

SURFACE WATER & DRAINAGE TECHNICAL REPORT

BOGHT ROAD - COLUMBIA STREET AREA

TOWN OF COLONIE, NEW YORK

TOWN OF COLONIE PLANNING BOARD

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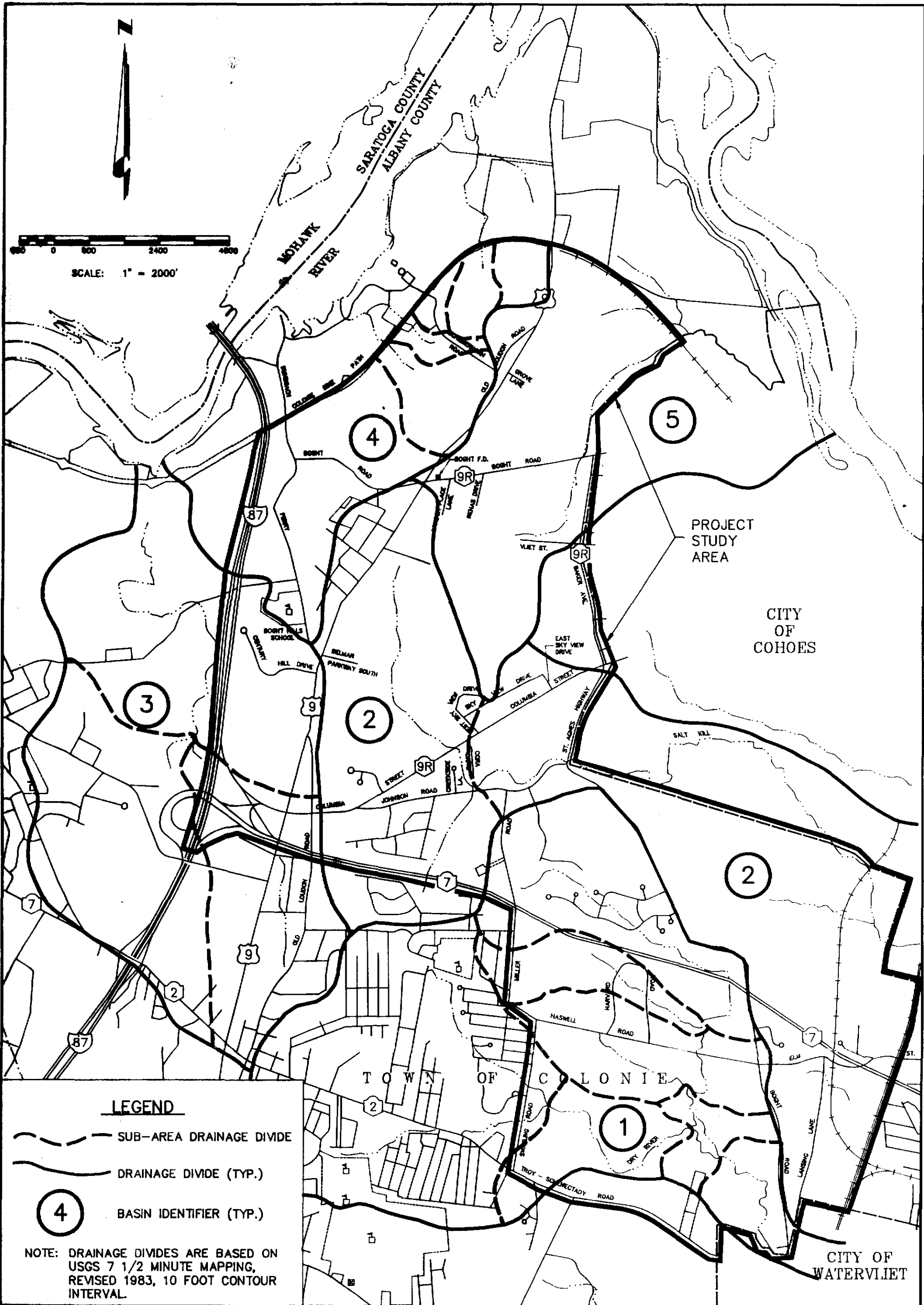
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This technical report addresses the impact that development places on the study area with respect to increased stormwater flows. Estimates of the volume and rate of stormwater runoff under existing and proposed conditions have been made and methods of mitigating the impacts have also been investigated. Design parameters for proposed facilities have been made in accordance with the ordinances in the Town of Colonie and the regulations of the New York State Department of Environmental Conservation.

