F. HYDROLOGY, DRAINAGE AND WATER QUALITY

This section addresses the impact that development places on the Study Area with respect to increased stormwater flows and effects on overall water quality conditions. Estimates of the rate of stormwater runoff have been made for existing and proposed conditions and methods of mitigating the impacts have been introduced and evaluated with respect to each drainage basin within the Study Area.

Although specific mitigation measures are discussed later in this section, it is recommended that all measures be incorporated into a comprehensive stormwater management plan which can be implemented for the Study Area. It is recognized that the Town of Colonie has adopted a Standard Format for Stormwater Management Plans and Report which establishes fairly comprehensive guidelines for stormwater management within the Town. Therefore, recommendations in this FGEIS have been made in a manner which are generally consistent with these standards. One exception to this is the portion of Shaker Creek which flows through the Village of Colonie. Most of this watershed within the Village is developed and the portion impacted by the proposed Shaker Run project was reviewed by the NYSDEC.

The Study Area comprises approximately ±8,500 acres. However, to adequately evaluate the hydrologic characteristics within the Study Area it is necessary to include other areas within this analysis. Therefore, hydrologic models that have been developed to evaluate hydrologic characteristics include outlying tributary drainage areas comprised of approximately ±10,267 acres.

The watersheds which are potentially impacted by projected development within the Study Area are: 1) Mohawk River; 2) Sand Creek; 3) Shiffendeckers Pond; 4) Shaker Creek; 5) Vly Creek; 6) Lisha Kill and 7) Delphus Kill. The Study Area and tributary drainage areas are shown on Exhibit II-F-1. In order to determine

stormwater runoff quantities, the Q-TR55 and TR-20 computer programs by Haestad Methods Inc., were used which incorporate the USDA Soil Conservation Service Model TR-55 and TR-20. These are widely accepted computer programs which are used extensively to predict stormwater runoff. For the purposes of this analysis, the drainage areas delineated on Exhibit II-F-1 are divided into sub-watersheds, which are also shown on this Exhibit. Topographic input parameters for this model were taken from 7.5 minute USGS topographic mapping, aerial photographs, Town of Colonie maps, and field visits. Estimated pre and post development stormwater flows are summarized in Table II-F-1 below.

TABLE II-F-I

PRE AND POST DEVELOPMENT FLOWS

	ACRES	STORMWATER FLOWS (CFS)							
		5-YEAR		10-YEAR		25-YEAR		100-YEAR	
WATERSHED	DA*	PRE	+POST	PRE	+POST	PRE	+POST	PRE	+POST
SHAKER CREEK	7965	691	888	1169	1426	1450	1734	2314	2674
SAND CREEK	179	2	9	9	21	13	31	32	83
VLY CREEK	380	64	64	134	134	178	175	297	297
LISHA KILL	1679	43	61	119	143	168	196	399	435
SHIFFENDECKERS POND	284	292	292	415	415	483	483	673	673
DELPHUS KILL	72	87	101	116	132	131	142	172	189
MOHAWK RIVER	810	501	561	767	853	921	1006	1370	1484

* Drainage areas (DA) are portion of total actual watershed for that body of water which lies within the Study Area.

\+ Post development flows are calculated as if flow from future development were unmitigated.

KEY

DRAINAGE AREA BOUNDARY

SUB AREA DRAINAGE BOUNDARY

N

500 0 800 2400 4000

VLY CREEK DRAINAGE AREA

PROJECT STUDY AREA

MOHAWK RIVER DRAINAGE AREA

DELPHUS KILL DRAINAGE AREA

SHAKER CREEK DRAINAGE AREA

LISHA KILL DRAINAGE AREA

SHIFFENDECKERS POND DRAINAGE AREA

SAND CREEK DRAINAGE AREA

CLOUGH, HARBOUR & ASSOCIATES
ENGINEERS & PLANNERS
3 WINNERS CIRCLE ALBANY, N.Y., 12205

DRAINAGE AREA BOUNDARY MAP

EXHIBIT NO.

II – F – 1

AIRPORT AREA GENERIC ENVIROMENTAL IMPACT STATEMENT

1. Existing Drainage Patterns and Stormwater Flows:

a. Shaker Creek

By far, the largest portion of the Study Area is encompassed by the Shaker Creek drainage area. The entire Shaker Creek drainage area is approximately 7,600 acres, of which 6,100 acres lie within the Study Area. Shaker Creek is comprised of three major and several minor branches. The main branch flows south to north, beginning at Ann Lee Pond and continuing north to the Mohawk River. The south branch is the main feeder to Ann Lee Pond and begins near Vly Road to the west and near the Northway to the east; the east branch flows north from near the intersection of Maxwell Road and Route 9 to its confluence with the main branch just north of Route 7. A minor tributary enters the main branch from the west, just south of Sicker Road. Another tributary to Shaker Creek, which is defined as the west branch, originates from both Memory Garden Cemetery and Shaker Ridge Country Club. The west branch contains two impoundment structures: one in Memory Garden and another downstream on the Country Club. This branch then flows generally due east past the Albany County Jail and under Albany Shaker Road to its confluence with the main branch just north of the Airport's main terminal building.

The topography of the Shaker Creek drainage area ranges from gently rolling hills in the area of Shaker Ridge Country Club to nearly flat in a large area adjacent to the Airport. The hydrologic and hydraulic nature of Shaker Creek have been drastically altered over the years and as such some localized flooding problems exist along its route.

The most notable for frequent flooding problems is the main branch of Shaker Creek from the Airport to a point just north of Mill Road. There are several probable factors which contribute to the flooding in this area: 1)

increased peak flows and runoff volumes due to the development of major public and private facilities in the area; 2) reduced floodplain storage capacity due to filling operations; 3) inadequate channel capacity due to siltation from agricultural and construction operations; and 4) stream crossings with inadequate capacity to pass peak flows.

Water quality has long been a problem along the entire length of Shaker Creek and in Ann Lee Pond. Ann Lee Pond is a relatively shallow man-made pond, the bottom of which still contains the stumps of the trees that were standing on the site when it was created. The high vegetative growth in the pond, experienced during the spring and summer months, as well as the high levels of turbidity, nitrogen, and phosphorous, sampled under previous studies conducted in 1973 and 1979 indicates that the pond is presently in a hyper eutrophic state; that is to say that it contains an overabundance of nutrients. The eutrophication process is directly related to the overproduction in the aquatic food chain. One additional factor which affects the accelerated eutrophication rate is the high ratio of surface area to volume. It is apparent that the heavy nutrient loading is primarily due to non point sources upstream such as agricultural runoff.

In Ann Lee Pond, as well as the rest of the Shaker Creek watershed, soil erosion has exacerbated both the problem of overall water quality and flooding. Inadequate sediment and erosion control throughout the watershed has substantially reduced the life of Ann Lee Pond and the capacity of the channel downstream. Soil erosion within the watershed has a definite negative impact on the water quality of the watershed. Sediment laden stream flow is more erosive than non-sediment laden water; sediment increases turbidity and can destroy fish spawning areas. Sediment also carries with it organic matter, the anaerobic decay of which produces objectionable odors. Sediment deposition in Shaker Creek below

Ann Lee Pond has reduced an already flat channel grade, which in turn, slows base flow velocities down to the point of near standstill in some areas. This further encourages sediment deposition.

