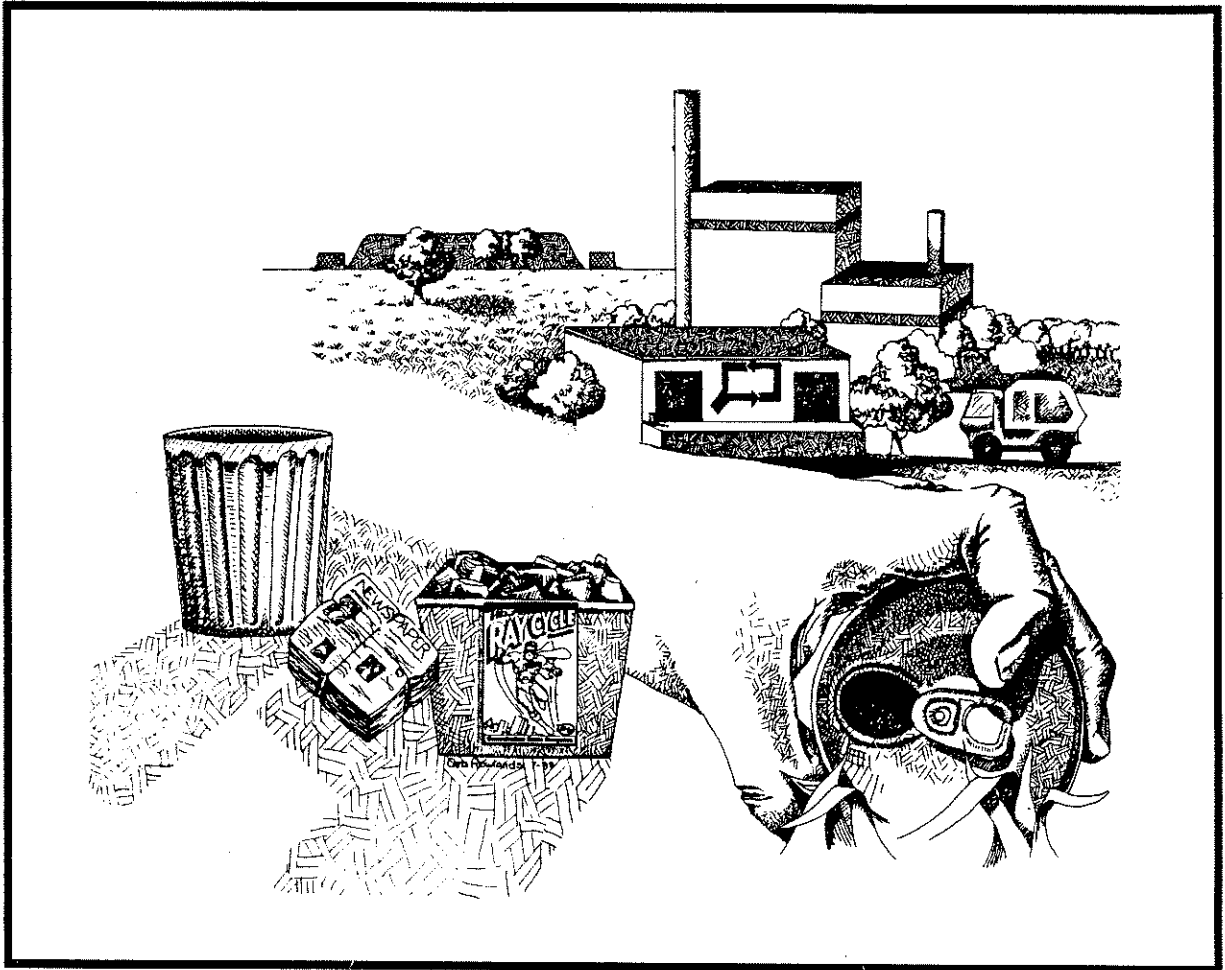


**IDENTIFICATION OF POTENTIAL ASH RESIDUE DISPOSAL SITES**

**PREPARED PURSUANT TO PUBLIC ACT 88-352**

**SUBMITTED TO THE CONNECTICUT GENERAL ASSEMBLY**



**JANUARY 1989**

**State of Connecticut  
Department of Environmental Protection  
Leslie Carothers, Commissioner**

## INTRODUCTION

Connecticut's proposed Solid Waste Management Plan calls for a blend of source reduction, recycling, resource recovery, and landfilling to meet the goal of environmentally sound disposal of municipal solid waste. As the waste to energy incineration component has moved forward, it has become clear that providing well-sited and engineered land disposal facilities for incinerator ash is one of the remaining challenges in implementing the plan. Landfills now permitted for ash have only a fraction of the capacity required to meet land disposal demands for the next twenty years. Identification, development, and permitting must begin now if reliance on costly and uncertain out-of-state disposal is to be avoided.

Recognizing this, the General Assembly enacted legislation in 1988 requiring the Department of Environmental Protection to add to the required state solid waste management plan a report on the estimated landfill capacity required for incinerator ash annually and for a twenty-year period. The law also directs the Department to estimate the number of landfills needed to dispose of these wastes. These estimates are also required for landfilling of bulky waste. That topic will be addressed in the final solid waste management plan to be issued in February, 1989.

To prepare this assessment, the Department developed detailed siting criteria for ash disposal sites. These criteria were proposed for public comment in the draft Solid Waste Management Plan issued in September, 1988. These screening criteria have been applied by the Department to all of Connecticut's undeveloped land to identify sites that might be candidates for development of ash disposal facilities.

This report briefly describes the characteristics and quantities of the ash to be landfilled and the four stage screening process used to identify candidate sites. It lists the sites screened and describes those found to be most suitable for consideration for ash disposal based on the siting criteria.

It should be stressed that no on-site investigations were conducted. It cannot be assumed that every candidate site identified could meet all of the Department's permitting standards if more detailed technical evaluations are performed. The report should demonstrate, however, that there is likely to be sufficient capacity to manage the ash from Connecticut's resource recovery plants in an environmentally sound setting within the state.

## ASH RESIDUE

Ash residue is the term used to describe the residual material left after the combustion of mixed municipal solid waste at a resource recovery facility or a municipal solid waste incinerator. The ash residue consists of bottom ash from the burning chamber and the fly ash which is more properly termed air pollution control residue. The latter consists of the material caught by air pollution control processes and the treatment materials themselves, predominantly lime. The ash is normally wet from quenching, has no odor, and contains no material that will attract birds or vermin. When disposed, it tends to form a rock-like material.

### *Ash Residue Disposal Capacity Needs*

The Department has calculated that on an *annual* basis, the ash residue disposal need will be for 830,375 tons based on the projected resource recovery capacity of 2,075,390 tons per year of mixed municipal waste. Analysis of the volume of ash relative to the weight and the amount of cover material and liners needed for landfilling, produces a weight to landfill capacity ratio of 1:1.4. This means that every ton of ash residue, nominally dewatered, plus cover and liner will consume 1.4 cubic yards of space. This means that the 830,375 tons per year of ash residue generated will require 1,162,525 cubic yards or 10 to 15 acres of landfill space each year. Over a twenty year period, the estimated space needed is 250 acres to handle 24 million cubic yards.

The Department hopes to reduce reliance on land disposal in the coming years as methods of recycling or reusing ash residue are developed. Studies at the Environmental Research Institute at the University of Connecticut, as well as New York, are investigating the prospects and methods for ash reuse. The Environmental Research Institute will also be evaluating the effects of removal of different waste products from the waste stream on the resulting ash residue quality and subsequently how these changes relate to its reuse. These studies may lead to changes in disposal techniques.

Tables 1 and 2 provide statistics on resource recovery facility capacity, ash residue generation and the location and capacity of existing disposal sites.

Table 1. Ash residue production.

Resource Recovery Facility	Ave. Daily Throughput Tons/Day	Ash Production Tons/Day*	Ash Production Tons/Year**	Space Needed CuYds/Year
Hartford	1,578	631	230,315	322,441
Bridgeport	1,800	720	262,800	367,920
Bristol	463	186	67,890	95,046
Wallingford	329	132	48,180	67,452
Windham	71	28	10,220	14,308
Projected Projects	1,445	578	210,970	295,358
<b>Total</b>	<b>5,686</b>	<b>2,275</b>	<b>830,375</b>	<b>1,162,525</b>

\* 60% Minimum Weight Reduction

\*\* 1 ton of ash = 1.4 cubic yards of capacity

Table 2. Current ash residue disposal sites and capacities.

Resource Recovery Facility	Current Disposal Site	Capacity (Cubic Yards)
Hartford	Hartford Landfill	1.50 million
Bridgeport	Shelton CRRA Landfill	0.07 million
Bristol	Bristol Landfill	0.25 million
Wallingford	Wallingford Landfill	0.25 million
Windham	Windham Landfill	1.50 million

*Environmental Concerns Of Ash Residue Disposal*

Incinerator ash contains metals, which do not burn and are toxic. Without proper management, there is a risk that land disposal of ash could result in pollution of ground or surface waters by leachate containing metals such as lead and cadmium. Although the early results of leachate sampling at one ash landfill in Connecticut do not indicate a severe leachate problem, the Department of Environmental Protection is adopting stringent siting and engineering controls for land disposal of incinerator ash to ensure the protection of public health and the environment.

The proposed ash residue disposal rule calls for the following controls on the siting, design, and management of ash disposal sites:

- \* All sites must be located in areas where ground water is, or can be classified as GC. This means the sites must be located in areas where hydrogeologic conditions exist which could be utilized as part of a waste treatment process and where development of a public water supply is unlikely due to low yield potential.
- \* All disposal must be in monofills (ash only), with interim and final monitoring, and adequate on-site storage facilities.
- \* All new sites, and following a design and construction interim, all existing sites must have composite liner and leachate collection, monitoring and treatment systems.
- \* Modeling must demonstrate that in the event of complete liner failure, no water supply wells will be impacted, and no degradation or aquatic toxicity will occur in the adjacent Class B surface water body.
- \* Complete administrative, permitting, monitoring, closure, post-closure and detailed technical provisions are provided.
- \* All existing requirements of the state's water quality management program must be met.

The public hearing on these proposed ash residue disposal regulations is set for March 10th, 1989.

## ASH RESIDUE DISPOSAL SITE IDENTIFICATION

### *Siting Review Matrix*

The proposed Solid Waste Management Plan provides a matrix and screening process to examine the natural and cultural features of the entire land area of the State to determine the best potential locations for ash residue disposal sites. The proposed matrix was put into use by the Department while the Plan hearing process was underway, with the recognition that some adjustment to the selection process would be needed depending on the public input and further Department evaluation. Table 3 presents the matrix criteria and the four levels of review factors.

Table 3. Ash residue siting review matrix.

CRITERIA	LEVEL I	LEVEL II	LEVEL III	LEVEL IV
HYDROGEOLOGY	Classified as potentially suitable for GC ground waters. Adjacent to Class B waterbodies. Has significant overburden on bedrock.	Has suitable depth and distribution fine grained sediments. Limited potential for development of water supply on parcel. Meets minimum surface water dilution criteria.	No potential for discharges to significant minor streams.	Adequate loading capacity in surface waters. Analyze allocation of available surface water loading capacity. Potential yield of local stratified drift. Actual ground water quality.
SITE SPECIFICS	Sites which are 10 acres or greater. Has gradual slopes.	Does not overfill known mixed waste sites.	Has greater than 10 acres of useable area.	Has greater than 1 million cubic yard capacity or Active landfilling operation.
ENVIRONMENT	Outside annual floodplain.	Has minimal wetlands.	Outside of 100 year floodway and floodway fringe.	Considered: Conservation areas. Wildlife management areas. Endangered or protected species. Present or future need for use as potential water supply.
AREA LANDUSE	Undeveloped areas meeting all criteria except GC classification. Landfills with potential capacity.	Public and private wells will not be impacted by leachate leakage. Avoids infringing on housing (or other landuse conflicts).	Mapping accurately reflects current development.	Considered: Site visibility and proximity of development. Proximity to railroad or to State roads. Known point and non-point source discharges in the area. Short-term mixed waste capacity needs. Historical areas.

During the public hearing process on the proposed Solid Waste Management Plan, concerns with the criteria for siting ash residue disposal areas adjacent to rivers, the proximity of sites to residences, and the site slope requirements were expressed. Although each of these concerns is addressed by the matrix criteria, further discussion is warranted.

*Concerns About Proximity of Disposal Sites to Rivers:* The matrix forces consideration of the State's hydrogeology and the water quality standards when reviewing potential sites. Both of these factors play a role in considering sites adjacent to rivers. The hydrogeologic conditions, in fact, mandate locations near rivers as the only acceptable areas. In Connecticut, ground water usually flows in a direction that parallels the gradient of surface topography and ultimately discharges to surface water bodies such as streams, lakes and ponds. In areas immediately adjacent to rivers the path that ground water flows is very short but in upland areas, removed from streams, ground water flows for greater distances before discharging to a watercourse. Therefore, in upland areas there is a much greater chance that ground water from a potential source of pollution will enter the fractured bedrock, contaminate a large body of ground water and be intercepted by a water supply well before discharging to a surface watercourse. To prevent this from happening, it is very important that such sources be located in areas where the ground water flow system is well defined, understood, and is short and controllable. The only areas meeting these conditions are stratified drift areas adjacent to major rivers.