I. DESCRIPTION OF STUDY AREA:

The Boght Road study area is bounded on the west by Interstate 87 (the Adirondack Northway), on the north by the Town of Colonie bike path, on the east by the Town line, on the south by a line which begins at the Intersection of I-87 and Sparrowbush Road, runs east/west along Sparrowbush Road until it intersects NYS Route 9. The line then runs north/south along Route 9 for a minimal length before running east/west along Route 7A, the southern boundary line, then runs north/south along Miller Road and Haswell Road, then runs east/west along Route 2, until it intersects the Delaware and Hudson railroad bed.

In developing a hydrologic model for the study area, it was necessary to consider runoff contributions from areas outside of the study area. These outlying areas extend to the Town of Colonie bike path to the north, Forts Ferry Road to the west, Shaker High School to the south, and to the study area boundary to the east. Exhibit 1 depicts these drainage area boundaries. For the purposes of this report, the term "study area" shall refer to the area within the study limits and the term "drainage area" shall refer to the study area and outlying tributary areas. This section shall address both areas in terms of existing and future runoff. However, since the scope of this study is directed toward the impact of future development within the study area, stormwater management techniques will be



applied primarily to those areas which are currently undeveloped within the study area.

Elevations within the Boght Road Drainage area range from nearly 400 feet above Mean Sea Level (MSL) near Route 7A to 250 MSL feet at a various locations along the Mohawk River. Topography over the area varies from undulating to flat and swampy.

The hydrologic characteristics of the soils within the study area are relatively consistent, with the area dominated by somewhat poorly drained soils of glacial and lacustrine origin. The poorly drained soils in the study area result in a high potential for runoff.

Land use within the study area has been limited to sparse residential development around existing roadways and commercial development limited primarily to the area along Route 9. The majority of the study area is medium density woods and fallow agricultural fields.

II. EXISTING DRAINAGE PATTERNS AND STORMWATER FLOWS:

The study area is comprised of approximately 4,100 acres. The drainage area is comprised of approximately 7,260 acres. As stated before, it is the intent of this study to offer alternatives for stormwater management that preserve the natural drainage patterns of the area. With this emphasis in mind, the study area was divided into five (5) drainage areas. Each drainage area is then broken down into further subareas for analysis which are described below. See Exhibit 1 for a drainage area boundary map and Exhibit 2 for a summary table of stormwater flows.

DRAINAGE BASIN	5 YR STORM			10 YR STORM			25 YR STORM			100 YR STORM		
	Existing Cond.	1999 Buildout	2009 Buildout	Existing Cond.	1999 Buildout	2009 Buildout	Existing Cond.	1999 Buildout	2009 Buildout	Existing Cond.	1999 Buildout	2009 Buildout
AREA 1	1112	1178	1184	1576	1618	1625	1811	1840	1848	2490	2490	2494
AREA 2	900	1309	1329	1316	1913	1922	1535	2238	2247	2164	3146	3156
AREA 3	512	546	571	797	841	942	931	1058	1098	1421	1499	1544
AREA 4	209	N/A*	366	331	N/A*	523	425	N/A*	623	637	N/A*	895
AREA 5	389	408	702	596	621	994	702	731	1151	1028	1064	1599

* THERE IS NO PROJECTED 1999 BUILDOUT FOR THIS AREA



**CLOUGH, HARBOUR
& ASSOCIATES**
ENGINEERS & PLANNERS

PEAK STORMWATER FLOWS
(CFS)

EXHIBIT 2

BOGHT ROAD – COLUMBIA STREET AREA, DRAFT GEIS, TOWN OF COLONIE

A. AREA 1:

Drainage Area 1 drains essentially to the east which comprises the Dry Creek and its tributaries. These streams have all been classified as Class D streams on the Natural Surface Drainage Map in the Town of Colonie Environmental Inventory. The point of analysis for this drainage basin is where the Dry Creek exits the study area. The area draining to this point is approximately 2,020 acres. The computer model of Area 1 has been divided into seven subwatersheds for the purpose of analysis. Water from off site tributary drainage areas enter the study area via a seven (7) foot corrugated metal pipe arch. Existing detention facilities within the drainage area consist mainly of a flood control dam located on the downstream portion of the Dry Creek. Additional facilities consist of small storm sewer systems installed in a few recent developments. Problem areas identified include slope failures on the banks of the Dry Creek downstream of the dam and localized flooding in the vicinity of Hay Path and Meadow Brook Road. No other problems are known to exist in this watershed.

