CITY OF LEWISTON, IDAHO

STORMWATER MASTER PLAN

Adopted by the Lewiston City Council on December 10, 2001
by Resolution 2001-82

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Section 1 – Executive Summary

Purpose

The purpose of the Storm Water Master Plan is to provide a conceptual drainage plan to assist City staff, City Council, and citizens in making decisions toward a comprehensive and integrated storm drainage system that meets the needs of the community.

Goals

- Y For areas with little or no existing storm drainage, provide a preliminary storm drainage layout to assist in coordinating future storm drainage improvements.

- Y Provide a tool for City Staff in making decisions regarding storm drainage for capital projects, development, local improvement districts, and system operation.

- Y Conduct preliminary assessments of existing storm drainage system capacities to target priority locations for further analysis or remediation.

- Y Provide a general understanding of operation & maintenance needs and future regulatory requirements for storm water.

Background

This study is limited to the area within the current Lewiston City limits. Previous storm drainage planning studies were conducted for the Downtown/Normal Hill area and Lewiston Orchards in 1964 and 1972, respectively. Existing storm sewer systems serve a portion of the Downtown, Normal Hill, and Country Club neighborhoods and the Port District in North Lewiston. The remainder of the City is served primarily through natural drainage ways, roadside ditches with some culverts, and a few minor systems.

Minor flooding occurs within the City during periods of heavy rainfall causing street flooding, erosion, and property damage. The majority of minor flooding occurs in the Downtown and Normal Hill areas. Nuisance storm water runoff causing minor erosion and ponding in yards occurs throughout the City, particularly in areas without curb and gutter. The City adopted a storm water control policy, Resolution 80-100, in 1980 to minimize the impact of urbanization on the existing drainage system. The policy is in need of updating to address issues that have arisen in the implementation of this policy.

Storm Drainage Basins

Storm drainage basin characteristics, including local climate, native vegetation, terrain, soils, and land use are the primary factors in determining storm water runoff. Lewiston is considered to have a moderate climate within the region do to its location in the Snake and Clearwater River canyons. Elevations in Lewiston vary from 740' to over 1500', creating steep terrain between the gentle to moderately sloped Normal Hill bench and Orchards. The average annual rainfall for Lewiston as measured at the Lewiston/Nez Perce County Airport is 12.79 inches. Soils in Lewiston are the Chard and Broadax-Oliphant, which are both in hydrologic soil group B. Group B soils are considered to have moderate infiltration rates when thoroughly wetted and a moderate rate of water transmission.

Of the basin characteristics, land use has the greatest impact on the rainfall – runoff relationship for any drainage area. For this study, the land uses designated in the 1999 Comprehensive Plan were used. The results of this study are therefore a build-out condition, assuming no changes in the designated land uses occur.

The City was divided into 20 drainage basins. Basins were identified by a single outfall or multiple outfalls to a common drainage feature. For analysis purposes, some of these basins were further divided into sub-basins. Figure 3.1 (Map Pocket) shows the limits of these basins. A total of approximately 7800 acres was included in the analysis.

Storm Drainage Analysis

Analysis of proposed and existing drainage facilities was performed using the Soil Conservation Service TR-55 Method (Urban Hydrology for Small Watersheds) as modified by Santa Barbara County, California. This method is commonly used for drainage areas greater than 25 acres. A hydraulic modeling software, HYDRA™, was used to perform the hydrologic and hydraulic analysis for this study. This model will provide City staff a tool to analyze alternatives and conduct design studies in the future.

The drainage basins discussed above were divided into smaller drainage areas for the purpose of analysis. 290 individual drainage areas are included in the model. Each of these drainage areas were assigned factors, such as runoff curve numbers, Manning's n for sheet flow, and rivulet flow velocities, based on the land use designated in the 1999 Comprehensive Plan. Where drainage areas consisted of multiple land uses, these factors were proportioned based on the approximate area of the various land uses.

The design storm selected for modeling was an event with a 25-year frequency or recurrence interval. The recurrence interval represents the average number of years between events producing the given precipitation or more in a specified

time period. It is important to remember that these values are averages and it is possible to exceed these values more than once in the given recurrence interval, or even within a single year. A 25-year storm is the most common design storm used for urban drainage design. Selection of a storm frequency for design purposes is a matter of cost verses benefit. Selection of a greater design storm frequency provides a reduction in the risk of flooding, but at a greater capital investment. Analysis of the system using a 10-year and 100-year frequency storm is included in the model. Distribution of rainfall with respect to time was done using the SCS Type II distribution utilized in the majority of the arid Western United States.

Existing pipes were entered into the model to provide system continuity necessary for the model to operate and to generate peak flow data for more detailed hydraulic analysis in the future. Data for existing pipe systems was limited to storm system mapping and construction drawings. The most significant limitation was the lack of accurate vertical and horizontal data. The vertical and horizontal data used was taken from the City's aerial mapping. On major systems where construction drawings existed, this information was used. As a result, the analysis of existing systems is preliminary and should be verified by more detailed studies.

Where no storm sewer system existed, a layout was developed using the following general criteria:

- Y The maximum length of street without storm drainage collection facilities is 660'.
- Y Use existing rights-of-way for storm drainage system where possible to minimize storm runoff to natural drainage ways.
- Y Where street rights-of-way are not feasible due to topography, utilize natural drainage draws where well-defined, undeveloped channels and culverts exist at road crossings.
- Y Whenever possible, storm drainage lines should be located where existing ground is 2% or steeper.
- Y Assume all streets have curb and gutter.
- Y Where feasible, incorporate primary drainage systems into arterial collector streets.

Using elevation data from the City's aerial mapping to approximate ground slopes, pipe sizes for proposed pipes were determined using the peak flows generated by the model and specified design criteria.

Storm Drainage Analysis Results

Figures 5A and 5B provide a summary of the system peak flows and capacity limitations, respectively. The capacity limits are based on limited existing pipe data and should only be used as a guide to identify areas of concern for more detailed analysis.

The figures provided in Section 5 of this report provided storm drainage system configurations, pipe sizing, and peak flow data for most of the drainage basins. It should be pointed out that recommended pipe sizes have been provided for existing pipes to provide a basis for identifying locations of concern (i.e. recommended pipe sizes significantly larger than the existing pipe size would indicate the potential for a major system restriction). These figures provide the most important tool in identifying storm drainage needs and providing coordination of storm system improvements.

Capital Improvements

Based on historical flooding in the City, four locations were identified as having the greatest need for storm drainage improvements. These locations and the opinions of probable cost in year 2000 dollars (ENR Construction Cost Index 6222) are:

- 14^{th} Street & 12^{th} Avenue (Basin 12)- $290,000
- 16^{th} Street & G Street (Basin 13)- $350,000
- 9^{th} Avenue & Prospect (Basin 14)- $330,000
- Idaho Street & 14^{th} Street (Basin 13)-$300,000

In all these cases, it is important to note the improvements will not only correct the current problems, but will provide a storm sewer trunk that will serve the sub-basin in which these improvements are located.

Storm Water Regulatory Requirements

Compliance with the Phase II Storm Water rules, a result of the 1987 Clean Water Act provisions regarding non-point sources, is schedule to begin in March 2003 with submittal of applications. Lewiston is not automatically included under this rule, unless it is designated an “urbanized area”, but may still be designated to comply by the permitting authority (EPA Region 10). The general requirements of the Phase II program include the following six minimum controls:

- Public Education and Outreach
- Public Participation/Involvement
- Illicit Discharge Detection and Elimination
- Construction Site Runoff Control
- Post-Construction Runoff Control

Y Pollution Prevention/Good Housekeeping

Should Lewiston be required to comply, significant staff time will be necessary to implement these requirements.

The City should also be involved in the development of Total Maximum Daily Loads (TMDLs) on the Clearwater River, which are scheduled for development by 2003. These TMDLs may place additional requirements on point and non-point discharges from the City.

Storm Systems Operation & Maintenance

An important aspect of any infrastructure is its operation and maintenance. The typical components of a storm water system operation and maintenance program include:

Y Routine system cleaning (including pipes, catch basins, open channels, and inlets)
Y Regular system inspection and assessment (including videotaping pipes)
Y Small system repairs, revisions, or upgrades
Y Customer Service (complaint response & investigation)
Y Emergency response

An assessment of the City's storm drainage system operation and maintenance needs should be conducted using recommended standards of practice. This will provide a tool in evaluating levels of service or specific activities and their corresponding costs. This assessment can also serve as a framework for an operation and maintenance manual for the storm drainage program.

Conclusions & Recommendations

Conclusions

Based on the preliminary assessment of existing facilities in this study, two major drainage systems that appear to have insufficient capacity. These systems are the lower portion of the 21st Street/Thain Road basin and a portion of the Southway Basin system from 8th Street & 16th Avenue to 14th Street & 18th Avenue. In addition, most of the minor systems in the Downtown and Normal Hill basins do not appear to have adequate capacity.

The majority of the Orchards neighborhoods and North Lewiston east of Hwy 12 do not have storm sewer systems. In addition, the upper portions of the Downtown, 17th /18th Street, Normal Hill, and Southway basins have limited storm sewer systems and can be served through extensions of existing systems. Planning level system layouts are provided for these areas.

Recommendations

Implementation

This study is intended to provide general guidance in the location and sizing of future storm sewers. One of the greatest benefits in implementation of this plan is the coordination of storm drainage improvements with the various activities within the City including:

Y Development Projects
Y Storm Drainage Capital Improvement Projects
Y Street Improvement Projects
Y Minor System Improvements
Y System Operation & Maintenance

Funding

In order to improve upon the storm drainage system in Lewiston, an adequate and consistent source of funding must be identified. It is recommended that the City investigate various funding options for the storm drainage program. Funding options the City may wish to investigate include:

Y Debt Financing
Y Utility Rates
Y Local Improvement Districts
Y General Fund / Street Fund
Y Impact Fees

Analysis

Further analysis of existing system components in the Downtown Basin, lower portion of the 21st Street/Thain Road Basin, and Southway Basin is recommended. The limited data available for the existing system components is crucial to the analysis of these locations due to the flat grades of the Downtown Basin and high flows in the lower portion of the 21st Street /Thain Road and Southway Basins. Additional data collection should include verification of pipe diameter and material, and most importantly, determining the vertical and horizontal position of these pipes.

Regulatory

The City should be prepared to implement the requirements of the Storm Water Phase II rule if required by EPA. Establishing contact with EPA Region 10's storm water program representatives to assure prompt notification should

Lewiston be designated for Phase II rules will help provide needed time to meet the compliance requirements. In addition, the City should be prepare for involvement in the Clearwater River TMDL study to assure the City's interests are represented.

