ORDINANCE 2004-16

AN ORDINANCE AMENDING CHAPTER 18 OF THE GENERAL PLAN OF TOOELE COUNTY REGARDING FLOOD AND STORM WATER

NOW, THEREFORE, BE IT ORDAINED BY THE LEGISLATIVE BODY OF TOOELE COUNTY, UTAH AS FOLLOWS:

SECTION I - AMENDMENT. The Tooele County General Plan, Chapter 18 is amended to read as attached hereto, which amendment is necessary to prevent future flood damages; solve existing flood/drainage problems; preserve the natural and beneficial functions of the natural drainage system; preserve and enhance storm water quality; and enhance the community's safety, environment, and quality of life.

SECTION II - REPEALER. Ordinances in conflict herewith are hereby repealed to the extent of such conflict.

SECTION III - EFFECTIVE DATE. This ordinance shall become effective 15 days after its passage provided it has been published, or at such publication date, if more than 15 days after passage.

IN WITNESS WHEREOF, the Tooele County Commission, which is the legislative body of Tooele County, passed, approved and enacted this ordinance this 25th day of May 2004.

ATTEST:

DENNIS D. EWING, Clerk

TOOELE COUNTY COMMISSION

DENNIS ROCKWELL, Chairman

(SEAL)

COUNTY OF TOOELE COUNTY CLERK STATE OF UTAH

Commissioner Rockwell voted Yea
Commissioner White voted Yea
Commissioner Lawrence voted Yea

APPROVED AS TO FORM:

DOUGLAS J. AHLSTROM
Tooele County Attorney

CHAPTER EIGHTEEN:
FLOOD AND STORM WATER MASTER PLAN

Tooele's comprehensive flood and storm water master plan includes five key goals:

- Prevent future flood damages.
- Solve existing flood/drainage problems.
- Preserve the natural and beneficial functions of the natural drainage system.
- Preserve and enhance stormwater quality.
- Enhance the community's safety, environment, and quality of life.

Ultimate watershed urbanization.

Runoff generally becomes deeper and faster, and floods become more frequent, as watersheds develop. Water that once lingered in hollows, meandered around stream channels, and soaked into the ground now speeds downhill, shoots through pipes, and sheets off rooftops and paving. These channels are capable of conveying the runoff to adjoining property more rapidly than under pre-development conditions. The effects of urbanization on stormwater drainage are related to the change in the quality, runoff rate, and the volume of stormwater entering the natural drainage system. In an urban setting, no longer is the runoff delayed by minor topographic depressions, the vegetative cover, or the indirect routes natural surface runoff must follow.

But unless plans and regulations are based on future watershed urbanization, development permitted today may well flood tomorrow as uphill urbanization increases runoff. The impervious surfaces also reduce the area available for rainfall infiltration. The subsequent reduction of water infiltrating the soil may result in a lowering of the water table and a potential reduction in the amount of groundwater recharging streams during normally low flow periods. Erosion and sedimentation. Erosion and sedimentation rob hillsides of valuable topsoil, dam lowlands, clog streams, and pollute rivers. Builders must control site erosion from new development.

Watershed-wide regulation.

Floodplains are only part of flood-management considerations. Water gathers and drains throughout entire

watersheds, from uplands to lowlands. Each watershed is an interactive element of the whole. A change at one place can cause changes elsewhere, whether planned or inadvertent. In association with the altered drainage characteristics there are changes in water quality. The runoff from the urban area contributes pollution loading of nutrients, bacteria, sediment, heavy metals, oils, grease and, in the spring, road salt. The "first flush" is a phenomenon whereby the initial stormwater runoff picks up pollutants from catchment surfaces, such as roads and parking lots, and sewer deposits, where they have been collecting since the last storm. Once these pollutants are washed through the system, the pollution level of the stormwater decreases for the remainder of the storm.

Stormwater management has evolved in the past several years to a point where it is recognized that comprehensive planning with multi-agency involvement is necessary to ensure the protection of human life, property, and our natural receiving waters. The three key components which are developed in this planning process include the Watershed Management Plan, Subwatershed Plan, and Stormwater Management Plan. To ensure effective stormwater management, all three components should be completed and be directly related to the county planning process.

