V. WETLANDS MANAGEMENT

A. Overview

The City has a wealth of natural resources including 12 lakes, 356 wetlands, and the origin of several major stream drainages including Bluff Creek, Riley Creek, and Purgatory Creek. The city also has some very sensitive aquatic resources such as Assumption Creek, Seminary Fen, and the wetlands associated with the Minnesota River. This section of the SWMP has been dedicated to describe the wetlands within the city and identifying measures to classify and provide adequate protective measures to them. In 1992, the City updated its wetland inventory and assigned management classifications and identified other details of interest on wetlands. The intent or use of a wetland was to be considered in its classification. The inventory has been updated and a MnRAM Version 3.0 assessment has been completed on 315 of the wetlands as part of this Plan update. The 41 basins not included with the functions and values assessment wer located on private property and could not be reached, or were new basins that were identified by aerial photograph review after completion of the field review.

The majority of the wetlands within the City are shallow marshes or wet meadow wetlands. These two wetland types make up approximately 68% of the total number of wetlands and 88% of the total wetland area of the City. Much of this is due to the extensive shoreland wetlands and those along the Minnesota River. Cumulatively, wetlands total 2,370 acres within the City limits, which is approximately 15% of the total area of the City. Storm water ponds account for an additional 78 acres of aquatic habitat. Lakes compose a significant portion of the City, with the 12 mapped lakes comprising 1,526 acres. Cumulatively, surface water features (lakes, wetlands, streams and ponds) account for 3,975 acres of the City's surface area. As stated previously, water features represent approximately 26% of the City's surface area.

The wetlands portion of the SWMP is intended to provide a plan for the protection and management of the City's wetland and associated natural resources. This plan has been developed in accordance with the Wetland Conservation Act guidelines (MN Rules 8420.0650), although it is not currently intended to be used as a Comprehensive Wetland Management Plan. The information contained within this section of the Plan will allow the City to protect and manage their wetland resources and provide protection beyond that already provided by the WCA or the local watershed districts and management organizations.

The primary objectives of this section of the SWMP are to:

- Identify all of the wetlands within the city through the completion of a wetland inventory;
- Complete a functions and values analysis on all wetlands within the city;
- Prioritize wetland regulations based on the functions and values of the basin;
- Identify the status and trends of wetlands in the city since the 1992 inventory was completed;
- Manage wetland resources with the intention of improving functions and values;
- Identify short term and long-term management strategies;

- Provide data on the wetlands in the city to residents and developers; and
- Identify restoration opportunities.

Field assessments of the wetlands presented in this Plan are not delineations of the inventoried wetlands. Delineations are performed prior to development of individual sites or for identifying mitigation and restoration opportunities.

B. Existing Wetland Regulations

Although one of the main purposes of the SWMP is to allow the City to regulate and manage their water resources, including wetlands to some degree, there are several layers of protection already in place. These regulations may be implemented at the state, local, or federal level, and can come from a variety of agencies and organizations. The following are summaries of some of the main agencies and organizations that may be encountered.

1. Minnesota Wetland Conservation Act

The WCA was first passed in 1991 and has been subsequently amended as the Act has evolved. The Board of Water and Soil Resources (BWSR) is the lead agency for administering the WCA, and its guidelines are published in Minnesota Rules 8420. The intent of the WCA was to achieve no net loss of wetlands in the state. This is achieved by regulating the filling, draining, excavation, and alteration of wetlands within the state. There are some notable exemptions, such as allowing temporary impacts, farming of wetlands, and allowing small impacts to occur (de minimis). If an activity cannot avoid impacts and certain thresholds of impacts are met, creation of new wetland, or restoration of an altered or drained wetland must occur.

The WCA is administered by the Local Government Unit (LGU), which is the City of Chanhassen for all areas within the city limits. This authority, within the rules of the WCA, allows the city to regulate wetland impacts and replacement criteria. The city is assisted with the administration of the WCA by a Technical Evaluation Panel (TEP). The TEP is comprised of the LGU, plus representatives of the BWSR, the County Soil and Water Conservation District (SWCD), and the Minnesota Department of Natural Resources (MNDNR). Other agencies and experts may be invited to attend TEP meetings, but are not voting members.

2. Minnesota Department of Natural Resources

The Minnesota Department of Natural Resources has regulatory authority of Protected Waters and Protected Water Wetlands, which are identified on the Protected Waters Inventory. Protected Waters and Protected Water Wetlands can be lumped together as Public Waters. Regulatory authority is to all areas below the Ordinary High Water (OHW) elevation of ponds and lakes and any area below the top of bank for rivers and streams. If an OHW has not been set, which is often the case for Protected Water Wetlands, the jurisdiction will be the delineated wetland edge. Within the city, there are 27 listed protected waters and wetlands and five waterways (see Figure 6). These basins are identified on the City's GIS database and are also available for viewing at the MNDNR's website (http://www.dnr.state.mn.us/waters/watermgmt_section/pwi/maps.html). Work below the OHW or within the channel of a Protected

Water may require a permit from the MNDNR. Water appropriations may also require permits depending on the rate and amount of water used. Wetlands are regulated by the Area Hydrologist.

3. United States Army Corps of Engineers

The USACE regulates filling and excavation of wetlands through Section 404 of the Clean Water Act. It also regulates impacts to navigable waters through Section 10 of the Rivers and Harbors Act. The USACE has regulatory authority over any navigable water, and any wetlands hydrologically connected or adjacent to them. Currently, the USACE does not have the authority to regulate isolated wetlands, although there are very few basins in Chanhassen that would be considered isolated under current guidelines. Any impacts, including filling, dredging, or excavation may require a permit from the USACE. Additionally, the USACE also approves wetland delineations, and can participate on a Technical Evaluation Panel. Permitting is conducted through the regulatory branch, and agents are identified on a by county basis. More specific information of the USACE regulatory process can be found at their website (www.mvp.usace.army.mil).

4. Watershed Management Organizations

Within the city limits are four water management authorities including the Minnehaha Creek Watershed District (MCWD) (http://www.minneahahacreek.org), the Riley Purgatory Bluff Creek Watershed District (RPBCWD) (http://www.rileypurgatorybluffcreek.org), the Lower Minnesota River Watershed District (LMRWD) (http://www.watersheddistrict.org), and the Carver County Water Management Organization (CCWRMO) (http://www.co.carver.mn.us/water). These organizations may have additional regulatory requirements which must also be complied with for both the surface water and wetland components of the SWMP.

C. 2006 Wetland Inventory

Mapping of the wetlands within the City of Chanhassen was started in the fall of 2004 and continued through the growing season in 2005. The intention of this wetland inventory was to:

- Update the inventory completed in 1992 by revisiting those basins
- Revisit those basins identified on the inventory and evaluate the functional assessment completed by the Minnehaha Creek Watershed District in 2003
- Identify any new wetlands not identified in the 1992 inventory
- Map any of the linear waterways and streams that were not within a wetland
- Map all of the storm water ponds to differentiate them from wetlands

The wetland inventory identified and mapped a total of 171 storm water treatment basins or other excavated ponds, which have a total area of approximately 78 acres. The total number of basins includes 57 treatment ponds that were part of the 1992 inventory and 114 basins that have been created since 1992 or were not included in the previous inventory. Storm water ponds are not

part of the wetland inventory, but were mapped to provide a designation for all of the ponds and wetlands in the city. Many of the storm water ponds, particularly those 57 that were part of the 1992 inventory, may have been wetland that was excavated and converted into storm water ponds. Storm water ponds that were created from wetlands are still under the jurisdiction of the WCA. Storm water ponds that may have been wetland previously have not been separated from those clearly created from upland. Figure 9 identifies all of the storm water ponds and identifies those that were present in the 1992 inventory and those created afterward. Basins that were included in the 1992 inventory may require further investigation to determine if they were formerly wetland. All other basins have been confirmed to have been built in an upland area, and would not be regulated under the WCA or would be considered incidental basins.

