Fletcher Creek Watershed

Study

Prepared for:
Alpena Township
City of Alpena
Alpena County

In Cooperation with:
The Intergovernmental Drainage Committee

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INTRODUCTION

The City of Alpena experienced a major flood event in April of 1998. Flooding affected residents, neighborhoods, and commercial businesses in the Oxbow subdivision, and portions of Ralph Street, Parker Avenue, Thomas Avenue, and Arbor Lane. Sanitary sewer manholes were submerged allowing excessive infiltration into the sanitary sewer system and backing up in homes of higher elevation.

The flooding that occurred was felt to be a result of a combination of factors including a late snowfall, combined with a period of high runoff due to warm temperatures, melting snow and heavy rains. Additionally, runoff from land areas to the north and west, that normally flows through other natural and manmade stormwater conveyance systems, entered the Fletcher Creek drainage basin and was a major contributor to the flooding. **Figure 1.1** is a graphic representation of the flooding event. The City of Alpena immediately identified problem sites that may have contributed to the flooding. It was soon realized that many of the contributing factors were in the upper portions of the watershed and within other political jurisdictions. Therefore, completing remedial measures in the lower portions of the watershed would not provide long-term protection against future storm events.

To address this concern, the Alpena County Intergovernmental Committee, comprised of representatives from the City of Alpena, Alpena County Board of Commissioners, Townships, and County Drain Commissioner, established a subcommittee to focus on drainage concerns. Priorities of the drain subcommittee focused on determining the extent of the stormwater problem within the Fletcher Creek and Gilchrist Creek watershed and outlying areas of the Genschaw Drain. Attention was also given to develop preventative measures to avoid future problems from occurring. With assistance from the Northeast Michigan Council of Governments (NEMCOG), the Alpena County Board of Commissioners submitted a grant proposal to the Economic Development Administration (EDA), to fund a study to identify stormwater problems, and to develop proactive and remedial measures to prevent flooding of the Fletcher Creek watershed. The grant was awarded in 1999, and NEMCOG, along with its partners commenced work on the project. Alpena County, the City of Alpena and Alpena Township contributed technical

resources and information to the project, including the delineation of the Fletcher Creek Watershed Boundary. Throughout the course of the study, the drain committee participated in overall project direction and held regular meetings to assist in the development of a model stormwater ordinance for local adoption.

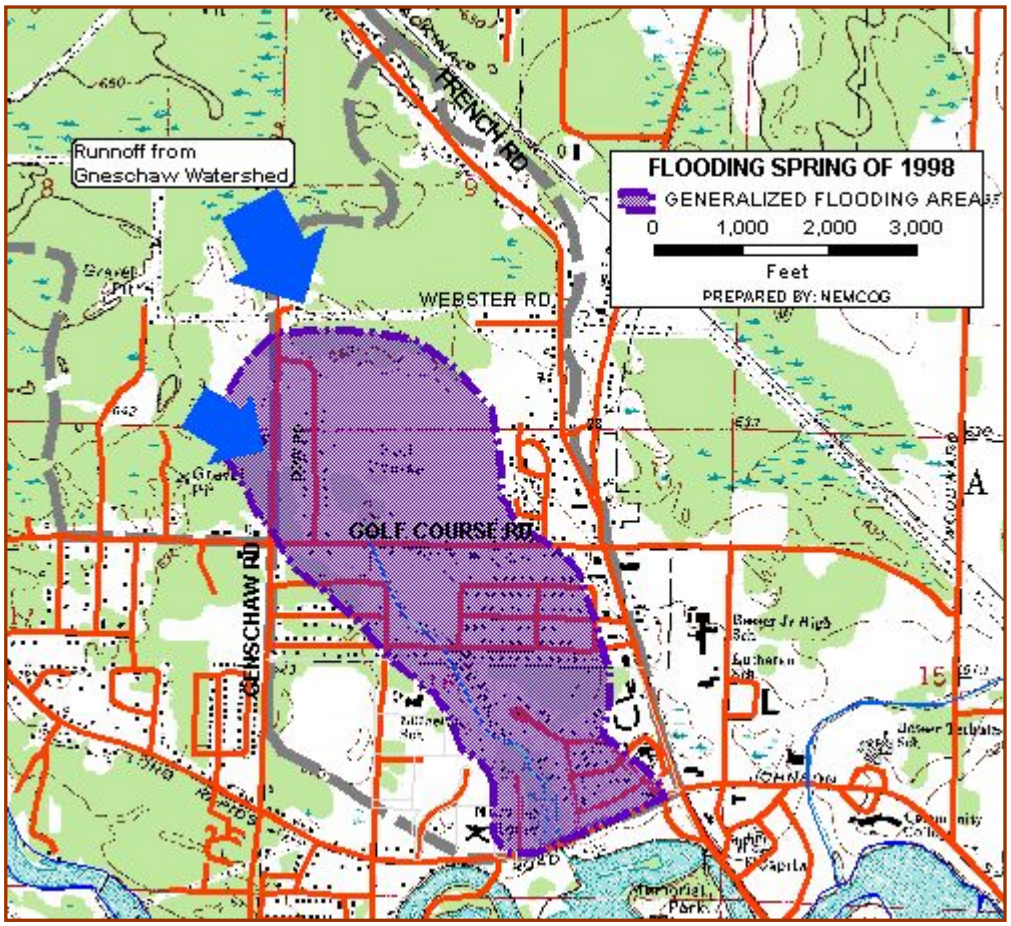

Figure 1.1: Flooding Spring of 1998

EXISTING CONDITIONS

Existing land uses, soils, and topography influence the quality and quantity of stormwater runoff within a watershed. Community land use planning has played an critical role in creating current stormwater problems and will continue to influence future conditions within the study area. Developing an accurate representation of existing conditions is the first step towards identifying problem areas. A series of maps will be presented to graphically display existing land use, zoning districts, future land use plans, soils and topography. Accompanying text will describe these maps and analyze related documents. Subsequent chapters will discuss hydrology and problems areas.

Description Of Watershed

The Fletcher Creek Watershed is located within the northern part of the City of Alpena and portions of Alpena Township in the County of Alpena. The watershed contains a total of 654 acres of land that drains into the Thunder Bay River within the City of Alpena. The main focus of this study is primarily the Fletcher Creek Watershed displayed in **Figure 2.1**. The Gilchrist Creek is a intermittent tributary of the Fletcher Creek and therefore is part of the watershed. Consideration was also given to the Genschaw drainage area due to its major impact on the flood event. The Genschaw drainage basin encompasses a land area of 4,370 acres and includes land once drained by Fall Creek. Past development has impeded water flow into Upper Fall Creek and manmade ditches, diverting surface runoff into the Genschaw drainage basin.

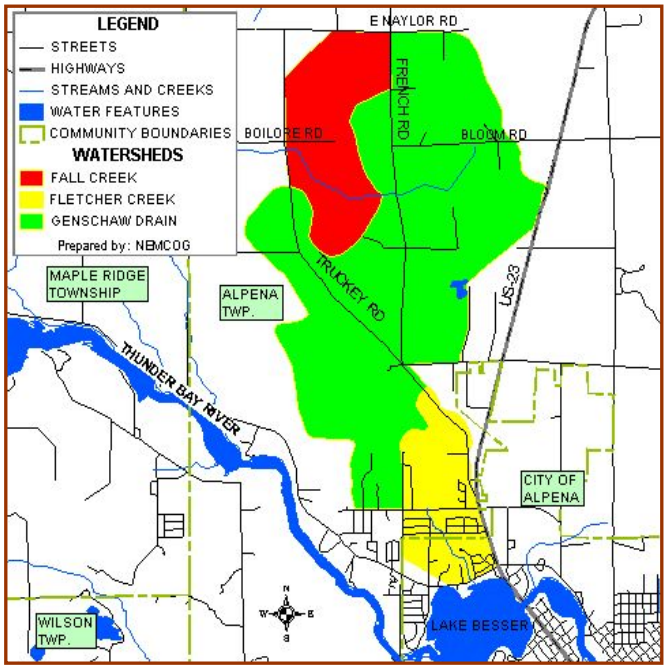

Figure 2.1 Watersheds

Existing Land Use

Introduction

As development occurs within a watershed, larger tracts of land are generally divided into smaller parcels. In the context of stormwater management, urbanization increases the amount of impervious surfaces such as pavement and buildings, which alter the natural flows of storm water runoff. This leads to increased flooding and degrading water quality. Studying the existing pattern of land divisions in the Fletcher Creek Watershed study area provides an ability to analyze the status of land use and its relationship to stormwater runoff.

