
Institution on larger than (3/4"x5/8") meter		$13.75/1000 gallons	1	895
			TOTAL	$7,028

Scenario (3). Conventional loan with no grants.

Assuming that the $727,000 loan is borrowed at 12% interest rate (prime rate plus 1%) for 30 years, the P & I costs would be $89,737 per year. The P & I plus O & M costs for the sewer system would be $101,737 per year. The annual costs for water and sewer will be $119,062.

The monthly water and sewer fees for users are projected as:

TABLE 3

	Less than 2000 gal./ Month	More than 2000 gal./ Month	No. of Users	Projected sub-total fee/month
Residents	$31.00	12.90/1000 gallons	133	$5,256
Commercial		15.53/1000 gallons	16	3,403
Institution on larger than (3/4"x5/8") meter		19.41/1000 gallons	1	1,263
			TOTAL	$9,922

SUMMARY: With the funding in Scenario 2, the users will pay 83.3% more for water and sewer P & I and O/M monthly fee.

With the funding in Scenario 3, the users will pay 158% more for water and sewer P & I and O/M monthly fee.

Again, the best variation is Scenario 1, that is, for the town to accept the grants and loans, thereby qualifying for the low rate of $12.00 per month.

Scenario (1) Extended. The following presents the financial impacts (column F) of various family sizes and use rates.

User:	Persons/ House-Hold	A Min. Rate	B Gallons Used(a)	C Gallons over min. X - 2000 (round to nearest 1000 gal.)	D Rate/1000 gallons over min.	E Change for galls. over min.	F Total Charge A + E
Residence	(1)	$12	1950	0	$5.00	0	$ 12.00
Residence	(2)	12	3900	1900 = 2	5.00	10.00	22.00
Residence	(3)	12	5850	2850 = 3	5.00	15.00	27.00
Residence	(4)	12	7500	5800 = 6	5.00	30.00	42.00
Residence	(5)	12	9750	7750 = 8	5.00	40.00	52.00
Residence	any size	12	8690	6690 = 7	5.00	35.00	47.00
Commercial: Bath	average	0	13700	0	6.00		82.20
Industrial (school): Bath High School	800	0	65000	0	7.50		487.50

(a) 1 person = 65 gallons per day, 30 day month = 1950 gal./month. According to the Town's water records (1981), 120 households now use less than 2000; only 13 households use more than the minimum, (8690 per month). 16 businesses are estimated to use 13,700 gallons per month. The school uses 65,000 per month.

As the system is now costed out ($727,000 total cost, with loans and grants), the system will pay for itself if:

120 households	use 2000 gal. per mo.	--	120 x $12 =	$ 1440/mo.
13 households	use 8690 gal. per mo.	--	13 x 47 =	611/mo.
16 businesses	use 13700 gal. per mo.	--	16 x 82.20 =	1315.20/mo.
1 school	uses 65000 gal. per mo.	--	1 x 487.50 =	487.50/mo.
				$ 3853.70/mo.

So, $3853.70/mo. x 12 mos. will raise $46,244/year. Actual debt service is $17,120 for water and $28,683 for sewer or $45,803. The fund balance (excess revenue) of $441 per year will revert to the contingency line item in the water and sewer fund.

2. Changing the Service Area Local and District Variations

a. Description.

Since November, 1983, discussions have been undertaken at Town Council meetings about the obstacle of the hook-up fees, etc. In these discussions, three (3) other sites for land application systems have been identified. Two (2) of these are "local variations" (serving the original service area only (that is, Bath proper and Springdale Village), while the other is a "district variation" (that is, serving a larger area of which the original service area is a portion).

The local variations may be seen on Exhibit G, indicated by the letters "A" and "B". Site A is currently used for agriculture, and is about 15 acres in size. The owner stated in a public meeting that she would be willing to work with the town to provide the site if it was needed (that is, if other sites cannot be found, etc.).