Watershed Management Plans are comprehensive strategies that establish broad water management goals and targets for an entire catchment. First, the plan documents and examines the physical, chemical and biological characteristics of the basin. This information is then used to define the existing and potential water uses. General goals, objectives, control methods and/or technologies are then evaluated and selected on a basin basis to protect or enhance the receiving waters.

Official Plans set out the objectives and policies which the county shall use to guide development. These plans should contain the stormwater management goals and targets established in the Watershed Management Plan. The county makes a commitment for comprehensive planning at all stages of land use planning.

Subwatershed Plans address the requirements for stormwater management on a sub-basin level. They use information prescribed in the Watershed Management Plan to develop necessary subwatershed stormwater

controls such as infiltration, trenches, extended swales (low-lying land) or stormwater ponds. This planning level is at the same scale as the neighborhood (secondary) plans, which provide more specific planning details such as land use and transportation corridors. Developing these two plans in an integrated manner will ensure the optimization of all resources within that sub-basin.

Similarly, Stormwater Management Plans and subdivision plans should be developed jointly. Stormwater management should be considered at an early stage in the subdivision planning process because it may significantly affect such items as the layout of subdivision lots, roadways and other services.

Another stormwater management concept involves minor and major drainage systems. The minor system is considered as the "convenience" drainage system that carries storm flows during frequent rainfall events. The major system consists of the streets, swales and open channels that carry water during high but infrequent floods. Although the minor system is perceived by most to be the primary means of disposing of stormwater, as stated, it carries a small proportion of the total rainfall during an extreme storm. These systems are only designed to carry stormwater from a two- to ten-year storm. The purpose of a major drainage system is to transport the excess overland stormwater flow in a controlled manner. Uncontrolled overland flows erode properties, flood basements, damage foundations through the buildup of hyraulic pressures, and flood roads. Major drainage systems are now typically designed to handle the 100 year storm. They also provide the most cost effective method of expanding the drainage capacity of an area.

Stormwater detention.

One way to avoid increased flooding downstream from new development is to provide stormwater detention basins throughout watersheds. Detention of stormwater runoff serves as short-term storage of stormwater until it is slowly released under controlled conditions. Storage facilities include methods such as retention (wet), detention (dry) and infiltration ponds, flat roofs of commercial buildings, large parking lots, local and arterial streets, and subterranean tanks or silos.

Ponds are also an effective way to manage stormwater due to their large holding capacity. There are generally

two types of ponds, namely "dry" and "wet." Dry ponds are typically dry; they hold water for a limited time only, releasing it to a receiving water slowly through a controlled outlet. Wet ponds are permanent water bodies designed to hold water until their capacity is exceeded, thus overflowing to a receiving water. They are long-term storage facilities and therefore provide long retention times. Wet ponds also serve as groundwater recharge sites.