Over the last 45 years, the Fletcher Creek watershed has transitioned from farm and forest land uses to predominately subdivisions, multi-family apartments, professional offices and highway commercial

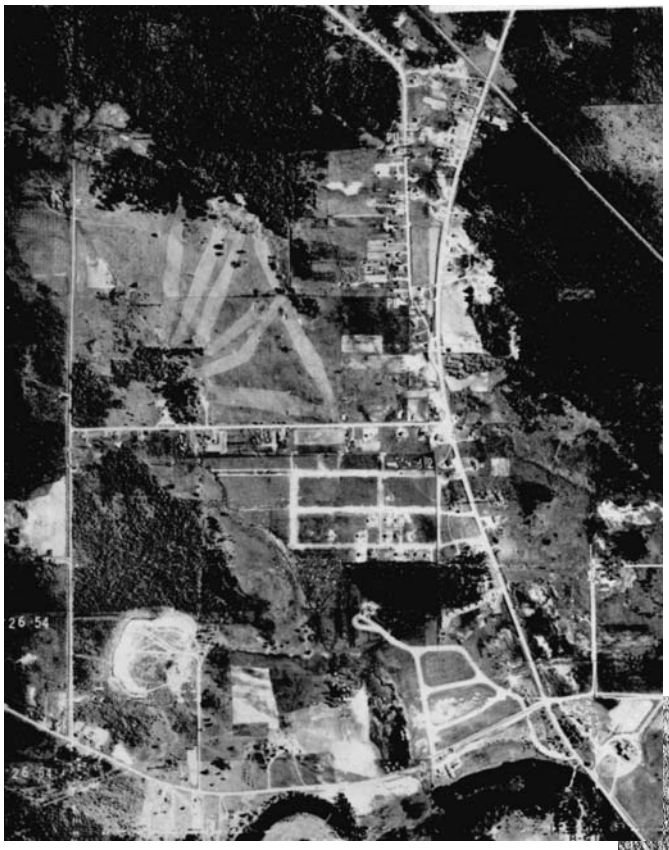

Figure 2.2 Study Area in 1954

A Historical Perspective

Over the last 45 years, the Fletcher Creek watershed has transitioned from farm and forest land uses to predominately residential and commercial land uses. **Figure 2.2** is an air photo taken in 1954. Note the new road construction associated with Owen's Park and Oxbow Subdivisions. on the 1954 photo. The dark areas with a rough texture are forest lands. The lighter gray areas with a smoother texture are fields and meadows. The wide light gray lines in the upper left of the photo are the fairways of the golf course. Also visible are the old dump in the lower left and the Thunder Bay River along the lower edge. There was still an active farmstead off Long Rapids Road, as indicated by the light gray blocky areas which are farm fields.

In comparison, the 1998 aerial photograph (**Figure 2.3**) shows a dramatic increase in development throughout the watershed. Many streets have been constructed since 1954, including Princeston, Partridge, Pinchrest, Sunset, Glendale, Maple Lawn, Eagle, Dow Streets. The golf course, including the fairways west of Genschaw Road, can be seen on this photo. The small black rectangles are roof tops of homes and businesses. The farmstead mentioned above has been replaced by commercial/office park, extended care facility and apartment complexes, all within the City limits. Fields and forests south of Golf Course Road have been converted to subdivisions. Also, note the commercial along US-23.

Figure 2.3 Study Area in 1998

Inventory of Existing Land Use

The land use inventory of the Fletcher Creek Watershed was conducted utilizing the Michigan Resource Information Systems (MIRIS) land cover/ use classification categories, 1998 aerial photography and extensive field checking. The updated information was then computerized to produce the existing land use map (see **Figure 2.4**) and statistics. **Table 2.1** presents the land uses with corresponding acreage and percent of the watershed.

Table 2.1
Existing Land Use Statistics

Land Use Category	Acres	Percent of Watershed
Residential	273	42
Commercial	46	7
Institutional	17	3
Recreational	98	15
Open	30	5
Forest	176	27
Wetlands	18	3
Water	3	Less than 1
Total	**652**	**100**
Source: MIRIS and NEMCOG		

Residential
As shown in Figure 2.4 and Table 2.1, residential accounts for 273 acres, or 42 percent of the total area. Residential development occurs primarily in subdivisions or on small lots adjacent to major roads throughout the watershed. Dwellings on larger parcels are found in the north, west and northwest portion of the watershed. Residential development includes both single-family and multi-family dwelling units.

Commercial
Commercial development is primarily found adjacent to major roads and ranks fourth in land use categories. Approximately 46 acres within the study area is currently used for commercial purposes, or 7 percent of the total area.

Institutional
Approximately 17 acres of land, or 7 percent of the total area are categorized as institutional. Included in this category are churches, schools, extended care facilities and government buildings.

Recreational
Recreational types of land use include parks, golf courses and other outdoor recreation areas. The two primary recreational areas in the study area are the Thunder Bay golf course, located in the northern portion of the watershed, and the ballpark field in the southwest side. Approximately 98 acres of land, or 15 percent of the total study area is classified as recreational.

Nonforested/Open Space/Undeveloped
This category consists of herbaceous open and shrub land. These tracts are found scattered throughout the study area, and account for approximately 30 acres of land, or 5 percent of the total study area.

Forests
The forest category includes upland and lowland forests. Species in the upland forest are maple, beech, aspen, birch, red pine, white pine and jack pine. Lowland hardwoods and conifers, such as northern white cedar, elm, red maple, ash, and aspen species are found predominately in the northern part of the watershed. Within the Fletcher Creek Watershed, approximately 27 percent of the land area is classified as Upland Forest.

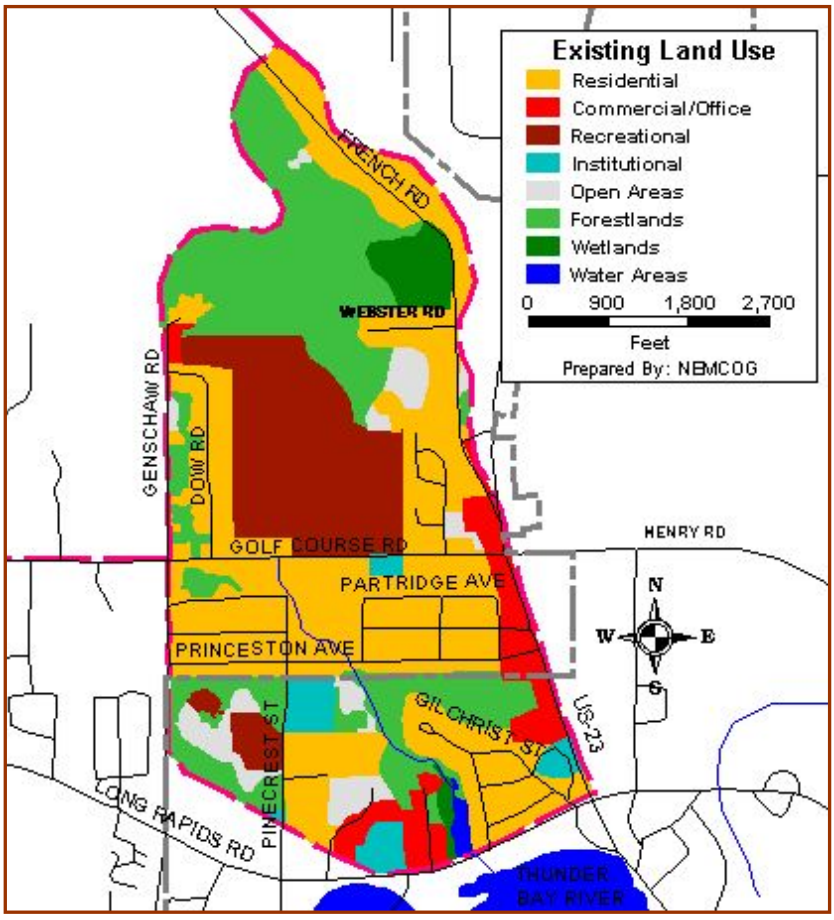

Figure 2.4 Existing Land Use

Wetlands
Wetlands include land that has sufficient water at, or near, the surface to support wetland or aquatic vegetation. These areas are commonly referred to as swamps, marshes, and bogs. Emergent wetlands are found adjacent to the Oxbow near the outlet of Fletcher Creek. A shrub/scrub wetland is found adjacent to French Road. This category covers approximately 18 acres of the watershed. It is important to note the wetland and lowland forest areas were based on Michigan Resource Information System (MIRIS) land cover maps and roadside observations. An intensive on-site wetlands delineation was not completed as part of this project. Thus, areas shown as wetlands may not actually meet State and Federal criteria for legally regulated wetlands. Additionally, areas mapped as forest may meet the criteria of regulated wetlands. However, the information is still valuable for general land use planning decisions.

Open Water
Open water is considered any lake, stream, river, or impoundment. The Oxbow at the outlet of Fletcher Creek is the only area mapped as water in the watershed. It is approximately 3 acres in size, and comprises about 0.5 percent of the total study area.

Conclusion
According to the current land use inventory, the residential category covers the largest area accounting for 42 percent of the watershed area. Over 50 percent of the watershed is classified as urban-built land use. The impervious surfaces associated with these types of land uses generate higher volumes of runoff than undeveloped areas. Within the 336 acres mapped as

urban built-up, only one small detention area has been constructed. All other runoff flows through ditches, low areas and intermittent drains, eventually emptying into the Thunder Bay River. Based on current community plans, the amount of urban built-up land use is expected to continue to increase.

Future Land Use Plans

Both the City of Alpena and the Township of Alpena have comprehensive master plans. The plans provide the legal foundation and policy guidelines that communities use for making zoning and planning decisions. A review of each communities' future land use plans was conducted to determine types and intensity of future growth that may occur within the watershed.