The matrix also takes into consideration that some stratified drift deposits, those for which the saturated zone is predominantly coarse-grained sands and gravels, have the capacity to yield large amounts of water. These deposits are potential water supply aquifers and are considered a potential resource which should be protected. The matrix, while focussing on sites adjacent to major rivers, eliminates from consideration those areas that are a potential drinking water resource.

In addition, disposal sites must be associated with streams and rivers which can assimilate any waste which may reach them without causing adverse water quality impacts. The surface water quality standards effectively limit discharges of any wastewater to streams with a goal of Class B or Class SB and preclude discharges of wastewater to high quality rivers and streams and to streams that have flows that are too low to allow assimilation of wastes without causing degradation. The State has 8,400 stream miles of which 880 are classified as major river miles and less than 500 miles of these can support waste discharge of any sort (Class B or SB). The water quality goal for these Class B and SB rivers are set to maintain them as fishable and swimmable waters. Any discharge, including any potential discharge from ash residue disposal sites, must not prevent the attainment of that goal.

*Concerns about Proximity to Residences:* The matrix considers land uses in all four levels of review, requiring first that the area be undeveloped or adjacent to a current landfill. At the second level it requires the sites to be distant from public and private wells and avoid encroachment on housing. At the third level it re-examines current development determined through on-site visits. At the fourth level it evaluates visibility from housing, nearness to transportation systems and impacts on historical districts and other cultural impacts.

*Concerns about Slope:* In terms of the slope, the matrix used the determinant of moderate slopes to assure ease of development, adequate depth of soils to bedrock, and to ensure the proper establishment and working of a liner system.

With regard to these specific concerns, the matrix considers all of these and it is not recommended that any changes be made. Subsequently, the Department utilized the matrix to identify the sites potentially suitable for ash residue disposal.

#### *Application Of The Siting Review Matrix*

The process for evaluating land areas which are best suited for ash residue disposal consisted of four levels of review. Each level evaluates a variety of factors in an increasingly detailed manner. In the preliminary screening, sites with basic hydrogeologic features necessary to prevent degradation of water quality were identified and all of those areas underwent an evaluation of the criteria presented in the Siting Review Matrix.

In the screening for sites with the necessary basic hydrogeologic features all land areas in a zone extending a half mile on either side of all Class B and SB rivers in the State were examined. This area encompassed approximately 10% of the State's land area and included all areas with a designation of GC and all State lands within the zone. In addition, all existing landfills with permitted capacity were included in the review.

Using this screening process, Department staff searched out and evaluated 92 potential ash residue disposal sites along Class B waterways or adjacent to existing landfills. The Department recognizes that other sites may exist but for obvious physical constraints, such as existing wells, streams, power lines or simply small size, were eliminated from the review process. If the constraints were removed, some of these sites may be acceptable for bulky waste disposal or even ash residue disposal.

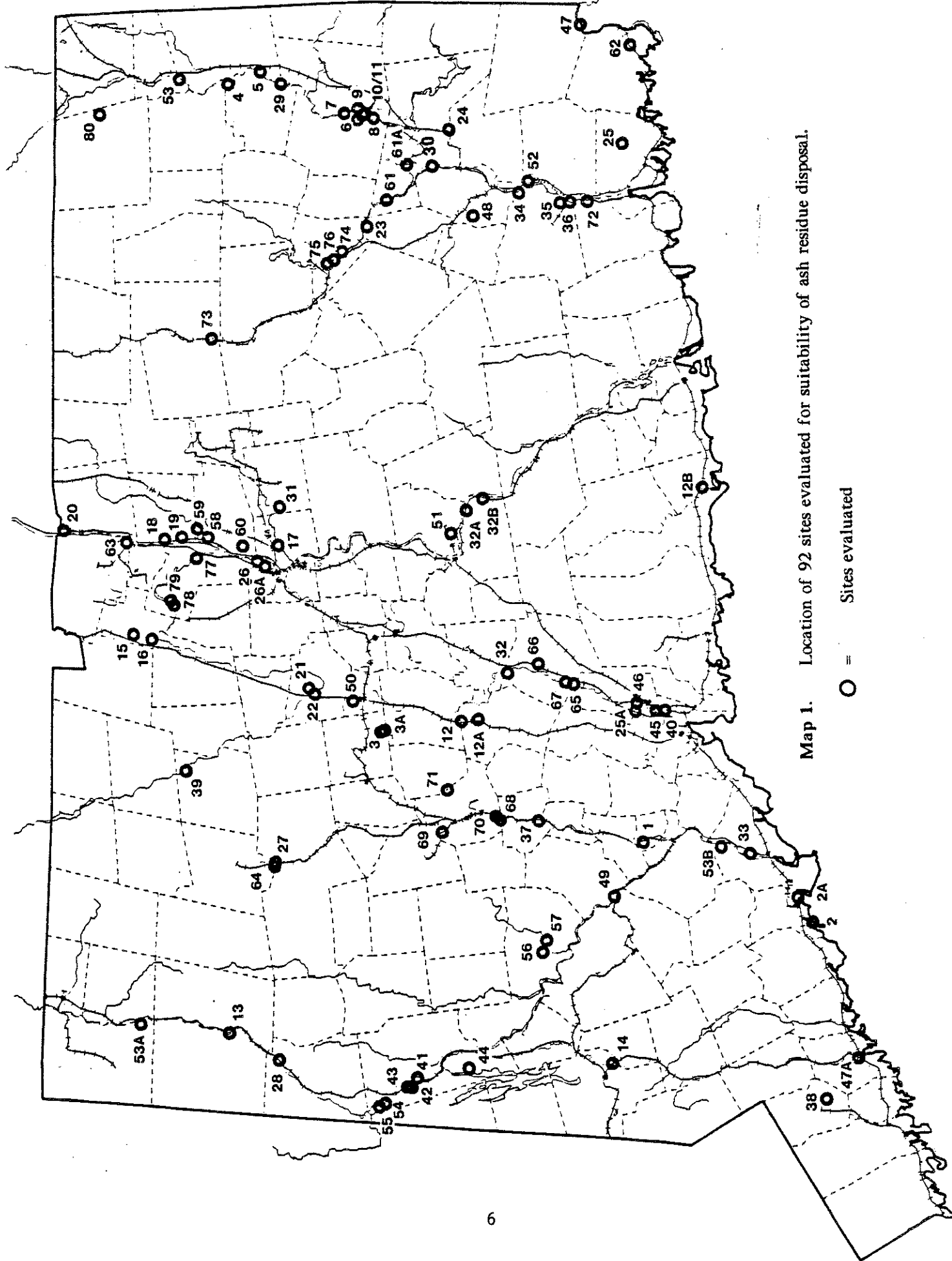
### LEVEL I

Ninety-two specific sites were identified for evaluation and are shown in Map 1. The 92 sites were evaluated for basic suitability factors in the first level of review. To pass this level, a site must be essentially undeveloped, with a contiguous land area of more than 10 acres and with relatively gentle slopes. In addition to being adjacent to a Class B watercourse there must be significant unconsolidated overburden overlying bedrock. This is necessary to ensure that, if any leachate does leak from a lined disposal facility, there will be porous, unsaturated soils to provide attenuation of leachate constituents and to ensure that the path of leachate flow is hydrologically defineable and controllable. Finally, sites must be outside the annual floodplain, as any type of waste disposal is unacceptable in areas subject to frequent flooding.

Of the 92 sites identified in the first phase evaluation, 26 sites were eliminated from further consideration because they did not meet Level I criteria and are shown in Table 4.

Table 4. Sites eliminated at Level I.

TOWN	SITE LOCATION	SITE NO.
Bridgeport	Urban GC area	2A
Canterbury	East of landfill	10
Clinton	GC area on Hammonasset River	12B
East Windsor	Riverfront area west of Rte 5	19
Hamden	GC area	25A
Hartford	Urban GC area	26A
Harwinton	GC area at Torrington Town Line	27
Kent	GC area north of North Kent	28
Middletown	GC area at River Road power plant	32A
Middletown	GC area at Aircraft Road	32B
Montville	Treatment plant area	35
Montville	Lathrop Road GC area	36
Naugatuck	Urban GC area	37
New Hartford	Town Hill Road GC area	39
New Milford	GC area east of Boardman Mtn	41
New Milford	GC area north of Boardman Mtn	43
New Milford	Landfill	44
Norwalk	Urban GC area	47A
Norwich	Landfill	48
South Windsor	Riverfront west of Main St.	58
Stonington	Landfill	62
Wallingford	North Plains Rd GC area	66
Waterbury	Platts Mill GC area	68
Windham	Brick Top Road GC area	75
Windsor	Kennedy Road GC area	77
Woodstock	Landfill	80



Map 1. Location of 92 sites evaluated for suitability of ash residue disposal.

○ = Sites evaluated



Location of Sites Evaluated Using Siting Review Matrix

Ansonia (1)	New Haven (40)
Bridgeport (2)	New Milford (41)
Bridgeport (2A)	New Milford (42)
Bristol (3A)	New Milford (43)
Bristol (3)	New Milford (44)
Brooklyn (4)	North Haven (45)
Brooklyn (5)	North Haven (46)
Canterbury (6)	Norwalk (47A)
Canterbury (7)	Norwich (48)
Canterbury (8)	North Stonington (47)
Canterbury/Plainfield (9)	Oxford (49)
Canterbury (10)	Plainville (50)
Canterbury (11)	Portland (51)
Cheshire (12)	Preston (52)
Cheshire (12A)	Putnam (53)
Clinton (12B)	Salisbury (53A)
Cornwall (13)	Shelton (53B)
Danbury (14)	Sherman (54)
East Granby (15)	Sherman (55)
East Granby (16)	Southbury (56)
East Hartford (17)	Southbury (57)
East Windsor (18)	South Windsor (58)
East Windsor (19)	South Windsor (59)
Enfield (20)	South Windsor (60)
Farmington (21)	Sprague (61)
Farmington (22)	Sprague (61A)
Franklin/Windham (23)	Stonington (62)
Griswold (24)	Suffield (63)
Groton (25)	Torrington (64)
Hamden (25A)	Wallingford (32)
Hartford (26)	Wallingford (65)
Hartford (26A)	Wallingford (66)
Harwinton (27)	Wallingford (67)
Kent (28)	Waterbury (68)
Killingly/Plainfield (29)	Waterbury (69)
Lisbon (30)	Waterbury (70)
Manchester (31)	Waterbury (71)
Middletown (32A)	Waterford (72)
Middletown (32B)	Willington (73)
Milford (33)	Windham (74)
Montville (34)	Windham (75)
Montville (35)	Windham (76)
Montville (36)	Windsor (77)
Naugatuck (37)	Windsor (78)
New Canaan (38)	Windsor (79)
New Hartford (39)	Woodstock (80)

## *LEVEL II*

In the second level of review, the hydrogeologic evaluation focused on whether the sites had the potential to provide a significant supply of potable ground water. Sites with thick, saturated, coarse-grained, unconsolidated sediments are potential public water supply aquifers and, unless already impacted by existing waste disposal facilities, were eliminated from the process. In addition, sites with ground water which are already in use as a drinking supply from public or private wells were eliminated from the process. Sites located near existing high-yield water supply wells which may have the potential to induce groundwater flow from the site to the wells were also eliminated. Further, at this level of review, the available surface water dilution in the adjacent Class B water course was evaluated and those sites adjacent to small rivers with little capacity for dilution were eliminated. Other factors evaluated were the extent and distribution of wetlands and local development patterns particularly with respect to the degree of a physical buffer between a site and residential development. Existing landfills were evaluated primarily as to whether there were sufficient adjacent potential expansion areas. Landfills that could be used only by placing ash residue over areas already filled with municipal solid waste were eliminated.

Of the 66 sites evaluated in the second phase, 37 eliminated from further consideration because they failed to meet Level II criteria. The sites eliminated are shown in Table 5. The following sites were eliminated from Level II for the following reasons:

\*The Griswold, Killingly/Plainfield, and Windham sites were eliminated in Phase II because they are located in areas with unconsolidated sediments that are potentially significant aquifers. These are not currently in use for water supply. These sites, except for their aquifer potential, would be suitable for ash residue disposal based on a Level IV review.

\*\*The New Milford site was eliminated from further review because of a single down gradient well. Should this well be taken out of service and upon suitable completion of Levels III, and IV of the Siting Review Matrix, this site may be an acceptable ash residue disposal area.

\*\*\*The Wallingford site was eliminated from further review because of a public water supply well field on nearby property. The well field is not in the direct path of a potential plume or the existing landfill plume. If it can be clearly documented that the pumping of the well field would not induce the movement of ash residue leachate into the well field, then this site would be suitable for ash residue disposal based on Level IV review.

Table 5. Sites eliminated at Level II.