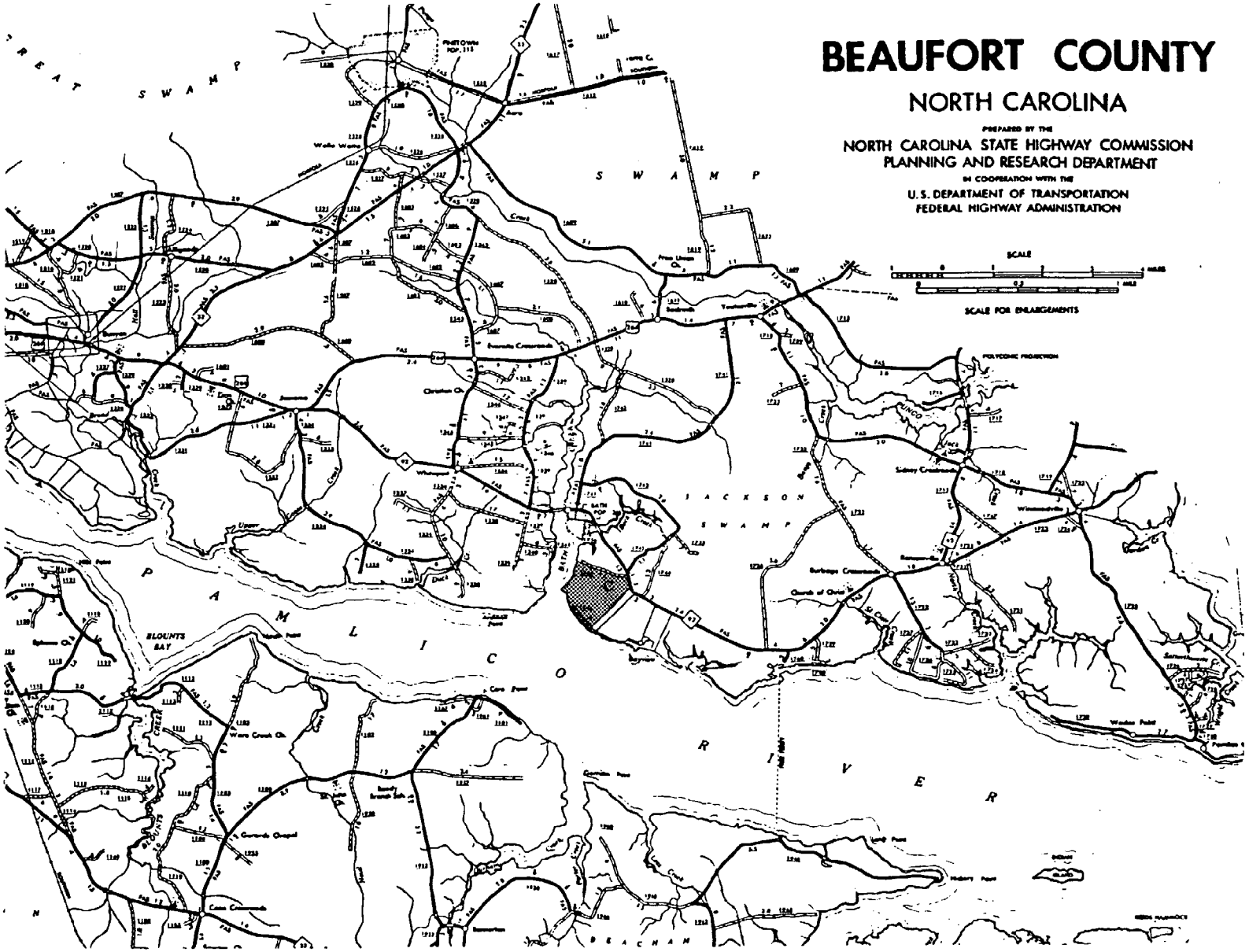
Site B has been mentioned earlier. The owner has several creative ideas about donation of an area large enough for a subsurface application system, but that suggestion is complicated by the proposed use of parking on top of the septic system, and such a system's unknown relationship to proposed (but not yet platted) development of lots. (That is, there is no subdivision plat showing how the development would accommodate the wastewater treatment site, or vice versa).