City of Alpena

The City of Alpena adopted a future land use plan in 1998. The plan guides growth and development within the city limits. The following provides a brief description of the future land use categories in the study area.

Low-Density Residential

This category provides areas for single family, detached dwellings, with a density of less than four units per acre. Other related facilities include parks, schools, and churches. Low-density residential category comprises approximately 31 acres, or 17.8 percent of the watershed area located in the City limits.

High Density Residential

This residential category is intended to provide a transition between the non-residential districts and low-density residential districts. Allowable density is greater than six units per acre and includes such housing as apartments, attached condominiums, and townhouses. One area, approximately 36 acres in size and adjacent to Pinecrest Street has been classified as high density residential in the City's master plan. Presently this area is developed as apartments, single family residential and an education facility. As can be seen in **Figure 2.5**, the Fletcher Creek runs through this area. The land adjacent to the creek has not been developed and remains in a natural forested state.

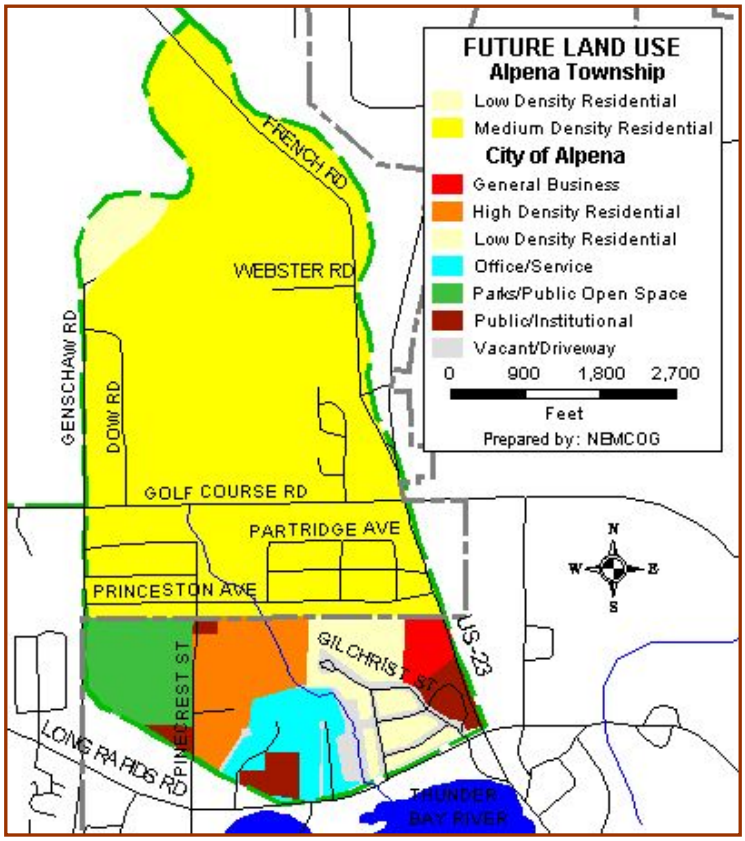

Figure 2.5 Future Land Use

Public/Institutional

This category allows for governmental and institutional uses such as municipal and state offices, libraries, schools and care facilities. The public/institutional category covers over 18 acres in

the study area within the City of Alpena. Location of these uses are primarily found along US-23 and Long Rapids Road.

Office/Service
This category is intended to provide for uses such as office buildings, museums, convention centers, public facilities, medical related facilities, colleges, and accessory apartments and dormitories. This category covers an area off from Long Rapids Road that has been subdivided as an office park. Approximately 26 acres or 15 percent of the study area in the City of Alpena is in this future land use area.

General Business
The general business category is intended for the wide variety of retail and service businesses that are traffic dependent. These can include drive-through restaurants, auto service establishments, and commercial uses located on high traffic volume thoroughfares. This area covers 9 acres and is located adjacent to US-23.

Parks/Public Open Spaces
This category includes parks and environmental preserves. The area west of Pinecrest Street and east of Genschaw Road, currently used as ball fields and open space is designated as the Parks/Public Open Spaces category. The area was once home of a municipal dump. The City of Alpena is developing a Brownfield redevelopment plan for this 33 acre site.

Alpena Township Future Land Use Plan
The future land use plan for Alpena Township was adopted in 1992. While the plan designates a number of categories such as Conservation, Forest/Recreation, Agriculture, and residential; the watershed area includes only two of these categories. These are low-density residential and medium-density residential, as shown on the above **Figure 2.5**.

Low-Density Residential
Low-density residential is intended to serve as transition areas between resource areas and urban areas. Thirteen acres in the northwestern part of the watershed is within this category.

Medium-Density Residential
This category is intended to incorporate all existing subdivided areas and residential areas in the central portions of the Township. Some 97 percent of the study area within Alpena Township or 460 acres is included in the future land use category. Additionally, this future land use area accounts for 70 percent of the total watershed area.

Conclusion
Both communities' master plans have designated all of the lands within the watershed for urban built-up land uses. Residential future land use categories comprise 83 percent of the watershed covering 540 of the 654 total acres. Most of the undeveloped lands are within the medium to high density residential future land use areas. Under current development standards, as these areas develop, the amount of impervious surfaces and stormwater runoff will increase; taxing an already inadequate system. Given this likely scenario, it is imperative the communities revisit planning documents and incorporate stormwater management into planning and development standards.

Community Zoning

Zoning is the primary tool used by most communities to implement their master plan and regulate the type, intensity, and location of the development.

City of Alpena

The City of Alpena administers it's own zoning ordinance which was last amended on October 20, 1997. The current ordinance establishes 18 zoning districts. Four of those districts can be found in the lower Fletcher Creek Watershed. **Figure 2.6** is zoning map of the watershed that shows the zoning districts in both the City of Alpena and the Township of Alpena.

A majority of the land located in the City's portion of the study area is zoned residential. Of the three residential zoning districts, R-1 covers the most area. The Office Service District, regulates commercial uses along US-23 and Long Rapids Road. Minimum lot sizes for these zoning districts are either ¼ acre or not defined. Development at these densities requires an active stormwater management program.

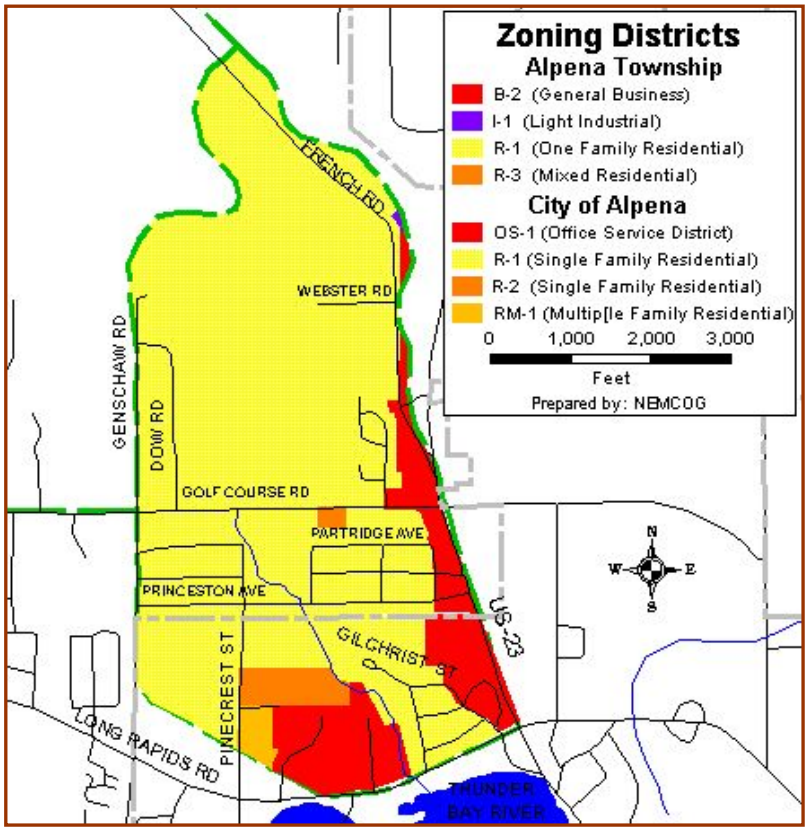

Figure 2.6 Community Zoning Districts

Stormwater Drainage is minimally referenced within the City of Alpena Zoning Ordinance and includes the following language: "special attention shall be given to proper site drainage so that removal of storm waters will not adversely affect neighboring properties;" The ordinance also states that the Federal Emergency Management Agency Flood Insurance Rate Map shall control all construction to minimize flood hazards.

Alpena Township

Alpena Township administers it's own zoning ordinance and was last amended on February 1, 1999. The current ordinance establishes 13 zoning districts, however, only four districts are within the watershed area, R-1, R-3, B-2, and I-1.

The R-1 Single Family Residential zoning district covers 94 percent of the study area in Alpena Township and accounts for 67 percent of the total Fletcher Creek Watershed. The minimum lot size for R-1 is 20,000 sq. ft. or less than ½ acre. The undeveloped lands in the northern parts of the watershed fall within this zoning district. Highway commercial zoning borders US-23. There is a small area in the northeast part of the watershed zoned Light Industrial.

