

RULS-AD-1978-10

3/23/78

- Affidavit of E. James Murray in support of Order to show cause
- Exhibit A
- Exhibit B

Pg 120

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MAR 23 1978

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*M. S. [unclear]*

SOMERSET COUNTY  
L. R. OLSON, CLERK

-36 896-70

P.W.

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ATTORNEYS FOR

Plaintiff, the Allan-Deane Corporation

SUPERIOR COURT OF NEW JERSEY  
LAW DIVISION - SOMERSET COUNTY  
DOCKET NOS. L-36896-70 P.W. 5-8541  
L-28061-71 P.W. 5-9153

THE ALLAN-DEANE CORPORATION,  
et al.

Plaintiffs,

vs.

THE TOWNSHIP OF BEDMINSTER,  
et al.

Defendants.

RULS - AD - 1978 - 10

Civil Action

AFFIDAVIT OF E. JAMES MURAR  
IN SUPPORT OF ORDER TO  
SHOW CAUSE

STATE OF CALIFORNIA )  
                          ) ss:  
COUNTY OF ORANGE   )

E. JAMES MURAR, residing at 2224 Aralia Street,  
Newport Beach, California, duly sworn, upon his oath,  
deposes and says:

1. I am the President of Johns-Manville Properties

Corporation and its wholly owned subsidiary, the Allan-Deane Corporation, the Plaintiff in this action.

2. I graduated cum laude from Dartmouth College, achieving highest distinction as an economics major, with graduate studies in Business Administration at UCLA. I am a Certified Public Accountant in the State of California.

3. My experience in real estate has extended over 13 years, having served as President of Rancho California, an 87,000 acre development in Southern California, including residential, agricultural, industrial, and recreational uses; President of Recreation Environments, Inc., which included projects totaling over 400,000 acres in California, Hawaii, and Michigan; and my present employment as a principal and President of RecreActions, Inc., a real estate management and consulting firm which has served such major corporations (or subsidiaries thereof) as Cerro Corporation, Leadership Housing, Continental Illinois Realty, Pacific Lighting, and American Cynamid, as well as numerous smaller companies and private investors. RecreActions manages the real estate investment assets of Johns-Manville Corporation, which, in addition to the Allan-Deane property, includes Ken-Caryl Ranch near Denver, Colorado, and Elkhorn at Sun Valley, Idaho. The 10,000 acre Ken-Caryl project, the largest Planned Unit

Development ever approved in Colorado, provides for over 5,000 housing units and includes 350 acres of industrial office park and commercial uses. Elkhorn at Sun Valley is a 2,900 acre community planned and zoned for over 2,000 living units varying from studio condominiums to large ranches. Over 400 living units are completed in addition to a major hotel and related recreation facilities.

4. The Allan-Deane Corporation acquired approximately 461 acres of land in Bedminster Township in late 1969 and has been seeking approval from Bedminster Township to develop said property at reasonable densities over the past eight years.

5. On February 9, 1976, a revised land plan entitled "A Proposal For An Open Space Community" was presented by Allan-Deane to the Bedminster Township Committee. During April of 1977 Allan-Deane requested an opportunity to present a specific site plan to the Planning Board in order to discuss the appropriate densities that should be incorporated in the required new Zoning Ordinance. In October, 1977 a meeting was held between the Allan-Deane Corporation and its planners and consultants with the ad hoc committee of the Bedminster Planning Board preparing the revised Zoning Ordinance for the purpose of reviewing the

specific site plan being prepared by Allan-Deane. The Committee was unwilling to consider the site plan or its concepts in preparation of the revised Ordinance. The final site plan is attached hereto as Exhibit "A". During November and December drafts of the Master Plan and new Ordinance were reviewed by myself and our staff, as well as outside planners and consultants. I found the proposed Ordinances to be woefully lacking in overcoming the deficiencies of the previous Ordinance and instructed the Allan-Deane staff and legal counsel to object to the new Ordinance at each of the public hearings leading to its adoption. These objections are a part of the public record of those proceedings.

6. The costs incurred during this eight year period of delay and frustration have been and continue to be enormous. The following chart shows how the total investment in the property has nearly doubled from \$5,641,220 in 1969 to \$10,914,445 at December 31, 1977. The costs incurred during 1977 were nearly \$3,000 per day. The chart also graphically shows the effective increase of land cost per housing unit (based on various densities) over this period.

(See chart on following page)

Accumulated Investment

|                                | At Acquisition<br>12/31/69 | Adoption of<br>PRN Ordinance<br>1973 (1) | 1st Opinion<br>Superior Court<br>2/24/75 (1) | Affirmation by<br>Appellate Court<br>1/24/77 (1) | New Ordinance<br>Adopted<br>12/24/77 (1) |
|--------------------------------|----------------------------|--|--|--|--|
| Land                           | \$5,641,220                | \$5,641,220                              | \$5,641,220                                  | \$5,676,357                                      | \$5,631,847                              |
| Property &<br>Other Taxes      |                            | 37,239                                   | 324,037                                      | 478,628  | 464,187                                  |
| Legal                          |                            | 195,729                                  | 229,063                                      | 374,544  | 508,474                                  |
| Planning                       |                            | 26,822                                   | 57,433                                       | 307,268  | 579,501                                  |
| (5) General & Admin.           |                            | ( 7,166)                                 | 29,635                                       | 89,738   | 155,918                                  |
| Int. on<br>Invest. (2)         |                            | 1,396,207                                | 1,902,560                                    | 2,988,089  | 3,574,518                                |
| Total Cost                     | \$5,641,220                | \$7,290,051                              | \$8,183,948                                  | \$9,914,624                                      | \$10,914,445                             |
| Allocated to<br>Bedminster (3) | \$2,933,434                | \$3,790,826                              | \$4,255,653                                  | \$5,155,603                                      | \$ 5,675,511                             |
| Cost Per Unit:                 |                            |  |  |  |  |
| 844 units (4)                  | 3,476                      | 4,492                                    | 5,042  | 6,108  | 6,724                                    |
| 458 units (5)                  | 6,405                      | 8,277                                    | 9,291  | 11,200   | 12,391                                   |
| 1849 units (6)                 | 1,587                      | 2,050                                    | 2,302  | 2,774  | 3,070                                    |

- (1) To simplify, amounts shown are for nearest year-end.
- (2) Interest is estimated based on the average accumulated investment exclusive of previous interest accumulation at an average rate of 6% for 1970-1973 and 8.25% for period 1974-1977.
- (3) Based on independent appraisal.
- (4) Allowable units (density of 1.88 units per acre) on Allan-Deane property based on old 1973 PRN Ordinance.
- (5) Allowable units (density of .99 units per acre) on Allan-Deane property based on new Ordinance adopted December 31, 1977.
- (6) Units (density of 4.01 units per acre) on Allan-Deane property based on specific site plan.

The costs during 1978 are projected to grow by over \$3,500 per day, a staggering amount when compared to the 1977 land cost per housing unit (\$3,070) based on the Allan-Deane plan of 1,849 units.

7. During December, 1977 and January 1978, extensive analysis of the new Master Plan, Zoning Ordinance, Site Plan Review Ordinance, and Subdivision Ordinance was completed in order to determine whether it would be possible under this Ordinance to construct on the Allan-Deane tract economically feasible multi-family housing or other housing for persons of upper middle, middle, moderate or lower incomes. This study was organized to carefully evaluate the three major factors (1) DENSITY, (2) COST GENERATIVE PROVISIONS, (3) TIME FACTORS INVOLVED IN PROCESSING) which affect the ultimate cost of a site for a housing unit developed pursuant to the Ordinance. The detailed analysis included, among other evaluations, a comparison with the old Ordinance, and the Allan-Deane Site Plan, and a detailed cost analysis.

8. As a result of this analysis I came to the following conclusions:

a. DENSITY

The New Zoning Ordinance provides for 46% fewer dwelling units on the Allan-Deane tract than the 1973 Ordinance which was invalidated by this Court as exclusionary.



The chart below compares the densities on the Allan-Deane property under the invalidated Ordinance and the new Ordinance.

ALLAN-DEANE PROPERTY

| Zone                  | Invalidated Ordinance |         |       | New Ordinance   |          |       |
|-----------------------|-----------------------|---------|-------|-----------------|----------|-------|
|                       | Undev.<br>Acres       | Density | Units | Undev.<br>Acres | Density  | Units |
| Critical              | -                     |         |       | 207             | -        | -     |
| R-3                   |                       |         |       | 102             | .29 (1)  | 30    |
| R-6                   | 449                   | 1.88    | 844   | -               | (1)      | -     |
| R-8                   |                       |         |       | 66              | 1.36 (1) | 90    |
| R-20                  |                       |         |       | 45              | 4.14 (1) | 188   |
| CRC                   |                       |         |       | 23              | 6.52 (1) | 150   |
| Business              | 12                    |         | -     | 10              |          | -     |
| New 202/206<br>Bypass | -                     |         |       | 8               |          | -     |
| Total                 | 461                   | 1.88    | 844   | 469             | .99      | 458   |

(1) As determined by application of provisions of new Ordinance to Allan-Deane property.

The principal density control of the invalidated Ordinance was the Gross Floor Area Ratio. It should be noted that there are many more and complex provisions in the new Ordinance which control density. These new provisions not only reduce density, but encourage less open space, larger lots, and consequently, more road frontage, all of which increase costs and are environmentally more damaging. Two of the most

burdensome are the imposition of a Net Floor Area Ratio (resulting in substantially lower overall density) and a new Critical Zone District (prohibiting all development in large parts of the Township).

b. COST GENERATIVE PROVISIONS

Average site development costs (exclusive of any costs of structures) under the new Ordinance are estimated to increase 73% over estimated costs under the old Ordinance. It was previously established in this Court that site development costs exclusive of land would average approximately \$6,476 under the invalidated Ordinance. A cost estimate was prepared from a site plan for the Allan-Deane property pursuant to the new Ordinance which resulted in an average cost of \$11,197 per site as follows:

| <u>Zone</u> | <u>Units</u> | <u>Total Cost</u> | <u>Cost Per Unit</u> |
|-------------|--------------|-------------------|----------------------|
| R-3         | 30           | \$1,004,310       | \$33,477             |
| R-8         | 90           | 1,111,727         | 12,093               |
| R-20        | 188          | 1,807,916         | 9,716                |
| CRC         | <u>150</u>   | <u>1,204,500</u>  | <u>8,030</u>         |
|             | 458          | \$5,128,453       | \$11,197             |

These excessive costs are generated by the inter-relationship of numerous provisions, some of which are new to this Ordinance as exemplified

by the Net Floor Area Ratio calculation. On the other hand, I could not find where any cost generating provisions had been eliminated from the old Ordinance. These provisions include road requirements, lot size provisions, street frontage requirements, parking requirements, the virtual prohibition of over/under units, the overall inability to effectively cluster units or create common areas including parking, the dictation of mix ratios, minimum size requirements, height limitations precluding anything larger than two story, prohibition of apartments in excess of one bedroom, prohibition of studio/efficiency units, landscaping requirements, and the addition of the 202/206 freeway bypass and its requirements. The entire concept of Floor Area Ratio is designed to limit population, not environmental degradation.

For comparative purposes an estimate has also been prepared for the Allan-Deane site plan which I believe to be based on reasonable and responsible standards of development which is summarized below:

| <u>Use Area</u>        | <u>Units</u> | <u>Total Cost</u> | <u>Cost Per Unit</u> |
|------------------------|--------------|-------------------|----------------------|
| Senior Citizen         | 200          | \$ 911,242        | \$ 4,556             |
| Subsidized Apt.        | 135          | 714,637           | 5,293                |
| Courtyard Homes        | 880          | 4,906,929         | 5,576                |
| Highland Townhomes     | 504          | 3,018,220         | 5,988                |
| Highland Single Family | 130          | 1,565,900         | 12,045               |
|                        | 1849         | \$11,116,928      | \$ 6,012             |

This estimate indicates that site development costs per unit would be 86% higher under the new Ordinance than the Allan-Deane site plan. In our analysis we did not attempt to quantify the effect of the provisions enumerated above or costs of structures, although in my opinion, it would be very substantial if units can, in fact, be designed to comply with all provisions.

c. TIME FACTORS INVOLVED IN PROCESSING

While it is difficult to quantify a specific time period from the initiation of a development proposal until construction is started, it is my opinion that due to the substantial discretionary authority retained by the Township, the lack of objective standards and developmental roadblocks imposed by the interrelationship and inconsistencies of the Master Plan, Site Plan Ordinance, and Zoning Ordinance and Subdivision Ordinance, and the ambiguities and inconsistencies contained within the Zoning Ordinance itself, that this period would be a minimum of two years -- if ever. In fact, I do not know of any construction that has been undertaken under this or similar

PRN Ordinances prepared by the Bedminster Planning Consultant and adopted by other townships.

The newly introduced Pluckemin Historical Zone covers over 130 acres and includes 80 acres in the R-20 zone. The Planning Board retains nearly complete discretion as to anything constructed within this zone. A new historic zone, Artillery Park, has also been created. Not only is this zone not at all defined by explicit or mapped boundaries, but all private construction is prohibited within it.

Under the Ordinance multi-family uses are permitted only as conditional uses.

The concept of a 202/206 freeway bypass of Pluckemin raises substantial questions of uncertainty as to access, development time schedules of adjacent property, and burden of costs. The Planning Board retains discretion for approval of open space maintenance,

landscaping, connection to sewers, and units constructed in each year, and thus can effectively thwart all development proposals. It can be seen why no major subdivisions have been approved or attempted in the township and why only 23 residential building permits have been issued for over the past eight years.

d. SUMMARY

The cumulative result of the new cost generative provisions is staggering. A comparison of the per unit site development costs, under the invalidated Ordinance, the new Ordinance, and the A-D site plan, for the Allan-Deane property reveals the composite effect:

Estimated Per Unit Site Cost For Allan-Deane Property

|                               | <u>Invalidated<br/>Ordinance</u> | <u>New<br/>Ordinance</u> | <u>Allan-Deane<br/>Site Plan</u> |
|-------------------------------|----------------------------------|--------------------------|----------------------------------|
| Density                       | 1.88                             | .99                      | 4.01                             |
| Land cost per<br>unit (pg. 5) | 6,724                            | 12,391                   | 3,070                            |
| Site development<br>costs     | 6,471                            | 11,197                   | 6,012                            |
| Carrying costs                | <u>1,423</u> (1)                 | <u>2,230</u> (1)         | <u>-</u> (2)                     |
|                               | <u>\$14,618</u>                  | <u>\$25,818</u>          | <u>\$9,082</u>                   |

(1) Calculated at 9% of land cost for a 2 year period.

(2) Assuming ability to immediately implement plan.

The per unit site development costs on the Allan-Deane property under the new Ordinance are 77% higher than under the invalidated Ordinance, and 184% above those incurred under the Allan-Deane Site Plan.

Since a finished site generally represents 25% of the sales price of a residential unit, the average sales price per unit would approximate \$103,000.00 under the new Ordinance as opposed to \$58,000.00 under the old Ordinance.

9. In addition to the dramatic increase in housing costs, the new cost generative provisions enumerated above demonstrate a lack of environmental sensitivity. We have estimated that under the new Ordinance, impermeable surfaces will be increased by over 17% and landscaped areas will be increased by over 50% with a resultant decrease in natural open space areas of 12%. On a per unit basis, impermeable surfaces are increased by over 15% under the new Ordinance.

9. Based on the information submitted I believe the new Zoning Ordinance does not comply with this Court's mandate and the laws of New Jersey; is arbitrary and unreason-

able and substantially worse than the invalidated Ordinance. We therefore seek the Court to immediately invalidate the new Zoning Ordinance and grant specific corporate relief to Allan-Deane.

11. Allan-Deane specifically seeks the following corporate relief:

- a. Immediate approval of the site plan and development proposal attached hereto as Exhibit "A".
- b. That the court retain jurisdiction in order to (1) review and approve specific subdivision maps being prepared by Allan-Deane conforming to the approved site plan, (2) grant building permits to Allan-Deane or its designee upon submittal of complete construction plans in accordance with the approved site plan, and (3) supervise the rezoning for the remainder of the township in order to comply with the Court mandate.
- c. Grant approval for the construction of and advanced waste water treatment



facility by Allan-Deane subject to meeting New Jersey DEP and Federal EPA standards. The concept design of such facility is presently undergoing review for conceptual approval by the New Jersey DEP and is attached hereto as Exhibit "B".

12. Allan-Deane will commit to the following as a part of its request for specific corporate relief upon approval of the entire site plan and development proposal as attached hereto as Exhibit "A":

- a. Give an option to a limited dividend or a non-profit corporation, to be established by the Cieswick Plaintiffs, to enable them to purchase sufficient land, at a price acceptable under the New Jersey Housing Finance Agency and federal programs, to construct at least 20% of the residential units on the Bedminster property as low and moderate income housing. The Allan-Deane Corporation and Johns-Manville Properties Corporation will cooperate, if specific corporate relief is granted, with the legal entity established to apply for subsidized financing and use its best efforts to insure that financing applications are approved.

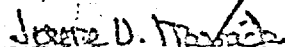
- b. Will include capacity in the advanced waste water treatment facility constructed by Allan-Deane to resolve the sewer problem in Pluckemin and correct such deficiency.
- c. Unless Bedminster Township also cooperates and adopts a resolution of need, grants tax abatements where necessary to obtain federal subsidies most, if not all, of the subsidy programs are presently unavailable. (See Oakwood at Madison, supra, page 546 and 547). In the event the options are not exercised due to the unavailability of funding or lack of municipal cooperation, Plaintiff Allan-Deane agrees to market least cost housing on those sites upon the expiration of the aforesaid options.

  
E. JAMES MURAR

Sworn to and Subscribed

Before Me this 14th day of

March , 1978.



JEREME V. MYRICK  
NOTARY PUBLIC OF NEW JERSEY  
MY COMMISSION EXPIRES MARCH 19, 1978

Exhibit "A"  
(AFFIDAVIT OF E. JAMES MURAR)

**PLAN FOR FIRST PHASE IMPLEMENTATION  
OF AN OPEN SPACE COMMUNITY  
IN BEDMINSTER TOWNSHIP**

Allan - Deane Corporation

PLAN FOR FIRST PHASE IMPLEMENTATION

OF AN OPEN SPACE COMMUNITY

IN BEDMINSTER TOWNSHIP

Allan-Deane Corporation

A Subsidiary of Johns-Manville Properties Corporation

December 1977

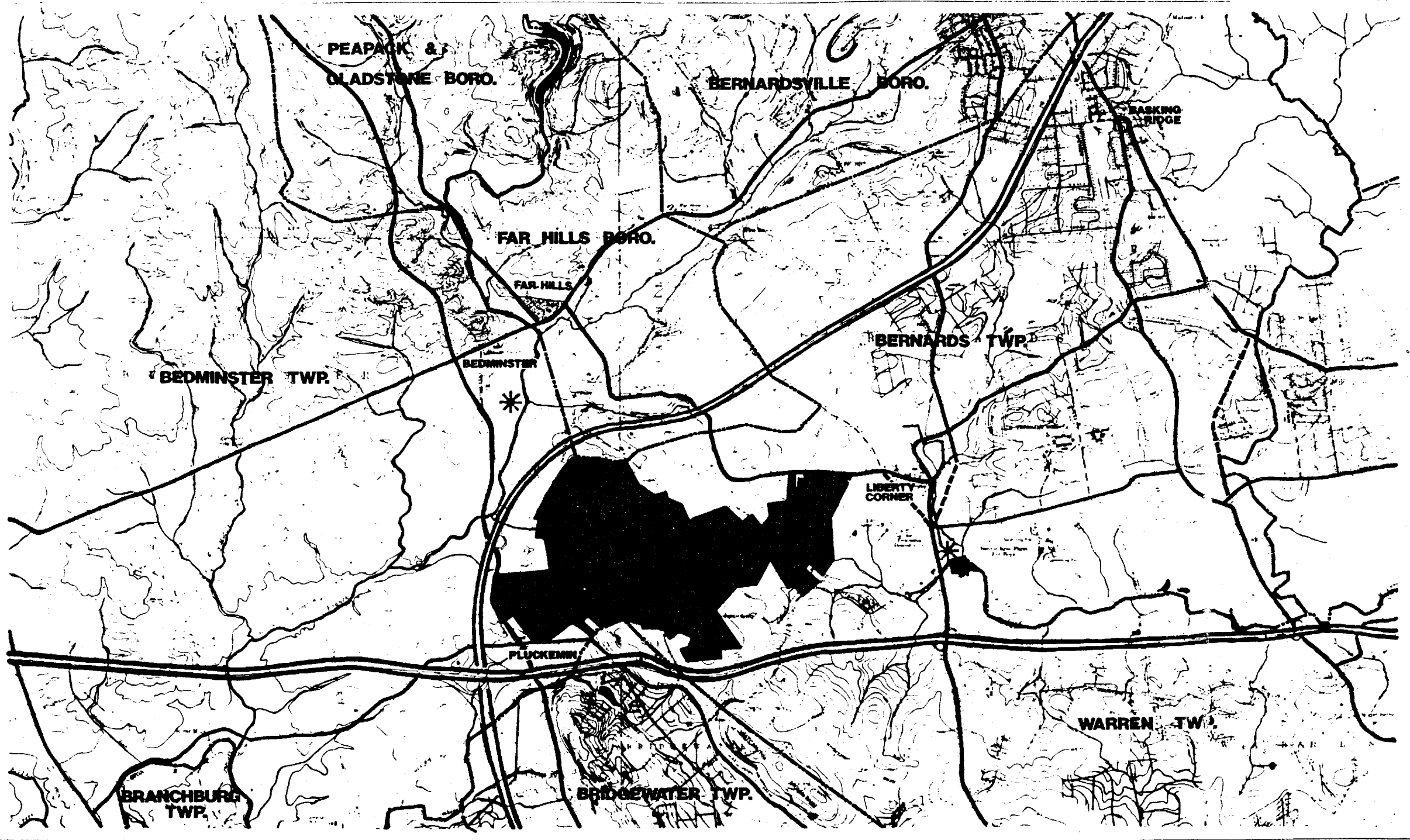
PLAN FOR FIRST PHASE IMPLEMENTATION  
OF AN OPEN SPACE COMMUNITY

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#### COMMUNITY LOCATION

Allan-Deane Corporation has proposed an open space community on a 1,532 acre site located in the Somerset Hills of north central New Jersey, partly in Bernards Township (1,071 acres) and partly in the Township of Bedminster (461 acres) at the headwaters of the Passaic River which flows through the Great Swamp National Wildlife Refuge as well as the headwaters of the Raritan River. The site is located less than one mile from the interchange of Interstate Routes 287 and 78 and is approximately 45 minutes from Manhattan. In addition, the Erie Lackawanna Railroad has two stations within Bernards Township providing commuter service to New York. The development pattern adjacent to the site is characterized by large residential lots and three areas of more intensive development - Pluckemin Center and Liberty Corners, which are developed with a mixture of single family residences on small lots and various business uses, and the built-up residential area of Bridgewater Township south of Route 78. To the north of the site on Route 287 is the new AT&T longlines facility, providing an additional 3,500 jobs to the local economy.