TOWN	SITE LOCATION	SITE NO.
Ansonia	River Street	1
Bridgeport	Landfill	2
Bristol	Lake Ave. and Middle St. GC area	3
Brooklyn	South Street GC area	5
Canterbury	West of landfill	11
Cheshire	Milldale GC area	12
Cheshire	Blacks Road GC area	12A
East Granby	Granbrook GC area	15
East Granby	Floydville GC area	16
East Hartford	Landfill	17
East Windsor	Water Street GC area	18
Farmington	Landfill GC area	22
Griswold*	George Palmer Rd GC area	24
Groton	Landfill	25
Killingly/Plainfield*	GC area on Town line	29
Manchester	Landfill	31
New Milford**	East of Squash Hollow Brook	42
North Haven	Conrail GC area	45
North Haven	GC area south of treatment plant	46
North Stonington	Boom Bridge Rd GC area	47
Plainville	Landfill	50
Portland	Landfill	51
Salisbury	Dugway Rd GC area	53A
Shelton	Landfill	53B
Southbury	Flood Bridge Rd GC area	56
Southbury	East Flat Hill Rd GC area	57
South Windsor	Rye Street GC area	59
South Windsor	Main and King Streets	60
Sprague	GC area west of Rte 97	61
Sprague	Versailles Station GC area	61A
Torrington	Landfill	64
Wallingford***	Meriden landfill	32
Waterbury	Steele Brook GC area	69
Waterbury	South End landfill	70
Waterbury	North End landfill	71
Willington	South Willington Brook GC area	73
Windham*	South of Plains Road	74

### LEVEL III

In the third level of review, Department staff conducted site visits limited to roads and public access areas. These site visits were undertaken in order to better assess current development patterns and to identify the presence of surface water bodies that do not appear on topographic mapping or current air photos. Sites where recent development infringing on a buffer zone had taken place were eliminated. This level of review also included the evaluation of the 100 year flood elevation. This data, as well as the evaluation of small streams passing through or adjacent to a site, were used to identify the area of the site that could potentially be used for ash residue disposal. Those portions of a site which could discharge to adjacent small streams would be unacceptable and were not considered as usable area. At this point, those sites with less than 10 acres of usable area were eliminated. The usable area estimated at this stage represents the maximum available area physically suited for disposal. During site investigations and the permitting process other factors may be identified to better determine the actual permitted area.

Of the 29 sites reviewed in the third phase of evaluation, nine sites were eliminated from further review because they failed to meet Level III criteria and are shown in Table 6.

Table 6. Sites eliminated at Level III.

TOWN	SITE LOCATION	SITE NO.
Bristol	Landfill	3A
Cornwall	Popple Swamp Rd GC area	13
Enfield	GC area on State Line	20
Farmington	North of river opposite landfill	21
Oxford	Stevenson Dam	49
Sherman	GC area east of Evans Hill Rd	54
Sherman*	GC area north of Evans Hill Rd	55
Windsor	South of landfill	78
Windsor	Landfill GC Area	79

\*The Sherman site was eliminated from further review because existing power lines significantly reduce the usable area. Should the power lines be moved, this site may, upon completion of Levels III and IV review, be an acceptable ash residue disposal area.

#### LEVEL IV

The fourth level consisted of the most complete evaluation that can be made without detailed on-site investigations and was applied to those remaining sites which passed the hydrogeologic screening. In this level of review, the transportation network based on existing or abandoned railroads and state highways were evaluated. Estimates of site capacity were made based on an assumed landform using the maximum area physically suitable for ash residue disposal. Any site with less than 1 million cubic yards of capacity was eliminated from consideration as too small to support development costs with the exception of sites adjacent to existing landfills. The potential impacts of a leachate discharge on the adjacent Class B water body was analyzed during this phase. The leachate volume was based on 6" of annual infiltration over the site and all discharging as leachate to the stream instantaneously at low stream flow conditions. In this analysis metals concentrations in the leachate were assumed to range from concentrations anticipated in leachate generated from ash residue sites to the highest concentrations detected in ground waters impacted by historical ash disposal areas in the state and in other parts of the country.

During this fourth level of review significant cultural and ecosystem features were evaluated. The factors that were evaluated included habitat for endangered species, archeological significance, significant flora and fauna, significant natural areas, and significant recreational potential.

Of the 20 sites evaluated at the Level IV review, seven were eliminated and are shown in Table 7.

Table 7. Sites eliminated at Level IV.

TOWN	SITE LOCATION	SITE NO.
Canterbury	Rte 169 GC area	6
Canterbury	Butts Bridge GC area	8
Canterbury/Plainfield	GC area on Town Line	9
Lisbon	Allen Rd GC area	30
Preston	Route 2A Bridge GC area	52
Suffield	GC area	63
Waterford	North of Quaker Hill	72

Of the 92 sites evaluated in this screening process, 13 sites possess the hydrogeologic, physical and cultural characteristics which qualify them as potentially acceptable for ash residue disposal and are shown in Table 8.

Map 2 shows the location of potentially suitable ash residue disposal sites, existing ash residue disposal sites, resource recovery facilities, incinerators and major transportation networks.

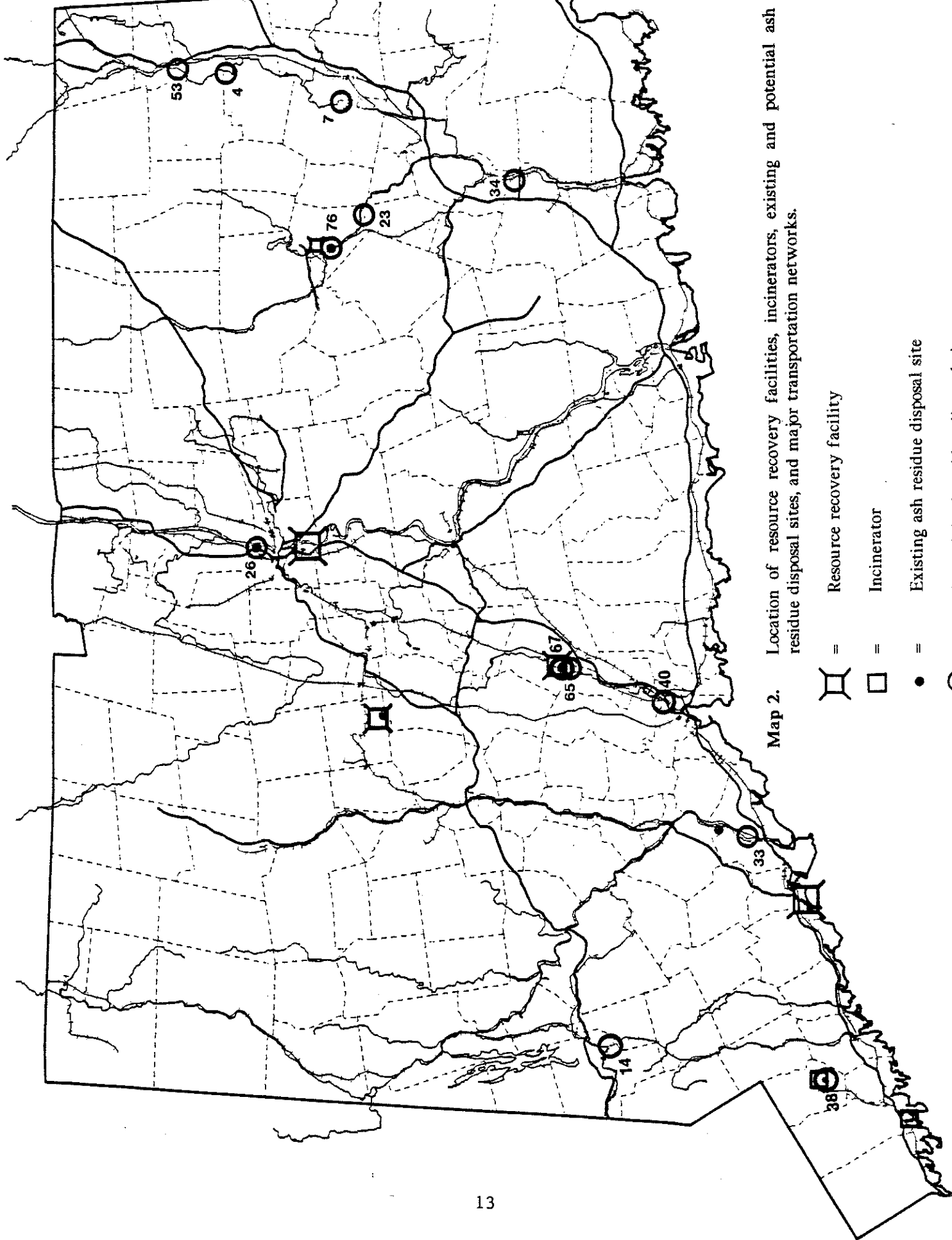
The capacity estimates included in this report are based on an assumed landform using all the physically usable land area. A range of capacities is given where there are uncertainties about the extent of usable area which can only be resolved by on-site geologic and geophysical investigations. Additional information on the amounts of ash residue leachate actually produced and on the actual metals concentrations found within it, may also limit the usable land area and the associated potential capacity.

It must be pointed out again that this list includes sites that appear to be the best candidates for the safe disposal of ash residue. They merit consideration by sponsors of resource recovery facilities in their search for suitable sites. Listing does not, however, establish that a site could receive a permit. The full complement of on-site investigations would be necessary to demonstrate that the site could meet all regulatory requirements. The Department hopes that the report will provide a useful starting point in moving toward the testing, acquisition, and development of the well-sited, well-designed ash residue disposal sites Connecticut needs.

Table 8. Potentially acceptable sites for ash residue disposal.

TOWN	SITE LOCATION	CAPACITY (in MCY)*	COMMENTS
Franklin/Windham Site No. 23	Susquehanna Plains	5 to 20+	Actual capacity to be determined by detailed on-site investigation
Putnam Site No. 53	Landfill	3.5 to 4	More capacity may be available if power lines moved
Canterbury Site No. 7	Southwest of Rte 14A	3	Capacity is limited so that landform will not be visible from Canterbury
Brooklyn Site No. 4	Pomfret Town line	2.5	Access issues would need resolution
Milford Site No. 33	GC area	2 to 2.5	Site may be limited by development, and Coastal Area Management issues
Windham Site No. 76	Landfill	1.5 to 2	Currently permitted for ash
Montville Site No. 34	North of Rte 2A Bridge	1.5 to 2	Site may be limited by shallow bedrock and Coastal Area Management issues
Hartford Site No. 26	North of landfill	1.5	Permitted for municipal solid waste - Planned for ash residue
Wallingford Site No. 65	Toelles Road GC area	1.5	Adjacent to inactive indust. waste disposal site
Danbury Site No. 14	Adjacent to landfill	0.5	Planned for municipal solid waste
New Haven Site No. 40	Adjacent to landfill	0.3	Planned for municipal solid waste
Wallingford Site No. 67	Adjacent to landfill	0.25	Site currently permitted for ash
New Canaan Site No. 38	Landfill	0.1	Site currently permitted for ash

\* MCY: million cubic yards.










Map 2. Location of resource recovery facilities, incinerators, existing and potential ash residue disposal sites, and major transportation networks.

- = Resource recovery facility
- = Incinerator
- = Existing ash residue disposal site
- = Potential ash residue disposal site

The next section of this report provides for each of the thirteen potentially acceptable sites for ash residue disposal the following information:

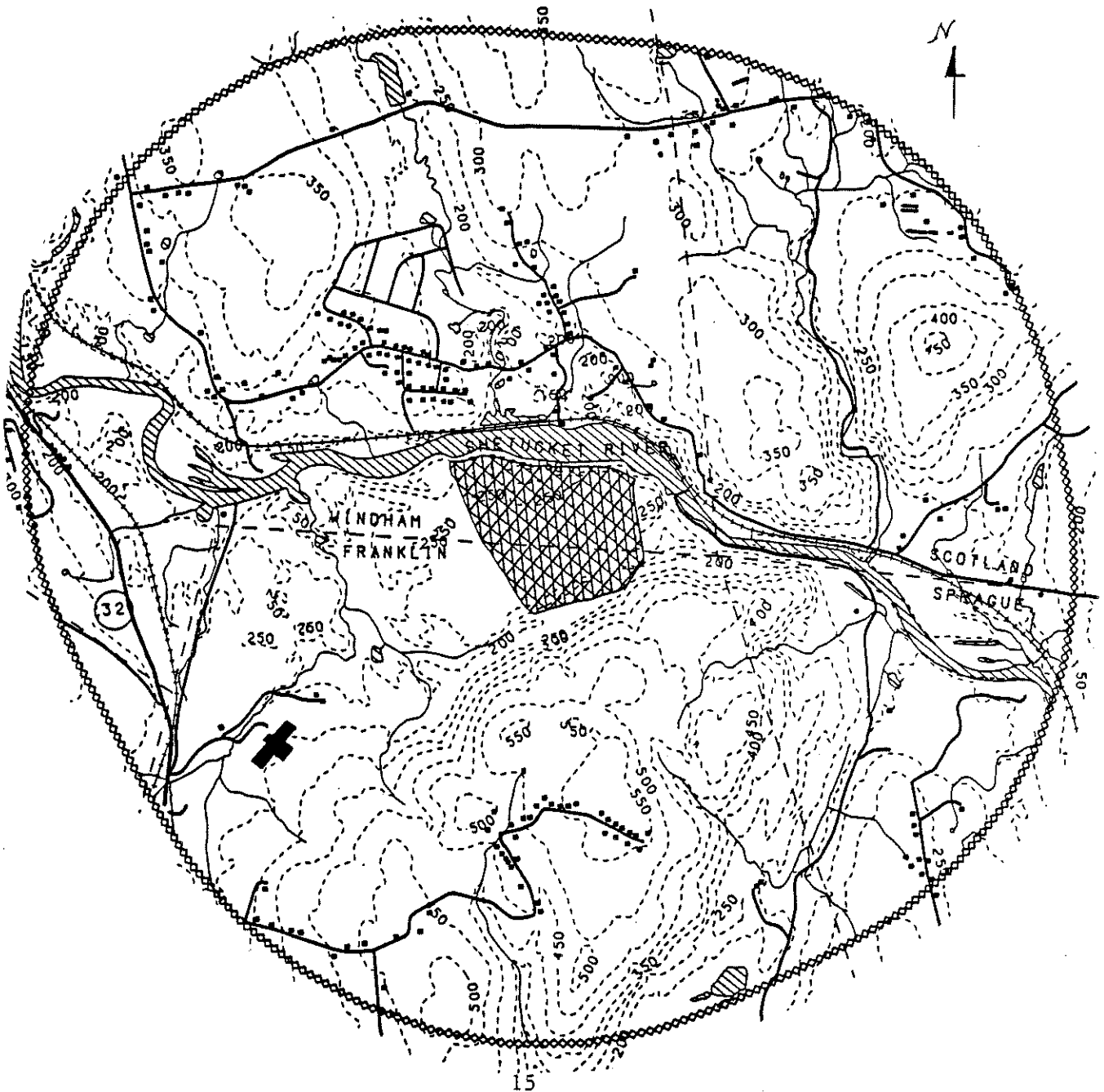
- \* A site map showing the potential site location, a 1 1/2 mile buffer extending outward from the site, nearby residences, buildings and facilities, major roads and rail networks, water resources, and 50' contour intervals.
- \* Significant information concerning hydrogeology, environmental and area land use considerations. The river flow during 7 day, 10 year low flow period (7Q10) is utilized as available dilution. This is a very conservative, low flow condition, which will occur only rarely.