Section 2 – Introduction

General

Storm drainage systems in urban areas are provided to convey storm water runoff to reduce the risk of property damage, protect the public health and safety, and minimize inconvenience to the citizens. This requires balancing (cost verses benefit) the reduction in risk or inconvenience with the capital costs required for improvements. Whatever the level of service desired, a storm drainage program is best implemented when the tools are available to make informed decisions based on a consistent policy. This plan strives to provide the basic system information necessary for the decision making process, and provides a modeling tool to refine this information and evaluation alternatives. Additionally, the plan highlights issues including operation & maintenance and storm water quality regulations that impact or may impact decisions regarding storm water.

Purpose

The purpose is to provide a conceptual drainage plan to assist City staff, City Council, and citizens in making decisions toward a comprehensive and integrated storm drainage system that meets the needs of the community.

Goals

Y For areas with little or no existing storm drainage, provide a preliminary storm drainage layout to assist in coordinating future storm drainage improvements.

Y Provide a tool for City Staff in making decisions regarding storm drainage for capital projects, development, local improvement districts, and system operation.

Y Conduct preliminary assessments of existing storm drainage system capacities to target priority locations for further analysis or remediation.

Y Provide a general understanding of operation & maintenance needs and future regulatory requirements for storm water.

Study Area

This study is limited to the area within the current Lewiston City limits. In general, the drainage basins within the City are either entirely within the City or form the upper reaches of a larger drainage and do not have contributing flows from outside the City limits. The exception to this is in North Lewiston, where the drainages extend up the Lewiston Hill. Analysis of these areas was not performed as part of this study, but the areas are identified and discussed in general within the report.

Previous Studies

Two previous storm drainage master plan studies have been conducted within the City of Lewiston. The first study titled Storm Sewer Study And Master Plan For the City of Lewiston, Idaho by Stevens & Thompson Consulting Engineers was published in May 1964. This study covered the area within the City limits at the time the report was prepared, which was located at approximately 18th Avenue. The second study titled Lewiston Orchards Area Storm Sewer Master Plan by Hoffman, Fiske, Wyatt Consulting Engineers is dated December 12, 1973. As the title implies, the plan covers what are now the Orchards neighborhoods as described in the 1999 Lewiston Comprehensive Plan.

Storm Drainage Facilities

With respect to existing drainage facilities, the City can be divided into three areas: North Lewiston, Downtown/Normal Hill, and the Orchards.

The western portion of North Lewiston, primarily the Port District, is served by a comprehensive storm drainage system constructed in the 1970s and early 1980s. The area east of Hwy 12 has a few minor drainage systems, but no comprehensive or coordinated drainage system. East of 31st Street N, drainage is provided by culverts beneath Hwy 12/95 with a new system constructed in 2000 to convey runoff from Lewiston Hill through this area.

The Downtown/Normal Hill neighborhoods are served by numerous drainage systems of various sizes. Significant drainage systems include a drainage system in 17th/18th Street constructed in the mid-1990s, a system serving the central portion of the Southway basin from 8th Street & 16th Avenue, southeast to the vicinity of 23rd Avenue & 15th Street, and three systems of pipes on open channels paralleling 21st Street, and the recently constructed system in Bryden Canyon and Country Club Drive. The remainder of Normal Hill and Downtown are served by numerous smaller systems.

In general, the Orchards neighborhoods are served by natural drainage ways and roadside ditches with some culverts. The only systems in the Orchards are

in Thain Road from Stewart Avenue to Linden Avenue, 8th Street from Preston Avenue to Linden Avenue, and in 18th Street from Grelle Avenue to Alder Avenue.

Localized Flooding

During heavy rainfall, minor flooding occurs in a number of areas throughout Lewiston. This minor flooding generally creates short-term (2 hours or less) standing water, erosion, minor property damage and inconvenience to the public. The most significant of these areas and those that are known to be recurring include:

- 9th & Prospect
- Idaho/G St & 16th Street
- Idaho Street & 9th Street
- 14th Street & 12th Avenue

Two factors that these areas have in common are: a flat or depressed area that prevents runoff beyond the capacity of the system from flowing over the surface and/or the surface overflow route causes flooding of buildings or severe erosion.

Storm Water Control Policies

In an effort to minimize localized flooding, the City adopted Resolution 80-100 in 1980. The intent of this resolution is to limit peak runoff from new development to the undeveloped rate. In theory, this would prevent an increase in the peak flows in the existing downstream storm drainage systems. However, this resolution does not address runoff volume, which is generally more difficult to limit than peak flow. Experience with implementing this resolution and a changing approach to storm water have brought about the need to update this resolution. Policy issues that should be addressed or clarified include:

- Definition of “minor” and “major” systems.
- Reconstruction or multi-phase construction on a parcel.
- Design storm for on-site detention and off-site conveyance.
- Drainage requirements for development of single lots and Administrative Plats.
- Discharge to adequately sized drainage systems and construction of drainage improvements on the full frontage of the property.
- Limitations or restrictions in the use of “interim” drainage facilities (i.e. “bubble-ups”) for new development.
- Curb and Gutter postponements.
- Runoff from residential subdivisions (street and lot runoff).
- Operation, maintenance, and ownership of detention facilities, particularly in residential subdivisions.

Y Allowable methods for handling storm water on-site (Due to soil conditions and underlying basalt, some areas of the City may not be suitable for infiltration or shallow injection (drywells) methods of storm water disposal.)

A revised storm water control policy should be coordinated with anticipated storm water quality regulations to avoid conflicting or overlapping requirements.

Environmental Concerns

During the past several decades, increased attention has been focused nationally on the water quality impacts from storm water runoff. Studies conducted as part of the National Urban Runoff Program (NURP) in the late 1970s identified numerous pollutants in storm water runoff including sediment, heavy metals, oils & grease, nutrients, and bacteria. As a result of the 1987 Clean Water Act, regulation of storm water runoff from industrial sites, construction sites, and municipal systems has been implemented through the National Pollutant Discharge Elimination System (NPDES) permitting program. The Final Storm Water Phase II rule was published in the Federal Register in December 1999. This rule applies to municipal separate storm sewer systems serving less than 100,000 in urbanized areas or as designated by the permitting authority, which for Lewiston is EPA Region 10. If designated, Lewiston will be required to submit a NPDES application by March 2003 or within 180 day of designation. An additional regulatory issue for Lewiston is the Total Maximum Daily Loads (TMDLs) for the Clearwater River. This process establishes upper limits for discharge of specified pollutants, so a water body can or will continue to meet State Water Quality Standards. This process can result in numerical discharge limits for point discharges or Best Management Practices (BMPs) for non-point discharges that may impact Lewiston's storm water requirements. Further discussion of environmental regulations is included in Section 7.

Section 3 – Storm Drainage Basins Characteristics

General

Runoff from storm drainage basins is determined by a number of characteristics of the area and individual basins. These characteristics include climate, which determines rainfall intensities and native vegetation, terrain, soils, and land use. This section provides a general summary of these characteristics within the study area and defines the individual basins. Specific basin characteristics are provided in Section 5.

Climate

Lewiston is considered to have a moderate climate in comparison to the surrounding areas of Central Idaho and Eastern Washington. This climate is the result of relatively low elevation, 740 feet above sea level at the confluence of the Snake and Clearwater Rivers to approximately 1500 feet in the East Orchards. The following is a climate summary based on data collected at the Weather Service Office and the Lewiston/Nez Perce County Airport from 1948 to 2000:

	January	July	Annual
Average Max. Temp. (F)	39.1º	88.8º	63.1º
Average Min. Temp. (F)	26.4º	58.7º	41.7º
Average Total Precipitation (in.)	1.24”	0.72”	12.79”
Average Total Snowfall (in.)	5.8”	0	15.8”

Terrain

Lewiston’s location at the confluence of the Snake and Clearwater Rivers provides for significant relief within the City. North Lewiston is composed of a flat area of former riverbed and banks protected from the Lower Granite Reservoir and Clearwater River by the Army Corps of Engineers’ Levee system. The base of Lewiston Hill, a steep canyon face extending nearly 2000’ above the valley floor, forms North Lewiston’s north edge. On the south side of the Clearwater, Lewiston has three distinct terrain types with respect to drainage. The lowest in elevation is a flat to moderate area consisting of former river flood plain (Downtown) and river terrace (Normal Hill and East Lewiston). Steep to very steep bluffs, bisected by drainage draws, between the river terrace and the Orchards. The Orchards has gentle to flat slopes, with moderately steep terrain occurring in areas around the drainage draws.

Soils

Two primary soils types are identified within Lewiston in the Nez Perce County Soil Survey prepared by the Natural Resource Conservation Service (NRCS), previously the Soil Conservation Service (SCS). These soil types are Chard and Broadax-Oliphant. The Chard soil type generally corresponds to the downtown area and the Broadax-Oliphant underlies the Orchards area. Both of these soils are in hydrologic soil group B. Group B soil textures are defined as silt loam or loam. With respect to runoff, SCS Technical Release 55 describes group B soils as having moderate infiltration rates when thoroughly wetted and a moderate rate of water transmission.

Land Use

Land use within a drainage basin generally has the greatest impact on the rainfall – runoff relationship. For this planning level study, the land use designations in Lewiston's 1999 Comprehensive Plan were used including low and higher density residential, commercial, industrial, and open space. The Comprehensive Plan defines low-density residential 5 to 8 units per acre and higher density residential as 18 or more units per acre (Neighborhood Sections, Part j). All areas were assumed to be built-out to the designated land use. Where land was undevelopable, such as steep canyons, the land was considered western desert landscape.

Storm Drainage Basins

The first step in developing a storm water plan was to identify the drainage basin limits that make up the study area. Drainage basins were determined using the 1995 contour mapping prepared by the Army Corps of Engineers. An area draining to a single outfall or group of outfalls that discharge to a common drainage draw or system defined the drainage basins. Some basins were further divided into sub-basins when the basin had multiple outfalls for ease of analysis. A map showing the location and limits of the major drainage basins (Figure 3.1) is included in the map pocket in the back of this report. Table 3.1 (below) summarizes the major drainage basins. Further information on the basin characteristics, including size, land use, and terrain is included the Section 5.