1. Methods

The wetland inventory was completed by observing and identifying each basin in the field during the growing season. At each basin, notes on wetland vegetation, wetland type, amount of open water, control structures, and any other observation were taken in a dedicated field notebook. Field work was facilitated by using a Trimble GeoXT Global Positioning System (GPS). The GPS unit was preloaded with rectified aerial photographs from 2000 and 2003, which allowed both efficient navigation and the ability to locate basins that were not visible from public roadways.

Whenever possible, wetlands were directly observed in the field as opposed to interpretation using off-site resources. Wetland boundaries were noted electronically on the rectified aerial photographs on the GPS unit, and accompanied by detailed field notes. When practical, all or part of the wetland boundary would be recorded directly using GPS. Approximately 75% of the wetlands mapped had at least one GPS location recorded along the wetland boundary. Approximately 30% of all the wetland boundaries were mapped using GPS, with the remainder being interpreted using recent aerial photographs. Although only a small portion of the wetlands were mapped directly, this allows much greater accuracy than using aerial interpretation alone. This allows small wooded basins, wooded fringes, and floodplain forests to be mapped accurately where tree cover completely obscures the wetland signature. This also allows a partially mapped boundary to establish a wetland signature that can be used to more accurately photo interpret the remaining boundary.

It is important to clarify that although portions of the wetlands have been mapped on the ground, this does not constitute a wetland delineation. A wetland delineation, as set forth in the 1987 Manual for Delineating and Identifying Jurisdictional Wetlands (U.S. Army Corps of Engineers, 1987), requires documentation of wetland hydrology, hydric soils, and hydrophytic vegetation. The current inventory is based only on visual observation of the basins, and therefore is based primarily on hydrophytic vegetation. Because of this, the boundaries in the wetland inventory are not sufficient and cannot be substituted for a jurisdictional wetland delineation. As required by ordinance and the Wetland Conservation Act, a wetland delineation must be completed if any work is proposed to occur in or near one of the inventoried basins. It is also worth pointing out that, although considerable effort has been made to locate and identify all the basins within the city, there is a possibility that some wetlands have been missed. The absence of a wetland on a given property, based on the results of the wetland inventory, does not necessarily mean that

there is no wetland present, nor does it obviate developer investigation and/or observation of wetlands on a site.

2. Inventory Data Format and Information

In the office, the field notes, sketches, and GPS data were used to digitize the wetland boundaries over the aerial photographs. Several data fields were created that provide information on the basin. The following fields were prepared for each basin:

2005 SWMP ID: This is the unique number for the basin for the current wetland inventory. This number is derived from the format of the Minnesota Routine Assessment Method 3.0, which is used to complete the functions and values assessment. The number is based on the location of a wetland and is composed of a two digit county identification number, three digit Township number, two digit Range number, two digit Section number, a unique number for each basin within a section, and finally a numeric code representing whether this is the first, second, third, or future assessment of the wetland.

Original Wetland Inventory No.: The identification code for the basin from the 1992 inventory. This older inventory number is based on the section the wetland occurs in and the location within that section. The last portion of the code is a letter which may be P, N, A, or U. These stand for Pristine, Natural, Ag/Urban, or Utilized, and are the basis for the regulations used in the ordinances prior to the currently recommended revisions.

Map Sequence: Order in which the basins were digitized. This is independent of the order the field work was completed, and is only used for QA/QC.

Wetland Type: The Circular 39 classification of the basin. Most wetlands are composed of more than one wetland type, but an effort has been made to classify the basin with the most dominant wetland type, with preference toward the deeper water habitats. Multiple wetland types are used occasionally when there is no clearly dominant wetland type. For example a basin that is 70% cattails, 20% reed canary grass and 10% wooded fringe would be classified as a Type 3 only. A basin that is 60% cattail marsh and 40% shallow open water would be classified as Type 3/4. Wetlands can be classified as Type 1 through Type 8.

The eight possible wetland types are as follows:

> ***Type 1 Seasonally Flooded Basins or Floodplains:*** Type 1 wetlands are seasonally flooded basins or flats in which soil is covered with water or is waterlogged during variable seasonal periods but usually is well-drained during much of the growing season. Type 1 wetlands are located in depressions and in overflow bottom lands along water courses. Vegetation varies greatly according to the season and duration of the flooding, and includes bottom land hardwoods, as well as herbaceous plants.
>
> ***Type 2 Wet Meadow:*** Occurs along the shallow edges of lakes, marshes and floodplains, or in perched depressions. The soil is usually without standing water during much of the

growing season, but is waterlogged within at least a few inches of the surface. Vegetation includes grasses, sedges, rushes and various herbaceous plants.

Type 3 Shallow Marsh: Soil is usually water logged during the growing season, often covered with as much as six inches or more of water. Vegetation includes grasses, bulrushes, cattails, arrowheads, smartweeds and other emergent aquatic vegetation.

Type 4 Deep Marsh: Soil covered with six inches to three feet or more of water during growing season. Vegetation includes cattails, reeds, bulrushes and wild rice. Open water areas may contain pondweeds, naiads, coontail, water milfoils and other submergent aquatic vegetation.

Type 5 Open Water: Water is usually less than 10 feet deep and is fringed by a border of emergent vegetation. Vegetation includes pondweeds, naiads, coontail, water milfoils and other submergent aquatic vegetation.

Type 6 Scrub shrub: Occurs along sluggish streams or on floodplains. The soil is usually waterlogged during the growing season, and is often covered with as much as six inches of water. Vegetation includes alder, willow, and dogwood.

Type 7 Wooded Swamp: Occurs along sluggish streams, on floodplains, on flat perched depressions and in shallow lake basins. The soil is waterlogged to within a few inches of its surface during the growing season and is often covered with as much as one foot of water. Vegetation typical to this wetland includes tamarack, white cedar, black spruce, balsam fir, red maple and black ash.

Type 8 Bog: Occurs along sluggish streams, on flat perched depressions and shallow lake basins. The soil is waterlogged and supports a spongy covering of mosses. Vegetation typical to this wetland type includes sphagnum moss, heath shrubs and sedges. Minnesota bogs contain leatherleaf, Labrador tea, cranberries and pitcher plants. Scattered stunted black spruce and tamarack also are common features of bogs.

Cowardin (NWI) Classification: This classification system is used by the National Wetlands Inventory (NWI) and is based on a tiered system. The NWI system is illustrated in Figure 10. This system identifies a wetland based on hydrology and vegetation composition, plus any special modifiers. The hierarchical structure progresses from Systems and Subsystems at the most general levels to Classes, Subclasses, and Dominance Types at the most specific levels. A comparison of Circular 39 and Cowardin wetland classifications along with the typical Cowardin classification symbols are provided in Table 38.