Exhibit J1 presents another variation of considerable merit, that of developing a district approach for the wastewater treatment system. The expanded service area would likely extend from the currently proposed service

area to the east side of Bayview initially covering the shoreline to Bayview, with fill-in of the area between the shoreline and Hwy. 92, over time. Exhibit J2 presents the nucleus of the expansion idea, indicating the involvement of a private developer (the Weyerhauser Real Estate Company). Under this proposal, a land application treatment site could be located near point "C" (see Exhibit J1) under a modification of the current FmHA proposal. This would leverage considerable development into the area which could help pay for the system in Bath, and serve needs of Bayview, which is having severe water problems (and potentially septic problems due to floodproneness).

The threads of a deal with the Weyerhauser Real Estate Company are being developed by one of the local town council members and Mr. John Doughty, who authored Exhibit J2. The essence of the thinking to date (1/17/84) is as follows:

Weyerhauser owns the land cross-hatched (shaded) in Exhibit J1. In exchange for reserve capacity (say 10,000 gallons per day of the proposed 40,000) which would allow the company to forego the cost of building its own package treatment plant to develop the property, the company would donate the land for the Town's treatment plant. This would reduce the Town's land costs and could leverage a donation of $70,000 into a hook-up fund from Weyerhauser which would pay for the currently proposed 150 households to hook-up. This would effectively remove the tightest constraint on the upcoming referendum -- the lack of funds for hook-up.



note: Alternative site "c" is shown inside the shaded area.

Exhibit J2

Weyerhaeuser Real Estate Company

P.O. Box 1391
New Bern, North Carolina 28560
(919) 633-3141

December 9, 1982

Mr. Wilton Smith
P.O. Box 713
Washington, NC 27889

Dear Wilton:

I have discussed the possibility that the Town of Bath may build a sewer system in the area east of the town with Dewitt Darden and Roger Lyons of Weyerhaeuser Company. They both realize the need for such a system and the value it may be to the Company should it ever develope the property known as Plum Point.

If a site is needed for a pumping station or treatment plant and it should be determined that the best site is on Company property it is possible that the property could be made available. A final decision can be made only after all the details of the project are known.

It was a pleasure talking with you about development in the Bath area. If I can help you or the town in any way please do not hesitate to call.

Sincerely,

John Doughty

JD/ti

Preliminary (discussion level) estimates of the details of the system are that:

. the treatment site could be placed near Highway 92 with pipes running along the road, encouraging further commercial development of the Bath planning area. This could stimulate annexation, thereby building the tax base.

. Weyerhauser is discussing building up to 400 housing units in the shaded area on Exhibit J1 (over, say, the next 10 years). Assuming 65 gallons per day for each person, a family of three (assuming younger families than Bath now has) would generate 5850 gallons per month, times 400 households would generate 2,340,000 gallons of wastewater per day. Adding the currently proposed 40,000 brings the total design capacity requirement for the "District System" to 2,380,000.

Under such a scenario, the company would have to provide expansion of the system beyond the 40,000 currently fundable by the FmHA/DEM proposal, since Beaufort County does not itself qualify for FmHA reduced interest rate loans. However, even the 9 1/8th percentage rate (FmHA's full rate) is more favorable than conventional rates, and the county is eligible for the FmHA full rate.