Stormwater Drainage is cited within the Alpena Township Zoning Ordinance. It is the responsibility of the developer or the landowner to retain on site all stormwater runoff in excess of natural conditions or predevelopment. If necessary, retention ponds or detention ponds may be built, unless the water can leave the site via an existing storm water pipe or through stormwater facilities developed simultaneously with the new use. All stormwater drainage facilities shall be designed to handle, at minimum, a storm event with the projected frequency of once every ten years.

Conclusion

The City, Township or County do not administer a stand alone stormwater management ordinance. The communities minimally address stormwater management in their zoning ordinances. While numerous problems were created prior to community zoning being in place, new development under current regulations will only exacerbate these drainage and flooding problems. Review of future land use plans shows current zoning districts within the watershed are consistent with the communities' long range plans for development types and density levels.

A build-out of the watershed under current zoning regulations could result in a additional 200 or more homes. Much of the undeveloped areas are in the upper watershed. Runoff from new development would be channeled into the Fletcher Creek and Gilchrist drainage and cause increased flooding in the lower reaches. This likely scenario further supports the need for communities to incorporate stormwater management standards and guidelines into their zoning ordinances.

Topography

The topography is relatively level in the watershed. According to the USGS topographic maps, elevations range from 640 feet above sea level in the upper level to 600 above sea level at the Fletcher Creek outlet into the Thunder Bay River. As can be seen in the topographic map inset (**Figure 2.7**), each contour line represents a 10 feet change in elevation. The wide spacing of contour lines show a gradual sloping of the land from the northwest to the southeast. Furthermore, a review of the map indicates surface drainages tend to be wide and shallow;

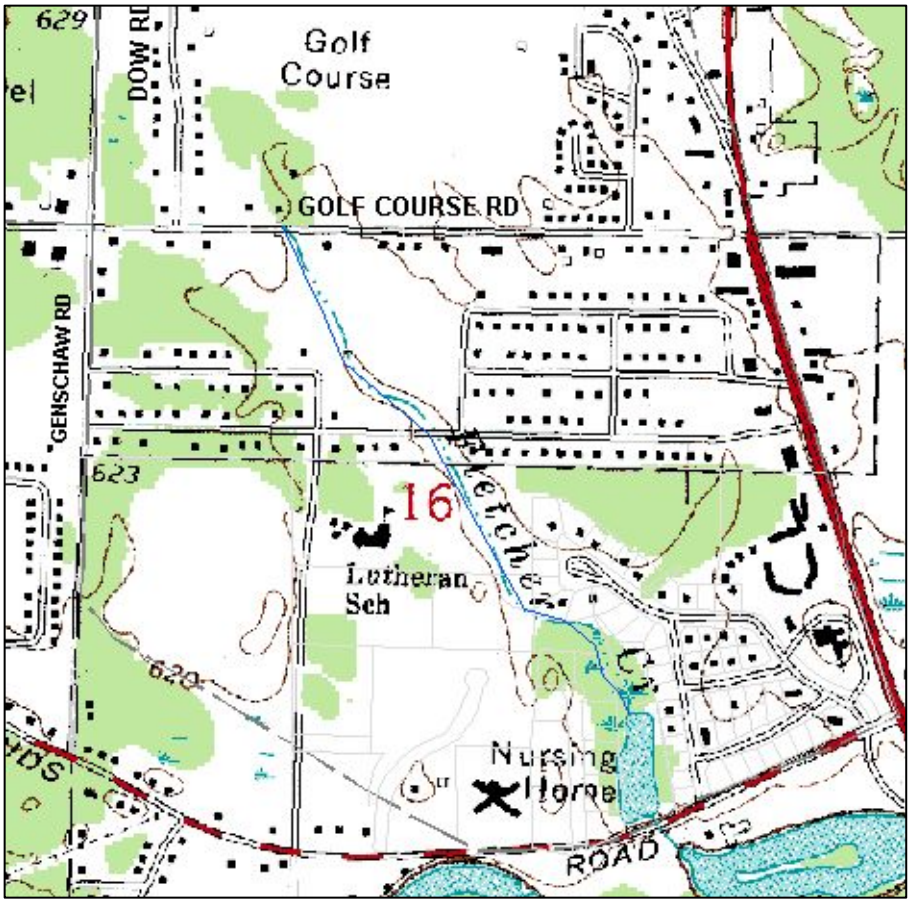

Figure 2.7 Inset of USGS Topographic Map compiled in 1971

and with the exception of Fletcher Creek, are not clearly defined. Parcels adjacent to Pinecrest Street and between Golf Course and Partridge Street were not developed by 1971.

Soils Information

Two factors that influence runoff in the watershed are soil types and depth to bedrock. Soil maps from the Alpena County Soil Survey were entered into NEMCOG's computer mapping system and overlaid onto watershed maps. Related soil type information, such as depth to bedrock and depth to water table was analyzed.

Soils in Fletcher Creek watershed range from well drained sand to poorly drained loam and organic soils. Over 67 percent of the study area is classified as urban-land soils (upidsamments and udorthents). Site preparation such as filling and grading, associated with construction of buildings and roads, has altered the soils in these areas. The soil survey does not rank these soils for hydric, depth to bedrock and building constraints. As a result, an analysis of these limiting factors would be inclusive.

Limestone bedrock at or near the surface greatly influences the surface drainage in the study area, by impeding water percolation into the ground in some locations and by rapidly draining water through bedrock cracks at other sites. The bedrock cracks at the surface are called swallow holes. Large volumes of water can drain into these swallow holes, entering the limestone bedrock aquifers of cracks and porous stone. Field observations indicate bedrock has a greater influence than would be expected from the soil survey information. Two small units of hydric soils, totaling 24 acres in size, are located in the watershed. However, field observation indicate greater extent of hydric soils within the study area.

Table 2.2
Soil Types and Acreage in the Fletcher Creek Watershed

Soil Label	Soil Type	ACRES
376A	Udipsamments (sandy soils in a built- up environment)	296.5
82C	Udorthents (loamy soils in a built-up environment)	115.0
396F	Proper - Deford - Rousseau Complex (muck and sand)	112.0
17A	Croswell Sand	36.1
83F	Udipsamments (unclassified filled areas)	27.4
369	Deford Muck	24.0
415A	Potagannissing Silt Loam	17.7
W	Water	6.9
145C	Rousseau Fine Sand	5.0
18A	Au Gres Sand	3.9
414B	Namur Channery Silt Loam	0.1

Source: Natural Resource Conservation Service and NEMCOG

STORMWATER SYSTEM INVENTORY

An inventory of culverts and ditches was conducted to determine current stormwater management problems, and to recommend remedial measures and proactive measures to prevent future problems from occurring. The methods and results of that inventory are described below.

Methods of Culvert and Drainage Inventory

Black and white infrared aerial photographs of the watershed, taken in 1998, were obtained from the Michigan Department of Natural Resources. The photos were scanned and geo-referenced for use in NEMCOG's computer mapping system. The aerial photographs were used to conduct an analysis of the study area and to assist in the field inventory.

The field inventory was conducted of the Fletcher Creek watershed study area. This consisted of visually checking all culverts, ditches, and drainages. Data was collected on the culvert size, location, and drainage patterns. In addition, drainages and ditches were field checked during both dry periods and storm events to determine adequacy of stormwater runoff facilities. The data was encoded into a Geographic Information System (GIS).

Culvert Inventory

Information was gathered on 289 culverts in the watershed area. The size and number of each category is presented in **Table 3.1**. The culverts 18 inches or less in diameter are being used for driveways. With the exception six driveway culverts along Golf Course Road, the larger culverts are road crossings. The culvert inventory is displayed in **Figure 3.1.**

Table 3.1
Culverts and Size of Culverts.