- MAJOR INTERSTATE
- ARTERIAL ROADS
- MAJOR SEWER INTERCEPTOR
- SEWAGE TREATMENT FACILITY
- EXISTING DEVELOPMENT
- BEDMINSTER & BERNARDS TWP.
- SITE

DASHED LINE  
 DOTTED LINE  
 DOTTED LINE

ALLAN DEANE ARCHITECTS

JOHN MANNING  
 CIVIL ENGINEER  
 1000 W. MAIN ST.  
 BRIDGEWATER, NJ 08807

COMMUNITY CONTEXT



## PROPOSED OPEN SPACE COMMUNITY

The proposed community was planned with several objectives in mind. The first objective is to respect the natural environment of the site, preserving the most sensitive areas as open space and determining the location and type of development most appropriate to the natural landscape. The second objective is to create a balanced community which meets the diverse needs of the regional housing market, including the need for low and moderate income opportunities. Accordingly, there will be a variety of housing types and prices: multi-family and single family attached dwellings for young couples and retired "empty-nesters", larger, single family attached and detached dwellings ranging from modest to luxurious to accommodate the full cycle of family growth. Thirdly, the plan seeks to create well defined neighborhoods, with open space areas in close proximity to housing and convenient access to recreation opportunities as well as a network of bicycle and pedestrian paths.

### The Land Use Plan

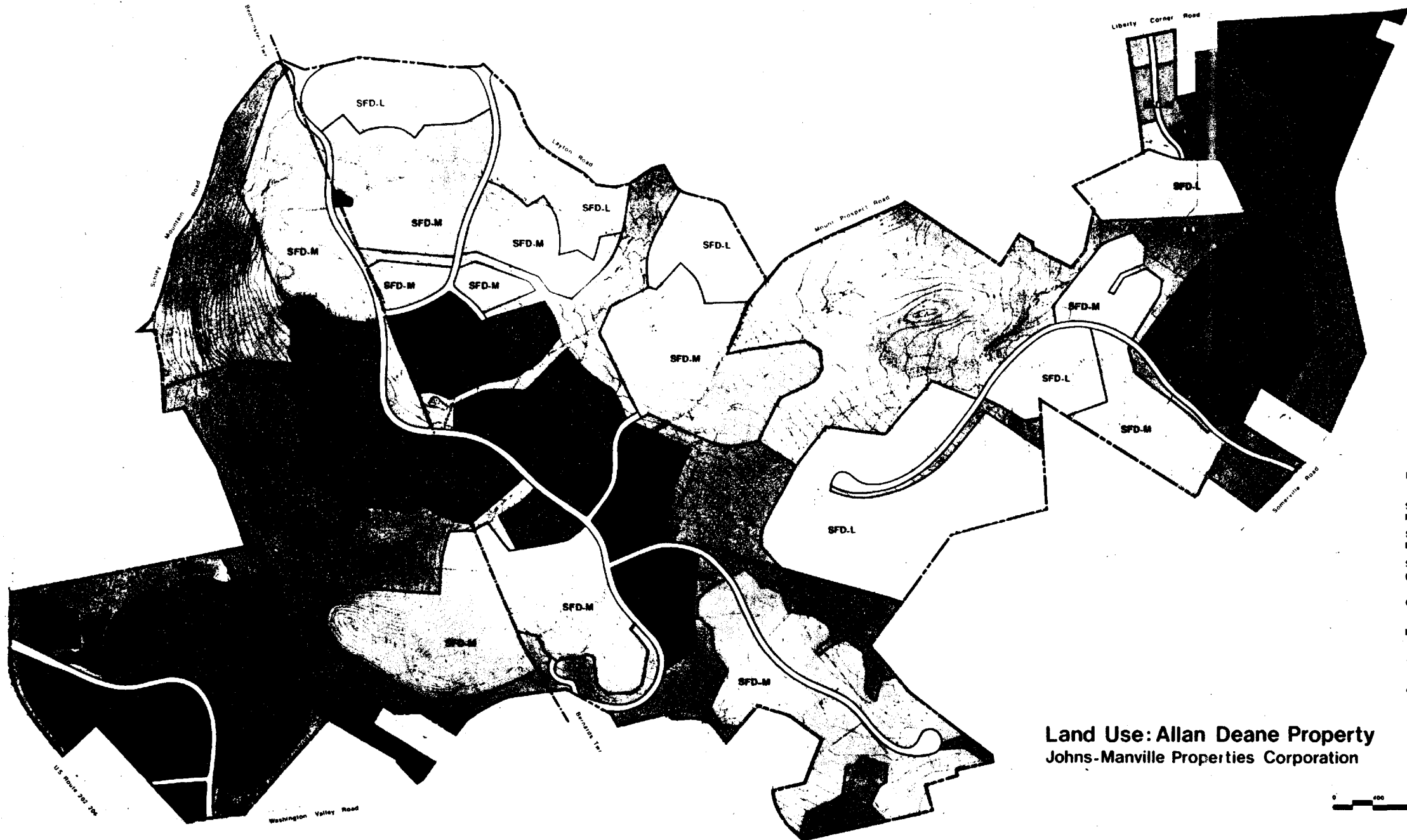
The environmental conditions of the site suggest a design solution which utilizes clusters of development defined and connected by open space areas. This solution



not only responds to the dictates of the site's natural features, but results in distinct, readily identifiable residential neighborhoods.

One neighborhood will be located on the open field between Pluckemin Center and the face of Watchung Mountain. With access to Washington Valley Road and Route 206, land uses in this section consist of single family attached and multi-family dwellings with two small neighborhood commercial sites near Pluckemin Center. A second neighborhood will be developed along a new north-south collector linking Washington Valley Road and Schley Mountain Road. Areas near the western face of the mountain will be devoted to large lot, single family dwellings, and the central area will be devoted to single family attached and multi-family dwellings. Single family areas will be placed on the perimeter of the site to ensure compatibility with land uses adjacent to the site. At the center of this neighborhood will be a village center with a school site, convenience shops, and a site reserved for such institutional uses as a church or a YM-YWCA.

The third neighborhood of the proposed community will be oriented toward Somerville Road with single family attached and multi-family dwellings facing onto a wide open space corridor along the floodplain of the Dead River. To the west will be single



**Land Use: Allan Deane Property**  
**Johns-Manville Properties Corporation**

- Multi-Family
- S.F. Attached Moderate Density
- S.F. Detached Moderate Density
- S.F. Detached Low Density
- Commercial
- Historic Site
- School Site
- Open Space



family lots of low to medium density served by a system of culs-de-sac. A small neighborhood commercial center has been located at the intersection of Somerville Road and Liberty Corner Road to meet convenience needs.

#### Open Space

The proposed community will have three major open space areas, which will be permanently preserved. One area will include the face of Watchung Mountain, a significant visual feature of the region and will include the 64 acre historic Washington Campground site. The second area, which is located on Mount Prospect Road, will be over a hundred acres in size and entirely covered with mixed deciduous forest. The third area will include the Dead River floodplain which is also extensively wooded. These major areas will be linked with smaller open space areas and corridors appropriate for the construction of pedestrian and bicycle paths.

#### Onsite Circulation

In order to achieve optimum traffic flow and maximum safety, the circulation system is composed of different types of streets which separate traffic according to its function. Collectors accommodate major through-site traffic with local roads providing access to the individual land use parcels. There will be no lotting along collector roads. Single family residential areas are served by culs-de-sac or loop roads which prevent through traffic and result in a quieter and safer street.

#### FIRST PHASE IMPLEMENTATION - BEDMINISTER DEVELOPMENT

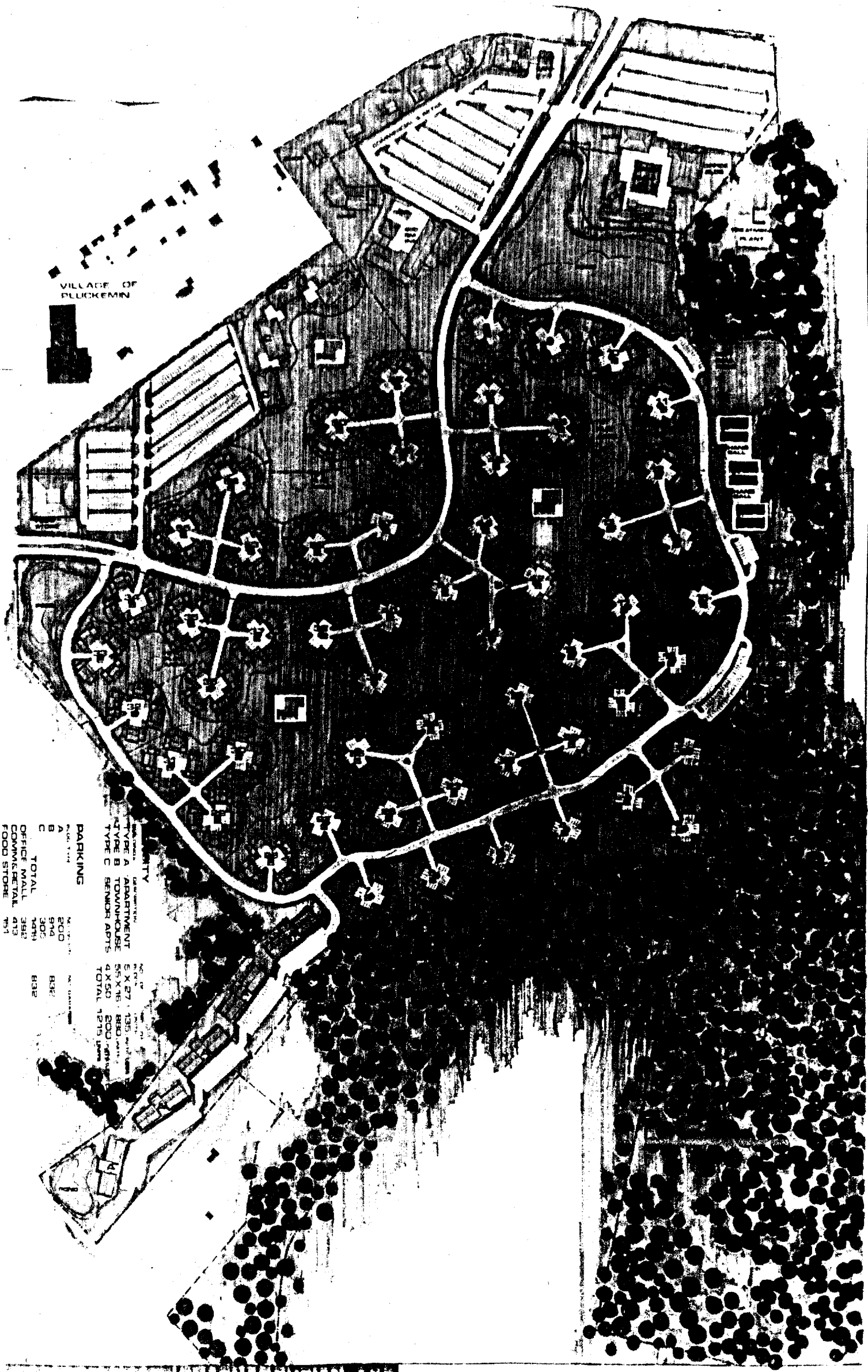
It is proposed that the new community be constructed over a five to ten year building period. It has been determined that the initial phase of development will occur in Bedminster Township in the open field near Pluckemin and along the north-south collector road linking Washington Valley Road and Schley Mountain Road.

Allan-Deane Corporation has undertaken the preparation of a detail site plan supported by exhaustive studies for the implementation of this initial phase. Working in conjunction with architects, environmental engineers, planners and builders, site and architectural plans have been prepared for five separate projects in the initial phase.

The detail plan for the 461 acres provides for an overall density of 4 units per acre for a total of 1,849 dwelling units. A summary of acreage and uses is set forth in the following table and shown on the detail site plan.

SUMMARY OF SITE PLAN-BEDMINSTER TOWNSHIP

| <u>Land Use Category</u>      | <u>Ac.</u>        | <u>% of Site</u>   | <u>No. of Dwelling Units</u> |
|-------------------------------|-------------------|--------------------|------------------------------|
| <b>Pluckemin Area:</b>        |                   |                    |                              |
| Residential                   |                   |                    |                              |
| Courtyard Homes or Apartments | 84                | 18%                | 880                          |
| Subsidized Apartments         | 7                 | 2                  | 135                          |
| Senior Citizen Housing        | <u>8</u>          | <u>2</u>           | <u>200</u>                   |
|                               | 99                | 22                 | 1215                         |
| Commercial                    | 28                | 6                  |                              |
| Open Space                    | <u>20</u>         | <u>4</u>           |                              |
| Total                         | <u>147</u>        | <u>30</u>          |                              |
| <b>Highland Area:</b>         |                   |                    |                              |
| Residential                   |                   |                    |                              |
| Townhomes                     | 57                | 12                 | 504                          |
| Single Family detached        | <u>92</u>         | <u>20</u>          | <u>130</u>                   |
| Total                         | <u>149</u>        | <u>32</u>          | <u>634</u>                   |
| <b>Open Space:</b>            |                   |                    |                              |
| Historic Site                 | 58                |                    |                              |
| Other Open Space              | <u>107</u>        |                    |                              |
| Total                         | <u>165</u>        | <u>36</u>          |                              |
| <b>Total</b>                  | <u><u>461</u></u> | <u><u>100%</u></u> | <u><u>1849</u></u>           |



VILLAGE OF  
DLUICKEMV

| PARKING     |            | TOTAL    |            |
|-------------|------------|----------|------------|
| NO. TYPE    | NO. SPACES | NO. TYPE | NO. SPACES |
| A           | 800        |          |            |
| B           | 946        |          |            |
| C           | 305        |          |            |
| TOTAL       | 1451       |          |            |
| OFFICE MALL | 382        |          |            |
| COMMERCIAL  | 473        |          |            |
| FOOD STORE  | 791        |          |            |

| NO. TYPE           | NO. UNITS | NO. TYPE | NO. UNITS |
|--------------------|-----------|----------|-----------|
| TYPE A APARTMENT   | 5 X 27    | 135      | 135       |
| TYPE B TOWNHOUSE   | 55 X 16   | 880      | 880       |
| TYPE C SENIOR APTS | 4 X 50    | 800      | 800       |
| TOTAL              |           | 1215     | 1215      |

**KRASHABGUMIAN AND  
BAHILL ARCHITECTS**

ALLAN-DEANE PROPERTY

|         |                     |      |
|---------|---------------------|------|
| DENSITY |                     |      |
| TYPE CA | CONDOMINIUM APTS    | 504  |
|         |                     |      |
|         | GARAGE PARKING      | 504  |
|         | ON SITE PARKING     | 504  |
|         | PARKING (POOL AREA) | 80   |
|         | TOTAL NO. PARKING   | 1088 |



ALLAN-DEANE  
PROPERTY

**KHACHADOURIAN AND  
CAHILL ARCHITECTS**  
150 WASHINGTON STREET BLOOMFIELD NEW JERSEY

DESCRIPTION  
SITE PLAN

Each of the five projects is summarized in the following text as well as shown on the larger scale blow-up of typical units and clusters.

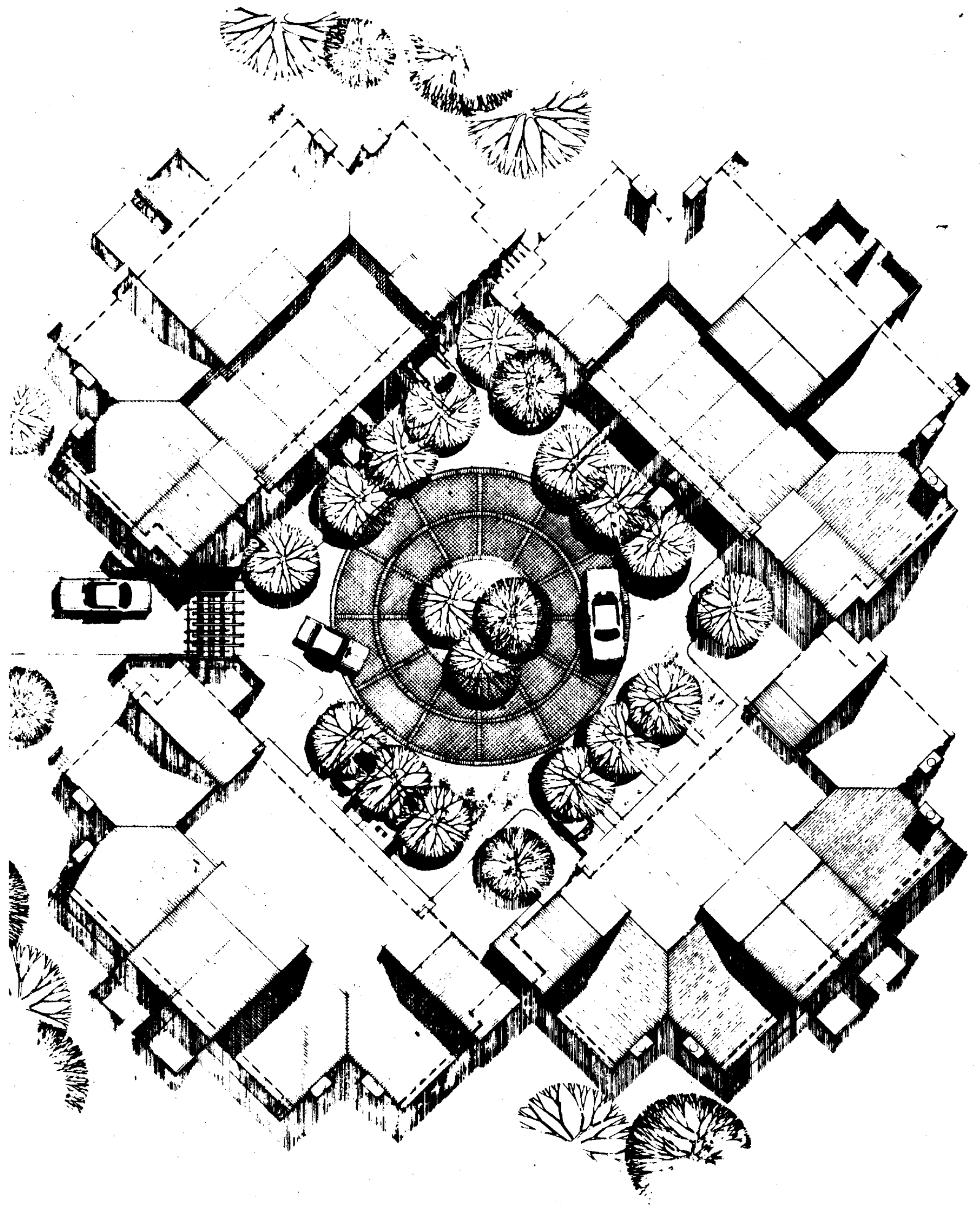
#### Courtyard Homes

The courtyard homes are clusters of 4 dwelling units per building with 4 buildings grouped around a courtyard. Each courtyard would thus contain 16 living units. The units would be composed of a mix of 2 bedroom, 2 bedroom + den and 3 bedroom units. The units would average approximately 1300 sq.ft. per unit. Two covered parking spaces per living unit would be provided as part of the design. The units would be 2 stories with no separate unit over or below another living unit. Some units may have partial or full basements.