Albany County Airport is entirely within the Shaker Creek drainage basin. Consequently, stormwater run off resulting from rain and snow melt drains off paved surfaces at the Airport, enters Shaker Creek at various points, and eventually enters the Mohawk River approximately 1 mile west and upstream of an intake structure to the Latham Water District's filtration plant.

Aircraft utilizing Albany County Airport during the months of October through April often encounter freezing temperatures combined with high humidity and/or precipitation in the form of snow, sleet, or freezing rain. Under these conditions, all aircraft are subject to icing of their wings and fuselage. This is a potentially life threatening situation as ice not only adds weight to the aircraft, but can seriously reduce the amount of lift each wing can produce to permit the aircraft to fly. Failure to de-ice aircraft properly prior to take-off could result in the loss of life and property.

To prevent the buildup of ice on aircraft, airports within the United States make use of ethylene glycol and/or propylene glycol as de-icing compounds. Before application to aircraft surfaces, these compounds are diluted to a mixture generally containing 45-50 percent water. At Albany County Airport, de-icing operations are carried out at both the east and west sides of the main terminal building and directly outside of the Page Avjet and Federal Express hangers.

Recent studies have indicated that approximately 50 percent of the aircraft de-icing mixture used will fall to the ground and find its way into runoff drainage systems. In the case of Albany County Airport, the runoff drains directly

into Shaker Creek and the Mohawk River. Prior to 1989, the airport held a State Pollution Discharge Elimination System (SPDES) permit with a discharge limit for ethylene glycol into Shaker Creek of 575 pounds per day. No limit for propylene glycol was specified.

On January 9, 1989, a revision was made in New York State Drinking Water Standards that stated "Unspecified Organic Contaminants" would be limited to 0.05 mg/l (50 parts per billion) for any drinking water source. This included both ethylene and propylene glycol. During March, 1989 the NYSDEC carried out testing in conjunction with the Albany County Health Department and the Latham Water District. In April 1989, the NYSDEC issued a proposed Order on Consent alleging that the County of Albany, Page Avjet Corporation and the commercial airlines operating from the Airport were causing the discharges of ethylene and propylene glycol to Shaker Creek and were contributing to a condition in contradiction to the revised New York State Drinking Water Standards.

In June 1989, a report was prepared by Clough, Harbour & Associates for Albany County entitled, Albany County Airport Investigation of De-Icing Operations. The primary objective of the study was to develop a suitable de-icing fluid collection and disposal system that would permit the Airport to comply with NYSDEC standards and provide full protection to the Mohawk River as the main water source for the Latham Water District. As of this time, various recommendations have been implemented by Albany County. These actions as well as other measures are further discussed in this section under "Impacts and Mitigation Measures".

b. Vly Creek

Vly Creek also flows through the Study Area. It is located in the northwest corner of the Town of Colonie and flows northward between Vly and Denison Roads into the Town of Niskayuna, before entering the Mohawk River. Vly Creek

begins near a 35-acre NYSDEC regulated wetland (N-13) adjacent to Vly Road and drains approximately 292 acres of the Study Area. Several existing residential subdivisions drain into Vly Creek; however no existing major flooding or water quality problems have been identified.

c. Lisha Kill

The portion of the Lisha Kill drainage area that lies within the Study Area includes approximately 820 acres. This drainage area is the second largest in the Study Area and encompasses areas near Vly and Dennison Roads. Only a very small portion of the Lisha Kill stream channel is in the Study Area (approximately 2,000 feet). Therefore, no major existing flooding conditions or water quality problems were identified.

d. Sand Creek

A small portion of the Study Area (179 acres) just north of Wertman Lane drains into Sand Creek. The Study Area does not contain any portion of the actual stream channel, and therefore, no major existing flooding or water quality problems were identified.

e. Delphus Kill

The portion of the Study Area that drains to the Delphus Kill consists of 72 acres. This acreage encompasses the Adirondack Northway from the Route 2/Route 7 crossing north to Exit 7. No portion of the actual Delphus Kill stream channel lies within the Study Area. Therefore, no major existing flooding or water quality problems were identified in this drainage area.

f. Shiffendeckers Pond

The southern terminus of Wolf Road drains to Shiffendeckers Pond in the Town of Colonie. Portions of both Colonie Center and Northway Mall drain to this pond which, in turn, discharges into Patroon Creek. Approximately 129 acres of the Study Area drains to this pond and no existing flooding problems were identified. Recent development in the area of Colonie Center has decreased rather than increased flows to the pond. Mall owners have installed on-site stormwater infiltration which mitigates water quality as well as quantity.

g. Mohawk River

The Mohawk River forms the northern boundary of the Study Area and is a major river in New York State. The Mohawk River begins just north of Delta Reservoir near the Lewis/Oneida County border and flows generally east through the Mohawk Valley past the Town of Colonie. When it reaches the City of Cohoes it joins the Hudson River. The Mohawk River is considered a navigable waterway and is part of the New York State Barge Canal system. As such, it is under the jurisdiction of both the US Army Corps of Engineers and the New York State Department of Transportation - Waterways Maintenance Division. The Mohawk River intersects the Study Area at one of the River's widest points. The Town of Colonie utilizes the River as a raw water supply with an intake just downstream from the Study Area. The City of Cohoes also uses the River as a raw water supply. Since the River is used as a source for water, the NYSDEC has given the River a Class A rating. The Mohawk River serves as a significant recreational resource for the region as well as habitat for a diverse number of plant and animal species. The portion of the Study Area which drains directly to the Mohawk River comprises

approximately 810 acres. The flow to the River from this drainage area is via many ravines. Intermittent streams and drainage swales in this area flow independently of each other.

Impacts and Mitigation Measures:

In order to quantify the amount of runoff generated in the Study Area, USDA Soil Conservation Service Methods TR-55 and TR-20 computer models were used. These methods, as adapted by Haestad Methods, Inc., are frequently used for watersheds of this size when direct stream gauging and precipitation data is not available.

In applying these computer models to this FGEIS, each watershed shown on Exhibit II-F-1 was divided into sub-watersheds and physical basin parameters were estimated. The models are dependent upon such parameters as basin area, cover type, land use, soil type, and the length and velocity of flow in the basin. These parameters were developed using field reconnaissance and USGS 7.5 minute mapping. The effects of development are reflected in the hydrologic model through changes in cover type (increase in impervious area) and the accompanying increase in the velocity of flow in the basin.

The development of the model for this FGEIS is representative of the initial stages of a hydrologic investigation. As development progresses and more detailed information becomes available, the model can be refined and re-evaluated to become a more effective planning tool for the Town and Village of Colonie and Albany County.