Table 38. Circular 39 and Cowardin Classification System Summary

Circular 39 Type	SYSTEM SUBSYSTEM CLASS SUBCLASS	Common Water Regimes	Typical NWI Symbols (Cowardin System)
Type 1	PALUSTRINE (P) Emergent (EM) Persistent (1) Forested (FO) Broad-Leaf Deciduous (1)	Temporarily Flooded (A) Intermittently Flooded (J)	PEM1A PEM1J PFO1A PFO1J
Type 2	PALUSTRINE (P) Emergent (EM) Persistent (1)	Saturated (B)	PEM1B
Type 3	PALUSTRINE (P) Emergent (EM) Persistent (1)	Seasonally Flooded (C) Semipermanently Flooded (F)	PEM1C PEM1F
Type 4	PALUSTRINE (P) OR LACUSTRINE (L) Littoral (2) Emergent (EM) Aquatic Bed (AB) Unconsolidated Bottom (UB)	Semipermanently Flooded (F) Intermittently Exposed (G) Permanently Flooded (H)	PEMF L2EM2F PEMG L2EM2G PABF L2EM2H PABG L2ABF PUBF L2ABG PUBG L2ABH
Type 5	PALUSTRINE (P) OR LACUSTRINE (L) Limnetic (1) Littoral (2) Aquatic Bed (AB) Unconsolidated Bottom (UB)	Intermittently Exposed (G) Permanently Flooded (H)	PABG L2ABG PABH L2ABH PUBG L2UBG PUBH L2UBH L1UBH
Type 6	PALUSTRINE (P) Scrub-Shrub (SS) Broad/Needleleaf Deciduous (1,2) Broad/Needleleaf Evergreen (3,4) Dead (5)	All nontidal regimes except Permanently Flooded (A,B,C,F,J,G)	PSS1,2,3,4, or 5A PSS1,2,3,4, or 5B PSS1,2,3,4, or 5C PSS1,2,3,4, or 5F PSS1,2,3,4, or 5J PSS1,2,3,4, or 5G
Type 7	PALUSTRINE (P) Forested (FO)	All nontidal regimes except Intermittently Flooded and Permanently Flooded (A,B,C,F,J)	PFO1,2,4, or 5A PFO1,2,4, or 5B PFO1,2,4, or 5C PFO1,2,4, or 5F PFO1,2,4, or 5J
Type 8	PALUSTRINE (P) Scrub-Shrub (SS) Broad + Needleleaf Deciduous (1,2) Broad + Needleleaf Evergreen (3,4) Dead (5) Forested (FO) Broad + Needleleaf Deciduous (1,2) Broad + Needleleaf Evergreen (3,4) Dead (5) Moss-Lichen (ML) Emergent (EM)	Saturated (B)	PSS1,2,3,4, or 5B PFO1,2,3,4, or 5B PMLB PEMB
	RIVERINE (R) Lower Perennial (LP) Upper Perennial (UP) Intermittent (IN) Unconsolidated Bottom (UB)	Intermittently Exposed (G) Permanently Flooded (H)	RUBG RUBH

Wetland Type Description: This is a text description of the wetland type and follows the same naming convention as the Circular 39 description. The wetland types that were found in the inventory where classified as one of nine possible types including: Seasonally flooded basin,

wet meadow, shallow marsh, deep marsh, open water, scrub shrub, wooded swamp, stream, and floodplain forest.

General Classification: This is a general category of a basin which allows for additional description of the basin than allowed by just using wetland types. This category helps to identify special basins that are less commonly observed, such as wooded swamps, and those that may have additional protection, such as mitigation areas. The following general classifications are provided:

- Farmed Wetland: A wetland that is used for agricultural production. Farmed wetlands must be disturbed and actually used for production, not just be in an agricultural setting. The WCA allows for agricultural exemptions, and unique wetland mitigation opportunities for these unique basins.
- Floodplain Forest: Wooded wetlands associated with forests and supported hydrologically by flooding. Most of these are along the creeks in the city, although some are supported by ephemeral streams and storm water runoff.
- Mitigation Area: Any wetland area created or restored for compensatory mitigation under the WCA.
- Shoreland Wetland: Wetland, typically cattail marshes or other shallow emergent vegetation, that is directly associated with one of the lakes. Many of the shoreland wetlands are below the ordinary high water elevation and are regulated by the MNDNR and USACE, not the WCA.
- Wetland: Any wetland, regardless of type, that doesn't fall into one of the other categories.
- Wooded Swamp: Wetland dominated by trees but is not a floodplain forest.

Significant Changes: This is a quick measure of whether a basin has changed significantly from the 1992 inventory. A 'no' indicates that the basin is relatively unchanged in both area and wetland type. A 'yes' indicates that either the wetland has changed in size or shape, in wetland type, merged or divided, or wasn't previously mapped.

Storm Water Pond ID: The identification number assigned to a wetland in the 1994 surface water plan.

MNDNR PWI: The identification code used by the Minnesota Department of Natural Resources Protected Water Inventory. If an identification number is provided, that basin is under the regulatory authority of the MNDNR.

McRAM ID: Identification code of a basin that was inventoried and classified by the Minnehaha Creek Watershed District study. This only includes basins with the Lake Minnewashta and Christmas Lake watersheds.

Comments: Brief text description of the basin including notes of flow, structures, and disturbances.

Acres: The size of the basin in acres.

Area: The size of the basin in square feet.

Perimeter: The linear distance of the wetland boundary.

Classification: The results of the MnRAM analysis after being processed through the "Basic" level of protection matrix as described in Section E below. This may be Preserve, Mange 1, Manage 2, Manage 3, or Undetermined. Undetermined indicates that the MnRAM assessment was not completed for that Basin.

3. Inventory Results

The wetland inventory identified a total of 356 wetlands which are illustrated in Figure 12. The inventory also resulted in a GIS mapping of all of the storm water treatment ponds, lakes, and water courses that were not within wetlands. The wetland inventory focuses on the wetlands, but a brief discussion of the lakes and major water courses and how all of the City's aquatic resources are related, is worthwhile. The following sections describe the results of the wetland inventory, but also include a brief discussion of the lake a stream resources.

a. Wetlands

The 356 mapped wetland basins shown in Figure 12 have been divided into classifications based on the results of the MnRAM analysis (described in Section D below). In addition to this classification, the wetlands can be divided and described by wetland type. Table 39 provides a summary of the results based on the general wetland classification. Following the table is a general description of the classifications identified, along with the rationale for inclusion of that category.

Table 39. Wetland Classification Summary

Classification	Number of Basins	Total Area (acres)
Farmed Wetlands	13	8.10
Floodplain Forest	11	9.75
Mitigation Areas	12	5.82
Shoreland Wetland	20	296.97
Stream	3	0.64
Wetland	291	2046.88
Wooded Swamp	6	1.14
Total	**356**	**2669.84**

Farmed Wetlands: Farmed wetlands are usually highly disturbed and are almost always classified as Manage 3. Farmed wetlands also have some of the best opportunities for

wetland restoration, application of agricultural exemptions, and ways of getting mitigation or wetland banking credits not eligible to non-farmed basins.

Floodplain Forest: In addition to being wooded wetlands, which are relatively rare already, floodplain forests are associated with waterways and have unique ecological functions.

Mitigation Areas: Mitigation areas are created wetlands and are placed under protective easements. Because of the additional protection and high standards for native vegetation and buffers, these areas are automatically classified as Preserve. Wetland mitigation areas are also protected from future impacts without significant justification. For this reason, impact avoidance for these basins is critical.

Shoreland Wetlands: Shoreland wetlands are unique in that they serve as a transition between the aquatic and wetland or terrestrial habitats. Most shoreland wetlands are used for fisheries habitat and also have high recreational and aesthetic functions and values. Most shoreland wetlands rank as Manage 1.

Stream: The stream feature is essentially the same as the linear feature, but has been inventoried in the past and is therefore included as a polygon. The stream feature is limited to a small portion of the unnamed channel leading from Lake Minnewashta to Lake Virginia

Wetland: The wetland classification covers all other wetland types not already specified. This classification includes the most common basins such as wet meadows, shallow marshes, deep marshes, and shallow open water. Wetlands will rank in all of the management classifications, but the majority are Manage 2.

Wooded Swamp: The wooded swamp designation includes small woodland basins dominated by tree cover. In Chanhassen these basins tend to be small, ephemeral, and sensitive to disturbance. Wooded swamps generally have higher quality and most are Manage 1.

Collectively, the less common wetland types comprise 18 % of the wetlands in the city. Removing the shoreland wetlands from this total, as they are separated only due to their shoreland zoning criteria, and the less common wetlands only comprise 13% of the total number of basins and less than 1% of the total wetland area. These numbers demonstrate how uncommon some of these wetland types are. Identification of these rare basins as separate categories helps to highlight them when they might otherwise be hidden by the majority.

