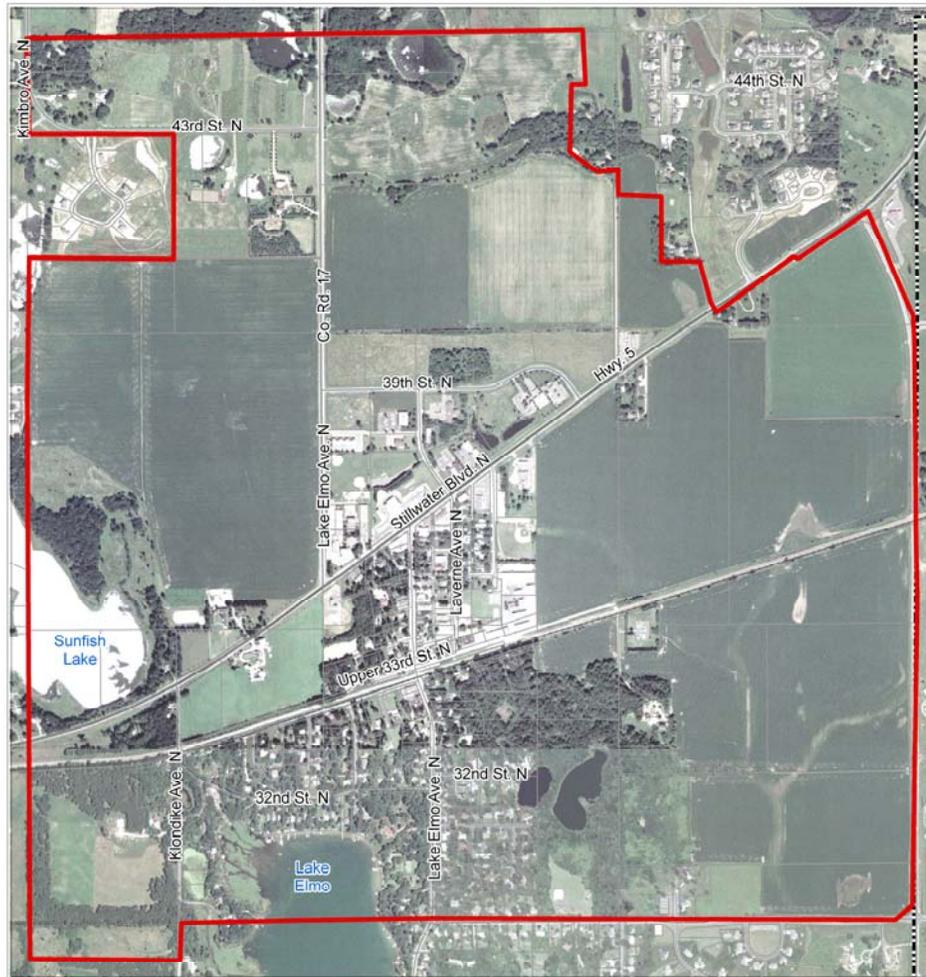


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# Lake Elmo Village Area Final Alternative Urban Areawide Review (AUAR)



Prepared for the City of Lake Elmo

May 5, 2009

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# Lake Elmo Village Area

## Final Alternative Urban Areawide Review (AUAR)

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**NOTE TO REVIEWERS:** The content and format of an AUAR document is organized by the Minnesota Environmental Quality Board (EQB). The AUAR guidance comes from the EQB document titled “Recommended Content and Format – Alternative Urban Areawide Review Documents” (September 2008). The Village Area AUAR is recorded on a customized form that represents a hybrid of the EQB’s standard Environmental Assessment Worksheet (EAW) form and the EQB’s AUAR guidelines. A blank EAW form and the EQB’s AUAR guidance document are located in Appendix B for reference. The content of this customized AUAR form is organized into 31 questions that are predetermined by the EQB. A response to each of the 31 questions is provided for each development scenario as appropriate. The topics associated with these 31 questions comprise the table of contents for this AUAR. The EQB requirements and guidance on this form pertinent to the AUAR process are in *italics* and preceded by the phrase “*AUAR Guidelines*”. The *AUAR Guidelines* pertaining to each numbered EAW item follows the **bold face** text from the EQB’s standard EAW form that is included in the grey boxes.

**1. Project Title:** Lake Elmo Village Area AUAR

*AUAR Guidelines: An appropriate descriptive title for the geographic area of the AUAR should be chosen*

**2. Proposer:** NA

*AUAR Guidelines: It is not necessary for AUAR proposers to identify property owners within the AUAR area (although it may be useful to use such names as identifiers of various land parcels).*

**3. RGU:** City of Lake Elmo  
Contact Kyle Klatt, Planning Director  
Address 3800 Laverne Avenue North  
Lake Elmo, Minnesota 55042  
Phone 651-777-5510  
Fax 651-777-9615  
E-Mail [kyle.klatt@lakeelmo.org](mailto:kyle.klatt@lakeelmo.org)

**4. Reason for EAW Preparation**

*AUAR Guidelines: Not applicable to AUAR*

**5. Project Location** Parts of Section 11, 12, 13 and 14, Township 29 N, Range 21 W

**County:** Washington **City:** Lake Elmo (See Figure 5-1)

Attach each of the following maps to the EAW: county map, USGS map, and a site plan.

***AUAR Guidelines:** The county map is not needed for an AUAR. The USGS map should be included. Instead of a site plan, include: (1) a map clearly depicting the boundaries of the AUAR and any subdistricts used in the AUAR analysis; (2) land use and planning maps as required in conjunction with items 9 and 27; and (3) a cover type map as required for item 10. Additional maps may be included throughout the document wherever maps are useful for displaying relevant information*

All required maps and additional maps displaying relevant information are found in Appendix A.

**6. Development Description**

- a. Provide a project summary of 50 words or less to be published in the *EQB Monitor*.
- b. Give a complete description of the proposed project and related new construction. Attach additional sheets as necessary. Emphasize construction, operation methods and features that will cause physical manipulation of the environment or will produce wastes. Include modifications to existing equipment or industrial processes and significant demolition, removal or remodeling of existing structures. Indicate the timing and duration of construction activities.
- c. Explain the project purpose; if the project will be carried out by a governmental unit, explain the need for the project and identify its beneficiaries.
- d. Are future stages of this development including development on any outlots planned or likely to happen?  Yes  No  
If yes, briefly describe future stages, relationship to present project, timeline and plans for environmental review.
- e. Is this project a subsequent stage of an earlier project?  Yes  No  
If yes, briefly describe the past development, timeline and any past environmental review.

***AUAR Guidelines:** Instead of the information called for on the form, the description section of an AUAR should include the following elements for each major development scenario:*

- 6a. Anticipated types and intensity (density) of residential land and commercial/warehouse/light industrial development throughout the AUAR area
- 6b. Infrastructure planned to serve the development (roads, sewers, water, stormwater system, etc.). Roadways are intended primarily to serve as adjoining land uses within an AUAR area are normally expected to be reviewed as part of an AUAR. More arterial types of roadways that would cross an AUAR area are an optional inclusion in the AUAR analysis; if they are to be included, a more intensive level of review, generally including an analysis of alternative routes, is necessary
- 6c. Information about the anticipated staging of various developments, to the extent known, and of the infrastructure, and how the infrastructure staging will influence the development schedule.

***Important Note:** Every AUAR document MUST review one or more development scenarios based on and consistent with the RGU's Comprehensive Plan in effect when the AUAR is officially ordered. (This is equivalent to reviewing the "No-build" alternative in an EIS.) If an RGU expects to amend its existing Comprehensive Plan, it has the options of deferring the start of the AUAR until after adopting the amended plan or reviewing developments based on both the existing and amended comprehensive plans; however, it cannot review only a development based on an expected amendment to the existing plan. Also, the rules require that one or more development scenarios analyzed must be consistent with known development plans of property owners within the AUAR area.*

*6a. Anticipated types and intensity (density) of residential land and commercial/warehouse/light industrial development throughout the AUAR area*

This AUAR assesses the potential environmental impacts of four development scenarios. Three scenarios are based on the Village Master Plan accepted by the City Council in April 2007 (Scenarios A – 600 residential units, B – 1,000 residential units, and C – 1,600 residential units) and one scenario is based on the Comprehensive Plan (Scenario D - 906 units). Each of the scenarios includes 300,000 ft<sup>2</sup> of commercial space (neighborhood-scale retail), 150,000 ft<sup>2</sup> of office space, and 200,000 ft<sup>2</sup> of institutional space (YMCA, library, city hall).

**THE VILLAGE MASTER PLAN – AUAR SCENARIOS A, B, AND C**

The Village Master Plan (“Master Plan”) began as a mechanism to accommodate some of the future sewered growth required by the Metropolitan Council as part of the 2005 Memorandum of Understanding (MOU) and Comprehensive Plan. It is the foundation for three of the development scenarios, and was prepared by Engstrom and Close Landscape Architects from August, 2005 through April, 2007.

The plan was developed around 13 land use principles summarized: 1) provoke a sense of place, 2) balance the natural and built systems, 3) broaden the mix of local goods and services, 4) provide a variety of housing choices, 5) invest in quality public space, 6) preserve and enhance natural and cultural resources, 7) improve connectivity, 8) build partnerships, 9) foster public safety, 10) forward a vision that can be implemented, 11) become a great model, 12) lead by design, and 13) minimize the impact on existing residences and businesses. The complete text of the land use principles is located in Appendix C.

The Village planning team met with community members and major property owners and hosted public open houses to receive input to the plan as well as studied the related land characteristics and future uses to fit these needs. The City Council accepted the Master Plan composite land use map and the guiding principles in April 2007.

The Master Plan composite land use map is shown on Figure 6-1. According to the Master Plan, it forwards a vision that places new development within a green framework of parks, trails, and open space. The composite land use map provides for residential neighborhoods that are located close to both convenience shopping areas and various amenities (parks, restaurants, public spaces). Mixing uses within neighborhoods adds to variety and interest and responds to the growing demand for housing choices, life without the automobile, and a desire to be close to daily needs and activity centers. Residential neighborhoods may include a mix of housing types, with more compact development patterns in the Village core. Table 6-1 includes a description of

the potential development opportunities associated with each land use category included in the composite land use map.

**Table 6-1**  
**Village Master Plan Composite Land Use Map – Potential Development Opportunities**

<b>Land Use Category</b>	<b>Acres</b>	<b>Potential Development Opportunities</b>
Potential Future Redevelopment (Existing Developed Parcels)	44.5	Apartments/Condos, Neighborhood Retail, Housing Over Retail, Office
New Mixed Use Development	72.5	Apartments/Condos, Townhomes, and Small Lot Single Family. Commercial and Office Node (along TH 5 near 39th St.)
New Civic/Institutional Development	16.5	City Hall, Community Campus (family service center, library, wellness center, art center), New schools
New Residential Development	308.6	Variety of single family detached lot sizes, Townhomes
Existing Old Village City Fabric (Built Area)	154.2	Represents the portions of the Village that are not identified for future redevelopment
Buffer Zone/Open Space, New Parks/Open Space, Existing Parks/Open Space, Horse Farm, and Existing Old Village City Fabric (Open Space)	532.2	Active and passive recreational opportunities
Open Water	62.0	Active and passive recreational opportunities
Right of Way (existing)	84.0	Road maintenance and improvement projects

The only difference between the three scenarios based on the Village Master Plan is in the number of residential housing units (Scenarios A – 600 residential units, B – 1,000 residential units, and C – 1,600 residential units). All other development assumptions are the same between the scenarios (e.g., parks, open space, commercial, office, and institutional uses). A development scenario description is included in Table 6-2 and displayed on Figure 6-1.

**Table 6-2  
Village Master Plan Development Scenarios Description (Scenarios A, B, and C)**

Composite Land Use Plan	Scenario A	Scenario B	Scenario C	Source:
Parks and Open Space (current and future)	47%	47%	47%	Village Master Plan prepared by Engstrom and Close Landscape Architects
Existing Village Built Area	14%	14%	14%	Village Master Plan
New Commercial/Institutional	7%	7%	7%	Village Master Plan
<ul style="list-style-type: none"> <li>• New Commercial</li> </ul>	300,000 ft <sup>2</sup>	300,000 ft <sup>2</sup>	300,000 ft <sup>2</sup>	Close Landscape Architects
<ul style="list-style-type: none"> <li>• New Office</li> </ul>	150,000 ft <sup>2</sup>	150,000 ft <sup>2</sup>	150,000 ft <sup>2</sup>	Close Landscape Architects
<ul style="list-style-type: none"> <li>• New Institutional</li> </ul>	200,000 ft <sup>2</sup>	200,000 ft <sup>2</sup>	200,000 ft <sup>2</sup>	Close Landscape Architects
New residential	32%	32%	32%	Village Master Plan
<ul style="list-style-type: none"> <li>• New Housing</li> </ul>	600 units (B)	1,000 units (B)	1,600 units (B)	(A) Comp plan  (B) Village Master Plan

#### **COMPREHENSIVE PLAN – AUAR SCENARIO D**

This future land use plan has been effectively replaced by the vision presented in the Village Master Plan for future development of the Village regardless of how many new housing units are part of the future development. Nevertheless, under the EQB's AUAR regulations, the city's comprehensive plan is a required scenario to be studied. The city attorney has determined the number of new housing units required in the comprehensive plan for the Village is 906 new units due to the number of actual existing housing units (Appendix D). This number is required to be used in evaluating the comprehensive plan impacts. However, the implementation of any new development scenario based on the Village Master Plan will require amending the comprehensive plan.

The city's adopted future land use plan is shown in Figure 6-2. This plan provides for low density housing located east of Reid Park between 30<sup>th</sup> Street and the railroad tracks, a high density residential area located at the former lumberyard site, medium density and mixed use centered along Stillwater Blvd (TH 5), public space east of the new residential areas, and a green belt surrounding the existing and proposed built portions of the village. Table 6-3 includes a more detailed description of Scenario D.

**Table 6-3**  
**Comprehensive Plan Scenario Description (Scenario D)**

<b>Village Future Land Use Designation</b>	<b>Acres</b>	<b>Housing Units</b>	<b>Commercial/Office (ft<sup>2</sup>)</b>	<b>Institutional (ft<sup>2</sup>)</b>
Village Residential High Density (VR/HD)	7	102	-	-
Village Residential Low Density (VR/LD)	77	339	-	-
Village Residential Mixed Use/Medium Density (VR MU/MD)	45	465	450,000	
Village Residential Mixed Use/Medium Density (VR MU/MD)	41			
Village Residential Public/Semi Public (VR P/S)	43	-	-	200,000
Village Residential Green Belt (VR GB)	717	-	-	-
Open Water	62			
Right of Way	84			
No designation (existing Village Area) <sup>2</sup>	199	-	-	-
<b>Total</b>	<b>1,275</b>	<b>906</b>	<b>450,000</b>	<b>200,000</b>

<sup>1</sup> Refers to the "white" areas on the Village Area Future Land Use Map

#### DEVELOPMENT SCENARIO COMPARISON

A comparison of the four development scenarios is provided in Table 6-4. The table provides a summary of the residential units, square feet of non-residential uses, and the percent of the Village that would accommodate the proposed uses.

**Table 6-4**  
**AUAR Development Scenario Comparison**

<b>Land Use Type</b>	<b>Scenario A</b>	<b>Scenario B</b>	<b>Scenario C</b>	<b>Scenario D</b>
Parks and Open Space	47%	47%	47%	64%
New Residential	32%	32%	32%	11%
• New Housing	600 units	1,000 units	1,600 units	906 units
New Commercial/Institutional	7%	7%	7%	7%
• New Commercial	300,000 ft <sup>2</sup>	300,000 ft <sup>2</sup>	300,000 ft <sup>2</sup>	300,000 ft <sup>2</sup>
• New Office	150,000 ft <sup>2</sup>	150,000 ft <sup>2</sup>	150,000 ft <sup>2</sup>	150,000 ft <sup>2</sup>
• New Institutional	200,000 ft <sup>2</sup>	200,000 ft <sup>2</sup>	200,000 ft <sup>2</sup>	200,000 ft <sup>2</sup>
Existing Village Built Area	14%	14%	14%	18%

*6b. Infrastructure planned to serve the development (roads, sewers, water, stormwater system, etc.). Roadways are intended primarily to serve as adjoining land uses within an AUAR area are normally expected to be reviewed as part of an AUAR. More arterial types of roadways that would cross an AUAR area are an optional inclusion in the AUAR analysis; if they are to be included, a more intensive level of review, generally including an analysis of alternative routes, is necessary*

The current infrastructure planned to serve existing and new development in the AUAR area is based on the following plans and studies:

1. 2030 Comprehensive Plan (2005) - which includes infrastructure plans for sanitary sewer, water supply, surface water, and transportation
2. 2004 Downtown Area Flooding Analysis (2004)
3. Old Village Study Area Comprehensive Water System Plan (2004)
4. Comprehensive Park and Recreation Plan (2008)

If future development occurs as proposed under Development Scenarios A, B, C, or D, new utilities, roads and other infrastructure will be needed to serve the AUAR area. This AUAR identifies the infrastructure needed to support the four development scenarios. Infrastructure needs are discussed in greater detail under AUAR Items 13 - Water, Item 17 – Surface Water, Item 18 - Wastewater, and Item 21-Traffic. Item 28 – Impact on Infrastructure and Public Services provides a summary of the new infrastructure that would be needed and where appropriate, provide comparisons between the scenarios.

6c. Information about the anticipated staging of various developments, to the extent known, and of the infrastructure, and how the infrastructure staging will influence the development schedule.

Essentially, three elements are involved in the Village Development process. 1) land use planning including the AUAR, 2) engineering and 3) financial planning. Table 6-5 provides a **tentative timeline** for the Village planning and development. Any future step may be shorter or longer. This process assumes that the city is in the position of managing the development rather than reacting to development proposals that developers submit for city consideration and approval. The timelines in the MOU are being met as efficiently as possible given the housing market and the local decision making steps necessary to accomplish the goals.

**Table 6-5  
Tentative Timeline - Village Development Process**

January 2005	2005 – 2006	2006 to April 2007	Spring, Summer 2007	April 2007 to date	Fall, 2007	Feb, March 2008	April 1, 2008	April 2009
Memo of understanding w Metro Council	Comp plan	Develop and accept Village Master Plan	I-94 to 30 <sup>th</sup> Street forcemain sewer project design	AUAR process underway	Financial feasibility analysis of sewer system demonstrates feasible	AUAR Development Scenarios	Order AUAR	Complete AUAR /adopt mitigation plans for the scenarios

May to June 2009	Summer 2009	Fall, Winter 2009	Fall, Winter 2009	Fall, Winter 2009	Fall, Winter 2009
Financial Analyses of Development Scenarios to determine costs of each development scenario. Including the mitigation, amenities and infrastructure costs to be born by developers.	Select a development scenario that meets environmental, financial and the land use planning principles in the Village Master Plan	Develop and adopt financial policies for paying for development – focus on policies for new development but make sure the fiscal system is feasible into the future and not isolated	Develop and adopt a Village comprehensive plan amendment to reflect the chosen development scenario	Develop and adopt Village zoning code and subdivision requirements and design elements to reflect selected development scenario	Develop capital improvement plan for the timing of public improvements for the long term implementation and the financing of public improvements and amenities

Fall 2009 (1)	December 2009 (1)	March 2010 (1)	2010	2010	2010	2010 and beyond
Get formal developer commitment to provide financial guarantees for sewer to the Village and new development according to the plan.	Order forcemain to the Village to serve new development, if financial commitments are made up front and housing market will support the cost of construction.	Begin construction of forcemain to the Village.	Negotiate development agreements with developers for new development	Develop infrastructure to support development in new Village as part of developer's responsibility.	Begin new Village development along the east side of the Village	Revisit fiscal policies, annually revisit the capital improvement plan for timing future public improvements and revisit land use controls through zoning when needed to clarify and improve

(1) This is subject to change depending upon the developers' ability to pay up front for the infrastructure and guarantee housing market to cover costs.

The staging of potential development projects within the AUAR area is unknown at this time. The city has not received any development project applications.

**7. Project Magnitude Data (See Table 7-1 below)**

Total Project Acreage: \_\_  
 Number of residential units: \_\_\_\_ unattached \_\_\_\_ attached  
 Commercial, industrial or institutional building area (gross floor space): total square feet \_\_\_\_  
 Indicate areas of specific uses (in gross square feet):  
 Office: \_\_\_\_\_ Manufacturing: \_\_\_\_\_  
 Retail: \_\_\_\_\_ Other Industrial: \_\_\_\_\_  
 Warehouse: \_\_\_\_\_ Institutional: \_\_\_\_\_  
 Light Industrial: \_\_\_\_\_ Agricultural: \_\_\_\_\_  
 Other Commercial (specify): \_\_\_\_\_  
 Building Height \_\_\_\_\_. If over two stories, compare to heights of nearby buildings.

*AUAR Guidelines: No changes from the EAW form, except that the information should be given for each major development scenario.*

**Table 7-1: Project Magnitude Data**

Project Magnitude Data	Scenario			
	A	B	C	D
Total Project Area	1,275 acres	1,275 acres	1,275 acres	1,275 acres
Total Residential Units	600 units	1000 units	1600 units	906 units
• Unattached Residential Units	600 units	475 units	707 units	339 units
• Attached Residential Units	0 units	525 units	893 units	567 units
Total Commercial, Office, Institutional Space	650,000 ft <sup>2</sup>	650,000 ft <sup>2</sup>	650,000 ft <sup>2</sup>	650,000 ft <sup>2</sup>
• Commercial Space	300,000 ft <sup>2</sup>	300,000 ft <sup>2</sup>	300,000 ft <sup>2</sup>	300,000 ft <sup>2</sup>
• Office Space	150,000 ft <sup>2</sup>	150,000 ft <sup>2</sup>	150,000 ft <sup>2</sup>	150,000 ft <sup>2</sup>
• Institutional Space	200,000 ft <sup>2</sup>	200,000 ft <sup>2</sup>	200,000 ft <sup>2</sup>	200,000 ft <sup>2</sup>

**BUILDING HEIGHTS**

No specific development plans have been submitted for review. Therefore, there are no known proposed building heights to review through this AUAR. City ordinances currently limit the height of all buildings to 35 feet, except for barns, silos, other farm structures, utility transmission services, and transmission towers of public broadcast stations (Lake Elmo Zoning Code Section 154.03). Two zoning districts allow greater heights: the Public and Quasi-Public Open Space (PF) District allows a maximum of 50 feet and the Business Park (BP) District allows a maximum of 60 feet. The existing Village contains buildings that range in height from 1 to 3 stories. The Village Master Plan did not anticipate buildings taller than three stories.

Portions of the AUAR area are located within the safety zones of the Lake Elmo Airport and the Village Master Plan took these into account. The city, through a Joint Airport Zoning Board (JAZB), will prepare an updated airport zoning ordinance that will include building height restrictions necessary within the airport safety zones. The existing and proposed height restrictions are shown on Figures 9-3 and 9-4.

**MITIGATION SUMMARY**

The city will work with a JAZB to prepare an updated airport zoning ordinance. The city will create design principles to address the scale and height of new development in the Village.

8. **Permits and Approvals Required:** List all known local, state, and federal permits, approvals, and financial assistance for the project. Include modifications of any existing permits, governmental review of plans and all direct and indirect forms of public financial assistance, including bond guarantees, Tax Increment Financing and infrastructure. *All of these final decisions are prohibited until all appropriate environmental review has been completed. See Minnesota Rules Chapter 4410.3100.*

*AUAR Guidelines: A listing of major approvals (including any comprehensive plan amendments and zoning amendments) and public financial assistance and infrastructure likely to be required by the anticipated types of development projects should be given for each development scenario. This list will help orient reviewers to the regulatory framework that will protect environmental resources. The list can also serve as a starting point for the development of the implementation aspects of the mitigation plan to be developed as part of the AUAR.*

### MAJOR PERMITS AND APPROVALS

Major permits and approvals likely to be required by the anticipated types of development projects are listed in Table 8-1. Depending on the type of project, the applicant for each permit or approval will vary - applicants may be developers, property owners, or the city. For example, a municipality is required to apply for and obtain the Sewer Permit to Connect from the Metropolitan Council for connection to a Metropolitan Council interceptor and the regional system. Connections needed by developers and homeowners would be covered under the permit received by the municipality and would not need an additional permit from the Metropolitan Council to connect.

On the other hand, the Sewer Extension Permit from the MPCA must be applied for and obtained by the municipality for connection to the regional sanitary system (interceptor), and also by developers and homeowners for connection to the municipal system. Additional information is provided in Item 18 regarding sanitary sewer permits.

**Table 8-1**  
**Major Permits and Approvals**

Unit of Government	Type of Application
United States Army Corps of Engineers	Section 404 Permit
	Letter of No Wetland Jurisdiction
Federal Aviation Administration	Notice of Construction Alternation (Form 7460-1A) and determination of no hazard for construction in excess of allowed heights in the forthcoming airport ordinance
Minnesota Pollution Control Agency	National Pollutant Discharge Elimination Systems (NPDES) Permit/General Stormwater Construction Permit
	Sewer Extension Permit
	MS-4 permit amendment, if needed
	CWA Section 401 Water Quality Certification
	Future review and permitting pending US EPA approval of Lake St Croix and Lake Pepin TMDL Implementation Plans
Minnesota Department of Transportation	Permit for work in State Highway right-of-way, if proposed
	Right-of-way access permit, if proposed
Minnesota Department of Natural Resources	Water Appropriation Permit for new municipal well, if needed
	Temporary Water Appropriation Permit for construction dewatering
	Public Waters Work Permit (for work within a DNR Public Water)

Unit of Government	Type of Application
	Water Appropriation Permit (#1961-1031) Modification, to increase usage beyond the permitted amount (60 mg/yr.)
Minnesota Department of Health	Permit for new municipal water well
	Permit to abandon and seal private wells, if necessary
	Permit for watermain construction
Washington County Highway Department	Utility Permit to install utilities within County road right-of- ways
	Permit to work in County roadways
	Permit for new accesses to County roadways, if proposed
Valley Branch Watershed District (VBWD)	Development Review and Approval/Permitting – land alterations, impervious surface creation, work below the established 100-year flood level, discharge of municipal or industrial water or wastewater to a surface water drainage system, erosion control plan, grading plan, stormwater management plan, landscape/vegetation plan, etc.
	Wetland Delineation Boundary Confirmation
	Permit for wetland impacts under Minnesota Wetland Conservation Act
	Certificate of Wetland Exemption for temporary impacts due to linear utility extensions
Metropolitan Council	Sewer Permit to Connect
	Comprehensive Plan Updates and Amendments
City of Lake Elmo	Comprehensive Plan Updates and Amendments
	Rezoning
	Conditional Use Permit
	Preliminary Plat
	Site Plan Review
	PUD
	Park Dedication
	Final Plat
	Sign Permit
	Developer Agreements
	Building Plan Review
	Design Guidelines, if adopted
	Utility permit for work in road right-of-ways
	Building permit
	Excavation and grading permit if moving more than 50 cu yds of material not in conjunction with a building permit
	Driveway permit
	Fence permit, if proposed
	Certificate of occupancy
Other permits, as required	

All required permits and approval will be obtained. Any necessary permits or approvals that are not listed in Table 8-1 were unintentionally omitted, and some listed may not be necessary.

**PUBLIC FINANCIAL ASSISTANCE**

The city has no plans for providing for public financial assistance to developers. The Village Master Plan discusses providing opportunities for housing for disabled adults in the Village area. How this will be financially implemented has not been determined.

**INFRASTRUCTURE**

The city's adopted Comprehensive Plan is based, in part, upon a Memorandum of Understanding (MOU) with the Metropolitan Council dated January, 2005. The MOU and plan identify the provision of sewer service through the MCES to the Village area and to the area between I-94 and 10<sup>th</sup> Street. The Comprehensive Plan includes plans for the provision of sanitary sewer, municipal water, surface water management and roads to the Village area. To implement the Village portion of the comprehensive plan the city undertook a Master Plan and a financial feasibility study of providing sewer service to the city as a whole and the Village in particular in 2007. The city has not yet adopted fiscal policies for the provision of sewer to the Village. The AUAR will provide important information on the environmental mitigation for the various scenarios for the city to use in making its future decision on development.

9. Land Use. Describe the current and recent past land use and development on the site and on adjacent lands. Discuss the compatibility of the project with adjacent and nearby land uses; indicate whether any potential conflicts involve environmental matters. Identify any potential environmental hazard due to past land uses, such as soil contamination or abandoned storage tanks.

*AUAR Guidelines: No changes from the EAW form*

#### **EXISTING LAND USE – AUAR AREA**

The 2005 existing land use map (Figure 9-1) details the Village AUAR area. The Village AUAR area is located along the eastern edge of Lake Elmo about midway between its southern border along I-94 and its northern border along Highway 36. The border is roughly defined by the road alignments of Washing County Road 15 to the east (Manning Avenue), 30<sup>th</sup> Street North to the south, Kimbro Avenue to the west and 45<sup>th</sup> Street North to the north. These roads are just reference points for the boundary; they do not necessarily extend along the entire boundary. Minnesota Highway 5 bi-sects the middle of the Village area from east to west. The existing downtown makes up the central part of the Village along the area around Lake Elmo Avenue. This area includes retail services, a post office, fire station one and a library. In the area just to the north of the downtown and north of Highway 5 is the city hall and Lake Elmo Elementary School. The area to the south of the downtown is primarily single family residential. The remaining land use is primarily agricultural.

**Table 9-1**  
**Existing Land Use – AUAR area**

<b>Existing Land Use</b>	<b>Gross Acres</b>	<b>Net Acres</b>
Agricultural	691	683
Farmstead	13	13
Single Family Detached	123	122
Single Family Attached	1	1
Retail and Other Commercial	45	45
Industrial and Utility	5	5
Institutional	17	17
Open Space	21	21
Undeveloped	175	168
Park, Recreational or Preserve	36	33
Right-of-Way	84	84
Open Water	62	62
NWI Wetland		21
<b>Total AUAR Area</b>	<b>1,275</b>	<b>1,275</b>

Source: Metropolitan Council as updated by Bonestroo

#### **LAND USE COMPATIBILITY – AUAR AREA**

The Master Plan addresses the future compatibility between the existing Village and the proposed new development through thirteen principles, which is intended to build on the existing Village's strengths. Many of the Master Plan's thirteen guiding principles address potential land use compatibility issues between the existing residences and business and the new development or redevelopment opportunities supported by the Master Plan composite land use map. It has been the intent of the planning process and it remains critical that the city follow the Master Plan principles when it prepares the Comprehensive Plan

update and creates its official controls through zoning, subdivision and other regulations to ensure land use compatibility. Examples include adopting building setbacks, screening, landscaping, light pollution, buffers, heights limits, architectural controls and design.

The thirteen principles summarized are: 1) provoke a sense of place, 2) balance the natural and built systems, 3) broaden the mix of local goods and services, 4) provide a variety of housing choices, 5) invest in quality public space, 6) preserve and enhance natural and cultural resources, 7) improve connectivity, 8) build partnerships, 9) foster public safety, 10) forward a vision that can be implemented, 11) become a great model, 12) lead by design, and 13) minimize the impact on existing residences and businesses. The complete text of the land use principles is located in Appendix C.

#### **EXISTING LAND USE – SURROUNDING AREAS**

Southwest of the AUAR area is the Lake Elmo Regional Park Reserve. To the south of the AUAR area is a neighborhood consisting of mainly single-family homes. To the northeast of the AUAR area is a gas station, a single commercial property. East of the AUAR area is the Lake Elmo Airport and the Washington County Fairgrounds, which are located in Baytown Township. The rest of the AUAR area is bounded by agricultural and large-lot residential uses. To the north of the AUAR area are Little Bluestem and Fields of St. Croix neighborhoods.

#### **LAND USE COMPATIBILITY – SURROUNDING AREAS**

##### **Existing Residential Development**

The edge of the Village is a green buffer in all four development scenarios. The buffer is intended to capture the development patterns that are established in the existing conservation developments and to maintain the character of the community with the additional development. It will also create some continuity between the Village area that is newly developed and the surrounding conservation, larger lot and agricultural uses on the edge of the Village. Specific details related to the design (length, width, location, character/purpose (land use buffer, land use screen, environmentally sensitive area conservation, stormwater management, etc.) habitat (type of wildlife habitat being conserved or restored), and the land use mechanisms for reserving the green belt buffer will continue to be addressed as the Village development process continues. This AUAR proposes many recommendations regarding the greenbelt buffer. The area will be officially addressed as part of the city's Comprehensive Plan Update.

##### **Lake Elmo Regional Park Reserve**

All scenarios propose to locate the greenbelt/buffer adjacent to the Regional Park Reserve. No land use compatibility issues are anticipated.

##### **Lake Elmo Airport**

The Lake Elmo Airport is located adjacent to the AUAR area and portions of its safety zones (see Figure 9-1) and noise contours/impact areas (see Figure 24-1) are located within the AUAR area. All scenarios propose to locate the greenbelt/buffer alongside TH 15, which provides a buffer from future development in the AUAR area to the airport. Scenarios A, B, and C propose to locate residential uses and open space within the safety zones and noise contours/impact areas. The majority of the land within the safety zones and noise contours/impact areas is guided greenbelt in Scenario D and only a small portion of safety zone B includes residential uses. No development will be allowed within the Runway Protection Zone (RPZ).

The State of Minnesota Department of Transportation (Mn/DOT) has established regulations that control the type of development allowed off runway ends in order to prevent incompatible development. These guidelines should be used to establish zoning ordinances to protect areas around an airport. The states zoning areas overlay and extend beyond the RPZs which are defined by FAA. The most restrictive areas

created by Mn/DOT regulations are called State Safety Zones A and B. The recommended safety zones should exist off each runway end and follow the approach zones out to the total length of the respective runway. The length of Safety Zone A is 2/3 of the total runway length; Safety Zone B is 1/3 of the total runway length and extends from Safety Zone A. There is also an area called Safety Zone C which is circular and typically follows the FAA's FAR Part 77 horizontal surface.