. The hypothetical location of the treatment site "C" is about 1.5 miles from the western shoreline of Back Creek, while the proposed Town Commons site is about 1.2 miles from the northern city limit line. Rough estimates of increased expenses for the District System are as follows:

	District	Local
6864 lf (1.3 miles) of 12" interceptor pipe @ $20/lf	$137,280	$101,760
1200 lf of 4" force main across the Back Creek bridge @ $19/lf	22,800	3,400
2 lift stations @ $7,000	14,000	14,000
TOTAL excluding O & M costs:	$174,080	$119,160
Comparable line items of the proposed line items for the Town Commons "local system"	119,160	
Difference (excess of the district system's cost over local):	$ 54,920	

Prorating the current FmHA loan/grant package to a hypothetical system on Site C which would support 100 new homes is as follows:

FmHA loan:	$ 940,000
FmHA grant:	1,089,000
DEM grant:	297,000
TOTAL cost:	$2,326,000

Besides additional cost, complicating factors on this variation include the following issues:

1. What will be the environmental requirements of the sewer along Back Creek?
2. Will the environment (and the state permit system) allow lift stations near the Back Creek bridge?
3. Will DOT allow the pipes to be "hung" on the bridge to get across Back Creek?

The resolution of these important uses is beyond the scope of this study.

III. The Hypothetical Case: Methodology for Other Coastal Communities

A. Analyzing Demand for Wastewater Treatment

The following section moves from the empirical experience at Bath to a more abstract or methodological way of identifying constraints before they bind, as an aid for other coastal communities embarking on the selection of an alternative wastewater treatment system.

Exhibit L presents a check list of demand criteria which can be helpful in articulating the community's profile of demand -- the target, so to speak, toward which funds and technical solutions will be directed.

Funding sources typically respond best to the best informed applicants. A considerable amount of time can be saved by preventing pursuit of the wrong funds.

Additionally, from completing Exhibit L, a range of alternatives could be established for variation.

Exhibit L

CHECKLIST OF DEMAND

Item	Data & Sources	Response
1. Level of Environmental Sensitivity of Community a. Effluent Quality	DEM classification and Effluent Quality. Limits will be determined by NRCD stream computer modeling analysis.	BOD (PPM) _____; suspended solids (PPM) _____; Stream classification __;
2. Special Site Limitations	Site requirements Suitability Known soils info. Proximity to water etc. (use Exhibit M)	Engineering Analysis
3. Type of Effluent	Residential, Commerical, Institutional, Industrial, by number and size of water.	
a. Quantity of Effluent Minimum Treatment Capacity	Quantity of Effluent in Terms of GPD	Engineering Projections
b. Ability to Pay . Median Family Income	NC Budget Office	Community Planning
. Available Source of Funds: FmHA EPA DEM	Contact each Agency	Engineer's and Planner's Assistance
Unappropriated Fund balances	Town Budget	
Tax base (existing & future)	Town Budget	
c. Desired impact on future land use and community lifestyle	State any growth assumptions; existing wastewater treatment system residents attitude for improvement and progress.	Community Planning
d. Others	TBD	TBD

Exhibit M

Demand in terms of Daily Flow

Type of Establishments	Daily Flow for Design
Residences	100 gpd/person
Airports, also RR Stations, bus terminals. (not including food service facilities)	5 gal/passenger
Barber Shops	100 gal/chair
Beauty Shops	125 gal/booth or bowl
Bowling Alleys	50 gal/lane
Camps	
Construction or work camps	50 gal/person
Summer Camps	50 gal/person
Camp grounds	150 gal/campsite
Churches	5 gal/member
Country Clubs -- Resident members	75 gal/person
Non-resident members	20 gal/person
Day Care Facilities	15 gal/person
Factories (exclusive of industrial wastes) -- per shift	25 gal/person
Hospitals	300 gal/bed
Laundries (self-service)	500 gal/machine
Motels/Hotels	75 gal/room
With cooking facilities in room	125 gal/room
Resort	200 gal/room
Offices -- per shift	25 gal/person
Nursing/Rest Homes -- With laundry	150 gal/bed
Without laundry	75 gal/bed
Residential Care Facilities	75 gal/person
Restaurants	40 gal/seat
Schools: Day Schools	15 gal/person
Note: Use 20 gal/person if aerobic treatment is proposed	
Boarding Schools	75 gal/person
Day Workers	25 gal/person
Service Stations	250 gal/water closet or urinal
Stores -- Note; if food service is included, add 40 gal/seat	250 gal/water closet or urinal
Swimming Pools and Bathhouses	10 gal/person
Theaters -- Auditoriums	3 gal/seat
Drive-In	5 gal/Car space
Travel Trailer Parks	150 gal/space

History Note: Statutory Authority G.S. 143-215.1; 130-160;
Eff. February 1, 1976.