1. Projected Development and Stormwater Flows:

Projected stormwater flows are based on the Cumulative Growth Scenario as depicted on Exhibit II-B-4. Future residential development is expected to be consistent with current zoning densities and future commercial, industrial, and

airport related development is expected to be hydrologically comparable to existing commercial development. The hydrologic analysis for all of the areas has been conducted for the 5, 10, 25, and 100 year storms and for the existing conditions as well as projected conditions for the year 2005. Pre and post-development stormwater flows consistent with the Cumulative Growth Scenario are summarized in Table II-F-1 and described with respect to each of the drainage areas as follows:

a. Shaker Creek

Since the drainage area for Shaker Creek is the largest portion of the Study Area, it follows that the largest portion of the projected development will occur in this area. Development in this area is primarily clustered around British American Boulevard and Sicker Road, just west of I-87 along Watervliet Shaker Road, and Watervliet Shaker Road in the area of South Family Drive. Less intensive development is expected to occur along Troy-Schenectady Road, Wade Road, and Wolf Road.

The hydrologic analysis under the Cumulative Growth Scenario indicates an increase in peak flows of nearly 15 percent. Unmitigated, this increase in flow will exacerbate already frequent flooding problems experienced at various locations along the Creek from Ann Lee Pond to Old Niskayuna Road.

Under the Cumulative Growth Scenario, increased nutrient, sediment, chloride, and oil loadings, if left unmitigated, will continue to degrade the quality and life expectancy of Ann Lee Pond and Shaker Creek. Due to numerous flooding and water quality problems in this area which have been identified by County and Town public works officials, special stormwater management techniques will need to be incorporated into future development plans. These techniques are identified in Part 3, Stormwater Management Techniques, and evaluated with respect to Shaker Creek in Part 4.b., Stormwater Management Techniques for Shaker Creek.

b. Vly Creek

The impact of projected development on Vly Creek is expected to be minimal, as only ± 4 acres are to be developed in the drainage area. The development is expected to occur near the Albany/Schenectady County border along Vly Road in the northern portion of the Study Area. In addition to minor impacts on water quantity, it is anticipated that this level of development may have an effect on the water quality of Vly Creek or the Mohawk River. Vly Creek flows directly to the Mohawk River via a relatively short channel and, as such, special water quality management techniques should be instituted in this area. Stormwater management techniques are identified in Part 3, Stormwater Management Techniques, and evaluated with respect to Vly Creek in Part 4.a.

c. Lisha Kill

Development by the year 2005 is expected to occur in the Lisha Kill portion of the Study Area, primarily along New Karner Road. Calculations indicate that the unmitigated flow caused by the projected development will represent an increase in stormwater flows by 9 percent for the 100-year storm. If this increase in stormwater flows was not mitigated, then it would likely create flooding problems in downstream areas. If current stormwater management requirements are met, then this development is expected to have little impact on the quantity of stormwater runoff.

d. Sand Creek

Projected development in the portion of the Study Area that drains to Sand Creek is expected to be minimal, encompassing only 35 acres. This is a small portion of the total Sand Creek drainage area. Therefore, proposed

development is expected to have a minimal impact on Sand Creek in terms of water quantity or quality assuming current Town of Colonie stormwater management requirements are met.

e. Delphus Kill

Projected development under the Cumulative Growth Scenario is minimal in the portion of the Study Area that drains to the Delphus Kill. Development is expected to consist of two commercial office projects with a total impacted an area of less than 50 acres. As no existing flooding or water quality problems are identified in this area, projected development will not create future flooding problems if current Town of Colonie stormwater management requirements are met.

f. Shiffendeckers Pond

Projected development under the Cumulative Growth Scenario for this area is minimal. It is anticipated that only 2 acres of land will be further developed. Since no existing flooding problems have been identified, projected development will have no significant impact on Shiffendeckers Pond if current Town of Colonie stormwater management requirements are met.

g. Mohawk River

With the exception of Sand Creek and Shiffendeckers Pond, the entire Study Area eventually drains to the Mohawk River. This section addresses the portions of the Study Area which drain directly to the Mohawk River. This is generally limited to those lands within the Study Area which are north of Route 7 (see Exhibit II-F-1). Development in this area is expected to consist of a few expansions of existing commercial operations and approximately 150 acres of new residential housing. Most residential development is expected to occur along the

south side of River Road. Development in this area could drain to either Shaker Creek or directly to the Mohawk River. Due to the area's proximity to the Mohawk River, special stormwater management techniques will be needed to mitigate impacts on water quality. These techniques are identified in Part 3 and evaluated in Part 4.

2. Stormwater Management Design Requirements:

One important element to be considered in developing a stormwater management plan for the Study Area will be to limit peak flows at the Study Area boundary to their current levels or below. This criterion has been established to ensure that any improvements proposed within the Study Area do not compromise conditions downstream. It may also be desirable to limit flows at certain points within the Study Area to their current levels or below to minimize the degree of improvements required in the lower reaches of the Study Area.

In the interest of consistency with Standard Format for Stormwater Management Plans and Reports issued by the Town of Colonie Engineering and Planning Services Department, the following basic criteria should be applicable to any stormwater management plan implemented within the Town or Village in watersheds that have only minor flooding or water quality degradation:

- Peak runoff rates from the project site after development shall not exceed rates prior to development by more than 10 percent or 1 cubic foot per second (cfs), whichever is less, based on a 10-year storm frequency;

- Storage capacity shall be provided on the project site for excess flows resulting from development based on a 25-year storm frequency;

- Provisions for overflow of stormwater for all stormwater management facilities shall be made to prevent loss of life and damage to personal property for storms of up to 100 year frequency;

- Provision must be made for continued conveyance of drainage entering the site from upland watershed areas; and

- Provision must be made for positive drainage from the project site to an existing storm sewer system or drainage course.

See Parts 3 and 4 for special water quality measures that can be taken. See Part 4.b.(iii) for special recommendations to mitigate peak flows in Shaker Creek watershed.

The size of a detention facility or the composition of its discharge may bring a particular project under NYSDEC regulation. Therefore, a stormwater management plan for the Study Area should incorporate, by reference, any applicable regulation and require that the applicant demonstrate that the plan is in compliance with said regulations.

3. Stormwater Management Techniques:

The Stormwater Management Master Plan ultimately implemented for the Study Area, as recommended earlier in this section, should include a combination of stormwater management techniques applied to various areas. Several stormwater management techniques will be explored which, if implemented, may improve conditions downstream of the Study Area. In the discussion of these techniques, downstream benefits will be identified, but will not be discussed at length since downstream improvements must be developed through a detailed floodplain management study and are beyond the scope of this FGEIS. The term "Stormwater Management Techniques" is intended to include techniques that mitigate both the quantity and

quality of stormwater runoff. This section presents a discussion of the following stormwater management techniques:

- Centralized detention with upstream conveyance facilities;
- On-site detention with downstream conveyance facilities;
- Centralized retention/recharge with upstream conveyance facilities; and
- On-site retention/recharge.