Safety Zone A does not allow any buildings or temporary structures, places of public assembly or transmission lines. Permitted uses include agriculture, livestock, cemeteries and auto parking areas.

Safety Zone B does not allow places of public or semipublic assembly (i.e. churches, hospitals, schools) and is subject to site-to-building area ratios and site population limits. Permitted uses are generally the same as Zone A, plus some low-density developments.

Safety Zone C does not allow use that causes interference with radio or electronic facilities on the airport or interference with radio or electronic communications between the airport and aircraft, lighting that makes it difficult for pilots to distinguish between airport lights and other lights or that results in glare in pilot's eyes, and lighting that impairs visibility in the airport vicinity.

A complete description and copy of the Minnesota Rules Chapter 8800 Department of Transportation Aeronautics Section 2400 Airport Zoning Standards can be found at <http://www.dot.state.mn.us/aero/avoffice/planning/zoning.html>.

Land use compatibility with airports is addressed in the Metropolitan Council's land use compatibility guidelines for aircraft noise and state airport safety zone regulations. It is noted that information regarding airport noise and land use compatibility is further discussed in response to AUAR Item 24 – Noise.

The safety zones defined by Mn/DOT are shown on Figures 9-1 and 9-2. The existing and proposed height restrictions are shown on Figures 9-3 and 9-4. Any future development proposed to be located within the safety zones and noise contours/impact areas will be subject to the development restrictions within each safety zone (e.g., land use type, building/structure height) and noise contours (e.g., land use type, structural requirements for minimizing noise impacts) established by state statute and the city.

To minimize land use compatibility issues with the airport, the city will work with a Joint Airport Zoning Board (JAZB) to prepare an airport zoning ordinance prior to new development occurring within or near the safety zones and updated noise contours. According to MAC, the JAZB will be comprised of two representatives each from Lake Elmo, Baytown Township, West Lakeland Township, Washington County, and MAC. The JAZB will determine the future safety zones; therefore, the draft safety zones displayed on figures in this AUAR may change.

The Lake Elmo Airport is included in the MAC Capital Improvement Program (CIP) for expansion of a runway. The runway expansion does not impact the safety zones or height restrictions within the Village AUAR area. However, the safety zones may change based on the ordinance prepared by and adopted by the Joint Airport Zoning Board. The existing and proposed height restrictions associated with the Lake Elmo Airport are shown on Figures 9-3 and 9-4.

According to the FAA, the location of stormwater management features that attract waterfowl should be discouraged within the safety zones and within 5,000 feet of the Lake Elmo Airport as waterfowl pose a safety hazard to aircraft. Large stormwater ponds with mowed grass buffers provide optimal habitat for waterfowl and should not be located within or near the safety zones. The majority of the soils within the

safety zones are appropriate for stormwater infiltration best management practices (BMPs) that are more appropriate stormwater management strategies than large regional ponds within the airport zones. The city should consult with MAC regarding wildlife habitat protection, creation, or restoration in the AUAR area to minimize potentially hazardous wildlife attractants. For example, any ponds or created wetlands within the AUAR area should be designed to be non-attractive to waterfowl and designed with emergent vegetation to minimize use by waterfowl.

#### **PIPELINES**

A 24-inch Northern Natural Gas pipeline traverses the AUAR area north-south approximately a quarter mile west of the eastern boundary of the AUAR area (see Figure 9-1). Outside of the AUAR area and just south of 50<sup>th</sup> Street North an 8-inch gas line branches off and heads east towards the southern end of Bayport. (Source: Protected Waters and Wetlands Map for Washington County, Sheet 1 of 2. 1985. MN DNR Division of Waters. )

A Northern Natural Gas utility station is located within the AUAR area south of the railroad line.

Northern Natural Gas is proposing to extend a new natural gas pipeline through the AUAR area along the same route as the existing pipeline. The project is part of a larger project called the Northern Lights Expansion Project. The phase that is proposed for construction in Washington County (including Lake Elmo) is called the Riverside C-Line Extension and is part of the Northern Lights 2009-2010 Zone EF Expansion. Construction of the project is planned to start May 2009 and is anticipated to be in service November 1, 2009.

#### **POTENTIAL ENVIRONMENTAL HAZARDS**

Information received from Environmental Data Resources, Incorporated (EDR) June 18, 2007 was used to assess the presence of potential environmental hazards such as registered underground and aboveground storage tanks (USTs and ASTs), hazardous waste generators currently existing within the AUAR area, and the occurrence of past spills or releases. The EDR report identified several sites of potential concern within and near the AUAR area (see Figure 9-2):

- 5 leaking underground storage tank (LUST) sites (*4 of these have been issued closure by the MPCA*)
- 1 leaking aboveground storage tank (LAST) site (*closure was issued by the MPCA*)
- 2 spill sites (*information regarding closure not provided*)
- 1 VIC site (*investigation in progress*)
- 1 SHWS site (*remediation and monitoring in progress*)
- 10 underground storage tank (UST) sites
- 2 aboveground storage tank (AST) sites
- 1 clandestine drug lab (CDL) site
- 2 sites that are required to submit a chemical inventory report (Tier 2)
- 1 permitted air facility (AIRS)
- 14 small quantity hazardous waste generator (SQG) sites

Of these sites, the LUST, LAST, Spill, VIC and SHWS sites are sites where a release of petroleum product or other chemical substance is documented to have occurred; these sites are summarized in the Tables 9-1 and 9-2. Four of the LUST sites and the LAST site have been issued closure by the MPCA. The MPCA issues closure to sites it determines no longer present a threat to human health or the environment.

Descriptions of the databases in which properties within or near the AUAR area are identified are provided below.

*LUST – Leaking Underground Storage Tanks.* Inventory of reported leaking underground storage tank incidents.

*LAST – Leaking Aboveground Storage Tanks.* A listing of leaking aboveground storage tanks.

*SPILL – Spills database.* Spills reported to the Minnesota Pollution Control Agency.

*VIC – Voluntary Investigation and Cleanup Program.* The VIC Program was created because in the 1980s many businesses and government organizations became unwilling to develop property with known or suspected environmental contamination. They were concerned that by purchasing property or disturbing contamination during property development, they could become liable under state or federal [Superfund](#) laws for cleanup costs, even though they were not originally responsible for the wastes.

Under the [Land Recycling Act of 1992](#), persons who are not otherwise responsible for a contamination problem may be eligible for future liability protection when they voluntarily undertake an investigation and, if necessary, cleanup action approved by the MPCA through the VIC Program. This process allows property transactions to move forward quickly, but it also helps promote redevelopment of contaminated property, mitigate health or environmental risks posed by wastes on these properties, and benefits communities by bringing new development, jobs, and tax base to old industrial zones.

Under the Land Recycling Act, future liability protection is usually available to eligible parties (including lenders and purchasers of property) when response actions approved by the MPCA Commissioner are conducted by property owners who may be responsible persons as defined by the [Minnesota Superfund law](#). These property owners may request assistance from the MPCA in anticipation of future property transactions, to obtain financing or simply to avoid the high costs associated with investigating and cleaning up property under the Superfund enforcement process.

Property owners not currently interested in selling or developing property may also voluntarily investigate and clean up property with assistance from the MPCA. Property owners may request assistance from the MPCA in anticipation of future property transactions, to obtain financing or simply avoid being required to investigate and clean up property under the Superfund enforcement process.

*SHWS – Site Remediation System (SRS) Database.* The SRS database includes all sites that the State Superfund Program is dealing with or has dealt with. The Superfund Program identifies, investigates, and determines appropriate cleanup plans for abandoned or uncontrolled hazardous waste sites where a release or potential release of a hazardous substance poses a risk to human health or the environment.

*UST – Underground Storage Tank Database.* Includes records of registered underground storage tanks. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program.

*AST – Aboveground Storage Tanks.* Registered Aboveground Storage tanks.

*CDL – clandestine drug labs – RE Federal database listing:* web site provided by Department of Justice (DOJ) as a public service. Contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of entries in the database is not the DOJ, and the DOJ has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

*RE State database listing:* Data is passively gathered – the MN Department of Health (MDH) requests law enforcement and other agencies to notify them of clandestine drug labs, but they do not require the reporting of events. Therefore the data likely represents a subset of all CDLs. The data has not been verified. The MDH has no knowledge if the CDL was involved in cooking or just consisted of chemicals associated with Meth production. The reports they receive are that a suspected CDL was seized.

*TIER 2* – Listing of facilities which store or manufacture hazardous materials that submit a chemical inventory report.

*AIRS – Permit Contact List.* Listing of permitted AIRS facilities.

*SQG – Small Quantity Hazardous Waste Generator* – generate between 100 kg and 1000 kg of hazardous waste per month Regulated under the Resource Conservation and Recovery Act (RCRA) of 1976.

*MN LS – List of Sites.* Includes: CERCLIS (Comprehensive Environmental Response, Compensation, and Liability Information System), NFRAP (No Further Remedial Action Planned), NPL (National Priorities List), PLP (Permanent List of Priorities), DPLP (sites delisted from the Permanent List of Priorities), HW PERM (Hazardous Waste Permit Unit Project Facilities), SW PERM (List of Permitted Solid Waste Facilities), METRO (1980 Metropolitan Area Waste Disposal Inventory), ODI (1980 Statewide Outstate Dump Inventory), VIC (Voluntary and Investigation Program), and LCP (Closed Landfill Sites Undergoing Cleanup).

*INST Control – Sites with Institutional Controls in place;* institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

*FINDS – Facility Index System/Facility Registry System maintained by the EPA.* EPA's Facility Index System (FINDS) is a data base of facility identification data maintained by the EPA. Facility identification data maintained by each program office data base are consolidated in FINDS and an attempt is made to reconcile discrepancies. The database contains both facility information and “pointers” to other sources that contain more detail. EDR includes the following FINDS databases in their report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

## Release Sites

Release sites in and near the AUAR area are listed below in Tables 9-2 and 9-3.

**Table 9-2**  
**Release Sites within the AUAR Area**

*Site Number	Site Name	Location	Potential Concern	Status
6	Brookman Motor Sales Inc	11144 Stillwater Blvd	LUST - release of used oil, fuel oil 1 and 2 discovered 11/16/93	Site closure issued 5/8/96
8	St Croix Sensory	3549 Lake Elmo Ave N	LUST – release from a UST discovered 11/16/2006	Closure has not been issued.
12	Lake Elmo Bulk Plant	11040 Upper 33 <sup>rd</sup> St N	LAST – release of unleaded gasoline and fuel oil 1 and 2 discovered 11/11/2003; contaminated soils remain.	Site closure issued 7/14/2004.
13	DBA Construction	3303 Lake Elmo Ave S	LUST - release of unleaded gasoline and fuel oil 1 and 2 discovered 8/30/98; contaminated soils remain.	Site closure issued 10/23/98
--	Bruggeman – Lake Elmo (Lake Elmo Development Group VIC Site)	SW Intersection of Cty Rd 15 and Hwy	VIC, MN LS, INST Control	Investigation is in progress. See discussion following this table for additional information.**
--	Baytown TWP Groundwater Contamination	Hagberg's Country Market (Site #5)	SHWS (State Superfund)	Remediation is in progress. See below for additional information.

\*corresponds to site numbering in EDR report and Figure 9-2

\*\*According to the property owner, it is not known whether this is a release site. Soil contamination may be exclusively attributable to groundwater contamination migration

### ***Status of Hagberg's County Market and Lake Elmo Development Group (LEDG) VIC Site***

The Hagberg's Country Market (Baytown Superfund Site) is located in the center of the AUAR area, near the southeast intersection of Highway 5 (Stillwater Boulevard) and Layton Avenue. A metal plating shop was previously operated at this location and it is believed that the business owner dumped his wastes down a well. This site is believed to be the origination of the Baytown groundwater contamination plume discussed here, and in Item 19. Remediation is underway to address the contamination and conditions are being monitored (see Item 19 for details).

Information obtained from the MPCA indicates that contaminated groundwater from the former metal plating shop site has migrated beneath the LEDG property, undeveloped land eastward of the Hagberg site. The LEDG site was entered into the VIC program October 15, 2004. Initial work completed at is described in the Initial Subsurface Gas Investigation (10/26/2004), Supplemental Phase II Investigation (12/1/2006), and a Supplemental Phase II Investigation Work Plan (2/1/2007). No Association Determination Letters were issued for the site by the MPCA 11/17/2004 and 11/3/2005. The MPCA indicated that an additional Phase II investigation was conducted at the site, based on the 2/1/2007 work plan, but that the agency has not received a copy of the report or its findings. The first investigation centered around soil gas, and it was discovered that gases from the solvents in the groundwater were detected in the soil as far as at least 12 feet below grade (ground water is approximately 50 feet below grade). Groundwater is impacted, but it does not appear that there is soil contamination; the additional

Phase II work, not yet received, may provide additional information regarding soil contamination. At this time, it appears the main concern is vapors from soil gas.

**Table 9-3**  
**Release Sites adjacent to or near the AUAR Area**

*Site Number	Site Name	Location	Potential Concern	Status
1	Lowell J. Rieks Jr. property	4564 Kimbro Ave N (less than ¼ mile north of AUAR area)	LUST – release discovered 9/8/92	Site closure issued 10/14/93
2	Lake Elmo K	4201 Stillwater Blvd (less than 1/8 mile north/northeast of AUAR area)	LUST – petroleum product release discovered 12/15/88. Groundwater was contaminated, contaminated soils remain, and contamination was documented offsite.	Site closure issued 6/27/01
3	Kunz Oil	Hwy 14 and Hwy 5 (adjacent to northeast corner of AUAR area)	Spill – petroleum product release (dates in report do not appear to be accurate)	A closure date was not listed
14	May Air Express	3275 Manning Ave (adjacent to southeast corner of AUAR area)	Spill – release of 23 gallons of aviation gas (high octane) and 5 gallons of other petroleum product due to plane crash 10/2/97. Soil was excavated and the site was referred to the Voluntary Investigation and Cleanup (VIC) program.	A closure date was not listed

\*corresponds to site numbering in EDR report and Figure 9-2

The CDL site identified by EDR may also be the site of a release, as the CDL database includes properties where law enforcement agencies found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites.

#### **Known Groundwater Contamination Plumes**

In addition to the release sites identified by EDR, two groundwater contamination plumes are known to be present in the area:

- Baytown Groundwater Contamination (TCE)
- Lake Elmo-Oakdale Groundwater Contamination (VOCs, metals, and PFCs)

Contamination associated with these plumes and the work being done to address it is summarized here and under AUAR Item 19.

The first area of groundwater contamination referred to as the Baytown plume is known to originate within the AUAR area boundary. TCE contamination has been documented from a former metal working facility located at the site currently occupied by Hagberg's Country Market. The contamination has impacted all four upper aquifer units: drift, Prairie du Chien, Jordan, and FIG (Franconia-Ironton-

Galesville) aquifers. Based on County Well Index (CWI) information, there are no documented wells completed in the lower Mt. Simon aquifer, so it is unknown whether TCE contamination has also impacted that aquifer. Treatment of the contamination plume has taken a multi-step approach. The first response was to provide well head treatment for private water supply systems that were within the TCE plume. Granular activated carbon (GAC) filters were installed in private water systems within the zone of contamination.

The next steps being undertaken to address the remediation of this contamination were developed by the MPCA in compliance with state and federal Superfund procedures. Following review of the Remedial Investigation and Feasibility Study, a Recommendation of Decision was adopted in December 2007, which incorporated remedial actions to address this contamination. The remedial actions are intended to stop the migration of contamination from the source area and to remediate the TCE contamination. . To this end, four barrier wells were installed in the spring of 2008 to pump the most highly-contaminated water to an air stripper treatment system. The air stripper is designed to remove 99% of the TCE from the treated water, with the resulting discharge expected to be below the current health risk limits for TCE. Pumping of the barrier wells started in March 2008. While the barrier wells are expected to halt migration of the more highly-contaminated portion of the plume, in-situ treatment of the TCE is also being investigated by the Minnesota Pollution Control Agency, as a means to reduce the duration the barrier wells need to be operated and reduce the need for GAC filters on private systems. Pilot studies for in-situ treatment were started in November 2007, with full scale treatment expected to be started by the end of 2008.

A second plume of groundwater contamination originates from multiple landfill and dumping sites in Oakdale and Lake Elmo, outside of the AUAR area. These sites accepted both municipal and industrial wastes in the past. Contamination from these sites consists of volatile organic compounds, metals, and perfluorochemicals (PFCs). At present, contaminants from this plume have not been detected in wells within the AUAR area, even though the special well construction area overlaps with the western third of the AUAR area. PFC contamination, one of the most mobile contaminants from the landfills, has been observed as far east as the intersection of Highway 5 and 31<sup>st</sup> Street. At present, it does not appear the direction of groundwater migration in this area will bring the contaminants any closer to the AUAR area. However, the movement of contaminants within fractured bedrock, such as the Prairie du Chien formation can sometimes travel in directions counter to the natural groundwater gradients. As a result, special well construction areas are often extended beyond the known plume areas into surrounding properties.

#### **Other Potential Environmental Hazard Sites**

The other databases listed previously (above Tables 9-1 and 9-2) include sites that are licensed to handle, store, transport, or generate regulated quantities of hazardous waste, petroleum products, or other chemical substances. These facilities are subject to regular inspection by the County and/or State. These non-release sites identified by EDR within and near the AUAR area are listed below in Tables 9-4 and 9-5 and their locations are shown on Figure 9-2.

**Table 9-4  
Other Potential Environmental Hazard Sites within the AUAR Area**

*Site Number	Site Name	Location	Potential Concern
4	Lake Elmo, City of	3800 Laverne Ave N	FINDS (MN-DELTA - (Minnesota – Permitting, Compliance, and Enforcement Information Management System) facilitates the issuance of permits and manages compliance. City listing in this database is associated with its NPDES Stormwater Permit.)
5	Dental Office Dahl, Kirk	11325 Stillwater Blvd N	SQG, FINDS
5	Hagberg's Country Market	11325 N Stillwater Blvd	UST
6	Lake Elmo Chrysler	11144 Stillwater Blvd N	SQG, FINDS
6	Lake Elmo Repair	11179 Stillwater Blvd N	SQG, FINDS
6	Tessar Dental Centre LLC	11240 Stillwater Blvd N	SQG, FINDS
6	Minnesota Health Lake Elmo	11240 Stillwater Blvd	SQG, FINDS
6	Lake Elmo Oil	11127 Stillwater Blvd	UST
6	Brookman Motor Sales, Inc	11144 Stillwater Blvd N	UST, FINDS
7	Lake Elmo Elementary School	11030 Stillwater Blvd N	SQG, FINDS
7	Renfrow Inc	3825 Lake Elmo Ave N	SQG, FINDS
9	Rogers JD GRP Lake Elmo Hardwood Lumber	11320 Upper 33 <sup>rd</sup> St N	SQG, UST, AIRS, FINDS
9	Northern Natural Gas Lake Elmo (2 listings)	11371 Upper 33 <sup>rd</sup> St N	TIER 2
10	Trimo Inc	3520 Laverne Ave N	SQG, FINDS
10	Lake Elmo WWTP	11194 Upper 33 <sup>rd</sup> St N	FINDS
11	The Hand Spa	3394 Lake Elmo Ave N	SQG, FINDS
11	Curt's Fixit Shop	11104 Upper 33 <sup>rd</sup> St N	SQG, FINDS
12	Lake Elmo Oil Co	11040 Upper 33 <sup>rd</sup> St N	AST
15	3151 Lake Elmo Ave	3151 Lake Elmo Ave	CDL

\*corresponds to site numbering in EDR report and Figure 9-2

**Table 9-5**  
**Other Potential Environmental Hazard Sites adjacent or near the AUAR Area**

<b>*Site Number</b>	<b>Site Name</b>	<b>Location</b>	<b>Potential Concern</b>
1	Lowell J Rieks Jr	4564 Kimbro Ave N	UST
2	Lake Elmo K (2 listings)	4201 Stillwater Blvd N	UST
3	Abandoned Gas Station	40 <sup>th</sup> St N and Stillwater Blvd	UST
14	Mac Lake Elmo Airport	3275 Manning Ave	SQG, UST, AST, FINDS
14	Walters Aviation	3275 Manning Ave	SQG, FINDS
14	Walters Aviation Inc (same as above?)	3275 Manning	SQG, UST, FINDS
16	Heritage Farm	30 <sup>th</sup> St N and Manning Ave	FINDS

\*corresponds to site numbering in EDR report and Figure 9-2

Due to the past and current agricultural use of some properties in the AUAR area, a variety of pesticides have likely been used and stored within the AUAR area. Small storage tanks for petroleum products are also likely to have been, or remain present at farmsteads within the AUAR area. If contamination is discovered during the course of development, the developer or other responsible party will be required to address the situation in accordance with Minnesota Pollution Control Agency rules.

State law requires that persons properly manage contaminated soil and water they uncover or disturb - even if they are not the party responsible for the contamination. Developers considering construction on or near contaminated properties should begin working early in their planning process with the MPCA's Petroleum Brownfields Program and/or the Voluntary Investigation and Cleanup Program to receive necessary technical assistance in managing (investigating, remediating, mitigating, etc.) contamination. For some properties, special construction might be needed to prevent the further spreading of the contamination and/or prevent petroleum vapors from entering buildings or utility corridors. Information regarding the Petroleum Brownfields Program can be found at: [http://www.pca.state.mn.us/programs/vpic\\_p.html#factsheets](http://www.pca.state.mn.us/programs/vpic_p.html#factsheets). Information regarding the VIC Program can be found at: <http://www.pca.state.mn.us/cleanup/vic.html>.

It should be noted that additional disposals and releases (old and new) could occur and be discovered between the time of final AUAR approval and actual development plans for the AUAR area. In light of this reality, the issue of potential contamination will be revisited during the site development process. Typically, a Phase I environmental site assessment (Phase I ESA) would be required by a lender in conjunction with a property transaction where some type of financial assistance (i.e.; loan) is being sought. The Phase I ESA will identify any potential site contamination concerns (referred to as "Recognized Environmental Conditions") that exist at that time, allowing the issue to be investigated and addressed prior to construction.

**MITIGATION SUMMARY**

*Land Use Compatibility:* Mitigation to address compatibility among different land uses of will consist of:

- Follow the Village Master Plan guiding principles that address potential land use compatibility issues between the existing Village residences and business and the new development or redevelopment opportunities supported by the Master Plan composite land use map. Specific examples of mitigation opportunities include establishing requirements for: building setbacks, screening, landscaping, light pollution, buffers, height, architectural controls, and design. These principles should continue to be followed as Village development planning continues (e.g., Comprehensive Plan, zoning, site plan requirements, design standards, etc.)
- Buffers consisting of berms and/or trees and shrubs will be established to shield residential and rural areas from more intensive land uses of commercial retail, office, institutional, and airport properties and between different types of residential uses (e.g., single family, townhomes, and condos).
- Compliance with lighting ordinances will be enforced to minimize conflicts between land uses.
- Prepare an airport zoning ordinance prior to new development occurring within the vicinity of the safety zones and noise contours/impact areas. This airport ordinance will be prepared by a Joint Airport Zoning Board comprised of two representatives from Lake Elmo, Baytown Township, West Lakeland Township, Washington County, and MAC. Follow the land use restrictions for the airport safety zones and noise contours established by the Joint Airport Zoning Board for development proposed to be located within the safety zones and noise contours. The JAZB will determine the future safety zones; therefore, the draft safety zones displayed on figures in this AUAR may change. Additional information regarding noise impacts is presented in AUAR Item 24 – Odors, Noise, and Dust.
- Prohibit the establishment of waterfowl habitat located within the airport safety zones and discourage the creation of hazardous wildlife attractants within 5,000 feet of the Lake Elmo Airport (e.g., large stormwater ponds with mown grass edges). The FAA has developed guidelines for potential wildlife attracting sources that lie within the vicinity of airports. FAA Advisory Circular 150/5200-33B is on file at City Hall. The city will consult with MAC and will refer to the FAA guidelines prior to activities that could result in establishing wildlife habitat considered hazardous to airports. For example, any ponds or created wetlands that contain open water should be designed with emergent vegetation to minimize use by waterfowl. Stormwater management facilities located within the airport safety zones should utilize infiltration BMPs to manage stormwater.

*Potential Environmental Hazards:* The potential presence of environmental hazards due to past site use will be revisited prior to development activities. At the time specific development is proposed, a Phase I Environmental Site Assessment (Phase I ESA) and possibly follow-up subsurface investigation may be warranted to determine if contamination is present.

A Phase I ESA is a study completed to find out if the potential for contamination exists at a particular property. The study uses reasonably ascertainable data to identify hazardous substances or petroleum products at a property which may indicate a recent release, past release, or a material threat of a release in structures at the property, or into the soil, ground or surface water at the property. A Phase I ESA includes collection and analysis of the following information: regulatory database records; historical information such as aerial photographs, address directories, topographic maps and Sanborn Fire Insurance

maps; geologic and hydrologic information; interview information from current and past site occupants, city staff, and others with knowledge of a property's use; and a site reconnaissance. A report is prepared that contains a list of recognized environmental conditions, describes the methods used to conduct the study, summarizes the study findings, discusses the significance of these findings, and assesses the need for additional studies which may be required to better characterize potential identified environmental concerns.

A Phase I ESA is meant to represent the due diligence needed to qualify for the innocent landowner defense to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980. The study is meant to constitute appropriate inquiry into the previous ownership and use of land at the property, consistent with good commercial or customary practices to identify recognizable environmental conditions. In the event that a Phase I ESA identifies recognized environmental conditions at a property, a Phase II ESA will typically need to be performed. This assessment focuses on the location, nature, and severity of the recognized environmental conditions and provides recommendations, if necessary, for remediation.

Oftentimes, a financial institution will require a Phase I ESA to be completed and a finding of "no recognizable environmental conditions" before it will lend money for a property transaction. These studies may be required by the lender for the purchase of, development of, or other improvements proposed for a property.

If contamination is discovered prior to or during the course of development within the AUAR area, the developer or other responsible party will be required to address the situation in accordance with MPCA rules.

**10. Cover Types. Estimate the acreage of the site with each of the following cover types before and after development**

	Before	After
Types 1-8 wetlands		
Wooded/forest		
Brush/Grassland	See Tables 10-2 and 10-3	
Cropland		
Lawn/landscaping		
Impervious Surface		
Stormwater Pond		
Other (describe)		
Total		

If Before and After totals are not equal, explain why:

*AUAR Guidelines: The following information should be provided instead:*

10a. *Cover Type Map, at least at the scale of a USGS topographic map, depicting:*

- *wetlands - identified by type (Circular 39)*
- *watercourses - rivers, streams, creeks, ditches*
- *lakes - identify protected water status and shoreland management classification*
- *woodlands - identify native and old field*
- *grassland - identify native and old field*
- *cropland*
- *current development*

10b. *An Overlay Map showing anticipated development in relation to the cover types; this should also depict any protection areas, existing or proposed, that will preserve sensitive cover types. Separate maps for each major development scenario should generally be provided.*

### **LAND COVER**

Current (2007) Minnesota Land Cover Classification System (MLCCS) data is available for the AUAR area (see Figure 10-1). The data was generated through a combination of field review of natural areas in September of 2006 and review of the 2005 Washington County Aerial photographs. Based on how current the data is, the use of recent aerial photographs for cover type mapping and adequate field check levels for natural areas, and an on-screen review to verify data quality, the data was deemed accurate and adequate for use for this analysis.

In summary, over half of the AUAR area is dominated by agricultural lands and cultivated vegetation. The second most abundant cover type is areas which contain impervious surface; this cover type is most common downtown and adjacent residential areas. Wooded and grassland areas are locally common, especially along the southwest and southeast areas of the AUAR area. Table 10-1 provides a summary of the cover types and acreages.

**Table 10-1**  
**Minnesota Land Cover Classification System (MLCCS) Cover Types**

<b>MLCCS Cover Types</b>	<b>Acres</b>	<b>Percent of Total Area</b>
Planted or Cultivated Vegetation	760.4	60
Artificial Surfaces and Associated Areas	207.6	16
Forest	120.3	9
Herbaceous	100.1	8
Water	62.4	5
Woodland	23.3	2
Shrubland	0.9	--
<b>Total:</b>	<b>1275</b>	<b>100.00%</b>

A brief description of the different land cover types based on the Minnesota Land Cover Classification System version 5.4 is provided below. More information about MLCCS and the complete MLCCS manual is available online, at <http://www.dnr.state.mn.us/mlccs/index.html>.

### **Planted or Cultivated Vegetation**

Most of the AUAR areas mapped as Planted or Cultivated Vegetation consist of active agricultural crop fields and areas of tall grass. This is the dominant land cover type (760.4 acres) in the AUAR area, and nearly surrounds the downtown on the west, north and east sides.

Definition: These are areas where vegetation may be planted, cultivated, treated with annual management and/or otherwise altered by humans, and has a vegetative cover of 96 - 100%. Natural vegetation has often been removed or modified and replaced with different types of vegetative cover resulting from human activities. Soil usually has been mechanically or physically altered for the establishment of vegetation. This formation class generally includes typical land uses of agriculture, parks, golf courses, or other such land use where the vegetation is cultivated, planted or maintained, and impervious surface contributes less than 5% of the area.

Most of the AUAR areas mapped as Planted or Cultivated Vegetation consist of active agricultural crop fields and areas of tall grass. This is the dominant land cover type (760.4 acres) in the AUAR area, and nearly surrounds the downtown on the west, north and east sides.

### **Artificial Surfaces and Associated Areas**

Most of the AUAR areas mapped as artificial surfaces and associated areas consist of commercial properties, roads, and single family residential lots. This cover type is concentrated in the south-central portion of the AUAR area, and is the second most common cover type in the AUAR area, covering 207.6 acres.

Definition: This class is determined by the presence of manmade impervious surface. In these areas vegetation has been altered, with a vegetative cover of <96%. Vegetation may be planted or cultivated (e.g., landscaping, gardens, and tree rows), or consist of pre-development vegetation that has been altered or fragmented by humans. These areas contain artificial cover as a result of human activities, such as construction (e.g. buildings, pavement), extraction sites (e.g. open mines, quarries, pits) and waste disposal sites. These areas could also include stormwater management facilities (e.g., ditches and ponds). This subsystem loosely correlates to typical land uses such as those defined as residential, industrial, transportation, etc.

**Forest**

Most of the AUAR areas mapped as forest consist of disturbed second growth forest, oak forest, maple-basswood forest, or lowland hardwood forest. The majority of forest areas occur in the southwestern portion of the AUAR area near Sunfish Lake and in the southeastern portion of the AUAR area, in and near Reid Park. Approximately 120.3 acres of the AUAR area are mapped as forest.

Definition: These areas contain trees with crowns overlapping (generally forming 60 - 100% cover). Forests are defined primarily by the dominate species present, not by the current height of the cover. For example, if the area is composed by young elms and ashes that are only 15 feet tall but will become much taller trees, it will be classified as a forest or woodland depending on the density of the tree species. If the area is composed of shrub species such as willows and dogwoods, also 15 feet tall, it will be classified as shrubland.

**Woodland**

Only a few woodlands, totaling 23.3 acres, were identified in the AUAR area. One, near Reid Park, is an oak woodland-brushland; another, southeast of the intersection between Lake Elmo Avenue and Stillwater Boulevard, is a disturbed non-native community type.

Definition: These areas contain open stands of trees with crowns not usually touching (generally 25 - 60% cover). Canopy tree cover may be less than 25% in cases where it exceeds shrub, dwarf-shrub, herb, and nonvascular cover, respectively.

**Herbaceous**

Most of the areas mapped as herbaceous cover consist of saturated or emergent wetlands (mostly in the northwestern portion of the AUAR area) or fallow pastures or fields dominated by non-native grasses ("old field") (throughout the remainder of the AUAR area). Approximately 100.1 acres are mapped as herbaceous within the AUAR area.

Definition: These areas contain herbs (graminoids, forbs, and ferns) as the dominant vegetation (generally forming at least 25% cover; trees, shrubs, and dwarf-shrubs generally with less than 25% cover). Herb cover may be less than 25% where it exceeds tree, shrub, dwarf-shrub, and nonvascular cover.

**Shrubland**

The only shrubland within the AUAR area is a small area of shrub wetland (0.9 acres) in the NE corner of the Village Area.

Definition: These areas contain shrubs and dwarf-shrubs with individuals or clumps generally forming more than 25% cover and with trees generally less than 25% cover. Shrub cover may be less than 25% where it exceeds tree, herb, and nonvascular cover.

**Water**

Areas mapped as water within the AUAR area include portions of Sunfish Lake and Lake Elmo, as well as some scattered small ponds. Water covers 62.4 acres within the AUAR area.

Definition: These areas contain open water. Open water may include large mats of floating algae or non-rooted vascular vegetation. Emergent vegetation generally contributes less than 5% total cover.

## PROPOSED PROTECTION AREAS

### Scenarios A, B, and C – Village Master Plan

The Village Master Plan includes a “Buffer Zone/Open Space” corridor that provides areas for parks, trails, and a greenbelt buffer that “has been a primary objective and key design component of the Master Plan from the outset.”<sup>[1]</sup> The greenbelt buffer addresses many land use issues including protection areas for sensitive cover types (e.g., wetlands, forests, woodlands), buffers to sensitive cover types, and buffers between different land use types (e.g., airport, TH 15, semi-rural housing). In addition, portions of the areas shown as “Existing City Old Village Fabric (Open Space)” contain sensitive cover types and there is an opportunity to protect those areas since urban-scale development is not planned for those locations.

The land use categories on the composite land use map that are considered “protection areas” for the purposes of the AUAR include the following: Buffer Zone/Open Space, Existing Old Village City Fabric (Open Space), Horse Farm, and Reid Park (see Figure 6-1). In addition, the existing cemetery is considered a protection area. The protection areas are the same for Scenarios A, B, and C.