Each courtyard cluster would be served by a 20 foot wide private driveway to the private collector road 24 feet in width.

The open space would be interconnected with pedestrian paths that would also lead to the 6 tennis courts, 2 handball courts, activity center, fields and play yards and 2 swimming pools. All of the above referenced





DESCRIPTION  
**COURT PLAN**

**KHACHADOURIAN AND  
CAHILL ARCHITECTS**  
130 WASHINGTON STREET BLOOMFIELD NEW JERSEY

DATE  
A

facilities, including the open space and detention/retention ponds, would be owned and maintained by a homeowner's association.

It is anticipated that these courtyard homes would be marketed in the \$55,000 to \$75,000 price range, based on 1977 costs of construction. The market research conducted by a marketing specialist, Alfred Gobar Associates (a copy of which is included as Exhibit A), indicates an estimated annual absorption of 110 units.

Examples of the courtyard home plan are two projects, "Tower Hill" and "The Meadows", being successfully marketed in Redbank and Hillsborough, New Jersey respectively. Brochures and information on these projects are included as Exhibit B.

The courtyard plan has the added flexibility for implementation as for rent apartments if market conditions dictate.

#### Subsidized Apartments

The subsidized apartments are contained in 5 buildings with each

building containing 27 units. Each building would be composed of a mix of approximately 3 one bedroom (approximately 650 sq.ft.), 18 two bedroom (approximately 850 sq.ft.) and 6 three bedroom (approximately 1,000 sq.ft). One and one-half parking spaces are provided for each unit.

The parking would access to the private collector road and Mt. Prospect Road.

The feasibility study concerning subsidized housing (attached as Exhibit C) completed by Alan Mallach Associates indicates the feasibility of funding approximately 50 units from a 515/section 8 Family Garden and 85 of the units by NJHFA Section 8 Family Garden over the initial 4 year period. This report also indicates estimated rentals and projected costs of operation. Allan-Deane will make available the land through a series of options to a non-profit or a limited dividend corporation. Allan-Deane will also provide initial start up assistance to the corporation in the form of preliminary architectural services.

### Senior Citizen

The senior citizen apartments are contained in 4 buildings of 4 stories each immediately adjacent to the commercial facilities and Pluckemin Village, thus providing easy access to services and shops. The estimated mix as projected by Allan Mallach Associates indicates 80 efficiency of 550 sq.ft., 100 one bedroom of 650 sq.ft. and 20 two bedroom of 750 sq.ft. One and one-half open parking spaces per unit are provided.

The Mallach study indicates the feasibility of financing such a project through NJHFA Section 8 Senior Citizen program. Allan-Deane will make land available for this project to a non-profit or limited divided corporation in the same manner as for the subsidized apartments.

### COMMERCIAL

The commercial areas are separated into 3 areas as summarized on the following table:

SUMMARY OF COMMERCIAL USES

| <u>Commercial Uses</u> | <u>Area</u>     | <u>Sq. Ft.<br/>Building</u> | <u>Parking Spaces</u> |
|------------------------|-----------------|-----------------------------|-----------------------|
| Area 1:                | 4.6 ac.         |                             |                       |
| Food market            |                 | 32,000                      | 150                   |
| Area 2:                | 15.0 ac.        |                             |                       |
| Conference Center/Inn  |                 | 150,000                     | 413                   |
| Convenience shops      |                 | 23,000                      |                       |
| Bank                   |                 | 10,000                      |                       |
| Area 3:                | 8.4 ac.         |                             |                       |
| Restaurant             |                 | 13,000                      | 392                   |
| Bank                   |                 | 10,000                      |                       |
| Office buildings       |                 | 70,000                      |                       |
| <b>Total</b>           | <u>28.0 ac.</u> | <u>308,000</u>              | <u>955</u>            |

Area 1 provides for a new market. A&P has already offered to purchase 4 acres for the construction of a new supermarket to be integrated with the existing center to meet current demand.

Area 2 is composed of a new Conference Center/Inn complex integrated through plan and architecture with the existing Eoff House to blend harmoniously with the surrounding area. The remainder of Area 2 includes a bank and individual shops architecturally controlled and integrated with Pluckemin through a Village Green. There exists an extreme shortage of meeting and overnight lodging facilities due to location of major office complexes in the area. Recently constructed on/off ramps provide immediate access to I287 thus not creating undue traffic burden. At least two banks have inquired as to possible sites.

Area 3 includes a complex of professional offices, a bank and a restaurant located adjacent to the detention/retention pond.

#### Townhomes

The townhomes located in the Highland area will be contained in 31 buildings of 16 units each plus 1 building of 8 units. The buildings

are adapted to the variation in grade in order to achieve economies of construction and are 2 and 3 story in height. The living units are composed of 1 bedroom + den (950 sq.ft.), 2 bedroom (1,050 sq.ft.) and 2 bedroom + den units (1,100 sq.ft.). One covered and one uncovered parking space per unit is provided. The units are served by private 20 foot wide roads from a 24 foot collector road. The open space, 2 tennis courts, pool, clubhouse, play yard and detention/retention pond will be maintained and owned by a homeowner's association. Under the auspices and direction of the New Jersey Department of Environmental Protection Allan-Deane initiated a program of selectively harvesting timber throughout this site to insure a sensitive and compatible forest management program.

It is anticipated that these townhomes would be marketed in the \$40,000 to \$55,000 price range based on 1977 costs of construction. Allan-Deane will commit through a system of internal subsidy with the builder to provide at least 50 units of for sale townhomes in the \$30,000 to \$40,000 range under a Section 235 program. The market research completed by Alfred Gobar Associates indicates an annual demand of approximately 130 units

for products in this price range.

An example of the townhome project planned for the Allan-Deane site is the "Union Gap" project in Clinton, New Jersey. (Information included as Exhibit D ).

#### Single Family Detached

These homes are clustered and individually sited based on terrain and existing features such as trees and rocks. The units would be of 1 and 2 storey design and range in size from 1700 sq.ft. to 2500 sq.ft. with 2, 3 and 4 bedroom units. Two covered parking spaces would be provided per unit.

The units would be served by private roads from the 24 foot major collector road shown on the site plan.

As with other products, common open space, recreation facilities and detention/retention ponds would be owned and maintained by a homeowner's association.



It is anticipated that these homes would be marketed at prices ranging from \$90,000 to \$130,000 based on 1977 costs of construction. Estimated absorption is 40 units per year according to Gobar Associates.

An excellent example of such a program is "Lyons Farm" in Greenwich, Connecticut. (Information on this project is included as Exhibit E.)

#### Conclusion

In summary, the first phase development and site plan incorporates a wide variety of housing types from 550 sq. ft. efficiency units for senior citizens to 3,500 sq. ft. single family detached homes. A wide variety of size units is proposed as well as a range of prices from \$30,000 to \$130,000. "For Rent" housing is also an integral part of the plan. While over 20% of the units are designated for low and moderate subsidized programs, an additional 55% of the units are planned to sell for under \$65,000, helping to provide least cost housing.

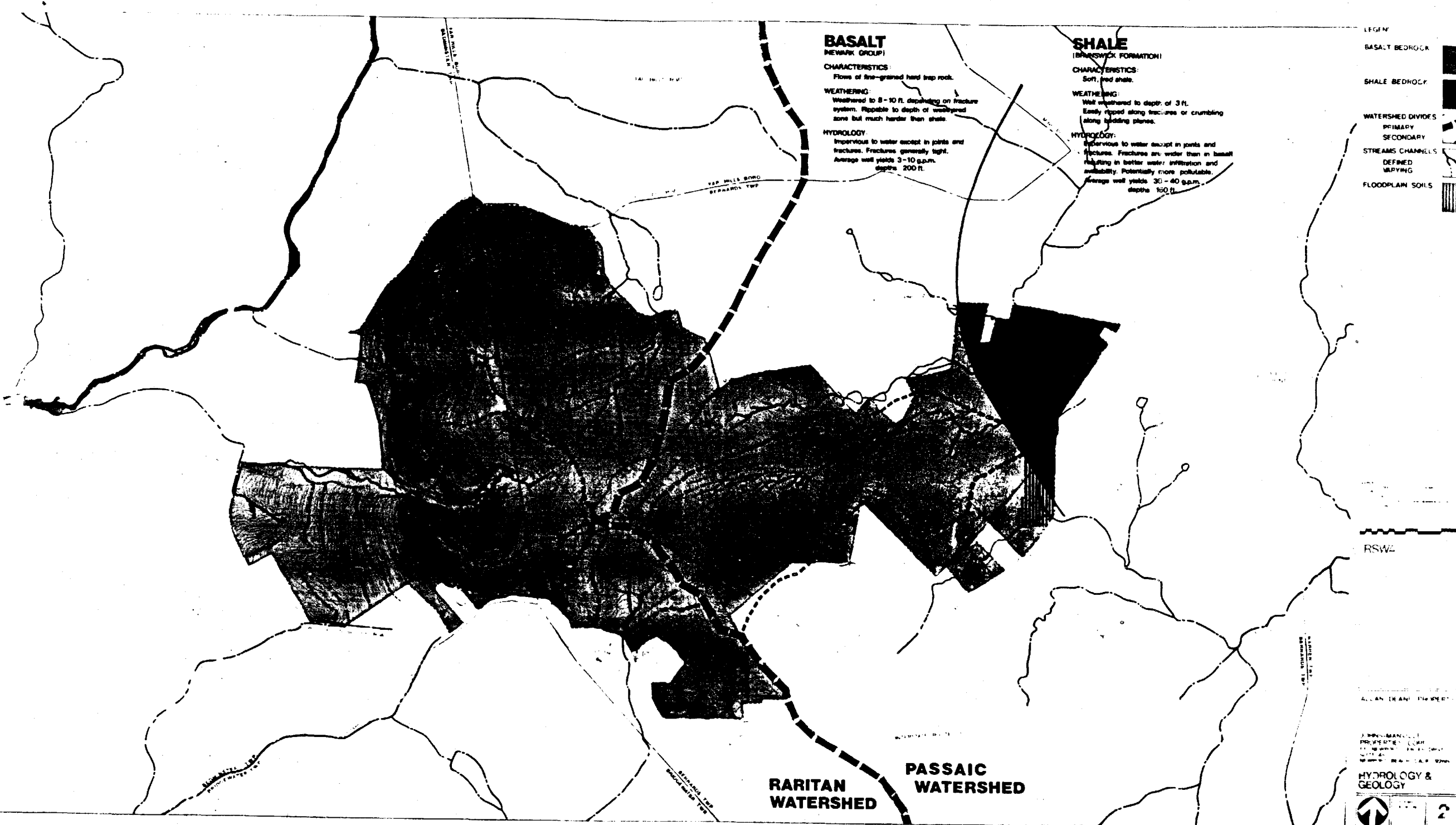
## ENVIRONMENTAL ANALYSIS

An analysis of the site's natural environment was undertaken to serve as the basis for planning the proposed open space community. Bedrock, soil, water table, slope, and vegetation conditions were examined with the objective of determining the capacity for development on each portion of the site. These conditions were mapped at a scale of 1" = 400' and reproductions of these maps are included within this report.

### Geology

There are two rock formations on the site: soft red shale with interbedded sandstone (Brunswick Formation - Triassic), and basalt flows of fine grained trap rock (Newark Group - Triassic). The latter is characteristic of the Watchung Mountains. Approximately 90% of the site is underlain with basaltic rock varying in depth from 3½ to 4½ feet and the remaining 10% of the site (near Liberty Corners) is underlain with shale varying in depth from 1½ to 3½ feet. The shale is soft and can be ripped to depths of 3 feet where it has expanded along fractures or crumbled on bedding planes. The basalt bedrock is fractured in places to a depth of about 10 feet, which can be worked, but

with somewhat greater difficulty. These conditions generally are not suitable for septic systems and for this reason septic systems are not contemplated for this development proposal. The use of a low pressure waste water collection system, one of the alternatives being studied, would reduce the need for extensive bedrock removal.



**BASALT**  
(NEWARK GROUP)

**CHARACTERISTICS:**  
Flows of fine-grained hard trap rock.

**WEATHERING:**  
Weathered to 8-10 ft. depending on fracture system. Ripable to depth of weathered zone but much harder than shale.

**HYDROLOGY:**  
Impervious to water except in joints and fractures. Fractures generally tight. Average well yields 3-10 g.p.m. depth 200 ft.

**SHALE**  
(BRUNSWICK FORMATION)

**CHARACTERISTICS:**  
Soft, red shale.

**WEATHERING:**  
Well weathered to depth of 3 ft. Easily ripped along fractures or crumbling along bedding planes.

**HYDROLOGY:**  
Impervious to water except in joints and fractures. Fractures are wider than in basalt resulting in better water infiltration and availability. Potentially more pollutable. Average well yields 30-40 g.p.m. depth 150 ft.

- LEGEND**
- BASALT BEDROCK
  - SHALE BEDROCK
  - WATERSHED DIVIDES
    - PRIMARY
    - SECONDARY
  - STREAMS CHANNELS
    - DEFINED
    - UNDEFINING
  - FLOODPLAIN SOILS

RSW

ALLAN (KANE) THOMAS

J. HENRY MANNING  
PROJECT ENGINEER  
1110 WEST 17TH STREET  
NEW YORK, N.Y. 10011-1000  
1974

HYDROLOGY & GEOLOGY



**RARITAN WATERSHED**

**PASSAIC WATERSHED**

### Hydrology

The site does not contain any aquifers which would be a significant source of water, nor does it have any potential aquifer recharge areas. There are existing wells near the site, but since septic systems are not contemplated, there is little risk of affecting these water sources. We anticipate that water for the proposed community will be obtained from public water supply.

Onsite investigations have identified two types of streams on the site. One type is characterized by well defined channels (indicated by solid lines on the Geology-Hydrology Map); the second type are underground seeps (indicated by dash lines on the map). Floodplains and wetlands associated with both types of water courses have been identified and are proposed for conservation as open space.

An important topographic as well as hydrologic feature of the site is the boundary between the Raritan River and Passaic River Watersheds, with the site occupying a position in the headwaters of both watersheds. Because the site generally slopes downward in all directions from the center, storm water retention devices are proposed in perimeter locations to prevent increased runoff.

### Slope Conditions

The site, which is located in the Second Watchung Mountains contains some steep slopes, primarily along the face of the basaltic outflow on the western portion of the site. Slope conditions have been mapped on 2 foot contour intervals with areas of more than 20% slope being restricted from development. Limited development can be accommodated on areas with 15 to 20% slopes and more intensive development has been clustered on slopes of less than 15%. Initial investigation and on-site inspection with Soil Conservation Service representatives indicated that the soils are not particularly erodible, but in some locations sediment catch basins are proposed.

### Soils

Several soil types are found on the site with some soil associations exhibiting mixed characteristics. Floodplains and soils subject to frequent flooding occupy small areas, largely in the northeast corner of the site. Another category shown on the soils map identifies soils subject to moderate to slight flooding or seasonal high water table from 0 to 1 feet. These areas are unsuitable for construction and have been designated as restricted. Other areas of the site exhibit mixed



LEGEND

|          |                        |
|----------|------------------------|
| 20% +    | [Dark Gray Box]        |
| 15 - 20% | [Medium-Dark Gray Box] |
| 12 - 15% | [Medium Gray Box]      |
| 8 - 12%  | [Light Gray Box]       |
| 3 - 8%   | [White Box]            |
| 0 - 3%   | [White Box]            |

RSWA

ALL IN DEAM PROPERTY

APPROXIMATE  
PROPERTY LINES  
BASED ON AERIAL PHOTO  
INTERPRETATION

SLOPE



3



**LEGEND:**

| SOIL TYPE     | FLOODING POTENTIAL | SEASONAL WIND WATER TABLE INJ SOIL GROUP | HYDROLOGIC DRAIN TO SOIL GROUP | DESIGN TO SOIL GROUP |
|---------------|--------------------|--|--------------------------------|----------------------|
| Pa - PANGLOSS | MODERATE           | 0-1                                      | D                              | 6+                   |
| Pb - PANGLOSS | SEVERE             | 1-3                                      | C                              | 6+                   |
| Wb - WICHITA  | SLIGHT-MODERATE    | 0-1                                      | D                              | 6+                   |
| Wc - WICHITA  | SEVERE             | 1-3                                      | C                              | 6+                   |
| Wa - WICHITA  | MODERATE           | 1-3                                      | C                              | 6+                   |
| Wb - WICHITA  | SEVERE             | 1-3                                      | C                              | 6+                   |
| Wc - WICHITA  | MODERATE           | 1-3                                      | C                              | 6+                   |
| Wd - WICHITA  | SEVERE             | 1-3                                      | C                              | 6+                   |

| No./In. | REMARKS | HOME | NO. HOMES | NO. HOMES | NO. HOMES | NO. HOMES |
|---------|---------|------|-----------|-----------|-----------|-----------|
| 100     | REMARKS | 1    | 2         | 3         | 4         | 5         |
| 200     | REMARKS | 1    | 2         | 3         | 4         | 5         |

| Area/Acre | LANDOWNER | HOME | NO. HOMES | NO. HOMES | NO. HOMES | NO. HOMES |
|-----------|-----------|------|-----------|-----------|-----------|-----------|
| 1.0       | WICHITA   | 1    | 2         | 3         | 4         | 5         |
| 2.0       | WICHITA   | 1    | 2         | 3         | 4         | 5         |

**LIBERTY CEMETERY**

**PSMA**

ALLAN-BEANE PROPERTY

**SOILS**

LIBERTY CEMETERY

4



soil associations with variable depths to bedrock and seasonal high water table ranging from 1 to 4 feet. Remaining areas have seasonal high water table at depths of 5 feet or more and pose few restrictions for development.

Sources of soil information were the Soil Conservation Service's Soil Survey of Somerset County supplemented by onsite investigations with Soil Conservation Service representatives, and categories of development suitability are those of the Soil Conservation Service.

#### Vegetation

Examination of color aerial photos taken in the spring of 1975 shows the majority of the site is covered with a mixed deciduous forest consisting largely of oak, hickory, maple, beech, and birch. Small areas of the site contain evergreen species - largely juniper. Other vegetation features of the site include old field conditions and hedgerows (sassafras, dogwood, and other species), old field succession (shrubs, juniper and sumac), and open, abandoned fields, formerly pasture and meadow.