B. AREA 2:

The main flow path for this area is a central stream, the Salt Kill Creek, beginning at the northern end of the drainage area just east of Route 9 and south of Meadow Street. The stream then flows in a southwesterly direction across Route 9R before leaving the study area near the intersection of Boght Road and St. Agnes Highway. The Salt Kill flows through a relatively undeveloped portion of the City of Cohoes and then re-enters the study area. Shortly thereafter an unnamed tributary enters the Salt Kill, approximately 2,000 feet downstream the creek leaves the study area again and enters the Hudson River in the Village of Green

Island. Included in this drainage area is a large portion of the commercial and residential development along Route 9 and Route 7A.

This drainage area contains approximately two thousand one hundred fifty two (2,152) acres and for the purpose of this analysis is broken into two (2) subareas. No problem areas have been identified in this watershed. Existing detention facilities are located in several relatively new developments and consist of small storm sewer systems without any significant detention facilities. This study assumes any detention facilities in this area have little effect on the overall peak discharges. No stormwater problem areas are known to exist in this watershed.

C. AREA 3:

This watershed drains to the west from Route 9 and then north past Route 87, and is essentially comprised of the commercial zone between the two (2) highways. Water eventually enters the Mohawk River via the Delphus Kill which has been classified as a Class D stream. The point of analysis for this watershed is at the confluence of the Delphus Kill with the Mohawk River where the drainage area is approximately 1,430 acres.

For the purpose of this analysis the watershed has been divided into three (3) subwatersheds, all of which are tributaries to the Delphus Kill. Existing stormwater facilities in this area are similar to those in Area 2, several small storm sewer systems without significant detention, installed in more recent developments.

D. AREA 4:

Drainage Area 4 drains in a northerly direction to the Mohawk River. The watershed is served by several small tributaries, all Class D, which run directly to the Mohawk River. The point of analysis for this watershed is the northern limit of the study area; the Town of Colonie Bike Path. The total area draining to this point is 554 acres.

For the purpose of analysis, the drainage area has been divided into six subwatersheds, all of which are tributaries to the Mohawk River, but do not flow through each other. Existing stormwater facilities in Area 4 are similar to Areas 2 and 3 and no major problems have been identified in this area.

E. AREA 5:

This area contains approximately 1,093 acres, a large portion of which lies outside of the Town of Colonie in the City of Cohoes. The main flow route through this area is an unnamed tributary which flows along the eastern Town line which is also the study area boundary. The unnamed tributary leaves the study area as it crosses under the bike path that borders the northern portion of the study area, and then flows through a fully developed part of the City of Cohoes before entering the Mohawk River. The portion of this drainage area that lies within the study area is quite unpopulated with the exception of Boght Road and a portion of Route 9 which runs along the western boundary of this drainage area. Existing stormwater facilities are very limited and do not provide any significant detention. No problems associated with stormwater have been identified in this area.

III. IMPACTS AND MITIGATION MEASURES

In order to quantify the amount of runoff generated, the USDA Soil Conservation Service Method TR-55 was used. This method, as incorporated into the program Quick-TR-55 by Haestad Methods Inc., is frequently used for watersheds of this size when direct stream gaging and precipitation data is not available.

In applying TR-55 to this study, each of the five (5) watersheds, were divided into sub-watersheds and physical basin parameters were estimated. The models are dependent upon such parameters as basin area, basin cover and land use, soil type, and the length and velocity of flow in the basin. These parameters were developed using field reconnaissance, and USGS 7-1/2 minute mapping. Since the study area is largely undeveloped, a conservative assumption was made to neglect the effects of existing structures. The effects of development are reflected in the hydrologic model input 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 study 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 of Colonie.