With the exception of Reid Park, Existing Parks/Open Space and New Parks/Open Space are not considered protection areas as these areas are currently used or may be proposed to be used for active recreational purposes. Reid Park contains natural open space and there are no plans to convert this open space to active recreational uses. The AUAR guidelines require that you examine a “worst case scenario” if the extent of potential impacts are known. Therefore, the location of the parks/open space land use categories are analyzed for the potential impact for land cover conversion to active recreational uses. It is noted that the proposed location of New Parks/Open Space does not include any sensitive cover types and would be appropriate for active recreational use.

Existing Old Village City Fabric (Developed) is not considered a protection areas as these areas are currently developed and property owners could impact sensitive cover types under a “worst case scenario”. Existing city, state and federal regulations protect wetlands (located in herbaceous areas), but no existing regulations would prevent an individual property owner from removing trees or woodlands from their property, except within the Shoreland District. Section 150.075 of the Land Usage Code, Keeping Natural or Existing Character, requires that property be “properly maintained in accordance with (its) natural or existing condition.” However, this does not state that removal of trees or woodlands is regulated. It is noted that areas defined as Existing Old Village City Fabric (Developed) include sensitive cover types. The city could adopt a new ordinance to regulation impacts to sensitive cover types for developers and existing property owners.

Figure 10-2 shows anticipated development (existing plus proposed) associated with the Village Master Plan. The white areas on Figure 10-2 indicate the location of existing or anticipated development. The non-white areas show the land cover that would remain if the Village Master Plan was implemented in accordance with the composite land use map. Table 10-2 indicates the potential extent of the land cover categories before and after the implementation of the Village Master Plan composite land use map, which includes the same protection area for Scenarios A, B, and C.

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<sup>1</sup> Village Master Plan, Close Landscape Architects, pg. 35

**Table 10-2**  
**Potential Land Cover Conversion – Village Master Plan (Scenarios A, B, and C)**

<b>MLCCS Cover Type</b>	<b>Before (Acres)</b>	<b>After (Acres)</b>	<b>Change (Acres)</b>
Artificial Surface and Associated Areas	207.6	767.0	559.4
Planted or Cultivated Vegetation	760.4	306.3	-454.1
Forest	120.3	57.3	-63.1
Woodlands	23.3	5.7	-17.6
Shrubland	0.9	0.9	0.0
Herbaceous	100.2	75.6	-24.7
Open Water	62.4	62.4	0.0
<b>Total</b>	<b>1275.1</b>	<b>1275.1</b>	<b>NA</b>

Implementation of the Village Master Plan could result in a loss of 63 acres of forest (a 52% reduction from existing conditions) 18 acres of woodlands (a 77% reduction), and 24 acres of herbaceous areas (a 25% reduction). The amount of potential land cover conversion is the same for Scenarios A, B, and D as they include the same protection area. The forest and woodland areas that could be impacted are located adjacent to Reid Park, northeast of the intersection of 39<sup>th</sup> St N and Laverne Ave N, and in scattered locations throughout the existing Village. The herbaceous areas that could be impacted are located adjacent to Reid Park and throughout the existing Village area. The conversion of these areas is not absolute; rather it represents an estimation of the areas that could be impacted due to a lack of existing protections (e.g., the city does not have a tree or woodland preservation policy) or land use policy (e.g., the areas could be proposed for development if the current version of the Village Master Plan is implemented).

#### **Scenario D – Comprehensive Plan**

The Comprehensive Plan includes a Greenbelt land use category that addresses many land use issues including protection areas for sensitive cover types (e.g., wetlands, forests, woodlands), buffers to sensitive cover types, and buffers between different land use types (e.g., airport, TH 15, semi-rural housing). The Greenbelt and existing cemetery represent the proposed protection area for sensitive cover types.

Figure 10-3 shows anticipated development (existing plus proposed) associated with the Comprehensive Plan. The white areas on Figure 10-3 indicate the location of existing or anticipated development. The non-white areas show the land cover that would remain if the Comprehensive Plan was implemented. Table 10-3 indicates the potential extent of the land cover categories before and after the implementation of the Comprehensive Plan. The impacted area is less because the Comprehensive Plan includes a larger protection area (i.e., greenbelt buffer).

**Table 10-3**  
**Potential Land Cover Conversion – Comprehensive Plan (Scenario D)**

<b>MLCCS Cover Type</b>	<b>Before (Acres)</b>	<b>After (Acres)</b>	<b>Change (Acres)</b>
Artificial Surface And Associated Areas	207.6	515.6	308.0
Planted or Cultivated Vegetation	760.4	553.0	-207.4
Forest	120.3	59.6	-60.8
Woodlands	23.3	6.9	-16.4
Shrubland	0.9	0.9	0.0
Herbaceous	100.2	76.8	-23.4
Open Water	62.4	62.4	0.0
<b>Total</b>	<b>1275.1</b>	<b>1275.1</b>	<b>NA</b>

Implementation of the Comprehensive Plan could result in a loss of 61 acres of forest (a 51% reduction from existing conditions) 16 acres of woodlands (a 70% reduction), and 23 acres of herbaceous areas (a 23% reduction). The forest and woodland areas that could be impacted are located adjacent to Reid Park, northeast of the intersection of 39<sup>th</sup> St N and Laverne Ave N, and in scattered locations throughout the existing Village. The herbaceous areas that could be impacted are located adjacent to Reid Park and throughout the existing Village area. The conversion of these areas is not absolute; rather it represents an estimation of the areas that could be impacted due to a lack of existing protections (e.g., the city does not have a tree or woodland preservation policy) or land use policy (e.g., the areas could be proposed for development if the current version of the Comprehensive Plan is implemented).

**MITIGATION SUMMARY**

AUAR Item 10 - Land Cover - provides data that is used in AUAR Item 11 – Fish, Wildlife, and Ecologically Sensitive Resources – to identify impacts to habitat and sensitive resources. Therefore, mitigation for both Items 10 and 11 is presented at the end of Item 11.

**11. Fish, Wildlife, and Ecologically Sensitive Resources**

- a. Identify fish and wildlife resources and habitats on or near the site and describe how they would be affected by the project. Describe any measures to be taken to minimize or avoid impacts.
- b. Are any state-listed (endangered, threatened or special concern) species, rare plant communities or other sensitive ecological resources such as native prairie habitat, colonial waterbird nesting colonies or regionally rare plant communities on or near the site?

Yes  No

If yes, describe the resource and how it would be affected by the project. Describe any measures that will be taken to minimize or avoid adverse impacts. Provide the license agreement number (LA-\_\_\_) and/or Division of Ecological Resources contact number (ERDB 20070720) from which the data were obtained and attach the response letter from the DNR Division of Ecological Resources. Indicate if any additional survey work has been conducted within the site and describe the results.

*AUAR Guidelines for 11.a: The description of wildlife and fish resources should be related to the habitat types depicted on the cover type maps (item 10). Any differences in impacts between development scenarios should be highlighted in the discussion*

**WILDLIFE**

The land cover types depicted in the Minnesota Land Cover Classification System Map (Figure 10-1) are based on the MLCCS data provided by the Washington County Conservation District. A discussion of major wildlife habitat types provided by the different land cover classes and the differences in impacts between development scenarios follows.

**Land Cover Type: Cultivated and Maintained Vegetation**Habitat Type: Short Grassland

This habitat is, for the most part, directly related to the artificial surfaces listed above. Short grassland consists of lawns that are mowed or manicured leaving little wildlife value. Species commonly found in this habitat type include those species that are closely associated with urban and suburban settings. Several bird species including house sparrow, common grackle and American robin will use this habitat type. Small to medium sized mammals such as the house mouse, squirrels, and cottontail rabbits commonly inhabit short grassland areas.

Habitat Type: Agricultural Fields

This habitat consists of cultivated or planted vegetation such as corn, soybeans, and hayfields. Disturbance to these areas limits their wildlife value, but they can serve as a food source to a variety of wildlife. White-tailed deer, Canada goose, several duck species, pheasants, and raccoons all utilize agricultural fields for cover and as a food source.

Existing Cultivated and Maintained vegetation are found (see Figure 10-1):

- Throughout the AUAR area around existing homes as manicured lawns
- Throughout the AUAR area as agricultural fields, located east, north, and west of the current downtown area

**Land Cover Type: Artificial Surfaces and Associated Areas**Habitat Type: Artificial Surfaces

This habitat retains little or no wildlife value due to the significant disturbance that the landscape has sustained. The habitat consists mainly of impervious structures such as roads and buildings.

Artificial surfaces can be found (see Figure 10-1):

- Throughout the AUAR area, mainly confined to the downtown area

**Land Cover Type: Woodland and Forest**Habitat Type: Woodland and Forest

Species commonly found in woodland/forest habitats include raccoon, red fox, grey fox, coyote, white-tailed deer, opossum, squirrels, woodpeckers, owls, turkeys and bald eagles. Many species that are common to closed canopy settings will be found in this habitat including a wide variety of warblers.

Existing Woodland and Forest habitat can be found (see Figure 10-1):

- existing Old Village City Fabric (Open Space) and (Developed) areas
- south central portion of the AUAR area in and around an existing Reid Park
- central portion of the AUAR area north of 39<sup>th</sup> Street North
- scattered in the north central portion of the AUAR area
- around Sunfish Lake
- small portion in the northeast corner of the AUAR area

Woodland and forest habitat that could be impacted under Scenarios A, B and C comprises 81 acres and would affect the areas located in the (see Figure 10-2 and Table 10-2):

- existing Old Village City Fabric (Developed) areas
- south central portion of the AUAR area in and around an existing Reid Park
- central portion of the AUAR area north of 39<sup>th</sup> Street North

Woodland and forest habitat that could be impacted under Scenario D comprises 77 acres and would affect the areas located in the (see Figure 10-3 and Table 10-3):

- existing Old Village City Fabric (Developed) areas
- central portion of the AUAR area south of 39<sup>th</sup> Street North
- south central portion of the AUAR area, east of Reid Park

**Land Cover Type: Herbaceous**Habitat Type: Tall Grassland

Areas of tall grassland habitats provide food and cover for a variety of prairie-loving species. Several non-game species including a variety of sparrows and occasionally bobolinks will utilize tall grassland areas for food, shelter and nesting habitat. Tall grassland areas rich in forb species will support a wide variety of insects that many bird species use as a food source. Upland game birds such as ring-neck pheasants will also use these habitats for nesting.

Pocket gophers, ground squirrels, voles and field mice and other rodents use tall grassland areas which, in turn, will entice birds of prey such as hawks to the habitat. Other mammals such as white-tailed deer, fox, coyote, weasel, turkey, raccoon and possibly badger also can be found in these tall grassland habitats.

Habitat Type: Savanna (sparse trees over tall grass)

Species found in the savanna habitats are similar to those found in the tall grassland habitats. Savanna habitat may have more diverse vegetation species than tall grassland areas therefore making it more enticing to a wider variety of wildlife.

### Habitat Type: Wetland

Isolated wetlands occur throughout the AUAR area, although most of the wetland areas are associated with the floodplain areas in and around Sunfish Lake and Lake Elmo. Waterfowl such as Canada geese and several species of ducks use this habitat to feed and rear their young. Great blue herons and egrets are likely to use the shallows to feed. A variety of amphibians and reptiles such as turtles, snakes and frogs will associate themselves in and around these water sources. Mammals such as raccoons and mink can be found around wetland edges with beaver and muskrat also being associated in and around these areas. While wetlands may be forested or shrubland, all of the wetlands within the AUAR area are herbaceous.

Existing Herbaceous habitat can be found (see Figure 10-1):

- in the northwest portion of the AUAR area in existing Old Village City Fabric (Open Space)
- around Sunfish Lake
- scattered in the north central portion of the AUAR area
- central portion of the AUAR area south of 39<sup>th</sup> Street North
- small area on eastern portion of the AUAR area north of the railroad tracks
- south central portion of the AUAR area, east of Reid Park

Herbaceous habitat that could be impacted under Scenarios A, B and C comprises 25 acres and would affect the areas located in the (see Figure 10-2 and Table 10-2):

- central portion of the AUAR area south of 39<sup>th</sup> Street North
- small area on eastern portion of the AUAR area north of the railroad tracks
- south central portion of the AUAR area, east of Reid Park

Herbaceous habitat that could be impacted under Scenario D comprises 23 acres and would affect the areas located in the (see Figure 10-3 and Table 10-3):

- central portion of the AUAR area south of 39<sup>th</sup> Street North
- south central portion of the AUAR area, east of Reid Park

### **The Department of Natural Resources *Strategic Conservation Agenda (2003-2007)***

The Department of Natural Resources Strategic Conservation Agenda (2007-2008) contains the state's wildlife conservation priorities and describes DNR's progress toward achieving conservation results. It uses approximately 90 measurable indicators and targets to paint a picture of natural resource conditions, DNR management activities, and the results they hope to accomplish through their management efforts. This report contains a list of indicators and targets for conserving wildlife species. The city can use this information as a resource when determining specific mitigation measures for habitat lost to development.

## **FISHERIES**

### **Lake Elmo**

The Lake Elmo lake bottom is mapped as a moderate quality site by the Minnesota DNR. According to MN DNR lake data, walleye, northern pike, tiger musky, largemouth bass, bluegill, crappie, trout and tullibee are all present in Lake Elmo. The DNR currently stocks the lake to support the fishery within Lake Elmo.

### **Sunfish Lake**

No data was available through the MN DNR lake data for Sunfish Lake. The Valley Branch Watershed Management Plan contains some information related to fisheries in Sunfish Lake, as follows:

DNR information concerning Sunfish Lake is limited to a game survey completed in 1976. At the time of this survey, the lake had a surface area of 54 acres, and a maximum depth of approximately 4 meters. Fish species noted in the lake included bass, bluegills, and sunfish. The DNR noted that these three types of fish were stocked in the lake from 1910 to 1941. However, no accurate records concerning stocking quantities are available.

The lake does not have a developed public access and has been subject to winterkill so the DNR does not have an active management program for the lake. Local residents report that sunfish and crappies were present until a severe winterkill in the early 1980s.

11b. Are any state-listed (endangered, threatened or special concern) species, rare plant communities or other sensitive ecological resources such as native prairie habitat, colonial waterbird nesting colonies or regionally rare plant communities on or near the site?

Yes  No If yes, describe the resource and how it would be affected by the project. Describe any measures that will be taken to minimize or avoid adverse impacts. Provide the license agreement number (LA-\_\_\_\_) and/or Division of Ecological Resources contact number (ERDB 20070720) from which the data were obtained and attach the response letter from the DNR Division of Ecological Resources. Indicate if any additional survey work has been conducted within the site and describe the results.

*AUAR Guidelines for 11.b: For an AUAR prior consultation with the DNR Division of Ecological Resources for information about reports of rare plant and animal species in the vicinity is required. Include the reference numbers called for on the EAW form in the AUAR and include the DNR's response letter. If such consultation indicates the need, an on-site habitat survey for rare species in the appropriate portions of the AUAR area is required. Areas of on-site surveys should be depicted on a map, as should any "protection zones" established as a result*

#### **MINNESOTA DNR NATURAL HERITAGE DATABASE**

Information about the presence or absence of state-listed species, rare plant communities, and other sensitive ecological resources was obtained from the Minnesota DNR Natural Heritage Database maintained by the Natural Heritage and Nongame Research Program. This database is continually updated as new information becomes available and is the most complete source of data on Minnesota's rare and natural features. The database was reviewed to determine if any rare plant, animal or other significant natural features were known to occur within the AUAR area or within one-mile of the AUAR area.

The MN DNR Natural Heritage Database identifies six known occurrences of rare species or natural communities within the AUAR area or within an approximate one-mile radius of the AUAR area. These include two Bald Eagle occurrences, one Lake Bed habitat, two Oak (Red Maple subtype) Woodlands, and one Sand Beach (Inland Lake subtype). Figure 11-1 shows the location of the Lake Bed habitat and Sand Beach (Inland Lake subtype), which are located within the AUAR area. DNR policy requires that known Bald Eagle nest can not be shown on a map as a measure to protect these sensitive resources. The two Woodlands are located outside the AUAR and are not shown on Figure 11-1.

## Rare Wildlife

### *Bald Eagle*

Bald Eagles were removed from the Federal list of threatened and endangered species on August 9, 2007. The United States Fish and Wildlife Service is currently working with the Minnesota Department of Natural Resources and other state agencies to monitor the health of the eagle populations for the next five years. Bald eagles are still however protected by the Migratory Bird Treaty Act, The Bald and Golden Eagle Protection Act, and are still considered a Special Concern species within the State of Minnesota. Two separate occurrences of Bald Eagles have been recorded, one within the AUAR area and the other within a one-mile radius of the AUAR area. Both occurrences are nesting locations near Sunfish Lake, in the western portion of the AUAR area.

The nesting location within the AUAR area was first observed in 1997 and last observed active in 2000. The nesting location west of the AUAR area was active in 2001 and 2003 and inactive in 2005.

Breeding bald eagles occupy “territories”, areas they will typically defend against intrusion by other eagles (National Bald Eagle Management Guidelines 2006). Bald eagles remain together for many years and usually return to the same territory each year (Ontario Ministry of Natural Resources 1987). In addition to the active nest, a territory may include one or more alternate nests (National Bald Eagle Management Guidelines 2006). Due to the close proximity of the two Bald Eagle nesting locations and the non-overlapping observation dates, it is possible that the two nests represent the same pair of eagles. Many factors could influence the inactive nest observed in the year 2005 including human disturbance, inadequate food source, death of a mate, etc.

Table 11-1 was developed by the Mn DNR to outline the relative sensitivity of bald eagles for portions of Minnesota and time periods in which eagles are the most susceptible. Table 11-2 was also developed by the Mn DNR to set up recommendations for avoiding and minimizing impacts to eagles. The following tables are directly related and are to be used in tandem with each other when working with the vicinity of an eagle nest. A MnDNR Nongame Specialist should be contacted if alterations are proposed to be conducted within the distance and timing periods described in the tables below.

**Table 11-1**  
**Mn DNR Bald Eagle Sensitivity**

Nesting Period Segment	Dates for	
	Northern Minnesota*	Southern Minnesota*
<b>Critical</b> - Eagles are involved with courtship, egg-laying, and incubation.	March 15th - May 15th	Feb. 10th - May 1st
<b>Moderately critical</b> - Eagles are becoming physiologically conditioned for breeding (February/March), or newly hatched chicks require frequent brooding and feeding (May/June).	Feb. 15 <sup>th</sup> - March 15th and May 15th - June 15th	Jan. 10th - Feb. 10th and May 1st - June 1st
<b>Less critical</b> - Eagle chicks are one month old to 1 week post-fledging.	June 15th - Aug. 15th	June 1st - July 31st
<b>Non-critical</b> - Most eagles are not regularly present at the nest site.	Aug. 15th - Feb. 15th	July 31st - Jan. 10th

\*The state is arbitrarily divided into north and south by State Highway 210

**Table 11-2  
Mn DNR Recommendations for Avoiding and Minimizing Impacts**

Activity	Nesting Period Segment			
	Critical	Moderately	Less Critical	Non-critical
<b>Primary Zone:</b> (within 330 feet of the nest)				
Landscape Alteration <i>a</i>	avoid	avoid	avoid	Avoid <i>b</i>
Construction (structures, trails, etc.) <i>c</i>	avoid	avoid	avoid	Avoid <i>b</i>
Burning <i>d</i>	avoid	avoid	avoid	restrict/minimize <i>b</i>
Minor Forest Maintenance <i>e</i>	avoid	avoid	avoid	restrict/minimize <i>b</i>
Motorized Access	Avoid <i>f</i>	Avoid <i>f</i>	restrict/minimize <i>b</i>	restrict/minimize <i>b</i>
Human Entry	Avoid <i>f</i>	Avoid <i>f</i>	restrict/minimize <i>b</i>	restrict/minimize <i>b</i>
Low Flying Aircraft	avoid	avoid	no restrictions	no restrictions
<b>Secondary Zone:</b> (330 to 660 feet from the nest)				
Landscape Alteration <i>a</i>	avoid	avoid	avoid	restrict/minimize <i>b</i>
Construction (structures, trails, etc.)	avoid	avoid	restrict/minimize <i>b</i>	restrict/minimize <i>b</i>
Burning <i>d</i>	avoid	avoid	avoid	restrict/minimize <i>b</i>
Minor Forest Maintenance	avoid	avoid	no restrictions <i>f</i>	no restrictions <i>g</i>
Motorized Access	Avoid <i>f</i>	restrict/minimize <i>b</i>	restrict/minimize <i>b</i>	no restrictions <i>g</i>
Human Entry	Avoid <i>f</i>	restrict/minimize <i>b</i>	restrict/minimize <i>b</i>	no restrictions
Low Flying Aircraft	avoid	restrict/minimize <i>b</i>	no restrictions	no restrictions
<b>Tertiary Zone:</b> (660 feet to 1/4 mile from the nest - May extend up to 2 mile from the nest, if topography or vegetation permit a direct line of sight to the disturbance area.)				
Landscape Alteration <i>a</i>	avoid	avoid	avoid	no restrictions <i>g</i>
Burning <i>d</i>	avoid	avoid	avoid	restrict/minimize <i>b</i>
Other Activities (as listed above)	Avoid <i>f</i>	no restrictions <i>g</i>	no restrictions <i>g</i>	no restrictions <i>g</i>

*a* Landscape alteration includes activities such as clear cutting or land clearing, which result in significant changes in the landscape.

*b* Restrictions should be decided on a case by case basis, based on type, extent, and duration of proposed activity, and sensitivity of individual eagle pairs. For assistance, contact your nearest DNR Nongame Specialist: Bemidji (218-755-2976); Grand Rapids (218-327-4267); New Ulm (507-359-6033); Rochester (507-280-5070); St. Paul (651-772-7978).

*c* For construction involving land clearing, see also recommendations for the "Landscape Alteration" activity.

*d* If burning can not be done within the non-critical nesting period segment, please contact your nearest DNR Nongame Specialist (see contact numbers above).

*e* Such as thinning of tree stands, pruning, and other like maintenance.

*f* Some eagles have become habituated to human activity and can be tolerant of these activities, particularly if they were occurring

regularly at the time the eagles began nesting. In these cases, complete avoidance of the activity may not be necessary. If you believe this is the case in your particular situation, contact your nearest Nongame Specialist (see contact numbers above).

*g* However, the habitat should not be altered in ways that would make it unsuitable for future nesting.

**Rare Plant Communities**

The Natural Heritage Database contains records for two rare plant communities within the AUAR area and two within a one-mile radius of the AUAR area. These include one Sand Beach (Inland Lake subtype) and one Lake Bed, both associated with Lake Elmo (see Figure 11-1), and two Oak (Red Maple subtype) Woodlands, which are located outside the AUAR area. Sites were documented during the 1988 Mn DNR County Biological Survey of Washington County.

***Sand Beach (Inland Lake subtype)***

The boundary of Lake Elmo is mapped as a rare plant community, sand beach type; the northern portion of the lake is within the AUAR area. The sand beach areas are best developed on the southern portions of Lake Elmo where the sand flats are exposed during drawdown (the southern portions of Lake Elmo are located outside the AUAR area). Vegetation is comprised primarily of *Carex spp.* and *Salix spp.*

***Lake Bed***

The Natural Heritage Database also identifies lake bed of Lake Elmo as a rare plant community. This site is within Lake Elmo Regional Park, which is managed by Washington County. Plant species include several species of pondweed, coontail, water stargrass, waterlily, duckweed and watermeal.

***Mesic Oak Forest***

The MN DNR identified two records located outside the AUAR area, but within approximately one-mile of the AUAR area. Both of these sites are mapped as moderate quality plant communities. The first community is dominated by red and white oaks, woody species dominate the understory, and native forbs are present. The second community is dominated by Northern pin and bur oaks, with a shrub layer consisting of red elderberry and gooseberry species, and the herbaceous layer containing typical oak woods flora as well as some species indicative of past disturbance. Small areas of aspen forest are associated with the oak forest communities.

**MLCCS NATURAL AND SEMI-NATURAL AREAS**

As defined by the Minnesota Land Cover Classification System (MLCCS), semi-natural areas are unmaintained or infrequently maintained areas of perennial vegetation with more than 50% of the cover is comprised of nonnative plants. In contrast, Natural Areas are comprised of more than 50% native plants, and typically fall within a type of plant community classified by the Minnesota DNR. Both of these types of permanent vegetation provide wildlife habitat of varying quality and may also combine to form important habitat complexes and connections. However, Natural Areas as defined by MLCCS tend to support more diverse assemblages of native plants and animals, and also support an overwhelming proportion of unique and/or rare species when compared to Semi-natural Areas. For this reason, natural areas are typically assigned a higher priority for conservation and management.

Natural and semi-natural areas are located throughout the AUAR area and are shown on Figure 11-2. Natural areas are concentrated within and adjacent to Reid Park, north of Sunfish Lake, south of Sunfish Lake and west of Lake Elmo, and in the north central portion of the AUAR area. The majority of the natural areas are protected by the Buffer Zone/Open Space presented in Scenarios A, B, and C and by the Greenbelt presented in Scenario D.

The large intact natural area surrounding Reid Park is proposed to be impacted by all Scenarios as they guide the area surrounding Reid Park for residential uses. Scenarios A, B, and C include two specific properties adjacent to Reid Park that are not anticipated to accommodate additional growth as these are classified as Existing Old Village City Fabric (see Figure 6-1). However, these properties are not included in the “protection area” analyzed in Item 10 as under a “worst case scenario” property owners could impact sensitive cover types as no existing regulations address removal of trees and woodlands by individual property owners, except within the Shoreland District. The natural areas adjacent to Reid Park would be lost unless the city adopts a new ordinance to protect environmentally sensitive areas.

**METRO CONSERVATION CORRIDOR**

The Metro Conservation Corridor is a planning area designated by the Minnesota DNR. The Corridor is aligned with existing natural features, parks, and open spaces areas such as wetlands, rivers, woodlands, forests, uplands and other land forms that are interconnected or have the potential to become connected across the 11-county metropolitan area. With technical support from the MN DNR, county staff with natural resource experience created these corridors by reviewing maps of existing conditions and incorporating local citizens’ knowledge. Sites within the corridor are prioritized as conservation areas by the MN DNR and may be eligible for grant funding to help preserve and restore them. The program

works with organizations, local governments, agencies and land owners to build a natural habitat network that protects and improves the health of native vegetation, fish and wildlife.

Sunfish Lake Park and Lake Elmo Regional Park are part of the network identified by the program, as is the corridor of land that connects them. This corridor is shown on Figure 11-2. Maintaining the corridor and implementing preservation and restoration activities within it helps enhance the value and ecological function of natural areas by interconnecting them, thereby mitigating habitat fragmentation as well as habitat loss. The corridors also provide wildlife habitat and facilitate wildlife movement between areas.

Regionally Significant Ecological Areas (RSEA) are identified by the Minnesota Department of Natural Resources. Sunfish Lake Park, Lake Elmo Regional Park Reserve, and the corridor of land that connects them contain RSEAs. Within the AUAR area, the RSEAs are located within the corridor that connects the two parks that is generally located west of Klondike Avenue. RSEAs are places where intact native plant communities and/or native animal habitat are found. They provide habitat for game and non-game animals, biological diversity, groundwater recharge, and improved water quality. Lake Elmo's RSEAs are identified as part of the network that makes up the Metro Conservation Corridors. The area identified as a Conservation Corridor within Lake Elmo is part of a larger system of habitat. The DNR's recognition of Lake Elmo's natural resources indicates that these lands are of environmental importance.

#### **LAND SUITABILITY ANALYSIS**

A land suitability analysis involves the application of criteria to the landscape to assess where land is most and least suitable for development of structures and infrastructure. A full analysis includes consideration of a number of factors, including natural system constraints, compatibility with existing land uses and development patterns, existing land use policies, and the availability of community facilities. For purposes of this project, the analysis focused on natural resources, and the suitability and sensitivity of particular areas to the impacts from development. This land suitability analysis provides the foundation to recommend a Conservation Framework for the AUAR Mitigation Plan for the purposes of mitigating potential impacts to ecologically sensitive resources. This Conservation Framework is a key element of the Mitigation Plan and should be followed as decisions regarding the development of the Village are made in the future (i.e., Comprehensive Plan update, Zoning ordinance update, design standards, etc.)

Factors considered for this analysis include the following:

- Hydrology
  - National Wetland Inventory
  - Public Waters Inventory
  - Lakes
  - Streams and Rivers
  - Floodplain
  - VBWD wetland function and value assessment
- Steep Slopes
- Prime Agricultural Soils
- Open Space and Greenways
  - DNR Metro Conservation Corridors
  - Existing Parks and Trails
  - Proposed Parks and Trails
- Natural Areas and Unique Features
  - Natural areas mapped in the Washington County Minnesota Land Cover Classification System
  - Semi-natural areas mapped in the Washington County MLCCS
  - Mn DNR records for Special Concern, Threatened, or Endangered Plants or Animals

- Mn DNR mapped regionally significant ecological areas

Overlaying these features illustrates that they are concentrated around the perimeter of the Village Area, especially in the southwest corner of the AUAR, the northern portion of the AUAR area, and within and surrounding Reid Park (see Figure 11-2 Comprehensive Land Suitability). The interior of the AUAR area is characterized by prime agricultural soils, while the existing urban center lacks the features included on the above list. Depending on local priorities and values this suggests that the areas most appropriate for development are in or near the existing urban areas. Areas around the perimeter of the Village Area have the highest concentration of natural features, making the land less suitable for development.

### **Identification of Ecologically Sensitive Resources**

The various datasets displayed on Figure 11-2 were compiled to place ecologically sensitive resources in two categories: primary and secondary areas. Primary areas include natural areas, steep slopes, wetlands, floodplain, locations of rare wildlife and plant communities, and regionally significant ecological areas. Secondary areas include semi-natural areas and hydric soils. The location of primary and secondary ecologically sensitive resources are shown on Figure 11-3.

#### ***Primary Areas***

All of the Scenarios propose to protect the majority of primary areas as they are included within the Buffer Zone/Open Space proposed in Scenarios A, B, and C or within the Greenbelt proposed in Scenario D. The noted exception is that the primary areas located adjacent to Reid Park are proposed for development in all Scenarios. Consideration should be given to modifying the location of the Buffer Zone or Greenbelt to include the primary areas adjacent to Reid Park. In conjunction with this, considerations for removing non-ecologically sensitive resource area from the Buffer Zone or Greenbelt may be necessary to offset the addition of areas adjacent to Reid Park. The Buffer Zone that is brought forward through future Village development decisions (i.e., Comprehensive Plan, ordinance updates, design requirements, development review and approval process, etc.) should consider the trade offs associated with protecting existing ecologically sensitive areas compared to restoring areas within the buffer that have been heavily impacted by past land uses (e.g., agricultural uses).

#### ***Secondary Areas***

All of the Scenarios propose to protect the majority of secondary areas as they are included within the Buffer Zone/Open Space proposed in Scenarios A, B, and C or within the Greenbelt proposed in Scenario D. The noted exceptions are the secondary areas located within the Existing Village, interspersed with the primary areas located adjacent to Reid Park, and surrounding existing businesses located north of Stillwater Blvd and east of Laverne Avenue. Secondary areas provide wildlife habitat of varying quality and may also combine to form important habitat complexes and connections. The protection of secondary areas located adjacent to primary areas should take precedent over isolated secondary areas that provide less habitat value. Therefore, secondary areas interspersed within the primary area located adjacent to Reid Park and located in the corridor connecting Sunfish Lake to Lake Elmo should take precedent over the isolated secondary areas located throughout the Old Village and surrounding existing businesses.

Consideration should be given to modifying the location of the Buffer Zone or Greenbelt to include the secondary areas interspersed with the primary areas located adjacent to Reid Park. In conjunction with this, considerations for removing non-ecologically sensitive resource area from the Buffer Zone or Greenbelt may be necessary to offset the addition of areas adjacent to Reid Park.

## MITIGATION SUMMARY

### Scenarios A, B, and C

The density of residential units differs for these three development scenarios, although the overall footprint for land use change is similar. These scenarios also look at redeveloping portions of the downtown area to incorporate some of the residential and non-residential growth. These scenarios all look to maintain existing parks and open space, while also creating new parks and open space within the Village. These scenarios include Buffer Zone/Open Space that protects the majority of the ecologically sensitive resources identified in this AUAR. The noted exception is the primary ecologically sensitive resources located adjacent to Reid Park.

These scenarios have the potential to impact the wildlife currently inhabiting the AUAR area. Especially wildlife habitat interspersed within agricultural lands and old fields; however these areas have a lower habitat value than natural and semi-natural areas, which include forests, woodlands, wetlands, and grasslands. These wildlife species will be forced to search and compete for food and shelter within other portions of the AUAR area or off-site. Birds will also be forced to search and compete for nesting locations once their current habitat is impacted. The proposed Buffer Zone/Open Space provides areas for wildlife to compete for food and nesting locations.

The following strategies are proposed to help mitigate potential impacts to wildlife habitat and environmentally sensitive resources.

- Revisit the location of the Buffer Zone/Opens Space to consider the inclusion of primary ecologically sensitive resources (e.g., primary areas adjacent to Reid Park) This may be compensated by considering the removal of non-ecologically sensitive resources that have been identified. Any modifications to the buffer will also need to address mitigating land use compatibility issues discussed in AUAR Item 9.
- Focus development on lands with lower habitat value areas (agricultural land)
- Keep remnant natural areas intact (large woodland in south central portion of AUAR area)
- Promote corridors to connect wildlife habitat on and off site. These corridors can be established as multi-functional greenway corridors that provide for wildlife movement, open space, trails, and areas for surface water management (e.g., infiltration BMPs).
- Enhance natural areas (through activities such as invasive brush removal, native wildflower seeding, and similar)
- Restore hydrology and vegetation of wetlands that are currently farmed
- Maintain steep slope areas
- Create a tree/woodland preservation policy

Development should be focused to encompass the lower quality habitat value areas including agricultural land with efforts made to maintain primary ecologically sensitive resources and secondary areas that are interspersed with or connected to primary ecologically sensitive areas.