B. Analyzing Supply (Capacity) of Different Treatment Systems

After having developed a general profile of demand, one should consider constraints (or limits) of various treatment systems.

Exhibit N presents the major constraints of four typical systems, in fact, the four which were considered in Bath over the years. Other systems, or more specific types within these four categories, can be added to the array.

Exhibit N
Characteristics of Supply

Type of System	Most Constraining Characteristic	Second-Most Constraining Characteristic	Third-Most Constraining Characteristic
System A: Package System	Quality of Effluent	Cost	Max. Population Servicable
System B: Conventional Plant	Quality of Effluent	Site Stream Classification	Capital and Operating Costs
System C: Land Application System (Surface)	Land Availability Soil Characteristics		Capital Costs
System D: Land Application (Subsurface)	Land Availability Soil Characteristics Vegetation Cover	Sensitivity of Surface Water and Ground Water	Capital Costs

Additionally, specific data may be placed in the cells to get a general quantitative idea for the capacity of each system to perform, relative to its cost, sensitivity, etc. Then this information, in a quick outline form, can be related to the demand information in the previous section.

IV. Summary Chart: Applying the Methodology to the Bath Case

A. Description:

The necessary considerations for the items listed on the community conditions and requirements (demand side), and the wastewater treatment alternatives and limits (supply side) are compared between the general evaluation process and specific examples derived from the experience in the wastewater treatment system development in Town of Bath.

This comparison will provide a guidance and example for the evaluation and selection procedure for the future wastewater system planning and design in the coastal area in North Carolina.

B. Chart

The following chart (Exhibit O) consists of three major parts: the first column lists the items needed to be considered. The second column states the suggested consideration for general case. The third column presents the specific experience and results from the Bath wastewater treatment development projects.

Both demand and supply considerations for the wastewater treatment planning are presented in the chart.

ITEMS TO BE CONSIDERED	GENERAL CONSIDERATIONS	SPECIFIC EXAMPLE: BATH WASTEWATER TREATMENT SYSTEM
1) DEMAND SIDE:		
Effluent Quality	Stream classification, effluent quality limits, type of influence from various activities (residents, businesses, industries)	Bath is a very sensitive area because of commercial fishing and concerns for coliform pollution in the water supply. Currently, there is no industry at Bath, all wastewater comes from residents and businesses. Domestic wastewater only. Point-discharge effluent quality needs to be determined by NC-DNRCD.
Quantity of Influent	The estimate of daily wastewater flow rate for residents and businesses should be calculated in accordance with Exhibit M, Industrial Wastewater quantity and quality needs to be identified. Future growth should be considered, the capacity to meet the community growth in 20 years is recommended.	Current population at Bath is 214. It is projected that Bath will have 400 people including 21 commercial establishments and one industry in 20 years (CAMA Land Use Plan). The projected wastewater flow rate is 40,000 gallons per day.
Ability to Pay	Community medium income level. Tax base for the loan. Availability of 3rd party grants and loans such as Federal and State governments.	The medium family income in Bath is $10,000. The total tax valuation of Bath is $2.3 million, with the final estimate of wastewater system cost of $727,000. $419,000 in grants were approved by FmHA, $90,461 in grants by NC-DEM, and $217,000 in loans at 7-1/8% interest rate for 40 years, by FmHA.
Residents Attitude Toward Wastewater Treatment Improvement	Type, history, and cost of existing wastewater treatment system. Level of demand for improvement Residents' attitude towards community improvement and progress in general.	Septic tank is the only treatment for the wastewater from residents and businesses at Bath. The field survey indicated that 103 septic tanks were in good condition, 53 are in marginal condition, and 30 were in bad condition. The septic tank at the union school was in bad condition. The Town Council is very supportive for the improvement of Bath wastewater treatment system. However, the individual residents still consider the wastewater treatment as an individual issue, particularly those residents whose septic tanks are in good condition.