#### MAP KEY TO THE ASH RESIDUE DISPOSAL SITES

	=	Potential ash residue disposal site
	=	1 1/2 mile radius
	=	Buildings
	=	Town boundary
	=	State road system
	=	Municipal road system
	=	Railroad



FRANKLIN/WINDHAM #23 - On town line in Susquehanna Plains, west of Scotland dam	
*	A sandy terrace of woodland bounded primarily by undeveloped land. Across the Shetucket River is rural residential land. A half mile south and 300 feet above the site is a rural subdivision.
*	A railroad extension and an access route into the site is necessary.
*	175 acres physically suitable for ash disposal.
*	Estimated capacity ranges from 5 to greater than 20 million cubic yards, depending on the number of acres actually used.
*	GA groundwater class GC Classifiable
	Shetucket River Bc class



## FRANKLIN/WINDHAM - SITE NO. 23

### *HYDROGEOLOGY*

\* Approximately 25 to 50 feet of stratified drift sediments overlie bedrock. Soils above the water table are predominantly coarse grained. Sediments beneath the water table are fine grained.

\* Stratified drift to the north and west of this site may have the potential to yield large amounts of water but that potential is believed to be low in this area.

\* The dilution ratio is 370:1 at low flow (7Q10) conditions assuming 6" of recharge per year, if the physically suitable acreage is fully used.

### *ENVIRONMENT*

\* The 100 year flood elevation is 138 to 140 feet above mean sea level. The existing ground in the study area is approximately elevation 220.

\* The Shetucket River is classified as Bc. This designation indicates that the present use and goal for this river is to maintain it as a fishable/swimmable river. It is suitable for cold water fisheries, has the potential and has been targeted for anadromous fisheries restoration.

\* Approximately 1.5 acres on the margin of the study area are mapped as wetland soils.

\* Connecticut's Natural Resource Inventory identified portions of this study area as potentially having a significant ecological community associated with well drained sand and gravel deposits.

\* While no archeological sites are known, the potential for sites exists.

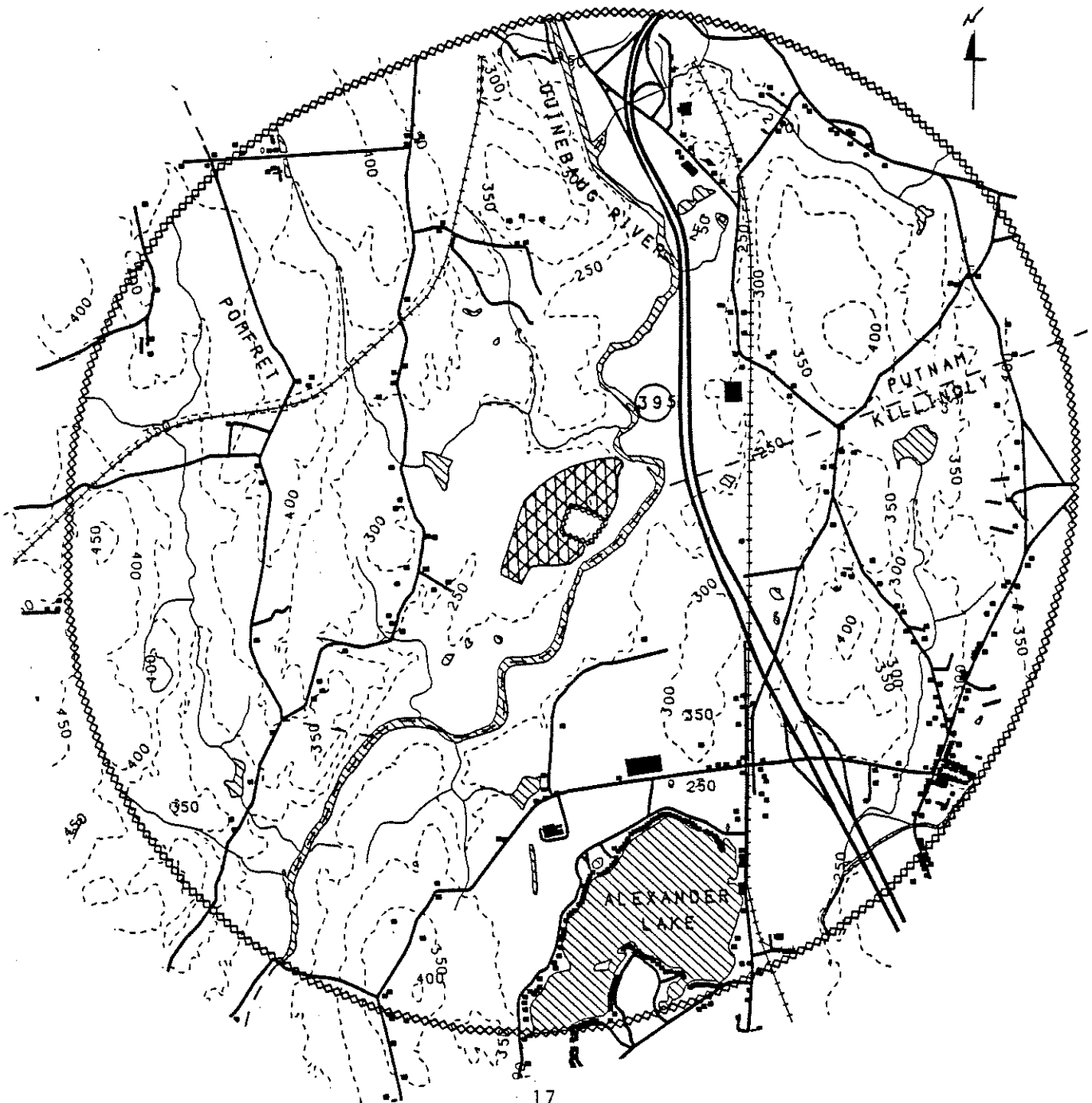
### *AREA LANDUSE*

\* Rail access to the study area is feasible. Access would also be possible by construction of a new road from Route 32.

\* Three landowners are involved.

PUTNAM #53 - Adjacent to existing Putnam Landfill, east of River Road

*	A level sandy terrace of woodland, open space and sand excavation bounded by undeveloped and rural residential land and existing municipal solid waste landfills. Separated from upgradient development by 1400 feet of woods and meadows.
*	Railroad extension, road improvements or other access routes are needed.
*	59 acres physically suitable for ash disposal.
*	Estimated potential capacity 3.5 million cubic yards.
*	GB/GB/GC groundwater class                      Quinebaug River C/Bc class



## PUTNAM - SITE NO. 53

### *HYDROGEOLOGY*

\* Approximately 100 feet of stratified drift overlies bedrock. Soils beneath the water table are principally coarse-grained near the surface and fine grained at depth.

\* Depth to water table is approximately 30 feet.

\* Mapping of regional aquifers has defined this area to be on the downstream margin of a zone specified as a potential high to moderate yeild aquifer, but water quality on-site has been impacted by existing waste disposal activities.

\* The dilution ratio is 1,100:1 at low flow (7Q10) conditions assuming 6" of recharge per year.

\* The small stream west of the study area has been given a buffer to protect its drainage basin.

### *ENVIRONMENT*

\* The 100 year flood elevation is 218 to 219 feet above mean sea level. The existing ground in the study area is approximately at elevation 275.

\* The study area avoided wetland areas abutting the site.

\* The Quinebaug River has a C/Bc class. The Bc goal indicates the Department's goal is to restore water quality to fishable/swimmable standards.

\* Connecticut's Natural Resource Inventory identified no sites immediately adjacent to the area.

\* While no archeological sites are known, the potential for sites exists.

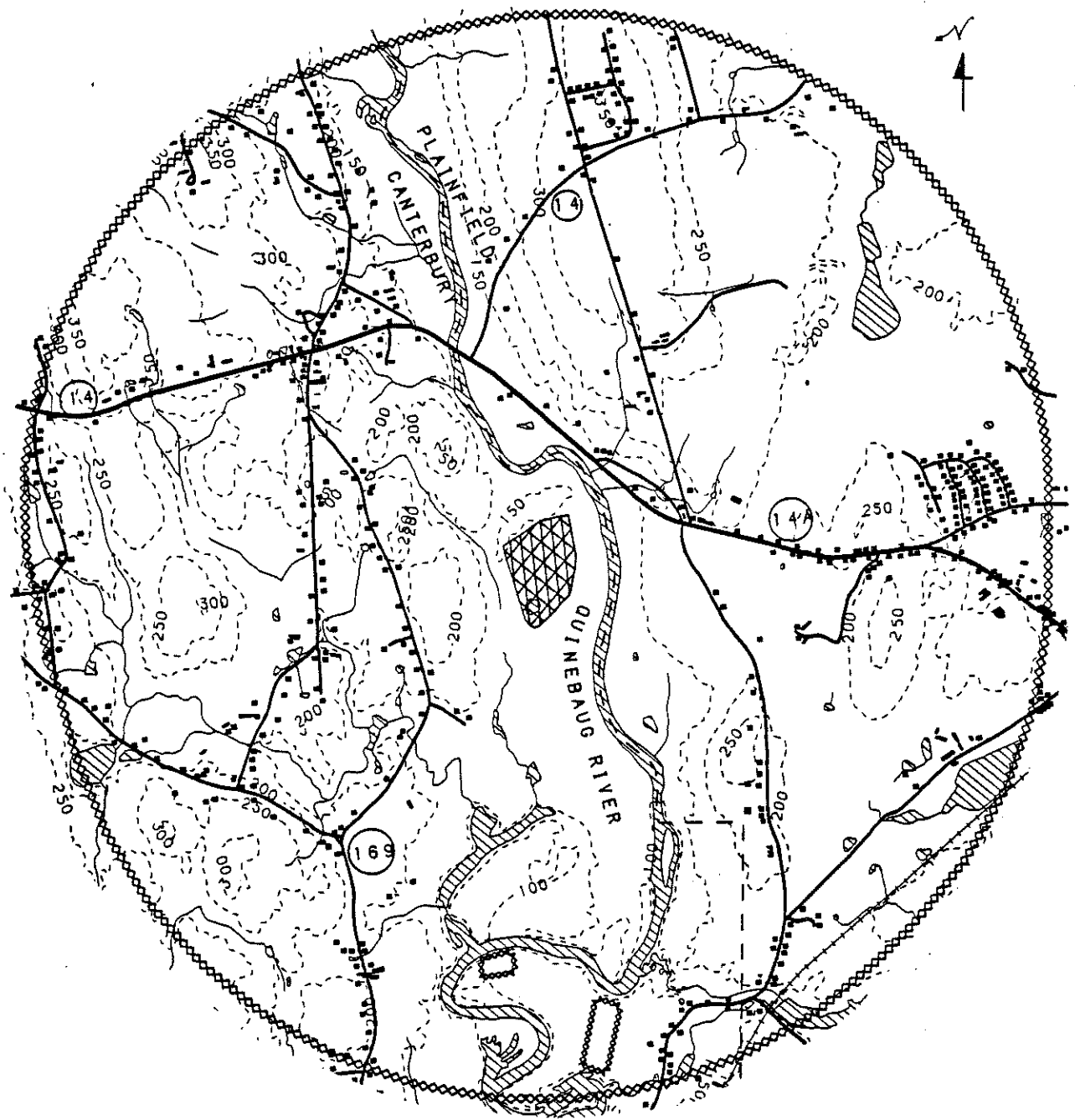
### *AREA LANDUSE*

\* Rail access to the study area is feasible by building approximately a half mile spur line and associated right-of-ways.

\* Six landowners are involved, including the Town.