Table 3.1 – Lewiston's Major Drainage Basins

Basin Number	Basin Name	Location	Sub-basins
1	Upper Lindsay Creek	East Orchards	3 (A-C)
2	18th Street	East Orchards	3 (A, C, & D)
3	15th Street	Central Orchards	
4	11th Street	Central Orchards	2 (A & B)
5	21st Street	East Orchards	
6	Gun Club Road/Warner Avenue	West / Central Orchards	2 (A & B)
7	21st /Thain Road	East Lewiston / West & Central Orchards	3 (A-C)
8	10th Street	West / Central Orchards	4 (A-D)
9	Country Club	Country Club	5 (A-E)
10	Bryden Canyon	Country Club / West Orchards	
11	Southway	Normal Hill / West Orchards	
12	17th /18th Street	Normal Hill	
13	Downtown	Normal Hill	7 (A-G)
14	Normal Hill	Normal Hill	5(A-E)
15	Port District	North Lewiston	2 (A&B)
16	Lewiston Hill	North Lewiston	
17	Hatwai Road	North Lewiston	
18	Northeast Lewiston	North Lewiston	2 (A&B)
19	East Lewiston	East Lewiston	2 (A&B)
20	Ripon Avenue	Central Orchards	2 (A&B)

Section 4 – Storm Drainage System Analysis

General

As discussed in Section 1, the purpose of this planning study is to provide a preliminary drainage system layout with approximate pipe sizes (and peak flows) and to make a preliminary assessment of the adequacy of the existing storm drainage system adequacy. In order to conduct this analysis, first a method of analysis must be selected and then the necessary input data collected. Input data for this type of analysis includes drainage areas and their characteristics, the rainfall event, and data on existing and proposed drainage facilities information and parameters. This section summarizes the analysis method and input.

Methodology

TR-55

The method of analysis selected for this study is based on the Soil Conservation Service's Technical Release 55 – Urban Hydrology for Small Watersheds, commonly referred to as the TR55 Method. This method generates a hydrograph, the relationship between storm water runoff flow verses time, for each drainage area defined. These individual hydrographs are then routed through the drainage system so that the hydrograph at any point along the drainage system can be determined. By generating hydrographs and routing them through the drainage system, this method provides results more representative of actual conditions than the Rational Method, which determines a peak flow, and the hydrographs allow for more accurate analysis of storm water control facilities, such as detention basins, used to reduce peak flows.

Modeling Software

The hydraulic modeling software utilized to conduct the hydrologic and hydraulic analysis for Lewiston is HYDRA™. HYDRA™ allows storm water runoff to be analyzed by a number of methods, including the Santa Barbara SCS Method. This is a modified version of the SCS TR-55 method developed by Santa Barbara County, California to better represent the hydrology of small urban watersheds. In addition, HYDRA™ has the following benefits:

- Y Has the ability to perform preliminary storm drainage pipe sizing based on design parameters input by the user and the peak flow generated by the model.
- Y Analyzes existing pipes input into the model to determine if adequate capacity exists, and if not, recommends a new pipe diameter or parallel pipe diameter.
- Y Provides a graphical interface with AutoCAD (ACAD) that allows drainage

system and basin configurations to be readily converted to modeling elements. This also allows the queries of the model input and output to be exported to ACAD for combining with other graphics, street rights-of-way for example, for interpretation and presentation purposes.

- Y Alternative conveyance system configurations can be readily input using the graphical interface to allow analysis of alternatives.
- Y Once developed, various pipe, drainage basin, and storm parameters can be easily changed and modeled to allow refinement and calibration of the model.

This modeling software is also used in wastewater collection system modeling, and previous sewer interceptor analysis performed for the City of Lewiston was done using an older version of this software. Future expansion of the wastewater collection system model could be done with this software.

Drainage Areas

Area

Based on the existing and proposed storm drainage layout and the topographic limits of each basin or sub-basin, drainage areas were determined. Drainage areas were determined using a number of criteria including:

- Y Located wholly within the basin or sub-basin and tributary to the existing or proposed drainage system.
- Y Topography allowed runoff from drainage area to be generally directed to one component of drainage system.
- Y Whenever possible, relatively uniform slopes and land use exist throughout drainage area.

Based on the above criteria, 290 individual drainage areas were identified and used in the modeling of the storm drainage system. These areas were digitized over the City ACAD base map and registered into the model to allow the individual areas to be determined by the computer software.

Curve Number (CN)

Curve numbers (CNs) are selected for each drainage area based on land use and soil types. These curve numbers represent the drainage areas imperviousness, how much rainfall will runoff the area, in generating each areas discharge hydrograph. As discussed in Section 3, all soils in Lewiston are classified as Type B soils. Therefore, the CNs only vary with land use throughout the City.

Land use for each drainage area was determined from the Lewiston, Idaho Comprehensive Plan – 1999. Therefore, the model represents the ultimate, or build-out, condition for the City based on the Comprehensive Plan designations. A summary of the Curve Numbers for each land use type identified within Lewiston is provided in Table 1. Where drainage areas included two or more land uses, the CN was approximated based on the area of each land use within the drainage area.

Table 1 – Summary of SCS Curve Numbers Used in Lewiston Storm Water Model

Comprehensive Plan Land Use Designation	SCS Cover Description	SCS Curve Number (Soil Group B)
Low Density Residential	Residential District 1/4 Acre Average Lot Size	75
Higher Density Residential	Residential District 1/8 Acre Average Lot Size	85
Commercial	Commercial and business	92
Industrial	Industrial	88
Parks, Open Space, Recreational	Open Space – Good Condition (grass cover > 75%	61
	Western desert Urban Areas – Natural desert landscaping	77

Time of Concentration

Time of concentration is the time required for rainfall to travel from the most hydraulically remote point in a drainage area to drainage areas point of discharge. The flow components that make up the time of concentration include sheet flow, shallow concentrated flow (rivulet flow), and in some cases open channel flow. The travel time in each of these flow conditions is dependent on the distance and velocity.

For this planning level model, sheet flow distance was generally assumed to be 300’ in low density residential and 200’ in high density residential corresponding to a typical block depth. In commercial and industrial areas, 300’ was used, typical of sheet flow across parking lots. Lesser distances were used in steep hillside areas or where specifically identified. No sheet flow greater than 300’ was used. The shallow concentrated flow, or rivulet flow, distance for each drainage area was based on the square root of the drainage area, approximating the length of the drainage area.

Sheet and shallow concentrated flow velocities vary based on the ground surface and slope. For sheet flow, the ground surface in low and higher density residential and open space areas was assumed to be lawn (dense grass) with a Manning's n of 0.24. In commercial and industrial, the surface was assumed to be asphalt with a Manning's n of .013. For shallow concentrated flow, a K value of 11 was used for low-density residential and open space representing lawn and a K value of 27 was used for all other land uses representing pavement. Slopes for all drainage areas were determined from the contour maps along the flow path.

Design Storm

Storm Frequency

Design storms (or rainfall events) are generally categorized by recurrence interval or frequency. These intervals are described in years, with published data typically available for 2, 5, 10, 25, 50, and 100-year recurrences. The recurrence interval represents the average number of years between events producing the given precipitation or more in a specified time period. For example, if the given 24-Hr rainfall for a 10-year recurrence interval is 2.0 inches, then on average, only one 24-hour precipitation event equal to or exceeding 2.0 inches will occur ever 10 years. What is important to remember is that these values are averages. It is possible to exceed these values more than once in the given recurrence interval, or even within a single year.

Selection of a storm frequency for design purposes is a matter of cost verses benefit. Selection of a greater design storm frequency provides a reduction in the risk of flooding, but at a greater capital investment. The most common design storm currently being utilized by municipalities in the United States is a *25*-year return frequency. The results presented in this report are based on a 25-year design storm. Model results for a 10-year and 100-year design storm are included with the model.

24-Hour Rainfall

The TR-55 method uses 24-hour rainfall amounts for the selected recurrence interval as one of the inputs to generate the runoff hydrograph. Twenty-four hour rainfall amounts for various recurrence intervals are available from the National Oceanic and Atmospheric Administration (NOAA) and a summary for various recurrence intervals is provided in Table 4.1 (below).

Table 4.1 – 24-Hour Precipitation for Various Recurrence Intervals at Lewiston, Idaho

Recurrence Interval (Years)	24-Hr Rainfall (In.)
2	1.2
5	1.6
10	2.0
25	2.2
50	2.6
100	2.8

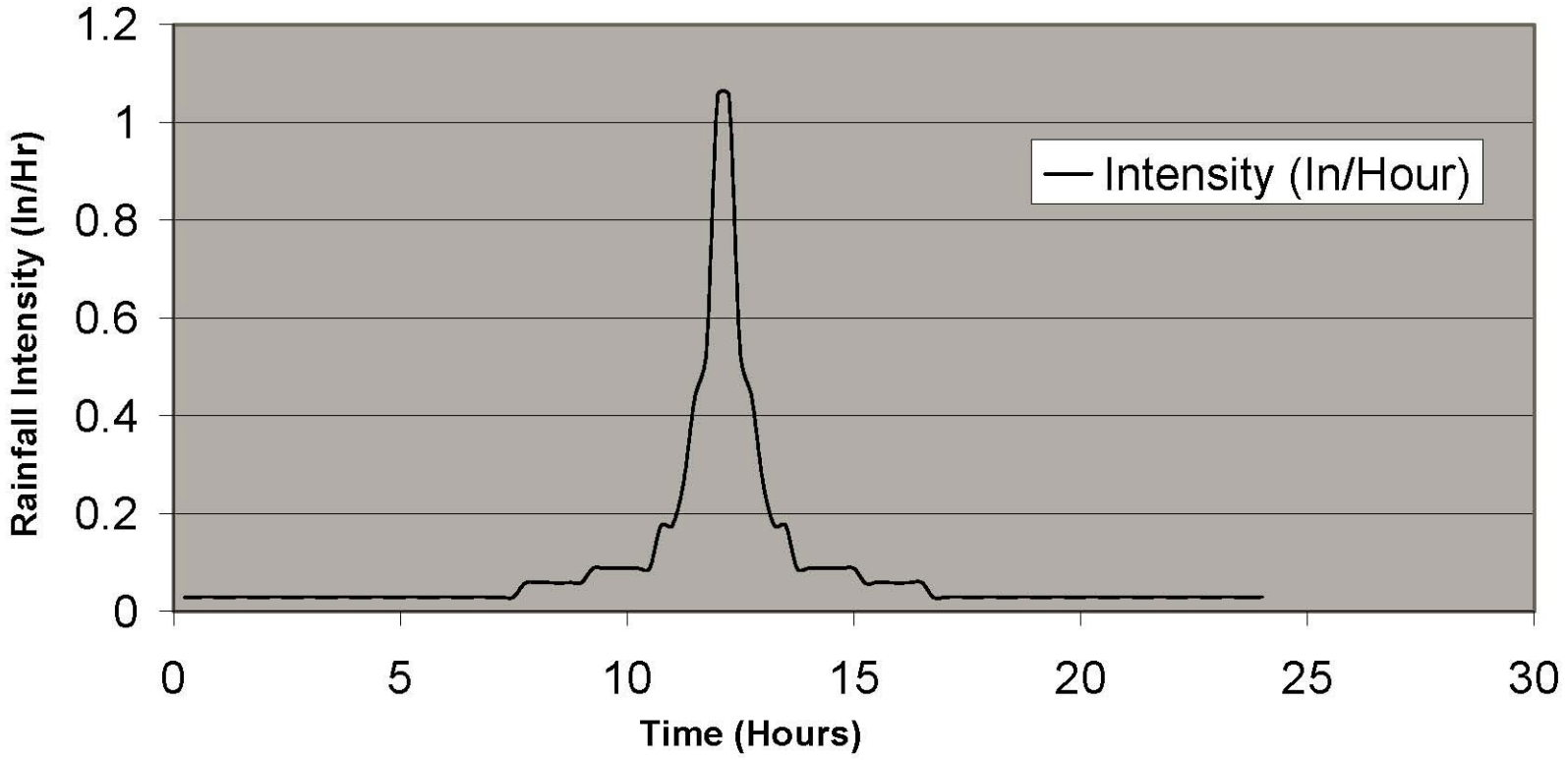
Source: NOAA Atlas 2 - Isopluvials of (#)-Year 24-Hour Precipitation. Maps available for viewing at the Western Regional Climate Center Website (www.wrcc.dri.edu).