A special discussion on modifications to standard wet and dry detention and infiltration basins as they relate to on-site water quality is included in Part 3.e.

The above techniques represent engineering solutions to increased amounts of stormwater runoff and water quality degradation due to development. Outlined below is a general discussion of the four stormwater management techniques which are only intended to present the basic components of each technique. Part 4 will apply the techniques discussed to the different drainage areas within the Study Area.

a. Centralized Detention With Upstream Conveyance Facilities

This alternative would include the construction of a large, centrally located detention facility to serve a large stormwater management area. Flows from storms of low recurrence intervals would be allowed to pass through an outlet designed to limit flows to existing levels or below, depending upon the capacity of downstream facilities. This outlet could be designed to either allow unobstructed conveyance of non-peak flows, or impound a certain amount of water before allowing a discharge to occur. Additionally, the pond would help to settle out solids in the runoff to improve water quality downstream.

Upstream improvements would include selective pipe and channel upgrading to accommodate future peak flows from remote areas within the watershed to the detention facility. Design of these facilities would also need to be adequate to safely convey overflows from the detention facility through downstream watersheds.

Part of the initial implementation process for this alternative would involve the acquisition of land to construct and operate the centralized facility. To avoid the short term effect of increased runoff to downstream watersheds, the detention facility would need to be in place prior to upgrading capacities upstream.

Future development within the stormwater management area served by a centralized detention facility would not be required to provide on-site storage. Developers would be required to provide for continued conveyance of runoff from upstream areas through their project site. Additionally, developers could be required to provide drainage improvements downstream from their site as required to convey excess flows to the detention facility. The impact of development on facilities upstream from the detention basin would be a cumulative effect, not attributable to any single development. As such, developers could be required to pay for a portion of the upstream improvements required at buildout, based on a pre-determined rate structure. The same technique could be applied to the detention facility improvements.

Maintenance associated with a centralized detention facility would include periodic cleaning of outlet pipes, overflow structures, and upstream culverts. Selective channel grading would occasionally be warranted to remedy silt build-up or to repair erosion due to peak flows from large storms. Additionally, landscaping and general grounds upkeep may be required.

b. On-site Detention With Downstream Conveyance Facilities

This alternative is similar to centralized detention except that smaller detention facilities would be located within each development constructed in the Study Area. Storage areas would be designed to hold a design storm volume. The release rate would be limited to pre-development peak flows. Overflow design capacity would be based on the 100-year storm or would be required to meet NYSDEC Dam Safety regulations.

Developers would not be required to make off-site upstream improvements unless they were required to convey upstream flow through their development site. Since the intent of this technique is to limit post-development runoff to pre-development rates, downstream improvements required by the developer would be limited to providing controlled outflow and overflow facilities. Existing inadequate drainage facilities downstream from an on-site detention area would require improvement by the Town or other appropriate jurisdiction.

One of the shortfalls of municipally-owned on-site detention is the exhaustive measures required by the municipality to maintain a potentially great number of small facilities. A maintenance program would be required which would provide for periodic servicing of each facility to ensure its proper operation. As an alternative, the municipality could require that the developers maintain ownership and thus the responsibility of maintenance of the on-site facilities. This, however, would not provide assurance that maintenance would be performed, and the municipality could find it difficult to communicate the fact that the responsibility for maintenance lies with the developer when concerned residents seek such service for failing stormwater management facilities.

On-site detention is attractive with respect to the low capital costs required for implementation. Such costs would be limited to those improvements undertaken to remedy the inadequacy of existing structures.

c. Centralized Retention/Recharge With Upstream Conveyance Facilities

This alternative is similar to centralized detention in that a large, centrally located storage facility would be constructed to serve a large stormwater management area. The basic difference lies in the outlet facility. A retention/recharge basin would not discharge any stormwater until an overflow occurred. The storage volume would still be based on a 25-year design storm; however, the volume required for the recharge basin would probably be greater since the release rate is limited to the rate at which stormwater percolates into the ground. Effective functioning of recharge facilities would require that the site soils be permeable and well drained. The nature of retention/recharge precludes its use for the control of runoff on an existing stream, since the flow of the stream would be interrupted.

d. On-site Retention/Recharge

In areas where there are appropriate soils, on-site retention/recharge could be an alternative to on-site detention. Recharge on a small scale could be achieved either through the use of a basin with overflow facilities similar to the on-site detention basin discussed in c. above, or through dry wells. The latter alternative is attractive because it incorporates stormwater management into a closed drainage system, thereby eliminating several of the problems associated with an open basin, such as aesthetic impacts, mosquitos, and health and safety hazards. However, dry well infiltration for most sites, requires substantially greater investment than an open basin.

c. On-site Water Quality Management Facilities

Where permeable, well drained soils without a high water table are available, infiltration of stormwater could be an effective method for removing sediment, nutrients, bacteria, oil and grease for drainage areas up to 50 acres. Infiltration basins could most closely reproduce natural, pre-development, hydrologic conditions. When properly designed and sized, infiltration basins could completely manage peak discharges from design storms, provide groundwater recharge, low flow augmentation, reduce storm runoff volumes and protect downstream channels from erosion. Infiltration basins preserve the natural water balance on a site, could serve larger developments, and could be used as sediment basins during construction with reasonable cost effectiveness.

The largest disadvantage in utilizing infiltration basins is that siting them on unsuitable soils or lack of maintenance could cause them to fail, which would result in standing water. This could create a breeding ground for mosquitoes and possible overuse of the emergency spillway.

Several alternative methods of on-site infiltration have been developed and used in other areas. Among these methods are:

- Drywell infiltration of the first flush of runoff, generally considered to be the first 1/2-inch of runoff which carries the majority of pollutants; and

- Combined infiltration/detention basin. With this type of basin a high frequency (2-year) storm is stored for infiltration, the 10 or 25-year peak is mitigated and the passage of severe storms is provided for.

In areas where poor soils, slow infiltration rates (slower than 1/2-inch per hour), high groundwater, minimum depth to bedrock, steep topography, or large drainage area reduce the effectiveness of on-site infiltration of stormwater runoff, variations of on-site detention basins can be used to mitigate water quality impacts of development. If the stormwater runoff into normally dry detention basins is detained for 24 hours or more (extended detention), then as much as 90 percent of the particulate pollutants can be removed. However, dry extended detention basins only slightly reduce levels of soluble nitrogen, phosphorous, chloride, and other pollutants found in urban runoff. Removal of these pollutants can be enhanced if the normally inundated area of the pond is managed as a shallow marsh or a permanent pool. See Exhibits II-F-2 and II-F-3 for a schematic representation of dry and wet extended detention basins.