CANTERBURY #7 - 4000 feet southeast of the center of Canterbury

*	Includes woods and farmland adjacent to the floodplain. Bounded by wooded hillsides and wooded and agricultural floodplain. A wooded knoll to the north is part of the Quinebaug River Wildlife Area. Rural residential development is 1500 feet to the west on opposite side of hills.
*	Probable access route would require construction of a bridge over river from Route 14A or 1.5 miles of new track for rail access.
*	38 acres physically suitable for ash disposal.
*	Estimated potential capacity 3 million cubic yards.
*	GA groundwater class GC classifiable
	Quinebaug River Bc class



## CANTERBURY - SITE NO. 7

### *HYDROGEOLOGY*

\* The eastern portion of the study area has stratified drift 70 feet thick overlying bedrock. Soils beneath the water table have shallow deposits of coarse grained sediments overlying thicker fine sands and silts. The study area is bordered on the west by shallow glacial till over bedrock controlled hillsides.

\* Depth to water table is greater than 10 feet.

\* Sediments indicate there is no potential for development of the immediate area for a significant water supply.

\* The small stream west of the study area has been given a buffer to protect its drainage basin.

\* The dilution ratio is 3,400:1 at low flow (7Q10) conditions assuming 6" of recharge per year.

### *ENVIRONMENT*

\* The 100 year flood elevation is 109 to 110 feet above mean sea level. The existing ground elevation is approximately at elevation 120.

\* The northern edge of the study area abuts an isolated portion of the Quinebaug River Wildlife Area.

\* Connecticut's Natural Resource Inventory identified no sites immediately adjacent to this study area.

\* The Quinebaug River is a class Bc waterbody which indicates that the present use and goal for this river is to maintain it at a fishable/swimmable quality. It is suitable for cold water fisheries. It also has the potential and has been targeted for anadromous fisheries restoration.

### *AREA LANDUSE*

\* The estimated landform for the study area has been limited to a height of 220 feet so that the landform would not be visible from the Town of Canterbury.

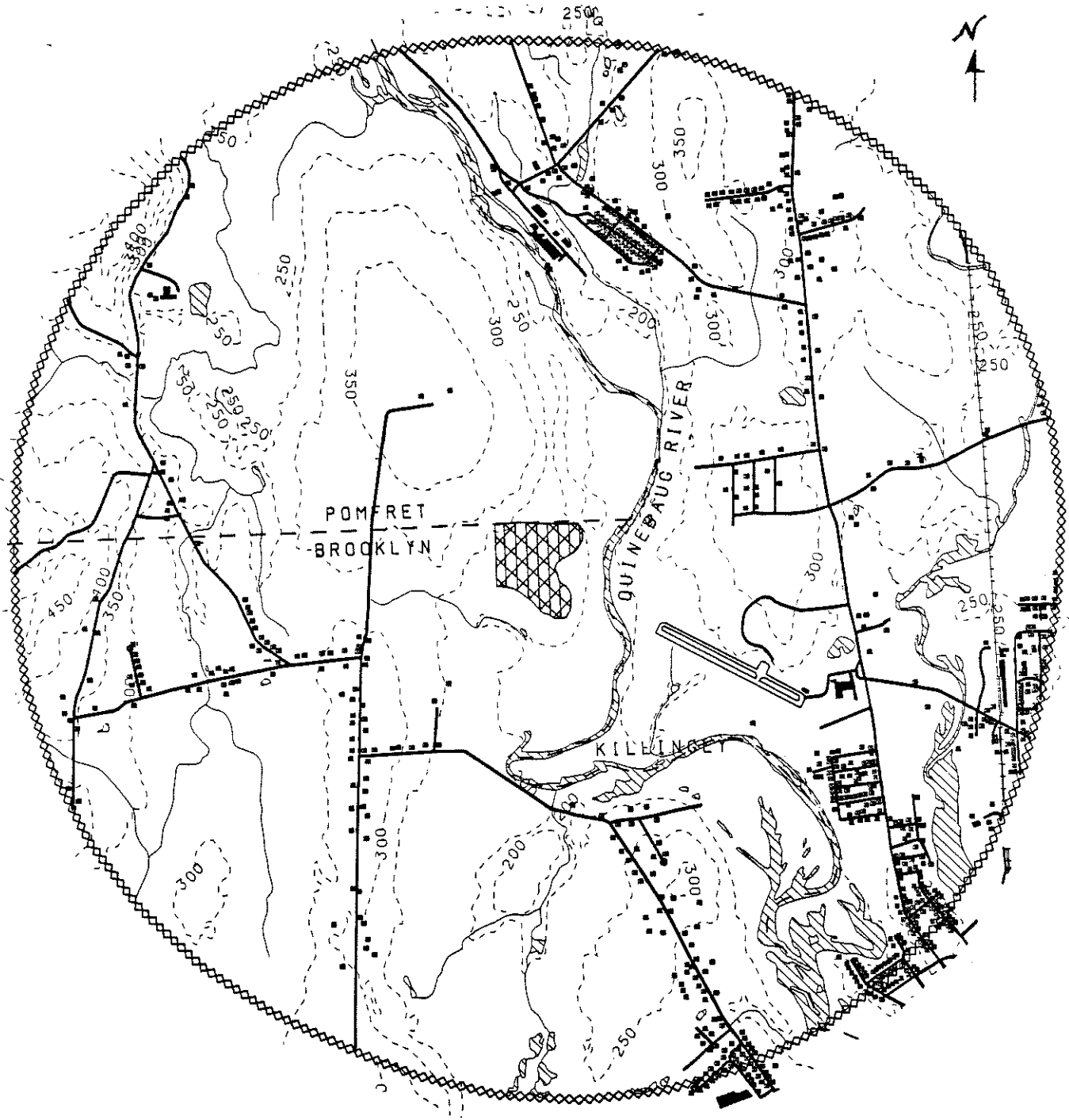
\* Approximately 15 acres of the 38 acre study area are in farmland.

\* The Town of Canterbury has designated portions of Route 169 west of the study area as a Historic District.

\* Approximately 22 acres of the Quinebaug River Wildlife Area immediately north of the site would also meet the criteria of the matrix if land preservation goals were modified.

\*Three landowners are involved.

BROOKLYN #4 - On Pomfret town line at west bank of Quinebaug River	
*	Gently sloping farmland and woodland bounded by floodplains and undeveloped rural land. Separated from development by 2000' of farmlands and woods.
*	Road improvements or alternate access routes will be necessary.
*	35 acres physically suitable for ash disposal.
*	Estimated potential capacity 2.5 million cubic yards.
*	GA/GA/GC groundwater class                      Quinebaug River C/Bc class



## BROOKLYN - SITE NO. 4

### *HYDROGEOLOGY*

- \* Approximately 10 to 30 feet of stratified drift soils overlie bedrock. The saturated thickness of the valley may range to in excess of 80 feet, however the materials are inferred to be fine grained at depth.
- \* Aquifer potential near the study area is limited.
- \* The water table is estimated to be at a depth of 25 feet over the majority of the site.
- \* The small stream to the southwest of the study area has been given a buffer to protect its drainage basin.
- \* The dilution ratio is at 2150:1 low flow conditions (7Q10) assuming 6" of recharge per year.

### *ENVIRONMENT*

- \* The 100 year flood elevation is 190 to 201 feet above mean sea level. The existing ground in the study area is approximately at elevation 220.
- \* Approximately 20 acres of the 35 acre study area is farmland.
- \* The Quinebaug River has a surface water classification of Bc which indicates it has a fishable/swimmable water quality. It is suitable for cold water fisheries and has the potential and has been targeted for anadromous fisheries.
- \* Connecticut's Natural Resource Inventory identified no sites immediately adjacent to the area.
- \* While no archeological sites are known on the study area, the potential for sites exists.

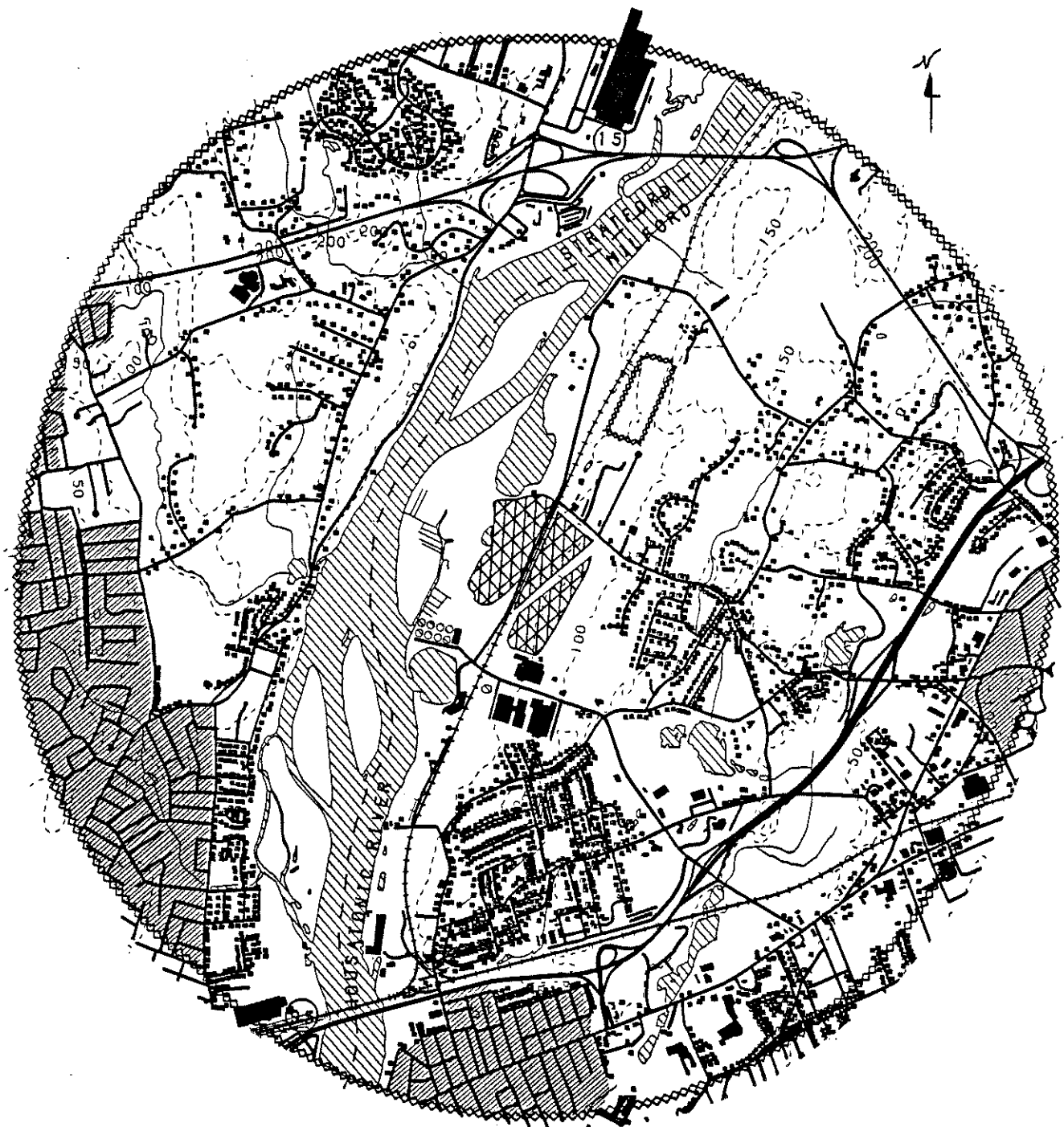
### *AREA LANDUSE*

- \* Rail access is not readily available for this site.
- \* One landowner is involved.



MILFORD #33 - 1.5 miles south of Sikorsky plant

*	Active and former sand excavation areas with limited revegetation. Divided into three sections by railroad, street and powerline. Bounded by principally by light industrial landuses. Residential area beyond 600 feet of wooded buffer, 40 above the site.
*	Rail access is available; 1.3 miles of major Town roads from highway.
*	70 acres physically suitable for ash disposal.
*	Estimated potential capacity 2 to 2.5 million cubic yards.
*	GB/GB/GC groundwater class                      Housantonic River SC/SB class



## MILFORD - SITE NO. 33

### *HYDROGEOLOGY*

- \* Less than 10 to approximately 60 feet of stratified drift soils overlie bedrock in the study area.
- \* Due to the potential of salt water intrusion to local ground water, the study area is not viable as a public water supply source.
- \* The proposed site's influence on the excavation ponds and drainage channels in the tidal wetland to the west will need to be further addressed.
- \* The dilution ratio is 8,300:1 at low flow conditions (7Q10) assuming 6" of the recharge per year.