Diameter of Culverts	Number of Culverts
8-inch	1
12-inch	114
16-inch	4
18-inch	50
24-inch	15
30-inch	2
36-inch	2
52-inch	1

Source: NEMCOG

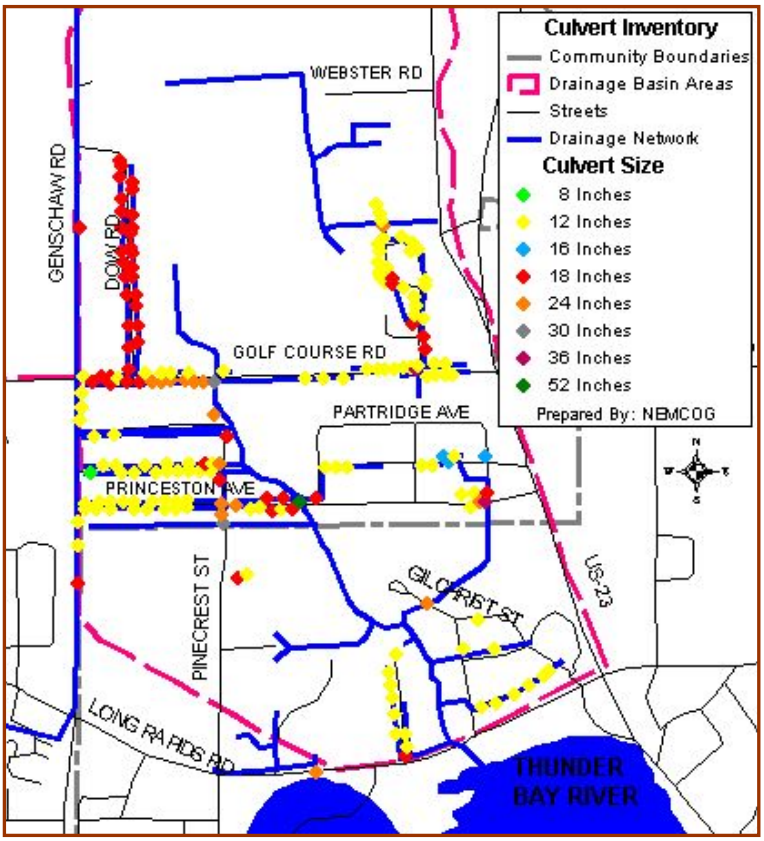

Figure 3.1: Culverts

Drainage Inventory

As development has occurred in the Fletcher Creek Watershed, the intermittent creeks and natural drainage system have been have altered. The natural drainage system has been replaced by a hap hazard, uncoordinated manmade drainage system. Buildings and roadways have been constructed in places where stormwater once flowed in natural drainages. Runoff from one subdivision is channeled into another development down gradient, only to flow overland through yards and into crawlspaces of homes, as the water seeks the pre-settlement drainages. Fletcher Creek was channeled and straightened in past attempts to improve drainage and increase the water carrying capacity. The inventory includes the Fletcher Creek and Gilchrist Creek, a small tributary of Fletcher. The network of roadside ditches, constructed to move runoff from subdivisions into the Fletcher Creek was mapped. Even though it is outside the Fletcher Creek drainage basin, due to its contribution to the flooding in 1998, information on the Genschaw Ditch was gathered. **Figure 3.2** shows the drainage network.

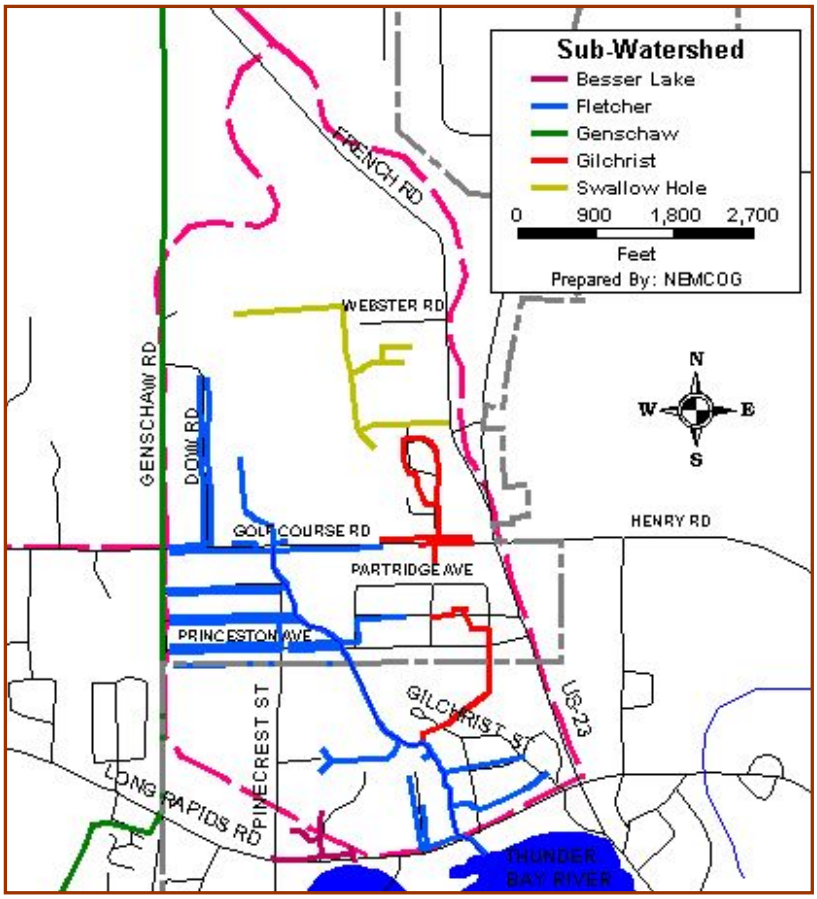

Figure 3.2: Drainage Network

Fletcher Creek

The Fletcher Creek is an intermittent drainage that runs approximately one mile from Lake Besser northwest to the Thunder Bay Golf Course. The intermittent drainage begins as a buried drainage pipe that functions as an overflow outlet to a manmade pond on the golf course. Except during spring run-off and major storm events, the creek bed is dry. The creek bed was channeled and straightened to improve drainage for past farming activities. North of Princeston Avenue, berms have been constructed along the edge of the ditch by landowners to protect their individual properties from seasonal flooding. Several low dams on the lower Fletcher Creek, were noted during the field inventory. The

low dams were apparently constructed as landscaping amenities, on private property. The structures create a low head of water, backing up the water in the creek.
The City of Alpena has completed a brush and trees clearing project from Princeston Avenue downstream Gilchrist Creek.

Gilchrist Creek

The Gilchrist Creek is an intermittent drainage that empties into Fletcher Creek, approximately 1/4 mile upstream from Besser Lake, after flowing under Gilchrist Street. Water flows much of the year in the lower 800' stretch of the creek. Upstream from Princeston Avenue, the Gilchrist is an intermittent drainage network of roadside ditches and drainage ditches. The ditches are dry most of the year, except during spring run-off and major storm events. The Gilchrist drainage basin includes commercial properties along US-23; Fairway Park and Fairway Park #1 subdivisions; eastern portions of Owen's Park subdivision, eastern parts of the golf course; southern stretch of French Road; and lands north of the golf course.

Genschaw Ditch

The Genschaw Ditch is an intermittent, manmade drainage, created in the 1930's by the WPA. The common practice at that time was to drain the large swamps for agricultural purposes. The ditch/county drain is the primary outlet of a watershed that covers approximately 4,500 acres extending from the outlet north to Naylor Road in Alpena Township. Maps show another manmade ditch that extends eastward from Fall Creek, into the upper reaches of the Genschaw watershed. Due to development and other undetermined factors, this ditch no longer carries water west to Fall Creek. Therefore, surface water must make its way south into the Genschaw Ditch. The drain outlets into the Thunder Bay River, upstream from Bagley Road. After crossing under Long Rapids Road, the ditch follows the west side of Genschaw Road, defining the western boundary of the Fletcher Creek drainage basin. The ditch from the northern end of Genschaw Road to French Road is not well defined. Sedimentation and woody debris have partially filled the ditch, decreasing its water carrying capacity. During normal run-off events, the Genschaw ditch still appears to function as a stormwater conveyance system. However, during high run-off events the water carrying capacity is surpassed. In these situations, surface water breaches the ditch banks and flows eastward through built-up areas, searching out the pre-developed drainageways of Fletcher Creek and Gilchrist Creek.

Roadside Ditches

The location of ditches and the direction of water flow were mapped. **Figure 3.2** shows the ditch network and the watershed. In general, ditches are lacking or undersized in older developed areas such as the Owen's Park and Fairway Park subdivisions. This poorly planned surface drainage system relies on streets and remnant low areas to convey and store stormwater runoff. Half buried culverts

along streets like Princeston Avenue and Sunset Boulevard, indicate ditches have been partially filled to enhance landscaping maintenance. While this activity may enable homeowners to have well manicured lawns to the edge of the street, the filling has compromised the water carrying capacity of the roadside ditches. A drainage ditch network north and east of the golf course drains an area approximately 200 acres in size. The terminus of the ditch system is a swallow hole in the northeast corner of the golf course. Large volumes of water can drain into these swallow holes, entering the limestone bedrock aquifers of cracks and porous stone.

PROBLEM IDENTIFICATION

Introduction

Over the last 45 years, the Fletcher Creek sub watershed has transitioned from farm and forest land uses to predominately subdivisions, multi-family apartments, professional offices and highway commercial establishments. According to the current land use inventory in Chapter 2, there are no longer any active farms in the watershed. As well, the forested/undeveloped areas have shrunk to approximately 176 acres. This transition from rural to suburban/urban conditions has created stormwater runoff problems.

Buildings and roadways have been constructed in places where stormwater once flowed in natural drainages. The natural drainage system has been replaced by a hap hazard, uncoordinated manmade drainage system. For example, runoff from one subdivision is channeled and dumped into another development down gradient, only to flow overland through yards and into crawlspaces. The filling of some lots prior to building construction, may provide individual onsite protection from stormwater damage, but the activity simply shifts the water problem to other property owners. Natural drainage flows are intensified when roofs, driveways, parking lots, roads and grade changes replace the vegetation and natural swales that once slowed runoff and allowed for infiltration into soils. Along with increases in peak volumes, the duration of peak flows shortens. As a result, more water flows through the landscape in a shorter period of time.