Rainfall Distribution

The TR-55 Method utilizes various 24-hour rainfall distributions depending on the location within the United States. These synthetic rainfall distributions were developed to best simulate the intense, brief rainfall events that generate the highest peak discharges in small, urbanized watersheds. The 24-hour rainfall distribution recommended in TR-55 for Lewiston is a Type II and is presented graphically in Appendix B of TR-55.

HYDRA™ allows the user to input any rainfall distribution for modeling. The rainfall distribution is entered as points on a hyetograph, time verses rainfall intensity. This allows any storm, including actual events where rainfall data is collected in relatively small increments (15 minutes or less is recommended), to be modeled. For this study, a Type II distribution was generated in tabular form using the 25-year 24-hour rainfall for input into the model. Chart 1 and 2 display this distribution graphically as time verses intensity and time verse percentage or 24-hour total, respectively. Distributions for 10-year and 100-year were also generated and are included in the model.

Chart 4.1 - Rainfall Hyetograph (SCS Type II)
25-Year Frequency
Lewiston, Idaho



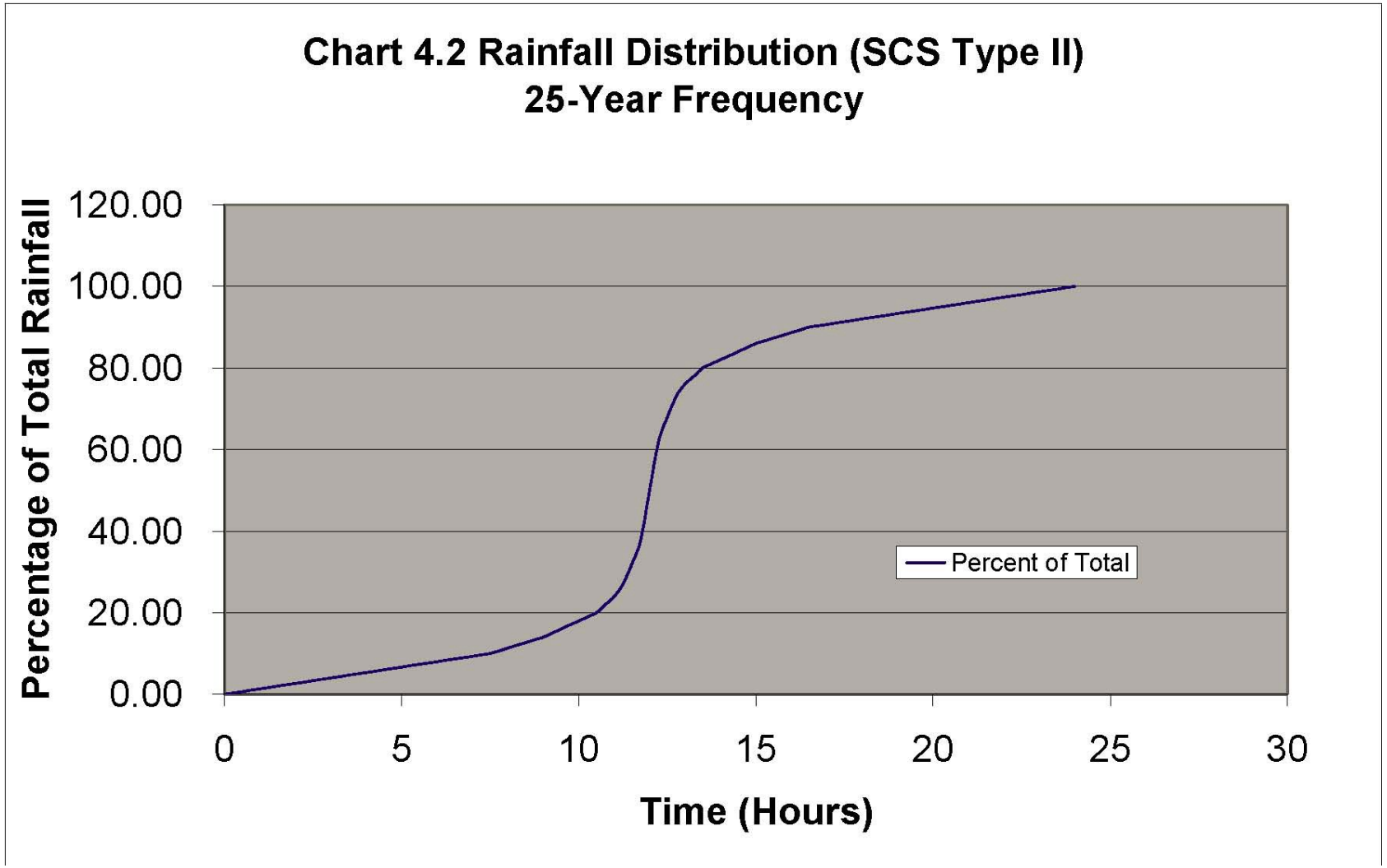


Chart 4.2 Rainfall Distribution (SCS Type II)
25-Year Frequency
Percentage of Total Rainfall
120.00
100.00
80.00
60.00
40.00
20.00
0.00
0
5
10
15
20
25
30
Time (Hours)
Percent of Total

Existing Storm Drainage System

The model allows input of various existing pipe and open channel parameters that determine the capacity. These parameters include elevation, length, diameter, and Manning's n. The data available on existing drainage system components, particularly elevation data, is not adequate to verify capacity of these components. Inclusion of these components in the model was to allow system continuity for routing and generation of peak flows. A general idea of the existing drainage systems adequacy to handle peak flows can be developed from this analysis.

Sources of Data

Available data sources for this study include the City's 1995 aerial mapping, storm drainage plats, design or record drawings, and system inventory information collected by the City's Street Division. No field surveys were conducted as part of this study.

Elevation Data

The primary source of elevation data for this analysis was the City's aerial mapping. For proposed drainage system components, ground elevations were determined from the aerial mapping by interpolating between contour lines or using spot elevations when available. This method was also used on many components of the existing system where better elevation data was not available. Design and record drawings for drainage systems in Thain Road, 17th /18th Street, Port District, Bryden Canyon, and Country Club Drive were utilized for these system components. The pipe grades from the plans were entered into the model and used over estimated ground or invert elevations. Where no invert depth information was available, the pipe slope was assumed to be the same as the ground slope. For a planning level analysis, this assumption should generate reasonable result in steep areas, but poor results in flat areas.

System Location

Location of existing pipes was based on storm drainage mapping developed for the City's Geographic Information System. This mapping was developed utilizing the storm drainage plats, design or record drawings, and the citywide aerial mapping. This mapping was done over the City's base map, and the segments were digitized and registered in the modeling software. In addition, open channel segments were determined using the aerial mapping and registered in the model. The model determined the drainage component lengths.

System Component Characteristics

Open Channels

Existing open channels are a key component of Lewiston's existing storm drainage system and will likely remain so in the future. For analysis purposes, existing open (natural) channels where analyzed using a single Manning's coefficient. Two typical natural channel conditions were assumed for this study. In steep areas where flow velocities are high leaving the channel with little vegetation but significant stones, a Manning's n value of 0.050 appears representative. In areas with flatter grades where lower flow velocities occur, typical of the natural drainages in the Orchards, allowing grass growth with some vegetation in and along the channel, a Manning's n value of 0.050 also appears representative.

Existing Pipes

Characteristics of pipes that relate to their hydraulic capacity are the diameter and pipe material. The diameter of existing pipes was taken from the City's Storm Drainage Plats and the design or record drawings from construction projects. Pipe materials where determined in the same manner. Where the pipe material was not shown, corrugated metal pipe was assumed, except in the downtown area were concrete was assumed. Manning's n values for concrete and CMP used in the model were 0.013 and 0.022, respectively.

Proposed Storm Drainage System

Layout Criteria

The following criteria were developed to provide guidance in laying out the proposed storm drainage system. The goal was to provide a system that was consistent throughout the City in its ability to provide storm drainage service.

- The maximum street length without storm drainage collection facilities is 660'.
- Use existing rights-of-way for storm drainage system where possible to minimize storm runoff to natural drainage ways.
- Where use of street rights-of-way were not feasible due to topography, natural drainage draws were utilized where well defined and undeveloped.
- Whenever possible, storm drainage lines should be located where existing ground is 2% or steeper.
- Assume all streets have curb and gutter.

- Where feasible, incorporate primary drainage systems into arterial collector streets.

Based on the criteria above, a storm drainage system layout was developed to meet these goals in each of the drainage basins or sub-basins previously identified. Figure 4.1 (Map Pocket) provides a summary of the model segment types (existing pipes, proposed (design) pipes, and open channels) used in the analysis.

Capacity Analysis Assumptions

HYDRA™ provides preliminary pipe sizing for proposed pipes based on user defined criteria. These criteria include Manning's n values, minimum pipe diameter, depth-to-diameter ratio (depth of flow divided by diameter of pipe), minimum cover, and ground elevation. The Manning's n assumed for proposed pipes was 0.013. This is representative of concrete pipe and would provide a conservative estimate of capacity for PVC or HDPE pipe. If CMP were used, pipe diameters would need to be increased to convey the peak flows. Minimum pipe diameter allowed was 12". This is based on City policy and good practice from a maintenance perspective. Minimum pipe cover allowed was 2'. The maximum depth-to-diameter ratio was set at 0.7 (70% full).

Section 5 – Storm Drainage Analysis Result

General

The following is a general summary of the entire drainage system with respect to peak flow and exceedance of existing pipe capacity. A summary of the analysis results and proposed drainage system layout for each drainage basin is provided in this section.