LEGEND

FOREST  
 DECIDUOUS  
 EVERGREEN

HEDGEROW

OLD FIELD  
 SUCCESSION

OPEN

PARENTHESES INDICATE CANOPY SPECIES OCCURRING LESS FREQUENTLY

RSW

ALL AN (NAME) PROPERTY

FORM: MANVILLE  
 NO. 10000  
 11. 10. 1950  
 10. 10. 1950  
 10. 10. 1950

VEGETATION

↑

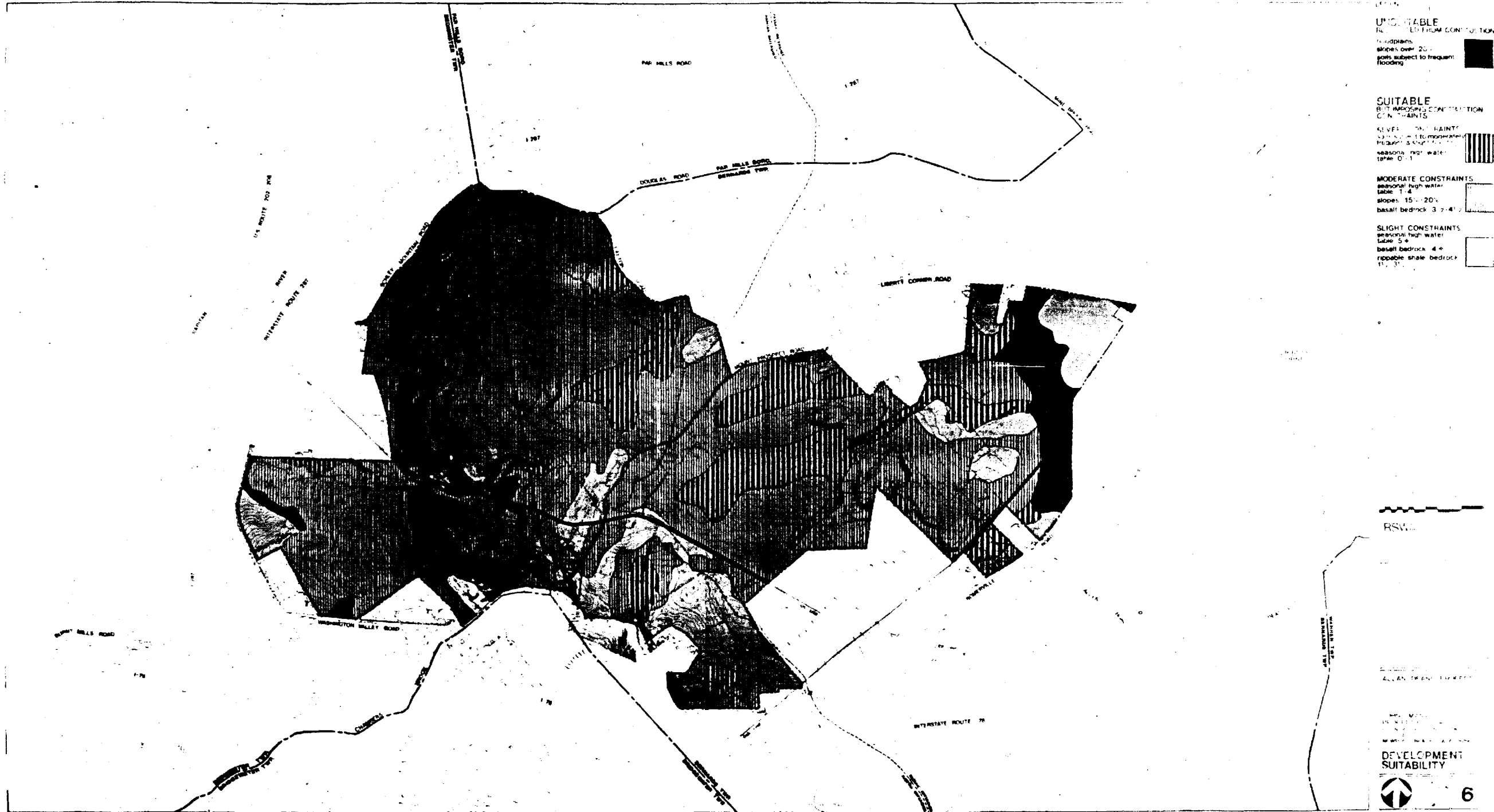
5

Historic

It has been determined that an area of the Allan-Deane property located along the slope in Bedminster Township may be a site of historical significance. No development has been planned for this area and an agreement has been entered into with Robert A. Brooks & Associates to investigate this potential historical site. (See Exhibit F for Agreement.)

### Development Suitability

The environmental conditions exhibited by the site have been assessed for their suitability for development and summarized graphically on the Development Suitability Map. One category of the map includes conditions which are environmentally unsuitable for construction: areas of more than 20% slope, floodplains, or soils subject to frequent flooding. Three additional categories have been established for varying degrees of environmental suitability. Areas of severe construction constraints include soils subject to moderate to frequent flooding and a seasonal high water table of 0 to 1 foot. Moderate construction constraints apply to areas with basaltic bedrock depth ranging from 3½ to 4½ foot, slopes between 15 and 20% or seasonal high water table from 1 to 4 feet. The category of Slight Construction Constraints was applied to areas with seasonal high water table greater than 5 feet, basaltic bedrock greater than 4 feet or rippable shale at a depth of 1½ to 3½ feet. The resulting composite map served as the basis for the land use plan which is shown in this report.



**UNDESIRABLE**  
 REJECTED FROM CONSTRUCTION  
 floodplains  
 slopes over 20%  
 soils subject to frequent  
 flooding

**SUITABLE**  
 BUT IMPOSING CONSTRAINTS  
 ON DEVELOPMENT

LEVELS: 10-15% SLOPES  
 15-20% SLOPES  
 FREQUENT SEASONAL FLOODING  
 SEASONAL HIGH WATER  
 TABLE 0-1'

**MODERATE CONSTRAINTS**  
 seasonal high water  
 table 1-4'  
 slopes 15% - 20%  
 basalt bedrock 3:1-4:1

**SLIGHT CONSTRAINTS**  
 seasonal high water  
 table 5-8'  
 basalt bedrock 4:1  
 ripplable shale bedrock  
 1:1-3:1

RSW

ALL DEVELOPMENT SHALL BE IN ACCORDANCE WITH THE ZONING ORDINANCE

**DEVELOPMENT SUITABILITY**



## PHYSICAL SYSTEMS

Detailed engineering studies have been undertaken of the physical systems which will serve the proposed community - traffic, water supply, wastewater treatment and stormwater control. The objective of these studies is to identify the project impacts and the proposed solutions which will minimize these impacts on the township.

### Roads and Traffic

Located at the interchange of Interstate 78 (an east-west route from New York City to northern Pennsylvania) and Interchange 287 (a circumferential highway around the New York Metropolitan Region), the site has excellent access to the region. Furthermore, U.S. Route 206, a north-south highway, provides additional access along the western edge of the site.

Orth Rodgers & Associates conducted a traffic, air and noise impact study of the proposed first phase Bedminster development in order to analyze the impact of the additional traffic upon the surrounding roadways and land uses. From this analysis, the highway improvements required to accommodate the site generated traffic volumes were determined. (Complete study attached as Exhibit F ).

In addition to current traffic conditions and the expansion created by the proposed Allan-Deane development, the study expanded traffic to reflect future growth from all other sources to the 1981 design year. Some of the other sources would include the completed AT&T Long Lines development.

In summary, the traffic analysis of roadway capacities, before and after the Allan-Deane development, demonstrates that the surrounding highway network has sufficient capacity to adequately service the additional traffic generated by the proposed development, providing that the highway improvements (noted in the body of the report) are implemented. The numerous access routings to the site (e.f., Interstate Route 287 and Interstate Route 78) will enable a wide dispersal of Allan-Deane development traffic throughout the surrounding highway network without negatively impacting existing residential and commercial land uses. Furthermore, the analysis revealed that additional development could be located on the Allan-Deane site (over 1400 acres) without exceeding the remaining available highway capacity of the surrounding roadway.

An air quality impact analysis was completed using proposed Environmental Protection Agency (EPA) guidelines and the volume/capacity analysis contained in the traffic impact analysis section of this report. An estimate of peak Carbon Monoxide (CO) concentrations at roadways and intersections near the site was completed for three alternative conditions: 1) 1977-Existing; 2) 1981-Without Development Generated Traffic; and 3) 1981-With Development Traffic.

The air quality analysis revealed that all of the locations investigated will operate substantially below the national standard for CO. The highest predicted concentration will occur during the evening peak traffic hour at the intersection of U.S. 202/206 and Washington Valley Road, yet this level will only represent 48% of the national standard.

A noise impact analysis was also completed at various existing and proposed land uses along U.S. 202/206 and Washington Valley Road to determine the impact of 1981 traffic volumes after development. These predicted noise levels were then compared with recommended Design Noise Levels for each land use category.



The analysis revealed that acceptable noise levels would be achieved for all of the units shown on the Allan-Deane development site plan and three of the four existing land uses along U.S. 202/206 and Washington Valley Road. The sole exception would occur at the existing dwelling units along U.S. 202/206. A comparison of predicted noise levels for these units revealed 1981 ambient levels 5dBA above that desired for residences. It is interesting to note that the calculated existing 1977 ambient noise level and the 1981 noise level without Allan-Deane development traffic are also in excess of the desired standard by 3dBA and 5dBA, respectively. In all cases, a reduction in the posted speed limit on U.S. 202/206 to 30 miles per hour would alleviate these undesirable conditions with predicted noise levels dropping to 70dBA or less.

#### Water Supply

The western portion of the proposed community will be served by the Commonwealth Water Company (See Will Serve letter attached as Exhibit ) which has a 16-inch main along Route 202-206. With purchases of



  
 AT&T SEWAGE  
 TREATMENT PLANT

AT&T

COMMONWEALTH  
WATER DISTRICT













COMMONWEALTH  
WATER DISTRICT

ELIZABETHTOWN  
WATER DISTRICT

HARRISON BROOK  
SEWAGE TREATMENT  
PLANT

  
 LIBERTY  
 CORNER

SOMERSET-RARITAN VALLEY  
SEWAGE TREATMENT  
PLANT - NORTH BRANCH

- LEGEND
- INTERSTATE HIGHWAY 
  - U.S. ROUTE 
  - STATE & COUNTY ROADS 
  - LOCAL PAVED 
  - LOCAL UNPAVED 
  - GAS LINE 
  - OIL LINE 
  - SEWER INTERCEPTOR LINE > 12 in 
  - SEWER LINE < 12 in 
  - WATER LINE > 12 in 
  - WATER LINE < 12 in 
  - SEWAGE TREATMENT FACILITY 

RSWA

|  |  |
|--|--|
|  |  |
|  |  |

ALLAN-DEANE PROPERTY

JOHN-MANVILLE  
PROPERTIES CORP  
100 N. BROADWAY CENTER DRIVE  
SUITE 400  
NEW BRUNSWICK, NEW JERSEY 08901

EXIST. PHYSICAL  
SYSTEMS



7

additional water from Bridgewater Township and the Elizabethtown Water Company, there will be an adequate supply. A booster station will be installed on-site to lift water to a storage tank to be built on the ridge. This will insure adequate pressure and sufficient water for fire protection. Detail engineering studies are in process to complete the preliminary design of such facilities.

The eastern portion of the site will also be served by the Commonwealth Water Company from a system which is connected with the Bridgewater Township water system. At present there is a 12-inch main along Martinsville Road with a 6-inch main reaching the site along Liberty Corner Road and a short 8-inch main along a portion of Allen Road. Neither of these smaller mains will provide sufficient capacity; therefore the developer proposes to contribute to the construction of larger mains to serve the eastern portion of the site.

#### Waste Water Systems & Water Resource Impacts

Several feasible alternatives have been analyzed and evaluated by Clinton Bogert Associates. Throughout the principle focus has

concentrated on a regional approach based on watershed areas rather than political boundaries. The use of septic systems is not among the alternatives under consideration. The completed study (copy attached as Exhibit I) has been submitted to the New Jersey Department of Environmental Protection for conceptual approval.

A complete evaluation of the water resource impacts of the development program has been completed by Resource Analysis, Inc. of Waltham, Massachusetts (full copy attached as Exhibit J). This report concludes as follows on each of the significant hydrologic issues:

Flooding -

The provisions for storage for control of downstream flooding incorporated into the plan will help to keep conditions at least as good as before development.

Effluent Disposal Impacts -

One of the principle alternatives for effluent disposal is for

on-site tertiary treatment with discharge to either, local surface waters, spray irrigation or rapid infiltration into the deep groundwater system. Resource Analysis has concluded that discharge of all or part of the tertiary treated sewage developed on the site to the Raritan would not violate the stringent New Jersey water quality standards for the stream (public water supply and high grade fisheries) nor antidegradation requirements; that spray irrigation can be carried out on-site with little, if any, negative impact on ground and surface water quality; and that direct recharge to groundwater by rapid infiltration ponds is limited by quantity rather than quality.

#### Storm Water Quality -

The controls proposed for dealing with increased quantities of runoff, i.e., detention ponds, also effectively improve the quality of the runoff. A large portion of the sediment solids would be removed by settling in passing slowly through the ponds.

Significant quantities of BOD, heavy metals, hydrocarbons, and other pollutants are known to be associated with this sediment and therefore would also be removed. The net result is that the change in stormwater quality resulting from the Allan-Deane development is expected to have a negligible impact on surface water quality.

Groundwater Quality and Quantity -

Local and regional groundwater quality should not be effected by the development. The limited permeability of the deep groundwater system limits the total amount of water that can reach the system. This water is either tertiary treated in the case of sewage effluent or partially treated and highly diluted in the case of the more innocuous storm water before entering the system thus leading to little quality impact.

## COMPATIBILITY OF PLAN

### Tri-State Regional Plan:

The first phase of development located in Bedminster Township is classified as an "Urban Area" in the Tri-State Regional Plan. Thus the planned development in concept and actual density is compatible with the overall regional plan and further its objectives as set forth in the text of plan.

### State of New Jersey Development Guide Plan:

The site is designated as a "Growth Area" in the State Development Guide Plan. "It is within the 'Growth Areas' that much of the State's investments in development encouraging facilities and services should be made." Thus the development plan is in furtherance of the objectives of the State of New Jersey.

### Somerset County Master Plan of Land Use:

The County Plan designates an approximately 500 acre area around Pluckemin as Village Neighborhood. The plan states "The existing Villages often form a society embracing all income levels of the population, and in this respect they are microcosms of the nation.

The housing ranges from modest houses to substantial residential establishments, often placed jowl to jowl. The compactness of the neighborhood and the close relationship between economic classes is part of the charming quality of the Villages. Existing densities of development range over a considerable spectrum and there is no need to set up stringent density definitions. Density is also dependent upon the amount of open space preserved, but the compact areas of development may well approximate five to fifteen families per acres and the size of the Village may vary ultimately from one to ten thousand persons."

Thus the plan suggests a density range from 2,500 units to 7,500 units. The 1849 units planned for this area, which will result in a population of approximately 5583, are well within the objectives of the County Plan even with the inclusion of land ownerships other than Allan-Deane in the Pluckemin area.

The concept of a totally planned village with pedestrian ways, recreation facilities and open space incorporated with business



and commercial uses as set forth in this site plan, is a unique opportunity to accomplish in a controlled manner precisely the objectives the County has set forth in the description of a Village Neighborhood.

CONSULTANTS ASSISTING IN PREPARATION OF OPEN SPACE COMMUNITY PLAN  
AND DETAIL SITE PLAN

|  |   |
|--|---|
| Land Planners  | Rahenkamp, Sachs, Wells &<br>Associates, Inc.<br>Philadelphia, Pennsylvania                                   |
| Architects & Site Planners                                 | Kachadourian and Cahill<br>Bloomfield, New Jersey   |
| Civil Engineers - Waste Water<br>Treatment<br>Water Supply | Clinton Bogert Associates<br>Fort Lee, New Jersey   |
| Civil Engineers  | Apgar Associates<br>Far Hills, New Jersey   |
| Water Resource Impacts                                     | Resource Analysis, Inc.<br>Waltham, Massachusetts   |
| Storm Water Control  | Vincent McKeever<br>Philadelphia, Pennsylvania  |
| Spray Irrigation   | William E. Sopper<br>State College, Pennsylvania  |
| Traffic Engineers  | Orth Rodgers & Associates,<br>Philadelphia, Pennsylvania<br>Simpson and Curtin,<br>Philadelphia, Pennsylvania |
| Low & Moderate Income<br>Housing Study                     | Alan Mallach/Associates<br>Trenton, New Jersey  |

Market Research

Alfred Gobar Associates  
Brea, California

Socio-Economic Profile-  
Bedminster Township

Richard Reading Associates  
Princeton, New Jersey

Planning Consultants

Carl Lindbloom,  
Princeton, New Jersey  
John Exley,  
San Rafael, California

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*Copy*

Exhibit "B"  
(AFFIDAVIT OF E. JAMES MUR

JOHNS-MANVILLE PROPERTIES CORPORATION

ALLAN-DEANE CORPORATION

CONCEPTUAL WASTEWATER DISPOSAL  
ALTERNATIVES FOR THE ALLAN-DEANE  
DEVELOPMENT

CLINTON BOGERT ASSOCIATES

December 1977

CONCEPTUAL WASTEWATER DISPOSAL  
ALTERNATIVES FOR THE ALLAN-DEANE  
DEVELOPMENT  
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## Introduction

It is the aim of this report to introduce to the New Jersey Department of Environmental Protection (NJDEP) and other concerned entities the wastewater disposal concepts studied for the Allan-Deane development. This report has been prepared at the recommendation of the NJDEP to provide public review of these concepts and to obtain responsible comments about them. The public response can then be considered by the NJDEP, together with the technical aspects presented herein, so that a preferred concept is identified.

## Background

The Allan-Deane Corporation proposes to develop its property located in the Townships of Bedminster and Bernards in Somerset County, New Jersey.

A summary description and statement of objectives of the proposed residential development is given in "A Proposal For An Open Space Community," prepared by Rahenkamp, Sachs, Wells and Associates, Inc., in February, 1976. A copy of this report, which includes sections that have subsequently been superseded, is enclosed as Appendix "A".

The land use summary for the Allan-Deane development of its property in the Raritan River watershed is in Table I. This table supersedes its counterpart contained in Appendix "A".

## Design Basis

The design bases of the alternatives in this report are intentionally different. This is necessary to accurately represent the actual situations under which the alternatives will be built. The differences are the result of different service areas. The service area for each alternative is established in accordance with the arrangements made among participants. Thus for Alternatives I and III the service area is solely the Raritan River basin portion of the Allan-Deane property. For Alternative II, the service area includes the Village of Pluckemin in addition to the aforementioned portion of the Allan-Deane property. This Allan-Deane-Pluckemin service area when connected to Bridgewater's Middlebrook basin, becomes part of a regional system.

The population listed in Table I is the maximum future population of the Raritan River watershed portion of the Allan-Deane development. This population will produce a 0.85 mgd design average daily flow from the Allan-Deane Development. The flow determination is shown in Table I. The per capita sewage flow values listed therein include an allowance for infiltration.

For Alternative II, to the average daily flow of 0.85 mgd from the Allan-Deane development is added the Village of Pluckemin's average daily flow of 30,000 gpd. This latter figure was obtained from the Township of Bedminster's engineer. The resulting total average daily flow is 0.88 mgd, and peak flow is 3.6 mgd.



TABLE I

ALLAN-DEANE PROPERTIES  
DEVELOPMENT PLAN AND SEWAGE FLOW

|  | <u>Dwelling<br/>Acres</u> | <u>Population<br/>Units</u> | <u>Flow Rate<br/>Factor</u> | <u>Total Sewage<br/>Population</u> | <u>Flow Rate<br/>GPCD</u> | <u>Total Sewage<br/>Flow GPD</u> |
|--|---------------------------|-----------------------------|-----------------------------|------------------------------------|---------------------------|----------------------------------|
| <u>Lowlands Area:</u><br>(All Bedminster Township) |                           |                             |                             |                                    |                           |                                  |
| Apartments   | 29                        | 463                         | 2.28                        | 1,056                              | 75                        | 79,200                           |
| Townhouses   | 70                        | 752                         | 2.83                        | 2,128                              | 100                       | 212,800                          |
| Commercial   | <u>28</u>                 | <u>    </u>                 | <u>    </u>                 | <u>    </u>                        | <u>    </u>               | <u>55,000</u>                    |
| Lowlands Total-                                    | 127                       | 1,215                       |                             | 3,184                              |                           | 347,000                          |
| <u>Highlands Area:</u><br>Bedminster-              |                           |                             |                             |                                    |                           |                                  |
| Townhouses   | 57                        | 504                         | 2.83                        | 1,426                              | 100                       | 142,600                          |
| Single Family                                      | <u>92</u>                 | <u>130</u>                  | <u>3.51</u>                 | <u>456</u>                         | <u>100</u>                | <u>45,600</u>                    |
|  | 149                       | 634                         |                             | 1,882                              |                           | 188,200                          |
| Bernards-  |                           |                             |                             |                                    |                           |                                  |
| Apartments   | 66                        | 830                         | 2.35                        | 1,950                              | 75                        | 146,250                          |
| Townhouses   | 41                        | 327                         | 2.83                        | 925                                | 100                       | 92,500                           |
| Single Family                                      | <u>106</u>                | <u>212</u>                  | <u>3.51</u>                 | <u>744</u>                         | <u>100</u>                | <u>74,400</u>                    |
|  | 213                       | 1,369                       |                             | 3,619                              |                           | 313,150                          |
| <u>Development Total</u>                           | <u>489</u>                | <u>3,218</u>                |                             | <u>8,685</u>                       |                           | 848,350                          |

TABLE II

EXPECTED RAW WASTEWATER CHARACTERISTICS

FROM ALLAN-DEANE DEVELOPMENT

| <u>Constituent</u>              | <u>Concentration</u> |
|---------------------------------|----------------------|
| 5-day Biochemical Oxygen Demand | 250 mg/l             |
| Suspended Solids                | 260 mg/l             |
| Ammonia Nitrogen                | 24 mg/l              |
| Total Nitrogen                  | 40 mg/l              |
| Total Phosphorous               | 13 mg/l              |
| pH                              | 6.5 to 8.5           |

For all alternatives the wastewater is almost totally obtained from residential sources, so typical domestic wastewater characteristics are expected. These are shown in Table II. Therein, the 5-day biochemical oxygen demand (BOD<sub>5</sub>) and suspended solids(SS) concentrations conform to New Jersey code requirements for domestic wastewaters. The SS concentration is based on a per-capita contribution of 0.20 pounds of SS per capita per day. Nitrogen concentrations are conservatively estimated after analyzing several studies on residential wastewater characteristics and other references. Phosphorous concentration is based on EPA reported domestic contributions of 3.5 pounds per capita per year. Heavy metals, pesticides, or toxic organics would not be present in deleterious concentrations because of the development's residential nature.