Remnant natural areas including the woodland and forest located in the south central portion of the AUAR area should be left intact. The location of this particular woodland and forest area is adjacent to Reid Park with a similar habitat type. Habitat fragmentation should be avoided if possible. This habitat may be able to be included into the buffer area or the park may be expanded to encompass this habitat in order to maintain this natural area. Restoration efforts including invasive species removal on this area and the adjacent park land would help to mitigate for wildlife habitat loss on other portions of the AUAR area.

Buffer areas surrounding the Village should encompass quality natural resource habitats in order to

maintain these habitats and restore them. Restoring portions of the buffer, which are currently crop fields, back to native vegetation would create wildlife habitat while helping to mitigate for habitat loss over the entire AUAR area. This buffer would have the potential to serve as a corridor for wildlife to travel on and off-site.

Restoring the hydrology back to currently farmed wetlands along with seeding native vegetation and creating an upland buffer area are efforts to help mitigate for wildlife habitat loss. This mitigation strategy is also discussed in item 12 (Wetlands).

The majority of the AUAR area is flat to slightly rolling terrain with steep slopes greater than 18% located at the perimeter locations shown on Figure 16-2. The city may consider leaving these steep slopes intact and use these areas as natural green space buffers. These also will help in creating wildlife corridors throughout the AUAR area.

The city has adopted regulations for subdivisions to dedicate portions of land or cash equivalent for public use to the city's Park and Open Space Fund. Primary ecologically sensitive areas should be sought after in these situations to help keep these remnant areas intact. These include natural and semi-natural areas found throughout the AUAR area with natural areas taking a higher precedence over semi-natural areas (see Figure 11-1). If cash put up by the subdivider in lieu of land, the money could be used to:

- Purchase primary ecologically sensitive resources for passive parkland. This is consistent with principle recently adopted Lake Elmo Comprehensive Park and Recreation Plan that states: *the parks system shall showcase, preserve, and respect our city's natural resources, and the location of our natural resources shall guide the placement and uses of our parks.*
- Protect natural areas within parks (through activities such as invasive brush removal, native wildflower seeding, and similar)

Although not a direct replacement for wildlife habitat that may be lost during the development process, this approach can mimic some aspect of natural habitats, provide important food and shelter, and maintain or restore some level of connectivity for wildlife between otherwise isolated native habitat patches.

#### **Scenario D**

This development scenario differs from the other three scenarios. The land use footprint is smaller and the green buffer area is larger. The area that is proposed to be developed in this scenario focuses more on the downtown area where the others expand the residential development beyond the downtown core. Mitigation efforts are similar to those expressed for Scenarios A, B, and C. The majority of the expanded land use footprint for the other Scenarios consists of agricultural land. Each of the land use scenarios includes maintaining large areas of open space within existing parks and around the perimeter of the AUAR area as a non-developed buffer zone or green belt as the Comprehensive Plan identifies it.

Similar to Scenarios A, B, and C, Scenario D has the potential to impact the wildlife currently inhabiting the AUAR area. Especially wildlife habitat interspersed within agricultural lands and old fields; however these areas have a lower habitat value than natural and semi-natural areas (forests, woodlands, wetlands, grasslands). These wildlife species will be forced to search and compete for food and shelter within other portions of the AUAR area or off-site. Birds will also be forced to search and compete for nesting locations once their current habitat is impacted. The proposed Greenbelt provides areas for wildlife to compete for food and nesting locations. The same mitigation strategies for Scenarios A, B, and C apply to Scenario D (see previous discussion).

**12. Physical Impacts on Water Resources.** Will the project involve the physical or hydrologic alteration (dredging, filling, stream diversion, outfall structure, diking, impoundment) of any surface water such as a lake, pond, wetland, stream, drainage ditch?

Yes  No

If yes, identify water resource affected and give the DNR Protected Waters Inventory number(s) if the water resources affected are on the PWI. Describe alternatives considered and proposed mitigation measures to minimize impacts

***AUAR Guidelines:** The information called for on the EAW form should be supplied for any of the infrastructure associated with the AUAR development scenarios, and for any development expected to physically impact any water resources. Where it is uncertain whether water resources will be impacted depending on the exact design of future developments, the AUAR should cover the possible impacts through a "worst case scenario" or else prevent impacts through the provision of the mitigation plan.*

### EXISTING WATER RESOURCES INVENTORY

Hydrologic features in and near the AUAR area are shown on Figure 12-1. These features include DNR public waters, wetland, hydric soils (likely associated with drained wetland), and the 100-yr floodplain.

### DNR Public Waters

The DNR Protected Waters and Wetlands Inventory for Washington County (Minnesota DNR, 1996) indicates that two public waters lakes and four public waters wetlands are located within the AUAR area. Figure 12-1 depicts the locations of the DNR public waters.

**Table 12-1**  
**DNR Public Water Characteristics**

Name	DNR ID	Surface Area (acres)	OHW	Depth (Max.)	Fishing Resource	Public Access
Lake Elmo	82-106P	*284 (VBWD) *206 (DNR)	885.6 ft	137 ft	Managed primarily for walleye; northern pike, muskellunge, bluegill, and black crappie also present	Yes (boat launch, fishing pier, regional park)
Sunfish Lake	82-107P	50	896.4 ft	25 ft	-	Yes (city park)
(unnamed)	82-388W	-	-	-	-	-
Veronica Pond	82-391W	-	-	-	-	-
(unnamed)	82-460W	-	-	-	-	Yes (city park)
(unnamed)	82-484W	-	-	-	-	-
- indicates that data was not available						

\*There is an inconsistency in the surface area reported for Lake Elmo by the Valley Branch Watershed District and the MN Department of Natural Resources.

The DNR has jurisdiction over all activities that take place below the ordinary high water level (OHWL) in the basins listed above. The OHWL is a reference point that defines the DNR's regulatory authority over development projects that are proposed to alter the course, current, or cross section of public waters and public waters wetlands. For lakes and wetlands, the OHWL is the highest water level that has been maintained for a sufficient period of time to leave evidence upon the landscape. The OHWL is commonly that point where the natural vegetation changes from predominately aquatic to predominantly terrestrial.

**Wetlands**

Based on review of the National Wetlands Inventory (NWI), there is the potential for up to 20 additional areas of jurisdictional wetlands located within the AUAR area. These wetland areas are regulated by the Wetland Conservation Act (WCA) through Valley Branch Watershed District (VBWD) as the Local Government Unit (LGU) and may be regulated by the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act (CWA).

Any unavoidable impacts to wetlands within the AUAR area and any wetland replacement would need to occur in accordance with the rules of the WCA, CWA, and VBWD.

The Army Corps of Engineers, St. Paul District, regulates the discharge of fill into waters of the U.S. The jurisdictional status of wetlands under the CWA is dependent on wetlands being adjacent to traditional navigable waters or having a significant nexus to a tributary of navigable waters. In short, the Corps does not regulate isolated wetlands.

The WCA regulates excavation, fill, and drainage in most wetland types. The VBWD rules and regulations incorporate the WCA rules, but the rules also have additional wetland restrictions that are not included in the WCA. Most notably, the VBWD rules and regulations include dredging, ditching, and excavation as regulated activities in all wetlands as defined in the WCA. Excavation is only allowed within isolated wetlands of relatively low function and value assessment for the region or area, when no more than 50 percent of the wetland is impacted, and when all contiguous property owners join in the application.

Wetland delineations have been conducted within portions of the AUAR boundary. Figure 12-1 depicts all of the wetlands within the AUAR boundary according to the National Wetland Inventory database.

The Valley Branch Watershed District (VBWD) has conducted an assessment of wetlands throughout its watershed in partnership with the Washington Conservation District and Barr Engineering Company. The study is being conducted as part of the VBWD's water resource inventory in order to better protect wetlands remaining in the area. The information collected will be used as a planning tool by the VBWD and the 14 communities within the watershed to identify problems with individual wetlands and determine appropriate solutions. The information will be included in each community's local water resource management plan.

The VBWD assessment classifies wetlands into four categories: Preserve, Manage 1, Manage 2 and Manage 3. Preserve wetlands are the highest quality wetlands and receive the highest level of protection. They require an average 60 foot buffer with no change to existing hydrology with respect to bounce, inundation, and runout elevation. Manage 1 are medium quality wetlands, require an average 40 foot buffer and allow minor changes to hydrology characteristics. Manage 2 wetlands are lower quality, require an average 30 foot buffer and allow more flexibility in hydrology changes. There are no Manage 3 wetlands within the AUAR study area. The current VBWD rules also require the establishment or protection of a 16.5 foot wide upland buffer around wetlands for all permitted activities. For Sunfish Lake and Lake Elmo, the VBWD requires a minimum of a 35-foot wide buffer strip measured perpendicular to the ordinary high water level extending 35 feet inland.

**POTENTIAL IMPACTS ON WATER RESOURCES**

No projects are proposed within the AUAR area; therefore, the city is unaware of any potential wetland impacts that may be proposed by property owners/developers in the future. The city's goal is to work with property owners, developers, and VBWD to avoid all wetland impacts. Direct impacts may include fill and/or excavation associated with the construction of roads, the installation of utilities and other infrastructure improvements. Indirect impacts may include land cover alterations that could effect hydrology movement in the drainage area of individual wetland basins. Development in the uplands surrounding the wetlands may cause an increase in the amount of runoff and/or decrease in infiltration and groundwater recharge.

There are four proposed scenarios (A, B, C, and D) within the AUAR area which could potentially directly and/or indirectly impact wetlands as portions of the proposed development area contain wetlands. Each of the proposed land use scenarios includes maintaining large areas of open space within existing parks and around the perimeter of the AUAR area as a non-developed greenbelt/buffer zone. Potential water resources impacts are outlined below, by scenario, in an effort to identify the areas within the Village where the city will need to work with property owners/developers and VBWD to achieve the goal of no wetland impacts.

**Scenarios A, B, and C**

Scenario A, B and C all have the same land use change footprint with open space left within existing parks and in the proposed buffer zone around the edge of the AUAR area. The majority of the existing wetlands and water resources are within the proposed open space except for six wetlands that are identified in the VBWD assessment as shown in Figure 12-2. Potential impacts to wetlands are discussed below:

- Wetland 13-001 (Manage 2) is partially located within a new residential area and could have potential direct or indirect impacts.
- Wetland 13-004 ((Manage 2) is located within a new residential area and could have potential direct or indirect impacts.
- Wetland 13-006 (Manage 2) is located within a potential future redevelopment area and could have potential direct or indirect impacts associated with redevelopment or improvements to TH 5.
- Wetland 13-007 (Manage 1) is located within a new residential area and could have potential direct or indirect impacts.
- Wetland 13-008 (Manage 1) is partially located within a new residential area and could have potential direct or indirect impacts.
- Wetland 13-014 (Manage 2) is located within a new residential area and is part of a proposed storm pond, which was recommended to address existing flooding issues downtown (2004 Downtown Area Flooding Analysis). Because this wetland is a long linear type basin, it is likely that portions would be impacted by road and/or utility crossings. This is also the low point and outlet for a major watershed for the AUAR area (see Figure 17-1) therefore this Manage 2 wetland could be restored and incorporated into the stormwater system.

**Scenario D**

Scenario D would potentially have the least direct impacts on water resources of the four scenarios shown. Under this scenario, wetlands are predominately located within existing parks or open space and land use proposed as open space (Green Belt). The larger area of Green Belt under this scenario would provide for more protection from direct and indirect impacts to wetlands when compared to Scenarios A, B, and C; however, four wetland areas could potentially be impacted as discussed on the following page:

- Wetland 13-006 (Manage 2) is located within a potential future redevelopment area and could have potential direct or indirect impacts associated with redevelopment or improvements to TH 5.
- Wetland 13-007 (Manage 1) is located within the low density residential area and could have potential direct or indirect impacts.
- Wetland 13-008 (Manage 1) is partially located within the low density residential area and could have potential direct or indirect impacts.
- Wetland 13-014 (Manage 2) is located within the greenbelt; however, it is part of a proposed storm pond, which was recommended to address existing flooding issues downtown (2004 Downtown Area Flooding Analysis). This is also the low point and outlet for a major watershed for the AUAR area (see Figure 17-1) therefore this Manage 2 wetland could be restored and incorporated into the stormwater system.

### **MITIGATION SUMMARY**

All four scenarios propose to preserve the majority of the areas containing wetlands within open space. Many of these wetlands are within areas that are currently cultivated in annually planted crops. The proposal to put these areas into open space will provide an opportunity not only for avoidance of impacts but protection and restoration of the wetlands and adjacent upland habitats.

The majority of the wetlands previously discussed that may experience direct or indirect impacts are all classified as Manage 2 wetlands. The wetland management standards and guidelines contained in Appendix C to VBWD Rules allow for some bounce and inundation of Manage 2 wetlands from stormwater. With proper pretreatment as well as conformance to VBWD and city requirements, these wetlands could be integrated into a future stormwater system.

Two of the wetlands (13-007 and 13-008) that may experience direct or indirect impacts are classified as Manage 1 wetlands, which require an average 40 foot buffer and allow minor changes to hydrology characteristics. Wetlands 13-007 and 13-008 are located within the “primary” ecologically sensitive area surrounding Reid Park that was identified and discussed under AUAR Item 11. AUAR Item 11 discusses mitigation strategies for protecting primary ecologically sensitive areas.

Should wetland impacts be unavoidable under any of these scenarios, wetland replacement in the area, watershed, or wetland banking options must be explored. Replacement location sequencing should meet the priority siting as identified by the WCA and VBWD (following these principles in descending order: avoiding, minimizing, rectifying, reducing, and replacing the wetland). Also, wetland replacement should replace, at minimum, the impacted wetland(s) lost functions, values, and community type.

Additionally, indirect impacts to the wetlands should be minimized by focusing on the following strategies:

- Protection of recharge areas
- Maintain drainage area for wetlands
- Promote infiltration and/or filtration of surface runoff prior to reaching wetlands
- Establish and maintain buffers of native vegetation that meet or exceed the WCA, VBWD, or city standards.

13. Water Use. Will the project involve installation or abandonment of any water wells, connection to or changes in any public water supply or appropriation of any ground or surface water (including dewatering)?  Yes  No  
If yes, as applicable, give location and purpose of any new wells; public supply affected, changes to be made, and water quantities to be used; the source, duration, quantity and purpose of any appropriations; and unique well numbers and DNR appropriation permit numbers, if known. Identify any existing and new wells on the site map. If there are no wells known on site, explain methodology used to determine.

*AUAR Guidelines: If the area requires new water supply wells, specific information about the appropriation and its potential impacts on groundwater levels should be given; if groundwater levels would be affected, any impacts resulting on other resources should be addressed.*

### **WATER SYSTEM PLANNING**

The City of Lake Elmo completed the Old Village Study Area Comprehensive Water System Plan in 2004, and a city wide Comprehensive Plan (including water system component) adopted by the City Council in 2005. Both plans addressed the development of the Village.

In April of 2007, the city completed a ground-water modeling and well siting study to identify optimal locations for the future development of water supply wells for the city. This study was in response to the various perfluorochemical (PFC) and trichloroethene (TCE) contamination plumes. This study resulted in well site identification that will address the city's water quality, both aesthetic and regulatory, and its conformance to US Environmental Protection Agency (EPA) mandated contaminant levels.

The city is in the early stages of updating its Comprehensive Water System Plan.

### **EXISTING WATER SYSTEM**

The existing Lake Elmo water system dates back to the construction of Well No. 1 and a 75,000 gallon elevated water storage tank in 1961. In 2001, a second well (No. 2) was constructed to supply the needs of a new development north of the Village Area as well as future growth that might occur. Since these customers were located at ground elevations higher than the original system could supply, a second pressure service area was established. Well Pumphouse No. 2 was constructed with a 10,000 gallon hydro pneumatic tank to provide storage sufficient only to manage the operation of the well. Storage on the system is now provided by the original 75,000 gallon elevated water storage tank (1,057-ft overflow elevation) and a new 750,000 gallon elevated tank (1,125-ft overflow elevation), constructed in 2006. The Village Area water distribution system is composed of 6 inch through 12 inch lateral and trunk water mains. The two pressure service areas are currently separated by manual isolation valves.

### **Existing Well Supply**

Well No. 1 (Unique No. 611031) is a 20 inch diameter well and it was drilled to a depth of approximately 800 feet. Well No. 1 is a multiple aquifer well, deriving its water from the Jordan, Franconia/Ironton-Galesville, and Mt. Simon aquifers. Well No. 1 is located in the AUAR area, and in both the Baytown and Lake Elmo-Oakdale Special Well Construction Areas. This well does not conform to existing well codes since it interconnects multiple aquifers across confining formations, a condition which could spread known contaminants into deeper aquifers should the nearby contamination plume migrate to this well. For this reason, the city has considered replacing Well No. 1. Well No. 1 has a maximum pumping rate of 500 gallons per minute (gpm).

Well No. 2 (Unique No. 603085) is an 18 inch well and it was drilled to a depth of 285 feet. Well No. 2 appropriates its supply from the Prairie du Chien-Jordan formation. Well No. 2 is currently outside of both the Baytown and Lake Elmo–Oakdale Special Well Construction Areas. This well conforms to all applicable codes and produces 1,000 gpm.

Well No. 3 (Unique No. 655910) is a 24 inch well drilled in the Prairie du Chien-Jordan aquifer to a depth of 422 feet. Well No. 3 is located in Eagle Point Business Park in the southwest corner of the city near Interstate 94, and is in the Lake Elmo–Oakdale Special Well Construction Area. This well has never been used, and does not currently have a pump or pumphouse. While this well should eventually be capable of serving the high service area of the Lake Elmo water system (1,175-ft overflow elevation), it may need treatment, and approximately 2.5 mile trunk watermain extension to connect it to the existing and Village Area water distribution systems. This well conforms to all applicable codes, and was test pumped at 1,200 gpm.

### **Existing Water Use and Needed Well Capacity**

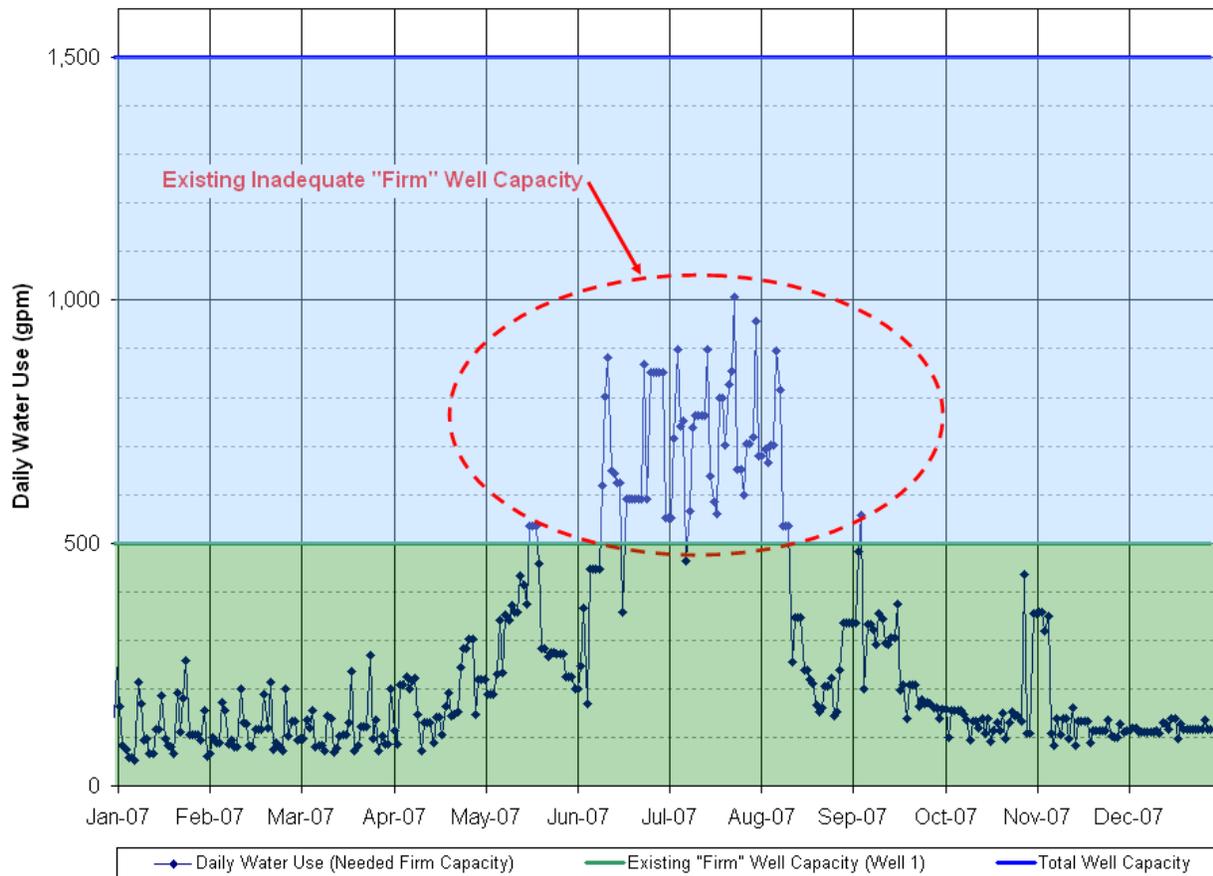
Peak day water use is a useful indicator of the needed (well) supply capacity of a system. Typically a community should have enough “firm” well capacity to supply the yearly peak day demand of the system. The “firm” capacity is defined as the capacity that would be available if the highest capacity well were removed from service due to maintenance, failure, or an emergency event.

The existing firm pumping capacity of the Village Area water system is 500 gpm. Both the 2004 Comprehensive Water Plan, and the 2005 Comprehensive Plan projected the need for a new well to be placed into service sometime after 2006, suggesting that the city is currently deficient in “firm” well capacity. After the need for additional well capacity was documented in both 2004 and 2005, a number of Lake Elmo households connected to the city’s water system in 2006 due to PFC pollution issues with private wells. Illustration 13-1 on the following page provides a graphical representation of daily water pumping for the year 2007. The city’s water use exceeded the firm well capacity for a two month period from early June to early August.

The city should provide additional “firm” well capacity as soon as feasible to support the existing population, and before allowing any significant expansion of the water system to occur. The most likely way to provide this capacity would be to construct a new well. It typically takes 2 years from the time the need for a new well is identified, to when that well can actually begin pumping water to the system. Other options include trying to increase the capacity of Well No. 1, placing Well No. 3 into service, or relying on interconnects with neighboring communities to supply water during an emergency. Each option presents its own benefits and unique challenges, and should be fully evaluated before a decision is made.

Of secondary note is that the Village water system is currently split between two pressure service areas. If Well No. 2 were lost due to maintenance or failure, it is possible that Well No. 1 may not have enough head (pressure) capacity to adequately fill the new elevated water tank to an acceptable level. This will present two potential problems to the water system. The first is reduced pressures during the outage, and the second and more important consequence would be the potential loss of fire storage for the duration of the outage. Oakdale may be able to supply some water in an emergency, but during peak summer conditions, the available water may be limited. The city will evaluate emergency water supply sources in its forthcoming Water System Plan update.

**Illustration 13-1  
2007 Daily Water Pumping**



Finally, to maintain a reliable source water supply, it is generally recommended that well pumps be removed every 5 – 10 years for maintenance and repair. Pumps that are operated on hydropneumatic tanks are typically subject to frequent starts and stops, and may have a maintenance frequency that is closer to every 5 years. Well No. 2 was drilled in 2001, and likely placed into service in 2002. At some point in the near future (but not during the water season), the city should consider removing the pump for Well No. 2 for inspection, maintenance, and repair.

**Existing Water Storage**

Water storage to the Village Area water system is provided by a 75,000 gallon elevated water storage tank serving the low pressure service area. A second, 750,000 gallon elevated storage tank was constructed adjacent to the new public works facility along Highway No. 5, and placed into service in 2006. This tank is connected to the middle pressure service area (Well No. 2 - 1,125-ft overflow elevation) to serve the north and west parts of Lake Elmo. The two pressure areas are currently separated by manual isolation valves.

Average day water use is a useful indicator of the needed storage capacity. Typically, communities should have a storage volume equal to or greater than the average daily use, and this volume should include a reasonable fire fighting reserve. This requirement may be reduced when the source water has

sufficient standby power capacity to maintain production during a power outage. The average day demand in 2007 was 388,000 gallons. Therefore, the existing 750,000 gallon and 75,000 gallon elevated water storage tanks will provide adequate storage for the AUAR area.

### **Existing Distribution System**

The Village Area water distribution system consists of watermain varying in size from 6 inch to 12 inch. The system lacks good hydraulic transmission capability and redundancy due to the watermain size and lack of looping. The Old Village Study Area Comprehensive Water System Plan identified a handful of locations throughout the system that were unable to meet the basic fire flows. However, the hydraulics of the distribution system have changed since that study was complete, particularly with the addition of the new elevated tank and modification of pressure zone boundaries.

When the updated Comprehensive Water System Plan is complete, it is expected to provide a plan for sizing and location of future trunk and lateral watermains, including trunk water mains to be installed in the Village Area as development occurs. The proposed distribution system, once constructed, should correct the deficiencies and weaknesses of the existing system (i.e. provide looping to create a more reliable source supply, increased capacity for better fire protection, provide better circulation of water).

### **Existing Wellhead Areas**

The City of Lake Elmo is currently in the process of developing a Part 2 Wellhead Protection Plan, which will outline management strategies for lands that fall within the delineated Drinking Water Supply Management Areas (DWSMAs). A draft of the Part 2 plan was sent out to local units of government on May 14, 2008 for public review. It is anticipated that the final draft of the plan will be submitted to the Minnesota Department of Health in July 2008 for review and approval. The anticipated approval date is no earlier than October 2008.

The DWSMA for Well No. 1 overlaps with much of the AUAR area as shown on Figure 13-1; it is anticipated that development within the area will need to be coordinated with the Wellhead Protection Manager to ensure that future contamination events do not occur in sensitive drinking water source areas. If the city decides to re-construct or abandon the multi-aquifer Well No. 1 to eliminate the potential for cross-aquifer contamination, the size, shape, and vulnerability of the DWSMA may change.

## **WATER SYSTEM NEEDS FOR NEW DEVELOPMENT**

### **Future Water Supply**

Future wells are recommended to be drilled into the Prairie du Chien-Jordan aquifer to maintain a consistent water quality to existing Well Nos. 2 and 3. New wells are not anticipated to affect individual wells drilled into the glacial drift in either the AUAR area or any other parts of Lake Elmo. Due to the poor bedrock geology and the Special Well Construction Areas (SWCA), future well sites will be located according to the Ground-Water Modeling and Well Siting report dated April 2007. This study was completed to identify the placement of future wells to take into consideration the location of contamination plumes in the areas of Oakdale, Lake Elmo, and Baytown Township. SWCAs have been established by the Minnesota Department of Health (MDH) to limit new well construction in areas shown to have contamination (see Figure 13-2). In addition, the MDH may limit the placement of high capacity wells in areas immediately outside the SWCAs out of concern that high volume pumping may draw contamination plumes into areas not previously impacted by contamination. Addition of new wells will require working closely with the MDH and MPCA to determine locations best suited for new wells.

Average day and peak day water demand projections were made for each of the AUAR development scenarios. These flow estimates are based on 95 gallons per capita per day (gpcd) for average day demand, and 368 gpcd for peak day demand (from Metropolitan Council Technical Report – Water Supply Planning in the Twin Cities Metropolitan Area published in January 2007). These estimates include both residential and non-residential water demand.

**Table 13-1  
Water Demand Projections**

<b>Development Scenario</b>	<b>Population Added</b>	<b>Average Day (GPD)</b>	<b>Peak Day (GPD)</b>
A	1,650	156,750	607,200
B	2,750	261,250	1,012,000
C	4,400	418,000	1,619,200
D	2,492	236,740	917,056

Note that this table doesn't include the water demand of the existing water system. The existing (2007) average day demand was 388,000 gallons per day (GPD), and peak day demand was 1,450,000 GPD.

Table 13-2 compares the average demand generated for each of the scenarios and includes the demand from the existing water system.

**Table 13-2  
Cumulative Water Demand Projections (Existing and Future)**

<b>Development Scenario</b>	<b>Average Day (GPD)</b>	<b>Peak Day (GPD)</b>	<b>Peak Day (GPM)</b>
A	544,750	2,057,200	1,429
B	649,250	2,462,000	1,710
C	806,000	3,069,200	2,131
D	624,740	2,367,056	1,644

Serving Scenario A would require not require the addition of a new well beyond the additional capacity needed to increase the city's "firm" pumping capacity. All other scenarios would likely require 1 additional well. However, water supply needs must be evaluated for the system as a whole, and not just a small part of the system. Growth elsewhere in the system could trigger much larger supply needs. When the updated Comprehensive Water System Plan is complete, it should address the storage needs for the system as a whole.

#### **Future Water Storage**

Average day water use is a useful indicator of the needed storage capacity. Scenario C generates the largest average day demand of 806,000 GPD (including water demand of the existing system). Current storage capacity is 825,000 Gallons, which should be sufficient to meet all scenarios. However, storage needs must be evaluated for the system as a whole, and not just a small part of the system. While growth within the Village Area may not trigger the need for additional storage, growth elsewhere in the system could trigger this need. When the updated Comprehensive Water System Plan is complete, it should address the storage needs for the system as a whole.

### Water Conservation

In 2004, Lake Elmo's per capita water use rates were approximately 63 gpcd for average day residential use, and 284 gallons per capita per day (gpcd) for peak day water use. These levels are reasonable for existing communities with well established lawns and landscapes. Growing communities oftentimes experience larger per capita use, typically on the order of 90 gpcd residential use, and frequently in excess of 350 gpcd for peak day water use. Allowing the per capita water use to increase unchecked could easily increase the number of needed wells, and the needed storage capacity. The DNR has set a goal of 75 gpcd for residential use, and a ratio of 2.6 for peak day to average day use, and has increased their efforts to encourage cities to work towards these goals. The city should be proactive in implementing water conservation measures early before water use has a chance to experience upward pressure.

### Distribution System

When the updated Comprehensive Water System Plan update is completed, it is expected to provide a plan for sizing and location of future trunk and lateral water mains, including trunk water mains to be installed in the Village Area as development occurs. Watermain construction in the Village should follow these recommendations.

### EXISTING WATER WELLS

A search through state databases identified 38 wells located within the AUAR area. These wells are a mixture of domestic, irrigation, municipal, public supply, monitoring, and remedial wells. Wells identified are listed in Table 13-3 and are shown in Figure 13-3.

**Table 13-3**  
**Wells Identified within AUAR Area**

Well Unique Number	Well Name/Owner	Address	Depth (feet)	Aquifer	Well Use
151703	Schwartz, Jean	3141 Klondike Avenue	130	Prairie du Chien	Domestic
208448	Lake Elmo No. 1	3303 Langly Court	805	Jordan-FIG-Mt.Simon	Municipal
255824	Christ Lutheran Cemetery	Stillwater Boulevard	NA	NA	Irrigation
267647	Hagberg's Country Market	11325 Stillwater Boulevard	119	Drift	Public Supply
404199	Riley, Pat	10550 Stillwater Boulevard	80	Prairie du Chien	Domestic
420376	Wier, Jed	10875 43rd Street North	100	Prairie du Chien	NA
424114	Kromschroeder, Jerry	10823 32nd Street North	94	Prairie du Chien	Domestic
457703	Eischen, Robert	1674 Stillwater Boulevard	138	Prairie du Chien	Domestic
469849	Bruchu, Todd	3150 Klondike Avenue	80	Prairie du Chien	Domestic
484963	MW-10B	11325 Stillwater Boulevard*	98	Prairie du Chien	Monitoring
513724	NA	4455 Lake Elmo Avenue	86	Prairie du Chien	Domestic
523526	MW-13	11325 Stillwater Boulevard*	110	Drift-Prairie du Chien	Monitoring
523527	MW-14	11325 Stillwater Boulevard*	205	Drift	Monitoring
526319	Schiltgen Farms	10843 Stillwater Boulevard	120	Prairie du Chien	Domestic
544430	Eder, Willard	3407 Lake Elmo Avenue	330	Jordan	Domestic
628258	Creative Office Gardens	11550 Stillwater Boulevard	93	Drift	Public Supply
705442	Schiltgen, Peter	11351 Upper 33rd Street North	103	Prairie du Chien	Monitoring
720611	MW-18	11325 Stillwater Boulevard*	53	Drift	Monitoring

Well Unique Number	Well Name/Owner	Address	Depth (feet)	Aquifer	Well Use
720612	MW-17	11325 Stillwater Boulevard*	46	Drift	Monitoring
720613	MW-19	11325 Stillwater Boulevard*	49	Drift	Monitoring
720614	MW-20	11325 Stillwater Boulevard*	44	Drift	Monitoring
730015	Minnesota Pollution Control Agency	11325 Stillwater Boulevard*	85	Drift	Remedial
730018	Minnesota Pollution Control Agency MW-A	11325 Stillwater Boulevard*	80	Drift	Monitoring
730019	Minnesota Pollution Control Agency MW-B	11325 Stillwater Boulevard*	80	Drift	Monitoring
730020	Minnesota Pollution Control Agency MW-D	11325 Stillwater Boulevard*	42	Drift	Monitoring
730021	Minnesota Pollution Control Agency MW-E	11325 Stillwater Boulevard*	80	Drift	Monitoring
730022	Minnesota Pollution Control Agency	11325 Stillwater Boulevard*	80	Drift	Monitoring
736134	MW-26	11325 Stillwater Boulevard*	70	Drift	Monitoring
736135	MW-27	11325 Stillwater Boulevard*	73	Drift	Monitoring
736136	MW-28	11325 Stillwater Boulevard*	80	Drift	Monitoring
741716	MW-29	11325 Stillwater Boulevard*	41	Drift	Monitoring
753121	Hagberg's Country Market	11325 Stillwater Boulevard*	50	Drift	Remedial
753122	Hagberg's Country Market	11325 Stillwater Boulevard*	80	Drift	Remedial
757611	RW-2	11325 Stillwater Boulevard*	80	Drift	Remedial
757612	RW-3	11325 Stillwater Boulevard*	83	Drift	Remedial
757613	Hagberg's Country Market	11325 Stillwater Boulevard*	76	Drift	Remedial

\* = Address represents parcel the monitoring/remedial wells are associated with. Actual locations for certain wells be fall outside of parcel.