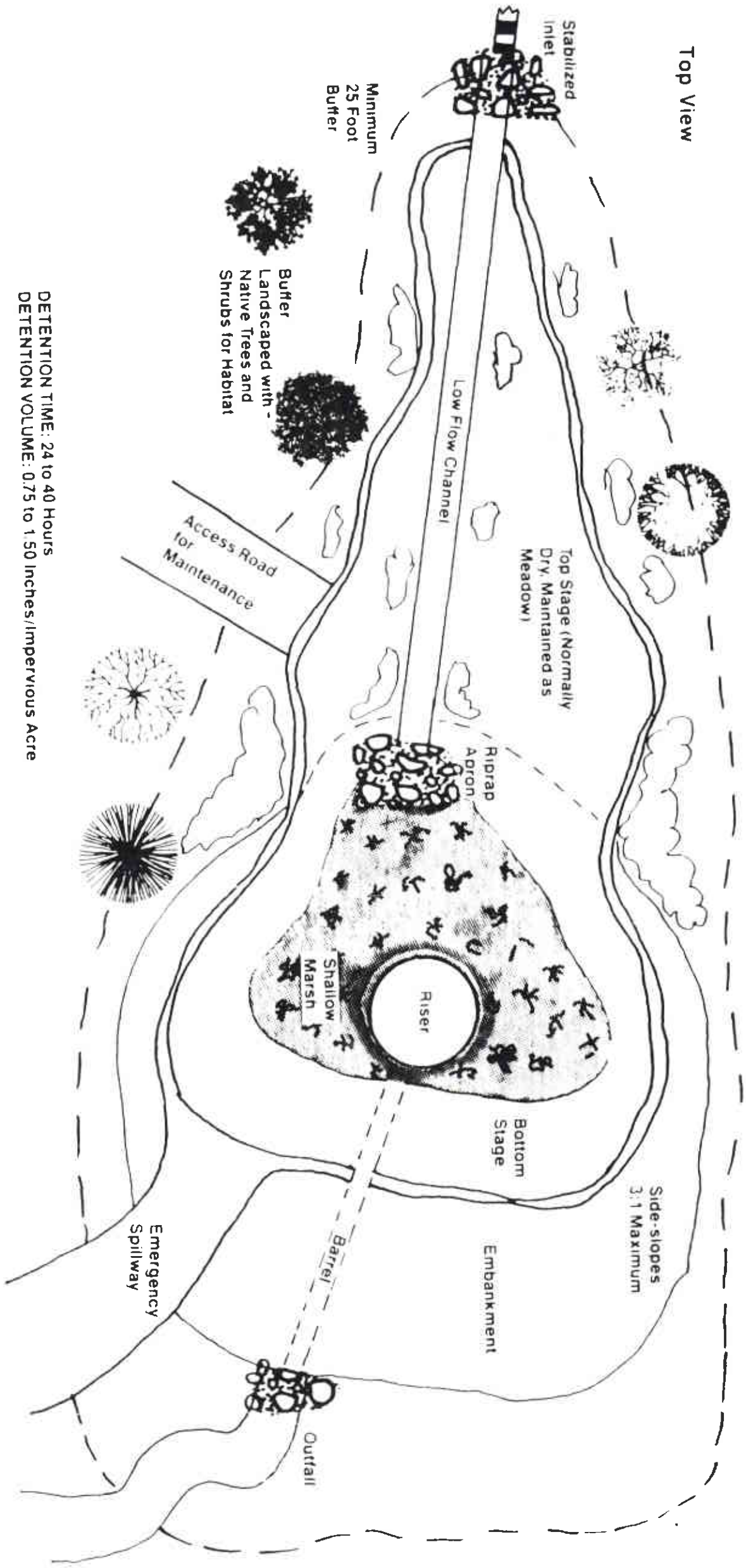
Part 4 below evaluates all of the above identified stormwater management techniques with respect to each of the drainage areas within the Study Area. References to on-site water quality mitigation will refer to whichever technique identified in this section best suits the specific area in question. At this early stage in the planning process specific recommendations for each anticipated site cannot be made as detailed site plans do not exist.

4. Evaluation of Stormwater Management Techniques:

a. General Stormwater Management Techniques

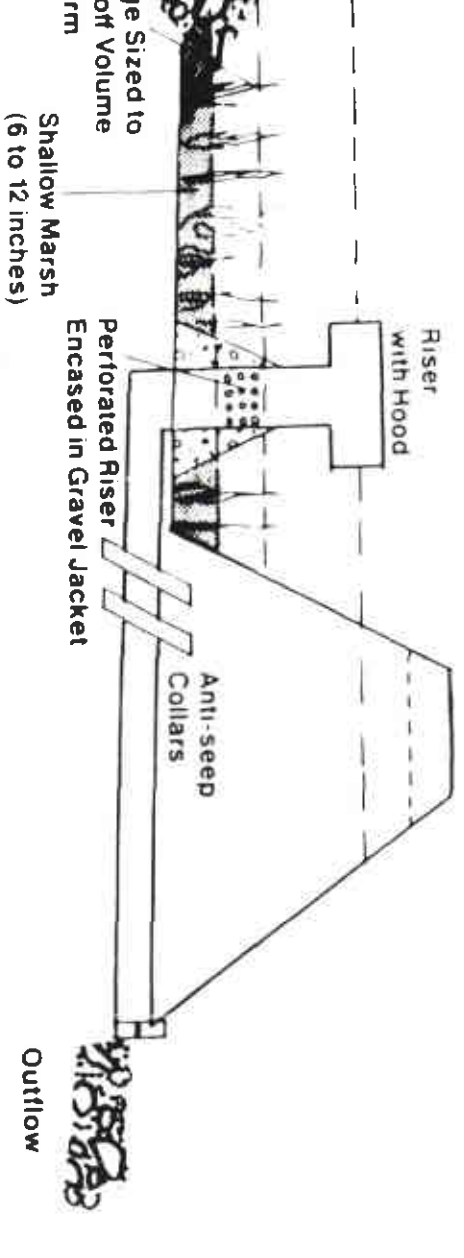
Localized improvements such as upgrading existing drainage culverts and channels to alleviate the inundation of roadways and adjacent land within the Study Area may need to be addressed. It should be understood that the implementation of such short-term improvements may actually worsen conditions in the lower reaches by releasing peak flows sooner. Therefore, any stormwater

Top View



DETENTION TIME: 24 to 40 Hours
DETENTION VOLUME: 0.75 to 1.50 Inches/Impervious Acre