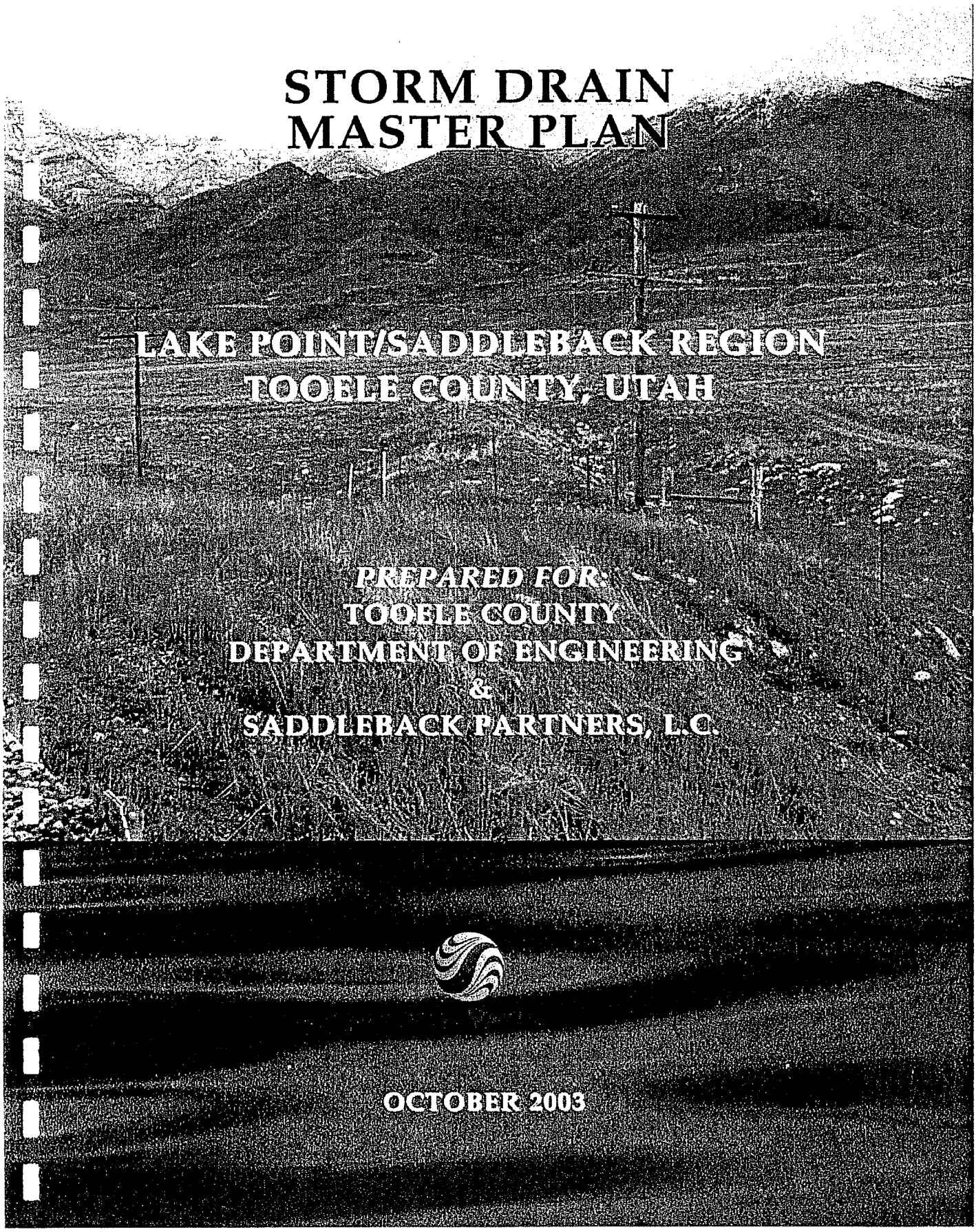
New or substantially improved developments must detain the excess stormwater on site – unless they are exempted in master plans. Water from detention basins is released slowly downstream. In most instances, the county has found regional detention basins to function more satisfactorily than smaller, scattered on-site facilities.

The purpose of rooftop, parking lot, street and subterranean storage is to delay the runoff or reduce the discharge rate to the major and minor systems. The basic requirements for the use of this technique include a containment location and an outflow release device to control the rate of runoff. Where necessary, an emergency overflow device should be included. There are other methods of altering urban drainage. Groundwater recharge can be achieved through the use of porous pavement in roads and parking lots. In residential areas, well-designed landscaping techniques and construction materials can make the major drainage system effective yet unobtrusive.

Valley storage.

Flood water cannot be compressed. It requires space. Encroachments into a channel or floodplain can dam, divert, or displace flood waters. Tooele County requires compensatory excavation if a development – including a flood control project – would reduce valley storage. Preserving or recreating floodplain valley storage is a keystone of the county's program.

STORM DRAIN MASTER PLAN



LAKE POINT/SADDLEBACK REGION
TOOELE COUNTY, UTAH

PREPARED FOR:

TOOELE COUNTY
DEPARTMENT OF ENGINEERING
&
SADDLEBACK PARTNERS, L.C.