### Conceptual Wastewater Disposal Alternatives

The conceptual alternatives considered for wastewater disposal are:

- I. On-site advanced treatment with discharge into the North Branch Raritan River;
- II. Connection to the Middlebrook Trunk Sewer and treatment at the Somerset-Raritan Valley Sewerage Authority Treatment Plant with discharge into the Raritan River's main stem; and
- III. On-site treatment followed by year round spray onto grasslands.

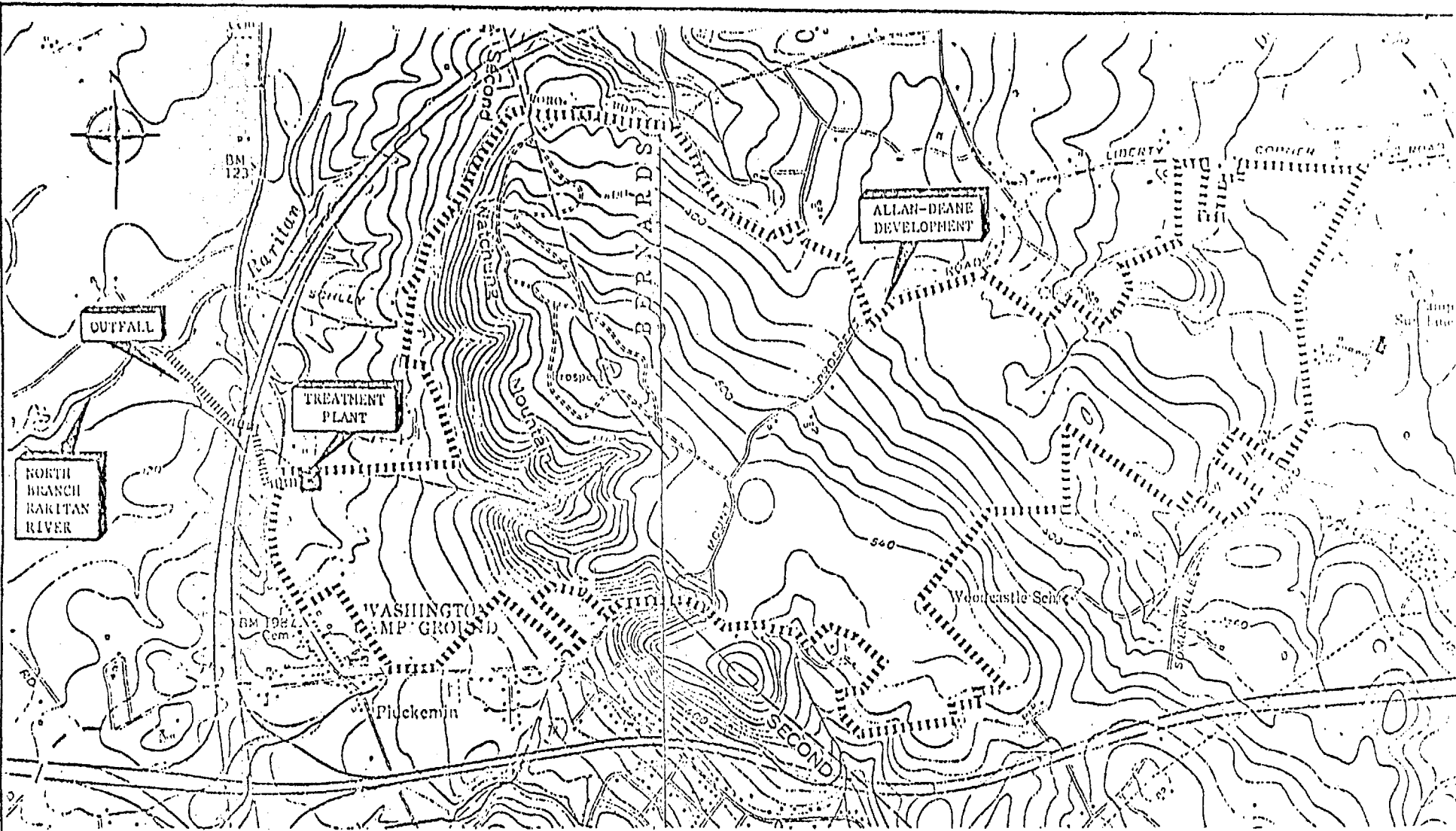
### Alternative I

Advanced treatment of wastewater before discharge into the North Branch Raritan River is the concept of this alternative. Figure 1 shows the preliminary location of the facilities.

To determine the specific method of treatment, it is necessary to know raw wastewater characteristics and effluent limits. The raw wastewater characteristics have been previously described. Effluent limits have been established by the Township of Bedminster and guidance has been provided by the NJDEP.

At our specific request, the NJDEP has defined the required level of treatment (effluent limits) in their letter of July 12, 1977. A copy of the correspondence is Appendix "B". In summary, the letter states that level 3 treatment is required for oxygen requirements and the discharge must comply with anti-degradation policy. Additionally, at a subsequent meeting, the NJDEP indicated that a treatment plant equal in performance to the existing A&T wastewater treatment plant in Bedminster would probably satisfy water quality requirements and anti-degradation policy.

The Township of Bedminster's Effluent Discharge Standards is Appendix "C". These standards can only be interpreted as prescribing the desired resultant river water quality after dispersion and dilution



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WASTEWATER DISPOSAL  
ALTERNATIVE I

of the effluent. This interpretation is based on two points: first, is the extensive use of narrative identical to Federal stream quality criteria; and second, is our analysis which indicates that the Township approved AT&T plant complies with Bedminster standards only after its effluent is dispersed and diluted in the river.

Based on the NJDEP letter and meeting, the Bedminster Effluent Standards (interpreted as in-stream standards) and a review of some existing water quality data; a conservative effluent criteria for the proposed treatment plant has been formulated. This criteria is given in Table III.

TABLE III

NORTH BRANCH RARITAN RIVER EFFLUENT CRITERIA

| <u>Constituent</u> | <u>Effluent Limit</u> |
|--------------------|-----------------------|
| BOD <sub>5</sub>   | 16 mg/l               |
| SS                 | 25 mg/l               |
| NH <sub>3</sub> -N | 1.5 mg/l              |
| NO <sub>3</sub> -N | 1.0 mg/l              |
| PO <sub>4</sub> -P | 1.0 mg/l              |
| D.O.               | 6.0 mg/l              |
| pH                 | 6.5 to 8.5            |
| Fecal Coliforms    | 200/100 ml.           |

Before discussing the derivation of the criteria it is pertinent to report that the approximate point of the North Branch that will receive the effluent lies at about Milepoint 12.25 in river segment 7. The milepoint and segment are identified in the 303 Study, i.e. the August, 1976, NJDEP Draft "Phase I Water Quality Management Basin Plan". This segment is a water quality limited, Class FW-2, non-trout waterway.

The tabulated 5-day biochemical oxygen demand (BOD<sub>5</sub>) and dissolved oxygen (D.O.) limits are identical with the NJDEP stipulated level 3 treatment limits reported in the 303 Study. The suspended solids (SS) limit is the EPA proposed water quality criteria for excellent fisheries. The pH and fecal coliform limits are in compliance with New Jersey Class FW-2 regulations.

The ammonia nitrogen (NH<sub>3</sub>-N) limit must satisfy the D.O. maintenance requirements of the river and avoid toxic distress in the freshwater biota. The NJDEP has defined a limit of 4.0 mg/l of NH<sub>3</sub>-N for the oxygen requirements. The toxicity limit can be

established from EPA proposed ammonia criterion. The Township of Bedminster standard is similar to this criterion. This criterion is based on limiting the un-ionized ammonia concentration in the river to 0.020 mg/l. The un-ionized concentration in the river is a function of total ammonia ( $\text{NH}_3 + \text{NH}_4^+$ ), pH, temperature and river flow. When temperature, pH and total ammonia increase, the toxic un-ionized ammonia concentration also increases. The October, 1973 "Water Quality and Aquatic Biology Report," prepared for AT&T Long Lines, reported maximum river temperatures of 26 C and a pH of 7.4 on September 6, 1973 in river segment 7. The NJDEP 303 Study reports the design river flow (MA7CD10) to be 8.49 mgd for segment 7. Based on the reported pH and temperature, and the conservative assumption that these were coincident with the MA7CD10 flow; the maximum allowable  $\text{NH}_3\text{-N}$  concentration of the effluent would be about 12 mg/l after full dilution in the river.

The above ammonia nitrogen limits of 4.0 mg/l and 12.0 mg/l are significantly higher than the current performance of the existing AT&T plant with its effluent  $\text{NH}_3\text{-N}$  concentration of 0.5 mg/l. Based on this performance it is our opinion that the performance of the AT&T plant under design (full flow and winter) conditions would produce an average effluent  $\text{NH}_3\text{-N}$  concentration of about 1.5 mg/l. We recognize this lowest concentration to be more indicative of NJDEP and Township of Bedminster objectives. Accordingly, the effluent limit is set at 1.5 mg/l., a practical, achievable, yet stringent limit.

The existing  $\text{NO}_3\text{-N}$  concentrations in the North Branch range from 0.8 to 1.8 mg/l according to the 303 Study. The effluent limit for  $\text{NO}_3\text{-N}$  is accordingly set at 1.0 mg/l.

Orthophosphate phosphorous ( $\text{PO}_4\text{-P}$ ) levels in the river are 0.5 to 1.0 mg/l. The existing AT&T treatment plant, under partial flow conditions, is attaining effluent concentrations of about 0.8 mg/l of  $\text{PO}_4\text{-P}$ . Accordingly an effluent limit of 1.0 mg/l of  $\text{PO}_4\text{-P}$  is prescribed.

The limits listed in Table III and the raw wastewater characteristics determine the functions the treatment system must perform. Though no single specific treatment system has yet been selected, the selected system will have to achieve high BOD, SS, ammonia, nitrate, orthophosphate and fecal coliform removals, and raise the effluent D.O. to the prescribed level (6.0 mg/l).

Some treatment systems that perform these functions include:

- 1) primary sedimentation, activated sludge and two-stage chemical precipitation followed by breakpoint chlorination;
- 2) primary sedimentation, high rate activated sludge with mineral addition, biological nitrification and biological denitrification;
- 3) extended aeration, biological denitrification, two-stage chemical precipitation and filtration; and

TABLE IV

ESTIMATED COSTS FOR ALTERNATE I

| <u>Facility or Operation</u> | <u>Construction<br/>Cost</u> | <u>Annual<br/>Operating and<br/>Maintenance Cost</u> |
|------------------------------|------------------------------|--|
| Raw Sewage Life Station      | \$ 400,000                   | \$ 8,000   |
| Advanced Treatment Plant     | 3,800,000                    | 350,000  |
| Outfall Sewer                | 180,000                      | 500  |
| Sludge Haul to SRVSA         | <u>20,000</u>                | <u>58,500</u>  |
| TOTAL                        | \$4,400,000                  | \$417,000  |

- 4) chemical precipitation, biological nitrification and biological denitrification.

Many other systems are also possible and a variety of equipment is available for each unit process. System (3) is the existing AT&T treatment plant in Bedminster.

The selected treatment system will be preceded by screening and raw sewage pumping. The pumping is needed to compensate for the head losses through the treatment plant. At a suitable point in the treatment system, post aeration will be provided to raise effluent D.O. to the prescribed level. Following treatment, the effluent will be chlorinated for disinfection. A chlorine contact chamber will provide the required detention. The effluent will then flow by gravity to the North Branch Raritan River.

The method of sludge disposal will be shipment to the Somerset-Raritan Valley Sewerage Authority (SRVSA) regional treatment facility. Discussions with SRVSA to receive and dispose of these sludges are in progress. The sludge load used in planning is 6600 dry lbs/day of mixed, organic-chemical sludge. It is expected to have a solids concentration of at least 8%, a pH of 10 to 11, and a volatile solids concentration of about 12%. The major inert fraction would be lime, which is used for the precipitation of organics and phosphorous. This load is the expected sludge production from treatment system (4). If another system is used the sludge load would be less, perhaps as much as 10% lower.

The space (acreage) requirements of the possible treatment systems vary. The required acreage for treatment structures will range from two to four acres. Additionally, a landscaped buffer zone will surround the treatment units so that residences shall be least 200 feet distant from any treatment unit.

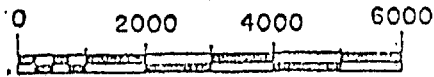
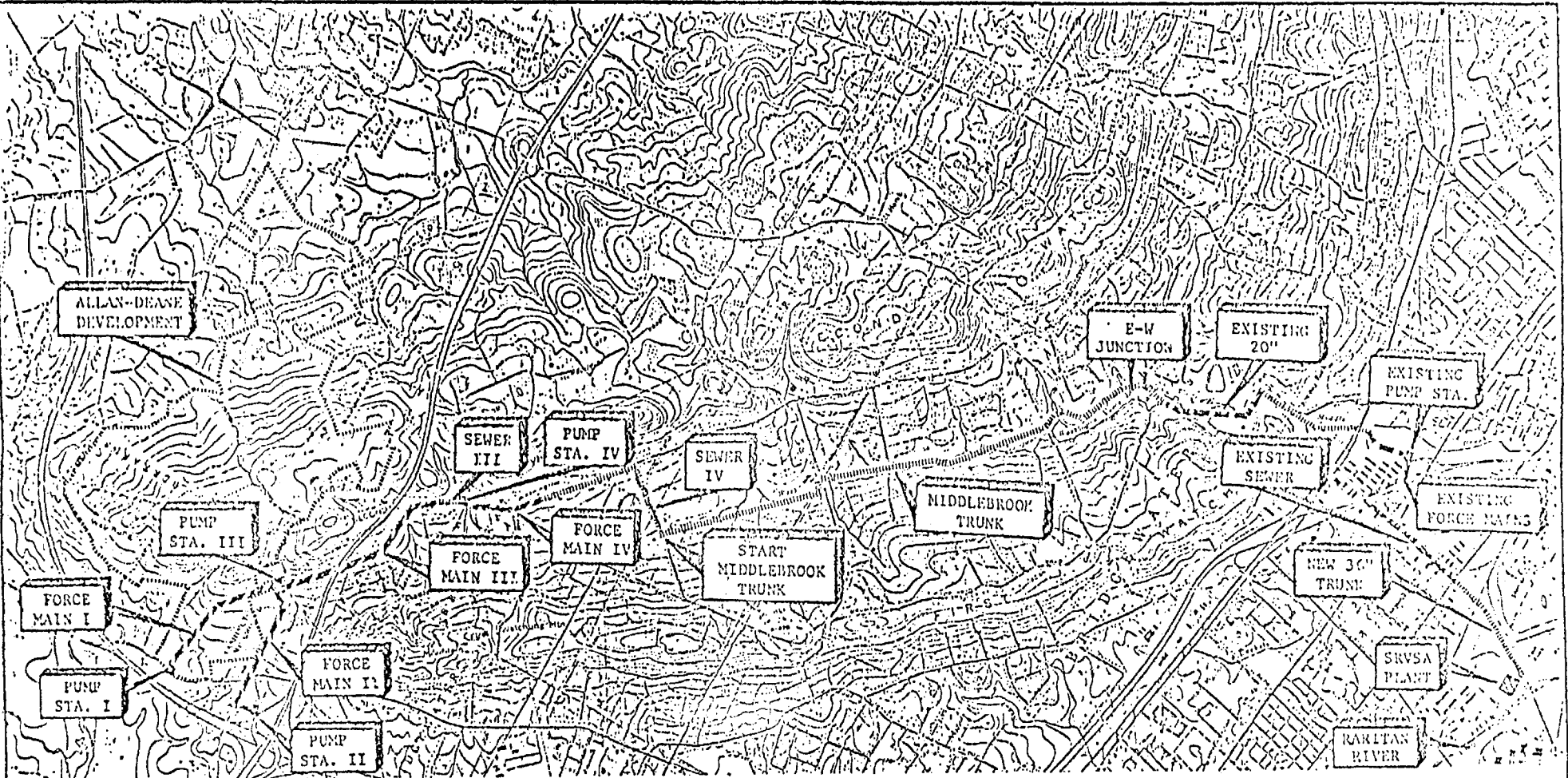
For the outfall about 2400 linear feet of right-of-way will be required. Permits to cross Routes 202/206 and Interstate Route 287 will also be needed.

The construction costs, estimated on a January 1978 basis, are presented in Table IV together with operating and maintenance costs. Land, right-of-way, engineering, legal and fiscal costs have not been included.

#### Alternative II

The transmission of the wastewaters of the Allan-Deane development and Village of Pluckemin to the Somerset-Raritan Valley Sewerage Authority (SRVSA) treatment plant via the Middlebrook Trunk Sewer (a proposed Bridgewater Township Interceptor) is this alternative concept. The wastewater after treatment at the SRVSA plant will be discharged into the main stem of the Raritan River. The SRVSA plant provides secondary treatment in compliance with New Jersey and Federal regulations. Figure 2 shows preliminary alignments and sites.





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WASTEWATER DISPOSAL  
ALTERNATIVE II

The design average daily flow from Allan-Deane and the Village of Pluckemin is 0.88 mgd. Peak flow is 3.6 mgd. The determination of flow and the reasons for its difference from the other alternatives, is discussed in the Design Basis section.

The facilities required to convey the flow includes four pump stations (I to IV), with force mains and interceptors located mainly in Washington Valley Road and Mount Vernon Road. Pump Stations I, II and III collect and lift the flow from separate collection districts. Pump Station IV is used to lift the flow out of the Chambers Brook basin into the Middlebrook basin.

At the intersection of Mount Vernon Road and the West Branch Middle Brook the Allan-Deane-Pluckemin flows will enter the upstream terminal manhole of Bridgewater Township's proposed west branch of the Middlebrook Trunk Sewer. The size of the proposed trunk sewer would have to be revised over most of its length to accommodate the increased (Bridgewater, Allan-Deane, Pluckemin) flows. The existing Route 287 Pump Station will be increased in capacity by replacing the existing pumps and motors with new larger pumps and motors. The existing force mains and sewers from the Route 207 Pump Station to the SRVSA treatment plant have sufficient capacity to convey the total flow. Table V lists the flows from each participant within sections of the transmission system.

Other alignments to connect Allan-Deane-Pluckemin with the Somerset-Raritan Valley Treatment Plant may be feasible. The most obvious is to route the Allan-Deane-Pluckemin flows through an upgraded Chambers Brook interceptor. Another is to run mains and sewers through streets of Sunset lake and upstream along Chambers Brook. This route would avoid some high ground and the high-head pumping that is needed for the Washington Valley Road alignment. However for the purposes of this report only the Washington Valley Road alignment is estimated.

The land requirements of the alternative are not large but are diverse. Pump stations I and III are on Allan-Deane property. Sites for Pump Stations II and IV would have to be acquired. A quarter of an acre site would probably suffice for each pump station.

Rights-of-way for the pipelines to the Middlebrook Trunk Sewer will be in local roads. There is over 18,000 linear feet of such pipeline. It is assumed that the rights-of-way for the Middlebrook Trunk Sewer are being obtained by Bridgewater Township.

The Allan-Deane-Pluckemin sludge load becomes an integral part of SRVSA sludge load and is processed through that plant's fluidized bed incinerator for landfill disposal. The Allan-Deane-Pluckemin sludge load should average about 1350 dry lbs/day. This load is the result of the primary and biological secondary treatment to be provided by the SRVSA plant. The sludge load in the year 2000 for the SRVSA plant has been projected to be 22 dry tons per day. Thus the Allan-Deane-Pluckemin load represents only 3% of the future sludge loads.