Peak Flows

Figure 5A (Map Pocket) provides a color-coded summary of the peak flows throughout the entire drainage system. The significances, with respect to peak flow, of each segment of the drainage system can be readily determined from this figure. As expected, the lower portions of the major drainage systems have the highest peak flows. Examples of this include the lower portions of the 21st Street/Thain Road and Southway basins.

Existing System Capacity

Figure 5B (Map Pocket) provides a color-coded summary of the preliminary capacity limitations in the system based on various flow ranges above the existing pipe capacity. It should be noted that these capacity limitations are preliminary in nature and a more detailed analysis using surveys to determining vertical and horizontal location of existing pipe should be conducted. This map should not be used alone to prioritize drainage system needs. Some systems are capable of conveying flows beyond the pipe capacity on the surface without causing damage or significant problems. Generally, documented flooding problems are a better indication of where existing system capacities are insufficient and surface flow routes are not available or impact property.

Drainage Basin Summaries

The following section provides a summary for each of the 20 drainage basins identified. The summary includes basin and sub-basin characteristics, general description of existing drainage components, recommendations and alternatives for further consideration. A map showing the basin limits, existing and proposed drainage system components, preliminary pipe sizing, and peak flow at key locations are also included.

Click here for the Major Drainage Basins Map

Upper Lindsay Creek (Basin 1)

Basin Name: Upper Lindsay Creek

Basin Number: 1

Location: East Orchards (North)

Terrain: Generally gently sloping to the north to drainage draws forming the upper part of the Lindsay Creek drainage.

Land Use: This basin consists primarily of low density residential.

Drainage Area: 377 Acres

Sub-Basin Summary:

Sub-Basin	General Location	Area	Primary Land Use	Average CN
A	21st to 22nd Street between Grelle Ave. and Birch Ave.	189	Low Density Residential	75
B	19th to 20th Street north of Alder	81	Low Density Residential	75
C	22nd to 23rd Street north of Grelle Avenue	107	Low Density Residential	75

Existing Drainage System Components:

No significant drainage system exists within this basin. Existing drainage is conveyed through natural drainage ways and roadside ditches with some approach culverts.

Proposed Drainage System Components: See Figure 5.1.

Other Considerations:

Y This basin is tributary to Lindsay Creek located to the north. The drainage systems in this basin discharge to natural drainage ways or ditches that eventually convey runoff to Lindsay Creek.

Y Drainage improvements discharging from this basin should be coordinated with downstream development to prevent adverse impacts.

Y Effort to preserve these natural drainage ways for conveyance and water

quality benefits should be undertaken now, prior to development.

- The potential for water quality treatment and detention facilities serving the basin or sub-basins should be explored to protect the water quality and minimize increases in peak flow in Lindsay Creek.

18th Street- Orchards (Basin 2)

Basin Name: 18th Street

Basin Number: 2

Location: East Orchards (North)

Terrain: Similar to Basin 1, gently sloping to the north to drainage draws forming the upper part of the Lindsay Creek drainage.

Land Use: This basin consists primarily of low density residential.

Drainage Area: 447 Acres

Sub-Basin Summary:

Sub-Basin	General Location	Area	Primary Land Use	Average CN
A	West side of 16th Street from Burrell Ave. to Birch Ave.	77	Low Density Residential	75
C	16th to 17th Street from Burrell Ave. to Birch Ave	80	Low Density Residential	75
D	17th to 21st Street from Burrell Ave. to Birch Ave	290	Low Density Residential	75

Existing Drainage System Components:

A drainage system exists from 18th Street to Alder Avenue, north on 18th Street to Grelle Avenue, and west on Grelle Avenue a short distance were the system discharges to a natural drainage way. Storm drainage for the remainder of the basin is conveyed through natural drainage ways and roadside ditches with some approach culverts.

Proposed Drainage System Components: See Figure 5.2.

Other Considerations:

☐ See Other Considerations stated for Storm Water Basin 1 on page 26.

15th Street - Orchards (Basin 3)

Basin Name: 15th Street

Basin Number: 3

Location: Central Orchards (North). 13th Street to east of 15th Street from Warner Avenue to Ripon Avenue.

Terrain: North sloping basin to drainage draws forming the upper part of the Lindsay Creek drainage. This basin has a significant natural drainage way extending south through the basin from Warner Avenue.

Land Use: This basin consists primarily of low density residential with some higher density residential and commercial along Thain Road and 14th Street.

Drainage Area: 466 Acres

Average CN: 78

Existing Drainage System Components:

No significant drainage system exists within this basin. Existing drainage is conveyed through natural drainage ways and roadside ditches with some approach culverts.

Proposed Drainage System Components: See Figures 5.3 A & B

Alternative(s):

An alternative to utilizing the natural drainage as discussed below and shown on the basin map would be to acquire an easement generally following the natural drainage to allow installation of a piped system. This approach is more costly and limits access for maintenance of the lines.

Other Considerations:

Due to the topography of this basin, use of the natural drainage way is necessary. Protection of this drainage way to prevent blockage or encroachment should be considered when land use or development is undertaken in or near this natural drainage.

Also, see Other Considerations stated for Storm Water Basin 1 on page 26.

11th Street - Orchards (Basin 4)

Basin Name: 11th Street

Basin Number: 4

Location: Central Orchards (North)

Terrain: Gently sloping to the north to drainage draws forming the upper portion of the Lindsay Creek drainage.

Land Use: This basin consists primarily of low density residential. A large open space area is proposed along the east side of the basin and the area along Thain Road includes commercial and higher density residential.

Drainage Area: 215 Acres

Sub-Basin Summary:

Sub-Basin	General Location	Area	Primary Land Use	Average CN
A	13th to 14th Street from Warner Ave. to Cedar Ave.	131	Low Density Residential/Open Space	69
B	West of 12th Street to 13th Street from Warner Avenue to Airway Avenue	84	Higher Density Residential/Commercial/ Public	83

Existing Drainage System Components:

There is no significant drainage system existing within this basin. Existing drainage in the majority of the basin is conveyed through natural drainage ways and roadside ditches with some approach culverts.

Proposed Drainage System Components: See Figure 5.4

Other Considerations:

As growth occurs north of Warner Avenue adjacent to this basin, provisions to accommodate storm drainage must be provided. Peak flows from the existing basin are included in this report, and in conjunction with flows from the developing site, can be used to estimate the size of these facilities.

Also, see Other Considerations stated for Storm Water Basin 1 on page 26.

21st Street - Orchards (Basin 5)

Basin Name: 21st Street

Basin Number: 5

Location: East Orchards. 20th to 22nd Streets south of Birch Avenue / Ripon Avenue.

Terrain: This basin generally slopes to the south with moderate slopes and is part of the Tammany Creek drainage.

Land Use: This basin consists primarily of low density residential.

Drainage Area: 83 Acres

Average CN: 75

Existing Drainage System Components:

No significant drainage system exists within this basin. Existing drainage is conveyed through natural drainage ways and roadside ditches with some approach culverts.

Proposed Drainage System Components: See Figure 5.5

Other Considerations:

This basin is tributary to Tammany Creek located to the south. The drainage systems in this basin discharge to natural drainage ways or ditches that eventually convey runoff to Tammany Creek.

Y Drainage improvements discharging from this basin should be coordinated with Nez Perce County and downstream development to prevent adverse impacts.

Y Effort to preserve these natural drainage ways for conveyance and water quality benefits should be undertaken now, prior to development.

Y The potential for water quality treatment facilities serving the basin or sub-basins should be explored to protect the water quality in Tammany Creek.

Gun Club Road/Warner Avenue (Basin 6)

Basin Name: Gun Club Road/Warner Avenue

Basin Number: 6

Location: Central Orchards (North)

Terrain: Gently sloping to the north to steeper drainage draws forming the upper portion of the Lindsay Creek drainage.

Land Use: This basin consists of commercial, and low & higher density residential.

Drainage Area: 118 Acres

Sub-Basin Summary:

Sub-Basin	General Location	Area	Primary Land Use	Average CN
A	North of Stewart Avenue / West of Gun Club Road	76	Low & Higher Density Residential	80
B	11th Street South of Warner Avenue	42	Commercial	92

Existing Drainage System Components:

There is no significant drainage system existing within this basin. An 18" diameter storm drainage pipe is located in 11th Street from Warner Avenue to Linden Avenue. Existing drainage in the majority of the basin is conveyed through natural drainage ways and roadside ditches with some approach culverts. A minor drainage system in sub-basin A has recently been constructed to serve a new subdivision, but detailed information was not available at the time the model was developed to allow analysis of these improvements.

Proposed Drainage System Components: See Figure 5.6 A & B

Other Considerations:

This basin is experiencing growth north of Warner Avenue and east of Gun Club Road. As this development occurs, provisions to accommodate storm drainage must be provided. Peak flows from the existing basin are included in this report, and in conjunction with flows from the developing site, can be used to estimate the size of these facilities.

21st Street/Thain Road (Basin 7)

Basin Name: 21st Street/Thain Road

Basin Number: 7

Location: West & Central Orchards, East Lewiston, and Normal Hill.

Terrain: This basin slopes to the north and consists of three tiers. First, in the west and central orchards the terrain is gently sloping toward the head of drainage draws bisecting the bluffs. The second portion consists of steeply sloped bluffs and drainage draws. The third tier consists of gentle to moderate sloping terrain from the bluff to the Clearwater River.

Land Use: This basin consists of a mix of land uses. Low density residential is located throughout the basin with commercial and higher density residential located along the arterials (21st Street, Thain Road, & Bryden Avenue) within the basin.

Drainage Area: 1591 Acres

Sub-Basin Summary:

Sub-Basin	General Location	Area	Primary Land Use	Average CN
A	Drainage paralleling 24th & 25th Streets and west side of Sunset Park from East Main to south of 16th Avenue	281	Commercial in Upper Basin / Low Density Residential in Lower Basin	82
B	Paralleling 21st Street/Thain Grade/ Thain Road from East Main Street to Alder Avenue	940	Mixture Low & Higher Density Residential and Commercial Throughout	83
C	Paralleling 19th & 20th Streets, the west side of Nez Perce Grace, and 6th Street from 8th Street (Downtown) to Bryden Avenue	370	Mixture Low & Higher Density Residential and Commercial Throughout	83

Existing Drainage System Components:

This basin has existing drainage systems from its discharge point into the Clearwater River, immediately east of Memorial Bridge, to the drainage draws bisecting the bluffs. The basin divides into three distinct systems. One begins near 24th Street and East Main Street and extends south beyond Sunset Park. A second branches off near 21st street and 8th Avenue and runs parallel to 19th and 20th Streets south to beyond 19th Avenue to the drainage draw immediately west of Nez Perce Grade. The third, and main system, extends south from 21st Street and 8th Avenue, veering east at 11th Avenue to the undeveloped 23rd Street right-of-way, then continuing south to the intersection of Thain Grade and Nez Perce Grade and up (south) Thain Grade to the drainage draw on the west side of this street. This system continues south as a piped system in Thain Road from north of Stewart Avenue to Alder Avenue. These systems consist of piped and open channel sections throughout their lengths.