IV. PROJECTED BUILDOUT AND STORMWATER FLOWS

Projected stormwater flows are based on estimated future development as depicted on Exhibit II-B-3. Future residential development is expected to be consistent with current zoning densities and future commercial development is expected to be comparable to existing commercial development. The hydrologic analysis for all five (5) of the areas has been conducted for the 5, 10, 25 and 100 year storms and for the existing, projected 1999, and projected 2009

conditions. Impact to the study area associated with the projected ten (10) year and twenty (20) year development is summarized in Exhibit 2 and described with respect to each of the five (5) drainage areas as follows:

A. AREA 1:

The majority of the projected buildout in Drainage Area 1 is expected to occur through the end of 1999 and to consist mostly of residential development with a small commercial area along Troy-Schenectady Road. The projected buildout for the year 2009 predicts a small amount of additional commercial development in the same area. Some of the residential development included in the 1999 projections has already been submitted for review. The projected ten (10) and twenty (20) year development will completely develop the drainage basin.

The hydrologic analysis of the 1999 build-out shows small increases in the peak rates of runoff for the more frequent storms, however, the increase in the peak for the one hundred (100) year storm is not significant. The duration of peak flow is increased as is the volume of runoff.

B. AREA 2:

The 1999 projected buildout is comprised almost entirely of residential development. There is some planned commercial development in the northern and southern extremes of the drainage area, however, this commercial development is not planned until the year 2009. The planned 1999 residential development will essentially complete the development in this area for the study interval. The impact of the residential development in this area will be significant in that the Salt Kill Creek will experience an increase in peak flows of nearly forty percent (40%) with existing detention facilities. The 2009 planned development is almost non-existent and will have negligible impact on downstream flows.

C. AREA 3:

The projected buildout in Drainage Area 3 is to be comprised of only commercial development and is divided evenly between the ten (10) year and twenty (20) year buildout periods. The hydrologic analysis of the 1999 build-out shows that there will be significant increases in peak rates of flow for all of the storm frequencies reported. Since the development is to be exclusively commercial, there will be the added problem of water quality impacts due to increased levels of silts, oils and salts.

D. AREA 4:

The projections for development in Area 4 are for residential development occurring during the period between 1999 and 2009 with only a small amount of commercial development.

The hydrologic analysis shows fairly large increases in peak rates of runoff by the end of the second 10 year period, however, there are no projections of runoff for the first ten (10) year period as there are no goals for development in this time period.

E. AREA 5:

The 1999 proposed development for this area is nearly zero. There is a small amount of commercial development planned along Route 9 and an equivalent amount of residential development planned in the southern reach of this area for this period. As a result of the small amount of planned development through the Year 1999, the increased storm runoff can be expected to be insignificant. The increase is estimated to be 4% from existing conditions. The majority of the planned development for this area is to occur between the Year 1999 and 2009 and is expected to be almost completely residential. The development during this period

will cover eighty-four percent (84%) of the drainage basin within the study area. The resulting impact on runoff in the Year 2009 is estimated to be an eighty percent (80%) increase from existing conditions and a seventy percent (70%) increase from the conditions that will prevail in 1999, if planned development is realized.

V. STORMWATER MANAGEMENT DESIGN REQUIREMENTS

One important element to be considered in developing a stormwater management plan for the Boght Road Study Area will be to limit peak flows at the study area limits 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 criteria should be applicable to any stormwater management plan implemented by the Town:

- o Peak runoff rates from the project site after development shall not exceed rates prior to development by more than 10% or 1 CFS, whichever is less, based on a 10-year storm frequency.
- o Storage capacity shall be provided on the project site for excess flows resulting from development based on a 25-year storm frequency.

- o Provisions for overflow of facilities shall be made for protection against loss of life and damage to personal property for storms of up to 100-year frequency.
- o Provision must be made for continued conveyance of drainage entering the site from upland watershed areas
- o Provision must be made for positive drainage from the project site to an existing storm sewer system or drainage course.

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

VI. STORMWATER MANAGEMENT TECHNIQUES

The Stormwater Management "Master Plan" ultimately implemented by the Town of Colonie for the Boght Road area most likely will 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, that benefit will be identified, but will not be discussed at length, since downstream improvements are beyond the scope of this study. The two basic techniques for stormwater management presented in this section are on-site stormwater management facilities and centralized stormwater management facilities. Also included will be a discussion of detention versus retention/recharge for both of the basic techniques. The possible combinations of the above yield the following:

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

The above techniques represent engineering solutions to increased amounts of stormwater runoff due to development. Following is a general discussion of the four stormwater management techniques. This section is intended to present the basic components of each technique only. Section VII will apply the techniques discussed to the different drainage areas within the Town of Colonic which comprise the study area.