NA = Information not available

Of the wells identified in the AUAR area, 23 wells are associated with the Hagberg's Country Market, located at 11325 Stillwater Boulevard. This property is thought to be the source site for the contamination that makes up the Baytown Plume. The wells are a mixture of monitoring and remedial wells, with one additional well in use for water supply for Hagberg's Country Market. Not all wells associated with this address may be located on this parcel. Some wells may be located on nearby parcels. It is expected that the monitoring and remedial wells will be in place for as long as deemed necessary by the Minnesota Pollution Control Agency. Abandonment of these wells is not likely to occur in the near future, since cleanup is expected to be ongoing over several years.

In addition to the discussion under Wellhead Protection Areas, it is possible that Well No. 1 may need to be abandoned. Since Well No. 1 was constructed as a multi-aquifer well, its construction risks the spread of known contaminants into deeper aquifers should the nearby contamination plume migrate to this well. The MDH has indicated their concern for its continued use. Well No. 1 may either be redeveloped and upgraded to bring the well into compliance with current well construction code, or abandoned and replaced with a well at a new site.

A number of other private wells already exist within the boundaries of the AUAR area. Identified wells are included in Table 13-3 and Figure 13-3. It is possible that other wells may exist within the AUAR area that are not accounted for in state databases, so it will be necessary to remain vigilant for additional wells during construction of the AUAR area. When development occurs, some properties may develop that have existing wells on them. It may be necessary to abandon and seal these wells according to the Minnesota Well Code at the time of development, if the wells will no longer be used. Also, since much of the AUAR areas is overlapped by the SWCAs, the MDH may have additional requirements for sealing wells in these areas. It will be necessary to coordinate any well sealing activities with the MDH to ensure all proper well management steps are taken.

## **APPROPRIATION OF GROUND OR SURFACE WATER**

### **Groundwater**

State and regional agencies responsible for managing water resources supplies indicate that areas experiencing rapid development over time may experience a drop in groundwater levels. While this has not been experienced in Lake Elmo, water levels should be monitored on a regular basis.

Lake Elmo is currently permitted under DNR Water Appropriations Permit Number 611031, withdrawing water from the two public supply wells previously discussed.

### **Dewatering**

One or more temporary Minnesota DNR Water Appropriation Permits may be necessary to conduct construction dewatering. Dewatering may be necessary during construction to install sanitary sewer, municipal water, and storm sewer in some areas. Contractors will carry out these activities on a case-by-case basis at the minimum duration and quantity necessary to construct utility service for the affected sites. The quantity and duration of construction dewatering is not known at this time, but dewatering activities will be temporary. Groundwater appropriated for construction dewatering purposes will be discharged into temporary or permanent ponds located with the AUAR Area.

A temporary DNR Water Appropriations Permit will be required if construction dewatering and pumping from development exceeds 10,000 gallons per day or 1,000,000 gallons per year. These thresholds trigger the need for a DNR Appropriations Permit.

## **MITIGATION SUMMARY**

The mitigation plan includes the following recommendations to improve the reliability of the City of Lake Elmo water system in the AUAR area and throughout the city:

### **Existing Water System Needs**

- Recent studies (2004 Comprehensive Water Plan, 2005 Comprehensive Plan) and daily water pumping records for the year 2007 suggest the city is currently deficient in “firm” well capacity. Current capacity is 500 gallons per minute (gpm). After the need for additional well capacity was documented in both 2004 and 2005, a number of Lake Elmo households connected to the city’s water system in 2006 due to PFC pollution issues with private wells. The city should provide

additional “firm” well capacity as soon as feasible to support the existing population, and before allowing any significant expansion of the water system to occur. Therefore, a new well is needed with or without development under the four scenarios.

- The existing Village water distribution system lacks good hydraulic transmission capability and redundancy due to the watermain size and lack of looping. The proposed distribution system, once constructed, should correct the deficiencies and weaknesses of the existing system (i.e. provide looping to create a more reliable source supply, increased capacity for better fire protection, provide better circulation of water).
- The Village water system is currently split between two pressure service areas, which may result in problems (for example if Well No. 2 is lost due to due to maintenance or failure). In that situation, it is possible that Well No. 1 may not have enough head (pressure) capacity to adequately fill the new elevated water tank to an acceptable level. This will present two potential problems to the water system - reduced pressures during the outage and potential loss of fire storage for the duration of the outage. Neighboring communities may be able to supply water in an emergency, but during peak summer hour conditions, the available water may be limited. The city will evaluate emergency water supply sources in its forthcoming Water System Plan update.
- To maintain a reliable source water supply, it is generally recommended that well pumps be removed every 5 – 10 years for inspection, maintenance and repair. At some point in the near future, but not during the watering season, the city should consider removing Well No. 2 for inspection, maintenance, and repair.

**Water System Needs for New Development**

- A summary of additional water supply needed (assuming 1,000 gpm well capacity and 368 gpcd peak day demand) is presented in Table 13-4.

**Table 13-4  
Summary of Additional Water Supply Needed**

Scenario	Supply needed to meet existing conditions	Additional supply needed to satisfy AUAR area demands	Total Supply Needed
A	1 well	0 wells	1 well
B	1 well	1 well	2 wells
C	1 well	1 well	2 wells
D	1 well	1 well	2 wells

Scenario A would be adequately served with the one new well needed to serve the existing population, assuming 1,000 gpm capacity and Well No. 1 remains in service, for a total supply capacity of 2,500 gpm.

Scenarios B, C, or D would require one new well in addition to the one new well needed to serve the existing population, assuming 1,000 gpm capacity for each well and that Well No. 1 remains in service, for a total supply capacity of 3,500 gpm.

- To maintain conformance to DNR goals for water use during periods of growth, the city should be proactive in implementing water conservation measures early before water use has a chance to experience upward pressure.

**Water Supply Planning**

- Water supply needs must be evaluated for the system as a whole, not just a small part of the system (e.g., the Village Area). Growth elsewhere in the system could trigger much larger supply needs. When the updated Comprehensive Water System Plan is complete, it should address the supply and storage needs for the system as a whole, as well as provide a plan for the sizing and location of the distribution system components.

14. Water-Related Land Use Management Districts. Does any part of the project involve a shoreland zoning district, a delineated 100-year flood plain, or a state or federally designated wild or scenic river land use district? If yes, identify the district and discuss project compatibility with district land use restrictions.  
 Yes    No

*AUAR Guidelines: Such districts should be delineated on appropriate maps and the land use restrictions applicable in those districts should be described. If any variances or deviations from these restrictions within the AUAR area are envisioned, this should be discussed.*

#### **CITY FLOOD CONTROL ORDINANCE**

The City of Lake Elmo has a Flood Plain District that regulates uses in the floodplain. Portions of Lake Elmo and Sunfish Lake fall within the AUAR area and are under the regulation of the city's Flood Plain District. Permitted uses in the Flood Plain District shall have low flood damage susceptibility, be permissible in the underlying zoning district, not obstruct flood flows or increase flood elevations and shall not involve structures, fill, obstructions, excavations, or storage of materials or equipment.

No structure (temporary or permanent), fill (including fill for roads and levees), deposit, obstruction, storage of materials or equipment, or other uses may be allowed as a conditional use that will cause any increase in the stage of the (100-year) regional flood or cause an increase in flood damages in the reach or reaches affected. Conditional uses must be permissible in the underlying zoning district.

All new principal structures in the Flood Plain district must have vehicular access at or above the regulatory flood protection elevation. Accessory land uses, such as yards, railroad tracks, and parking lots, may be at elevations lower than the regulatory flood protection elevation. Fill shall be properly compacted and the slopes shall be properly protected by the use of rip-rap, vegetative cover, or other acceptable method. Flood plain developments shall not adversely affect the hydraulic capacity of the channel and adjoining flood plain of any tributary water course or drainage system where a floodway or other encroachment limit has not been specified on the official zoning map. All dwelling units must be at least 20 feet wide through the main living area of the structure. The structure must have continuous frost footings. Travel trailers, travel vehicles, and manufactured homes are prohibited in the flood plain district.

The Federal Emergency Management Agency (FEMA) is in the process of updating its Floodplain maps for the city. The Floodplain data provided by VBWD (see Figure 12-1) is generally consistent with the updated FEMA map (currently in draft form). The final FEMA map will need to be incorporated into the city's Floodplain District Ordinance to regulate development within newly identified floodplain areas. The new Floodplain map and future ordinance update will result in more areas being regulated by the Floodplain District. For example, many floodplain areas associated with wetlands have been added that were not included in the previous floodplain maps. VBWD will continue to use its floodplain data to implement its rules and regulations regarding activities affecting floodplain areas. Any development proposed in an area designated as floodplain by VBWD, FEMA, or the city will need to work with these entities to ensure compliance with floodplain regulations.

**SHORELAND AREA**

The City of Lake Elmo has a Shoreland District (shown on Figure 27-1 Current Zoning Districts), with regulations provided in the Zoning Ordinance. None of the scenarios include development within the riparian shoreland of Sunfish Lake or Lake Elmo. Scenarios A, B, and C propose residential development within the shoreland area of Lake Elmo located between TH 5 and the railroad tracks. No deviations or variances from the regulations area anticipated. If the city were to allow sewer residential development within shoreland areas, then the Shoreland District ordinance would need to be updated to address sewer residential uses. However, there are no plans for sewer development in the Shoreland District.

The city's basic Shoreland District regulations regarding lot dimensions requirements are summarized in tables 14-1 – 14-4. The Shoreland Ordinance also sets additional requirements, including shoreland and vegetation alterations, grading and draining, surface cover restrictions, and erosion control. Two lakes are in the AUAR area, Sunfish Lake and Lake Elmo. In terms of shoreland management, Sunfish Lake is classified as a Natural Environment Lake and has an ordinary high water level of 896.4 feet. Lake Elmo is classified as a Recreational Development Lake and has an ordinary high water level of 885.6 feet.

The following information regarding natural environment and recreational development lakes is from "Shoreland Management Classification System for Public Waters" (DNR Division of Waters, 1976).

**Natural Environment Lakes** usually have less than 150 total acres, less than 60 acres per mile of shoreline, and less than three dwellings per mile of shoreline. They may have some winter kill of fish; may have shallow, swampy shoreline; and are less than 15 feet deep. This classification is intended for those waters that need a significant amount of protection because of their unique natural characteristics or their unsuitability for development and sustained recreational use. They are assigned the most restrictive development standards. The management goals and objectives for these lakes are to:

- Preserve and enhance high quality waters by protecting them from pollution
- Protect shorelands of waters which are unsuitable for development
- Maintain a low density of development
- Maintain high standards of quality for permitted development

**Recreational Development Lakes** usually have between 60 and 225 acres of water per mile of shoreline, between 3 and 25 dwellings per mile of shoreline, and are more than 15 feet deep. This classification is intended for waters which are capable of absorbing additional development and recreational use. They are usually lightly to moderately developed at the time of classification and are assigned an intermediate set of development standards. The management goals and objectives for these lakes are to:

- Provide management policies reasonably consistent with existing development and use
- Provide for the beneficial use of public waters by the general public as well as riparian owners
- Provide a balance between the lake resource and lake use
- Provide for a multiplicity of lake uses
- Protect areas unsuitable for residential and commercial use from development

**Table 14-1  
City of Lake Elmo Shoreland District Regulations Summary – Lot Area**

<b>Shoreland Zone</b>	<b>Natural Environment Lakes</b>	<b>Recreational Development Lakes</b>
Lot Area: RESIDENTIAL ESTATES (RE) (No sewer) Riparian Non-Riparian	2.5 acres 2.5 acres	2.5 acres 2.5 acres
Lot Area: ONE FAMILY RESIDENTIAL (R1) (No sewer) Riparian Non-Riparian	80,000 s.f. 80,000 s.f.	1.5 acres 1.5 acres
Lot Area: RURAL RESIDENTIAL (RR) (No sewer) Riparian Non-Riparian	10 acres 10 acres	10 acres 10 acres
Lot Area: AGRICULTURE (AG) (No sewer) Riparian Non-Riparian	40 acres 40 acres	40 acres 40 acres
Lot Area: OPEN SPACE PRESERVATION DISTRICT (OP) (No sewer) Riparian Non-Riparian	0.5 acres 0.5 acres	--- ---
Lot Area: MOBILE HOME PARK (R3) (Sewer) Riparian Non-Riparian	40,000 s.f. 20,000 s.f.	20,000 s.f. 15,000 s.f.
Lot Area: GENERAL BUSINESS (GB) (Sewer) Riparian Non-Riparian	3.5 acres 3.5 acres	3.5 acres 3.5 acres
Lot Area: BUSINESS PARK (BP) (Sewer) Riparian Non-Riparian	3 acres 3 acres	3 acres 3 acres

**Table 14-2**  
**City of Lake Elmo Shoreland District Regulations Summary – Lot Width**

<b>Classification</b>	<b>Riparian Lot (No Sewer)</b>	<b>Riparian Lot (With Sewer)</b>	<b>Non-Riparian Lot (No Sewer)</b>	<b>Non-Riparian Lot (With Sewer)</b>
Natural Environment Lakes	200 ft.	200 ft.	200 ft.	N/A
Recreational Development Lakes	150 ft.	150 ft.	150 ft.	N/A

Table 14-3 describes the required setbacks from the ordinary high water level of each type of lake.

**Table 14-3**  
**City of Lake Elmo Shoreland District Regulations Summary – Setbacks**

<b>Classification</b>	<b>Structures</b>	<b>Sewage Treatment System</b>
Natural Environment Lakes	150 ft.	150 ft.
Recreational Development Lakes	100 ft.	75 ft.

The Shoreland District ordinance also details additional setbacks, as seen in Table 14-4.

**Table 14-4**  
**City of Lake Elmo Shoreland District Regulations Summary – Additional Setbacks for Structures**

<b>Setback From</b>	<b>Setback in feet</b>
Top of bluff	30
Unplatted cemetery	50
Right-of-way line of federal, state or country highways	50
Right-of-way line of town road, public street, or other roads or streets not classified	30

#### **WILD AND SCENIC RIVER**

No part of the AUAR area has been designated as a wild or scenic river. However, ultimately most of the drainage from the Village Area discharges to the St. Croix River which is classified as a Wild and Scenic River. In 1994, the St. Croix Basin Water Resources Planning Team, comprised of representative from state, federal, and local units of government and other organizations, developed water resource goals for the river. The team later determined nutrient and sediment loading to be the top issue affecting the water quality in the St. Croix River, and the team has recommended a 20% reduction in the total phosphorus loading within the St. Croix River Basin. See AUAR Items 16 and 17 for additional discussion regarding sedimentation and water quality. Given the requirements and opportunities for water quality treatment, no significant adverse impacts to the St. Croix are anticipated.

#### **MITIGATION SUMMARY**

- After the FEMA floodplain maps are updated, the city will update its Floodplain Management ordinance and official map to regulate all development within the floodplain.
- If the city were to allow sewer residential development within shoreland areas, then the Shoreland District ordinance would need to be updated to address sewer residential uses.

15. Water Surface Use. Will the project change the number or type of watercraft on any water body?  Yes  No  
If yes, indicate the current and projected watercraft usage and discuss any potential overcrowding or conflicts with other uses.

*AUAR Guidelines:* This item need only be addressed if the AUAR area would include or adjoin recreational water bodies.

As shown on Figure 12-1, there are several waterbodies located partially or wholly within the AUAR area, including two lakes – Lake Elmo and Sunfish Lake. As discussed in Item 14, Lake Elmo is classified by the DNR as a recreational development lake and is used for fishing, swimming, water skiing, and recreational boating. Sunfish Lake is classified a natural environment lake and is used for fishing (mostly from shore), canoeing, and occasionally by lakeshore residents for swimming, although there is no official swim beach. Other waterbodies in the AUAR area may also be used for fishing and non-motorized boating.

With any of the proposed development scenarios, the population of Lake Elmo is expected to increase. None of the scenarios propose additional development directly adjacent to Lake Elmo or Sunfish Lake, nor do any of the scenarios propose new or expanded boat accesses to the lakes. However, it can be anticipated that some of the new residents within the AUAR area will utilize the area waterbodies for boating.

Only Lake Elmo has an official public access for boats. There is no official boat access to Sunfish Lake and no future plans for creating a boat access to the lake. The Lake Elmo public access is located within the Lake Elmo Park Reserve, on the western side of the lake, and is maintained by Washington County. The boat launch is open from 6 a.m. to ½ hour after sunset. It is closed in the winter. A parking lot with 20 vehicle/boat trailer spaces is provided at the launch. If there are no parking spaces available, it is not permissible to launch a boat. Overflow parking outside of the Lake Elmo public boat launch parking area is not permitted in the Lake Elmo Park Reserve. “No Parking” signs are posted and strictly enforced by Washington County. In addition, the City of Lake Elmo has established parking prohibitions along some of the roads near Lake Elmo outside of the park reserve, including the south 100 feet of Klondike Avenue to the dead end, and 32<sup>nd</sup> Street from Lampert Avenue to Klondike Avenue. These parking restrictions are outlined in City Code, Title VII Traffic Code, Chapter 73 Parking Schedules.

Providing a limited number of parking spaces is a means to control/manage boat traffic on a water body such as Lake Elmo. The Lake Elmo Park Reserve Master Plan (Washington County, 2006) indicates that improvements (not expansion) are planned for the Lake Elmo boat landing in the future.

The potential issues of overcrowding and conflicting uses can be managed in a variety of ways. The most widely used management tool is zoning. Water surface use is addressed in Lake Elmo’s City Code, Title IX General Regulations, Chapter 97 Parks and Recreation. The following parts of the City Code address lake access and watercraft launching.

## § 97.21 WATERCRAFT AND WATER SURFACE USE REGULATIONS.

(F) *Non-public lake access.* No person, except riparian owners, shall launch a watercraft or gain access to or egress from a lake other than at a designated public access point except in the case of any emergency or except with the written permission of the riparian lot owner. A person who has written permission to launch a watercraft from a riparian lot shall park their vehicle(s) and trailer(s) on the lot of the riparian owner. Riparian lot owners who grant permission to use their property as a launch site shall otherwise comply with all of the land use regulations of the city.

(G) *Public launching areas.* No person shall launch a watercraft or gain access to or egress from a lake except from a public right-of-way or other public park area in those locations specifically designated and posted for the purpose.

The additional use that could be anticipated is not expected to overwhelm the lake, or result in significant congestion on the water. According to DNR information collected in the past, boat use on a lake is generally limited by the number of parking spaces at a public boat launch and the number of residents with direct lake access. None of the development scenarios would change either of these conditions. As is currently the case, overuse and crowding will be controlled through limited access to the waterbodies, such as by the number of parking spaces available at the Lake Elmo public boat launch.

16. Erosion and Sedimentation. Give the acreage to be graded or excavated and the cubic yards of soil to be moved: NA acres NA cubic yards. Describe any steep slopes or highly erodible soils and identify them on the site map. Describe any erosion and sedimentation control measures to be used during and after project construction.

*AUAR Guidelines: The number of acres to be graded and number of cubic yards of soil to be moved need not be given; instead, a general discussion of the likely earthmoving needs for development of the area should be given, with an emphasis on unusual or problem areas. In discussing mitigation measures, both the standard requirements of the local ordinances and any special measures that would be added for AUAR purposes should be included.*

### SOIL TYPES

The Soil Survey of Washington County Version 3 Aug 2006 and a WEB based soil survey from the Natural Resources Conservation Service (NRCS) were used to assess existing soils and erodibility potential. Most of the soils described in the soil survey and located in the AUAR were classified as silt loams, sandy loams and loamy fine sands. These soils vary from well drained to poorly drained depending on their location within the AUAR area. Most of the soils are of hydrologic groups A and B which indicates they have high to medium high infiltration rates. General characteristics of the soils within the AUAR as identified in the soils information are presented in Table 16-1. Figure 16-1 depicts the locations of the soil types. The soil map unit symbol in the table below corresponds to the soils figure.

**Table 16-1**  
**Soil Characteristics within AUAR Area**

Soil Map Unit Symbol	Soil Name	% Slope	Soil Erodibility Factor (K-Factor)*	Soil Erodibility Rating	Hydrologic Group**
49	Antigo silt loam	0-2	0.37	High	B
49B	Antigo silt loam	2-6	0.37	High	B
49C	Antigo silt loam	6-12	0.37	High	B
49D	Antigo silt loam	12-18	0.37	High	B
1055	Aquols and histols, ponded	--	0.28	Low	B/D
189	Auburndale silt loam	--	0.37	High	B/D
120	Brill silt loam	--	0.37	High	B
456	Barronett silt loam	--	0.38	Medium	B/D
	Barronett silt loam, sandy substratum	--	0.28	Medium	B/D
367B	Campia silt loam	0-8	0.37	High	B
155B	Chetek sandy loam	0-6	0.24	Medium	B
155C	Chetek sandy loam	6-12	0.24	Medium	B
155D	Chetek sandy loam	12-25	0.24	Medium	B
452	Comstock silt loam	--	0.37	High	B
449	Crystal Lake silt loam	1-3	0.37	High	B
453B	DeMontreville loamy fine sand	2-6	0.17	Low	B
453C	DeMontreville loamy fine sand	6-12	0.17	Low	B
264	Freeon silt loam	1-4	0.37	High	C

Soil Map Unit Symbol	Soil Name	% Slope	Soil Erodibility Factor (K-Factor)*	Soil Erodibility Rating	Hydrologic Group**
266	Freer silt loam	--	0.37	High	C
177B	Gotham loamy sand	1-6	0.17	Low	A
342B	Kingsley sandy loam	2-6	0.2	Medium	B
342C	Kingsley sandy loam	6-12	0.2	Medium	B
342D	Kingsley sandy loam	12-18	0.2	Medium	B
454B	Mahtomedi loamy sand	0-6	0.15	Low	A
454C	Mahtomedi loamy sand	6-12	0.15	Low	A
454D	Mahtomedi loamy sand	12-25	0.15	Low	A
454F	Mahtomedi loamy sand	25-40	0.15	Low	A
896C	Mahtomedi-Kingsley complex	3-12	0.2	Low	B
896D	Mahtomedi-Kingsley complex	12-25	0.2	Low	B
468	Otter silt loam	--	0.28	Medium	B/D
507	Poskin silt loam	--	0.37	High	B/D
302C	Rosholt sandy loam	6-15	0.24	Medium	B
153B	Santiago silt loam	2-6	0.37	High	B
1033	Udifluents	--	---	Low	---
858C	Urban land-Chetek complex	3-15	0.24	Medium	B
857	Urban land-Waukegan complex	0-3	0.32	High	B
W	Water	0	0	---	---

\* K-Factor indicates the susceptibility of a soil to sheet and rill erosion by water. Values of K range from 0.02 to 0.64; the higher the value, the more susceptible the soil is to water erosion.

\*\* Hydrologic soil groups are used to estimate runoff from precipitation: A=high infiltration rate, low runoff potential, through D=slow infiltration rate, high runoff potential.

### ERODIBLE SOILS

The soils within the AUAR fall into three main soil erodibility categories: high, medium and low (see Table 16-1). Several of the soil types identified in the soils survey are classified as silt loams and contain 50-70 % silt. In general, soils with high silt contents are potentially highly erodible. The overall erodibility of these silt loam soils is tempered by their B hydrologic classification which indicates that they have good infiltration potential. In other words these silt loam soils will be able to infiltrate smaller rain events such as ½ inch rain falls or less. But they will have high erodibility for the larger rainfall events such as 1 inch or more. These same silt loam soils will also have high track out problems for construction equipment leaving construction sites and a high potential for “mud on the streets.”

Soils classified as sandy loams within the AUAR such as Kingsley, Rosholt and Chetek contain 65-70% sand and because of their silt contents over 20% are categorized as medium in soil erodibility potential. These soils are of hydrologic group B and have good water infiltration capacity.

Soils categorized as low in soil erodibility are generally loamy sands with silt contents less than 10% and hydrologic group A or organic type soils.

In conclusion, the erodibility of the soils identified and listed on the soil survey is a function of their silt content. Soils with less than 10% silt were found to be low in erodibility. Whereas, soils with 50-70% silt content were found to have high erodibility potential.

**STEEP SLOPES**

In general, the area within the central portion of the AUAR area is flat to very slightly rolling. Steep slopes greater than 18% are located at perimeter locations. The city may consider leaving these steep slopes intact and use these areas as natural green space buffers. Slopes within the AUAR area are shown on Figure 16-2.

**EARTHMOVING**

Earthmoving for development within the AUAR area will include activities such as grading for streets and residential lot layout, utility installation, home construction, commercial construction, and other amenities. Based on the soils identified in the soil survey, the soils in the area should not pose unique construction problems. Most of the soils are of hydrologic group A or B and have good infiltration potential. However, as previously stated, the silt loam soils have high erodibility potential for storm events larger than ½ inch. Because of high silt content the soils also have a high potential for track out from construction equipment leaving individual construction sites within the AUAR area.

The city's NPDES MS4 permit requires the city to develop a program to control construction site runoff. Specifically, the city must develop a construction site runoff control ordinance, enforcement mechanisms, and training. Currently, the city has an erosion control ordinance (Title XV: Land Usage; Chapter 151.027) which includes enforcement provisions. Contractors and developers within the AUAR area will be required to follow these requirements or other requirements established by the city.

All land disturbing activities greater than or equal to one acre or part of a common plan of development or sale greater than or equal to one acre will require a National Pollutant Discharge Elimination System (NPDES) Construction Storm Water Permit from the Minnesota Pollution Control Agency (MPCA). Per NPDES requirements, a Storm Water Pollution Prevention Plan (SWPPP) must be developed by each project proposer. Included in the SWPPP are temporary and permanent erosion/sediment control provisions, provisions for preventing pollution during construction such as from concrete washwater, stormwater mitigation measures required as a result of environmental or archeological review, and permanent storm water management provisions. Project proposers within the AUAR area will need to submit a detailed SWPPP for their respective projects. Permits and approval of erosion and sediment control plans will also be required from the Valley Branch Watershed District (VBWD) and the city of Lake Elmo. Examples of erosion control measures to be considered and included in the SWPPP are:

1. Street sweeping as necessary and installation of construction stabilized pads or the use of mud retaining mats to reduce tracking of mud from the construction sites onto the streets.
2. Inlet protection and maintenance of the inlet protection devices for curb inlets and other inlets that drain off site.
3. Protection during site dewatering and storm water pumping activities. This is especially important during site excavation activities and also during installation of utilities.
4. Stockpile protection and/or stabilization.
5. Placement of perimeter control best management practices (BMPs) such as silt fence, biologs or other proven methods prior to initiation of earthwork activities.
6. Construction of temporary sediment basins as required by permit along with the use of flocculants as necessary to settle clay and silt sized particles.
7. Energy dissipation such as riprap at concentrated flow areas. Because of the fine grained soils use of geotextile under the riprap to prevent piping is highly recommended.
8. Stabilization of exposed soils on each site completed as soon as practical and within 14 calendar days of completion of rough grading. Cover crops, seed, sod, mulch, erosion control blankets and/or landscaping must be included.

Inspection and maintenance of the BMPs listed above during each construction activity must be consistent with NPDES permit requirements. According to those requirements, the permittee must conduct inspections weekly and after rain events greater than ½". BMPs must be cleaned out and maintained as necessary and removed as sites are stabilized within the AUAR area. Long term maintenance of permanent storm water management features must be addressed with the City of Lake Elmo.

#### **LONG TERM STRATEGIES**

Long term strategies that contain sediment and improve water quality can be implemented within the AUAR area. These long term strategies may include leaving natural buffers in steep slope areas around perimeter of AUAR area, use of rain water gardens on individual lots and parking lots, use of larger bioswales for larger commercial parking lots and incorporating subsurface flow wetland systems into the overall development plan. The long term strategies will improve overall water quality and decrease the volume of storm water requiring management. Storm water infiltration, evaporation, transpiration and treatment will be improved.

**17. Water Quality - Surface Water Runoff.**

- a. Compare the quantity and quality of site runoff before and after the project. Describe permanent controls to manage or treat runoff. Describe any stormwater pollution prevention plans.
- b. Identify routes and receiving water bodies for runoff from the site; include major downstream water bodies as well as the immediate receiving waters. Estimate impact runoff on the quality of receiving waters.

*AUAR Guidelines: For an AUAR the following additional guidance should be followed in addition to that in EAW Guidelines:*

- *it is expected that an AUAR will have a detailed analysis of stormwater issues;*
- *a map of the proposed stormwater management system and of the water bodies that will receive stormwater should be provided;*
- *the description of the stormwater system should identify on-site and regional detention ponding and also indicate whether the various ponds will be new water bodies or converted existing ponds or wetlands. Where on-site ponds will be used but have not yet been designed, the discussion should indicate the design standards that will be followed.*
- *if present in or adjoining the AUAR area, the following types of water bodies must be given special analyses:*
  - *lakes: within the Twin Cities metro area a nutrient budget analysis must be prepared for any "priority lake" identified by the Metropolitan Council. Outside of the metro area, lakes needing a nutrient budget analysis must be determined by consultation with the MPCA and DNR staffs;*
  - *trout streams: if stormwater discharges will enter or affect a trout stream an evaluation of the impacts on the chemical composition and temperature regime of the stream and the consequent impacts on the trout population (and other species of concern) must be included.*

**NOTE TO REVIEWERS:** The entire response to Item 17 was revised in response to Draft AUAR comments. Tracked changes are not shown due to the extensive revisions.

**STORMWATER MANAGEMENT ISSUES**

The AUAR process presents an opportunity to incorporate surface water management in the planning stages of design - integrating traditional water quality and quantity requirements through stormwater detention ponds with environmental restoration and conservation design. This plan should be implemented on both a regional and site scale to minimize the impact of development on runoff rates and volumes, water quality and the region's aquatic resources.

Based on the analysis described further in this section there are several stormwater issues triggered by development, including:

- An increase in runoff rates and volumes due to the increase in imperviousness and connectedness
- Potential for downstream impacts to Downs Lake, Legion Pond, St Croix Lake and St Croix River due to the increase in runoff volumes.

Analysis of the existing conditions, current and pending stormwater guidelines and requirements in the AUAR and downstream led to development of the mitigation strategies.

#### **EXISTING CONDITIONS**

The AUAR area contains portions of Down's Lake, Lake Elmo, Sunfish Lake and Goetschel Pond watersheds, as shown on Figure 17-1. The majority of the area is within Down's Lake upper watershed. The drainage area boundaries were obtained from the Valley Branch Watershed District 2005-2015 Watershed Management Plan.

Most of the developable area within the AUAR area is currently used for agriculture (approximately 54%). The existing development is focused around the City of Lake Elmo's existing downtown, north of Lake Elmo lake and between the Chicago and Northwestern railroad and Highway 5. The entire area tributary to Lake Elmo lake is considered fully developed. The area tributary to Goetschel Pond is almost entirely agriculture. The AUAR area also contains very little relief, which prevents effective drainage. Thus drainage for a large proportion of the AUAR area depends on agricultural drainage ditches. Because runoff largely originates from agricultural areas, it is likely infused with pesticides, herbicides and fertilizer residues.

Stormwater models were used to define the peak pre-development runoff discharge rates. Each subwatershed is drained by a culvert or overflow generally located at road crossings. Storage upstream of the outlets is included in the model. Culvert inverts, overflow elevations, and existing storage data used in this analysis was obtained from the 2004 Downtown Area Flooding Analysis completed by TKDA. Curve numbers were used to generate runoff for the watersheds and are a function of land use/land cover/impervious surface, soil group, hydrologic condition and antecedent moisture conditions. Curve numbers have been generated for each watershed based on Soil Conservation Service (SCS) now Natural Resources Conservation Service (NRCS) TR-55 publication.

#### **RECEIVING WATER BODIES DISCUSSION**

Implementing a management scheme that focuses on regional stormwater management involves taking a holistic view of the AUAR area and its associated watersheds. Understanding existing hydrologic regimes is critical in establishing a regulatory framework that ensures the safety of people, property, and natural resources.

Table 17-1 lists the key information for the waterbodies within the AUAR area. Valley Branch Watershed District has also identified each of these major water bodies with a priority ranking in their 2005-2015 Watershed Management Plan, which is also provided in Table 17-1.

**Table 17-1**  
**Key Information for AUAR Area Waterbodies**

Lake Data	Downs Lake	Lake Elmo	Sunfish Lake	Goetschel Pond	Legion Pond
<b>DNR ID</b>	82-110W	82-106	82-107P	82-313W	82-462W
<b>Surface Area (ac)</b>	34.2 @ Elev 887.4	283.6 @ Elev 884.8	50 @ Elev 890	22.2 @ Elev 891.5	16.2 @ Elev 883.0
<b>Mean Depth (ft)</b>	5	Not determined	Not determined	4	Not determined
<b>Max Depth (ft)</b>	7	137	Not determined	14	Not determined
<b>Volume below the outlet (af)</b>	Not determined	Not determined	Not determined	92	Not determined
<b>OHW</b>	889.1	885.6	896.4	900.7	888.7
<b>Tributary Area (ac)</b>	2,339	1191	526	2812	224
<b>Watershed:Lake Ratio</b>	68:1	4:1	10:1	127:1	14:1
<b>VBWD Priority Ranking</b>	Low	High	Medium	Low	Low
<b>Outlet</b>	Overland	Weir	Landlocked	Landlocked	Landlocked

#### ASSESSMENT OBJECTIVES

The objective of this analysis was to analyze the potential impacts of development proposed in the AUAR on receiving waters, and provide guidance on stormwater mitigation measures necessary to protect Downs Lake, Lake Elmo, Sunfish Lake, Goetschel Pond and Legion Pond. The standards and strategies used to guide the mitigation come from the following sources:

- Minnesota Pollution Control Agency National Pollution Discharge Elimination System (MPCA NPDES) General Construction Permit
- Valley Branch Watershed District (VBWD) 2005-2015 Water Management Plan
- City of Lake Elmo Comprehensive Plan
- City of Lake Elmo 2004 Downtown Area Flooding Analysis
- MPCA Municipal Separate Storm Sewer System (MS4) permit

Specific standards that guided the stormwater analysis for the AUAR are as follows:

1. **Rate control** – proposed peak discharge rates must be less than or equal to existing rates for all critical duration events, up to and including the 100-year event for all points where discharge leaves the site. Design criteria shall be 2, 10 and 100-year, 24-hour events and the 100-year, 10-day snowmelt.
2. **Outstanding Resource Value Waters Discharge Plan** – The AUAR area is eventually tributary to the St Croix River, an outstanding resource value water (ORVW). As a part of the city's MS4 permit it is required to comply with Minnesota nondegradation rule for ORVW waters.
3. **Volume control** – current volume control requirements are the greater of:  
For the 1-inch, 24-hour event, proposed runoff volumes must be less than or equal to existing runoff volumes and, infiltration systems must be provided with sufficient capacity to infiltrate 0.5" of runoff from impervious surfaces
4. **Water Quality** – The primary water quality treatment design criteria is to provide adequate volume control as described above. Since infiltration appears to be feasible based on the soils within the AUAR area, this is the recommended method for providing water quality treatment.
5. **Temperature control measures** – minimize impervious surfaces, minimize connected impervious, shading, infiltration, etc.
6. **Pretreatment** - prior to discharge to infiltration facilities.