Proposed Drainage System Components: See Figure 5.7 A - D

Alternative(s):

- The proposed drainage system shows the need to increase the pipe sizing in the main drainage system from 21st Street and 8th Avenue, south up Thain Grade to accommodate the peak flows. Consideration should be given to constructing a parallel storm drainage line in 21st Street/Thain Grade sized to handle peak flows along with the existing system. This configuration would provide two benefits. First, it would provide a system to directly handle runoff from 21st Street. Most of 21st Street does not have a storm drainage system within the street. Second, if this could be done in conjunction with a Federal Aid project, a portion of these drainage improvements could be paid for through that program.

Other Considerations:

- The existing drainage systems within this basin include both open channels and piped components. The change from open channel to piped systems is a point where debris and vegetation can accumulate and restrict flows. These locations require more maintenance than other system components and should be considered for improved inlet structures, such as slotted standpipes with overflows, to minimize blockage of the inlets.

- Maintaining the open channel sections within these existing systems should be considered to take advantage of the water quality benefits derived from these segments. These open channel segments provide an opportunity for settlement and entrapment of sediment and related heavy metals from storm water that may benefit the City in meeting future storm water quality regulations.

10th Street - Orchards (Basin 8)

Basin Name: 10th Street

Basin Number: 8

Location: West & Central Orchards.

Terrain: This basin generally slopes to the south and west with gentle to moderate slopes in the upper portions of the basin, transitioning to steeper slopes near the drainage draws that convey runoff to Tammany Creek.

Land Use: This basin consists primarily of low density residential.

Drainage Area: 478 Acres

Sub-Basin Summary:

Sub-Basin	General Location	Area	Primary Land Use	Average CN
A	6th to 9th Street from Grelle Ave to Burrell Ave.	111	Low Density Residential	75
B	10th to 12th Street from Cedar Ave. to Powers Ave.	191	Low Density Residential	75
C	10th to 12th Street from Powers Ave. to Richardson Ave.	176	Low Density Residential	75

Existing Drainage System Components:

No significant drainage system exists within this basin. Existing drainage is conveyed through natural drainage ways with culverts providing drainage across roadways, 10th Street having the most significant drainage structures. Roadside ditches with some approach culverts provide street drainage in some areas.

Proposed Drainage System Components: See Figure 5.8 A & B

Other Considerations:

- Y Due to the topography of this basin, use of natural drainage ways is recommended. Protection of these drainage ways to prevent blockage or encroachment should be considered prior to development occurring in or near this natural drainage.

- Drainage improvements discharging from this basin should be coordinated with Nez Perce County and downstream development to prevent adverse impacts.
- The potential for water quality treatment facilities serving the basin or sub-basins should be explored to protect the water quality in Tammany Creek.

Country Club (Basin 9)

Basin Name: Country Club

Basin Number: 9

Location: Country Club.

Terrain: Moderate to steeply sloping terrain from the West Orchards to the Snake River.

Land Use: This basin consists primarily of low density residential and native desert landscape.

Drainage Area: 968 Acres

Sub-Basin Summary:

Sub-Basin	General Location	Area	Primary Land Use	Average CN
A	Sunset Palisades Additions south of Duthie Blvd.	109	Low Density Residential/Open Space	68
B	Sunset Palisades Additions to Airport	603	Low Density Residential/Native Desert	75
C	Country Club Drive east to bluffs from Echo Hills Drive to Reservoir Drive	99	Low Density Residential	75
D	Country Club Drive east to bluffs from Snake River Avenue intersection to Echo Hills Drive	130	Low Density Residential	75
E	Area east of Snake River Avenue from Bryden Canyon Road to Country Club Drive	27	Low Density Residential	77

Existing Drainage System Components:

Three primary drainage systems exist within this basin:

1. A system extending from Snake River Avenue along Country Club Drive to just north

of Echo Hills Drive. This system was installed in 1999 as part of an Idaho Department of Transportation project. An existing pipe extends from this system to Meadowlark Drive.

2. From Country Club Drive and Echo Hills Drive, a system extends south to Shiloh Drive, then east up Shiloh Drive to Selway Drive.
3. A drainage draw extends from the Snake River to the Airport through the Sunset Palisades Subdivisions with culverts at the street crossings.

Proposed Drainage System Components: See Figure 5.9

Other Considerations:

Due to slope stability concerns, future use of infiltration or percolation facilities for storm water management in this basin should not be permitted.

Bryden Canyon / Bryden Avenue (Basin 10)

Basin Name: Bryden Canyon / Bryden Avenue

Basin Number: 10

Location: West Orchards/Country Club. Bryden Avenue to Burrell Avenue from 4th Street to 10th Street and Bryden Canyon and tributary area to south.

Terrain: The upper portion of this basin consists of flat to gently sloping terrain to the head of Bryden Canyon. Bryden Canyon provides a steeply sloping drainage to the Snake River.

Land Use: This basin consists primarily of low density residential with commercial and higher density residential along the west end of Bryden Avenue.

Drainage Area: 652 Acres

Average CN: 79

Existing Drainage System Components:

As part of the Bryden Canyon Road project, drainage systems were installed in the lower portion of this basin. A primarily piped system is located within the road alignment west of 8th Street. A parallel system provides flows to the natural drainage draw on the north side of the road alignment. Both of these systems begin in the natural drainage southeast of the 8th Street overpass. A pipe and ditch system conveys drainage from 5th Street & Bryden Avenue to the natural Bryden Canyon drainage. No significant drainage system exists within the upper portion of this basin in the vicinity of Bryden Avenue.

Proposed Drainage System Components: See Figure 5.10 A & B

Southway (Basin 11)

Basin Name: Southway

Basin Number: 11

Location: Normal Hill / West Orchards. This basin is bounded by Bryden Canyon on the south, 17th/15th Street on the east, and 15th Avenue on the north.

Terrain: This basin slopes to the north and west and consists of three tiers. In the upper part of the basin, located in the west orchards, the terrain is gently sloping to the head of drainage draws bisecting the bluffs. The second portion consists of steeply sloped bluffs and drainage draws. The third tier consists of moderately sloping terrain from the bluff to the Snake River.

Land Use: This basin consists primarily of low density residential. An area of commercial & higher density residential exists along 16th Avenue and an area of higher density residential is proposed south of 21st Avenue and east of 8th Street Grade.

Drainage Area: 882 Acres

Average CN: 79

Existing Drainage System Components:

A system of pipes and open channels currently provides drainage conveyance along Southway from Snake River Avenue to 8th Street. From 8th Street and 16th Avenue, the primary system serving this basin jogs south and east to 14th Street and 18th Avenue, then generally south to the vicinity of 23rd Avenue near 13th Street. A piped system extends from this main system approximately ½ block east of 8th Street to the south and picks up the natural drainage west of 8th Street Grade.

Proposed Drainage System Components: See Figure 5.11 A & B

Alternative(s):

Extending the existing 36" storm drainage pipe in 16th Avenue east of 8th Street to 14th Street, then south on 14th Street to the existing system would allow diversion of the existing flows and alleviate overloading the downstream 24" pipe. Extension of the pipe in 16th Avenue is necessary to provide drainage for this street. The drainage improvements in 16th Avenue could be done as part of a Federal Aid project for improving 16th Avenue.

Extension of a storm drainage line south on 8th Street from 16th Avenue to the natural drainage way located between 18th Avenue and 21st Avenue would also reduce overloading of the downstream 24" pipe east of 8th Street. This drainage work could be included in a future Federal Aid project on 8th Street.

17th/18th Street (Basin 12)

Basin Name: 17th/18th Street

Basin Number: 12

Location: Normal Hill. The 17th/18th Street corridor and the area from 10th to 19th Streets from 11th to 16th Avenues.

Terrain: Gentle to moderately steep terrain sloping to the north. This basin discharges in to Levee Ditch.

Land Use: This basin consists primarily of low and higher density residential.

Drainage Area: 283 Acres

Average CN: 81

Existing Drainage System Components:

An existing drainage system exists within 17th/18th Streets from Hwy 12 By-Pass (Army Corps of Engineers Ditch) south to 11th Avenue. A minor drainage system extends west from this system at 10th Avenue to 11th Avenue & 14th Street.

Proposed Drainage System Components: See Figure 5.12 A & B

Downtown (Basin 13)

Basin Name: Downtown

Basin Number: 13

Location: Normal Hill.

Terrain: The lower portions of these basins are flat. The bluff between Downtown and Normal Hill forms the upper portions of these basins and consists of steep to moderate slopes.

Land Use: This basin consists primarily of higher density residential and commercial.

Drainage Area: 388 Acres

Sub-Basin Summary:

Sub-Basin	General Location	Area	Primary Land Use	Average CN
A	Main Street to 9th Avenue from 14th to 18th Streets	99	Higher Density Residential/ Commercial/Open Space	89
B	Main Street to 9th Avenue from Miller Grade to 14th Street	100	Low Density Residential	84
C	Main Street to 9th Street Grade from 10th to 12th Streets	37	Higher Density Residential/ Commercial	89
D	D Street to 6th Avenue from 6th to 10th Streets	68	Higher Density Residential/ Commercial/Open Space	81
E	C Street to Main Street from 7th to 8th Streets	11	Commercial	92
F-G	Hwy 12 to 3rd Avenue from 1st to 7th Streets	73	Higher Density Residential/ Commercial	89

Existing Drainage System Components:

Each of the sub-basins has an existing piped storm drainage system in the downtown area that discharge to the Levee ditch or ponds.

Proposed Drainage System Components: See Figure 5.13

Alternative(s):

- Sub-basin 13 B & C outfall to the Levee ditch beneath the railroad tracks should be combined into a single pipe if possible. This would likely be more cost effective than installing two parallel pipes at this location, particularly due to the costs associated with the railroad undercrossing.

- A portion of sub-basin 13 A currently drains to sub-basin 13B. However, due to the flat grades in this area, it does not appear that flows from 13A can be conveyed through 13B using reasonable pipe grades and diameters. A more detailed study, including a survey to establish the vertical and horizontal location of existing drainage system components and outfalls, should be undertaken to determine the best alternative for resolving the drainage in sub-basins 13A, B, & C.

Normal Hill (Basin 14)

Basin Name: Normal Hill

Basin Number: 14

Location: Normal Hill.

Terrain: This basin generally slopes to the west with gentle grades. Up to the bluff between Prospect Avenue and Snake River Avenue where very steep grades exist. The portion of the basin along Snake River Avenue is flat.