A. CENTRALIZED DETENTION WITH UPSTREAM CONVEYANCE FACILITIES:

This alternative involves the construction of a large detention facility centrally located 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 to impound a certain amount of water before allowing a discharge to occur. Additionally, the pond may help to settle out solids in the runoff to improve water quality downstream.

Upstream improvements would include selective pipe and channel upgrading to accommodate the conveyance of anticipated 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. In order to avoid the short term effect of increased runoff to downstream watersheds, the detention facility would need to be in place prior to upgrading the capacities of upstream facilities.

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. More than likely however, the impact of development on facilities upstream from the detention basin will 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 predetermined rate structure. The same technique could be applied to the detention facility improvements. Funding will be discussed in a subsequent section of this report.

Maintenance associated with a centralized detention facility will include periodic cleaning of outlet pipes, overflow structure and upstream culverts. Selective channel grading may be occasionally warranted to remedy silt buildup or to repair erosion due to peak flows from storms of large recurrence intervals. Additionally, landscaping and general grounds upkeep may be required, depending upon the other uses of the facility.

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 twenty-five (25) year storm volume. The release rate would be limited to pre-development peak flows for the ten (10) and twenty-five (25) year storms. Overflow design capacity would be based on the one hundred (100) year storm.

Developers would not be required to make off-site upstream improvements unless required to convey upstream flow through their development site. Since the intent of this technique is to limit post development runoff to predevelopment rates, the extent of 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 be improved by the Town.

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

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. Long term maintenance costs, however, could be greater than those associated with a centralized facility.

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 twenty-five (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. In many locations within the study area the percolation rate would be negligible due to impervious soil conditions. 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.

Effective functioning of recharge facilities require that the in situ soils be permeable, and well drained. Our investigation of the soils within the project limits revealed that there are almost no soils suitable for use with a recharge facility. For this reason, recharge is not considered a viable option for the Boght Road area.

D. ON-SITE RETENTION/RECHARGE:

Where warranted by appropriate soils, on-site retention/recharge is 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 above, or dry wells. The latter alternative is attractive in that 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. The lack of soils suitable for this type of facility precludes it for use in the Boght Road area.

VII. EVALUATION OF STORMWATER MANAGEMENT TECHNIQUES

This section will discuss how the stormwater management techniques identified in Section VI relate to the study area. Projected detention volume requirements and estimated costs of centralized facilities are listed in Table 1. Likely locations of centralized detention facilities also discussed in this section and identified in Exhibit 3.

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 management plan implemented should carefully assess the downstream impacts of improvements.

A. AREA 1:

The natural drainage system and topography of this watershed lends itself towards a regional stormwater facility. There is already such a facility in place, just north of the Western and Eastern Avenue development, and is apparently in need of repairs. The City of Watervliet, which has an easement to the pond, is currently undertaking an investigation of the facility.

To mitigate the impact of the projected buildout, we have estimated that a total of 45 ac-ft of storage would be required for the 10 year buildout period in this drainage area. Without accurate information regarding the existing pond, it is not possible to estimate the volume currently available or what would

be required to improve the facility. As the area to the east of this pond is proposed to be designated for development, the pond could be incorporated into the development as a passive recreation facility for the development or the entire community. It should be noted that if this existing facility is upgraded into a regional detention facility a NYSDEC Dam Safety permit may be required. A detailed engineering evaluation of the pond and watershed should be performed and should address the suitability of the soils for ponding, slope stability, and the adequacy of the upstream conveyance facilities.

B. AREA 2:

The main flow path through this area (the Salt Kill) leaves the study area and then goes into the City of Cohoes before re-entering the study area. This natural drainage pattern indicates that it is desirable to limit future flows upstream from the point where the Salt Kill leaves the study area for the first time by means of a detention facility. It is estimated that the total detention volume within Area 2 needed to hold runoff to present levels by the year 1999 will be 97 acre feet. It appears that a large centralized detention facility could be located in the area just west of the study area boundary and just south of Columbia Street near where the Salt Kill leaves the study area to provide a portion of the needed detention volume. Additional runoff generated in the southeastern region of this area could be detained by a centralized facility located just east of the study area boundary where the Salt Kill leaves the Town limits for the second and last time. If on-site facilities are planned for this area it would be desirable to limit storm runoff before it reaches the Salt Kill.

As there is very little planned development in this area between the years 1999 and 2009 little additional detention volume will need to be provided.