Another common analysis of wetlands is by wetland type. Wetland type is based on a combination of hydrology and vegetation, and can be one of eight types as previously described. Wetland typing is often difficult, as most basins have more than one type present. For this comparison, the dominant wetland type has been used to identify the basin as a single type. In cases where the basin is roughly equal areas of more than one wetland type, the deepest hydrologic designation is given preference. Table 40 shows the distribution of wetlands based on wetland type.

The most common wetland type in the city is a shallow marsh. Shallow marshes are typically dominated by cattails and occur as isolated basins and along the lake shores. The second most common wetland type is the wet meadow. This can include sedge meadows, but most often wet meadows are dominated by reed canary grass, particularly in agricultural or disturbed areas. Type 6 basins are very rare in the city. Type 6 basins are typically dominated by shrubs, typically willows or alders. While only two basins were inventoried that would be considered to be Type 6, many basins have a small type 6 component. Type 6 wetland isn't as uncommon as suggested, but it is rare for that wetland type to comprise more than 20% of any given basin.

Table 40. Summary of Basins Based on Wetland Type

Wetland Type	Description	Number of Basins	Total Area (acres)
Type 1	Seasonally Flooded	21	13.355
Type 2	Wet Meadow	94	547.18
Type 3	Shallow Marsh	131	1464.86
Type 4	Deep Marsh	52	154.95
Type 5	Shallow Open Water	11	125.92
Type 6	Scrub Shrub	2	0.42
Type 7	Wooded Swamp	24	8.91
Total		**335**	**2315.61**

b. Lakes

Twelve lakes were mapped as part of the wetland inventory. Mapping of the lakes was based on the extent of emergent vegetation, not the Ordinary High Water elevation. This was chosen as it allows the shoreland wetlands to be mapped accurately, and will allow future evaluations to determine if the amount of emergent vegetation changes significantly in the lakes. Areas of floating leaved or submerged vegetation were not included in the wetland inventory. The lakes section of the Surface Water Management Plan identifies additional information on the lakes and describes management opportunities and an implementation plan.

c. Linear Waterways

In addition to the rich abundance of wetlands, Chanhassen has several significant waterways. As part of the wetland inventory, all linear waterways were also mapped to complete the comprehensive overview of the city's aquatic resources. Linear waterways include the major streams and creeks, but also include some of the ditches, grassed swales, and other areas designated for conveyance of surface waters. Many waterways flow through wetland areas. In these portions, the channel has not been mapped, but is contained within the wetland boundary. The channels have been mapped for those portions not located within a wetland, i.e. those areas that flow through an upland area. Mapping was done with both GPS and through aerial photography interpretation. A summary description of the following waterways within the City is provided in Section IV of this Plan:

- Assumption Creek
- Bluff Creek
- Lake Minnewashta Outlet
- Purgatory Creek
- Riley Creek
- Unnamed Creek – Southeast Bluff Area.

4. Limitations on Inventory

While every effort was made to identify every wetland within the city, there are undoubtedly instances where wetlands may have been missed or have boundaries that are not as accurate as possible. The following are some of the limitations of the inventory.

- Access to Private Property: Several areas of the city are privately owned and access could not be obtained. In these areas, the wetlands were viewed from public vantage points or interpreted from aerial photographs. This decreases accuracy, but future access may be able to provide better boundaries and results. If any of these areas are proposed for development, a wetland delineation and functions and values assessment would be required.
- Farmed wetlands: Because of the high levels of disturbance, farmed wetlands can be difficult to identify. Review of the annual crop slides available at the USDA Service Center may identify additional farmed wetlands not apparent in a routine ground survey.
- Dating of Aerial Photographs: During the inventory process, aerial photographs from 2000, 2002, and 2003 were used. Recent changes are not visible on these, and the resolution of the most current photographs isn't fine enough to make interpretations on small or wooded basins.
- Amount of Recent Construction: In areas of current development, there is so much change that both the aerial photographs and the previous inventory are significantly different than what exists today. In these areas, ongoing construction and wetland impacts instantly date the inventory. Follow-up survey following construction or review of as-builts may adjust the boundaries or increase the number of storm water ponds and mitigation areas.
- Wetland in Right-of-Way: Many of the major roads and highways have built in drainage systems composed of ditches within the right of way. These wetlands were not included in the wetland inventory unless they were also included in the 1992 inventory. Under current regulatory guidelines, these ditches are usually considered to be jurisdictional wetland and are regulated under the Wetland Conservation Act. These ditches are typically encountered with transportation projects, but should be relatively unaffected by residential development.
- Wetlands along Railroad: Crossing the city along a roughly east-west corridor is a single-track railroad line. Most of the railroad has Type 3 cattail ditches along both sides of it.

These wetlands are all located on railroad property, and were not included in the wetland inventory. Many of these wetlands may be incidental under the WCA.

5. Comparison to the 1992 Inventory

In 1992 a wetland inventory was completed for the City as part of the 1994 Surface Water Management Plan. The 1992 inventory identified a total of 406 basins. These basins were classified as Pristine, Natural, Ag/Urban, or Utilized depending on quality and setting. Table 41 summarizes the results of the 1992 inventory.

Table 41. Results of 1992 Wetland Inventory

Classification	Number of Basins
Pristine	3
Natural	106
Ag/Urban	242
Utilized	55
Total	**406**

Of this total of 406 wetlands, 55 were classified as Utilized, which is the equivalent of being a storm water pond in the current inventory. Removal of these basins from the inventory leaves a total of 351 basins, which is slightly less than the 356 wetlands mapped in the current inventory. This suggests that there has been no net loss of wetlands in the city, but it is not accurate enough to identify a trend based solely on the number of basins. Twenty two of the wetlands in the 1992 inventory are not part of the current inventory. These basins are not included because they are no longer wetland (either filled or no longer meet criteria); were mapped as wetland on the 1992 inventory but weren't wetland then either (the 1992 inventory has several mapped basins that have field notes indicating "not wetland"); or changed designation, such as Riley Creek as it flows south from Lake Ann, which was on the 1992 inventory, but is now mapped as a linear feature and not a wetland.

The current wetland inventory includes 58 wetlands that had previously not been inventoried. Additionally, the 1992 inventory had 15 basins that were identified as separate basins that have been merged into single basins in the current inventory. There are also 10 basins that were single basins that have been split into two basins, and two basins that were one and are now three individual basins.

Although it is debatable if the number of basins has really changed, the truly significant measure is just how much wetland is present, and if there has been a loss or gain of wetlands by area, not number of basins. The 1992 inventory did not calculate the wetland areas, so there is no acreage available for comparison. Comparing the two inventories using a light table indicates that, at least for the larger basins, very little has changed. The basins in the 1992 inventory that are no longer present are all small basins, as are the wetlands that have been added and were not previously inventoried. Cumulatively, these basins make up only a few percent of the wetlands,

and do not add or take away significant wetland areas. When the new wetland areas created for wetland mitigation are considered, it appears that there has been a slight increase in the amount of wetland in the city, although that cannot be quantified at this time.