Side View



2% or Greater Slope for Drainage

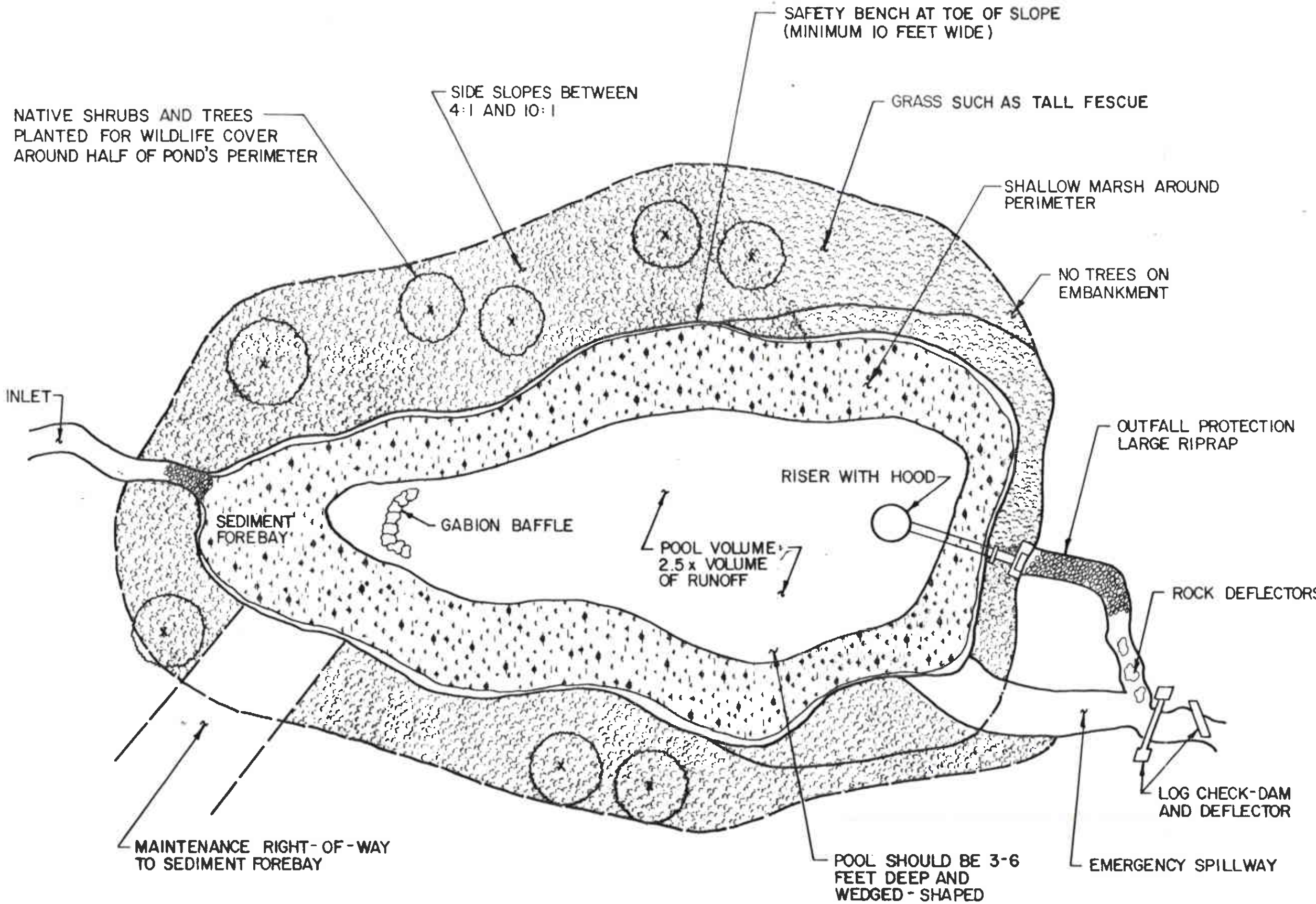
CLOUGH, HARBOUR & ASSOCIATES
ENGINEERS & PLANNERS
3 WINNERS CIRCLE ALBANY, N.Y. 12205

SCHEMATIC OF EXTENDED DETENTION DRY POND

EXHIBIT NO.

II - F - 2

AIRPORT AREA GENERIC ENVIRONMENTAL IMPACT STATEMENT



RESERVE ON-SITE DISPOSAL AREA
FOR DREDGED SEDIMENT

SCHEMATIC OF EXTENDED DETENTION WET POND

AIRPORT AREA GENERIC
ENVIRONMENTAL IMPACT STATEMENT

CLOUGH, HARBOUR & ASSOCIATES
ENGINEERS & PLANNERS
3 WINNERS CIRCLE ALBANY, N.Y. 12205
CHA

EXHIBIT NO. II-F-3

management plan implemented should carefully assess the downstream impact of any improvements.

Based on our investigation of the Study Area and an evaluation of the available stormwater management techniques, centralized detention facilities are rejected as an alternative for all of the watersheds affected by the Study Area for the following reasons:

- The Shaker Creek drainage basin will experience the majority of development during the 15-year planning period. Shaker Creek is a relatively flat, meandering channel with a correspondingly flat drainage basin. This fact will make gravity flow from projected development to a centralized facility difficult. Shaker Creek also experiences frequent flooding at various points along its length. To provide adequate conveyance of increased flow to a centralized facility, existing inadequacies of the system will have to be remedied, which will be very costly; and

- The remaining impacted watersheds within the Study Area do not presently experience significant flooding and are not expected to experience significant development. Therefore, there is no need for centralized facilities in these areas.

It is beyond the scope of this FGEIS to conduct a detailed investigation of alternatives for mitigating existing water quality and flooding problems. However, in areas other than Shaker Creek, existing problems can be addressed as per the discussion in Part 4.b.(iii) below on mitigating impacts of future development. Existing water quality problems may be alleviated by mitigating water quality impacts brought on by future development because

mitigation of future impacts may improve existing downstream conditions. This would depend on the location, condition and use of existing undeveloped land. For example, if an existing 10 acre parcel of land is presently used for agricultural purposes and is poorly managed, implementation of any water quality mitigation measures as a result of proposed development of the parcel could result in the reduction of sediment transported from the site to a stream within the watershed. In the portions of the Study Area which drain to Vly Creek, Lisha Kill, Delphus Kill, Mohawk River, Sand Creek, and Shiffendeckers Pond, mitigating impacts of future development and correcting existing problems should be addressed together. The impacts of future development in the Study Area on both water quality and flooding as well as correcting existing problems can be adequately mitigated by the following methods:

i) **Peak Mitigation**

The current Town policy to limit the 25-year, 24-hour post-development storm to the 10-year, pre-development level should be maintained. The remaining peak stormwater management design requirements identified in Part 2 should also be maintained. Strict adherence to this plan will ensure that runoff from undeveloped sites will not be increased as a result of development, future development will not exacerbate upstream flooding, and impoundment structures will safely pass severe storms. It is important to note that the existing Town of Colonie stormwater regulations do not require applicants to verify that the detainment and slow release of increased stormwater flows will not combine with existing downstream flows to create a more critical situation downstream than existed prior to that development. If it is the Town's desire to insure that this does not occur, then applicants who propose projects in the future should be required to evaluate timing of a project's peak discharge with respect to the timing of the peak discharge downstream.

ii) Water Quality Mitigation

The existing guidelines for soil erosion and sediment control in Highway and Drainage Standards published by the Town of Colonie in 1982, identifies a range of measures which will, in most instances, aid in the control of erosion from construction sites. The regulations address construction sites only and do not address existing urban, agricultural or open lands.