ITEMS TO BE CONSIDERED	GENERAL CONSIDERATIONS	SPECIFIC EXAMPLE: BATH WASTEWATER TREATMENT SYSTEM
2. SUPPLY SIDE:		
Package Treatment System	Effluent quality needs to be examined carefully. Site of package plant should be selected with the consideration of point-source discharge quality limits. The cost for package treatment may be comparatively reasonable.	Due to the high environmental sensitivity at the Town Commons, the low-cost package treatment plant may not produce high enough quality of effluent to satisfy the discharge quality limits for Back Creek.
Conventional Treatment System	High quality effluent can be produced by this advanced conventional wastewater treatment plant. But the high capital and operation/maintenance costs may be a limit for the selection of this treatment alternative.	To provide adequate treatment for the Town of Bath, the centralized conventional wastewater collection and treatment system was estimated to cost $1.2 million or $9,000 per unit for the Bath residents, which is far too costly to local residents. EPA funding was at least 6 years off, and even then, the increased local share put the program out of reach for Bath.
Land Application (subsurface) System	Land availability, soil characteristics, vegetation cover, surface water and ground water contamination health considerations (coliform and odor).	With the investigation of the soil characteristics of all available open land sites, it was found that the site adjacent to the school and owned by the School Board was an ideal site for land application purpose. The subsurface wastewater land application system was suggested, because the consideration of health and odor problems and future use of the site as football or baseball field. However, the Beaufort County Board of Education declined the request of using the school site as subsurface wastewater drainage site.

ITEMS TO BE CONSIDERED	GENERAL CONSIDERATIONS	SPECIFIC EXAMPLE: BATH WASTEWATER TREATMENT SYSTEM
2. SUPPLY (con't.) Land Application (Surface) System	Land availability, soil characteristics, vegetation cover, surface water and groundwater contamination, health considerations (coliform and odor).	No land owners are willing to allow the land application systems to be established on their land which is in the Bath Town Limits. The Town of Bath owns 15 acres of mostly wooded land north of the Town and adjacent to Possum Hill Road. It was found that this site might be suitable for land application systems because: 1. The area is large enough, 15 acres (the calculation indicates 4 acres are enough). 2. The soil can absorb moisture. The surface application was selected because: 1. This is wooded area. It will be expensive to build and maintain subsurface system because the tree roots. 2. There is about a 4 inch leaf layer on the ground at the site which can absorb the excess wastewater during the surface wastewater land application process. However, preliminary engineering study is required to analyze the odor, health, and surface and ground water quality impact. The permit needs to be approved by NC-NRCD through complete engineering evaluation and study.

C. Conclusion

This section has briefly illustrated how the check lists of demand (Exhibit L) and of supply (Exhibit N) may be used to summarize critical points in the Bath situation. In a like manner, other communities can construct such a summary, from which two points of information may come:

1. Information which indicates important factors which act as constraints, and warrant further detailed study (variation).
2. A strategy for mobilizing resources toward a clear choice, (if one is derived from the community's work with Exhibits L, N and O).

It is from the rigor of such analysis that the choices which Bath has to select and install an appropriate wastewater treatment system have become much clearer and implementation strategies more direct and fundable than could have been achieved in a longer period of time under less structured approach. The application of these techniques should provide similar insights in other communities of coastal North Carolina.

US Department of Commerce
NOAA Coastal Services Center Library
2234 South Hobson Avenue
Charleston, SC 29405-2413

NOAA COASTAL SERVICES CENTER LIBRARY
3 6668 14102 0885