7. **Design Measures** – requisite design measures for stormwater features generally following the design guidelines provided in the Minnesota Stormwater Manual, City of Lake Elmo requirements and VBWD requirements
8. **Maintenance** – routine maintenance is required for stormwater features to maintain their function

#### **RATE CONTROL ANALYSIS FOR NEW DEVELOPMENT**

For each of the major waterbodies (Downs Lake, Lake Elmo, Goetschel Pond, Sunfish Lake, Legion Pond) an analysis of the existing and proposed system was completed.

Downs Lake – The majority of the land use change occurs in the Downs Lake watershed. Based on the recommendations in the 2004 Downtown Area Flooding Analysis, a regional system approach was pursued to meet the rate control requirement. Based on the 2004 Downtown Area Flooding Analysis, two regional basins are proposed to be located in subwatersheds 519 and 520, shown on Figure 17-1. Proposed basin 519 is located in an existing agricultural ditch. Proposed basin 520 is located adjacent to wetland 13-014, see Figure 12-2. This long linear wetland was classified by VBWD as a Manage 2 wetland and is currently used for agricultural drainage conveyance. Runoff from watershed 519 and 514 discharge via culverts under Upper 33<sup>rd</sup> Street North into this wetland prior to discharging downstream. The intent of locating a regional basin adjacent to this wetland is dual: allow for potential restoration of the wetland and utilize a portion of the wetland for flood storage. Prior to discharge to this and any wetland within the AUAR limits compliance with Wetland Conservation Act, MPCA NPDES and VBWD requirements for bounce, inundation and runout control are required.

Together these basins would serve to provide rate control for the 2, 10 and 100-year events for existing conditions (as recommended in the 2004 Downtown Area Flooding Analysis) and all four development scenarios as shown in Table 17-3. Conservatively, the pond sizing assumes no infiltration practices will be incorporated with AUAR area development to address City and VBWD volume control requirements. Any infiltration practices will further improve the rate controls shown below, particularly for the 2-year event.

Lake Elmo – There is no change in the land use from existing conditions in the Lake Elmo watershed. Therefore no additional rate restriction or ponding was evaluated. Table 17-2 lists the existing discharge rates.

Sunfish Lake - There is no change in the land use from existing conditions in the Sunfish Lake watershed. Therefore no additional rate restriction or ponding was evaluated. Table 17-2 lists the existing discharge rates.

Goetschel Pond - There is no change in the land use or the change is from existing agricultural land use to open space resulting in a decrease in runoff volume and discharge rate from existing conditions in the Goetschel Pond watershed. Therefore no additional rate restriction or ponding was evaluated. Table 17-2 lists the existing discharge rates.

Legion Pond – There is a small change in land use to new residential along the eastern border of the watershed. Since the drainage area is relatively small (approximately 25 acres), local BMPs implemented with site development are the proposed method for meeting the VBWD requirements. The rates in Table 17-2 reflect these assumptions. Note that the watershed is labeled Legion Pond on figure 17-1, but Legion pond is actually south of 30<sup>th</sup> Street North and the AUAR area.

**Table 17-2**  
**Existing Discharge Rates**

Waterbody	Existing Discharge (cubic feet per second)		
	2-year	10-year	100-year
Downs Lake	10.7	45.3	90.9
Lake Elmo	131.4	281.8	502.9
Sunfish Lake	74.0	132.4	219.7
Goetschel Pond	38.1	96.5	188.8
Legion Pond	31.1	94.5	199.6

- Existing conditions land use was assumed for tributary drainage to the Downs Lake watershed outside the AUAR.

The City of Lake Elmo stormwater ordinance requires that a curve number of 58 be utilized for determining existing conditions discharge rates, regardless of hydrologic soil group and existing land use. This curve number is more reflective of pre-settlement (prairie/meadow) conditions. To align with the current ordinance a curve number of 58 was used to generate existing conditions discharge rates in Table 17-2 for Downs Lake watershed only since that watershed will see the majority of the land use changes.

Table 17-3 lists the proposed discharge rates to Downs Lake for each of the scenarios with the construction of the two ponds. As described previously, there is no change in the land use from existing conditions for the other waterbodies.

**Table 17-3**  
**Proposed Discharge Rates to Downs Lake**

Storm Event	Existing Discharge (cfs)	Proposed Discharge (cfs)			
		Scenario A	Scenario B	Scenario C	Scenario D
2-year	10.7	10.7	10.7	10.7	10.7
10-year	45.3	43.6	42.8	43.3	40.2
100-year	90.9	83.3	81.5	82.1	77.9

As shown in Table 17-3, the proposed conditions discharge is less than existing for each of the four scenarios with the construction of the two ponds. The footprint and flood storage required for proposed ponds 519 and 520 stay relatively consistent for all scenarios since the change in runoff is fairly small between scenarios. Table 17-12 provides design parameters for these two ponds.

For each proposed Scenario, existing conditions land use was assumed for tributary drainage outside the AUAR area. If the existing land use outside the AUAR area was agricultural row crop a curve number of 70 was used for proposed conditions modeling to conservatively reflect the existing land use, versus the pre-settlement conditions. This allows for flexibility in the design of the proposed system.

Proposed conditions curve numbers for the four scenarios vary depending on the density and estimated impervious percent of the proposed land use.

### **RESTRICTED DISCHARGE WATERS PLAN**

The AUAR area is eventually tributary to the St Croix River. The City of Lake Elmo, as a part of its Municipal Separate Storm Sewer System (MS4) permit, is required by the MPCA to restrict its stormwater discharges to the portion of the St Croix River designated as an Outstanding Resource Value Water (ORVW). The entire length of the St Croix River was designated as a wild and scenic river in the original Wild and Scenic Rivers Act in 1968. Due to this designation, the State of Minnesota declared the entire length of the river an ORVW.

The Minnesota nondegradation rule (Minnesota Rule Ch. 7050.0180) protects ORVW waters from degradation by prohibiting or restricting new and expanded discharges to these waters so as to maintain their “function as exceptional recreational, cultural, aesthetic, or scientific resources”, according to the provisions of these rules. These state rules were put in place in order to comply with the “antidegradation” part of the federal Clean Water Act passed in 1972.

The city’s MS4 permit gives specific requirements that the city must follow to bring discharges to the St Croix River into compliance. A Best Management Practice (BMP) contained within the city’s MS4 permit titled “Discharge to Waters with Restricted Discharges Assessment” requires the city to conduct the following review process by 2009:

- Identify all discharges to the prohibited or restricted water (St. Croix River).
- Map watersheds from the identified discharge points and routes to the ORVW.
- Evaluate changes in the watersheds, projected out at least through 2020. This evaluation may include changes in land use, hydrology, modifications to the MS4 permit system or other changes.
- Determine if there are feasible and prudent alternatives to the discharge, such as diversion from the ORVW watershed, infiltration, or other alternatives.

The actual MS4 permit language states that Lake Elmo must demonstrate prudent and feasible alternatives to a new and expanded discharge over 1984 conditions (the year the St Croix River was designated an ORVW). These prudent and feasible alternatives include ordinance and zoning changes or other Best Management Practices. Based on the results of this analysis, the city will determine if new and expanded discharges to the ORVW can be eliminated. If the discharge cannot be eliminated entirely, the city will propose BMPs that will allow the existing high quality of the ORVW water to be maintained, which will preserve the wilderness, scientific, recreational, and other characteristics that make the St. Croix River an ORVW. The city is required to modify its Storm Water Pollution Prevention Plan (SWPPP) to incorporate these findings and submit the SWPPP to the MPCA for approval. According the city’s MS4 BMP Summary Sheet, by 2010 the BMPs that will allow the existing high quality ORVW be maintained will need to prepared. Additionally, the city will need to prepare a projected schedule and timeline to incorporate any necessary changes into the SWPPP.

Completion of the ORVW Restricted Discharge Waters Plan is necessary to evaluate downstream impacts prior to development in the AUAR area, only if the AUAR area cannot be developed in such a way as to maintain existing volumetric discharge of the following pollutants: water volume, total suspended solids and total phosphorus. (It was assumed for the AUAR analysis that existing conditions are similar to land use conditions in 1984. It was also assumed that a reduction in water volume inherently suggests a similar reduction in all pollutants) However, the analysis that follows intends to show that the development of the AUAR area can proceed in a manner that reduces or maintains existing volumetric discharge of these three pollutants – thereby meeting Lake Elmo’s permit requirements in regard to the St Croix River and as an ancillary benefit, protecting other waters downstream of the AUAR area from impacts due to urbanization.

#### **VOLUME CONTROL ANALYSIS**

A comparison of the existing and proposed runoff volume for the four scenarios for the AUAR area was completed by performing loading calculations for the three pollutants using annualized runoff coefficients. For urban land uses, the volumetric runoff coefficient was derived from the impervious coverage. An average annual rainfall of 33.1 inches was used. Table 17-4 lists the runoff coefficients assumed in the analysis.

**Table 17-4  
Annual Runoff Coefficients**

<b>Land Use*</b>	<b>Runoff Coefficient</b>	<b>Notes</b>
Row Crop Agriculture	0.14	Based on review of literature sources
New Residential (Scenario A)	0.12	Approximately 15% impervious (1.5 units/acre)
New Residential (Scenario B)	0.17	Approximately 22% impervious (2.3 units/acre)
New Residential (Scenario C)	0.21	Approximately 30% impervious (3.5 units/acre)
Low Density Residential (Scenario D)	0.21	Approximately 30% impervious (4.4 units/acre)
Existing Old Village (All Scenarios)	0.30	Weighted to reflect existing industrial, commercial, institutional and single family residential land uses
Medium Density Residential /Mixed Use (Scenario D)	0.31	45% impervious
High Density Residential (Scenario D)	0.43	65% impervious
New Mixed Use/New Civic/Public-Semi Public (Scenarios A, B, & C)	0.46	70-80% impervious
Open Space/Green Belt/Buffer (All Scenarios)	0.07	MPCA guidance
Horse Farm (Scenarios A, B, & C)	0.12	Based on review of literature sources

\* See Figures 6-1, 6-2 and 9.1 for the location of these land uses

The annual runoff coefficients used in Table 17-4 were derived using a combination of detailed site specific study results from the upper Midwest, generally accepted literature values from credible sources, knowledge of local conditions, and professional judgment.

For urban land uses, the volumetric runoff coefficient was derived from the impervious coverage using a relationship developed as part of the NURP study (Beduhn,1994) as reflected by the following equation:

$$R_v = 0.607 \times (\text{Impervious fraction}) + 0.033$$

The equation was developed to calibrate a PondNET model based on monitoring data collected as a part of a Phase 1 diagnostic feasibility study conducted under the MPCA's Cleanwater Partnership Program. The monitoring effort involved continuous flow monitoring as well as water quality sampling for a one year period and covered inputs to the lake from about 90% of the lake's 3,000-acre watershed, which was dominated by low and medium density residential land use. Use of the equation generated a PondNET model that was able to represent water and phosphorus loads to the lake within 10% of the monitored values. The work was accepted by the MPCA. Thus, we feel the equation has a track record in helping credibly represent annual water loads from suburban watersheds in similar size and land use composition to those for many of the evaluation points in Lake Elmo's AUAR area.

The  $R_v$  value for agricultural row crop was the most difficult variable to select because of the wide range of conditions inherent in this land use that can affect runoff (soils, topography, tile drainage, tillage practices, crop cover, etc.). The  $R_v$  value of 0.14 was chosen based in part on the fact that this value

produces a pollutant loading rate (0.55 lbs/ac/yr) for this land use that is about 20% below that for the low density residential land use (0.69 lbs/ac/yr). This reflects the general view among knowledgeable water quality professionals that raw total phosphorus export rates for agricultural row crops with conservation practices are slightly lower than raw export rates for residential.

Several different analyses were performed to evaluate the necessary volume reduction required within the AUAR area to mitigate the downstream impacts from the proposed development. The volume analyses completed are:

1. Entire AUAR area with and without application of VBWD requirements
2. Event based analysis
  - a) 2.2-inch event over entire AUAR area
  - b) 2.2-inch event over the concentrated density area only (no green belt)
  - c) 6.0-inch event over the concentrated density area only
3. VBWD simplified method for determining 100-year high water level for landlocked basins over the concentrated density area only
4. VBWD requirements applied to the concentrated density areas only

#### Entire AUAR area with and without application of VBWD requirements

In order to evaluate the existing VBWD volume management standard for adequacy in mitigating the increase in loads for the four scenarios it is necessary to annualize the VBWD event based requirement. The VBWD standard states that the greater of: the 1-inch, 24-hour events, proposed runoff volumes must be less than or equal to existing runoff volumes and infiltration systems should be sized to infiltrate 0.5" of runoff from impervious surfaces. Annualizing the standard was done by considering rainfall increments and the average annual runoff that is generated. For each rainfall increment the runoff that is generated was determined and reduced by the percentage that is infiltrated under the VBWD standard. Application of the VBWD standard results in a weighted 65% annual volume reduction. The 65% reduction was weighted based on the mix of land use types in the AUAR area for the four scenarios. Mixed use commercial type developments generate more runoff volume due to the larger quantity of impervious surfaces. Therefore the VBWD requirement isn't as effective in mitigating the increase in runoff volume for these type developments. On the other hand, the VBWD requirement is quite effective in mitigating the increase in runoff volume for less dense residential development. The percentage reduction takes into account these factors.

Table 17-5 lists the runoff volume for existing and the four scenarios with and without application of VBWD requirements for volume management.

**Table 17-5**  
**Runoff Volume Comparison**

Scenario	Volume without BMPs	Volume with BMPs
	(ac-ft/year)	(ac-ft/year)
Existing Conditions	1,167	N/A
A	868	304
B	960	336
C	1,089	381
D	2,151	753

Even without BMPs to meet VBWD volume requirements, three of the four scenarios result in a decrease in average annual volume due to the large proportion of low density residential and, more importantly, buffer zone/open space proposed. Scenario D, the more impervious scenario, shows a calculated increase in average annual runoff volume under the no BMP condition. However, application of the VBWD rules

to this scenario leads to a significant reduction in average annual volume for Scenario D over existing conditions.

This analysis was completed based on the assumption that the buffer zone/open space areas in all four scenarios are fully converted to woods, prairie or meadow or other pre-settlement type ground cover. Since there is the potential for this area to remain agricultural row crop, this warranted additional analyses without claiming credit for the land cover conversion.

Application of the VBWD volume requirement for all scenarios is adequate to maintain existing conditions runoff volume. Note that this analysis isn't intended to replace the full analysis required of the city for their MS4 permit and the St. Croix River Restricted Discharge Waters Plan but only as a preliminary analysis of runoff volumes to meet annual existing loads for the AUAR development scenarios.

In effect, the combination of the AUAR proposed land uses with VBWD's performance requirement for infiltration means that the AUAR development scenarios do not create a new and expanded runoff volume discharge to the St Croix River and, since all runoff volume mitigation occurs within the AUAR area itself, there is no new and expanded runoff volume discharge to any waterbody outside the AUAR area for average annual conditions.

#### Event Based Analysis

Also of concern, however is whether a mitigation strategy based on meeting VBWD requirements is also sufficient for non-average or wet period conditions or for conditions where multiple substantial rainfalls occur over a period of several days. To determine this a 1-year (2.2-inch) event was used, which is more restrictive than the applicable VBWD requirement. According to VBWD rules, this runoff volume must be infiltrated in 48 hours according to the soil infiltrative capacity specified in the rules. Accordingly, a system of infiltration areas to serve any of the four development scenarios would have capacity to maintain existing runoff volumes for 7.7 inches of rainfall per week, 33 inches per month and 268 inches per 8-month April through October rainfall season. Clearly such a system would be sufficient to maintain existing runoff volumes under any conceivable wet period of record.

It should also be considered how such a system might perform under single large rainfall and runoff events. In order to establish this performance parameter a comparison of existing runoff volume versus scenario D runoff volume is made for the 100-year rainfall event.

**Table 17-6  
2.2-inch Rainfall Comparison – AUAR Area**

	Land Use	Area (ac)	CN	Runoff Depth (in)	Runoff Volume (ac-in)
Existing	Old Village	199	79*	0.64	127.4
	Agricultural	905	70	0.32	289.6
	Open Space	57	61	0.10	5.7
	<b>TOTAL</b>				
Scenario D	Old Village	230	79*	0.64	147.2
	Green Belt**	718	61	0.10	71.8
	High Density Residential	7	87	1.06	7.4
	Low Density Residential	77	76	0.51	39.3
	Mixed Use/Medium Density Residential	85	79	0.64	54.4
	Public/Semi-public	45	87	1.06	47.7
	<b>TOTAL</b>				

\*Old Village CN is weighted to account for existing industrial, commercial, institutional and residential with the Village.

\*\*Assumes conversion of land cover to presettlement conditions, not agricultural row crop.

Because of the large open space areas and the assumption that these areas are converted to pre-settlement type land cover, runoff volume is reduced for the AUAR area in total. However in areas of concentrated density, runoff volume will increase. Table 17-7 lists the results considering those areas only (i.e., not including open space).

**Table 17-7  
2.2-inch Rainfall Comparison – Concentrated Density**

	Land Use	Area	Runoff Volume (ac-in)
Existing	Old Village	199	127.4
	Agriculture	245	78.4
	<b>TOTAL</b>		<b>444</b>
Scenario D	Old Village	230	147.2
	High Density Residential	7	7.4
	Low Density Residential	77	39.3
	Mixed Use/Medium Density Residential	85	54.4
	Public/Semi-public	45	47.7
	<b>TOTAL</b>		<b>444</b>

To mitigate according to VBWD standards approximately 90 ac-in of infiltration volume must occur within the more impervious development areas.

Assuming:

1. Two feet of infiltration BMP depth
2. 48 hour drawdown
3. HSG B soils VBWD allowed infiltration rate of 0.3 in/hr

90 ac-in/48 hour = 1.88 ac-in/hour

$1.88 \text{ ac-in/hr} / 0.3 \text{ in/hr} = 6.3 \text{ acres}$

Consequently 6.3 acres of runoff to soil contact area is needed within the 444 acre portion of the AUAR area that will see new impervious surfaces.

The analysis was extended to include the 100-year, 6.0-inch rainfall. Table 17-8 lists the results of the 6.0-inch rainfall comparison.

**Table 17-8**  
**6.0-inch Rainfall Comparison – Concentrated Density**

	Land Use	Area	Runoff Depth (in)	Runoff Volume (ac-in)
Existing	Old Village	199	3.68	732
	Agriculture	245	2.80	686
	<b>TOTAL</b>	<b>444</b>		<b>1,418</b>
Scenario D	Old Village	230	3.68	846
	High Density Residential	7	4.51	32
	Low Density Residential	77	3.38	260
	Mixed Use/Medium Density Residential	85	3.68	313
	Public/Semi-public	45	4.51	203
	<b>TOTAL</b>	<b>444</b>		<b>1,654</b>

Based on Table 17-8 an additional 236 ac-in (1,654 ac-in – 1,418 ac-in) of runoff are created for the 100-year event. However, 90 ac-in are provided in mitigation for the 2.2 inch design rainfall leaving 146 ac-in of excess runoff for this event.

Considering the full 236 ac-in volume and repeating the area impact calculations:

$236 \text{ ac-in} / 48 \text{ hour} = 4.92 \text{ ac-in/hr}$

$4.92 \text{ ac-in/hr} / 0.3 \text{ in/hr} = 16.4 \text{ acres}$

Therefore 16.4 acres of runoff to soil contact area is needed for the concentrated impervious portion of the AUAR area. This represents approximately 3.7% of the total 444 acres that will see new impervious surface within the AUAR area. This same calculation could be completed for the snowmelt event. Since frozen ground is assumed for the snowmelt event, pervious surfaces have a similar curve number to impervious surfaces. Therefore the total volume for existing and scenario D would be the same.

#### VBWD Landlocked Basin Simplified Method

VBWD developed a simplified method for determining the 100-year flood levels for landlocked basins. This conservative analysis relies on determining approximate annual runoff volumes. The calculation is further described in VBWD rules and the results are provided in Table 17-9. The calculations were completed for only the concentrated impervious areas for Scenario D.

**Table 17-9**  
**VBWD Method – Concentrated Density**

Scenario	Land Use	Area (ac)			VBWD Runoff Volume (ac-in)
		Impervious	Pervious/Turf	Water	
Existing	Old Village	159.2	39.8	0	2945
	Agriculture	0	245	0	2450
	<b>TOTAL</b>				<b>5395</b>
Scenario D	Old Village	184	46	0	3404
	High Density Residential	4.55	2.45	0	97
	Low Density Residential	23.1	53.9	0	909
	Mixed Use/Medium Density Residential	68	17	0	1258
	Public/Semi-Public	0	45	0	450
	<b>TOTAL</b>				<b>6118</b>

Based on Table 17-9 an additional 723 ac-in (6,118-5395 ac-in) are needed to mitigate the increase in runoff volume for Scenario D concentrated density areas. Considering the full 723 ac-in volume and repeating the area impact calculations:

$$723 \text{ ac-in}/48 \text{ hours} = 15 \text{ ac-in/hr}$$

$$15 \text{ ac-in/hr} / 0.3 \text{ in/hr} = 50.2 \text{ acres}$$

Consequently 50.2 acres of runoff to soil contact area is needed for the concentrated impervious portion of the AUAR area. This represents approximately 11% of the total 444 acres that will see new impervious.

#### VBWD Requirement

VBWD's infiltration rule is two-part in that it specifies that infiltration facilities shall be designed to infiltrate the additional runoff from the 1-inch rainfall event and that these facilities should be able to infiltrate 0.5 inches of runoff volume off new impervious surfaces. Whichever of these leads to more infiltration capacity becomes the applicable standard. The calculation for the 444 acre portion of the AUAR area that sees new impervious surface would be:

$$444 \text{ ac} \times 0.4 \text{ (average impervious fraction)} \times 0.5\text{-inch} = 88.8 \text{ ac-in of infiltration capacity}$$

#### **Runoff Volume Summary**

It is recommended then that runoff volume facilities be constructed to not increase runoff volumes from existing conditions for the 100-year event as calculated by the VBWD simple calculation for landlocked basins as guided by the calculations above. As described above 50.2 acres or 11% of the 444 acre development area within the AUAR will have to be dedicated to obtain runoff to soil contact. However, since these areas will be dispersed and not centralized and some land must be dedicated to separate them from buildings and parking areas, it is suggested that up to 15% of the available land might be dedicated to infiltration BMPs.

All these comparisons are based on the more highly impervious scenario D. The same calculations could be run for each of the scenarios, resulting in slightly smaller runoff to soil contact area due to the smaller

impervious areas with scenarios A through C. It is assumed that the scenario D land use plan is adaptable to the 15% BMP dedication.

The City of Lake Elmo will work with developers to identify opportunities to include infiltration BMPs for new development to address City and VBWD volume control requirements. Infiltration allows stormwater to permeate back into the soil rather than runoff and cause the need for storage (ponding) for rate control and water quality treatment. Since the soils in the area are primarily HSG B soils, typically they have acceptable rates of infiltration and are therefore suitable for infiltration BMPs. Refer to Figure 17-2 for hydrologic soil groups.

The city will address stormwater runoff volume management measures for the entire city through its Surface Water Management Plan (SWMP) update and Restricted Discharge Waters Plan in compliance with the pertinent agency regulations. Through this process, the city will determine if it needs to adopt more restrictive volume control standards city-wide than VBWD. The city is in the process of updating its Surface Water Management Plan as part of its required 2030 Comprehensive Plan update.

There are several options for the city and developers to explore for addressing City and VBWD volume control requirements for new development. If proposed basins 519 and 520 were constructed as multi-cell regional basins, then infiltration in portions of the basins could occur while still providing for flood storage. Another option is to provide a continuous surface water conveyance system (ponding, infiltration, and conveyance) along natural drainage routes. This type of stormwater management concept was presented in the Village Master Plan.

Infiltration BMPs are best located throughout the development versus in large regional basins. Smaller scale stormwater infiltration facilities located within each future development site can minimize the potential problems with sinkholes and issues with depth to groundwater. This is because the drainage area to the BMPs is smaller and therefore the depth of the BMP is shallower, which increases the depth to groundwater and minimizes the potential for sinkholes.

Additional volume management techniques include impervious area reduction, disconnection of impervious surfaces, use of porous pavements, green roofs, protection of natural areas, minimizing soil compaction and/or mitigating compacting areas, and other similar techniques.

#### **WATER QUALITY**

Another requirement of the AUAR process is to compare existing and proposed water quality. This analysis was completed utilizing PondNET modeling software and the following pollutant loading rates and event mean concentrations (EMC) for total phosphorus (TP) and total suspended solids (TSS).

**Table 17-10  
Water Quality Input Values**

Land Use	TP EMC (ppb)	TP Loading Rate (lbs/ac/yr)	TSS EMC (ppm)	TSS Loading Rate (lbs/ac/yr)
Row Crop Agriculture	540	0.57	163	171
New Residential (Scenario A)	350	0.32	216	200
New Residential (Scenario B)	450	0.56	178	222
New Residential (Scenario C) and Old Village	450	0.71	140	222

Land Use	TP EMC (ppb)	TP Loading Rate (lbs/ac/yr)	TSS EMC (ppm)	TSS Loading Rate (lbs/ac/yr)
Medium Density Residential	450	1.03	140	320
High Density Residential	450	1.44	140	447
New Mixed Use/New Civic/Public-Semi Public	350	1.20	140	479
Open Space/Green Belt/Buffer	250	0.13	216	112
Horse Farm	350	0.31	163	146

The input parameters were based largely on literature values for Minnesota and the upper Midwest and an average annual precipitation of 33.1 inches.

Table 17-11 lists the raw TP and TSS loads for the AUAR area with and without BMPs applied. The specific BMPs considered are those necessary for the infiltration requirement under current VBWD rules with the stipulation that each infiltration or volume management BMP must include a pretreatment or filtration component to protect the BMP from sediment. The area for pretreatment is included in the overall estimate of 10% of the land area dedicated to stormwater BMPs. It is conservatively estimated that an infiltration BMP designed for a 65% annual volume reduction will also reduce total phosphorus and total suspended solids by 65% as well.

**Table 17-11**  
**Water Quality Comparison**

Scenario	TP without BMPs	TP with BMPs	TSS without BMPs	TSS with BMPs
	(lbs/yr)		(lbs/yr)	
Existing Conditions	1,438		504,273	
A	840	294	405,062	141,772
B	1,015	355	419,602	146,861
C	1,173	411	441,069	154,374
D	782	274	349,051	122,168

Due to the large amount of green space proposed with the four development scenarios the proposed TP and TSS annual loads are less than existing for all four scenarios. Note that the water quality comparison was made based on the current VBWD requirement for infiltration volume. With application of runoff volume facilities constructed to maintain existing runoff volume for the 100-year event as recommended, the water quality reduction in post-development TP and TSS will be even more significant.

#### TEMPERATURE CONTROL MEASURES

Temperature control measures such as minimizing impervious surfaces, minimizing connected impervious, shading and infiltration are all required by VBWD requirements and NPDES. Some potential specific options are tree planting for shading around the constructed basins and other BMPs and constructing the regional ponds as multi-cell biofiltration areas with wetland vegetation. The wetland vegetation provides shading. The ponds can serve several functions by including flood storage, water quality and infiltration. Integration of these regional basins into the new residential development will allow for their use as amenities.

**NUTRIENT BUDGET ANALYSIS**

A nutrient budget analysis is required if activities from a project may affect lakes identified as a “priority lake” in the EAW Guidelines (Environmental Quality Board, 2000). The proposed development has the potential to cause an increase in stormwater volume entering Lake Elmo, Sunfish Lake, Goetschel Pond and Down’s Lake. Only Lake Elmo is identified as a priority lake by the Metropolitan Council. For several reasons a nutrient budget analysis has not been completed:

- No land use change is proposed in the Lake Elmo watershed
- Size of the watershed in the AUAR area is very small in comparison to the total Lake Elmo watershed
- Nutrient budget analyses focus on phosphorus, because it is one of the major contributors to water quality problems associated with development. It is also a nutrient that can be mitigated quite well if the problem is understood. Effective mitigation of total phosphorus can be achieved through responsible land use practices and stormwater design.

Sound watershed management requires an understanding of chemical components within stormwater runoff. One of the groups of constituents having the most detrimental effects on lakes, rivers and streams is nutrients. At high concentrations they can be toxic to fish and plant species, but even in relatively small concentrations they can have profound effects on natural systems. Often times the nutrients that are most damaging are the phosphorus and nitrate species. These two subsets of the nutrient family expedite the process of eutrophication in lakes, which can destroy native ecosystems and make the system undesirable for recreation and water supply. Any development in the AUAR area should have a nondegradation water quality policy to prevent further eutrophication of downstream water bodies, which complies with the Valley Branch Watershed District goals for the water bodies.

**Impaired Waters**

The Minnesota Pollution Control Agency (MPCA) has established a list of impaired waters, which includes Lake Elmo within the AUAR area. Lake Elmo was first listed in 1998 for mercury. A mercury listing is considered by the MPCA to be a regional and national issue, not a watershed based impairment. Therefore the MPCA recently completed a statewide mercury total maximum daily load (TMDL) pollutant reduction plan. The Minnesota Statewide Mercury Total Maximum Daily Load was approved by the Federal Environmental Protection Agency March 27, 2007. The long-term goal of the mercury TMDL is for fish to meet water quality standards. The approach for Minnesota’s share is mass reductions from state mercury sources. The state’s mercury TMDL indicates a 93% reduction in state emissions from 1990 is needed for the state to meet its share. Water point sources will be required to stay below one percent of the total load to the state and all but the smallest dischargers will be required to develop mercury minimization plans. More than 99.5% of mercury in fish is the result of atmospheric deposition, with 90% of the deposition originating from outside the state. MPCA research has determined that 70% is from anthropogenic (people) sources and 30% is from natural sources such as volcanoes. For the purposes of the state’s TMDL, air sources are divided into three sectors (products, energy and mining). Because water point source emissions are minimal in comparison, the air sources will have a 93% emission reduction goal from 1990 levels.

The Minnesota Department of Health issued fish consumption advice for Lake Elmo due to perfluorooctane sulfonate (PFOS) measured in fish tissue. The advice recommends limiting intake of fish species from the lake. The advice is based on analysis of recently completed fish sampling that is part of a larger, ongoing investigation of perfluorochemical contamination in Minnesota fish, surface and ground waters, soil and air by the Minnesota Pollution Control Agency.

Although not within the AUAR area, Lake St Croix receives runoff from the project area prior to discharging to the St Croix River. Lake St Croix is included in the 2008 303(d) TMDL list as impaired for aquatic recreation due to eutrophication. The MPCA is in the process of completing a TMDL Study and Implementation Plan for this lake with a target date of 2011. The implementation plan will set waste load allocations to areas tributary to Lake St Croix, potentially including the City of Lake Elmo.

The steps listed in the mitigation plan for this AUAR area are intended to not increase TP, TSS and volume loads at the boundary of the AUAR area from existing conditions. These steps are in line with the goal of removing Lake St Croix from the impaired waters list. Although it should be noted that additional measures may be required beyond those set in this AUAR mitigation plan for complying with the future TMDL implementation plan for Lake St Croix.

The St Croix River discharges to Lake Pepin. The Lake Pepin TMDL implementation plan is currently being written which may have a waste load allocation for Lake Elmo that affects the AUAR area.

In 2004 the St Croix Basin Water Resources Planning Team developed water resources goals for the St Croix River after review of monitoring data and projected land uses changes within the watershed. To meet these water resources goals, a 20 percent phosphorus reduction by the year 2020 is needed. The phosphorus reduction is intended to replicate the ecological conditions prior to 1950 when a peak in nutrient loadings occurred.

#### **MITIGATION SUMMARY**

The mitigation plan includes the following recommendations to protect the water resources in the AUAR area and downstream:

#### **Existing Surface Water Management Needs**

- Based on recommendations in the 2004 Downtown Area Flooding Analysis, two regional basins are proposed within the Downs Lake watershed to address existing stormwater management needs in the Village.

#### **Stormwater System Needs for Future Development**

- Continue to address stormwater runoff volume management, rate control, and water quality treatment measures for the entire city through its Surface Water Management Plan (SWMP) update in compliance with the pertinent agency regulations. Through this process, the city will determine if it needs to adopt more restrictive standards city-wide than VBWD. The city is in the process of updating its Surface Water Management Plan as part of its required 2030 Comprehensive Plan update. The 2030 Comprehensive Plan update is due to the Metropolitan Council by May 29, 2009.
- Construct ponds 519 and 520 to alleviate existing downtown flooding issues and address rate control and potentially the volume management and water quality treatment goals for the AUAR area in the Downs Lake watershed. Approximate pond sizes required are listed in Table 17-12. The pond size required varies only 5% between Scenario A with the lowest residential development intensity and Scenario C with the highest development intensity. Any ponds that contain open water should be designed with emergent vegetation to minimize use by waterfowl.