This study identifies types and location of drainage problems in the Fletcher Creek watershed. Additionally, factors outside the watershed that impact Fletcher Creek during stormwater runoff events such as the spring flood of 1998 will be discussed. The identified problems were

compiled from field observations, and interviews with local residents, local officials and municipal staff.

Limestone Bedrock Geology

Depth to limestone bedrock ranges from a few inches to over 50 feet within the study area. Exposed bedrock can be seen in ditches along Golf Course and Genschaw Roads. Bedrock influences the surface drainage in the study area, by impeding water percolation into the ground in some locations and by rapidly draining water through bedrock cracks at other sites. The bedrock cracks at the surface are called swallow holes. Large volumes of water can drain into these swallow holes, entering the limestone bedrock aquifers of cracks and porous stone.

During the field inventory, two swallow holes were located in the study area. These swallow holes are in ditches that convey stormwater run-off. One is located in the Genschaw ditch approximately 100 feet south of the dead end of Genschaw Road. The other is located at the terminus of the drainage network that ends in the northeast part of the golf course. Given the presence of karst geology, there are likely other bedrock cracks within the watershed.

While these swallow holes function as part of the drainage system, they are variables that would be difficult if not impossible to define in the stormwater management equation. It is not possible to reliably calculate the retention capacity of these swallow holes. Also, determination of where the water goes and resurfaces after entering this underground network of bedrock cracks is not within the scope of this project. As a result, the swallow holes should not be used for stormwater management.

Genschaw Ditch

The lower section of the Genschaw ditch from approximately Golf Course Road to its outlet into the Thunder Bay River is a designated county drain. The lower stretch has been deepened and widened, records are not readily available to document when and under what circumstances the lower stretch was improved. The drainage ditch north of Golf Course Road, also referred to as the Genschaw ditch, was apparently constructed as a WPA project in the 30's. There are no records that designate this section as an official county drain. The ditch/county drain is the primary outlet of a watershed that covers approximately 4,500 acres extending from the outlet north to Naylor Road in Alpena Township.

Much of the Genschaw watershed is currently undeveloped with upland and wetland forest types prevailing. The watershed is influenced by limestone bedrock which can be found close to the surface in certain areas. The USGS 1:24,000 scale topographic map shows another manmade ditch that extends eastward from Fall Creek, into the upper reaches of the Genschaw watershed. Due to development and other undetermined factors, this ditch no longer carries water west to Fall Creek. Therefore, surface water must make its way south to the Genschaw Ditch before entering the Thunder Bay River.

The ditch from the northern end of Genschaw Road to French Road is not well defined. Sedimentation and woody debris have partially filled the ditch, decreasing its water carrying capacity. During typical run-off events, the Genschaw ditch still appears to function as a stormwater conveyance system. However, during high run-off events, such as the combined snowmelt and rainstorms that occurred in the spring of 1998, the water carrying capacity is surpassed. In these situations, surface water breaches the ditch banks and flows eastward through built-up areas, searching out the pre-developed drainageways of Fletcher Creek and Gilchrist Creek.

Gilchrist Creek Drainageway

The Gilchrist Creek empties into Fletcher Creek, approximately 1/4 mile upstream from Besser Lake, after flowing under Gilchrist Street. According to local observations, the lower stretch of Gilchrist Creek flows year round. During fieldwork in November of 1999, the creek bed was dry as a result of an extended period of low precipitation. Upstream from Princeston Avenue the Gilchrist is an intermittent drainage network of roadside ditches and drainage ditches. The Gilchrist drainage basin includes commercial properties along US-23; Fairway

Park and Fairway Park #1 subdivisions; eastern portions of Owens Park subdivision, eastern parts of the golf course; southern stretch of French Road; and lands north of the golf course.

The development of Owens Park subdivision in 1951, platted lots and roads over the natural intermittent drainage system. The movement of water has been diminished and blocked by development. Predevelopment retention areas that once flooded and detained water have been filled. Development has increased stormwater runoff quantities along with restricting the flow of water. The intermittent drainage needs to be reconstructed to allow for movement of water through residential areas.

Lack of Coordinated Drainage Systems

A review of platted areas within the study area, found that only Fairway Park #1 subdivision has set aside drainage easements. Generally, drainage concerns have been either addressed on a lot by lot basis or addressed by roadside ditching and grade changes. As evidenced by partially buried culverts under driveways, roadside ditches have been filled to extend the mowable lawn area to the edge of the road. A drainage ditch follows the City/Township border running along the back lot lines of lots abutting the southern side of Princeston Avenue. The water carrying capacity of the ditch is being compromised by landowners dumping lawn clippings and leaves into the ditch.

The lack of a comprehensive approach to stormwater management has resulted in a hit and miss approach to stormwater drainage. When the Owens Park subdivision was platted in 1951, there was no consideration given to the natural drainage systems. The intermittent drainages of Fletcher Creek and Gilchrist Creek were platted into residential lots. Homes were constructed over the Gilchrist Creek intermittent drainage, blocking the flow of stormwater runoff. Runoff from the golf course and Fairway Park subdivisions is collected into roadside ditches and conveyed under Golf Course Road through a 36-inch concrete culvert and into a ditch 100 feet in length. The ditch ends in a shallow depression in the backyard of homes located on lots 1 & 2 in block 14 of Owens Park subdivision. This fragmented drainage system results in

stormwater runoff flowing through yards, into crawl spaces and along street surfaces, searching for the original drainageway. Another example is the use of a swallow hole for a stormwater retention area. The site is located in the northeast corner of the golf course. When the retention capacity is reached, water flows through the golf course and residential neighborhoods.

Golf Course Stormwater Run-off

Shallow depressions in the fairways and roughs function as stormwater detention areas. Three ponds have been constructed on the course, one at the beginning of the Fletcher Creek drainage system; and two in the golf course expansion located west of Genschaw Road. These two ponds empty into the Genschaw drainage system. Along with the shallow depressions, the ponds act as stormwater detention areas. In addition, a swallow hole is located at the terminus of a network of ditches that drain lands north of the golf course, parts of the golf course, and developed areas along French Road. This swallow hole functions as a "retention basin" with an undeterminable capacity.

During spring snow melt and major stormwater events, the capacity of the detention/retention areas is exceeded and overland water flow discharges water into the Fletcher and Gilchrist drainage networks. In the southeastern corner of the golf course, overland water flows through residential areas, into the Gilchrist drainage system. The upper reaches of the Gilchrist drainage system, that also serves Fairway Park subdivisions, flows south under Golf Course Road near the Eagle Road intersection and empties into the Owens Park Subdivision. Expanding the detention capacity of depressions and diverting water from residential areas will reduce stormwater impacts.

Loss of Natural Retention Areas

Fifty years ago much of the watershed was undeveloped, with farm and forest land uses prevailing. Stormwater runoff was minimized and slowed by tree, shrub and grass cover. Undeveloped areas temporarily flooded and released runoff into intermittent drainages. However, these natural retention areas have been altered by filling, building construction, road construction and ditching. The loss of retention areas has caused

increased runoff quantities, created drainage problems in existing neighborhoods, increased construction and maintenance costs, and increased road repairs.

Undeveloped parcels are concentrated in the northern part of the watershed. There are several undeveloped parcels or partially developed parcels, five to twenty acres in size, in the lower watershed, with the city limits. Undeveloped lots in Golf Course, Willo-Brooke, and Owens Park subdivisions as well as small tracts still function as natural stormwater retention areas. Further loss of natural areas will intensify stormwater runoff problems in developed areas. Setting aside key natural retention areas and creating retention/detention areas that incorporate a staged release of stormwater runoff will minimize water quantities and improve water quality.

Combination of sanitary and storm water sewer

Sump pumps and individual home drainage systems should not be connected to sanitary sewers. Local ordinances prohibits the discharge of sump and drainage water into sanitary sewers. Higher volumes of sewer generated during major run-off events indicate sump pumps may be connected to the sanitary sewer system.

Condition of Fletcher Drainageway

The Fletcher Creek is an intermittent drainage. Between Gilchrist Creek and Golf Course Road, Fletcher Creek has been channeled and straightened. North of Princeston Avenue, berms have been constructed along the edge of the ditch by landowners to protect their individual properties. Filling of natural retention areas and construction of berms, forces more water through the system at a faster rate. This approach simply moves the flooding problem down stream.

Several low dams on the lower Fletcher Creek, were noted during the field inventory. The low dams were apparently constructed as landscaping amenities, on private property. The structures create a low head of water, backing up the water in the creek. While these structures do not cause direct flooding of homes, their presence likely exacerbates drainage problems during major stormwater runoff events.

The City completed a brush and trees clearing project from Princeston Avenue downstream Gilchrist Creek. After the flood event of spring of 1998, the City of Alpena replaced culverts under Long Rapids Road.

Conclusion

This study has identified numerous drainage problems that occur on a yearly basis. Continued development within the watershed will amplify these problems. Remedial actions will be necessary to correct drainage problems. In the long term a comprehensive approach that incorporates similar guidelines, regulations and development standards into local zoning, considers both on-site and off-site drainage, provides a consistent approach between communities, uses natural elements for the transport and storage of stormwater, considers both quantity and quality of water and treats the watershed as a whole.