OCTOBER 2003

STORM DRAINAGE MASTER PLAN LAKE POINT/SADDLEBACK REGION TOOELE COUNTY UTAH

October 2003
Stantec Project No. 862 00376
Prepared for:

Tooele County Department of Engineering 47 South Main Tooele Utah 84074
and
Saddleback Partners, L.C. 139 East South Temple Suite 310 Salt Lake City Utah 84111

Prepared by:

Stantec Consulting Inc. 3995 South 700 East Suite 300 Salt Lake City Utah 84107 801-261-0090

EXECUTIVE SUMMARY

The Storm Drainage Master Plan for the Lake PointlSaddleback Region identifies storm water drainage and flood control facilities for existing and future land use conditions within the study area. The total study area consists of approximately 13,000 acres. As development plans proceed, the need to plan and integrate an effective storm drain system for the entire area is obvious. The improvements investigated will convey and store storm water runoff from the mountainside through the bench areas, under the existing railroad embankment, through the Lake Point area, under State Road 36 and Interstate 80, with eventual discharges to the Great Salt Lake.

The following tasks were completed within the scope of work to complete the storm drainage master plan for the Lake PointlSaddleback study area.

Collect and review existing information (topography, soil, geology, planning, aerial photos) Inventory existing drainage facilities (field reconnaissance)

Define drainage basin boundaries

Develop hydrologic computer models for existing and proposed land use conditions Identify potential detention/retention basins for the following canyons: Rodgers, Green Ravine, Big, Coyote and Pole

Determine cost estimates for recommended improvements

Preparation of report

The proposed drainage system relies on retention facilities located at the base of the major canyons, approximate to the mouths of the canyons in the bench area, and along the eastern border of the railroad. In this manner storm water runoff is captured, retained and infiltrated near to the point of generation and would not be conveyed through the entire basin. Storm water runoff from the Lake Point and Salt Plant areas will be conveyed to ponds with the option for full retention or detention with a release rate.

The recommended storm drainage improvements are shown on Figure 6-1. Table E-1 summarizes the options and the associated costs. The recommended improvements include piped conveyance through the Lake Point area with regional ponds located at key design points.

Table E-1 Summary of Cost Estimates

Option	Total Cost
Option 1 - Retention/ Infiltration ponds	$8,587,959
Option 2 - Detention/ Infiltration ponds with release rate in Lake Point	$6,891,565

1.0 INTRODUCTION

1.1 Background

The Lake PointlSaddleback region, located in northeastern Tooele County, is currently being planned for future residential development. A significant portion of the study area is currently undeveloped. With the current planning for development, the need to investigate future storm water facilities and integrate these facilities with ongoing planning was identified. Existing

storm water facilities that service the agricultural and residential development in the area consist of roadside ditches, open areas and low lying depressions.

1.2 Purpose of Study

The Storm Drainage Master Plan for the Lake Point/Saddleback Region identifies storm water drainage and flood control facilities for existing and future land use conditions within the study area. The total study area consists of approximately 13,000 acres. The study area designated for this plan is shown in Figure 1-1.

As development plans proceed, the need to plan and integrate an effective storm drain system for the entire area is obvious. The improvements investigated will convey and store storm water runoff from the mountainside through the bench areas, under the existing railroad embankment, through the Lake Point area, under State Road 36 and Interstate 80, with eventual discharges to the Great Salt Lake.

Coordination with the Bureau of Land Management (BLM) is included as part of the planning process and essential as storm water runoff from the western slopes of the northern Oquirrh mountainsides flow through the proposed Saddle back Development, which will be located at the base (bench area) of major canyons. Coordination and review with Tooele County and the Saddleback Development owners is also required, as the proposed storm drainage system will be owned and maintained by the County.

Through this storm drainage planning process, system wide improvements are recommended and a prioritization (phasing) of those improvements is performed. The prioritized list of improvements allows the County to budget and schedule for implementation of storm drainage improvements to service the community. Additional studies and further coordination efforts are outlined herein.