A document entitled New York Guidelines for Urban Erosion and Sediment Control published jointly by the NYS Soil and Water Conservation Committee, Cornell University, NYSDEC, NYSDOT, New York Chapter of the Land Improvement Contractors Association, O'Brien and Gere, and the USDA Soil and Conservation Service in 1988, was prepared to aid design professionals and reviewing agencies in attaining a high level of erosion related damage control. This document includes specifications, details, and design parameters for a wide range of vegetative and structural erosion control measures. Incorporation of this document into Town and Village of Colonie regulations on sediment and erosion control would greatly improve the effectiveness of future sediment and erosion control efforts. Since Albany County is not subject to local regulations, they should also consider adopting those standards for any County sponsored projects within the Study Area.

As previously stated, the watersheds in the Study Area drain to either Class 'A' drinking water supplies or to environmentally sensitive freshwater wetlands. For this reason, special consideration should be given to improving the effectiveness of permanent erosion and sediment control measures, namely on-site detention basins. Several configurations of infiltration and detention basins were identified in Part 3.e. Incorporation of some of these measures into the stormwater management regulations would also improve not only sediment removal but also nutrient, bacteria, trace metal, and Biochemical Oxygen

Demand (BOD) removal. All of the above peak flow and water quality measures can be combined into a revised stormwater management ordinance which can adequately mitigate the impacts of future development. An evaluation of the identified techniques with respect to the Shaker Creek watershed is as follows:

b. Shaker Creek

i) Mitigation of Existing Flooding and Water Quality Problems

The following flooding problem areas have been identified by Albany County and Town of Colonie Public Works officials within the watershed:

Area 1 Frequently the area near the intersection of Old Wolf and Watervliet Shaker Road is inundated and portions of the roadway are closed to traffic. This intersection appears to be a low area with an inadequate culvert crossing. Due to the flat grades downstream it does not appear that a larger culvert could be installed to alleviate the problem. Either a raised road elevation and a larger culvert, or simply a larger culvert with the provision of an adequate outlet channel will help alleviate this problem (see No. 1 Exhibit II-F-4).

Area 2 The intersection of Old Wolf and Albany Shaker Road is a natural low area with an inadequate outlet due to flat downstream grades. This low area is one of the headwater branches of Shaker Creek and is wet throughout the year. It is not a NYSDEC regulated wetland, however there is hydrolytic vegetation on the site. It is not clear whether this is a result of groundwater or of surface water. If there is a surface

water problem, it is not clear whether an adequate outlet could be provided as it may be affected by downstream channel conditions in Shaker Creek (see No. 2 Exhibit II-F-4).

Area 3 Albany Shaker Road in the area of Ann Lee Pond experiences quite frequent flooding, at least three or four times a year, and presents a hazard both to infrastructure and traffic according to Albany County Department of Public Works officials. This problem may be caused by a combination of inadequate temporary flood storage and outlet structure and/or tailwater condition in the Shaker Creek (see No. 3 Exhibit II-F-4).

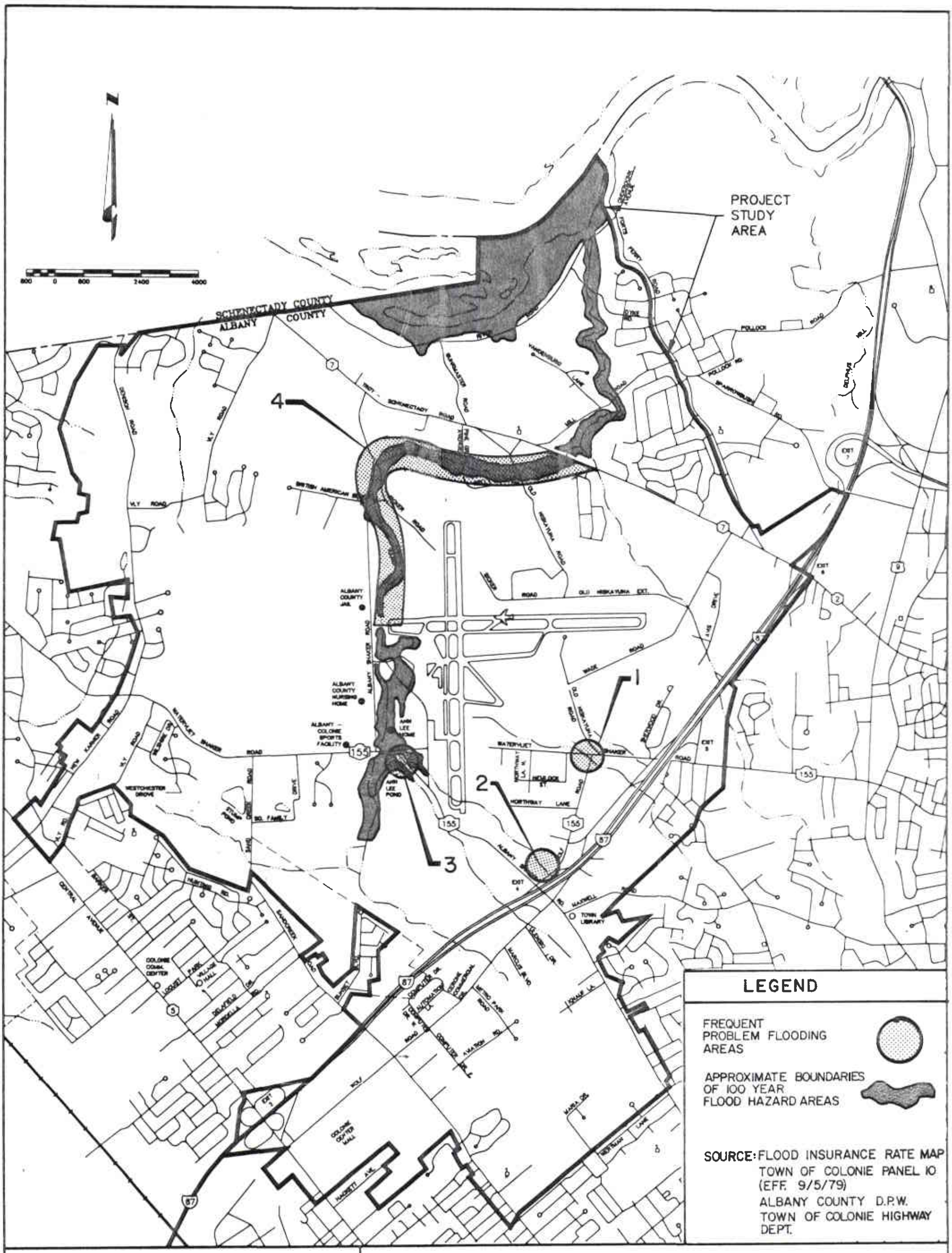
Area 4 Shaker Creek from the Albany County Airport to Route 7, as previously stated, experiences flooding as a result of many contributory factors. This portion of Shaker Creek is part of a relatively large drainage area which has many complex interactive components such as the Airport; Ann Lee Pond; wide, insufficient channel storage; and wetlands (see No. 4 Exhibit II-F-4).