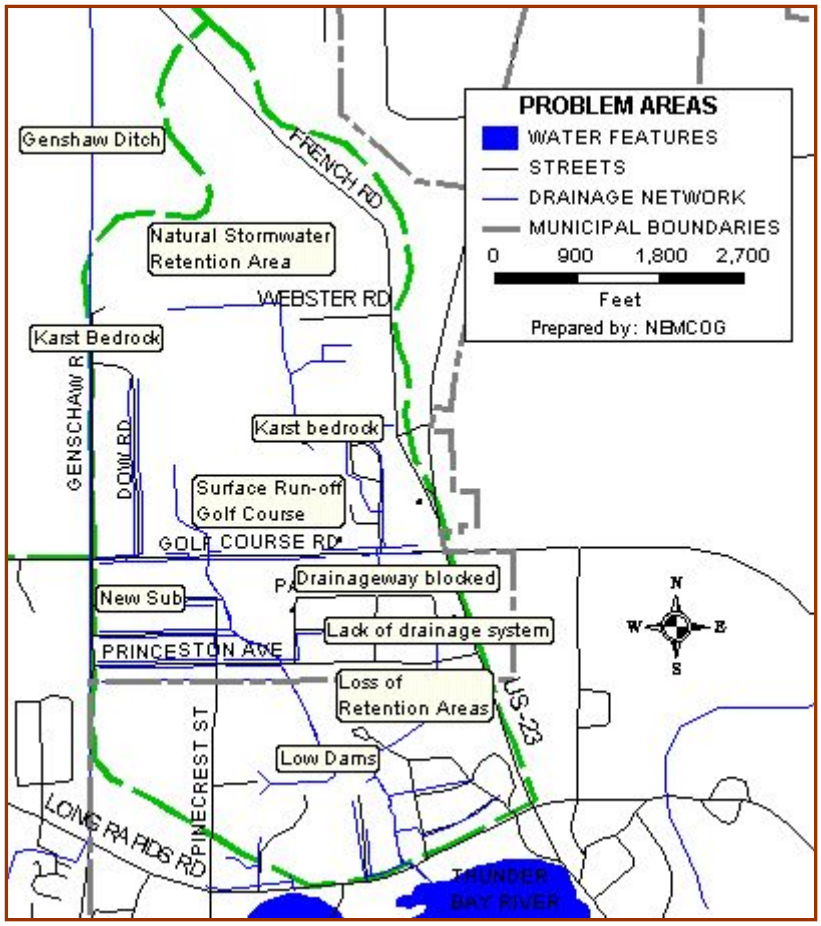

Figure 4.1 Identified Problem Areas

RECOMMENDATIONS

The Fletcher Creek Watershed Study concludes with a series of recommendations that will address ongoing drainage problems, minimize damage related to flooding events and encourage a proactive approach to managing the communities' stormwater. The recommendations are based on information complied in earlier sections, field observations and community input. The recommendations can be grouped into two categories corrective and proactive. Under all recommended courses of action, it is imperative to consider downstream impacts and take a storage-oriented approach whereby there is a controlled release of stormwater into the system.

The proactive recommendations focus on development of a comprehensive stormwater management program that includes adopting guidelines and regulations and implementing an education program targeting landowners, developers, and local officials. The corrective components center on the Michigan Drain Code. "An act to codify the laws relating to the laying out of drainage districts, ……, the construction and maintenance of drains, ……..; to provide for flood control and drainage projects within drainage districts; to provide for the assessment and collection of taxes; ……." As intended by the state statute, the County Drain Commissioner is the local official who's role is to assist communities and landowners in correcting drainage and flooding problems.

Develop a Comprehensive Intergovernmental Stormwater Management Program

There is no single state law that designates stormwater management responsibilities with one agency, either state or local. Instead, there is an array of state laws and enabling statutes providing tools for managing stormwater. The Michigan Department of Environmental Quality issues wetland and other water resource permits, county drain commissioners construct drainage projects on a request basis and review subdivision plats for internal and external drainage; state and county road agencies plan and construct roadside drainage systems; local departments of public works construct storm sewers. Problems identified in the study within the Fletcher Creek Watershed typify this disjointed approach to managing stormwater. Furthermore, due to the urban built-up character of the Fletcher Creek watershed, the protection of water quality needs to be addressed through use of natural swales and detention areas and the construction of detention/retention areas.

Local units of governments, in contrast, have the combination of legal authority, concern and regulatory flexibility to address all aspects of stormwater management together. Rather than looking at wetlands, road drainage, stormwater detention, erosion control, and other aspects separately, local governments can integrate together many inter-related elements. In addition, local governments can develop policies and regulatory standards that reflect the unique natural resources, watershed position and objectives of the community[1].

The comprehensive approach incorporates similar guidelines, regulations and development standards into local zoning, considers both on-site and off-site drainage, provides a consistent approach between communities, uses natural elements for the transport and storage of stormwater, considers both quantity and quality of water and treats the watershed as a whole. Table 5.1 compares the difference between the traditional approach and the comprehensive approach.

[1] Stormwater Management Guidebook for Michigan Communities, by Peggy Johnson and Lillian Dean.

- Stormwater management needs to be incorporated into each communities' planning and management functions. For townships and cities, this is best addressed in their zoning ordinance under the site plan review process. See Appendix for the site planning process integrating drainage considerations and natural resource features.

- Since flowing water crosses municipal boundaries, coordination between local governments is crucial. Along with working together on remedial actions to correct existing problems, communities should adopt similar guidelines and regulations to address stormwater management.

- Due to the urban built-up character of the Fletcher Creek watershed, communities should manage both the quantity and quality of stormwater run-off into the Thunder Bay River and Lake Huron. Best management practices should be used to detain and treat runoff from developed areas. Appendix contains a report by the Michigan Department of Environmental that provides guidelines for constructing wetlands to control nonpoint source pollution.

- The use of natural elements for stormwater transport and storage are key to this comprehensive approach. This "green infrastructure" includes forests, meadows, swales, creeks, intermittent drainages, depressions, wetlands, deep swales and ponds. Along with reducing runoff and protecting water quality, the community's green infrastructure provides habitat for wildlife and areas for public and private recreation.

Table 5.1
Traditional vs. New Approach to Stormwater Management

Traditional Approach	*Proactive Approach*
Remedial - emphasis on correcting existing problems	Preventative - emphasis on avoiding future problems
Stormwater considered the "enemy"	Opportunities for using stormwater to enhance community appearance and recreation areas recognized.
Single-purpose	Multiple -purpose
Site-oriented	Watershed-oriented, with downstream impacts considered
Conveyance-oriented (rapid removal of water from land	Storage-oriented (hold stormwater with controlled release)
Engineers and Technicians determine stormwater plans and measures	Policy options needing direction and decisions by local officials are recognized
Piecemeal projects	Systems approach links individual plans and projects together
Source: Clinton River Watershed Council	

- Stormwater management regulations in zoning ordinances tend to address commercial, industrial and higher density residential development (subdivisions, site condominiums, & apartment complexes). However, the cumulative affects of individual single family residential development can also create stormwater management problems. The communities should develop recommended guidelines for "stormwater friendly" single family development and provide that information to landowners building new structures or adding to existing structures.

- The comprehensive approach includes a stormwater education component that targets landowners, local officials and developers. The MSU Cooperative Extension Service has agreed to sponsor a stormwater management workshop.

Alpena County Drain Commissioner

Recommendations focusing on remedial or corrective actions are primarily the responsibility of the Alpena County Drain Commissioner. The Alpena County Drain Commissioner is an elected official and serves a term of four years. He is responsible to the voters of Alpena County. The Michigan Drain Code (Act 40 of Public Acts of 1956, as amended) governs the duties of the Commissioner. The Drain Commissioner's Office is responsible for maintaining all legally established county and intercounty drains within Alpena County. This responsibility includes managing and financing drain construction projects. A county drain can be an open ditch, swale, stream, underground pipe, or retention pond that conveys stormwater.

The Drain Commissioner's primary role, defined in the Michigan Drain Code, is to assist all parties in planning and developing the ways to correct drainage and flooding problems. This lead role includes providing petitions, convening required public hearings, and overseeing the planning and design stages of petitioned new drains or for reconstruction of existing drains in a timely, responsible manner. When faced with documented flooding and drainage problems, combined with community willingness to address these problems, it is quite clear a County Drain Commissioner's posture should be to facilitate the process, not to discourage or disregard the community's needs.