The 1992 wetland inventory classified wetlands using the Cowardin and Circular 39 systems, but they are also not quantified. Comparison of the current inventory to the 1992 inventory, however, matches wetland types in more than 90% of the wetlands compared. This suggests that there has also been little change in wetland types between the two inventories. One of the things that was observed, however, is the increased prevalence of cattails and reed canary grass within the basins. In the 1992 inventory, cattails (*Typha latifolia* and *T. angustifolia*) and reed canary grass (*Phalaris arundinacea*) were common, and were often dominant in the more disturbed basins. Sedges seemed to be more prevalent in 1992 than they are now, which is reflective of the increased reed canary grass. Many basins that are currently reed canary grass monotypes had several additional species present in 1992. This trend is unfortunate, but is occurring just about everywhere and is not a problem unique to Chanhassen. One other important observation concerning invasive and exotic species is purple loosestrife. Purple loosestrife was observed in 1992 and continues to be in the city. Wetlands that had purple loosestrife in 1992 continue to have it, but there are very few basins that have it now that did not have it previously. Those wetlands that have purple loosestrife tend to be impacted by storm water or have a history of disturbance. This suggests that purple loosestrife is relatively contained and is not posing a significant problem.

Summary of observations from 1992 to 2005:

- In general, there seems to be about the same amount of wetland now as there was in 1992. Inclusion of mitigation areas probably increases the amount of wetland slightly.
- Reed canary grass and cattails have increased significantly, at the expense of sedge meadows and diverse marsh and emergent vegetation assemblages.
- Purple loosestrife does not seem to have increased significantly.
- There are fewer wetlands in agricultural areas, and many more surrounded by residential development.
- The number of storm water treatment ponds has tripled, although much of that is due to development. However, several wetlands have been retrofitted with treatment cells to improve water quality.
- A total of 58 wetlands were added that had not previously been inventoried. These additional basins are mostly small wetlands that may have been missed, but also include wetland mitigation areas.
- 22 basins that were identified in the 1992 Inventory were no longer present. These basins are not part of the 2005 inventory update as they are
    - No longer present,
    - Are undergoing current modification related to current development,
    - Were mapped but failed to meet wetland criteria currently and based on the field notes from 1992.

- Have changed type to be mapped as other features (for example, some of the streams were mapped as wetlands, but are better mapped as linear waterways).

- A total of 15 basins that were mapped as separate basins in the 1992 Inventory have been merged into single basins in the 2005 Update.
- A total of 10 basins that had been mapped as one wetland in 1992 were divided into 2 separate basins in 2005. Two basins that had been mapped as one were divided into three new basins (six total) in 2005.

6. Comparison to MCWD Inventory

In 2002, the Minnehaha Creek Watershed District completed a functional assessment of all the wetlands in their watershed. This assessment was called the Minnehaha Creek Routine Assessment Method (McRAM), and was a pilot project that eventually evolved into the current MnRAM program. A portion of the Minnehaha Creek watershed is present in the north and northwest portions of the City of Chanhassen, including the Lake Minnewashta and Christmas Lake watersheds. The MCWD inventory identified 159 basins within the city of Chanhassen, most of which were Type 2 and Type 3. In this same area, the current city inventory identified 122 Wetlands, seven of which were not in the MCWD inventory. Most of the basins identified by the MCWD inventory and not in the city inventory are small basins, but upon investigation did not appear to be wetland currently. Additionally, the MCWD inventory has several basins identified as storm water ponds, ditches along the roadways, or areas of potential wetland restoration, which have not been counted in the city wetland inventory.

In terms of wetland area the two surveys are similar, but the MCWD inventory identifies several basins as being considerably larger or merges several basins into larger wetland complex. Overall, there is approximately a 90% agreement in the wetlands. As the two inventories were both field assessed and had similar protocols, there is no easy explanation for the differences. Wetland types generally match, as do functions and values assessments. As any projects done in these areas will require a wetland delineation and review, these differences are likely only academic and should not have an influence of the validity of the current inventory. Results of the 2002 Minnehaha Creek McRAM results compared to the current inventory are provided graphically in Figure 11.

The City will have two sets of wetland inventories for the area of the City that is within the MCWD. The City will adopt the McRAM data that the MCWD completed in 2002, along with the City's MnRAM data that was completed in 2005. Both data sets will be used for wetland assessments in this area of the City.

D. Functions and Values Assessment

Of the 356 wetlands, 515 were assessed using the Minnesota Routine Assessment Method Version 3.0 (MnRAM). MnRAM 3.0 was developed using the concept of ideal theoretical, pre-European settlement wetland conditions as the baseline. This application will rank each wetland for several functional criteria and determine quantitatively whether this function is low, medium, high, or exceptional for each basin. The MnRAM values will be used to determine the

classification of a basin, and as a result the appropriate management required to preserve or manage the basin.

The functional criteria that are evaluated in the MnRAM are:

- Maintenance of Characteristic Vegetative Diversity/Integrity
- Maintenance of Hydrologic Regime
- Flood/Stormwater Attenuation
- Downstream Water Quality
- Maintenance of Wetland Water Quality
- Shoreline Protection
- Maintenance of Characteristic Wildlife Habitat Structure
- Maintenance of Characteristic Fish Habitat
- Maintenance of Characteristic Amphibian Habitat
- Aesthetics/Recreation/Education/Cultural
- Commercial Uses
- Ground Water Interaction

Additional Evaluation Information

- Restoration Potential
- Sensitivity to Storm Water & Urban Development
- Additional Storm Water Treatment Needs

1. Methods

The wetland inventory was completed by visiting each of the wetlands as part of the wetland inventory. At each wetland the dominant vegetation, wetland types, and a sketch were made in a dedicated field notebook. A digital photograph was also taken. The data colleted was either entered directly into the MnRAM database using a laptop computer, or was filled out on field data sheets and later transcribed into the database. The database is completed using additional information from the inventory, including wetland area, proximity to other wetlands, surrounding landuse, soil survey information, and ownership.

One of the first measures of a wetland is the identification of the basin as a critical resource. Wetlands in the assessment area are evaluated for designation as critical resources based on several features defined by Minnesota Statutes. These critical wetland resources should be classified into the Preserve management class due to their special functions. Criteria for designating wetlands as critical resources are as follows:

- Outstanding Resource Value Waters (Minn. Rules 7050.0180)
- Designated Scientific and Natural Areas (Minn. Rules 86A.05)

- Wetlands with known occurrences of Threatened or Endangered Species (Minn. Stat. 84.0895)
- State Wildlife Management Areas (Minn. Stat. 86A.05, subpart 8)
- State Aquatic Management Areas (Minn. Stat. 86A.05, subpart 14)
- Wellhead Protection Areas (Minn. Stat. 103I.101, MN Rules Chapter 4720)
- Sensitive Ground Water Areas (MN Rules 8420.0548, Subp. 6)
- Designated trout streams or trout lakes (MN Rules 6264.0050)
- Calcareous fens (MN Rules 8420.1010 through 8420.1060)
- High priority areas for wetland preservation, enhancement, restoration and establishment (MN Rules 8420.0350, subpart 2)
- Designated Historic or Archaeological Sites
- State or federal designated wild and scenic rivers (MN Rule Chapter 7050)
- Mn Pollution Control Agency "special waters search" mapping utility

The City of Chanhassen has wetlands that meet these criteria including the large wetlands along the Minnesota River, which are part of the Raguet Wildlife Management Area and the Minnesota Valley Wildlife Refuge; Seminary Fen, which is a calcareous fen; and Assumption Creek, which is a trout stream. The City also has an abundance of high quality habitats that are known to contain threatened and endangered species. These areas are not restricted to wetlands, although the wetlands would be the prime emphasis for protection under this plan.

Calcareous fens are defined in MN Rules 8420.1020 as peat-accumulating wetlands dominated by distinct groundwater inflows having specific chemical characteristics. The water is characterized as circumneutral to alkaline, with high concentrations of calcium and low dissolved oxygen content. The chemistry provides an environment for specific and often rare hydrophytic plants. Minnesota Rules 8420.1010-1070 sets out minimum standards and criteria for the identification, protection, and management of calcareous fens as authorized by Minnesota Statutes, section 103G.223. The MnDNR is charged with identifying and maintaining a list of calcareous fens in the state and maintains a database of them. Calcareous fens are also listed in the Classifications for Waters in Major Surface Water Drainage Basins. Finally, the rules for Nondegradation of Outstanding Resource Value Waters also lists identified calcareous fens in the state.