Land Use: This basin consists primarily of low density residential with open space. Commercial land use exists along Snake River Avenue.

Drainage Area: 330 Acres

Sub-Basin Summary:

Sub-Basin	General Location	Area	Primary Land Use	Average CN
A	12th to 19th Avenues from Prospect Ave to 5th Street	81	Low Density Residential/Open Space	70
B	5th to 12th Avenues from Prospect Ave. to 11th Street	179	Low & Higher Density Residential	79
C	Snake River Avenue to Prospect Avenue south of 11th Avenue	19	Higher Density Residential	85
D	Snake River Avenue to Prospect Avenue H Street to 11th Avenue	14	Commercial	92
E	Prospect Avenue to 5th Street from Prospect Boulevard to 5th Avenue	37	Higher Density Residential/ Commercial	88

Existing Drainage System Components:

Minor systems exist in this basin to convey runoff from Prospect Avenue to Snake River Avenue or the Corps of Engineers system/ponds. Storm drainage pipes are located at some of the intersections within this sub-basin to collect gutter flows and convey these flows across the intersections to the downhill gutter lines.

Proposed Drainage System Components: See Figure 5.14 A & B

Alternative(s):

A preliminary location for routing drainage from Prospect Avenue to Snake River Avenue (Sub-basin 14B) is shown between 6th and 7th Avenues. There is an existing pipe at this location and a pipe further south on Prospect Avenue near 9th Street. These outfalls were combined to reduce overall costs for providing drainage to this basin. The preliminary location shown was selected based on street grades and a direct discharge to the Levee Ponds. A thorough evaluation of alternatives should be conducted to determine the final piping configuration in this area.

A portion of basin 13D is shown as being diverted into basin 14. This was done to reduce the flows to basin 13D which has very flat grades in the lower portion of the basin. Basin 14 generally has more gradient available to convey the flows generated in this area being diverted.

The south end of Basin 14 is shown as being directed into the lower portion of the Southway (Basin 11) system. This was done to reduce the multiple pipes over the bluff and associated discharges, some to the ditch line of Snake River Avenue.

Port District (Basin 15)

Basin Name: Port District

Basin Number: 15

Location: North Lewiston

Terrain: The majority of this basin is flat with some steep bluffs in the upper portion of the basin.

Land Use: This basin consists primarily of industrial land use with some commercial.

Drainage Area: 209 Acres

Sub-Basin Summary:

Sub-Basin	General Location	Area	Primary Land Use	Average CN
B	3rd Avenue N to 7th Avenue N from 12th Street N to 18th Street N.	126	Industrial/ Native Landscape	84
C	1st Avenue N to Hwy 128 from 18th Street N to Hwy 12.	83	Commercial/ Industrial	88

Existing Drainage System Components:

These basins both have trunk storm sewer systems.

Proposed Drainage System Components: See Figure 5.15

Lewiston Hill (Basin 16)

Basin Name: Lewiston Hill

Basin Number: 16

Location: North Lewiston. Area north of Hwy 12/95 Interchange.

Terrain: This basin consists of the lower portion of Lewiston Hill and is very steep terrain.

Land Use: Designated Rural Residential.

Existing Drainage System Components:

Flows from this area are collected along the north side of Hwy 12/95 and conveyed by culverts and a highway ditch to the Levee Ponds east of Memorial Bridge.

Proposed Drainage System Components:

No analysis of this system was performed as part of this study due to the lack of available data on the highway culverts and associate highway drainage components.

Hatwai Road (Basin 17)

Basin Name: Hatwai Road

Basin Number: 17

Location: North Lewiston. 31st Street N. to east to 41st Street N north of Hwy 12/95.

Terrain: Lower portion of this basin between Hwy 12/95 and Hatwai Road is gentle sloping. The upper part of this basin, north of Hatwai Road, is very steep terrain.

Land Use: This basin consists primarily of industrial and rural residential.

Existing Drainage System Components:

Existing drainage systems for this basin consist of culverts under Hwy 12/95. A system was installed from the mouth of a major drainage draw located east of 31st Street North to the Clearwater River in 2000.

Proposed Drainage System Components:

Again, no analysis of this system was performed as part of this study due to the lack of available data on the highway culverts that drain this area.

Northeast Lewiston (Basin 18)

Basin Name: Northeast Lewiston

Basin Number: 18

Location: North Lewiston

Terrain: This basin has flat to gentle slopes tending to the south.

Land Use: This basin consists primarily of industrial uses.

Drainage Area: 118 Acres

Sub-Basin Summary:

Sub-Basin	Location	Area	Primary Land Use	Average CN
A	Hwy 12 to 26th Street N from 1st Ave N to Hwy 12 Frontage Road	70	Industrial	88
B	26th Street N to 31st Street N from 3rd Ave. N to Hwy 12 Frontage Road	48	Industrial	88

Existing Drainage System Components:

No significant drainage system exists within this basin. Minor systems are located in the Hwy 12 frontage road near 7th Avenue N and in 24th Street N south of 3rd Avenue N.

Proposed Drainage System Components: See Figure 5.18

Alternative(s):

From the low point in 28th Street N between 3rd Avenue N and 7th Avenue N the discharge to the Levee ditch could be routed to the southeast, instead of south. An easement for drainage exists along the north property line of the warehouse located on the east side of 28th Street N. Additional easement width should be obtained when the property to the north is developed.

East Lewiston (Basin 19)

Basin Name: East Lewiston

Basin Number: 19

Location: East Lewiston. South of Clearwater Avenue from 26th Street to East Main Extended.

Terrain: Gentle to flat slopes in the lower portion of the basin near Lindsay Creek to steep bluff slopes in the upper portion of the basin. This basin generally slopes north and toward Lindsay Creek.

Land Use: This basin consists primarily of low density residential.

Drainage Area: 136 Acres

Average CN: 83

Existing Drainage System Components:

A storm sewer system was installed in East Main Street and provides drainage to this basin on both sides of Lindsay Creek.

Proposed Drainage System Components: See Figure 5.19

Ripon Avenue (Basin 20)

Basin Name: Ripon Avenue

Basin Number: 20

Location: Central Orchards

Terrain: This basin generally slopes to the south and east with gentle to moderate slopes in the upper portions of the basin, transitioning to steeper slopes near the drainage draws that convey runoff to Tammany Creek.

Land Use: This basin consists primarily of low density residential.

Drainage Area: 282 Acres

Sub-Basin Summary:

Sub-Basin	Location	Area	Primary Land Use	Average CN
A	11th to 15th Streets south of Ripon Avenue	137	Low Density Residential	75
B	15th to 18th Streets south of Birch Avenue	145	Low Density Residential	75

Existing Drainage System Components:

No significant drainage system exists within this basin. Existing drainage is conveyed through natural drainage ways and roadside ditches with some approach culverts.

Proposed Drainage System Components: See Figure 5.20 A & B

Other Considerations:

Y This basin is tributary to Tammany Creek located to the south. The drainage systems in this basin discharge to natural drainage ways or ditches that eventually convey runoff to Tammany Creek.

Y Drainage improvements discharging from this basin should be coordinated with Nez Perce County and downstream development to prevent adverse impacts.

Y Effort to preserve these natural drainage ways for conveyance and water quality benefits should be undertaken now, prior to development.

- The potential for water quality treatment facilities serving the basin or sub-basins should be explored to protect the water quality in Tammany Creek.

Section 6 – Capital Improvements

Storm Drainage Project Prioritization

Although many needs for upgrading existing storm drain and constructing new storm drainage systems were identified in Section 5, the greatest needs are in those areas where the risk to public health & safety or property damage is greatest. In the case of storm drainage, areas of known recurring flooding are likely to be locations where these risks are the greatest. In Lewiston, these areas have been identified as:

- 14th Street & 12th Avenue
- 16th Street & G Street/Idaho Street
- 9th Avenue & Prospect
- Idaho Street & 14th Street

Project Descriptions

14th Street & 12th Avenue

This location has experienced routine flooding for many years with depth greater than 2' in 14th Street. This area is located in a depression and the existing pipe beneath Bengal Field is inadequate to convey the flows from this area during heavy rainfall. In addition, when water depths are sufficient to allow overland flow, flooding of several downstream homes occurs. It is recommended that this problem be corrected by extension of the 17th/18th Street system to the low point at this location with provisions for future extension to minimize street flows in the upper portion of the basin. To correct this flooding, the recommended improvements include extension of the 17th/18th Street system with 30" diameter pipe to the intersection of 14th Street & 12th Avenue. The planning level probable cost for these improvements is $290,000 (in year 2000 dollars).

16th Street & G Street

This is a widespread area that floods during heavy rainfall and has caused damage to numerous businesses in the area. This is a low area with an existing system the drains west on 'G' Street to Lincoln Street. See the Idaho Street & 14th Street location for a discussion on the remainder of this system. It is recommended that this area be taken directly north across Main Street and the railroad tracks to the Army Corps of Engineer Levee ditch. There is an existing pipe to the ditch that currently serves Main Street and vicinity. This pipe will need to be increased in size to accommodate the additional flows. The shorter distance to the Corps system utilizing this route, as opposed to west on 'G' Street, should allow this system to be constructed with reasonable pipe sizes. The recommended improvements consist of constructing a 36" diameter pipe from the Levee ditch to 16th Street & Idaho Street via Delsol Lane and 'G' Street.

The planning level probable cost for these improvements is $350,000 (in year 2000 dollars).

9th Avenue & Prospect

This is a low spot along Prospect Avenue on the west side of the Normal Hill Basin. An existing drainage system begins at this location and continues west over the bluff to Snake River Avenue and eventually to the Army Corps of Engineers storm drainage pipe adjacent to the Levee. This location has experienced street flooding with the overtopping flow creating substantial erosion along the bluff. Indications are that the existing piping between the bluff and Snake River Avenue are not adequately sized. It is recommended that flows from this location be collected and conveyed north on Prospect Avenue to a location between 6th and 7th Avenue. An existing drainage system extends west from this point down the bluff to Snake River Avenue and on to one of the Levee Ponds. This storm sewer should be sized as a trunk line to serve the central portion of this basin. The recommend improvements include constructing a drainage system from the Levee Pond to 9th Avenue & 4th Street (to intercept the existing storm drainage line from LCSC) with 42", 36", 30", and 24" diameter pipe. The planning level probable cost for these improvements is $330,000 (in year 2000 dollars).