All drainage work completed through the Drain Commissioner's Office is by petition of the property owners or municipalities. Beneficiaries are property owners, cities, villages, townships and the county-at-large. Projects are financed through special assessments. The Drain Commissioner is responsible for spreading the special assessments, maintaining accounting of expenditures and assessment collections, for maintaining records of the establishment and operation of each drain, and for conducting routine maintenance of the drains. Costs for creating, extending and maintaining county drains are recovered through special assessments levied on private properties, local governments, county roads, railroads, and state highways. Property owners are assessed for direct benefit. Cities, villages and townships are assessed for health benefits and the county-at-large is assessed for the benefit to county roads.[2]

The Drain Office should maintain a close working relationship with the Alpena County Road Commission. Drains such as roadside ditches, pipes, bridges and culverts under roads that drain state highways and county roads, which are not designated as county drains, are maintained by the Alpena County Road Commission. However, drain pipes that are not county drains and are not along the roadside, may be the responsibility of property owners. Rivers,

[2] Michigan Drain Code (Act 40 of Public Acts of 1956, as amended). Drain Commissioner's offices in Iosco County, Kent County, Grand Traverse County, Lapeer County and Washtenaw County.

streams or creeks, which are not under the Drain Commissioner's jurisdiction, may be the responsibility of the Michigan Department of Environmental Quality.

The Drain Commissioner reviews external and internal drainage of preliminary and final plats for subdivisions/residential developments as governed by the Michigan Subdivision Control Act. All plats require the signature of final approval as to stormwater management from the Drain Commissioner. A review of subdivision's platted during the 1950's found there was no consideration given to external and internal drainage. Since the 1960's, platted areas in the watershed have addressed internal drainage. However, in the case of Fairway Park #1, no consideration was given to negative stormwater impacts down gradient, as the runoff from the subdivision flows through Owen's Park Subdivision. To limit impacts of future development, both within the watershed and in Alpena County as a whole, it is imperative the Alpena County Drain Commissioner reviews and assures both internal and external drainage factors are properly engineered.

Extend Genschaw Drainage District

The lower section of the Genschaw Drain from approximately Golf Course Road to its outlet into the Thunder Bay River is a designated county drain. Drains become designated as county drains through a petition process defined in the Michigan Drain. The County Drain Commissioner's office is responsible for maintaining all legally established county and intercounty drains within Alpena County. This responsibility includes facilitating, financing and managing drain construction and maintenance projects.

From Golf Course Road north to the dead end of Genschaw Road the Genschaw Drainage is a roadside ditch. This section has not been maintained and therefore, the water carrying capacity has diminished over the years. The ditch from the northern end of Genschaw Road to French Road is not well defined. Sedimentation and woody debris have partially filled the ditch, decreasing its water carrying capacity.

- To increase the water carrying capacity of the upper reaches of the Genschaw Drainage ditch, a petition to extend Genschaw Drainage District to a least French Road should be filed. The drain extension should follow the existing drainage ditch, originally dug as a WPA project.

- Petitioning through the Michigan Drain code will allow for the costs of deepening, widening and maintaining the drain to be recovered through special assessments levied on private properties, local governments, county roads, railroads, and state highways.

- The initial petition can be filed by landowners or local communities. The Drain Code has legal steps that must be followed to initiate and complete the proposed project.

- The Alpena County Drain Commissioner is the local official responsible for facilitating this process.

Create Fletcher Drainage District

The preliminary Fletcher Creek drainage basin was defined as part of this study. This area includes both the intermittent Fletcher Creek and Gilchrist Creek drainageways. Problem areas have been identified in previous sections of this study. The best approach to correcting the

problems is to create a drainage district under the Michigan Drain Code. In addition to providing a means to correct existing problems, establishment of a drainage district provides a mechanism for maintaining the drainage network. The initial petition can be filed by landowners or local communities. The Drain Code has legal steps that must be followed to initiate and complete the proposed project. The Alpena County Drain Commissioner is the local official responsible for facilitating this process. Appendix XXX is a flow chart of the process to establish a drainage district under the Michigan Drain Code.

The following recommended activities should be accomplished to improve drainage problems and minimize flooding in the Fletcher Creek watershed:

- *Establish the location of the Fletcher Creek and Gilchrist Creek intermittent drainage network.* Projects during the past fifty years have defined the location of Fletcher Creek. Actions include straightening, deepening and widening the drainage ditch. This work was not accomplished through the drain code and as a result easements and right-of-ways were not established. The Gilchrist Creek and associated drainageway has a much different history. The lower segment of the Creek, from its outlet upstream to St. Onge Street is a defined channel. From St. Onge upstream, stormwater runoff is either transported through ditches, vacant lots and residential lots. Between Partridge Ave. and Sunset Boulevard development has blocked the overland flow of water. Establishing easements under the Drain Code will allow for the protection of these important drainages, thereby prohibiting individuals from altering the drainage course or blocking the flow of water without first obtaining approval from the County Drain Commissioner.

- *Reconnect fragmented natural drainage systems.* Past development activities have blocked and fragmented the natural drainage network. The filling of lots, construction of homes and building of roads have all negatively impacted the flow of stormwater runoff. Th highest concentration of problems is in the Owen's Park Subdivision. Undeveloped lots and undeveloped platted roads segments could be used for constructing open ditches and retention areas. There are sections, for example the Gilchrist drainage system between Partridge Ave. and Sunset Boulevard, that will require enclosed stormwater pipes.

- *Create detention/retention areas where needed.* Undeveloped lots in subdivisions can be used to create retention areas that will hold run-off from all or part of the development. Looking back, we recognize this should have been done as part of the original development, but the potential for retrofitting has not been lost. Lots can be purchased by the proposed drainage district and developed into retention basins. Additionally, new developments in the watershed should be required to detain run-off on site with discharges not exceeding predevelopment quantities. For example the city is proposing a multiple use development on the property where the old city dump is located. There is sufficient land to construct detention basins that will complement the development, provide wildlife habitat and protect water quality.

- *Expand detention/retention areas where needed*. Shallow depressions in the golf course fairways and roughs function as stormwater detention areas. During spring snow melt and major stormwater events, the capacity of the detention/retention areas is exceeded and overland water flow discharges water into the Fletcher and Gilchrist drainage networks. The additional capacity is needed in the late winter/early spring, when the golf course is not in use. Therefore, the detention capacity of existing shallow depressions can be expanded without detracting from the quality of the golf course. In fact, improving the detention capacity of the "roughs" will improve drainage and playability of the fairways. Outflows into functioning proposed county drains will serve to divert water from residential areas and to

reduce stormwater impacts. The proposed drainage district could also purchase existing detention basins and expand those facilities to accommodate runoff from other sites.

- *Purchase fee simple or purchase development rights of critical sites to preserve stormwater detention capacity.* There are undeveloped, lower lots that, by default, function as detention/retention areas. However, as parcels increase in value, the filling of low lots becomes advantageous. When these natural retention areas are filled, more stormwater runoff is pushed into a drainage network that is already inadequate. This plan recommends the fee simple purchase or purchase of development rights of critical sites to preserve stormwater detention and conveyance capacity.

- *Improve roadside ditches along all roads*. The field inventory identified numerous instances where either roadside ditches had not been constructed or lot owners had filled the ditches for ease of lawn mowing. Buried culverts under driveways are evidence of this situation. Standing water on roads creates a safety hazard. Saturated roadbeds shorten the life of paved and gravel roads. Maintenance of roadside ditches on public roads, that are not designated county drains, is the responsibility of the County Road Commission or, on state trunklines, the Michigan Department of Transportation. In Alpena Township and the City Department of Public Works in the City of Alpena a cooperative effort between road agencies and local communities should be pursued to improve and maintain roadside ditches. Communities have the options of either improving roadside ditches or constructing enclosed storm sewers. The latter is more costly to construct and maintain.

- *Maintain existing drainage ditches.* There are several drainage ditches on private property. It is not certain whether there are recorded easements for these ditches. These include a drainage ditch along the northeast corner of the Thunder Bay Golf Course, with feeder ditches entering from other properties to the east. This ditching empties into a swallow hole on the golf course. Another ditch runs along the southern boundary of Birchview and Owen's Park Subdivisions, emptying into the Fletcher Creek just downstream of Princeston Avenue. The water carrying capacity of the Birchview/Owen's Park ditch has been greatly diminished by vegetative growth and landowners dumping grass and leaves. During the establishment of the proposed drainage district, consideration should be given to including these ditches as branches of the county drain. This will provide a means both for stopping landowners from using the ditches as a dumping ground for yard waste and for the maintenance of the ditch.

- *Provide alternative to karst/swallow holes for stormwater retention*. A drainage network along the northeast corner of the Thunder Bay Golf Course, with feeder ditches entering from other properties to the east, empties into a swallow hole on the golf course. There is no means of calculating the retention capacity of this swallow hole. The capacity varies, depending upon frequency, volume and duration of past runoff events. At some point the retention capacity is reached and water flows overland seeking the lowest points, eventually flowing into the Gilchrist and Fletcher Creeks. An overflow channel from this swallow hole should be defined and if necessary constructed to channel water into the proposed county drains. The overflow from the swallow hole could also be moved through a series of detention basins, that would take advantage of groundwater infiltration, evaporation and filtration of lawn chemicals. When defining the routes of the proposed Fletcher/Gilchrist County Drain, a branch should connect with the swallow hole and function as an overflow channel.

Fletcher Creek Watershed Study

Appendix

Flow Chart - Procedures for Establishing and Extending a County Drain

Elements of Stormwater Transport and Storage

Site Planning Process Integrating Drainage Considerations and Natural Resource Features

Stormwater Management and Polluted Runoff

Constructed Wetland Use in Nonpoint Source Control