### *ENVIRONMENT*

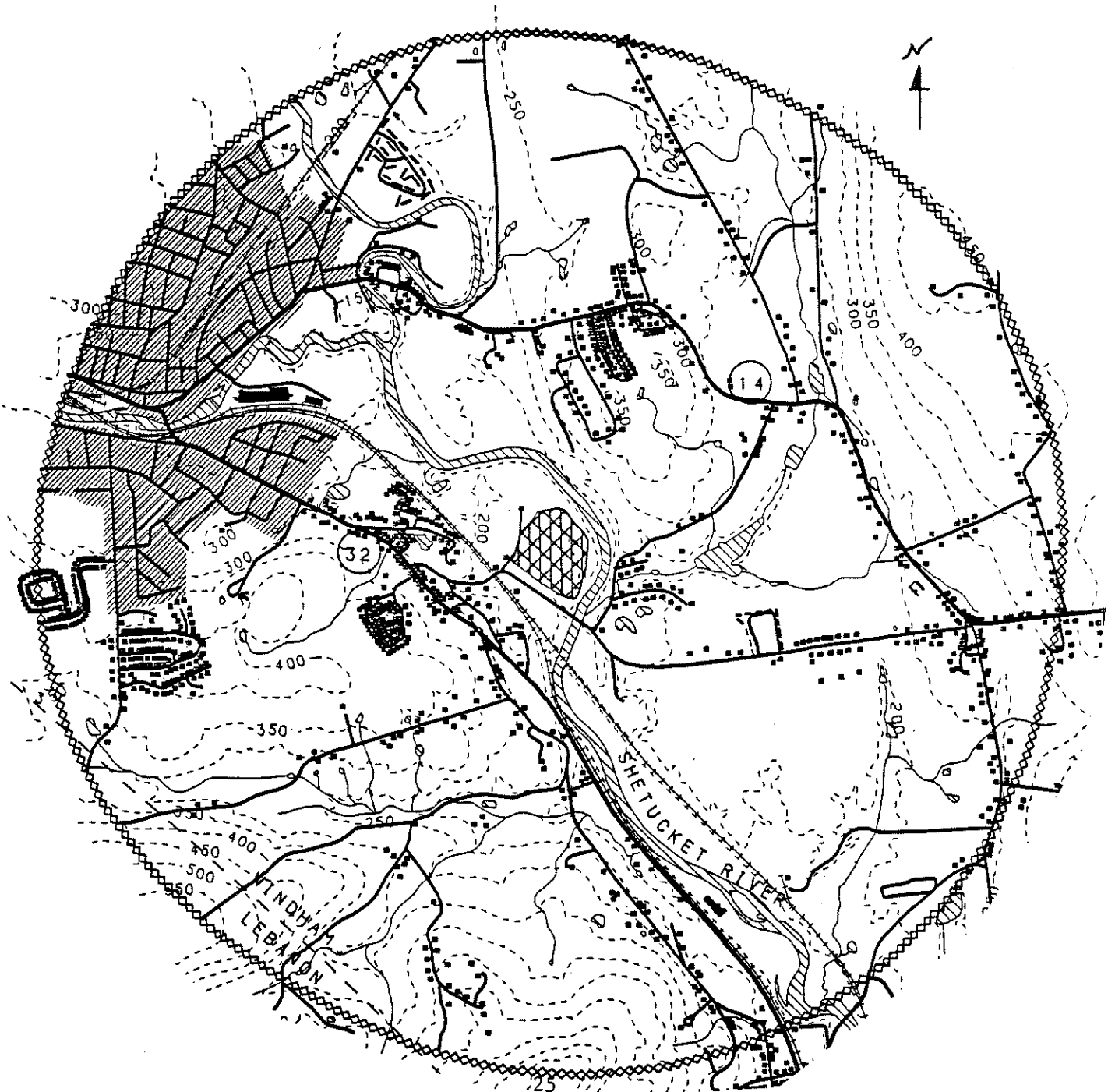
- \* The 100 year flood elevation is 11 to 12 feet above mean sea level. The existing ground in the study area is approximately at elevation 20 for the west landform and at elevation 50 for the east landform.
- \* The Housatonic River has a surface water classification of SC/SB indicating that it is tidally influenced, and that the Department's goal is to restore fishable/swimmable water quality.
- \* Connecticut's Natural Resource Inventory identified a species of concern located on the opposite side of the Housatonic River.
- \* While no archeological sites are known on the site, the potential for sites exists.

### *AREA LANDUSE*

- \* The study area consists of an active gravel processing plant and nearby sparsely vegetated areas. The surrounding area is being developed as an industrial park, with reported plans for duplex housing immediately south of the eastern landform.
- \* A residential neighborhood served by public water is located 600 feet to the east and 60 feet uphill from the study area beyond a wooded buffer. Another residential area is located south of the site immediately beyond the municipal sewage treatment plant.
- \* The State owned Wheeler Wildlife Area has two small parcels of land in the tidal wetland immediately downgradient of the study area.
- \* Rail access to the study area is available.
- \* Incinerator ash and bulky waste disposal historically took place to the north of this study area.
- \* Three landowners are involved.

WINDHAM ASH LANDFILL #76 - One mile south of Willimantic.

- \* An active landfill adjacent to a sand excavation area in a narrow, partially wooded river valley. Hillsides to the north, southwest and southeast of the site have limited residential development with some wooded buffering.
- \* Railroad access to the site is available, currently accessed by road.
- \* 30 acres are presently permitted for unlined ash disposal and bulky wastes. Liner needs to be designed for long-term ash disposal.
- \* Permitted capacity 1.5 million cubic yards, 0.5 MCY vertical expansion may be feasible.
- \* GA/GA/GC groundwater class                      Shetucket River Bc class



## WINDHAM-- SITE NO. 76

### *HYDROGEOLOGY*

\* Approximately 60 feet of stratified drift sediments overlie bedrock. Soils above the water table are primarily coarse grained. Sediments beneath the water table are coarse grained in some areas.

\* The study area is included as part of the Shetucket River major aquifer but this specific area was judged not to have the potential to serve as significant water supply in this active landfill's permitting process.

\* The dilution ratio is 2,150:1 at low flow conditions (7Q10) assuming 6" of recharge per year.

### *ENVIRONMENT*

\* The 100 year flood elevation is 147.5 to 149.5 feet above mean sea level. The existing ground in the landfill area is approximately at elevation 145, with a flood control dike isolating the site from the floodplain.

\* The Shetucket River has a surface water classification of Bc which indicates it has a fishable/swimmable water quality. It is suitable for cold water fisheries. It also has the potential for development and has been targeted for anadromous fisheries restoration.

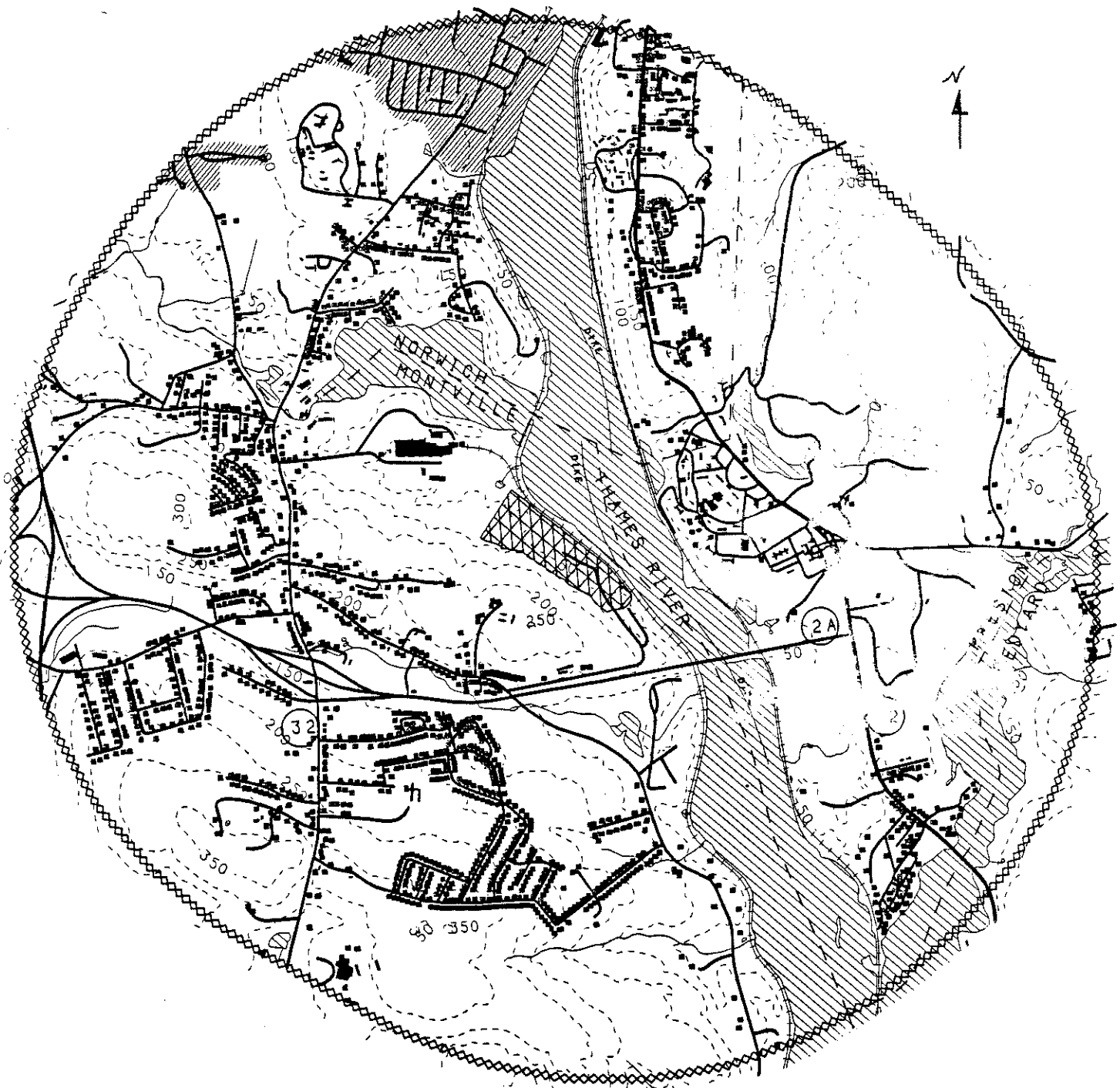
### *AREA LANDUSE*

\* Landfilling of ash and other wastes has occurred over portions of the site. For this review process, it has been assumed that the site remains in a condition suitable for the installation of a liner and full utilization of the remaining capacity can occur.

\* One landowner is involved.

MONTVILLE #34 - West bank of Thames River, opposite Norwich State Hospital

*	Partially excavated alluvial terrace and the wooded slope to the southeast. Residential area 800' to the southeast is buffered by a wooded slope. Abuts property of State Park to the south.
*	Rail access available. Road extension will be necessary.
*	45 acres physically suitable for ash disposal.
*	Estimated potential capacity ranges from 1.5 to 2 million cubic yards.
*	GA/GA/GC groundwater class                      Thames River SC/SB class



## MONTVILLE - SITE NO. 34

### *HYDROGEOLOGY*

\* 10 to 30 feet of stratified drift soils overlie bedrock in the study area. Sediments are coarse grained but shallow.

\* Aquifer potential for the site is small.

\* The water table is at a depth of approximately 10 feet.

\* The dilution ratio is 12,900:1 at low flow conditions (7Q10) assuming 6" of recharge per year.

\* There is a small inlet separated from the river channel by a railroad bed, which would have to be evaluated.

### *ENVIRONMENT*

\* The 100 year flood elevation is 14 feet above mean sea level. The existing ground in the study area is approximately at elevation 20.

\* There are no significant naturally occurring wetlands on the site, although depressions in the historic excavations have areas of wetland vegetation.

\* The Thames River is a tidally influenced river which has a surface water classification of SC/SB. The Department's goal is to restore fishable/ swimmable water quality. The Thames River has the potential and has been targeted for an anadromous fisheries restoration.

\* Connecticut's Natural Resource Inventory was checked and no site was identified in the immediate area.

\* While no archeological sites are known on this study area, the potential for sites exists.

### *AREA LANDUSE*

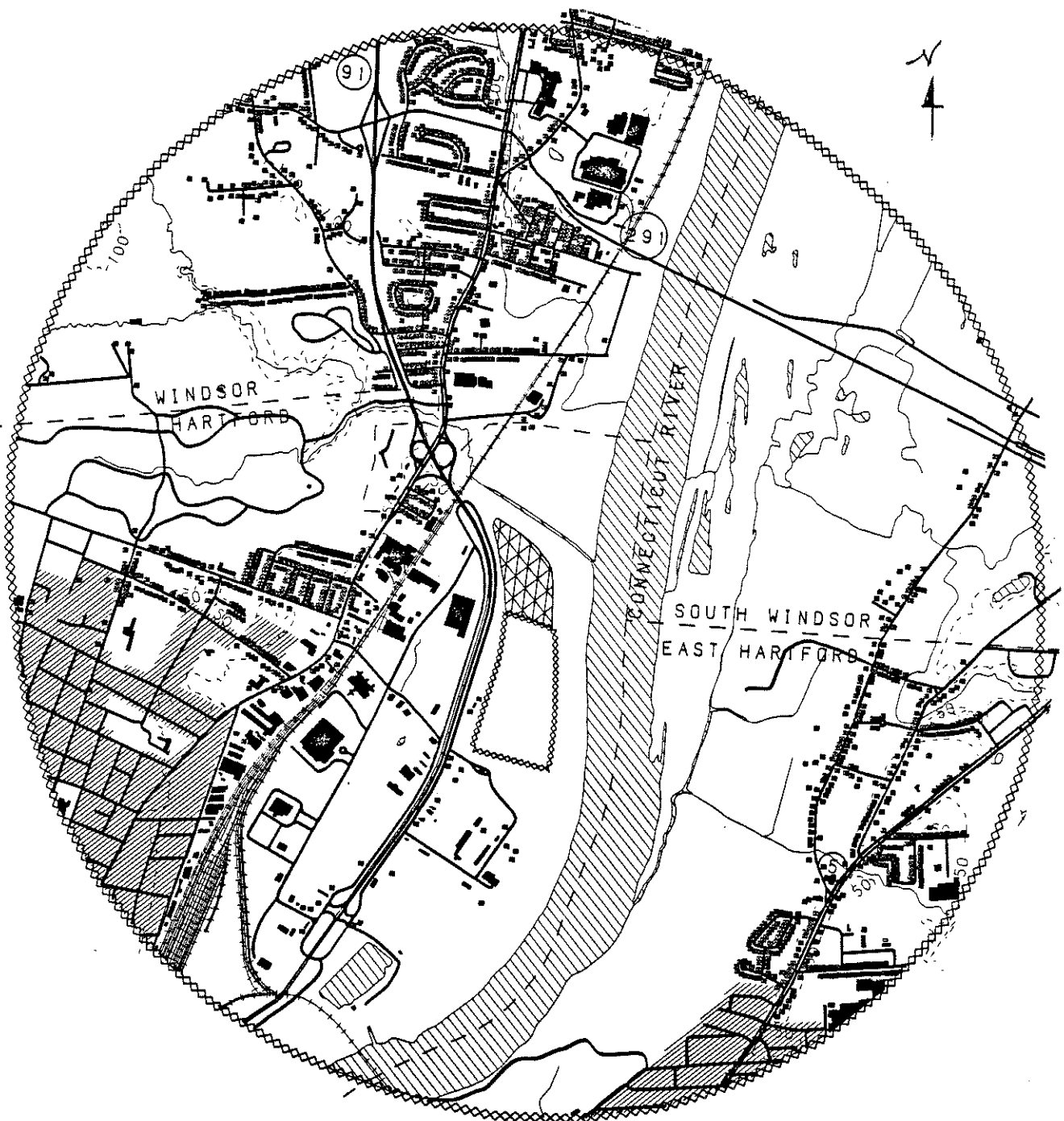
\* The site is presently used in part for septage lagoons, is in part an abandoned sand and gravel pit and in part wooded.