State wildlife management areas are established to protect those lands and waters which have a high potential for wildlife production and to develop and manage these lands and waters for the production of wildlife, for public hunting, fishing, and trapping, and for other compatible outdoor recreational uses. State wildlife management areas satisfy the following criteria:

- Includes appropriate wildlife lands and habitat, including but not limited to marsh or wetlands and the margins thereof, ponds, lakes, stream bottomlands, and uplands, which permit the propagation and management of a substantial population of the desired wildlife species; and

- Includes an area large enough to ensure adequate wildlife management and regulation of the permitted recreational uses.

Designated trout streams and lakes in the state of Minnesota are inhabited by trout other than lake trout. Fishing and other restrictions have been placed on these waterbodies to protect and foster the propagation of trout. Wetlands associated with these lakes are an integral part of the whole ecosystem that functions to maintain the characteristics necessary to support the cold-water fishery.

Endangered and threatened plant and animal species are protected under Minnesota Statute 84.0895 and are designated as one of three categories:

- Endangered, if the species is threatened with extinction throughout all or a significant portion of its range.
- Threatened, if the species is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.
- Species of Special Concern, if although the species is not endangered or threatened it is extremely uncommon in this state, or has unique or highly specific habitat requirements and deserves careful monitoring of its status.

In 1987 the state began a systematic survey of rare biological features through the Minnesota County Biological Survey. The goal of this survey was to identify significant natural areas and to collect and interpret data on the distribution and ecology of rare plants and animals. The data collected by the county biological survey is available through published maps of each county. The data available for Chanhassen is through the *Natural Communities and Rare Species of Carver, Hennepin, and Scott Counties, Minnesota*. This resources identifies the corridor of Bluff Creek from south of CSAH 14 (Pioneer Trail) to the intersection of TH 101 and 212 as an area of maple basswood forest, lowland hardwood forest, oak forest, oak woodland, and dry prairie. The bluff area in the southeast portion of the City is also identified as having critical maple basswood habitat. These are all upland types, but are centered along Bluff Creek, and the unnamed creek in the southeast portion of the city. The area of Seminary Fen and Raquet Wildlife Management Area (WMA) are also identified on the survey for having outstanding wet meadow, mixed emergent marsh, oak woodland, seepage shrub swamp, and maple basswood habitats. These are primarily wetland habitats, and therefore would be of greater concern for the SWMP.

All of these areas identified as having critical habitats are also identified for numerous state or federally listed plant species. The greatest concentration is in and around Seminary Fen, but listed species have been identified along Bluff Creek and within the Raquet WMA. Lake Minnewashta has also been identified as having a listed animal species (Least darter, *Etheostoma microperca*), and is the only area in the city outside of the bluff, fen, and river bottom habitats that has a habitat or species identified on the county biological survey. The MNDNR Natural Heritage and Nongame Research Program collects, manages, and interprets information on nongame species and is the primary contact for more recent information on what species and habitats are present. It is strongly recommended that the Natural Heritage program is contacted prior to development to obtain the most current information and to identify mitigation measures that may reduce or eliminate impacts to listed species.

Once this initial step of identifying critical resources is completed, the data is filled in to address the remaining functional categories. Each wetland function is rated with a numeric index according to the formulas embedded in the MnRAM programming. The scoring system is from 0.1 to 1.0 signifying low to high, respectively; in the instances where an exceptional rating applies, a score of 2 accentuates the rarity. For 'yes-no' questions, 'yes' will receive a score of 1 and 'no' will receive a score of 0.1. Each wetland function then receives an index score with ratings as follows:

Functional Ratings	Question Score	Functional Index Score
Exceptional:	2.0	1.01 - 2.00
High:	1.0	0.66 - 1.00
Medium:	0.5	0.33 - 0.65
Low:	0.1	0.10 - 0.32

The MnRAM database is then programmed to run a summary report that lists the results of the 12 functional criteria for each basin. This information is then used to identify the wetland classification based on the flow chart in Appendix L. This will allow each basin to be classified as Preserve, Manage 1, Manage 2, or Manage 3.

E. Classification and Management Standards

1. Description of Standards

The MnRAM functions and values analysis will be used to classify basins for the purposes of establishing regulatory guidelines. The Board of Water and Soil Resources (BWSR) has established recommended guidelines for classifying and managing wetlands based on the result of the MnRAM analysis. The BWSR guidelines provide two classification standards based on wetland recommendations and in compliance with the WCA, state water quality standards, and multiple wetland management plans. Suggested classifications are either Basic Protection or Increased Protection, with the local authority determining which level of protection is most appropriate. Appendix K contains the flow charts used to determine the levels of protection under both standards. The City has selected to use the Basic Protection Standard, although the Increased Protection Standard will remain for reference purposes, and may be used as an alternative if an additional level of protection is warranted.

The Basic Protection Standard is the minimum recommended to satisfy no net loss goals, protect critical resources, and allow for use of some wetlands in developing areas. The increased Protection Standard will include more wetlands in the Preserve category that would otherwise be considered Manage 1. This has the net effect of protecting more wetlands with higher standards. A summary of the proposed protection standards is included as Table 42.

Using the system recommended by BWSR, each wetland that has been surveyed will be classified into one of four categories: Preserve, Manage 1, Manage 2, or Manage 3. The Preserve category is for exceptional and highest-functioning wetlands, or those sensitive wetlands receiving conveyed storm water runoff that have yet retained a medium level of vegetative

diversity/integrity. These wetlands are those that should be preserved in (or improved to) their most pristine or highest functional capacity with wide, natural buffers, in perpetuity.

In the Manage 1 category are high-quality wetlands that should be protected from development and other pressures of increased use, including indirect effects. Maintaining natural buffers will help to retain the significant function these wetlands provide. In the event that impacts to these wetlands cannot be avoided, replacement ratios for mitigation should exceed the state-required minimums. Manage 2 wetlands provide medium functional levels and the wetland extent should be maintained. These wetlands often provide optimal restoration opportunity. Manage 3 wetlands have been substantially disturbed and have the lowest functions and values.

1. Preserve

Wetlands classified as Preserve have at least one of the following characteristics:

- Are identified as Critical Resources
- Wetlands rated with exceptional vegetative diversity/integrity, which may include wetlands with natural communities not significantly impacted by invasive species or other human-induced alterations, wetlands harboring endangered or threatened plant species, or rare wetland habitats classified as imperiled (S1) or critically imperiled (S2) by the state rankings.