The estimated costs to Allan-Deane-Pluckemin for this alternative includes payments for the use of existing facilities in addition to costs for new construction. The 'payments for use' represent the

TABLE V  
ALTERNATIVE II  
TRANSMISSION SYSTEM FLOW

| Pipeline                         | Length<br>Feet | Allan-Deane<br>Pluckemin<br>Flow<br>mgd | Bridgewater<br>Flow<br>mgd | Total<br>Flow<br>mgd | Existing<br>Minimum<br>Capacity<br>mgd |
|----------------------------------|----------------|---|----------------------------|----------------------|--|
| Force Main I                     | 5000           | 0.74                                    | -                          | 0.74                 | -                                      |
| Force Main II                    | 4350           | 0.78                                    | -                          | 0.78                 | -                                      |
| Force Main & Sewer III           | 6300           | 3.6                                     | -                          | 3.6                  | -                                      |
| Force Main & Sewer IV            | 7600           | 3.6                                     | -                          | 3.6                  | -                                      |
| <u>Middlebrook Trunk Sewer:*</u> |                |   |                            |                      |  |
| Mt. Vernon to Crim Rd.           | 5150           | 3.5                                     | 1.0                        | 4.6                  | -                                      |
| Crim Rd. to Circle Dr.           | 4130           | 3.5                                     | 1.8                        | 5.4                  | -                                      |
| Circle Dr. to Newmans La.        | 3350           | 3.5                                     | 2.4                        | 6.0                  | -                                      |
| Newmans La. to E-W. Jct.         | 3760           | 3.5                                     | 2.8                        | 6.4                  | -                                      |
| E-W Jct. to Existing 20"         | 930            | 3.5                                     | 7.8                        | 11.4                 | -                                      |
| Existing 20"                     | 3035           | 3.5                                     | 7.8                        | 11.4                 | 12.6                                   |
| Existing 20" to Existing 27"     | 3810           | 3.5                                     | 7.9                        | 11.5                 | -                                      |
| Existing 27"                     | 1990           | 3.5                                     | 8.0                        | 11.6                 | 13.0                                   |
| Route 287 Pump Station           | -              | 3.5                                     | 8.0                        | 11.6                 | 11.5                                   |
| Existing Force Mains             | 1700           | 3.5                                     | 8.0                        | 11.6                 | -                                      |
| Existing 20" pressure sewer      | 490            | 3.5                                     | 8.0                        | 11.6                 | 12.5                                   |
| Existing 24" gravity             | 1780           | 3.5                                     | 8.0                        | 11.6                 | 16.0                                   |
| Existing 36" to Main Street      | 1870           | 3.5                                     | 8.2                        | 11.8                 | 13.8                                   |
| Main Street to SRVSA             | 4580           | 3.6                                     | 9.1                        | 12.7                 | 25.8                                   |

\*Sewer line section nomenclature is descriptive, not exact. Nearest large street name is used to describe terminal points.

TABLE VI  
ALTERNATIVE II  
ALLOCATION OF CONSTRUCTION COSTS & CURRENT VALUES

| <u>Facility</u>                 | Costs in thousands of dollars   |                               |                                    |                           |
|---------------------------------|---------------------------------|-------------------------------|------------------------------------|---------------------------|
|                                 | <u>Cost of New Construction</u> | <u>Current Existing Value</u> | <u>Allan-Deane-Pluckemin Share</u> | <u>Bridge-Water Share</u> |
| Allan-Deane-Pluckemin System:   |                                 |                               |                                    |                           |
| Pump Stations                   | 1,290                           | -                             | 1,290                              | -                         |
| Force Mains                     | 640                             | -                             | 640                                | -                         |
| Sewers                          | 400                             | -                             | 400                                | -                         |
| Bridgewater Systems:            |                                 |                               |                                    |                           |
| New Sewers                      | 3,360                           | -                             | 1,560                              | 1,800                     |
| Pump Station                    | 230                             | 490                           | 150*                               | 160                       |
| Pump Station Modification       | 230                             | -                             | 70                                 | 160                       |
| Existing Sewers and Force Mains | -                               | 1,340                         | 410                                | -                         |
|                                 | <u>5,920</u>                    | <u>1,830</u>                  | <u>4,520</u>                       | <u>1,960</u>              |

\*These are 'payments for use'. See text.

TABLE VII  
ALTERNATIVE II  
ALLOCATION OF OPERATING AND MAINTENANCE COSTS

| <u>Facility</u>                 | Cost in dollars per year     |                                    |                           |
|---------------------------------|------------------------------|------------------------------------|---------------------------|
|                                 | <u>Annual O &amp; M Cost</u> | <u>Allan Deane-Pluckemin Share</u> | <u>Bridge-Water Share</u> |
| Allan-Deane-Pluckemin System:   |                              |                                    |                           |
| Pump Stations                   | 32,000                       | 32,000                             | -                         |
| Force Mains                     | 1,300                        | 1,300                              | -                         |
| Sewers                          | 800                          | 800                                | -                         |
| Bridgewater System:             |                              |                                    |                           |
| New Sewers                      | 3,450                        | 1,700                              | 1,700                     |
| Existing Pump Station           | 17,000                       | 5,300                              | 11,700                    |
| Existing Sewers and Force mains | 1,700                        | 500                                | 1,200                     |
| SRVSA Charges:                  |                              | <u>135,200</u>                     |                           |
| TOTAL                           |                              | <u>\$176,800</u>                   |                           |

purchase of a part of each existing facility that carries Allan-Deane-Pluckemin flow. A fair payment can be considered to have the same ratio to the facilities current value, as the Allan-Deane-Pluckemin peak flow has to the total peak flow. Current value may be determined by several methods of valuation, but whichever method is used the value finally decided upon will be obtained by negotiation. For this report, current value was made equal to the facilities replacement cost less depreciation. Replacement cost is the estimated January, 1978 construction cost for an approximately identical facility. Depreciation is equal to the replacement cost times the 'age to service life' ratio of the facility. Service lives were generally taken to be the maximum number of years stipulated in the EPA Cost-Effectiveness guidelines. Salvage values were considered to be zero. The 'current values' and 'payments for use' listed in Table VI were calculated on this basis.

The allocation of new facility construction costs, between Bridgewater and Allan-Deane-Pluckemin, were also made according to peak flow ratios. These allocations are also listed in Table VI. Land, right-of-way, engineering, legal and fiscal costs have not been estimated.

As indicated in Table VI the total cost to Allan-Deane-Pluckemin for this alternative is \$4,520,000. The corresponding total annual operating and maintenance cost to Allan-Deane-Pluckemin is \$176,800.

The operating and maintenance (O&M) cost breakdown is shown in Table VII. The costs allocated to Allan-Deane-Pluckemin are 100% of the O&M costs for facilities used solely by Allan Deane-Pluckemin. Peak flow percentages were used to determine the O&M allocations for facilities used by all parties (Allan-Deane-Pluckemin-Bridgewater). The annual charges of the SRVSA were computed using their 1977 rate of \$421 per million gallons.

### Alternative III

This concept is to provide treatment through partial denitrification followed by year-round spray irrigation of grasslands.

Publications by EPA provide guidance for the design of wastewater disposal spray irrigation systems. Guidance was also provided by the NJDEP in their letter of July 12, 1977 (Appendix 'B') and in informal communications.

The pertinent information from the above sources has been compiled into the following guidelines for spray irrigation facilities.

1. Minimum of secondary treatment including disinfection.
2. Maximum application rate of 2 inches per acre per week.
3. Storage or alternate subsurface facilities provided for disposal during inclement weather.

4. Buffer zones of 200 feet from property lines and 100 feet from surface waters.
5. Soil permeabilities should be moderately slow to moderately rapid (0.2 to 6.0 inches/hr.).
6. Minimum of six feet of suitable soil should overlie bedrock at year round spray disposal sites.
7. Seasonally high water table must be 5 feet or more below the surface.
8. Nitrate-nitrogen concentrations in the groundwater beneath the spray site should not exceed 10 mg/l  $\text{NO}_3\text{-N}$ .

EPA has reported that renovated water from spray irrigation systems contained 1 to 2 mg/l BOD, 1 to 2 mg/l SS, 2 to 4 mg/l total nitrogen and 0.1 to 0.5 phosphorous. This quality was rather consistently obtained and was generally independent of original concentrations in the applied wastewater.

Pennsylvania State University (PSU) has operated a harvested, reed canary grass spray site-located on a deep, well-drained clay loam soil-continuously since 1964. During the initial years (1964 to 1970), secondary municipal effluent was applied year round at average annual application rates of 2 inches/week and 480 to 610 lbs nitrogen per acre per year. The renovated effluent generally contained less than 10 mg/l  $\text{NO}_3\text{-N}$ .

Because of the success of the PSU project we have considered year round spraying of reed canary grass as a wastewater disposal alternative.

At the NJDEP's prescribed maximum hydraulic loading rate of 2 inches/week, 110 acres of irrigable land is required to dispose of the 0.85 mgd design flow.

A study of Soil Conservation Service data and the logs of test pits excavated on the Allan-Deane property indicates that the 1532 acre Allan-Deane property has sufficient acreage that could be suitable irrigable land. These areas are mostly forested and are comprised of the Neshaminy, Mount Lucas and Anwell (with underdrains) soil series.

The wastewater treatment system preceding spray irrigation would include secondary treatment, chlorination and partial denitrification. The need for denitrification was determined from a nitrogen balance approximation. This calculation indicated that the allowable winter-time loading rate is about 400 lbs. Nitrogen per acre per year. At design flow, the corresponding concentration in the wastewater effluent is 17 mg/l of nitrogen. Secondary treatment of the wastewater can not attain this level, so some denitrification is required.

The treatment system does not include facilities for phosphorous removal. They were omitted on the assumption that the phosphorous removal performance of the soil-crop matrix would be satisfactory in

all aspects, which are: rate of removal, ultimate capacity and phosphorous concentration in the renovated water.

This alternative envisions pumping the wastewater collected in the Lowlands in two steps up to a treatment plant located near the ridge of the Second Watching Mountains. The first pump station will contain comminuting and degritting facilities. It will lift the 0.35 mgd lowlands flow (see Table I) about 200 feet to a second pump station. This pump station will lift the flow about another 180 feet into a junction box. At that box, preliminary treated (comminuted and degrittied) and pumped (low lift) wastewater flow (0.50 mgd) from the Highlands section will join the Lowlands flow. The combined flow will then receive the aforementioned treatment. The treated effluent will be discharged into a six million gallon, lined basin. This basin would store one week of effluent flow during freezing or wet weather at which times spraying is not done. The basin will also serve as a wet well for the spray pump stations that supply anywhere from three to six spray fields. The number and location of the fields would depend upon the results of detailed site and soil investigations. The spray stations would deliver stored effluent to one section of the field daily. Section applications would be rotated weekly. Dosing would be at 1/4 inch per hour, for 8 hours, on one day, followed by a 6 day rest period. Thus seven sections would be irrigated each week by each pump set. The size of the sections will depend upon the spray field sizes (which need not be uniform), the number of fields, their location, elevation and other factors. The spray pump station details will depend upon similar factors.

The sludge produced by the treatment system will be a typical biological secondary treatment plant sludge. About 1500 dry lbs per day of 5% solids sludge is expected. The planned method of disposal is trucking to the SRVSA regional treatment plant.

The acreage requirements of the entire system is primarily dependent upon the number of spray fields. The 110 acres of irrigable land are to be surrounded by a 200 foot buffer strip. If these 110 acres are divided into three spray fields almost 200 acres of irrigable land and buffer strip is needed. If however there are six spray fields, the comparable land requirement could be 250 acres. The pump stations, treatment plant and storage basin altogether would require another ten acres. The total land needs of the system is therefore between 200 to 260 acres.

Since all facilities are on Allan-Deane property there would be no off-site land or right-of-way acquisitions.

Table VIII presents the estimated January 1978 construction costs and operating and maintenance costs. Engineering, legal and fiscal costs have not been included.

TABLE VIII  
ESTIMATED COSTS FOR ALTERNATE III

| <u>Facility or Operation</u>              | <u>Construction<br/>Cost</u> | <u>Annual<br/>Operating<br/>Maintenance Cost</u> |
|---|------------------------------|--|
| Lowlands Pump Stations<br>and Force Mains | \$ 880,000                   | 12,000   |
| Treatment Plant                           | 2,700,000                    | 270,000  |
| Storage Basin                             | 50,000                       | 500  |
| Spray Disposal<br>Facilities              | 1,350,000                    | 84,000   |
| Sludge Haul to SRVSA                      | <u>20,000</u>                | <u>8,500</u>                                     |
| TOTAL                                     | \$5,000,000                  | 375,000  |



## Comparison of Alternatives

The alternatives will be directly compared even though the design flow for Alternative II is somewhat greater than for Alternatives I and III. This direct comparison is made because there would not be an Alternative II if the extra flow (the Village of Pluckemin) was not added. There is further discussion on this topic in the Design Basis section.

The alternatives may be compared economically through the annualized Allan-Deane costs. These are:

- \$899,000 per year, for Alternative I;
- 672,000 per year, for Alternative-II;
- \$923,000 per year, for Alternative III.

The annualized costs do not include the costs for land, rights-of-way, engineering, legal or fiscal items. The amortization of construction costs was based on a 20-year period at a 9% interest rate. At lower interest rates or longer periods, the annualized differences between the alternatives would be even greater. On an annualized cost basis, Alternative II is the most economical.

The inclusion of land and rights-of-way costs is not expected to change the economic positions of the alternatives. Though Alternative II does have the greatest land and right-of-way needs it is believed that those costs will not override the current differential because most of Alternative II rights-of-way are in streets, waterway easements, or are in existence. The differential between Alternatives I and III will decrease since Alternative III would not incur any land or right-of-way costs. Economically then these alternatives are essentially equal.

A major consideration in the evaluation of the alternatives is their conservation of water, i.e. preserving their discharges for eventual reuse. The preservation of water supply sources is a major necessity in New Jersey. The effluent discharge of Alternative I will add an average daily flow of 0.85 mgd to the North Branch Raritan River, upstream of the planned Raritan Confluence Reservoir. This flow would thereby fractionally increase the dependable water supply yield of the basin. Even if the Confluence Reservoir was not built, several water supply intakes exist downstream of the outfall. Thus, Alternative I preserves water resources.

The effluent of Alternative II will enter the main stem of the Raritan River near Manville. Downstream of that point, the only water resource development being studied is the Crab Island Dam and Reservoir. The prospects of this project are reported to be in jeopardy. The project's purpose is to prevent salt water intrusion into aquifers in Middlesex County. Thus alternative II may also preserve the State's water resources but the possibility is not as positive, nor the quantity as much, as that provided by Alternative I.

Alternative III's effluent will enter the groundwater system. The ultimate destination of those groundwaters are multiple and not positively identifiable. They may however, on an optimistic basis, be assumed a totally available water resource.

Thus Alternatives I and III are about equal in the preservation of the State's water resources, whereas Alternative II is less productive in this aspect.

The impacts of Alternative I upon the North Branch Raritan River will be minimal. The effluent will be of high quality containing little oxygen demanding or nutrient constituents. The discussion on effluent criteria in the Alternative I section explicitly relates effluent quality to the existing river quality. The most adverse impact will be the ammonia addition, yet the added amount will be below concentrations toxic to aquatic life, and considerably below the 4.0 mg/l limit permitted by NJDEP for oxygen depletion effects. It is believed that the bio-stimulation effects of the ammonia would be minimal.

The impact on the main stem of the Raritan River by Alternative II is considered to be insignificant. The SRVSA treatment plant, through which the flow shall pass, is projected to handle about 15 mgd. Ongoing 201 studies for Somerset County may increase that projection. Current flows average about 8 mgd. The Allan-Deane-Pluckemin flows could be readily accommodated.

The impacts of Alternative III upon groundwater quality is expected to be minimal. There will be an increase in groundwater nitrate content, but the level of nitrates, even below the spray sites, will not exceed the potable water standard of 10 mg/l of nitrate-nitrogen. Beyond the spray sites the nitrates will decrease, though the magnitude of the decrease is not calculable, as a result of dilution.

In comparing the water quality impacts of the alternatives, the effects of flow volume must be considered. Alternative I will exert a slight adverse impact in the vicinity of its outfall. However, the increased flow it contributes will aid later in the downstream dilution of pollutants entering the river from non-point sources. Thus, in assessing adverse quality impacts on the receiving waters, Alternative II is the most favorable, but not significantly. Alternatives I and III are considered equal.

The impacts upon the land are most apparent for Alternative III. To construct the spray fields perhaps as much as 95 acres of mixed hardwood forest would have to be permanently cleared. This is esthetically undesirable. Alternative II would be the most disruptive to the local population. The construction of its sewers and force mains in the public roads would inconvenience local traffic and the residents along the alignment. Alternative I would require the clearing of a few acres along its outfall route. Its construction activity will not affect traffic since highway crossings will be done

by jacking pipelines underneath the road bed. Only a few homes lie along the outfall route so only a few people would experience brief construction activity.

Accordingly, the ranking of alternatives in order of increasing adverse land impacts, and judging permanent effects to be more significant than short-term effects, is Alternative I, Alternative II and Alternative III.

The final but, perhaps, most influential factor in comparing the alternatives is implementation. Common to all alternatives are implementation problems associated with the zoning and environmental aspects of the Allan-Deane development. The pertinent issues of these subjects are discussed in other reports.

Alternative I can be readily executed by the Allan-Deane Corporation after the required approvals are obtained. Alternative II, however, requires the participation of the Township of Bridgewater, and the acceptance of the Somerset Valley Regional Sewerage Authority. The latter has informally indicated its acceptance of the Allan-Deane-Pluckemin flow. The Township of Bridgewater has however declined, to date, to meet and negotiate a joint facility. Allegedly, this is because Bridgewater has already completed its contract documents for the Middlebrook Trunk Sewer and may believe it is more expeditious to proceed along. Even though the benefits of lower costs and improved reliability would be available to Bridgewater through a joint venture, our conclusion is that the community will not participate. Additionally, Alternative II has included the Pluckemin area in its concept. This inclusion requires the approval of the Township of Bedminster. The subject has not been presented to them since Bridgewater's acceptance of the concept is a pre-requisite. This alternative therefore can not be considered implementable.

Alternative III can also be readily executed by the Allan-Deane Corporation. However, New Jersey experience with spray disposal is limited and formal State regulations governing such facilities do not exist. It is expected that this absence of formal regulations would adversely affect the progress and implementation of this alternative.

Thus in comparing implementability Alternative I is the most implementable. Alternative III is next, whereas Alternative II must be considered non-implementable.

In weighing the advantages and disadvantages of the alternatives we conclude that Alternative I is most preferred. It is the most readily implementable, costs are favorable in comparison with Alternative III (the only other implementable option), it preserves water resources at slight adverse water quality impact, and is the least disruptive to the land.

APPENDIX "A"

'A Proposal For an Open Space Community'  
by Rahenkamp, Sochs, Wells and Associates  
February, 1976

A PROPOSAL FOR AN OPEN SPACE COMMUNI

The Allan-Deane Corporation

A PROPOSAL FOR AN OPEN SPACE COMMUNITY

A Report to the Bedminster Township Committee:

February, 1976

The Allan-Deane Corporation  
A Subsidiary of Johns-Manville Properties Corporation

Land Planners:

Rahenkamp Sachs Wells and Associates, Inc.  
Philadelphia, Pennsylvania

February, 1976

Bedminster Township Committee  
Somerset County  
New Jersey

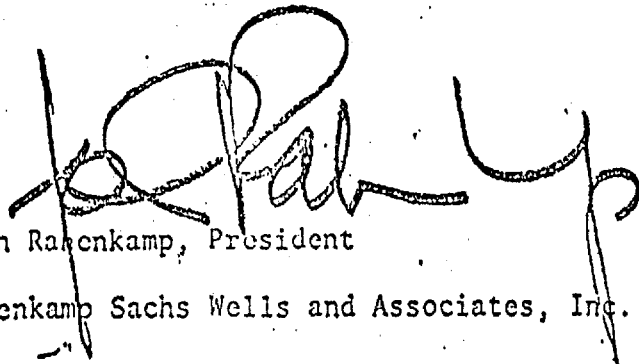
Dear Planning Board Members:

We are pleased to submit for your examination our land use plan for the Allan-Deane Corporation's proposed open space community. Throughout the planning effort we sought to design a community which will complement the existing natural amenities of the Township and which will equitably and logically meet the needs of residents of the area.

To this end, the plan presented here is a carefully considered response to the environmental conditions of the Allan-Deane site. Sensitive areas have been set aside as permanent open space, and every effort has been made to integrate the dwellings with the natural landscape, preserving visual and recreational amenities. This is achieved by building according to the natural capacities of the land, clustering dwellings to preserve open space, and planning in terms of neighborhoods with integrated recreation and non-motorized traffic networks.

The plan proposes a variety of dwelling types to meet the diverse needs of young couples, growing families, and retired couples whose children have left home. Because the price of housing in the proposed community will encompass a broader range than the usual subdivision, the proposed development will help meet the township's fair share requirements and do so in a way that encourages community quality. In addition provision has been made for convenience commercial to ensure a balance of land uses necessary to community life.

We look forward to working with you to create a community which will be an asset to Bedminster Township.



John Rahenkamp, President

Rahenkamp Sachs Wells and Associates, Inc.



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## COMMUNITY LOCATION

The 1532-acre site of the proposed open space community is located in the Somerset Hills of north central New Jersey, partly in Bernards Township (1071 acres) and partly in the Township of Bedminster (461 acres) at the headwaters of the Passaic River which flows through the Great Swamp National Wildlife Refuge as well as the headwaters of the Raritan River. The site is located less than one mile from the interchange of Interstate Routes 287 and 78 and is approximately 45 minutes from Manhattan. In addition, the Erie Lackawanna Railroad has two stations within Bernards Township providing commuter service to New York. The development pattern adjacent to the site is characterized by large residential lots and three areas of more intensive development - Pluckemin Center and Liberty Corners, which are developed with a mixture of single-family residences on small lots and various business uses, and the built-up residential area of Bridgewater Township south of Route 78. To the north of the site on Route 287 is the new A T & T long-lines facility, providing an additional 3500 jobs to the local economy.