\* Rail access is feasible to the northeast side of the site.

\* Six landowners including the State, are involved.

HARTFORD #26 - North of existing landfill, east of Route I-91

*	Former floodplain area now protected from floods by the Hartford flood control dike. Site is partially wooded, partially disturbed. Surrounding land is industrial, highway, landfill and wooded floodplain beyond the dike.
*	Road improvements may be needed. Rail access is nearby.
*	32 acres permitted for mixed wastes, liner being designed for ash disposal.
*	Permitted capacity 1.5 million cubic yards.
*	GB/GB/GC groundwater class                      Connecticut River SC/SB class



## HARTFORD - SITE NO. 26

### *HYDROGEOLOGY*

\* Approximately 20 feet of coarse grained sediments overlie in excess of 100 feet of clay and silt. There is no significant water supply potential in the vicinity.

\* The dilution ratio is 100,000:1 at low flow conditions (7Q10) assuming 6" of recharge per year.

### *ENVIRONMENT*

\* The 100 year flood elevation is at 31 feet above mean sea level. The existing ground in the study area is approximately at elevation 20, with a flood control dike isolating the site from the floodplain.

\* The Connecticut River is classified as SC/SB indicating that the Department's goal is to restore the river to fishable/swimmable water quality. It presently serves as a corridor for anadromous fisheries and has the potential for further development.

### *AREA LANDUSE*

\* The site is presently used as a police firing range and open space woodland and is immediately adjacent to the Hartford Landfill.

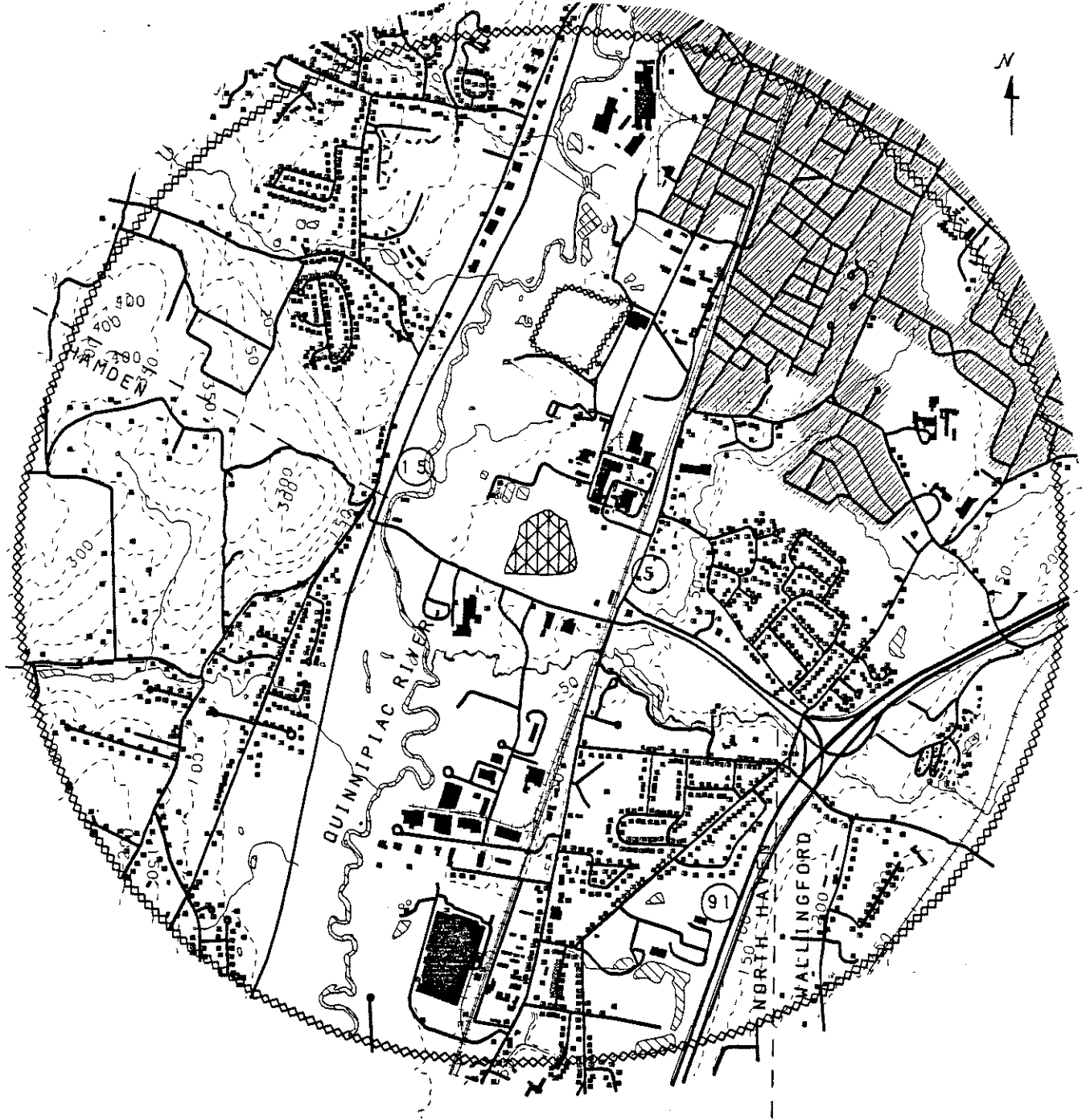
\* The site currently has a permit for the disposal of municipal solid waste and is planned for the disposal of ash residue.

\* One landowner is involved.



WALLINGFORD-TOELLES ROAD #65 - Southern end of American Cyanamid property

*	Sandy flat woodland, sparsely vegetated field and active gravel pit. Bounded by heavy and light industries. State Park 1000 feet to east.
*	Railroad access and highway are easily accessible.
*	22 acres physically suitable for ash disposal.
*	Estimated potential capacity 1.5 million cubic yards.
*	GB/GB/GC groundwater class                      Quinnipiac River C/B class



## WALLINGFORD - SITE NO. 65

### *HYDROGEOLOGY*

\* Approximately 150 feet of stratified drift overlies bedrock. A clay and silt unit, approximately 60 feet thick separates the thin coarse grained unit at the surface from the thicker coarse unit beneath the clays.

\* Depth to water table is approximately 15 feet.

\* The dilution rate is 2,200:1 at low flow (7Q10) conditions assuming 6" of recharge per year.

### *ENVIRONMENT*

\* The 100 year flood elevation is 23 to 24 feet above mean sea level. The existing ground in the study area is approximately at elevation 50.

\* There are 2 minor streams and several seasonally wet areas in the wooded floodplain between the study area and the river which will require additional review in future studies.

\* The Quinnipiac River has a surface water classification of C/B which indicates that the Department's goal is to restore water quality to fishable swimmable standards.

\* Connecticut's Natural Resource Inventory identified the study area and the surrounding land as a pine barren habitat and has identified several plants of special concern.

\* Archeological sites have been identified nearby. There is the potential for similar archeological remains in the study area.

### *AREA LANDUSE*

\* The study area is located just east (upgradient) of a closed industrial waste landfill.

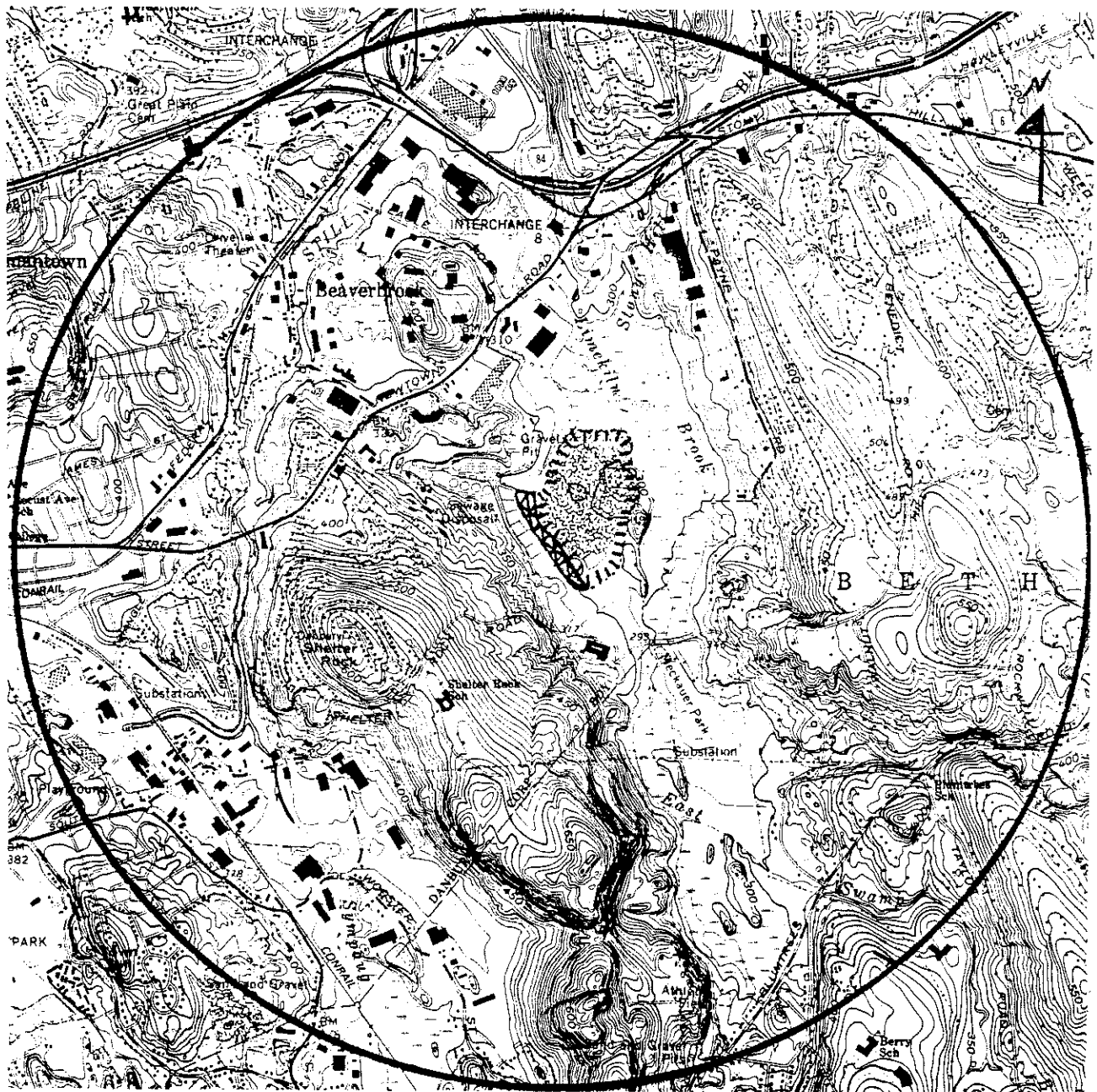
\* The Quinnipiac River Wildlife Management Area is located across the river, approximately 1500 feet from the site.

\* Wharton Brook State Park and Natural Area Preserve is located 600 feet southeast of the study area.

\* Rail access to the site is available immediately east of the site.

\* Three landowners are involved.

DANBURY #14 - West of existing landfill	
*	Site is a narrow wetland between the active landfill and sewage sludge drying beds. Separated from residential area to 1000 feet to the west by steep partially wooded slope. It is screened from development to east by landfill.
*	Accessed from Route 6, 3500 feet off I-84.
*	Eight acres potentially suitable for ash disposal.
*	Estimated potential capacity 0.5 million cubic yards.
*	GB groundwater class GC Classifiable
	Limekiln Brook C/B class.