Therefore, it may, be desirable to restrict any developments during this period to on-site facilities. The additional detention volume needed between the years 1999 and 2009 is estimated at 1.5 acre feet if planned development is realized.

C. AREA 3:

The large expanses of paved areas associated with commercial development expected in this area present additional problems that need to be addressed in a comprehensive stormwater management plan. These unique problems in addition to the problems of increased rates and volumes of runoff are related to water quality. The water quality problem is due to the high concentrations of oils, road salts and silts that commercial development generates.

For the proposed commercial development in Area 3 there should be a stormwater management plan which addresses two (2) items: 1) On a site specific basis, the commercial development should have water quality basins for the purpose of removing deicing materials and oils; 2) Either on a site specific level or on a regional level, facilities should be constructed to address the problem of flood control. Having on-site water quality facilities will leave the capital improvement and maintenance burden with the owner, while regional flood control facilities will provide the most benefit with the least cost.

The best location for regional facilities appear to be out of the study area for this watershed. There are areas within the drainage area but beyond the study area limits which could be developed into a regional facility should the Town desire to purchase easements outside the study area. The estimated total detention volume needed for this area by the Year 1999 is 39 acre-feet and by the Year 2009 an additional 45 acre-feet. The size of the water quality basins will depend upon each specific development. It may be desirable to limit stormwater management facilities in this area to the on-site alternatives.

D. AREA 4:

The projected buildout of Area 4 could potentially divert more area through the point of analysis. Since the amount of area that could potentially be redirected is relatively small, and the water will still drain to the Mohawk River, this does not present a problem.

The impact from the proposed buildout would best be handled by two (2) facilities. The first one could be located in the depression to the west of Route 9 adjacent to the Colonie Bike Path. The estimate for required storage in this basin is 5 ac-ft. The second facility is proposed between the two small tributaries to the Mohawk. The estimate for the required storage of this facility is 9 ac-ft.

E. AREA 5:

The shape of Area 5 is relatively long and narrow with a natural channel (unnamed) flowing to the north along the eastern side. The shape and natural drainage pattern of this area does not lend itself to one large detention facility that could service the entire area. The best method of mitigating the impact of projected buildout is a series of detention facilities constructed on the western side of the stream in natural depressions. This study identifies four (4) potential locations for these structures (Exhibit 4). If successive downstream structures are to be designed in this area, one of the factors to be considered is that each successive downstream structure may have to be larger than would otherwise be required; State approval might then be required because of the increased size, construction and maintenance costs may be higher, and Town liability and hazard to downstream residents may be increased. The magnitude of the effects of successive downstream facilities depends on many factors including

relative locations within the drainage basin. Careful consideration should be given to any proposal which locates successive detention facilities directly on a stream or main flow path.

The proposed buildout for this area in 1999 includes small amounts of residential and commercial development, the resulting estimated detention volume required is 21 ac-ft.

The majority of the development planned for this area is residential and will occur between the years 1999 and 2009. The estimated detention volume required for this buildout period is 57 acre feet. These volumes are estimates intended to indicate the order of magnitude of required detention facilities. As the need arises a detailed engineering analysis of each proposed site should be undertaken.

VIII. COST OF IMPROVEMENTS:

The cost associated with the construction and maintenance of centralized detention facilities will include the cost of constructing several associated measures such as: grading, seeding, collection system installation, and easements. Additionally, there will be costs associated with conveyance of upstream and downstream flows. Table 1 illustrates the anticipated costs of these facilities based on the following assumptions:

Detention Facility	\$15,000.00/Ac-ft
Land Acquisition	\$20,000.00/Ac
Installed Storm Sewers	\$ 80.00/ft
Culvert Improvements	\$ 1,000.00/Lf

The anticipated cost of storm sewer improvements are based on the installation of the storm sewer pipes in the locations shown on Exhibit 1.

TABLE 1

Drainage Area	Ac-ft Estimated Storage Volume		Estimated Costs (1988 Dollars)	Estimated Cost Per Acre	
	1999	2009		Commercial	Residential
1	45	0	\$1,471,279.00	\$ 5,740.00	\$2,870.00
2	97	1.7	\$1,852,000.00	\$ 7,560.00	\$3,780.00
3	39	45	\$1,568,000.00	\$13,400.00	0 None Planned
4	N/A ¹	15	\$ 804,550.00	\$11,920.00	\$5,960.00
5	21	36	\$1,115,000.00	\$ 4,340.00	\$2,170.00

¹No development anticipated in Drainage Area Number 4 during planning period 1.