2.0 EXISTING CONDITIONS

2.1 Topography

The study area is located in the northeast corner of the Tooele Valley, along the west flank of the northern portion of the Oquirrh Mountain Range. The study area generally slopes to the west toward the Great Salt Lake. Topography throughout the area varies from 10 to 25% from the mountain slopes to the bench area. Through the bench area to the Lake Point area slopes are averaging 3 - 5%. Through Lake Point and the Salt Plant area, drainage slopes are very mild with average slopes of approximately one percent grade from east to west.

Due to the natural breaks in topography and the man-made roadway features, the study area was broken up into the following distinct regions: mountain, bench, Lake Point and Salt Plant

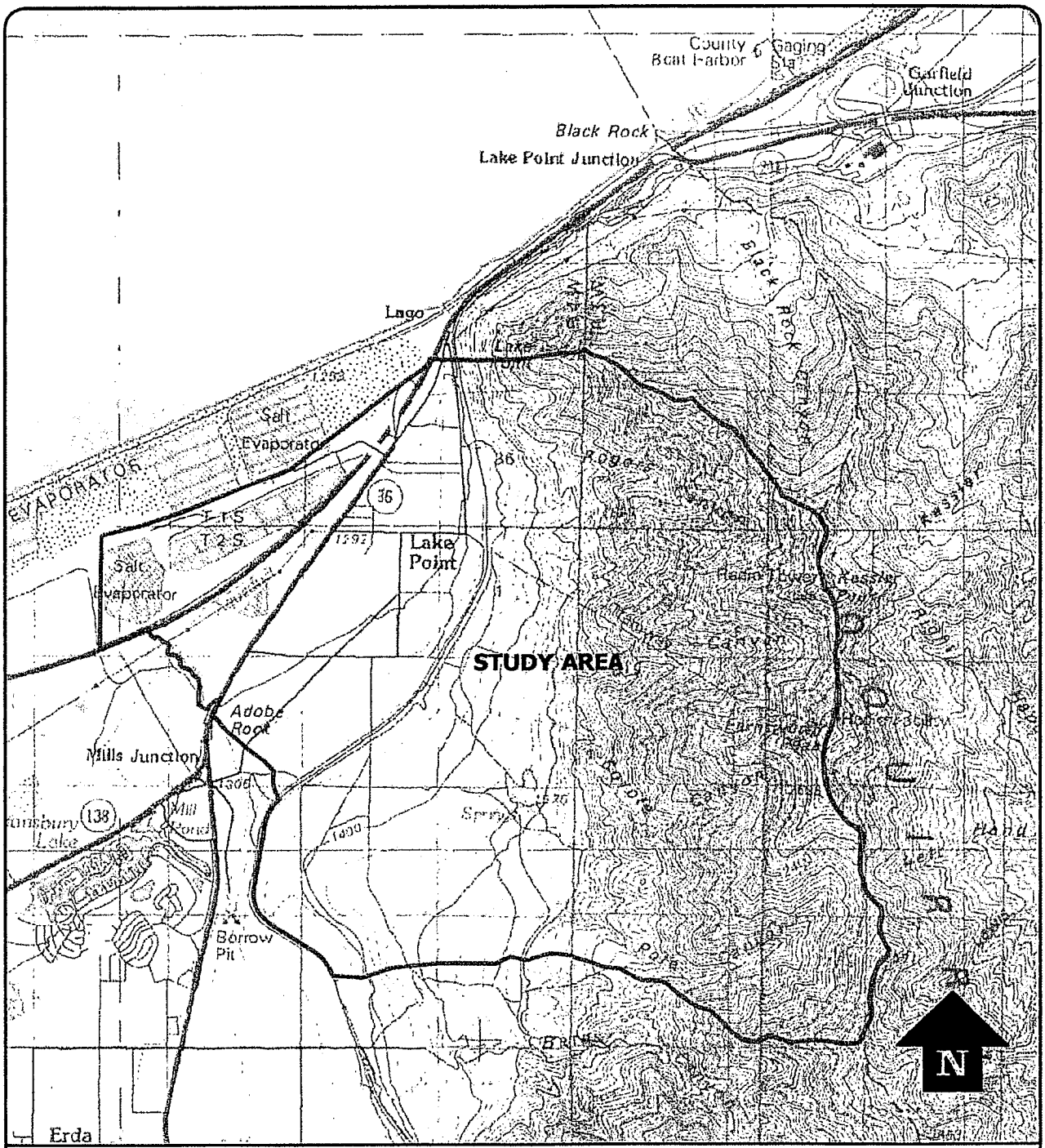
2.2 Soils

The National Resources Conservation Service (NRCS) 2000 Soil Survey of Tooele Area, Utah was used as a reference to determine soil types in the study area. Table 2-1 summarizes the soil types. Figure 2-1 depicts the project area with soil types.