## DANBURY - SITE NO. 14

### *HYDROGEOLOGY*

- \* Approximately 40 feet of stratified drift soils overlies bedrock. Sediments are primarily silt with a layer of sand at the surface.
- \* Depth to water table is less than 5 feet.
- \* The dilution ratio is 610:1 at low flow (7Q10) conditions assuming 6" of recharge per year.

### *ENVIRONMENT*

- \* The 100 year flood elevation is 293.5 feet above mean sea level. The existing ground in the study area is at elevation 294. Elevation 300 was used as the base grade of the landform proposed by the City in their Landfill application.
- \* The Limekiln Brook has a C/B class. The B goal indicates the Department's goal is to restore the river to fishable/swimmable water quality.
- \* Wetlands in the expansion area were proposed to be overfilled in the City's 1986 expansion application and local approval to fill the wetlands has been given.
- \* Connecticut's Natural Resource Inventory identified a species of special concern in the wetland east of the existing landfill.
- \* No archeological sites are known or anticipated.

### *AREA LANDUSE*

- \* The study area has a landfill expansion application pending. It is adjacent to an active, permitted landfill, the City's Public Works facility and the municipal sewage treatment plant.
- \* Present plans for the study area are for use as a municipal solid waste landfill. However, because of elevated ammonia concentrations in Limekiln Brook, the site cannot be used for municipal solid waste until the sewage treatment plant is upgraded.



NEW HAVEN - SITE NO. 40

*HYDROGEOLOGY*

\* In excess of 100 feet of stratified drift sediments overlie bedrock. Approximately 50 feet of artificial fill and swamp deposits overlie a thick sand unit.

\* Due to the potential for salt water intrusion to local groundwater, the study area is not viable as a public water supply source.

\* Depth to water table is approximately 15 feet.

\* The dilution ratio is 49,000:1 at low flow (7Q10) conditions assuming 6" of recharge per year.

*ENVIRONMENT*

\* The 100 year flood elevation is 10 feet above mean sea level. The existing ground in the study area is approximately at elevation 20.

\* The Little River has an SB class, which indicates the river has a fishable/swimmable water quality.

\* Connecticut's Natural Resource Inventory identified the site as being within the Quinnipiac Marshes Natural Area, although the study area itself is no longer in its natural state. This Natural Area also contains a wetland of special concern and a vegetative species of special concern.

*AREA LANDUSE*

\* The study area is adjacent to an active, permitted landfill.

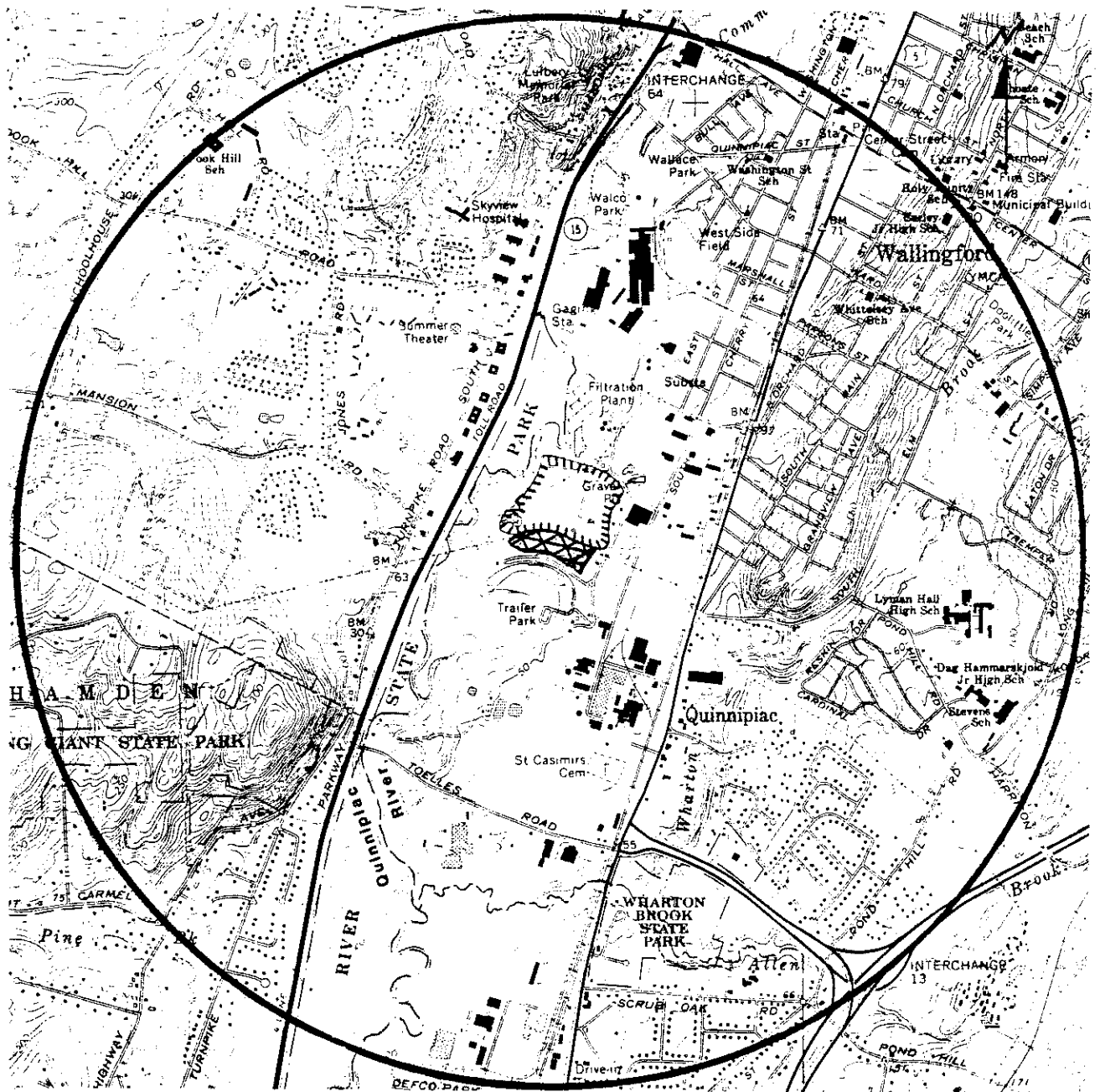
\* Side slopes of the existing municipal landfill, the fill material historically placed in the area and the swamp deposits underlying the fill all have been assumed to be suitable to serve as a base for a liner for this review process.

\* No visual screening exists between the potential landform and landuses to the east.

\* Two landowners are involved.

WALLINGFORD ASH LANDFILL #67 - South of existing landfill

*	A sandy flat sparsely vegetated field, bounded by the landfill and sewage treatment plant to the north and heavy industry to the east and southeast. A small trailer park is 600 feet to the south, with a limited buffer. Suburban development is on hillsides 2000 feet to the east and west.
*	6 acres permitted for interim ash residue disposal.
*	Permitted capacity 0.25 million cubic yards.
*	GB/GB/GC groundwater class                      Quinnipiac River C/B class



## WALLINGFORD - SITE NO. 67

### *HYDROGEOLOGY*

\* Approximately 30 feet of stratified drift soils overlies a silt and clay unit approximately 100 feet thick. Beneath the clay approximately 40 feet of sand overlies bedrock.

\* Depth to water table is approximately 10 feet.

\* The dilution ratio is 8,000:1 at low flow (7Q10) conditions assuming 6" of recharge per year.

### *ENVIRONMENT*

\* The 100 year flood elevation is 26 feet above mean sea level. The existing ground in the study area is approximately at elevation 34.

\* The Quinnipiac River has a C/B class. The B goal indicates the Department's goal is to restore fishable/swimmable water quality. The Quinnipiac River has existing anadromous fisheries.

\* Connecticut's Natural Resource Inventory identified no sites immediately adjacent to the area.

### *AREA LANDUSE*

\* The study area is an active, unlined ash residue landfill, adjacent to an active solid waste landfill.

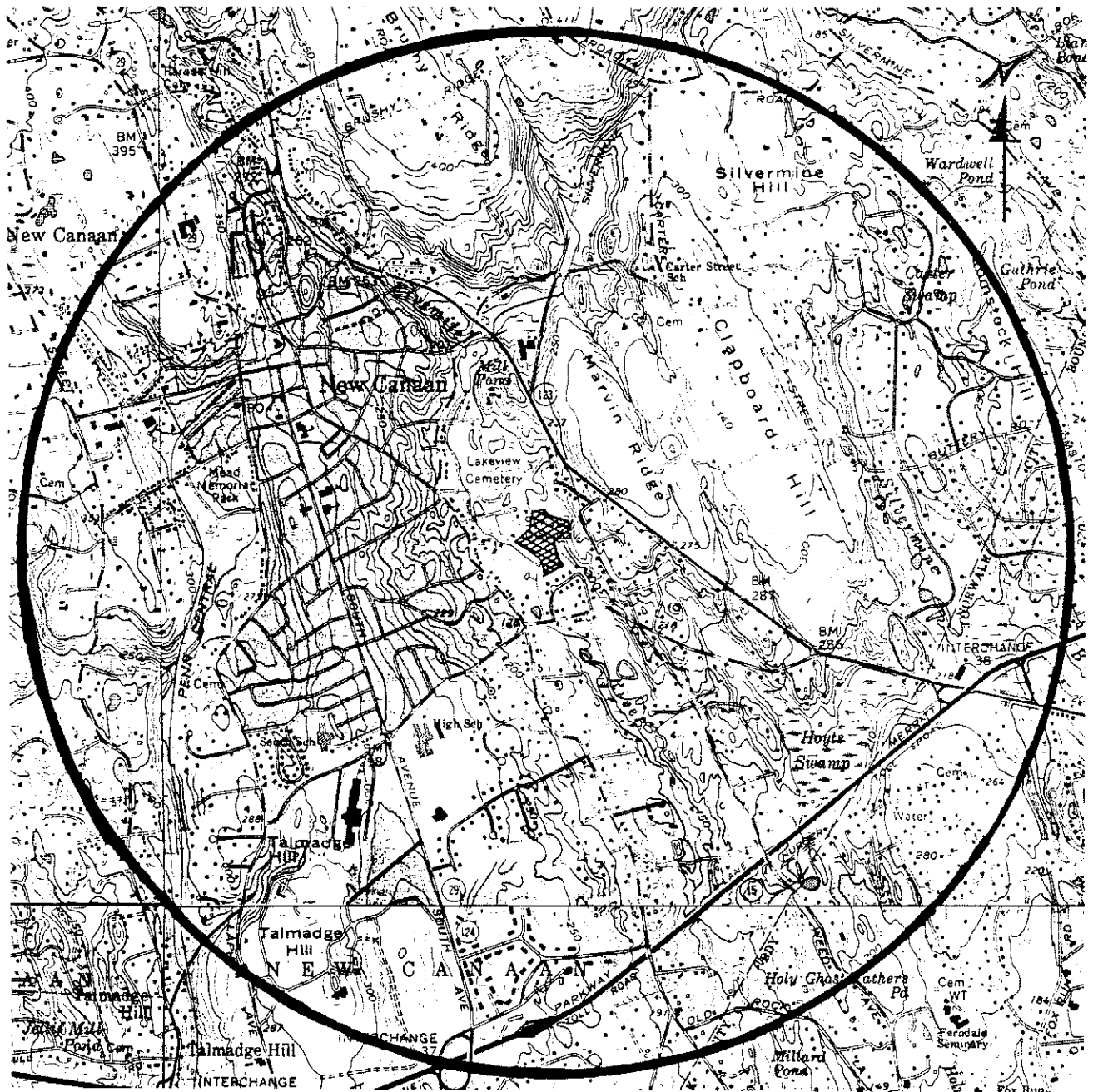
\* The Quinnipiac River Wildlife Management Area is located across the river, approximately 1000 feet from the site.

\* Rail access to the site is feasible by building a 1500 foot spur line and associated right-of-ways.

\* Natural visual screening is limited between the suburban developments on the valley's hillsides and the ash landfill with adjacent industrial landuses.



NEW CANAAN #38 - Existing ash landfill, Old King's Highway		
*	Active 10 acre ash landfill adjacent to existing municipal waste incinerator and sewage treatment plant. Separated from suburban residential neighborhoods by narrow wooded buffers.	
*	Estimated capacity of a lined disposal area is 0.1 million cubic yards.	
*	GB/GA groundwater class GC Classifiable	Fivemile River C/B class.



## NEW CANAAN - SITE NO. 38

### *HYDROGEOLOGY*

- \* Up to 10 feet of stratified drift overlies till soils and bedrock.
- \* The dilution ratio is 200:1 at low flow (7Q10) conditions assuming 6" of recharge per year over the full existing landfill.

### *ENVIRONMENT*

- \* The 100 year flood elevation is 164 feet above mean sea level. The existing ground in the study area is approximately at elevation 200.
- \* The Fivemile River has a C/B class indicating the Department's goal is to restore fishable/swimmable water quality.

### *AREA LANDUSE*

- \* The study area is an active, permitted landfill. As with other ash residue disposal sites, this site will need to have a liner installed with leachate collection if it is to remain in operation following the adoption of the State's residue disposal regulations.
- \* For this review process, it has been assumed that the ash landfilled on the site will provide an adequate base for the installation of a liner and full utilization of the remaining capacity can occur.
- \* Filling of portions of the site with bulky wastes may have limited the feasibility of the construction of a liner.
- \* No changes in the existing relationship between the site and neighboring landuses are anticipated by this change of landfill status.