Idaho Street & 14th Street

This has been a long-standing flooding problem. Drainage system improvements were made in this area in the late 1980s with increased pipe sizes to the intersection of Lincoln Street and 'G' Street. Unfortunately, the existing pipes downstream from this location are also undersized and flooding has continued. Replacement of the downstream system to the Levee Ponds is necessary to correct this problem. The improvements discussed for 16th Avenue & G Street could alleviate some of this flooding by redirecting flows from that location to a new system. An outfall to the Levee Ponds coordinated with the 13th Street system should be considered as part of correcting this problem. Recommended improvement to correct this problem include replacement of the existing system from Lincoln Street and 'G' Street to Main Street with a 36" diameter pipe and construction of a new 42" outfall to the Levee Pond. This outfall would accommodate flows from the 13th Street system in the basin. The planning level probable cost for these improvements is $300,000 (in year 2000 dollars).

Cost estimates for these improvements are included in Appendix C along with assumptions made in preparing these estimates.

Section 7 – Storm Water Regulatory Requirements

Clean Water Act

The 1972 Federal Water Pollution Control Act (FWPCA), commonly referred to as the Clean Water Act, a significant change from the previously enacted FWPCA, established the framework for studies to determine the water quality concerns related to storm water runoff. The 1987 Clean Water Act (CWA) established the National Pollution Discharge Eliminate System (NPDES) permitting process and non-point source programs. Non-point pollution sources are defined as sources that are generated and/or transported as part of the hydrologic cycle from a substantial area. Storm water is considered a non-point source. The Phase I rule for storm water was implemented in 1990 and applied to industrial sites, municipalities with a population over 100,000, and construction activities that disturbed greater than 5 acres. The Final Phase II rules were published in the Federal Register in December 1999, with NPDES applications due March 2003. Phase II rules apply to municipal systems with a population greater than 10,000. Those systems within urbanized areas are automatically required to apply. Should Lewiston be designated as an urbanized area, the City would be required to apply for an NPDES permit under the Phase II rules. Municipalities with a population over 10,000 and outside urbanized areas can be designated by the permitting authority (EPA Region X).

Phase II Storm Water Rule

The Phase II rules will require regulated municipalities to submit an NPDES application or Notice of Intent (NOI) by March 2003. A Notice of Intent serves as the application for the general permit that prescribes one set of requirements for all permittees. EPA strongly encourages the NOI for the Phase II program. In the application or NOI, the following information must be provided:

- Y Best Management Practices (BMPs) for each of the six minimum controls (discuss below)
- Y Measurable goals for each minimum control
- Y Estimated date for implementation of each measure
- Y Person or persons responsible for implementing program

The six minimum control measures required under the Phase II rule with examples are:

- Y **Public Education and Outreach**
  - Brochures or fact sheets
  - Storm drain stenciling
  - Storm water hotline
  - Recreational guides

- Volunteer citizen educators
- Seminars

Y **Public Participation/Involvement**
- Citizen panels
- Volunteer water quality monitoring
- Volunteer educators/speakers
- Community clean-ups
- "Adopt A Storm Drain" programs

Y **Illicit Discharge Detection and Elimination**
- Develop a storm sewer system map
- Ordinance prohibiting non-storm water discharges to storm sewer
- Plan to detect and address non-storm water discharges to system
- Education about hazards of illegal discharges
- Illicit discharge detection and correction program

Y **Construction Site Runoff Control**
- Erosion control ordinance enacted
- Plan review procedures established
- Conduct seminars for contractors/developers
- Site inspection and enforcement procedures in place
- Sanctions established to ensure compliance

Y **Post-Construction Runoff Control**
- Develop and implement strategies for Best Management Practices
- Adopted ordinance requiring BMPs on new construction
- Ensure long-term maintenance and operation of BMPs

Y **Pollution Prevention/Good Housekeeping**
- Develop and implement O & M program for municipal operations
- Conduct employee training
- Determine BMP and goals for municipal activities

The cost associated with initial implementation and continued compliance are difficult to estimate. The majority of expenditures will be in labor costs and will include:

- Program development and NPDES application
- Monitoring and documenting program compliance
- Ordinance development and preparation
- O & M program development and manual preparation
- Ongoing plan review and site inspections
- Coordinating public education and involvement programs

EPA estimated the annual per household Phase II program costs for those municipalities automatically covered under the Phase II rules at $9.16. Using this value, the annual cost of this program for Lewiston would be approximately $90,000 (in year 2000 dollars).

Total Maximum Daily Load (TMDL)

The Total Maximum Daily Load (TMDL) program establishes upper limits for specific pollutants on designated water bodies that do not meet water quality standards. This can result in numerical discharge limits for point sources and BMP requirements for non-point discharges, such as storm drainage. This is a concern for Lewiston, since the Clearwater River is included on Idaho's list of water bodies that do not meet water quality standards. The EPA approved 303(d) listing has the TMDLs for the Clearwater River scheduled to be completed by 2003. According to Todd Maguire, Idaho Department of Environmental Quality Headquarters, the pollutants of concern for the Clearwater River are phosphorus and sediment. The City should be involved in the development of the Clearwater River TMDLs to assure the City's interests are represented during this process.

Section 8 – Storm Water Systems Operation & Maintenance

A storm drainage system, likely any other infrastructure, requires routine maintenance to maximize system capacity and extend the useful life of the system. In the past, this maintenance was only undertaken to maximize the drainage systems ability to convey storm runoff. However, maintenance of storm drainage systems has expanded in recent years to include efforts to improve water quality. As discussed in Section 7, the Phase II rules require development of an O & M program targeting water quality. Providing adequate and consistent funding for storm drainage operation and maintenance is essential for a successful storm water program.

Lewiston, like most cities in the northwest, places the responsibility for operation and maintenance of storm drainage systems in the Street Department. Storm drainage therefore competes for manpower and funding with the needs of pavement repair and replacement, snow and ice removal, and other street maintenance needs. This often results in minimal or inconsistent funding for storm drainage needs. In some cities, the formation of “storm water utilities” or rate funded storm water programs has resulted in consistent funding, and in some cases, operation and maintenance responsibilities being shifted to separate storm drainage departments within these cities.

The typical components of a storm water system operation and maintenance program include:

- Routine system cleaning (including pipes, catch basins, open channels, and inlets)
- Regular system inspection and assessment (including videotaping pipes)
- Small system repairs, revisions, or upgrades
- Customer Service (complaint response & investigation)
- Emergency response

Due to the water quality benefits, street sweeping is often placed in storm water O & M programs. These components need funding for personnel, equipment, supplies, and support services (engineering, contracted services, etc.).

An assessment of the City’s storm water O & M program should be undertaken to determine how the current level of service compares with recommended standards of practice. This assessment should be undertaken with the City’s O & M staff taking the lead role. The following are references that will assist in this assessment by providing recommended activities and their frequencies:

- Inspection and Maintenance of Permanent Stormwater Management Facilities – Training Manual, Lorin R. Reinelt, Center for Urban Water Resources Management – University of Washington, April 1992.
- Standard Guidelines for Operation and Maintenance of Urban Subsurface

Drainage, American Society of Civil Engineers, 1994.

- Standard Guidelines for Operation and Maintenance of urban Stormwater Systems – Draft, American Society of Civil Engineers, 1999.
- Urban Stormwater Management, American Public Works Association, 1981.

The American Public Works Association has a number of publications on benchmarking that may also provide guidance for storm drainage activities.

This assessment will provide a tool to evaluate levels of service or activities and their corresponding costs. The assessment can also serve as the framework for an operation and maintenance manual for those program elements that are in place or as they are implemented.

Section 9 – Conclusions and Recommendations

Conclusions

Existing Drainage Systems Capacity

The purpose of including existing drainage systems within this planning study was to provide continuity of the system for flow routing necessary for the model and provide the user a better understanding of the system operation. As discussed in Section 4, data from project drawings were used for a number of the major drainage systems to improve the model. The peak flow information generated by the model for existing drainage segments can be utilized to evaluate these systems along with additional field data. Based on the preliminary assessment of existing facilities in this study, two major drainage systems appear to have insufficient capacity. These systems are the lower portion of the 21st Street/Thain Road basin and a portion of the Southway Basin system from 8th Street & 16th Avenue to 14th Street & 18th Avenue. In addition, most of the minor systems in the Downtown and Normal Hill basins do not appear to have adequate capacity.

Proposed Drainage Systems

The majority of the Orchards neighborhoods and North Lewiston east of Hwy 12 do not have storm sewer systems. In addition, the upper portions of the Downtown, 17th/18th Street, Normal Hill, and Southway basins have limited storm sewer systems and can be served through extensions of existing systems.

Recommendations

Implementation

This study is intended to provide general guidance in the location and sizing of future storm sewers. As more detailed investigations are conducted, alternative routing may be preferred and the plan should be updated to reflect these changes. The model provides the most important tool in conducting more refined analysis and evaluating alternatives in the future. One of the greatest benefits in implementation of this plan is the coordination of storm drainage improvements with the various activities within the City including:

- Development Projects
- Water and Sewer Improvement Projects
- Street Improvement Projects
- Other Storm Drainage Capital Improvement Projects
- Minor System Improvements
- System Operation & Maintenance

Funding

In order to improve upon the storm drainage system in Lewiston, an adequate and preferably consistent source of funding must be identified. It is recommended that the City investigate various funding options for the storm drainage program. Funding options the City may wish to investigate include:

- Debt Financing
- Utility Rates
- Local Improvement Districts
- General Fund / Street Fund
- Impact Fees

Analysis

This planning level study does not provide the level of analysis required for final design of the storm drainage system components discussed in the study. A preliminary and final design process should be undertaken before implementation of these improvements.

Further analysis of existing system components in the Downtown Basin and lower portion of the 21st Street/Thain Road Basin is recommended. The limited data collection for existing system components is crucial in these locations due to the flat grades of the Downtown Basin and high flows in the lower portion of the 21st Street /Thain Road Basin. Additional data collection should include verification of pipe diameter and material, and most importantly, determining the vertical and horizontal position of these pipes.

Regulatory

The City should be prepared to implement the requirements of the Storm Water Phase II rule if required by EPA. Establishing contact with EPA's Region 10 storm water program representatives to assure prompt notification should Lewiston be designated for Phase II rules will help provide needed time to meet the compliance requirements. In addition, the City should be prepared for involvement in the Clearwater River TMDL study to assure the City's interest are represented.

References

1. Ven Te Chow: “Open Channel Hydraulics”, McGraw-Hill Publishing Company, Inc., 1959, Reissued 1988.

2. United States Department of Agriculture, Soil Conservation Service, Engineering Division: “Urban Hydrology for Small Watersheds”, Technical Release 55 - Second Addition, June 1986.

3. City of Lewiston: “Lewiston Comprehensive Plan – 1999”, November 1999.

4. The Urban Water Resources Research Council of the American Society of Civil Engineers and the Water Environment Federation: “Design and Construction of Urban Stormwater Management Systems”, American Society of Civil Engineers, 1992.

5. PIZER Incorporated: “HYDRA 6 User’s Manual”, PIZER Incorporated, Revised May 26, 2000.