The ponding footprint required is approximately 35 acres with slight variations between scenarios. This footprint could account for 70% of the required 50 acre infiltration footprint if designed to allow for infiltration capacity. The other 30% would need to be provided through individual developments via other methods.

**Table 17-12**  
**Approximate Pond Size Required**

Scenario	Pond	Footprint at HWL (ac)	Flood Storage (ac-ft)
A	519	7.6	44.2
	520	27.2	76.9
B	519	7.6	44.2
	520	27.5	79.5
C	519	7.6	44.2
	520	27.5	79.9
D	519	7.5	40.5
	520	27.2	77.0

- Provide runoff volume facilities adequate to not increase runoff volumes from existing conditions as calculated by the VBWD simplified method for determining 100-year high water levels for landlocked basins. This requires approximately 15% of the area to be utilized for infiltration in order to mitigate for the runoff volume calculated based on VBWD's simplified method.
- Encourage utilization of volume management techniques to minimize the stormwater impacts by emphasizing water infiltration, valuing water as a resource and promoting the use of the natural drainage system to treat water runoff. Some examples include:
  - Special ditches, arranged in a series, that soak up more water
  - Vegetated filter strips at the edges of paved surfaces
  - Residential or commercial rain gardens designed to capture and soak in stormwater
  - Porous pavers, concrete and asphalt
  - Decreased and disconnected impervious, narrower streets
  - Rain barrels and cisterns
  - Green roofs
  - Protection of natural areas
  - Minimizing soil compaction and/or mitigating compacted areas
  - Street trees that intercept rainfall, improve water quality, and facilitate stormwater infiltration/treatment
- Provide pretreatment upstream of volume management facilities.
- Require use, management and enforcement of BMPs to control erosion and sedimentation such as silt fence, erosion control blanketing and temporary stormwater ponding during and after construction as required by the NPDES construction permit.
- Require temporary control measures per the NPDES construction permit.
- Complete ongoing maintenance of proposed and existing stormwater facilities
- Conduct the "Discharge to Waters with Restricted Discharges Assessment" required by its MS4 permit to determine if there are feasible and prudent alternatives to the discharge, such as diversion from the St. Croix River watershed, infiltration, or other alternatives. The city is required to modify the city's Storm Water Pollution Prevention Plan (SWPPP) to incorporate these findings and submit the SWPPP to the MPCA for approval. No adverse impact to the St Croix River is allowed.
- The city will complete the MPCA requirements for Outstanding Resource Value Waters by the end of 2009. Through this process, the city will determine the requirements necessary to meet this regulation.

**18. Water Quality - Wastewater**

- a. Describe sources, composition and quantities of all sanitary, municipal and industrial wastewater produced or treated at the site.
- b. Describe waste treatment methods or pollution prevention efforts and give estimates of composition after treatment. Identify receiving waters, including major downstream water bodies (identifying any impaired waters), and estimate the discharge impact on the quality of receiving waters. If the project involves on-site sewage systems, discuss the suitability of site conditions for such systems.
- c. If wastes will be discharged into a publicly owned treatment facility, identify the facility, describe any pretreatment provisions and discuss the facility's ability to handle the volume and composition of wastes, identifying any improvements necessary.
- d. If the project requires disposal of liquid animal manure, describe disposal technique and location and discuss capacity to handle the volume and composition of manure. Identify any improvements necessary. Describe any required setbacks for land disposal systems.

**AUAR Guidelines:** *Observe the following points of guidance in an AUAR:*

- *only domestic wastewater should be considered in an AUAR – industrial wastewater would be coming from industrial uses that are excluded from review through an AUAR process;*
- *wastewater flows should be estimated by land use subareas of the AUAR area; the basis of flow estimates should be explained;*
- *the major sewer system features should be shown on a map and the expected flows should be identified;*
- *if not explained under item 6, the expected staging of the sewer system construction should be described;*
- *the relationship of the sewer system extension to the RGU's comprehensive sewer plan and (for metro area AUARs) to Metropolitan Council regional systems plans, including MUSA expansions, should be discussed. For non-metro area AUARs, the AUAR must discuss the capacity of the RGU's wastewater treatment system compared to the flows from the AUAR area; any necessary improvements should be described;*
- *if on-site systems will serve part of the AUAR the guidance in EAW Guidelines (page 16) regarding item 18b under Residential development should be followed.*

**EXISTING WASTEWATER SYSTEMS**

The existing Lake Elmo wastewater system in the AUAR area consists of individual sewage treatment systems (ISTS) and three city-owned 201 common wastewater systems. Six residential developments located near to the AUAR area are served with private wetland treatment systems (Sunfish, Tapestry, Tana Ridge, Fields of St. Croix, Carriage Station, and Tamarack Farm Estates) and one city-owned 201 common wastewater system is located south of 30<sup>th</sup> Street. According to the Comprehensive Plan, the city plans to abandon all 201 systems within the Village after the planned sanitary sewer system is constructed and extended to the Village. However, there is no schedule for this. The city has no plans to construct new city-owned 201 systems.

The estimated sanitary sewer flow generated by existing development in the Village is 0.112 million gallons per day (MGD). The estimated flow assumes that all existing Village development would connect to the new sanitary sewer by the year 2030. The existing flow estimate was based on applying the unit rates adopted in the Comprehensive Plan to the residential equivalent connections (RECs) for existing residential units (194 RECs), commercial (171 RECs) and institutional properties (47 RECs).

### PROPOSED WASTEWATER SYSTEM

A public sanitary sewer system is planned to be constructed to serve new development, existing individual ISTS and three city-owned 201 common wastewater systems.

### Sources and Composition

Wastewater production estimates will be based on proposed land uses and development intensities proposed in the four AUAR development scenarios. Discharge of process water or other wastewater containing industrial contaminants is not anticipated. If such uses are proposed, appropriate environmental review (i.e. EAW, EIS) will be required in accordance with MN Rules Chapter 4410, as AUARs are not a substitute form of environmental review for heavy industrial uses.

### Quantity of Wastewater

The types and amounts of wastewater produced will be typical of residential and commercial land uses. Both the Minnesota Pollution Control Agency (MPCA) and the Metropolitan Council Environmental Services (MCES) have compiled and documented extensive data that relates wastewater flow generation to population and land use. This information is used as the city's basis for estimating the wastewater flows and peaking design conditions to determine the size and capacity of the existing and future sewer system. Additionally, the city is developing a *Draft Comprehensive Sewer Plan* that will provide a more detailed analysis in comparison to what is provided in the city's overall Comprehensive Plan. The *Draft Comprehensive Sewer Plan* will guide the orderly expansion of the sanitary sewer collection system for the AUAR area in Lake Elmo.

Sanitary wastewater production was estimated based on the proposed land use and the proposed unit rates from the *Lake Elmo Comprehensive Plan*. The *Lake Elmo Comprehensive Plan* has established 273 gallons of wastewater per unit per day for residential units and that 10 employees are equivalent to one residential unit. From this information the unit rates in Table 18-1 were developed and applied to the AUAR development scenarios.

**Table 18-1**  
**Sewage Flow Unit Rates**

Land Use	Unit Rate
Residential	273 gal/unit/day
Commercial <sup>1</sup>	1,092 gal/acre/day
Public/Semi-Public/Civic	250 gal/acre/day

1)40 employees/acre (from *Lake Elmo Comprehensive Plan*) \* 1 residential unit/10 employees \* 273 gal/day/unit = 1,092 gal/day/acre

Sanitary sewer flow projections were made for each of the potential land use scenarios in the undeveloped areas of the AUAR area and redevelopment areas as shown in Tables 18-2 through 18-5. These flow estimates were based on applying the unit rates in Table 18-1 to the land use types.

**Table 18-2**  
**Proposed Average Flow - Scenario A**

<b>Land Use</b>	<b>Units</b>	<b>Acres</b>	<b>Average Flow (MGD)</b>
Undeveloped <sup>1</sup>	NA	380.8	0
New Mixed Use			
Mixed Use (Non-res)	NA	16.5	0.018
Mixed Use (Res)	100	56	0.027
New Residential	450	308.6	0.123
Redevelopment		44.5	
Non-Residential <sup>2</sup>		20	0.022
Residential	50		0.014
New Civic	NA	16.5	0.002
<b>TOTAL</b>	600	822.9	<b>0.206</b>

1) Includes new parks/open space, horse farm, existing open space, buffer zone

2) Estimated non-residential redevelopment area to be 20 acres for purposes of sewage flow generation

The average flow of 0.206 mgd is equivalent to 755 RECs.

**Table 18-3**  
**Proposed Average Flow - Scenario B**

<b>Land Use</b>	<b>Units</b>	<b>Acres</b>	<b>Average Flow (MGD)</b>
Undeveloped <sup>1</sup>	NA	380.8	0
New Mixed Use			
Mixed Use (Non-res)	NA	16.5	0.018
Mixed Use (Res)	200	56	0.055
New Residential	700	308.6	0.191
Redevelopment		44.5	
Non-Residential <sup>2</sup>		20	0.022
Residential	100		0.027
New Civic	NA	16.5	0.002
<b>TOTAL</b>	1000	822.9	<b>0.315</b>

1) Includes new parks/open space, horse farm, existing open space, buffer zone

2) Estimated non-residential redevelopment area to be 20 acres for purposes of sewage flow generation

The average flow of 0.315 mgd is equivalent to 1,154 RECs.

**Table 18-4**  
**Proposed Average Flow - Scenario C**

<b>Land Use</b>	<b>Units</b>	<b>Acres</b>	<b>Average Flow (MGD)</b>
Undeveloped <sup>1</sup>	NA	380.8	0
New Mixed Use			
Mixed Use (Non-res)	NA	16.5	0.018
Mixed Use (Res)	400	56	0.109
New Residential	1015	308.6	0.277
Redevelopment		44.5	
Non-Residential <sup>2</sup>		20	0.022
Residential	185		0.051
New Civic	NA	16.5	0.002
<b>TOTAL</b>	1600	822.9	<b>0.479</b>

1) Includes new parks/open space, horse farm, existing open space, buffer zone

2) Estimated non-residential redevelopment area to be 20 acres for purposes of sewage flow generation

The average flow of 0.479 mgd is equivalent to 1,755 RECs.

**Table 18-5  
Proposed Average Flow - Scenario D**

Land Use	Units	Acres	Average Flow (MGD)
Undeveloped <sup>1</sup>	NA	717	0
Public/Semi-Public	NA	43	0.005
Low Density Residential	339	77	0.093
Medium Density Residential	465	86	0.127
High Density Residential	102	7	0.028
<b>TOTAL</b>	906	930	<b>0.253</b>

1) Includes new parks/open space, horse farm, existing open space, buffer zone

The average flow of 0.253 mgd is equivalent to 927 RECs.

Note that these tables don't include the existing Village. The potential flow generated by existing development in the Village was estimated to be 0.112 MGD. The existing Village flow estimate was based on applying the unit rates in Table 18-1 to the residential equivalents for existing residential units (194 RECs), commercial (171 RECs) and institutional properties (47 RECs). The estimated flow assumes that all existing Village development would connect to the new sanitary sewer by the year 2030.

Table 18-6 compares the average flow generated for each of the scenarios and includes the existing flow from the Village.

**Table 18-6  
Cumulative Comparison of Scenarios  
(Existing Village Development plus AUAR Scenarios)**

Scenario	Average Flow (MGD)	RECs Equivalent
A	0.318	1,165
B	0.427	1,564
C	0.591	2,164
D	0.365	1,337

Scenario C generates the largest average flow of 0.591 MGD (or 2,164 RECs). Scenario A generates the smallest amount of flow with 0.318 MGD (or 1,165 RECs).

### City Wastewater System Expansion

The city has been exploring the potential schematic layout of the major sanitary sewer facilities required to extend sewer service into the AUAR area. Current plans calls for a trunk sewer from the I-94 interceptor to 30<sup>th</sup> Street on the south end of the Village. The trunk sewer is proposed to follow Lake Elmo Avenue. It will be a forcemain sewer to 30<sup>th</sup> Street with gravity sewer serving properties within the AUAR area, see Figure 18-1. A major lift station would be located near 30<sup>th</sup> Street. The lift station is being designed to accommodate the projected initial low flow conditions and to allow for staged expansion based on the future growth.

The planned expansion of the city sewer system is based on MCES providing additional capacity to serve the anticipated development by construction of a new interceptor in northeast Woodbury, called the Lake Elmo East Interceptor. This interceptor has been designed and is currently under construction. The Northeast Regional lift station number 77 (Northeast Regional LS-77) that the interceptor will connect to is currently in the early stages of design.

### **MCES Interceptor System Expansion**

The existing Lake Elmo wastewater system in the AUAR area consists of individual sewage treatment systems (ISTS) and three city-owned 201 common wastewater systems. In the future, sanitary flow from the AUAR area will discharge to the MCES Lake Elmo East interceptor, which then discharges to the Northeast Regional LS-77. As noted in the *Lake Elmo Comprehensive Plan 2005-2030*, the city plans to abandon all city-owned 201 common wastewater systems within the AUAR area, when sewer is available to these sites.

The capacity of the Lake Elmo East Interceptor is 2.7 million gallons per day (MGD) design flow with a peaking factor of 2.7 results in a peak flow of 7.3 million gallons per day.

The Eagles Point Waste Water Treatment Plant will be the ultimate treatment facility for Lake Elmo sanitary sewer flows. It was constructed in 2002 and located in Cottage Grove. The plant capacity is a million gallons per day using primary and advanced secondary treatment with ultraviolet disinfection before discharging into the Mississippi River. MCES estimates the plant will have adequate capacity to serve the entire area tributary to the plant until 2020, when the plant will be expanded to treat 20 million gallons per day. (Note that the inclusion of the AUAR area does not trigger the plant expansion, rather it is due to the growth within the entire plant service area). Because of discharge requirements placed on wastewater treatment plants, and the type of wastewater generated from the AUAR area, no adverse impacts to the Mississippi River from the proposed AUAR area are anticipated.

### **PERMITTING**

Under Minnesota law (Minn. Statute 115.07, Subd. 3), an MPCA permit (Sanitary Sewer Modification or Extension Permit) is required for any extension, addition, or modification that: increases an existing pollutant discharge; introduces a new pollutant; or will result in an increase or potential increase in the amount of flow in a sanitary sewer system. This includes:

- New development not previously connected
- Connection of existing facilities that were not previously connected
- Construction of an individual service connection, even if the additional flow doesn't force other changes to the public sewer system
- An individual home service connection not previously approved
- Further division of existing residential property resulting in an increased population density
- Redevelopment of existing properties to a different use that will increase population density. For example, conversion of a warehouse to an apartment complex, or conversion of a parking lot to a new building
- Expansion of an existing industrial, commercial, or institutional facility that will increase or potentially increase flow to the system
- Sewer mains, trunks, interceptors, or other projects that may lay the groundwork for future expansions of service, even if no new flow is initially added
- Increasing the size of an existing sewer pipe
- Installing additional pumps or larger pumps to increase pumping capacity.

The city will need to apply for this permit for construction of trunk and lateral sewer lines in the AUAR area, as well as for connection of any of its properties to the system. Developers will also need to secure this permit to extend service to their properties. Developers will also need to obtain approval from the

City of Lake Elmo to connect to the municipal sewer system. Additional information regarding the MPCA permit is available at: <http://www.pca.state.mn.us/publications/wq-wwprm1-15.pdf>

A Sewer Permit to Connect will be required from the Metropolitan Council for the city to connect its municipal sanitary sewer system to the Metropolitan Council's regional system.

#### **LIQUID ANIMAL MANURE**

Projects within the AUAR area will not generate or require the disposal of liquid animal manure.

#### **MITIGATION SUMMARY**

The mitigation plan includes the following recommendations:

- Size the proposed major lift station adequately to accommodate the flow from development within the AUAR area. The range of predicted flow is from 0.318 mgd to 0.591 mgd (or 1,165 to 2,164 RECs).
- Size the proposed future trunk sanitary sewer adequately to accommodate the flow from development within the AUAR area. The range of predicted flow is summarized above.

**19. Geologic Hazards & Soil Conditions.**

- a. Approximate depth (in feet) to ground water: 10 feet minimum, 40 feet average  
to bedrock: 50 feet minimum, 100 feet average  
Describe any of the following geologic site hazards to ground water and also identify them on the site map: sinkholes, shallow limestone formations or karst conditions. Describe measures to avoid or minimize environmental problems due to any of these hazards.

*AUAR Guidelines: A map should be included to show groundwater hazards identified. A standard soils map for the area should be included.*

The Lake Elmo area is underlain by a major north-south trending buried bedrock valley. The valley starts approximately at the Village Area and runs underneath Lake Elmo (the lake) due south to Cottage Grove. In the buried bedrock valley, the Prairie du Chien dolomite is eroded and, in the center of the valley, is missing completely. Over much of the AUAR area, the Prairie du Chien is the first bedrock encountered at depth. Average depth to bedrock is 50-100 feet, except in the buried bedrock valley, where depths to bedrock can reach 200-250 feet.

The fact that a carbonate bedrock (the Prairie du Chien) is the uppermost bedrock in the AUAR area, combined with knowledge that the bedrock has been exposed to erosion and has had varying water table elevations, indicates a moderately high likelihood of karst conditions existing within the bedrock (see Figure 19-1). This assumption is further re-enforced by evidence that groundwater contamination in the area has spread rapidly through fractures and solution cavities within the Prairie du Chien. While sinkholes tend to occur in settings where depth to bedrock is less than 50 feet, there may still be a possibility of sinkhole formation within the AUAR area. Location of potential future sinkholes, however, is very difficult to determine without extensive geophysical investigations.

- b. Describe the soils on the site, giving NRCS (SCS) classifications, if known. Discuss soil texture and potential for groundwater contamination from wastes or chemicals spread or spilled onto the soils. Discuss any mitigation measures to prevent such contamination.

*AUAR Guidelines: A map should be included to show groundwater hazards identified. Include any relevant information on soil contamination due to past land uses within the area, as mentioned under item 9.*

Soils within the AUAR area are predominantly silt loam with low slopes and are moderately to well-drained. Suitability of soil types for building ranges from fair to well-suited. Small portions of the AUAR area may have soils that are less-suitable for building. Soil characteristics are presented in Table 16-1 in AUAR Item 16.

The area has been ranked as being vulnerable to contamination during the creation of the Part 1 Wellhead Protection Plan for the City of Lake Elmo. In addition, two large plumes of groundwater contamination impact the areas in and around the AUAR area, providing anecdotal evidence that the area is susceptible to contamination. Figure 13-2 depicts the Special Well Construction Areas (SWCAs) established by the Minnesota Department of Health because of the two contamination plumes.

The first area of groundwater contamination that makes up the Baytown plume is known to originate within the AUAR area boundary. TCE contamination has been documented from a former metal working facility located at the site currently occupied by Hagberg's Country Market. The contamination has impacted all four upper aquifer units: drift, Prairie du Chien, Jordan, and FIG (Franconia-Ironton-Galesville) aquifers. Based on County Well Index (CWI) information, there are no documented wells completed in the lower Mt. Simon aquifer, so it is unknown whether TCE contamination has also impacted that aquifer. Treatment of the contamination plume has taken a multi-step approach. The first response was to treat private water supply systems that were within the TCE plume. Granular activated carbon (GAC) filters were installed in private water systems within the zone of contamination.

The next steps being undertaken to address the remediation of this contamination were developed by the MPCA in compliance with state and federal Superfund procedures. Following review of the Remedial Investigation and Feasibility Study, a Recommendation of Decision was adopted in December 2007, which incorporated remedial actions to address this contamination. The remedial actions are intended to stop the migration of contamination from the source area and to remediate the TCE contamination. To this end, four barrier wells were installed in spring of 2008 to pump the most highly-contaminated water to an air stripper treatment system. The air stripper is designed to remove 99% of the TCE from the treated water, with the resulting discharge expected to be below the current health risk limits for TCE. Pumping of the barrier wells started in March 2008. While the barrier wells are expected to halt migration of the more highly-contaminated portion of the plume, in-situ treatment of the TCE is also being investigated by the Minnesota Pollution Control Agency, as a means to reduce the duration the barrier wells need to be operated and reduce the need for GAC filters on private systems. Pilot studies for in-situ treatment were started in November 2007, with full scale treatment expected to be started by the end of 2008.

Any water withdrawals that take place during the cleanup of this site are overseen by the MPCA. The City of Lake Elmo currently plays no active role in the cleanup of this site, as the cleanup is under the jurisdiction of the MPCA and any identified responsible parties. The city, however, is limiting the potential for impacts to their own drinking water supply system by locating any future municipal drinking water wells in areas of the city not impacted by the groundwater contamination plume.

A second plume of groundwater contamination originates from multiple landfill and dumping sites in Oakdale and Lake Elmo, outside of the AUAR area. These sites accepted both municipal and industrial wastes in the past. Contamination from these sites consists of volatile organic compounds, metals, and perfluorochemicals (PFCs). At present, contaminants from this plume have not been detected in wells within the AUAR area, even though the special well construction area overlaps with the western third of the AUAR area. PFC contamination, one of the most mobile contaminants from the landfills, has been observed as far east as the intersection of Highway 5 and 31<sup>st</sup> Street. At present, it does not appear the ambient flow direction of groundwater in this area will bring the contaminants any closer to the AUAR area. However, flow of contaminants within fractured bedrock, such as the Prairie du Chien formation can sometimes travel in directions counter to the natural gradient of groundwater flow. As a result, special well construction areas are often extended beyond the known plume areas into surrounding properties.

#### **MITIGATION SUMMARY**

Special Well Construction Areas (SWCAs) have been designated by the MDH for both groundwater contamination plumes (see Figure 13-2). Both SWCAs overlap with the AUAR area, with approximately 75% of the AUAR area contained within at least one or both SWCAs. The SWCAs establish requirement that restrict the construction of new wells to certain aquifers or certain locations. Wells constructed must meet MDH guidelines for both monitoring and treatment.

20. **Solid Wastes; Hazardous Wastes; Storage Tanks**
- a. Describe types, amounts and compositions of solid or hazardous wastes, including solid animal manure, sludge and ash, produced during construction and operation. Identify method and location of disposal. For projects generating municipal solid waste, indicate if there is a source separation plan; describe how the project will be modified for recycling. If hazardous waste is generated, indicate if there is a hazardous waste minimization plan and routine hazardous waste reduction assessments.

*AUAR Guidelines: For an AUAR, only the estimated total quantity of municipal solid waste generated and information about any recycling or source separation programs of the RGU need to be included.*

Waste to be generated under the different development scenarios is anticipated to consist primarily of domestic waste, though the scenarios all include commercial, industrial, and institutional development in addition to residential housing. As is currently the case in Lake Elmo, solid waste will be collected weekly by a licensed hauler and disposed of at a licensed landfill. Curbside collection of materials for recycling will also be available in the AUAR area. Using statistical information provided by Washington County and the development scenarios proposed for the AUAR area, the volume of municipal solid waste that would be generated under each of the proposed development scenarios was estimated. In addition, the volume of material for recycling was also estimated. For the purposes of calculating waste generation and recycling estimates, it is assumed that 1 household represents 1 residential or dwelling unit and that the term “non-residential” includes commercial, industrial, and institutional development.

The following statistics were obtained from Washington County, or were derived using statistical information from the County, for the City of Lake Elmo:

Residential Waste Generation:	1.3 tons/household/year
Non-Residential Waste Generation:	2.06 tons/employee/year
Recycling (residential and non-residential)	46% of solid waste generated

According to information collected previously from Washington County, approximately 27.7% of residential solid waste generated is recycled, and 16% of the waste generated is yard waste. Of the yard waste generated, approximately 81% is composted. The County no longer tracks solid waste and recycling volumes separately for residential and non-residential properties. Recent information from the County indicates that approximately 46% of the total solid waste generated from both residential and non-residential sources is recycled. This includes drop-off and curbside pick-up. Based on these statistics and those listed above, calculations were performed to predict the waste that would be produced and recycled under the conceptual development scenarios for the AUAR area.

Estimations of solid waste volumes for non-residential properties were based on the estimated number of employees. The number of employees for each type of non-residential land use was calculated using the square footage assumed for each land use and based on information from the Energy Information Administration in its 2003 Commercial Buildings Energy Consumption Survey (included in Table 20.1).

**Table 20-1  
New Employees for Non-Residential Land Uses**

<b>Principal Building Activity</b>	<b>Mean Square Feet per Worker</b>	<b>AUAR Development Scenario Land Use Category</b>	<b>Square Footage proposed</b>	<b>Number of Employees Expected</b>
Retail (other than mall)	1,246	Commercial (Specialty Retail)	300,000 sf	240.8
Office	434	Office	150,000 sf	345.6
Public Assembly	1,645	Institutional (City Hall, YMCA, Library/Art Center)	150,000 sf	91.2
Education	791	Institutional (Continuing Education)	50,000 sf	63.2

Existing land uses in the AUAR area consist of retail and other commercial, industrial and utility, single family homes, farmsteads and agricultural land (including a horse farm), parks and recreation areas, and undeveloped areas. Approximately 194 households are currently present. Future land uses designated for the AUAR area include single and multi-family residential, commercial, office, and institutional. Land use subcategories for the non-residential land uses are shown in the preceding table.

**Table 20-2  
Solid Waste Generation**

<b>Scenario</b>	<b>Land Use</b>	<b>Units</b>	<b>Rate</b>	<b>Solid Waste Generated per Land Use</b>	<b>Total Solid Waste Generated per Scenario*</b>
Scenario A	Residential	600 households	1.3 tons/hh/year	780.0 tons/year	2,306 tons/year
	Commercial – specialty retail	300,000 sf 240.8 employees	2.06 tons/emp/year	496.0 tons/year	
	Office	150,000 sf 345.6 employees	2.06 tons/emp/year	711.9 tons/year	
	Institutional - education	50,000 sf 63.2 employees	2.06 tons/emp/year	130.2 tons/year	
	Institutional – public assembly	150,000 sf 91.2 employees	2.06 tons/emp/year	187.9 tons/year	
Scenario B	Residential	1000 households	1.3 tons/hh/year	1,300.0 tons/year	2,826 tons/year
	Commercial – specialty retail	300,000 sf 240.8 employees	2.06 tons/emp/year	496.0 tons/year	
	Office	150,000 sf 345.6 employees	2.06 tons/emp/year	711.9 tons/year	
	Institutional - education	50,000 sf 63.2 employees	2.06 tons/emp/year	130.2 tons/year	
	Institutional – public assembly	150,000 sf 91.2 employees	2.06 tons/emp/year	187.9 tons/year	
Scenario C	Residential	1600 households	1.3 tons/hh/year	2,080.0 tons/year	3,606 tons/year

Scenario	Land Use	Units	Rate	Solid Waste Generated per Land Use	Total Solid Waste Generated per Scenario*
	Commercial – specialty retail	300,000 sf 240.8 employees	2.06 tons/emp/year	496.0 tons/year	
	Office	150,000 sf 345.6 employees	2.06 tons/emp/year	711.9 tons/year	
	Institutional - education	50,000 sf 63.2 employees	2.06 tons/emp/year	130.2 tons/year	
	Institutional – public assembly	150,000 sf 91.2 employees	2.06 tons/emp/year	187.9 tons/year	
Scenario D	Residential	906 households	1.3 tons/hh/year	1,177.8 tons/year	2,704 tons/year
	Commercial – specialty retail	300,000 sf 240.8 employees	2.06 tons/emp/year	496.0 tons/year	
	Office	150,000 sf 345.6 employees	2.06 tons/emp/year	711.9 tons/year	
	Institutional - education	50,000 sf 63.2 employees	2.06 tons/emp/year	130.2 tons/year	
	Institutional – public assembly	150,000 sf 91.2 employees	2.06 tons/emp/year	187.9 tons/year	

\*prior to recycling and composting

Based on percentages provided by Washington County, the following volumes of solid waste would be expected to be recycled and composted per year under each of the development scenarios:

**Table 20-3  
Recycling and Composting**

Development Scenario	Recycling (Residential and Non-Residential, curbside and drop-off)	Composting* (Residential)
Scenario A	1,061 tons/year	101 tons/year
Scenario B	1,300 tons/year	169 tons/year
Scenario C	1,659 tons/year	270 tons/year
Scenario D	1,244 tons/year	153 tons/year

\*curbside pickup of composting materials is available through some of the licensed waster haulers that serve Lake Elmo. Drop off sites are available within the county.

County specific data regarding yard waste is no longer collected. The estimates in Table 20.3 were calculated using County statistics provided in the past. The State provides for a 5% “credit” on the total recycling rate for counties with yard waste composting sites. Washington County has at least six yard waste composting sites, both municipally and commercially operated. In addition, some of the waste haulers accept waste in a separate truck during the summer growing season, and many residents choose to compost their own yard waste.

The City of Lake Elmo has committed to Reuse and Recycling efforts in order to reduce the impact on the environment. Recyclables are typically collected on the same day as regular trash is collected. The city has an open trash collection system where the homeowner selects which of the waste haulers licensed by

the City of Lake Elmo they will use for trash collection. A list of licensed haulers is available from the city and is also accessible through the city's web site. Separation requirements for recyclables may differ somewhat among the trash haulers. In general, items accepted for recycling include glass bottles and jars, metal cans, plastic bottles with necks, mail, office and school paper, magazines and catalogs, newspapers, phone books, cardboard boxes, aluminum cans.

- b. Identify any toxic or hazardous materials to be used or present at the site and identify measures to be used to prevent them from contaminating groundwater. If the use of toxic or hazardous materials will lead to a regulated waste, discharge or emission, discuss any alternatives considered to minimize or eliminate the waste, discharge or emission.

*AUAR Guidelines: No response is necessary for AUAR Item 20.b.*

- c. Indicate the number, location, size and use of any above or below ground tanks to store petroleum products or other materials, except water. Describe any emergency response containment plans.

*AUAR Guidelines: For AUAR Item 20.c, potential locations of storage tanks associated with commercial uses in the AUAR should be identified (e.g., gasoline tanks or service stations).*

Approximately 650,000 square feet of non-residential development is proposed under each of the four development scenarios. At this time, the non-residential development is assumed to consist of 300,000 sf of commercial development (specialty retail), 150,000 sf of general office, and 200,000 sf of institutional development (YMCA (100,000 sf); continuing education center (50,000 sf); library/arts center (25,000 sf); and new city hall (25,000 sf)). None of these uses is expected to use, store or generate large quantities of hazardous materials or petroleum products. However, it is possible they may use and store small amounts of chemicals and/or petroleum products, and some may utilize aboveground or belowground tank systems, particularly associated with heating or grounds maintenance activities. Any business using or storing chemicals or petroleum products would be subject to local and state rules regulating such activity.

The AUAR area includes some areas of existing non-residential development (see Figure 9-1 Current Land Use), including some existing gas stations/convenience stores. Large underground storage tanks for gasoline and diesel fuel are located at these facilities. In addition, small canisters of propane and small containers of vehicle maintenance chemicals may also be used and stored for sale at the facilities. Storage and use of these materials by such facilities is subject to all applicable federal, state and local laws and regulations regarding pollution prevention. Businesses within the AUAR that are registered to use, store, or generate hazardous materials or petroleum products in regulated quantities are listed in AUAR Item 9 (see Table 9-4). As indicated previously, new permanent storage tanks for petroleum products and/or hazardous materials, such as would be expected for additional gas stations, manufacturing facilities, etc. are not anticipated to be located within the AUAR area under the potential development scenarios.

During construction activities, it is likely that portable storage tanks of fuel for construction vehicles and machinery may be temporarily located in various portions of the AUAR area during construction activities. For the purpose of minimizing impact due to potential spills, the re-fueling of vehicles and machinery will be conducted away from wetlands and other sensitive areas.

Currently and in the future, hazardous materials and petroleum products will likely be transported within and through the AUAR area via roads and railroads. Businesses engaged in the transport of these materials are required to be registered with the EPA and licensed by Mn/DOT, as well as meet several other requirements listed in the MPCA publication Hazardous Waste #1.06 (May 2000) titled Step 6: Transport and Dispose of Hazardous Waste Correctly (<http://www.pca.state.mn.us/waste/pubs/1-06.pdf>) in order to ensure that the materials are safely transported.

#### **MITIGATION SUMMARY**

*Solid waste:* The city will require solid waste to be disposed of properly. Solid waste is collected weekly by licensed waste haulers selected by individual property owners; the city will require businesses operating in the AUAR area to retain a licensed trash collection service and to manage their wastes, while onsite, in accordance with local, state and federal regulations.

*Recycling:* The city will require licensed waste haulers to provide weekly pickup of recyclable materials within the AUAR area as is the current practice in the already developed portions of the AUAR area and other parts of the city.

*Storage tanks, hazardous materials, petroleum products:* Under all scenarios, potential commercial and office uses could include facilities such as dental or medical clinics, schools, photo developing shops, and similar uses. These types of businesses typically use, store, and dispose of small amounts of substances that can be classified as hazardous and which are subject to special disposal requirements. They may also use and store petroleum products, such as for grounds maintenance equipment. Any facilities to be located in the AUAR area will be required to comply with local, state, and federal regulations pertaining to the use, manufacture, and/or storage of hazardous materials and petroleum products. In addition, contractors using portable petroleum storage tanks on site temporarily during construction activities will also be subject to local, state, and federal regulations regarding their use. Agencies with authority to enforce compliance include the City of Lake Elmo, Washington County, the Minnesota Pollution Control Agency (MPCA) and the Environmental Protection Agency (EPA).