Table 42. Recommended Wetland Management Strategies

Management Class	Management Strategy	Stormwater Treatment	Minimum Buffer[1]	Mitigation Standard	Hydrologic Guidelines
Preserve	Maintain wetland and existing functions, values and wildlife habitat. Possible need for active management of wetland to protect unique features. Apply strict avoidance standards. May be appropriate to develop a conservation easement.	Avoid conveyed flows where prudent and feasible. Upstream sediment and nutrient pretreatment required to maintain background loading rates. Maintain existing hydrology—divert increased flows. Avoid concentrating flows.	50 feet Require monuments to mark buffer edge.	WCA minimum or greater replacement ratio with documented replacement of functions/values. Consider requiring buffer replacement.	*Bounce (10 yr)*: Existing *Inundation (1 & 2 yr):* Existing *(10 yr)*: Existing *Runout Control*:[3] No Change Maintain existing hydrology. Encourage infiltration and reduced impervious BMPs. Conduct water budget analysis.
Manage 1	Maintain wetland without degrading existing functions, values and wildlife habitat. Apply WCA sequencing process.	Pretreat conveyed flows to maintain background loading rates.	35 feet Require monuments to mark buffer edge.	WCA minimum or greater replacement ratio. Emphasis on replacement of functions and values on site In compliance with Ch. 7050 the entire area affected by storm water or other wastewater flows must be avoided, minimized and replaced at a replacement ratio of 1:1 for all changes in wetland type.	*Bounce (10 yr)*: Existing + 0.5 ft *Inundation (1 & 2 yr):* Existing plus 1 day *(10 yr)*: Existing + 7 days *Runout Control*:[2] No Change Maintain existing hydrology. Encourage infiltration and reduced impervious BMPs.
Manage 2	Maintain wetland footprint. Improve wetland biological and plant community diversity/integrity or enhance other functions if possible. Apply WCA sequencing process. Consider for restoration.	Pretreat all conveyed discharges to remove all heavy particles and maximize removal of fine grained sediment prior to discharging to the wetland	25 feet Require monuments to mark buffer edge.	WCA minimum or greater replacement ratio. Emphasis on replacement of functions and values on site	*Bounce (10 yr)*: Existing + 1.0 ft *Inundation (1& 2 yr):* Existing plus 2 days *(10 yr)*: Existing + 14 days *Runout Control*: [2] 0 to 1.0 ft above existing runout
Manage 3	Allow for sequencing and replacement plan flexibility. Consider for restoration/enhancement.	Pretreat all conveyed flows to remove all medium grained and larger sediments.	16 feet	WCA minimum replacement, although sequencing flexibility may be used (M.R. 8420.0650).	*Bounce (10 yr)*: No Limit *Inundation (1 & 2 yr):* Existing plus 7 days *(10 yr)*: Existing + 21 days *Runout Control*:[2] 0 to 4.0 ft above existing runout

1. Buffers are unmowed, naturalized strips of vegetation around the wetland perimeter. Buffers would be provided during development or redevelopment
2. If currently landlocked, new outlet should be above delineated wetland elevation.

- Wetlands rated as exceptional for wildlife habitat. These include wetlands known to harbor endangered or threatened animal species, rare communities, or wildlife refuges and fish and wildlife management areas whose purpose is maintaining suitable habitats for wildlife.
- Wetlands rated as high for amphibian habitat.
- Wetlands rated as exceptional for fish habitat. These wetlands include those specifically managed for fish management; designated trout streams, lakes or adjacent wetlands; and known spawning habitat for game fish.
- Wetlands rated high for shoreline protection. Wide wetlands bordering lakes and feeder streams that have persistent, emergent, submergent, or floating-leaved vegetation are critical to protecting the water quality of the lakes from bank erosion and sedimentation from upstream.
- Wetlands rated exceptional for aesthetics/education/recreation/cultural and rated high for wildlife habitat, include those located on public lands that provide a unique or rare recreational, educational, or cultural opportunity, and have high functional level for wildlife since that is typically a primary focus for users.
- Wetlands that are exceptionally sensitive to storm water impacts and have a vegetative diversity/integrity rating of medium or higher were also placed in this category. These wetlands may have suffered some degradation from human influences due to their heightened sensitivity. The vegetative quality of the wetland is such that improved management may allow for restoration of the community.
- Wetlands with a high vegetative diversity/integrity rating and a high rating for wetland water quality. The vegetative community in these wetlands typically has been only slightly affected by humans and still maintains high functioning to maintain water quality, which is critical to wetland sustainability.
- Wetlands with a high vegetative diversity/integrity rating and a high rating for hydrologic regime. The vegetative community in these wetlands typically has been only slightly affected by humans and still maintains high functioning levels for hydrologic regime, which is critical to wetland sustainability.

2. Manage – 1

Wetlands classified as Manage 1 have at least one of the following characteristics:

- Wetlands rated with high vegetative diversity/integrity, which typically include diverse wetland plant communities with less than 20 percent cover of non-native or invasive species.
- Wetlands rated as high for wildlife habitat. These generally include wetlands located within large tracts of undeveloped land or in parks, which allow for wide high quality upland buffers. In addition, this includes seasonal wetlands that are well buffered.
- Wetlands rated as medium for amphibian habitat. This includes seasonal wetlands that are well buffered.

- Wetlands rated as high for fish habitat. These wetlands are lacustrine/riverine or are contiguous with a permanent waterbody or watercourse and provide spawning/nursery habitat, or refuge for native fish species in adjacent lakes, rivers or streams.
- Wetlands rated medium for shoreline protection. These wetlands include those that are moderately wide and support persistent emergent, submergent, or floating-leaved vegetative cover bordering lakes and feeder streams.
- Wetlands rated high for aesthetics/education/recreation/cultural and medium for wildlife habitat, include those that provide a number of benefits that may include: spatial buffering, accessibility, public ownership, multiple recreational opportunities, and medium-quality wildlife habitat.
- Wetlands that are highly sensitive to storm water impacts and have a vegetative diversity/integrity rating of medium or high. The vegetative quality of the wetland is such that improved management may allow for restoration of the community.
- Wetlands with a medium vegetative diversity/integrity rating and a high rating for wetland water quality. The vegetative community in these wetlands has only been moderately affected by humans and still maintains high functioning levels for water quality, which is critical to wetland sustainability. These wetlands would likely benefit from active management.
- Wetlands with a medium vegetative diversity/integrity rating and a high rating for hydrologic regime were placed in the Manage 1 category. The vegetative community in these wetlands has only been moderately affected by humans and still maintains high functioning levels for hydrologic regime, which is critical to wetland sustainability. These wetlands would likely benefit from active management.
- Wetlands rated high for commercial use. These wetlands provide important social value without having an altered hydrology.

3. Manage – 2

Wetlands classified as Manage 2 have at least one of the following characteristics:

- Wetlands rated with medium vegetative diversity/integrity, which typically include wetlands with less diversity and up to 50 percent cover of non-native or invasive species.
- Wetlands rated as medium for wildlife habitat. These often include wetlands that are increasingly separated from natural communities and wildlife corridors; they often lack significant upland buffers and are increasingly altered.
- Wetlands rated as low for amphibian habitat. These wetlands are increasingly altered, but they still have some opportunity to provide either breeding, over wintering, or resting habitat for amphibians.
- Wetlands rated as medium for fish habitat. These wetlands include those which are intermittently connected to waterbodies supporting native fish populations
- Wetlands rated low for shoreline protection. While these wetlands are not providing the highest level of protection to the lake or river systems, their mere presence provides some

level of protection that should not be dismissed. These wetlands are typically narrow, with little emergent, submergent, or floating-leaved vegetation.

- Wetlands rated Medium for aesthetics/education/recreation/cultural and Low for wildlife habitat.

4. Manage – 3

Wetlands classified as Manage 3 include all of the remaining wetlands that did not fit into any of the above-described conditions. All of these wetlands would rate low for vegetative diversity/integrity. Many of these wetlands rate medium or high for downstream water quality protection and for flood storage/attenuation. This correlation is expected since wetlands that provide higher levels of water quality treatment and runoff/rate control often suffer from ecological degradation.

2. Results

The 315 wetlands that were included within the updated wetland inventory and the Minnehaha Creek Watershed Inventory were subjected to the basic Protection Standard to determine the appropriate wetland classification. The results of this classification are shown below in Table 43, and graphically on Figure 12.

Table 43. Results of 2002 McRAM and 2005 Chanhassen Wetland Inventories

Classification	Number of Basins
Preserve	85
Manage 1	175
Manage 2	34
Manage 3	21
Total	**315**

The majority of the wetlands have been classified as Manage 1, with the second most common classification being preserve. This appears to be somewhat skewed toward a conservative approach, but many of the wetlands such as mitigation sites, shoreland wetlands, Seminary fen, and the Minnesota River backwaters are all automatically classified as Preserve. Although many of the basins have generally lower quality vegetation, and upon first appearance may be ranked low, the additional functions such as storm water attenuation, wildlife habitat, and water quality improvements elevate these basins to a higher classification. Manage 3 wetlands are primarily farmed wetlands and are very degraded. Many of these, however, are good candidates for wetland restoration.