There is no obvious solution to the above existing flooding problems on Shaker Creek. Flooding problems along the Creek are interrelated. A solution in one location could conceivably exacerbate downstream flooding problems. Therefore, to completely resolve flooding problems along Shaker Creek more detailed engineering studies are required which are beyond the scope of this FGEIS.

ii) Mitigation of Existing Water Quality Problems in Ann Lee Pond and Shaker Creek

In Part I.a. Existing Drainage Patterns and Stormwater Flows, several water quality problems were identified such as nutrient, sediment and other pollutant loadings, high vegetative growth, high turbidity, and the potential contamination of surface and groundwater with airport related pollutants. In regard to the hypereutrophic state of Ann Lee Pond, (a chemical analysis conducted in 1973 by Dr. Edward LaRow for the Town of Colonie) identified agricultural runoff as one of the major causes of accelerated eutrophication of Ann Lee Pond. However, this conclusion is dated and there may be other factors which may control the rate of eutrophication of this pond.

The key to controlling the rate of pond eutrophication lies in limiting plant nutrients as well as sediment delivery. As a pond becomes more eutrophic, it is widely accepted that phosphorous becomes the limiting element. Because of this, control of eutrophication by limiting the nitrogen supply during agricultural fertilization is highly questionable. Phosphorous control can be much more effective in controlling the extent of plant growth in the pond. Although the only effective means of preventing or reversing eutrophication is nutrient control, several temporary measures could be used to reduce the nuisance effects in the pond including: artificial mixing of the pond water, harvesting of plants and algae, chemical control, and flushing of the pond by introducing clean water. Harvesting of plants has been favored for clearing swimming and boating areas. However, harvesting is costly and should not be considered as an effective means of removing nutrients from eutrophic ponds since 2 tons of aquatic plants by wet weight contain only about 1 pound of phosphorous and 10 pounds of nitrogen. Copper sulfate could be used for control of algae, however, accumulation of it in lake sediments can be toxic to fish.



CLOUGH, HARBOUR & ASSOCIATES
ENGINEERS & PLANNERS
3 WINNERS CIRCLE ALBANY, N.Y. 12205

PROBLEM FLOODING AREAS

EXHIBIT NO.

II - F - 4

AIRPORT AREA GENERIC ENVIRONMENTAL IMPACT STATEMENT

Sediment delivery to Ann Lee Pond and Shaker Creek has also been identified as a major problem. Sediment delivery can be mitigated through the adoption of stringent sediment and erosion control regulations in the watershed. The USDA Soil Conservation Service in conjunction with the local Soil and Water Conservation District can provide individual conservation plans for agricultural operations in the watershed.

Town and Village officials could request from the Albany County Soil and Water Conservation District a Memorandum Of Understanding (MOU) which could allow the Federal USDA Soil Conservation Service to provide technical services to the Town, Village, or County. However, the availability and extent of the services that could be provided by the Albany County Soil and Water Conservation District Office is heavily dependent on federal funding. According the Albany County Planning Department the District office is currently operating on 50 percent of its requested funding for 1991. The District Office received no funding for fiscal year 1990 and currently has limited staff consisting of the District Manager and part-time receptionist. Therefore, under current conditions, services that the Albany County Soil and Water Conservation District Office could provide would be limited. The services that could be available through this MOU range from a federally funded design and a subsequent, partially funded construction project under the Resource Conservation and Development (RC&D) program to soil and water conservation plans for all of the landowners in the drainage area.

Potential contamination of surface and subsurface water from airport related pollutants has also been identified as a water quality problem in the area. In the year 2005 an additional 1,491,000 passenger enplanements over 1989 figures are projected to occur on an annual basis at Albany County Airport. The resulting increase in aircraft departures will effectively increase the amount

of de-icing compounds used during the winter months at this facility. However, management at Albany County Airport has already taken the following actions to comply with the new State Drinking Water Standards:

- As a preliminary step in reducing the environmental effects of de-icing operations, the fixed base operator and airlines at Albany County Airport have switched to the utilization of propylene glycol exclusively. This compound is a common food additive and is less toxic than ethylene glycol. It is, however, still regulated by NYS Drinking Water Standards;

- Albany County has constructed a $5 million collection and retention system to collect propylene glycol which runs off the aircrafts and enters the drainage system. Three areas of the Airport have been incorporated into this collection network. They are the terminal apron areas to the east and west of the terminal building and the general aviation apron area which includes the areas in front of the Page Avjet and Federal Express hangars. Runoff from these areas is collected and piped to a 3.5 million gallon equalization basin located in the northwest quadrant of the airport. Presently, the runoff is pumped into tank trucks and hauled to the Albany County Sewer District's North Wastewater Treatment Plant. Ultimately, the equalization basin should be connected to the Albany County Sewer District so the runoff can be directly discharged through the sewer system at a controlled and continuous pumping rate for treatment. This plant has a design capacity of 35 million gallons per

day (MGD) and is presently only treating 21 MGD of wastewater. Therefore, treating airport runoff will not significantly increase sewage flows at the treatment plant; and

- Albany County is presently developing a Best Management Plan to control the application of propylene glycol at the Airport. The purpose of this plan will be to implement procedures that will control and minimize the use of propylene glycol to de-ice aircraft. Some possible measures may include: 1) establishing training programs to increase technical competence to eliminate over de-icing of aircraft; 2) developing procedures that ensure de-icing is performed at the last possible moment prior to take-off, thus minimizing the opportunity for aircraft to be de-iced more than once; 3) using different de-icing procedures depending on weather conditions such as the use of forced air to remove light, dry snow or the use of hot water de-icing when air temperature is above one 1^{0} centigrade (34^{0} Fahrenheit).

iii) Mitigating Impacts of Future Development on Water Quality and Flooding

Implementation of the water quality management techniques identified in Part 3.e. and 4.b. will adequately mitigate the impacts that future development will have on water quality in Shaker Creek.

As the Shaker Creek watershed now experiences frequent and sometimes extensive flooding, some modifications to existing Town of Colonie

stormwater management regulations could be implemented which will help prevent future development from increasing the risk of flooding of the creek. Specifically, the following changes are suggested:

- o limit the 10-year post-development peak flow to the 10-year pre-development level;
- o limit the 25-year post-development discharge to the 25-year pre-development level;
- o limit the 50-year post-development discharge to the 50-year pre-development level;
- o overflow design capacities of all stormwater retention/detention basins should meet NYSDEC Dam Safety Regulations; and
- o incorporate New York Guidelines for Urban Erosion and Sediment Control into the regulations.

Mitigation of the lower frequency storm (50-year) will likely provide over mitigation of the higher frequency storms and this will help to alleviate existing flooding problems. The design of single stage structures to mitigate these less frequent storms, generally provides greater storage than is needed to mitigate the more frequent storms.