1:50,000

WATER RESERVOIR

ARTIFICIAL HOUS

WATER MAIN  
TRUNK LINE

SEWAGE TREATMENT  
FACTORY

RAILWAY  
ELECTRICITY

INTERNATIONAL  
BOUNDARY LINE

SET

|                   |  |  |  |
|-------------------|--|--|--|
|                   |  |  |  |
| SHEET NO. 1       |  |  |  |
| COMMUNITY CONTACT |  |  |  |



## THE PROPOSED OPEN SPACE COMMUNITY

The proposed community was planned with several objectives in mind. The first objective is to respect the natural environment of the site, preserving the most sensitive areas as open space and determining the location and type of development most appropriate to the natural landscape. The second objective is to create a balanced community which meets the diverse needs of the regional housing market, including the need for low and moderate income opportunities. Accordingly, there will be a variety of housing types and prices: multi-family and single-family-attached dwellings for young couples and retired "empty-nesters", larger, single-family-attached and detached dwellings ranging from modest to luxurious to accommodate the full cycle of family growth. Thirdly, the plan seeks to create well-defined neighborhoods, with open space areas in close proximity to housing and convenient access to recreation opportunities as well as a network of bicycle and pedestrian paths.

### The Land Use Plan

The environmental conditions of the site suggest a design solution which utilizes clusters of development defined and connected by open space areas. This solution

not only responds to the dictates of the site's natural features but results in distinct, readily identifiable residential neighborhoods.

One neighborhood will be located on the open field between Pluckemin Center and the face of Watchung Mountain. With access to Washington Valley Road and Route 206, land uses in this section consist of single-family-attached and multi-family dwellings with two small neighborhood commercial sites near Pluckemin Center. A second neighborhood will be developed along a new north-south collector linking Washington Valley Road and Schley Mountain Road. Areas near the western face of the mountain will be devoted to large-lot, single-family dwellings, and the central area will be devoted to single-family-attached and multi-family dwellings. Single-family areas will be placed on the perimeter of the site to ensure compatibility with land uses adjacent to the site. At the center of this neighborhood will be a village center with a school site, convenience shops, and a site reserved for such institutional uses as a church or a YM-YWCA.

The third neighborhood of the proposed community will be oriented toward Somerville Road with single-family-attached and multi-family dwellings facing onto a wide open space corridor along the floodplain of the Dead River. To the west will be single-

family lots of low to medium density served by a system of culs-de-sac. A small hood commercial center has been located at the intersection of Somerville Road and Corner Road to meet convenience needs.

#### Open Space

The proposed community will have three major open space areas, which will be preserved. One area will include the face of Watchung Mountain, a significant feature of the region and will include the 64 acre historic Washington Campground. The second area, which is located on Mount Prospect Road, will be over a hundred in size and entirely covered with mixed deciduous forest. The third area will be the Dead River floodplain which is also extensively wooded. These major areas will be linked with smaller open space areas and corridors appropriate for the construction of pedestrian and bicycle paths.

#### On-Site Circulation

In order to achieve optimum traffic flow and maximum safety, the circulation system is composed of different types of streets which separate traffic according to its function. Collectors accommodate major through-site traffic with local roads providing access to the individual land use parcels. There will be no lotting along collector roads. family residential areas are served by culs-de-sac or loop roads which prevent through traffic and result in a quieter and safer street.

Implementation

It is proposed that the new community be constructed over a ten year building period. Legal implementation will be facilitated by drafting appropriate revisions to the Bedminster zoning ordinance with respect to the area involved.

ALLAN-DEANE CORPORATION OPEN SPACE COMMUNITY - TOTAL SITE

LAND USE SUMMARY TABULATIONS

| Land Use Category                                      | Acres          | % of Site    | Number of Dwelling Units |
|--|----------------|--------------|--------------------------|
| <b>Residential</b>                                     |                |              |                          |
| Single-family-detached,<br>low density (0.33 DU/AC)    | 260.3          | 17.0         | 72                       |
| Single-family-detached<br>moderate density (2.2 DU/AC) | 326.5          | 21.4         | 688                      |
| Single-family-attached,<br>low density (6 DU/AC)       | 28.2           | 1.8          | 169                      |
| Single-family attached,<br>moderate density (8 DU/AC)  | 125.7          | 8.2          | 1,005                    |
| Multi-family (14 DU/AC)                                | 193.6          | 12.6         | 2,703                    |
| <b>Residential - Subtotal</b>                          | <b>934.3</b>   | <b>61.0</b>  |                          |
| Commercial   | 28.2           | 1.8          |                          |
| Road R.O.W.  | 74.1           | 4.8          |                          |
| Village Center   | 11.0           | 0.7          |                          |
| School   | 36.6           | 2.4          |                          |
| <b>Open Space</b>                                      |                |              |                          |
| Park   | 118.0          |              |                          |
| Historic Site  | 64.4           |              |                          |
| Other Open Space                                       | 103.5          |              |                          |
| <b>Open Space - Subtotal</b>                           | <b>447.5</b>   | <b>29.3</b>  |                          |
| <b>Totals</b>  | <b>1,531.7</b> | <b>100.0</b> | <b>4,687</b>             |
| Average Gross Density 3.03 DU/AC                       |                |              |                          |



ALLAN-DEANE CORPORATION OPEN SPACE COMMUNITY - BEDMINSTER TOWNSHIP PORTION

LAND USE SUMMARY TABULATIONS

| Land Use Category                                       | Acres        | % of Site    | No. of Dwelling Units |
|---|--------------|--------------|-----------------------|
| <b>Residential</b>                                      |              |              |                       |
| Single-family-detached,<br>low density (0.33 DU/AC)     | 66.5         | 14.4         | 14                    |
| Single-family-detached,<br>moderate density (2.2 DU/AC) | 40.0         | 8.7          | 63                    |
| Single-family-attached,<br>low density (6 DU/AC)        | 28.2         | 6.1          | 169                   |
| Single-family-attached,<br>moderate density (8 DU/AC)   | 62.9         | 13.6         | 503                   |
| Multi-family (14 DU/AC)                                 | 66.7         | 14.5         | 933                   |
| Residential - Subtotal                                  | 264.3        | 57.3         |                       |
| Commercial  | 17.1         | 3.7          |                       |
| Road R.O.W.   | 11.7         | 2.6          |                       |
| <b>Open Space</b>                                       |              |              |                       |
| Historic Site   | 64.4         |              |                       |
| Other Open Space  | 103.5        |              |                       |
| Open Space - Subtotal                                   | 167.9        | 36.4         |                       |
| <b>Totals</b>   | <b>461.0</b> | <b>100.0</b> | <b>1,682</b>          |

Average Gross Density 3.65 DU/AC

## ENVIRONMENTAL ANALYSIS

An analysis of the site's natural environment was undertaken to serve as the basis for planning the proposed open space community. Bedrock, soil, water table, slope and vegetation conditions were examined with the objective of determining the capacity for development on each portion of the site. These conditions were mapped at a scale of 1"=400' and reproductions of these maps are included within this report.

### Geology

There are two rock formations on the site: soft red shale with interbedded sands (Brunswick Formation - Triassic), and basalt flows of fine-grained trap rock (New Group - Triassic). The latter is characteristic of the Watchung Mountains. Approximately 90 percent of the site is underlain with basaltic rock varying in depth from 3½ to 4½ feet and the remaining 10 percent of the site (near Liberty Corners) is underlain with shale varying in depth from 1½ to 3½ feet. The shale is soft and can be ripped to depths of 3 feet where it has expanded along fractures or crumbles on bedding planes. The basalt bedrock is fractured in places to a depth of about 10

feet, which can be worked, but with somewhat greater difficulty. These conditions generally are not suitable for septic systems and for this reason septic systems are not contemplated for this development proposal. The use of a low-pressure waste water collection system, one of the alternatives being studied, would reduce the need for extensive bedrock removal.

### Hydrology

The site does not contain any aquifers which would be a significant source of water nor does it have any potential aquifer recharge areas. There are existing wells near the site, but since septic systems are not contemplated, there is little risk of affecting these water sources. We anticipate that water for the proposed community will be obtained from public water supply.

On-site investigations have identified two types of streams on the site. One type is characterized by well-defined channels (indicated by solid lines on the Geology-Hydrology Map); the second type are underground seeps (indicated by dash lines on the map). Floodplains and wetlands associated with both types of water courses have been identified and are proposed for conservation as open space.

As important topographic as well as hydrologic feature of the site is the boundary between the Raritan River and Passaic River Watersheds, with the site occupying a position in the headwaters of both watersheds. Because the site generally slopes downward in all directions from the center, storm water retention devices are proposed in perimeter locations to prevent increased runoff.

### Slope Conditions

The site, which is located in the Second Watchung Mountains contains some steep slopes, primarily along the face of the basaltic outflow on the western portion of the site. Slope conditions have been mapped on 2-foot contour intervals with areas of more than 20 percent slope being restricted from development. Limited development can be accommodated on areas with 15 to 20 percent slopes and more intensive development has been clustered on slopes of less than 15 percent. Initial investigation and on-site inspection with Soil Conservation Service representatives indicated that the soils are not particularly erodible, but in some locations sediment catch basins are proposed.

### Soils

Several soil types are found on the site with some soil associations exhibiting mixed characteristics. Floodplains and soils subject to frequent flooding occupy small areas, largely in the northeast corner of the site. Another category shown on the soils map identifies soils subject to moderate-to-slight flooding or seasonal high water table from 0 to 1 foot. These areas are unsuitable for construction and have been designated as restricted. Other areas of the site exhibit mixed

PARAMETER

STANDARD

GUIDELINE

COMMENTS

Turbidity and Color

the combined effect of color and turbidity not change the compensation point more than 10 per cent from its seasonally established norm. such a change should not place more than 10 percent of the biomass of photosynthetic organisms below the compensation point. Until the compensation point is determined the turbidity standard shall be 0-5 JTU or 0-5 FTU<sup>2</sup>. If a compensation point does not exist, the turbidity standard shall be 0-5 JTU or 0-5 FTU and the color standard shall 0-30 pcu.

The standard for color and turbidity in terms of compensation point is a United States Environmental Protection Agency criterion.

The interim standards ensure that existing stream quality will not be degraded.

Filtration Residue

0-225 mg/l

State of New Jersey FW-2 surface water quality standard: 500 mg/l or 1/3 above natural characteristic levels, whichever is less. characteristic levels generally appears to be equal to or less than 170 mg/l in the North Branch of the Raritan River.

| <u>PARAMETER</u>                | <u>STANDARD</u>   | <u>GUIDELINE</u> | <u>COMMENTS</u>   |
|---------------------------------|---|------------------|---|
| Biochemical oxygen demand (BOD) | The BOD level of the discharge should be below the level which would reduce oxygen concentrations in the receiving waters to below the oxygen concentration listed above under proposed discharge standards. A minimum of 90% reduction of BOD must be achieved. In no case shall the arithmetic mean of the values for effluent samples collected in a period of 30 consecutive days exceed 30 mg/l nor shall the arithmetic mean of the values for effluent |                  | United States Environmental Protection Agency criterion for dissolved oxygen <sup>b</sup> . |
| Residual Chlorine               | 0-0.003 mg/l. As an exception, concentrations not to exceed 0.05 mg/l for a period of up to 30 minutes in any 24 hour period are permitted.   |                  | United States Environmental Protection Agency criterion <sup>b</sup> .                      |
| Hydrogen Sulfide                | 0-0.002 mg/l  |                  | United States Environmental Protection Agency criterion <sup>b</sup> .                      |
| Ammonia - N                     | Levels of un-ionized ammonia in water should not exceed 0.05% of the 96-hour lethal concentration (LC <sub>50</sub> , median) values. LC <sub>50</sub> values should be determined using the receiving water and the most sensitive species in the locality. The limit should never exceed 0.02 mg/l.   |                  | United States Environmental Protection Agency criterion <sup>b</sup> .                      |

| <u>PARAMETER</u>      | <u>STANDARD</u>  | <u>GUIDELINE</u>   | <u>COMMENTS</u>   |
|-----------------------|--|--------------------|---|
| Nonfiltrable Residue  | 0-80 mg/1  | 0-10 mg/1          | Existing water quality should not be degraded <sup>c</sup> .  |
| Total Phosphorus as P | 0-0.05 mg/1  |                    | United States Environmental Protection Agency criterion <sup>b</sup> .  |
| Inorganic Nitrogen    | 1 mg/1   | 0-0.3 mg/1         | 0.3 mg/1 "is considered a first approximation in the establishment of water-quality standards for preventing eutrophication" <sup>d</sup> . |
| Nitrite - Nitrogen    |  | 0-0.02 mg/1        | Existing stream quality should not be degraded <sup>c</sup> .   |
| Chloride              |  | 0-20 mg/1          | Existing stream quality should not be degraded <sup>c</sup> .   |
| Total Sulfides        | 0-0.002 mg/1   |                    | United States Environmental Protection Agency criterion <sup>b</sup> .  |
| Sulfate               | 0-250 mg/1 presently existing levels, which ever is lower. |                    | United States Environmental Protection Agency potable water criterion <sup>b</sup> ; Existing water quality should not be degraded.         |
| Arsenic               | 0-0.05 mg/1  | N.J. Surface Water | United States Environmental Protection Agency potable water criterion <sup>b</sup> .  |
| Barium                | 0-1 mg/1   |                    | United States Environmental Protection Agency potable water criterion <sup>b</sup> .  |
| Boron                 | 0-1 mg/1   |                    | United States Environmental Protection Agency potable water criterion <sup>b</sup> .  |



| <u>PARAMETER</u>    | <u>STANDARD</u>  | <u>GUIDELINE</u>  | <u>COMMENTS</u>   |
|---------------------|--|---|---|
| Cadmium             | 0-0.0004 mg/l  |   | United States Environmental Protection Agency criterion for soft water <sup>b</sup> .   |
| Chromium            | 0-0.05 mg/l  |   | United States Environmental Protection Agency criterion <sup>c</sup> .  |
| Copper              | Copper concentrations should not exceed one-twentieth the 96 hour LC <sub>50</sub> value. The LC <sub>50</sub> value should be determined on the most sensitive local species using the receiving water. | Until the LC <sub>50</sub> value is determined the copper concentration shall not exceed 0.02 mg/l. | United States Environmental Protection Agency criterion <sup>b</sup> . The interim maximum value of 0.02 mg/l was suggested by Mandia <sup>f</sup> .                            |
| Iron                |  | 0-.05 mg/l  | Iron concentrations of 0.3 mg/l or greater can be hazardous to fresh water biota and wild-life concentrations less than 0.05 seem to present little or no hazard <sup>g</sup> . |
| Sodium              |  | 0-10 mg/l   | Existing stream quality should not be degraded <sup>c</sup> .   |
| Lead                | 0-0.03 mg/l  |   | United States Environmental Protection Agency criterion <sup>b</sup> .  |
| Manganese           | 0-0.05 mg/l  |   | United States Environmental Protection Agency potable water criterion <sup>b</sup> .  |
| Mercury (Inorganic) | 0-0.2 ug/l or .0002 mg   |   | United States Environmental Protection Agency criterion <sup>b</sup> .  |

| <u>PARAMETER</u>           | <u>STANDARD</u>   | <u>GUIDELINE</u>  | <u>COMMENTS</u>  |
|----------------------------|---|---|--|
| Nickel                     | Nickel levels should not exceed 0.02% of the 96-hour LC <sub>50</sub> value. The LC <sub>50</sub> value should be determined using the receiving water and the most sensitive local species.                                      |   | United States Environmental Protection Agency criterion <sup>b</sup> .               |
| Selenium                   | 0-0.01 mg/l   |   | United States Environmental Protection Agency potable water criterion <sup>b</sup> . |
| Silver                     | 0-0.05 mg/l   |   | United States Environmental Protection Agency potable water criterion <sup>b</sup> . |
| Zinc                       | Concentrations of zinc should not exceed 0.005% of the 96 hour LC <sub>50</sub> value for most sensitive local organisms. The LC <sub>50</sub> value should be determined using the receiving water.                              |   | United States Environmental Protection Agency criterion <sup>b</sup> .               |
| Cyanide                    | Cyanides in water should not exceed .05 percent of the 96 - hour LC <sub>50</sub> value determined by using the receiving water in question and the most sensitive species in the area in both static and flow-through bioassays. | Concentrations of cyanide should not exceed 0.005 mg/l at any time. | United States Environmental Protection Agency criterion <sup>b</sup> .               |
| Carbon Adsorbable Organics | 0-0.3 mg/l carbon - chloroform extract and 0-1.5 mg/l carbon - alcohol extract.   |   | United States Environmental Protection Agency potable water criterion <sup>b</sup> . |

PARAMETERSTANDARDGUIDELINECOMMENTS

Organic

Linear alkylate sulfonates should not exceed .05 per cent of the 96-hour LC<sub>50</sub> value determined using the receiving water in question and the most sensitive species in the areas. Concentrations should never exceed 0.2 mg/l. Methylene blue active substances should not exceed 0.5 mg/l. There should be no visible oil on water surfaces, concentrations of emulsified oils should not exceed .05 per cent of the 96-hour LC<sub>50</sub> value determined using the receiving water in question and the most sensitive species in the area; and concentrations of hexane extractable substances in air dried sediments should not exceed 1000 mg/kilogram on a dry weight basis. Phthalate esters should not exceed .3 micrograms per liter.

United States Environmental Protection Agency criterion<sup>b</sup>.

The maximum value of 0.5 mg/l for methylene blue active substances is an United States Environmental Protection Agency criterion for potable water<sup>b</sup>.

Pesticides

For pesticides on which toxicity data are not available, acceptable concentrations in water should not exceed .01 percent of the 96-hour LC<sub>50</sub> value determined using the receiving water in question and the most sensitive species in the area. In no instance should the level of organophosphorus and carbamate insecticides exceed 0.1 mg/l.

United States Environmental Protection Agency criterion<sup>b</sup>. The maximum value of 0.1 mg/l for organophosphorus and carbamate insecticides is a United States Environmental Protection Agency potable water criterion<sup>b,c</sup>. Lethal Concentration per 50 mg of body weight for 96 hours.

PARAMETERSTANDARDGUIDELINECOMMENT

Pesticides  
(continued)

Recommended permissible limits  
for organo-chlorines are as  
follows:

Aldrin should not exceed .01  
micrograms per liter; DDT,  
.002 micrograms per liter;  
TDE, .006 micrograms per  
liter; Dieldrin, .005  
micrograms per liter;  
Chlordane, .04 micro-  
grams per liter; Endo-  
sulfan, .003 micrograms  
per liter; Endrin, .002 micro-  
grams per liter; Heptachlor,  
.01 micrograms per liter;  
Lindane, .02 micrograms  
per liter; Methoxychlor,  
.005 micrograms per liter;  
and Toxaphene, .01 micro-  
grams per liter.

EPA's recommended maximum  
concentrations for organo-  
phosphates are as follows:

Azinphosmethyl should not  
exceed .001 micrograms per  
liter; Clodrin, .1 micro-  
grams per liter; Coumaphos,  
.001 micrograms per liter; Diazinon,  
.009 micrograms per liter;  
Dichlorvos, .001 micro-  
grams per liter; Dioxathion,  
.09 micrograms per liter;  
Disulfoton, .05 micro-  
grams per liter; and Dursban,  
.001 micrograms per liter.

Ethion, .02 micrograms per liter;  
EPN, .06 micrograms per liter;

PARAMETER

STANDARD

GUIDELINE

COMMENT

Pesticides  
(continued)

Fenthion, .006 micrograms per liter; Malathion, .008 micrograms per liter; Mevinphos, .002 micrograms per liter; Naled, .004 micrograms per liter; Oxygmenton Methyl, .4 micrograms per liter; Phosphamindon, .03 micrograms per liter; Parathion, .001 micrograms per liter; TEPP, .3 micrograms per liter; and Trichlorophon, .002 micrograms per liter.

For carbamates, a limit of .02 micrograms per liter for carbaryl and of .1 micrograms per liter for zectran.