IX. FUNDING:

In addition to an increased potential for flooding, the increase in stormwater runoff due to development of the study area impacts the financial responsibilities of the Town of Colonie as the facilities needed to mitigate the effects of increased stormwater runoff have to be constructed and maintained. Since the current residences to be constructed derive the benefit, it follows that the developer should bear the financial burden of these improvements. However as the Town accumulates more facilities, routine maintenance and inspection could become costly.

For the construction of centrally located facilities, the Town could initially fund the improvements with paybacks through off-site contributions as development progresses. Based upon a rate structure, the developer would make off-site contributions for the facilities the Town has already constructed. This is a

form of an impact fee which is discussed in Section II, M, Economics in the Boght Road - Columbia Street area DGEIS. Other funding mechanisms are also discussed in that section.

The key to the above referenced alternative is to establish a rate structure which assesses each parcel based on its contribution at buildout. The rate structure should provide payback of initial construction costs as well as establish escrow for future maintenance. Upon determination by the Town as to which improvements are to be made; further investigation will be warranted to establish a specific funding program.

X. IMPLEMENTATION:

In order to create and execute an effective regional stormwater management plan for the study area, a plan of implementation needs to be adopted. The basic plan outlined below assumes that the decision to create centralized facilities will be made. The outlined plan will need to be implemented for each drainage area discussed in the report. Since our discussions with the Town did not reveal knowledge of existing hydraulic deficiencies within the study area, the implementation of the plan could be coincident with or directly precede development in the watershed.

BASIC PLAN FOR IMPLEMENTATION OF CENTRALIZED STORMWATER FACILITIES

- o Enact ordinance requiring compliance with the regional concept of stormwater management within the watershed.

- o Commission a detailed hydrologic/hydraulic analysis for the watershed which would detail alternatives and costs for centralized facilities within the watershed.

- o Town of Colonie chooses alternative for the watershed.
- o Acquire land/easements for the centralized facility.
- o Solicit bids for the construction of facility.
- o Enact ordinance establishing rate structure for developers contribution.
- o Construct centralized facility coincident with or preceding commencement of large scale development.
- o Ongoing contributions by developers for payback of initial construction costs and on-going maintenance.

In the basic plan outlined above, there are several places where the developer and the Town can work together to expedite the execution of the plan. The developers liquidity might expedite the process of land acquisition and obtainment of easements. The construction of the facilities might proceed in a more timely fashion and be more cost effective when done in conjunction with a large development.

The developers' desire to expedite the approval process and issuance of permits combined with the Town's desire to implement an effective stormwater management plan has the potential to foster a cooperative environment such that both goals are realized.

XI. REVIEW OF PENDING DEVELOPMENT APPLICATIONS:

The Town of Colonie has provided copies of seven (7) applications for development pending within the study area. These applications have been reviewed for consistency with the proposed concept of regionalized detention. All of the

applications reviewed imply compliance with the stormwater management regulations in place. Consequently, all but one of the applications have on-site stormwater management facilities.

A. SPRING MEADOW:

The plans reviewed for the Spring Meadow Development (undated, received at the Town August 16, 1988) show Phases 3 and 4 of the townhouse development. The plans show the extension of Harvard Road with two (2) crossings of a tributary to the Dry Creek. The development lies within Drainage Basin 1, therefore, flow from the subdivision will eventually end up at the existing pond mentioned in previous sections. The developer proposes to create two (2) new detention basins in addition to the one already built for the development.

This development represents an opportunity for the Town to begin a plan of implementation for a centralized facility which would assure the Town that they have effective stormwater management controls in place and that they have been well engineered to provide a long service life for the Town.

B. RIVERFIELD ESTATES:

The plans reviewed for Riverfield Estates show the subdivision of a 58.6 acre, parcel into sixty eight (68) lots and are dated March 1988. The proposed project is located along the northern and eastern edge of the existing pond in Drainage Area 1 and does not propose to use it as a detention facility rather, the developer has proposed to construct a small detention pond in a gully between the Dry Creek and Boght Road which is downstream of the existing pond. It is possible, however, to design the utilities for the subdivision so that the majority of the runoff would flow into the existing pond.