The area was classified into twelve distinct soil associations. These soils fall into the Hydrologic Soil Groups (HSG) B, C and D for the purpose of storm drainage modeling. The HSG classification of B indicates permeability rates in the range of 0.60 to 60.00 inches per hour, . HSG C soils have permeability rates in the range of 0.00 to 6.00 inches per hour and HSG D soils have permeability rates in the range of 0.00 to 2.00 inches per hour.

2.3 land Use

Existing land use, within the boundaries of the study area, is predominately agricultural and mountainous, as depicted in Figure 2-2. The mountain and bench areas are currently undeveloped. The existing residential land use in



SITE LOCATION MAP
Storm Drainage Master Plan
Lake Point / Saddleback Region
Tooele County Utah

Stantec

DATE: OCT 2003

FIGURE NUMBER: 1-1

the area is classified as low density (approximately one acre per lot) and rural in nature. The majority of commercial development in the study area, to date, has occurred along State Route 36 (SR36). Undeveloped areas exist in the low lying lake Point area and heavy manufacturing activities associated with the production of salt exist in the Salt Plant region.

2.4 Natural Drainage
Natural drainage in the undeveloped mountain region of the study area collects in several canyon creeks, which generally flow from east to west. In other areas the natural drainage is primarily overland runoff that generally flows from east to west and ultimately discharges to the Great Salt lake.

2.5 Maior Roadways
Interstate 80 (1-80) is the major east-west traffic route and SR36 is the major north-south traffic route.

2.6 History of Flooding
The most well known historical flooding events occurred during the wet years of 1983 and 1984. During that time there was a significant amount of snowpack in the Oquirrh Mountains. Temperatures rose quickly during the month of May and caused the snow to melt quickly producing runoff. The flooding from the runoff lasted for approximately three to four days in the lake Point area. Debris flows also occurred during these years and are described further in the accompanying report titled "Evaluation of Debris Flow Potential and Proposed Mitigation Measures" by Stantec Consulting.

2.7 Field Observations
The existing storm drain system was observed during a site visit in the month of May. Little drainage conveyance was observed other than that needed to cross the railroad and to convey flows across. SR36 and 1-80. Photographic documentation (Attachment 1) and Geographic Information System (GIS) maps summarizing the existing system were created.

3.0 FUTURE CONDITIONS

3.1 Land Use
Future land use information and land planning information was obtained from Saddleback Development and discussions with Tooele County Engineering and Tooele County Planning. Figure 3-1 depicts the future land use for the study area.

Future residential areas will remain, on the average, at a low density, approximately one acre per lot. Recreational land uses will be included in the overall residential development on the bench area, by Saddleback Development. In the lower regions of the study area, SR 36 to the Great Salt Lake, future land use is anticipated to be commercial, office and industrial.

3.2 Drainage
As urbanization of rural areas occurs, increased storm water runoff will occur due to increased impervious areas. Many of the existing roads in the Lake PointiSaddleback region currently have little to no formal drainage system. With more development and population, a system will be required to convey the increased flows away from roadways to natural drainages. Conveyance systems will generally follow main collector roadways where possible.

The proposed drainage system relies on retention facilities located at the base of the major canyons, approximate to the mouths of the canyons in the bench area, and along the eastern border of the railroad. In this manner storm water runoff is captured, retained and infiltrated near to the point of generation and would not be conveyed through the entire basin. It is observed that soils and topography allow for infiltration at the higher elevations of the study area, where it may not be as feasible in the lower regions of the study area.

Stormwater runoff from the Lake Point and Salt Plant areas will be conveyed to ponds with the