Herbicides, Fungicides,  
and defoliants

Aminotriazole should not exceed 300 micrograms per liter; Dalapon, 110 micrograms per liter; Dicamba, .2 micrograms per liter; Dichlobenil, 37 micrograms per liter; Dichlone, .7 micrograms per liter; Diquat, .5 micrograms per liter; and Diuron, 1.6 micrograms per liter;

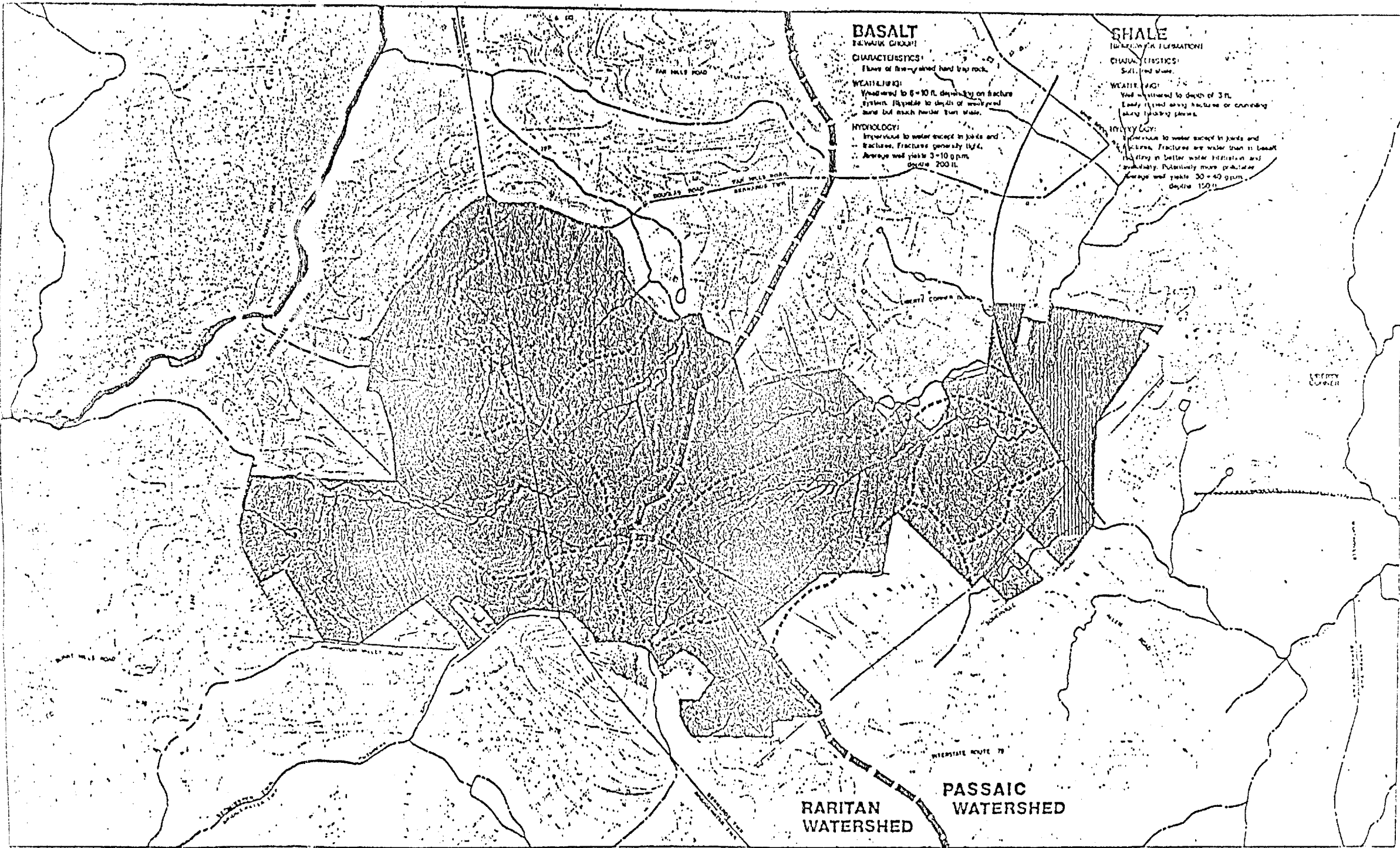
2-4,D (BBE), 4 micrograms per liter; Fenac (sodium salt),

United States Environmental Protection Agency criterion<sup>b</sup>

The standard of 2ug/l for 2, 4, 5, T is a United States Environmental Protection Agency criterion for potable water<sup>b, c</sup>.

| <u>PARAMETER</u>                  | <u>STANDARD</u>  | <u>GUIDELINE</u>                            | <u>COMMENTS</u>   |
|-----------------------------------|--|---|---|
|                                   | 45 micrograms per liter; Silvex (OBE), 2.5 micrograms per liter; Silvex (PGDE), 2 micrograms per liter; and Silvex (potassium salt), 10 micrograms per liter; 2, 4, 5 T, 2 micrograms per liter. |   |   |
| Polychlorinated Biphenyls (PCB's) | Polychlorinated biphenyls should not exceed 0.002 ug/l.  |   | United States Environmental Protection Agency criterion <sup>b</sup> .  |
| Phenols                           | 0.05 percent of the 96-hour LC <sub>50</sub> determined by using most sensitive important species as a test organism. Concentrations should never exceed .1 mg/l.                                |   | United States Environmental Protection Agency criterion <sup>b</sup> .  |
| Oil and Grease                    | Zero, must be absent   | For purpose of measurement less than 1 mg/l | United States Environmental Protection Agency criterion for oil and grease states that oil and grease should be essentially absent from raw water. A reasonable lowest limit which can be measured precisely and accurately by standard method number 137 <sup>n</sup> is 1 mg/l. |
| Taste and Odor                    | Fair or good. Odor should never exceed a threshold odor number of 3.   |   | When the threshold odor number exceeds 3, the odor of water is likely to be objectionable to most people <sup>1</sup> .   |
| Fecal Coliform                    | 200/100 ml (MPN)   |   | State of New Jersey FW-2 water quality standard.  |





**BASALT**

BEAVER CREEK

**CHARACTERISTICS:**

Flows of fine-grained hard trap rock.

**WEATHERING:**

Weathered to 6-10 ft. depth by fracture system. (Up to 10 ft. of weathered zone but much harder than water.)

**HYDROLOGY:**

Impervious to water except in joints and fractures. Fractures generally 1/4 in. Average well yields 3-10 gpm. Depth 200 ft.

**SHALE**

BEAVER CREEK FORMATION

**CHARACTERISTICS:**

Soft red shale.

**WEATHERING:**

Well weathered to depth of 3 ft. Easily eroded along fracture or channeling along existing planes.

**HYDROLOGY:**

Impervious to water except in joints and fractures. Fractures are wider than in basalt. Fractures in better water infiltration and availability. Potentially more productive. Average well yields 30-40 gpm. Depth 150 ft.

- 12/4/70
- BASALT BEDROCK
- SHALE BEDROCK
- WATERSHED DIVIDES IN BASALT
- STREAM CHANNELS
- FLOODPLAIN SOILS

RARITAN WATERSHED

PASSAIC WATERSHED

ALLEN IN THE FIELD

HYDROLOGY & GEOLOGY

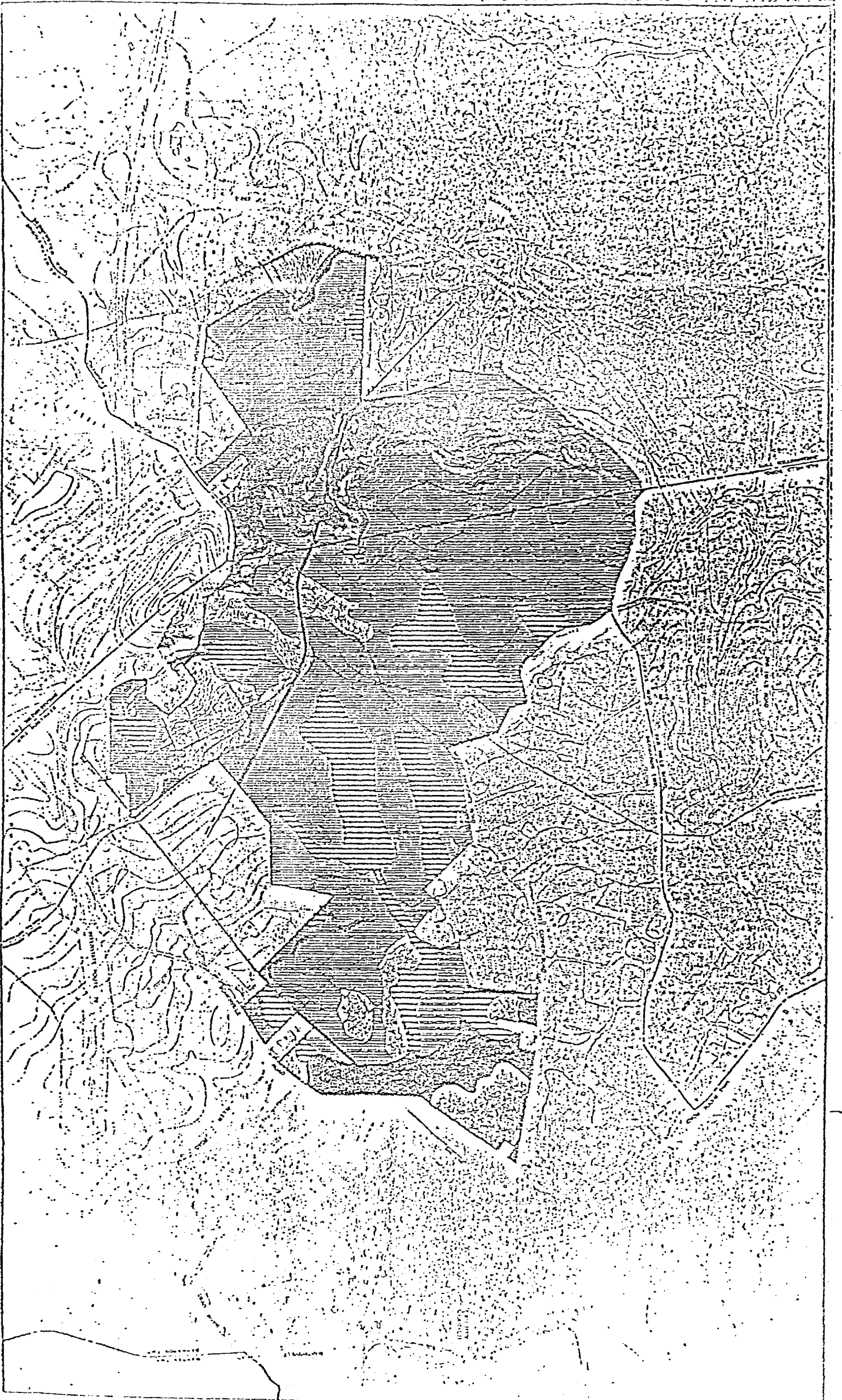
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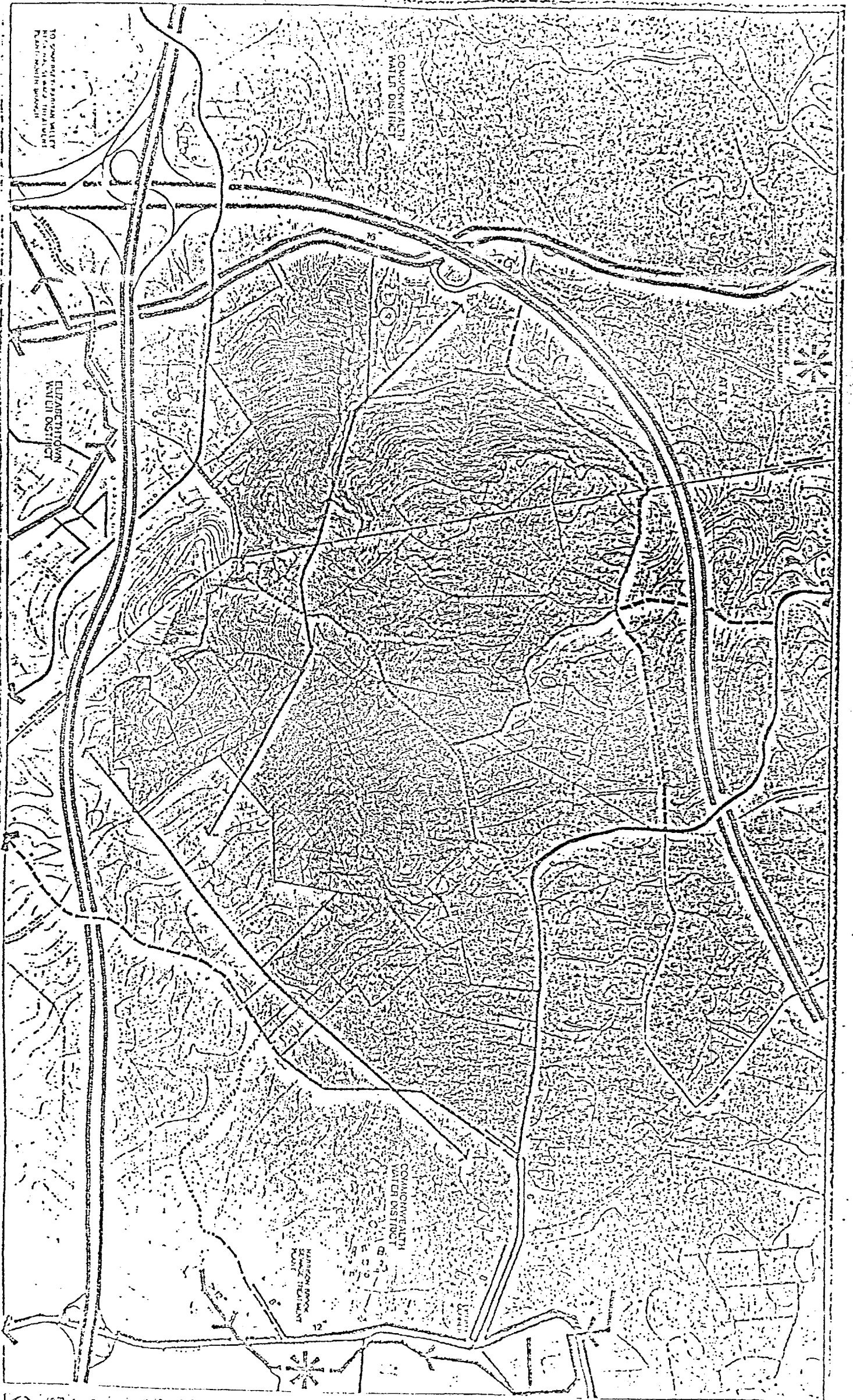
## PHYSICAL SYSTEMS

Detailed engineering studies have been undertaken of the physical systems which will serve the proposed community - traffic, water supply, wastewater treatment, and storm-water control. The objective of these studies is to identify the project impacts and to propose solutions which will minimize these impacts on the township.

### Roads and Traffic

Located at the interchange of Interstate 78 (an east-west route from New York City to northern Pennsylvania) and Interchange 287 (a circumferential highway around the New York Metropolitan Region), the site has excellent access to the region. Furthermore, U.S. Route 206, a north-south highway, provides additional access along the western edge of the site.

Initial traffic engineering studies suggest that in order to effectively facilitate traffic flow between the proposed community and the regional highway network linking employment and shopping centers, it will be necessary to improve certain roads and intersections. Staged intersection improvements will assist in the control of turn-



TO OBTAIN INFORMATION RELATIVE  
TO THIS MAP, CONTACT THE  
Public Health Bureau

ELIZABETHTOWN  
MAINTENANCE DISTRICT

COMMONWEALTH  
MASSACHUSETTS

COMMONWEALTH  
MASSACHUSETTS

WAIKENA  
MAINTENANCE DISTRICT

U.S. GEOLOGICAL SURVEY  
WATER RESOURCES DIVISION  
Topographic Map

Scale: 1:25,000

Vertical Datum: Mean Sea Level

Horizontal Datum: NAD 83

Projection: UTM Zone 18N

Map Date: 1988

Sheet No. 1 of 1

ES&S

MAINTENANCE DISTRICT

LOCAL ROAD

LOCAL HIGHWAY

STATE ROAD

STATE HIGHWAY

RAILROAD

WATER LINE

WATER TREATMENT PLANT

WATER TOWER

WATER RESERVOIR

WATER PUMP

WATER CONDUIT

WATER TUNNEL

WATER POND

WATER CISTERN

WATER TANK

WATER SUMP

WATER DRAIN

WATER DITCH

WATER GULLY

WATER CHANNEL

WATER RIVER

WATER STREAM

WATER BROOK

WATER CREEK

WATER FALL

WATER RAPIDS

WATER WEIR

WATER DAM

WATER LOCK

WATER GATE

WATER VALVE

WATER PIPE

WATER CULVERT

WATER BOX

WATER STRUCTURE

WATER FACILITY

WATER EQUIPMENT

WATER SYSTEM

WATER NETWORK

WATER INFRASTRUCTURE

WATER UTILITY

WATER SERVICE

WATER CONNECTION

WATER INTERSECTION

WATER JUNCTION

WATER CROSSING

WATER OVERPASS

WATER UNDERPASS

WATER TRESTLE

WATER BRIDGE

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WATER TANK

WATER RESERVOIR

WATER POND

WATER CISTERN

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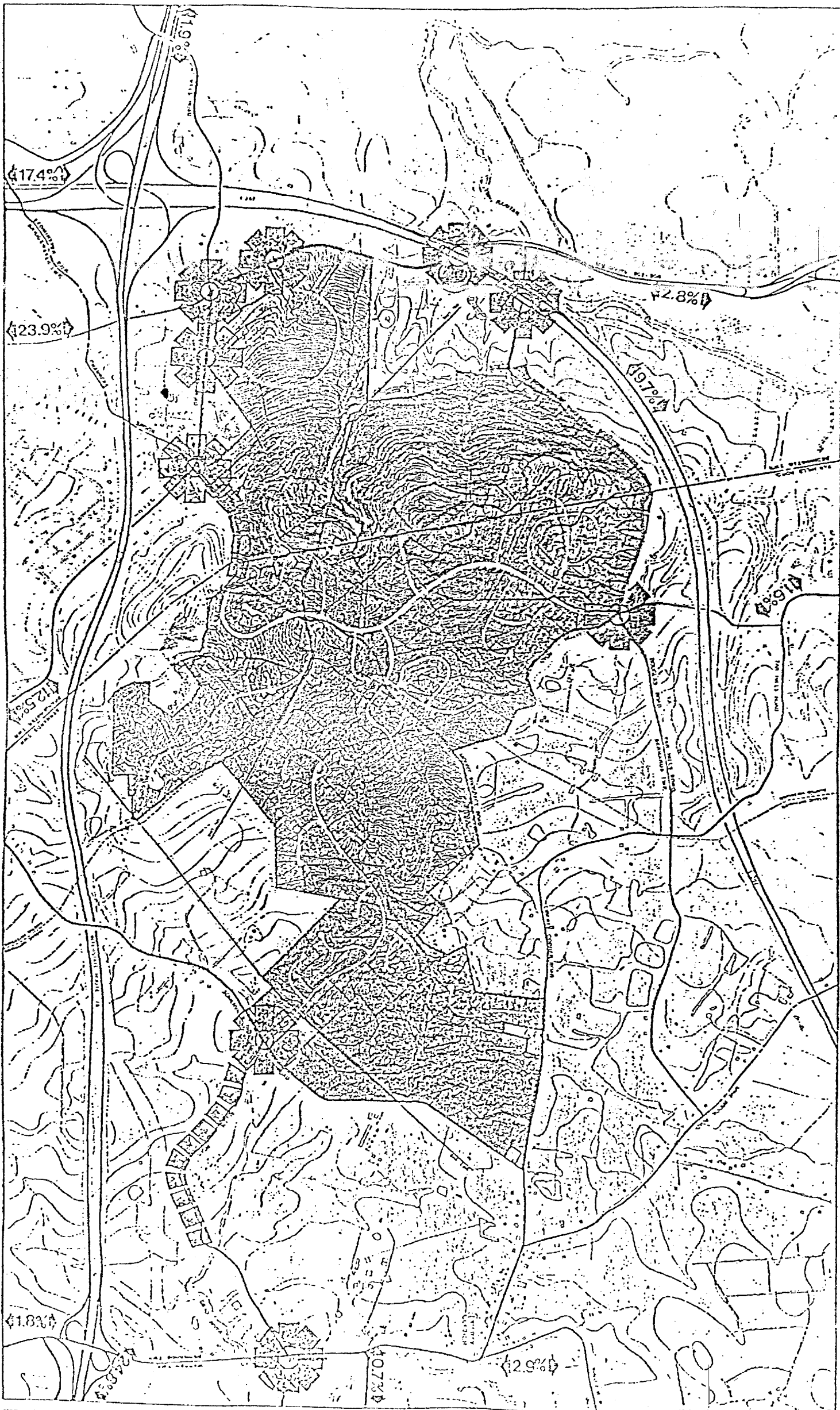
WATER OVERPASS

WATER UNDERPASS

WATER TRESTLE

WATER BRIDGE





U.S. GEOLOGICAL SURVEY  
 WASHINGTON, D. C.  
 DIVISION OF GEOLOGICAL ENGINEERING AND HYDROLOGICAL INVESTIGATION

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