Not enough topographic information has been submitted by the developer to precisely determine what part of the subdivision could be directed toward the pond. This subdivision represents an opportunity to start the plan of implementation and to acquire easements around the pond should the Town desire to create a regional facility for this drainage basin.

C. DELTA D & I CORPORATION:

Plans submitted for review are those dated August 27, 1988 and show the subdivision of land to create ten (10) new lots in the Business E zone. There are no indications of proposed improvements and therefore, it is assumed that after subdivision each lot would be sold and individually developed. From a stormwater management perspective this would create a minimum of nine (9) new detention basins (one of the proposed lots is a sixty (60) foot right-of-way).

All of the proposed project lies within Drainage Area 2. At this stage in the development, the only requirement necessary for making the plans consistent with the concept of regional detention would be to create a series of utility easements. The purpose of the easements being for the creation of a way to connect the storm drainage from each of the proposed lots.

D. NORTHBROOK ESTATES:

The proposed Northbrook Estate development encompasses 190.5 acres and will include three hundred four (304) single family units. A review of the Concept Highway Plan indicates that this development straddles drainage basins 2 and 5. The applicant has proposed five (5) small detention basins, two (2) of which lie within Area 2 and three of which lie within Area 5. The proposed stormwater plan is inconsistent with a centralized stormwater management plan. It is feasible to incorporate this proposed development into a centralized facility plan for drainage basins 2 and 5 should the Town decide that a centralized facility will meet their

long term goals for stormwater management in the study area. If the Town chooses to require this developer to participate in the development of a centralized facility then a detailed plan of implementation should be developed as outlined in Section 10.

E. SALT KILL ESTATES:

This development proposes to subdivide 47.9 acres into seventy four (74) single family detached homes. This project is located entirely within drainage area 2 and lies just to the west of the Town of Colonie limits near where the Salt Kill crosses the Town line. This area in Section 7 and on Exhibit 3 is identified as a possible centralized stormwater management facility location. The proposed stormwater management plan detains excess runoff in two on-site detention basins which are to be deeded to the Town of Colonie. Due to the location of this project, the plans as submitted are not consistent with a centralized stormwater management concept. This application represents an opportunity to initiate the development of a regional stormwater management plan as it may be possible to combine runoff from the Hunters Run, Salt Kill Estates, Manchester Heights, and possibly a portion of Northbrook Estates in a central detention facility. A detailed implementation plan should be developed by the Town should they desire to promote centralized facilities.

F. HUNTERS RUN:

This project comprises a 25 acre parcel with total drainage area of 31.1 acres and proposes to subdivide this parcel into 40 single family lots. This development although relatively small will have an impact on stormwater runoff. The applicant has proposed to detain the excess runoff in one on-site detention facility near the intersection of Boght Road and Columbia Street. This parcel lies on a portion of the study area which does not clearly belong to either drainage

area 2 or 5. This small section, because of the planning orientation of this study, was arbitrarily included in area 5. This site actually drains to the southeast into the City of Cohoes. Due to the unique location of this project, permitting this applicant to proceed with an on-site stormwater management plan is more desirable when compared to the concept of a central stormwater management facility.

G. MANCHESTER HEIGHTS:

This project consists of a 46 acre site located on Boght Road within area two (2) near where the Saltkill flows from the study area. The plans reviewed are dated March 18, 1888 and propose three (3) new detention basins on site to limit peak flows. This development is near an area which is identified on Exhibit 3 as a possible centralized stormwater management facility location. Due to the location of this project the stormwater management plan as submitted is not consistent with the centralized facility concept. This project represents an opportunity for the development of a regional stormwater management plan as it may be possible to combine runoff from Hunters Run, Saltkill Estates, Manchester Heights, and possibly a portion of Northbrook Estates in a central facility.

XII. CONCLUSION:

The preceding report has defined the existing drainage patterns and associated stormwater flows within the Boght Road Study Area. The effects of the proposed 10 year and 20 year buildout on the flow of stormwater have been analyzed and recommendations for mitigating these effects have been made. A plan for further study and implementation has been outlined and a discussion of different stormwater management techniques and how they can be incorporated into the 10 year and 20 year buildout has been presented. Levels of costs have been estimated and alternatives for funding have been discussed.

We have demonstrated the feasibility of centralized detention facilities within the study area in all of the drainage areas except area 3. Within area 3, onsite water quality basins should be considered with either centralized or on-site flood control facilities.