F. Wetland Buffer Standards

Wetland buffers are used to reduce runoff of sediment and nutrients into wetlands. Buffers can also provide wildlife habitat, if they are of sufficient size. The effectiveness of buffers varies depending on slope, density of vegetation, type of vegetation, and width. While the literature is quite variable, the one certainty is that the bigger the better. For this reason, the recommended minimum buffer width is greater for Preserve classifications, and decreases as wetland quality decreases. The standards recommended are minimum standards, and are intended to provide a reasonable level of protection for the quality of the wetland being protected.

G. Storm Water Susceptibility

Storm water runoff contains more than just water. Nutrients, soil particles, and other contaminants are also included in runoff, and levels can be very high depending on the types of soils and land use in the areas surrounding a wetland. These other components can be detrimental to a receiving body, and can upset the ecological balance. Changes in the volume, rate, frequency, or duration of storm water entering a basin can also alter the ecological integrity. Alterations associated with storm water can lead to changes in the function of wetlands, and can lead to loss of fish and wildlife habitat, replacement of native species with invasive or nonnative species, and loss of other wetland functions. Wetland sensitivity varies by wetland type.

Table 44 identifies wetland types and their sensitivity to storm water. Pristine wetlands, bogs, and fens are highly susceptible to hydrologic alteration. Floodplain forests are moderately susceptible, as storm water discharge can mimic some of the natural conditions of that habitat type. Shallow marshes and wet meadows are the most tolerant, particularly those that are already degraded or composed on non-native species.

Table 44. Susceptibility of Wetlands to Degradation by Stormwater Impacts

Exceptionally Susceptible Wetland Types:[1]	Highly Susceptible Wetland Types:[2]	Moderately Susceptible Wetland Types:[3]	Least Susceptible Wetland Types:[4]
Sedge Meadows	Shrub-carrs[a]	Floodplain Forests[a]	Gravel Pits
Open Bogs	Alder Thickets[b]	Fresh (Wet) Meadows[b]	Cultivated Hydric Soils
Coniferous Bogs	Fresh (Wet) Meadows[c, e]	Shallow Marshes[c]	Dredged Material/Fill Material Disposal Sites
Calcareous Fens	Shallow Marshes[d, c]	Deep Marshes[c]	
Low Prairies	Deep Marshes[d, c]		

Source: *Storm -Water and Wetlands: Planning and Evaluation Guidelines for Addressing Potential Impacts of Urban Storm-Water and Snow-Melt Runoff on Wetlands*, St. of Mn. Storm-Water Advisory Group, June, 1997

Notes: There will always be exceptions to the general categories listed above

1. Special consideration must be given to avoid altering these wetland types. Inundation must be avoided. Water chemistry changes due to alterations by storm water impacts can also cause adverse impacts. All Critical Resources are considered exceptionally susceptible regardless of wetland type
2. a, b, c can tolerate inundation from 6 to 12 inches for a short period of time. May be completely dry in drought or late summer conditions. d can tolerate more than 12 inches inundation, but adversely impacted by sediment and nutrient loading and prolonged water levels. e, some exceptions
3. a, can tolerate annual inundation of 1 to 6 feet or more, possibly more than once per year. b, fresh meadow dominated by reed canary grass, cattail, giant reed, or purple loosestrife
4. These wetlands are usually so degraded that input of urban storm water may not have adverse impacts

Wetland management for storm water inputs are proposed to maintain tolerable hydrologic and water quality changes based on the goals of the management classification. The standards represent what is recommended for tolerable bounce, inundation period, and inlet and outlet controls.

H. Potential Wetland Mitigation and Restoration Sites

One of the components of the wetland inventory was to identify potential areas on city-owned property that would be suitable for the creation of wetland mitigation areas or for developing a wetland bank. One of the questions (number 56) on the MnRAM specifically asks for an evaluation of the restoration potential of a basin. This is a somewhat difficult question as it is specific to restoration of wetland hydrology, and it is rare that you would know of subsurface drainage or hydrologic alterations from a single field visit. Guidance suggests that the question isn't applicable to basins that are not drained or ditched or agricultural purposes. Only 11 basins were identified as farmed wetlands, and none of them had any indication of subsurface drainages or ditches. None of them were on city–owned property either.

The McRAM evaluation identified 45 basins within the city that are restorable, but this evaluation is limited to the Lake Minnewashta and Christmas Lake basins, which are not areas of intensive agriculture. Certainly many basins would be candidates for vegetation restoration. The widespread occurrences of reed canary grass, hybrid cattails, giant reed grass, and purple loosestrife would make many basins candidates for vegetation restoration. The biggest drawback to this, however, is that it is very difficult to get wetland credits, and a good restoration project is very costly. The cost benefit of vegetation restoration is currently so low that it is practically unfeasible.

There are a few areas that creation of new wetlands may be feasible on city-owned property. Many of these sites would be extensions of existing basins, and careful hydrologic analysis would be required to determine how feasible this may be. Careful consideration must also be given concerning the species of plants present in the existing and proposed basins. Many extensions of low quality basins are performed, but few are as successful as proposed due to the problems of fighting invasive and exotic species. This list of suggested opportunities does not include areas that are currently wooded, as the ecological value of many of the woodlands may exceed the value of the additional wetland created. Mitigation opportunities on private properties are also not discussed. There are many opportunities for wetland restoration and/or creation in many of the agricultural areas. Much of the property owned by the University of Minnesota and Carver County also have areas suitable for wetland creation. In both these instances, however, the properties are not readily available for city use, and therefore it is not feasible to suggest properties that cannot be used.

The following properties are suggested for further investigation into the potential to create wetlands, and/or create a wetland bank. These sites have been selected based on the potential area that could be used to create new wetland areas and potentially restore adjacent wetlands as well. Many other opportunities to create small wetland areas are also present, but are not included as it is typically not cost-effective to create or restore small areas. The following eight

properties have been identified as the best potential areas for creating new wetland. These parcels are identified on Figure 13

Parcel ID 3641 - This property is within a city park adjacent to Carver County property. There are two wetlands in the park, plus some recreational amenities. The existing wetlands are low quality, but there is some room for expansion and potential restoration. The McRAM identifies this area as potential wetland restoration as well.

Parcel ID 6114 – This property is also a park with a small trail system. A small storm water treatment pond is located on the west end, and could be used as the first cell of a larger wetland complex. Space is somewhat limited, and there is a concern that sufficient hydrology could be obtained.

Parcel ID 4177 – This property is also a small city park, and already has degraded Type 2 wetland on it. There is room for expansion of this basin and restoration of hydrology and vegetation. This basin has also been identified as a potential restoration site by the McRAM.

Parcel ID 4285 – This parcel is also located in a city park and currently has a grassed swale running through it. It may be possible to intercept the drainage from the swale and support a mitigation area in the park. This could be designed to incorporate the existing trail system and have less loss of green space than would occur in other parks. This is one of the better sites reviewed for creating wetland.

Parcel ID 3960 – This is also a park with a small ballfield. A portion of the ballfield is low and has been included in the wetland inventory. Restoration of this site is possible, but would come at the cost of losing the ball field. Given the soggy conditions, this may be a good exchange over the improvements needed to improve the park.

Parcel ID 3695 – This is a small parcel surrounded by residential development. A grassed swale, flow-through wetland exists in the property. This could be expanded into a larger flow-through wetland.

Parcel IDs 12823 and 12835 – These two adjacent properties are located on the south side of Rice Marsh Lake and are undeveloped. The area along the lake is wooded, but there is some open space on the south side that may be suitable for the creation of wetland.

This page left intentionally blank.