21. Traffic. Parking spaces added \_\_. Existing spaces \_\_ (if project involves expansion). Estimated total average daily traffic generated \_\_. Estimated maximum peak hour traffic generated and time of occurrence \_\_. If the peak hour traffic generated exceeds 250 vehicles or the total daily trips exceeds 2,500, a traffic impact study must be prepared as part of the EAW. Using the format and procedures described in the Minnesota Department of Transportation Traffic Impact Study Guidance (available at <http://www.oim.sot.state.mn.us/access/pdfs/Chapter%205.pdf>) or a similar local guidance, provide an estimate of the impact on traffic congestion on affected roads and describe any traffic improvements necessary. The analysis must discuss the project's impact on the regional transportation system.

*AUAR Guidelines: For AUAR reviews a detailed traffic analysis will be needed, conforming to the MnDOT guidance as listed on the EAW form. The results of the traffic analysis must be used in the responses to item 22 and to the noise aspect of item 24.*

Note: All figures referenced in this section are included in the traffic report provided in Appendix E.

## INTRODUCTION

The traffic analysis provides an evaluation of three overall traffic-related conditions: existing (2008), year 2030 without Village development, and year 2030 with Village development.

The first evaluation is of existing traffic-related conditions along the primary road network and at selected intersections. The conditions are described in a metric called "level of service" (LOS), which estimates the performance of a roadway or intersection based on levels of traffic congestion.

The second evaluation is of traffic-related conditions in the year 2030 without Village development. The year 2030 background condition analysis accounts for the steady growth in traffic that is predicted to occur due to development in the region (including development in Lake Elmo located outside the Village), but does not account for development within the Village. Predicted traffic levels in the year 2030 without Village development are also described in terms of levels of service (LOS) and several roadway improvements are identified that are needed to serve the predicted growth in traffic.

The third evaluation is of traffic-related conditions in the year 2030 with Village development. This analysis accounts for both the steady growth in traffic that is predicted to occur due to development in the region and development within the Village. Predicted traffic levels in the year 2030 with Village development are also described in terms of levels of service (LOS) and several roadway improvements are identified that are needed to serve Village development.

## EXISTING CONDITIONS

The Lake Elmo City Council recently authorized the undertaking of a city-wide transportation study and development of a traffic management plan that will address transportation needs across the city. This study will get underway in 2008 or early 2009. The data compiled in the AUAR and the data from the Washington County transportation plan (currently underway) and from the Trunk Highway 36 and County Road 17 intersection study (currently underway) will also be incorporated into this work when available.

The AUAR traffic analysis will evaluate the scenarios based on the Lake Elmo Village Master Plan and the Comprehensive Plan. The analysis will consider the impact of the development scenarios on existing conditions, including impacts to the roadways utilized by Lake Elmo Elementary School traffic. Included in preliminary evaluations is the analysis of traffic-related existing conditions along the primary roadways and at selected critical intersections. The work tasks accomplished for the existing conditions analysis included the following:

- Area roadway/intersection reconnaissance;
- Conducting a.m. and p.m. peak period traffic counts at eight critical intersections;
- Gathering existing available lane data and traffic controls at the critical intersections;
- Calculating existing levels of service for the morning and afternoon peak hours at the critical intersections.

### **EXISTING ROADWAY SYSTEM**

The primary area roadway system for the study area is shown on Figure 21-1 (All figures referenced in this section are included in the traffic report provided in Appendix E). This graphic also provides the available traffic lanes and intersection traffic control. Generally, the area is served by three primary facilities: Minnesota Trunk Highway (TH) 5, County State-Aid Highway (CSAH) 17, and County State-Aid Highway (CSAH) 15.

### **Functional Classification**

TH 5 is functionally classified as an "A" minor arterial and provides for east-west travel through Lake Elmo. *Minor arterial roadways* are defined as roadways that connect the urban service area to cities and towns inside and outside the region and generally service medium to short trips. The emphasis for minor arterial roadways is on mobility (i.e., through trips) rather than on local land access (i.e., direct property access via driveways). In urban areas, direct land access along minor arterials is generally restricted to concentrations of commercial and industrial parcels. In Lake Elmo, TH 5 provides east-west travel through the city and also provides direct access to properties within the Village. This dual purpose causes a conflict between regional and local traffic movements which can contribute to congestion and safety problems.

CSAH 17 (Lake Elmo Avenue) provides for north-south travel and contains an alignment jog as the facility intersects with TH 5. The north leg of CSAH 17 (Lake Elmo Avenue) is classified as an "A" minor arterial expander. The south leg is classified as a "B" minor arterial between TH5 and 10<sup>th</sup> Street. Lake Elmo Avenue is classified as major collector between 10<sup>th</sup> Street and the southern city limits. *Collector streets* are defined as roadways that provide more land access than arterials and provide connections to arterials. Collectors serve a dual function of accommodating traffic and providing more access to adjacent properties than arterials.

The third primary roadway is CSAH 15 (Manning Avenue). CSAH 15 (Manning Avenue) is a north-south route providing a connection between TH 5 and I-94 and then proceeding southerly thru Washington County. The roadway is functionally classified as an "A" minor arterial.

The roadways in the AUAR study area are two-lane roadways with turn lanes and/or bypass lanes provided at several locations. Figure 21-2 shows the available traffic lanes.

**Traffic Control**

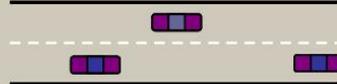
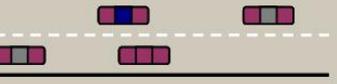
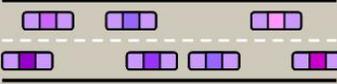
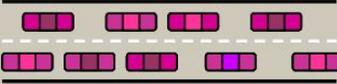
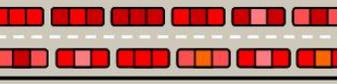
The only traffic signal within the study area is at the intersection of TH 5 with CSAH 15 (Manning Avenue). TH 5, as it passes through the AUAR study area, is afforded free flow as all roadways intersecting with TH 5, other than CSAH 15, have stop sign control. The intersection controls for the critical intersections analyzed are also shown on Figure 21-2.

**EXISTING TRAFFIC OPERATIONS**

**Roadway Segment Capacity Analysis**

Existing and future traffic operations are analyzed in terms of levels of service. Level of service (LOS) is an estimate of the performance of transportation facility operations. Methodology presented in the *Highway Capacity Manual (HCM) (Transportation Research Board, 2000)* is commonly used to determine LOS. This analysis used the Synchro/SimTraffic software package to model the study intersections using the HCM LOS criteria. The degree of traffic congestion and delay is rated using the letter “A” for the least amount of congestion to the letter “F” for the highest congestion level (i.e., LOS A through LOS F). LOS A represents the best result with little or no delay. A LOS F represents the worst result with excessive delay and queues. Table 21-1 provides general descriptions of the different levels of service as defined in the Highway Capacity Manual.

**Table 21-1  
Level of Service Description**

Level of Service	Description	
A	Lower volumes Little to no delay Unimpeded movement	
B	Minor delays Reasonably unimpeded operation Slightly restricted movement	
C	Stable conditions More restricted movements Speeds controlled by higher volumes	
D	Higher density traffic Volumes near capacity Some noticeable congestion	
E	At capacity Major delays are common Lower speeds	
F	Failing condition Significant delays Very low speeds with stop and go traffic	

The level of service measure is not a direct measure of how safe an intersection or road segment is. There are several factors that must be examined to determine if safety factors could be an issue at an intersection. These include, but are not limited to the geometric layout of an intersection, the number of lanes and alignment, crash rate and crash density, sight distances, and speed characteristics. The following discussion describes how traffic streams react to an incident under each of the LOS categories. Higher speeds can be a contributing factor to crash severity. Better service levels normally indicate vehicles travelling at higher speeds.

#### *LOS A*

Effects of incidents or point breakdowns are easily absorbed. The LOS may go down in the vicinity of an incident but quickly returns to normal upon passing the incident.

#### *LOS B*

The effects of minor incidents and point breakdowns are more easily absorbed, however local deterioration is more severe than in LOS A.

#### *LOS C*

Minor incidents are still absorbed, but local deterioration is substantial. Queues form behind any significant blockage. Drivers experience a noticeable increase in tension due to additional vigilance required for safe operation.

#### *LOS D*

Traveling speeds decline slightly with increasing flows. The vehicular density begins to deteriorate more quickly with increasing flows. The freedom to maneuver is limited and the driver experiences reduced physical and psychological comfort levels. Such behavior can lead to driver decisions that are unsafe.

#### *LOS E*

Traffic operations in this level are volatile with virtually no usable gaps in the traffic stream. Any disruption to the traffic stream, such as vehicles entering from a ramp or changing lanes, causes following vehicles to give way to admit that vehicles establishing a disruptive wave that propagates throughout the upstream traffic flow. Incidents produce serious breakdowns with extensive queuing. Maneuverability is extremely limited. The level of physical and psychological comfort afforded the driver is extremely poor. Driver decision, in these instances, can be unsafe.

#### *LOS F*

The LOS F describes breakdowns in vehicular flow. This type of condition generally exists within queues forming behind breakdown points. Such breakdowns occur for many reasons:

1. Traffic incidents cause temporary reductions in capacity of a short segment, such that the number of vehicles arriving is greater than the number of vehicles that can traverse it.
2. Recurring points of congestion exist, such as merge or weaving areas, where the number of vehicles arriving is greater than the number of vehicles discharged.
3. In forecasting situations, any location presents a problem when projected peak hour (or other) flow rate exceeds the estimated capacity of the location.

Whenever LOS F conditions exist, there is a potential for vehicles to extend upstream for significant distances.

Though there are no hard and fast guidelines in Minnesota for what level of service is considered acceptable, it is typical for an intersection with an overall<sup>2</sup> LOS D to be acceptable in urban or developing communities. Intersections with some turn movements operating at LOS E or F during peak hours may be acceptable, as LOS E or F conditions do not always correspond with safety problems. However, intersections with level of service concerns should also be monitored for potential safety problems.

The capacity of any roadway is based upon many factors. These factors may include the: number of lanes provided, number of access points per mile, number of signalized intersections per mile, percentage of truck traffic, and slope of the roadway. However, for planning purposes, a generalized average daily traffic (ADT) threshold for roadways is used. Table 21-2 shows generalized ADT volume thresholds by roadway type and number of lanes with corresponding levels of service (LOS).

**Table 21-2  
Generalized Average Daily Traffic (ADT) Volume Thresholds**

Facility Type	Maximum ADT Volume at Level of Service <sup>1</sup>				
	A	B	C	D <sup>2</sup>	E
2-Lane Roadway – (e.g., CSAH 17, TH 5, CSAH 15 along the Village AUAR boundary)					
Without Turn Lanes	3,000	4,500	6,500	8,500	10,000
With Right Turn Lanes	4,750	7,200	10,300	13,500	15,900
With Left Turn Lanes <sup>3</sup>	5,250	7,900	11,400	14,900	17,500
With Left and Right Turn Lanes <sup>3</sup>	7,500	11,250	16,250	21,250	25,000
4-Lane Roadway – (e.g., CSAH 15 near I-94)					
Without Turn Lanes	7,100	10,700	15,400	20,100	23,700
With Right Turn Lanes	9,600	14,400	20,700	27,100	31,900
With Left Turn Lanes <sup>4</sup>	10,100	15,200	21,900	28,600	33,700
With Left and Right Turn Lanes <sup>4</sup>	12,600	18,900	27,200	35,600	41,900

<sup>1</sup> ADT Volumes above the LOS E maximum threshold would be considered LOS F.

<sup>2</sup> LOS D is considered acceptable by most agencies within the metro area.

<sup>3</sup> Also considered the planning capacity for a 3-lane roadway (one through lane in each direction with a center, two-way left-turn lane) with or without a right-turn lane.

<sup>4</sup> Also considered the planning capacity for a 5-lane roadway (two through lanes in each direction with a center, two-way left-turn lane) with or without a right-turn lane.

Note: Approximate values based upon several assumptions:

- Capacity assumptions per lane
- Directional distribution
- Peak hour percentages
- ¼ mile signal spacing

Based on the information presented in Table 21-2, the LOS for each roadway can be determined. Table 21-3 shows the results of the roadway segment capacity analysis including existing LOS based on the thresholds shown in Table 21-2. As shown in the Table 21-2, the roadways within the Village AUAR area currently provide adequate capacity for their respective levels of traffic. For this reason, no capacity improvements are recommended for existing conditions.

<sup>2</sup> Overall intersection LOS is determined from the average seconds of delay experienced by all vehicles moving through the intersection.

**Table 21-3  
Existing Roadway Planning Levels of Service (LOS)**

Roadway	Segment	2007 AADT Volume	Existing Lanes	Planning Level LOS
TH 5	West of CSAH 17 South	12,000	2	D
	Between CSAH 17 South & CSAH 15	11,500	2	D
	Northeast of CSAH 15	16,600	2	E <sup>1</sup>
CSAH 17	North of TH 5	3,100	2	A
	Between TH 5 & Upper 33 <sup>rd</sup> St N	4,200	2	B
	Between Upper 33 <sup>rd</sup> St N & 30 <sup>th</sup> Street	3,650	2	B
	South of 30 <sup>th</sup> Street	3,200	2	B
CSAH 15	Between TH 5 & CSAH 14	10,000	2	B
	Between CSAH 14 & 30 <sup>th</sup> Street	10,700	2	B
	South of 30 <sup>th</sup> Street	9,500	2	B
30 <sup>th</sup> Street	Between CSAH 17 & Lisbon Ave	860	2	A
	Between Lisbon Ave & CSAH 15	700	2	A
39 <sup>th</sup> Street	Between TH 5 & CSAH 17 North	690	2	A

<sup>1</sup> Located outside Village AUAR area

### Existing Intersection Capacity Analysis

The result of the existing LOS analysis for the critical intersections is shown on Figure 21-4. All movements within the AUAR area performed at LOS D or better except the northbound approach at CSAH 17 (Lake Elmo Avenue) and TH 5, which operates at LOS F. At all stop-controlled intersections along TH 5, side street traffic controlled by stop signs is adversely affected by free-flowing traffic on TH 5. Vehicles are required to wait for acceptable gaps in TH 5 traffic which can create substantial delay for these movements during peak hours. Typically, only new traffic signals could improve these minor movement levels of service, but the volumes for these movements are so small that the required warrants for a new signal would not be met.<sup>3</sup>

In addition, the northbound left turn at CSAH 15 (Manning Avenue) and TH 5 operates at LOS E in the p.m. peak hour, but the overall intersection operates at LOS C.

### Existing Planned Roadway Improvements

The city is preparing a “Safe Routes to School” plan that could result in improved visibility and signing of crosswalks at key intersections. In addition, the county is investigating potential funding sources to improve the intersection of CSAH 15 (Manning Avenue) at 30<sup>th</sup> Street by adding north and southbound left turn lanes. Beyond these spot improvements, there are no plans to improve intersections or roadways within the AUAR area.

<sup>3</sup> Warrants for new traffic signals are documented in the Minnesota Manual on Uniform Traffic Control Devices (MnDOT, 2005); there are eight warrants which describe thresholds and/or conditions that must be met to warrant a new signal and include criteria such as peak hour traffic volumes, four-hour traffic volumes, eight-hour traffic volumes, pedestrian volumes, and crash experience.

**EXISTING TRANSIT**

At the present time, there is bus transit service in the AUAR area. Route 294 passes through the city on TH 5. The route offers weekday peak period service through the Village in Lake Elmo to downtown St. Paul and Stillwater. The route has a time point and bus stop at TH 5 and Lake Elmo Avenue. In total route 294 has 32 stops located in Lake Elmo which are listed in the Appendix E.

**YEAR 2030 BACKGROUND CONDITIONS (WITHOUT VILLAGE DEVELOPMENT)**

Year 2030 background conditions were examined to determine the adequacy of the roadway network to accommodate general background growth in the community (i.e., increases in traffic without Village development). The year 2030 was chosen as the future analysis year to be consistent with the Metropolitan Council's Regional Transportation Model (which uses Year 2030 as the planning horizon year), the Metropolitan Council's 2030 Regional Development Framework, the 25-year plan adopted in 2005 to guide the seven-county metropolitan area's future growth patterns. In addition, MnDOT and Washington County also use Year 2030 as their planning horizon for future travel demand forecasts and transportation system plans.

The existing traffic on the roadways was increased to account for background growth in the area not associated with Village development. Based on a review of historic average annual daily traffic volumes on area roadways and a comparison with the state-aid growth factor for Washington County, an average annual growth factor of two percent was determined. This factor was used to increase the existing traffic volumes to account for general population growth in the area and was applied to existing volumes to project the 2030 background volumes shown in Figure 21-5 for the a.m. and p.m. peak hours.

**Year 2030 Roadway Segment Capacity Analysis (without Village development)**

Using the ADT volume thresholds from Table 21-2 compared to projected 2030 background daily volumes (without Village development) the LOS can be determined. LOS is used to determine the recommended improvements such as recommended number of lanes for each roadway. Table 21-4 shows the 2030 background planning LOS by roadway segment for the existing roadway system configuration. In locations where the projected 2030 planning LOS is an E or F, improvements would be needed to reach an acceptable LOS D or better (without Village development). The number of lanes needed to accommodate the 2030 background ADT is shown under the "Improved Lane Configuration" column along with the associated planning LOS.

There have been discussions about the possibility of realigning the north leg of CSAH 17 to alleviate the jog at TH 5. This would entail extending the south leg of CSAH 17 through TH 5 to connect to CSAH 17 North near 39<sup>th</sup> Street. Another realignment possibility that was discussed with Washington County in response to their comments on the preliminary Draft AUAR is to shift the north leg of CSAH 17 and TH 5 intersection to the west of Lake Elmo Elementary. Thus creating a buffer between the school and CSAH 17 and providing access to the lands west of Gorman's restaurant. However, this AUAR does not take these realignment discussions of CSAH 17 into consideration as there are no approved plans for these improvements. This report assumes that the alignment of CSAH 17 remains as it is today, but these options should be reviewed by the city, county, and state in future transportation studies prior to development or redevelopment in this area.

**Table 21-4  
2030 Background Traffic Growth Planning Levels of Service**

Roadway	Segment	2007 Existing ADT	2030 Background ADT	Existing Lanes		Improved Lane Configuration	
				No. of Lanes	Planning LOS	No. of Lanes	Planning LOS
TH 5	West of CSAH 17 South	12,000	18,920	2	F	4	C
	Bet. CSAH 17 & CSAH 15	11,500	18,140	2	F	4	C
	Northeast of CSAH 15	16,600	26,180	2	F	4	C
CSAH 17	North of TH 5	3,100	4,890	2	C	2	A <sup>1</sup>
	South of TH 5	3,650	5,760	2	C	2	A <sup>1</sup>
CSAH 15	South of TH 5	10,700	15,770	2	E	2	C <sup>2</sup>
30 <sup>th</sup> Street	Between CSAH 17 & CSAH 15	860	1,360	2	A	2	A
39 <sup>th</sup> Street	Between TH 5 & CSAH 17 North	690	1,090	2	A	2	A

<sup>1</sup> With added signals and intersection turn lanes as described under "Intersection Capacity Analysis" below

<sup>2</sup> With turn lane improvements for northbound approach, LOS E is improved to LOS C without widening roadway segment.

As shown in Table 21-4, even without Village development, TH 5 will need to be upgraded from two lanes to four lanes with right and left turn lanes at intersections. Although the specific roadway improvements for TH 5 should be planned, traffic volumes should be monitored to determine the actual timing of any improvement. The City of Lake Elmo should coordinate with MnDOT, Washington County, and others, as necessary, to ensure the proper monitoring and roadway plans/designs are in place as development continues throughout the AUAR area.

The Village development will have minimal impacts on the regional transportation system. It is expected that the Village development would increase the ADT on I-694, I-94, and TH 36 by between 1.2% and 3%. This increase in ADT volumes is not enough to impact the LOS thresholds; meaning the interstate's original LOS would not change. Table 21-5 shows the generalized ADT threshold for the freeway and arterial type roadways.

Table 21-6 shows the 2030 projected volumes expected on the regional transportation system without the Village development, the ADT expected to be added from the Village development, and the associated Levels of Service as determined from Table 21-5. As shown in Table 21-6, there is little discernable impact on the regional transportation system.

**Table 21-5  
Generalized Average Daily Traffic (ADT) Thresholds**

Facility Type	Number of Lanes	Maximum ADT Volume at Level of Service <sup>1</sup>				
		A	B	C	D <sup>2</sup>	E <sup>1</sup>
Interstate / Freeway	6	34,000	55,000	82,000	105,000	127,000
	4	17,000	37,000	55,000	70,000	85,000
Divided Arterial	6	20,000	32,000	51,000	57,000	64,000
	4	13,000	21,000	34,000	38,000	42,000
Principal Arterial	5	16,000	25,000	40,000	45,000	50,000
	4	12,000	19,000	30,000	36,000	43,000
	3	8,000	13,000	20,000	27,000	34,000
	2	5,000	8,000	12,000	18,000	24,000
	2(one-way)	6,000	10,000	16,000	19,000	25,000
Minor Arterial	5	15,000	24,000	38,000	43,000	47,000
	4	11,000	18,000	28,000	34,000	40,000
	3	7,000	12,000	19,000	26,000	32,000
	2	4,000	7,000	11,000	17,000	23,000
	2 (one-way)	6,000	9,000	15,000	18,000	24,000
Collector	4	7,000	11,000	18,000	22,000	26,000
	3	5,000	8,000	12,000	17,000	21,000
	2	3,000	5,000	7,000	11,000	15,000
	2(one-way)	4,000	6,000	9,000	12,000	16,000

<sup>1</sup> ADT Volumes above the LOS E maximum threshold would be considered LOS F.

<sup>2</sup> LOS D is considered acceptable by most agencies within the metro area.

Source: Highway Capacity Manual, Met Council Travel Demand Model, and WSB & Associates, Inc.

**Table 21-6  
Village Development Impact on Regional Transportation System**

Road Segment	2030 ADT <sup>1</sup>	2030 LOS	Village Development 2030 ADT <sup>2</sup>	Cumulative 2030 ADT <sup>3</sup>	Cumulative LOS
I-94 west of CSAH 15	110,000	E	1,325	111,325	E
I-694 south of TH 5	106,000	E	3,585	109,585	E
TH 36 east of TH 5	50,000	D	1,830	51,830	D
TH 36 west of CSAH 17	67,000	F	1,025	68,025	F

<sup>1</sup>From Washington County 2030 Draft forecast Volumes

<sup>2</sup>To be added onto regional transportation system.

<sup>3</sup>Regional transportation system 2030 ADT plus Village Development 2030 ADT

**Year 2030 Intersection Capacity Analysis (without Village development)**

With the 2030 background a.m. and p.m. peak hour volumes determined, the Synchro/SimTraffic software was used to evaluate traffic operations. The existing lane geometry was first analyzed to determine how the current roadway system would handle the future volumes. Figure 21-6 shows 2030 levels of service using the existing lane configurations.

As shown in Figure 21-6, several individual turning movements would operate at LOS F during the a.m. and p.m. peak hours. Only the intersection of CSAH 17 (Lake Elmo Avenue) and 30<sup>th</sup> Street would operate at a satisfactory level during the a.m. and p.m. peak hours.

Based on these results, the existing lane geometry is not sufficient for projected 2030 background growth (without Village development) within the city. Physical capacity improvements will be needed to accommodate the expected traffic growth in this area.

### **Year 2030 Recommended Roadway Network Improvements (without Village development)**

Since the existing roadway geometry was not sufficient for the projected 2030 background traffic volumes (without Village AUAR development), additional analyses at the study intersections determined recommendations for improved lane geometry. The recommended number of lanes, as determined by the daily volume planning level analysis, was used as a starting point. This included the upgrade of TH 5 east of CSAH 17 (south) from two to four lanes as required under 2030 Background Conditions (see Table 21-4). An iterative process followed with the results of Synchro/SimTraffic analysis dictating the final lane geometry for improving levels of service at the intersections.

Recommended improvements for each individual study intersection are described in Table 21-7. All analyses presented were completed using traditional intersection control (i.e., either a stop sign or traffic signal). Other potential methods of intersection control, such as roundabouts, are discussed later in this report.

The level of service results for Year 2030 Background Conditions with the suggested roadway improvements are shown on Figure 21-7. As shown in this figure, the turn movement levels of service have improved. Traffic control signals were assumed on TH 5 at both CSAH 17 intersections. This improvement alleviated congestion through the intersections with the improved street network. Another possible improvement option has been discussed between county and state officials that would realign TH 5 to intersect with Manning Avenue (CSAH 15) at the existing intersection with 40th Street North (CSAH 14), thereby creating a continuous north/south movement through the existing TH 5/CSAH 15 intersection. This option should be re-evaluated by city, county, and state officials in the future.

**Table 21-7**  
**Recommended Roadway Improvements – 2030 Background Conditions**  
**(Without Village Development)**

<b>Intersection</b>	<b>Description<sup>1</sup></b>
TH 5 and CSAH 15 (Manning Avenue)	<ul style="list-style-type: none"> <li>•Additional left-turn lane to create dual northbound left-turn lanes</li> <li>•Additional eastbound and westbound through lanes creating four-lane section.</li> <li>•Additional left-turn lane to create dual westbound left-turn lanes.</li> </ul>
TH 5 and 39 <sup>th</sup> Street	<ul style="list-style-type: none"> <li>•Additional eastbound and westbound through lanes resulting in four-lane section.</li> <li>•Additional eastbound left-turn lane.</li> </ul>
TH 5 and Laverne Avenue	<ul style="list-style-type: none"> <li>•Additional eastbound and westbound through lanes.</li> <li>•Additional eastbound and westbound left-turn lanes.</li> </ul>
TH 5 and CSAH 17 (Lake Elmo Avenue South)	<ul style="list-style-type: none"> <li>•Install new traffic signal.</li> <li>•Additional eastbound and westbound through lanes creating four-lane section.</li> </ul>
TH 5 and CSAH 17 (Lake Elmo Avenue North)	<ul style="list-style-type: none"> <li>•Install new traffic signal.</li> <li>•Additional eastbound and westbound through lanes resulting in four-lane section.</li> <li>•Additional eastbound exclusive left-turn lane</li> </ul>
CSAH 15 (Manning Avenue) and 30 <sup>th</sup> St	<ul style="list-style-type: none"> <li>•Install new traffic signal.</li> <li>•Additional eastbound and westbound exclusive left-turn lanes.</li> <li>•Additional northbound and eastbound exclusive left-turn lanes.</li> </ul>

<sup>1</sup> Refer to Figure 21-7 an for illustration of the recommended improvements.

### *TH 5 and 39<sup>th</sup> Street*

While the overall LOS at TH 5 and 39<sup>th</sup> Street is A (due to the predominantly heavy volumes on TH 5 that are not required to stop), the southbound left-turn movement of TH 5 and 39<sup>th</sup> Street would continue to operate at LOS F during both the a.m. and p.m. peak hours. Minor street left-turn movements are often difficult during peak periods at side street, stop-controlled intersections. No additional measures short of installing a traffic signal or a roundabout would improve the LOS for the minor street left turns and warrants<sup>4</sup> for a new signal would not be met due to the low volumes on 39<sup>th</sup> Street.

### *TH 5 and Laverne Avenue*

At the intersection of TH 5 and Laverne Avenue, the northbound and southbound left turns, are expected to operate at LOS F in the p.m. peak hour. In addition the southbound through movement would operate at LOS E in the a.m. peak hour and the westbound left would function at LOS E in the p.m. peak hour. However, no additional measures short of installing a traffic signal or a roundabout would improve the LOS for these movements and warrants<sup>5</sup> for a signal or roundabout would not be met due to the low volumes on 39<sup>th</sup> Street. In addition, this intersection would be too close to the recommended signal at CSAH 17 (south) to meet MnDOT spacing guidelines.

### *CSAH 15 (Manning Avenue) and 30<sup>th</sup> Street*

The side-street, stop-controlled intersection of CSAH 15 (Manning Avenue) and 30<sup>th</sup> Street would have all movements operating at LOS F on the side street in the p.m. peak hour and most movements at LOS E or F in the p.m. peak hour. Due to these low levels of service, a traffic signal is recommended at this intersection. The eastbound and westbound approaches would require one left-turn lane and one through-right lane. With the improvements outlined, the intersection is expected to operate at LOS B and all movements would function at LOS D or better during both the a.m. and p.m. peak hours.

## **YEAR 2030 CUMULATIVE CONDITIONS (WITH VILLAGE DEVELOPMENT)**

There are four scenarios analyzed as a part of this AUAR. Three of the scenarios developed are based on the Village Master Plan and one scenario is based on the Comprehensive Plan. The only difference between the three scenarios is the number of residential units.

### **Village Development Trip Generation**

The determination of the trip generation characteristics of the development begins with assumptions concerning the expected type of land use (i.e., residential, commercial, office) and intensity of each land use (i.e., number of residential units, square feet of commercial and office space). Information contained in the Village Master Plan and Comprehensive Plan identified the land use characteristics of the study area.

Using the land use and intensity information provided, the projected trip generation was determined using the Institute of Transportation Engineers' (ITE) *Trip Generation, 7<sup>th</sup> Edition, 2003*. This industry standard publication provides average trip rates of land uses based upon studies completed across the nation. Table 21-8, provides the estimated trip generation for each AUAR scenario.

### **Village Development Trip Distribution**

With the potential new traffic quantified, the volumes were then distributed to the study area roadway

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<sup>4</sup> Warrants for new traffic signals are documented in the Minnesota Manual on Uniform Traffic Control Devices (MnDOT, 2005); there are eight warrants which describe thresholds and/or conditions that must be met to warrant a new signal and include criteria such as peak hour traffic volumes, four-hour traffic volumes, eight-hour traffic volumes, pedestrian volumes, and crash experience.

<sup>5</sup> Warrants for new traffic signals are documented in the Minnesota Manual on Uniform Traffic Control Devices (MnDOT, 2005); there are eight warrants which describe thresholds and/or conditions that must be met to warrant a new signal and include criteria such as peak hour traffic volumes, four-hour traffic volumes, eight-hour traffic volumes, pedestrian volumes, and crash experience.

system based upon knowledge of the area, existing flows of traffic, and input from the City of Lake Elmo and Washington County. Figure 21-10 shows the trip distribution percentages for the study roadways. Based on an examination of existing traffic patterns, TH 5 serves as a commuter route during the a.m. and p.m. peak periods. For this reason, two trip distributions were established. The first set of distribution rates was for the distribution of residential trips. This breakdown distributed almost half of the trips southwest towards the metropolitan area, consistent with the existing traffic patterns. The second set of distribution rates was for the remaining commercial, office, and institutional land uses. This breakdown still shows a majority of traffic heading southwest on TH 5 toward the metropolitan area, but also reflects a draw into Lake Elmo for these commercial and office land uses. New traffic was distributed to the roadway system based upon these percentages.

The generated trips were assigned to the roadway system for each Scenario. Figures 21-11 through 21-14 show the projected 2030 Village development-generated traffic for a.m. and p.m. peak hours at the study intersections. Projected daily volumes are also included on these figures. All peak hour and daily volumes shown represent full development of the Village by the year 2030. These volumes do not include any existing or other potential development traffic, but only represent expected future traffic generated by a particular AUAR Scenario. General growth of the area was captured in the 2030 background growth analysis. The study roadways and intersections were determined to be the most critical intersections of minor arterials and collectors that would most likely be impacted by Village development.

Figures 21-15 through 21-18 show the cumulative 2030 projected a.m. and p.m. peak hour and daily volumes for each AUAR Scenario (2030 background conditions with Village development). **Table 21-8**

**Village Development Estimated Trip Generation**

Scenario	Land Use	AM Peak Hour		PM Peak Hour		Daily (2-Way)
		Entering	Exiting	Entering	Exiting	
Scenario A	Residential	93	274	315	186	4,860
	Commercial	127	96	356	454	13,270
	Office	204	28	38	185	1,650
	Civic/Institution	352	133	216	282	6,740
	Subtotal Gross Vehicle Trips <sup>1</sup>	776	531	925	1,107	26,510
	<b>Net Vehicle Trips<sup>2</sup></b>	<b>665</b>	<b>465</b>	<b>803</b>	<b>950</b>	<b>22,785</b>
Scenario B	Residential	121	401	441	252	7,070
	Commercial	127	96	356	454	13,270
	Office	204	28	38	185	1,650
	Civic/Institution	352	133	216	282	6,740
	Subtotal Gross Vehicle Trips <sup>1</sup>	804	658	1,051	1,173	28,730
	<b>Net Vehicle Trips<sup>2</sup></b>	<b>690</b>	<b>579</b>	<b>916</b>	<b>1,010</b>	<b>24,774</b>
Scenario C	Residential	183	661	721	410	11,420
	Commercial	127	96	356	454	13,270
	Office	204	28	38	185	1,650
	Civic/Institution	352	133	216	282	6,740
	Subtotal Gross Vehicle Trips <sup>1</sup>	866	918	1,331	1,331	33,080
	<b>Net Vehicle Trips<sup>2</sup></b>	<b>746</b>	<b>813</b>	<b>1,170</b>	<b>1,152</b>	<b>28,689</b>
Scenario D	Residential	115	368	403	245	6,780
	Commercial	127	96	356	454	13,270
	Office	204	28	38	185	1,650
	Civic/Institution	352	133	216	282	6,740
	Subtotal Gross Vehicle Trips <sup>1</sup>	798	625	1,013	1,166	28,440
	<b>Net Vehicle Trips<sup>2</sup></b>	<b>685</b>	<b>549</b>	<b>882</b>	<b>1,004</b>	<b>24,513</b>

<sup>1</sup> Gross trip generation before deductions for pass-by, multi-use, and internal trips. <sup>2</sup> This traffic will increase the existing volumes on the roadways.

### **Village Development Roadway Segment and Intersection Capacity Analysis (with 2030 improved network)**

As shown in Table 21-8, Scenario A will contribute the least amount of traffic (22,785 trips) and Scenario C will contribute the most traffic (28,689) to the roadway network. Because of this, only these two scenarios were fully analyzed with the traffic engineering software. Impacts from Scenario B (24,774 trips) and D (24,513) are within the range of impacts resulting from Scenarios A and C. For this reason, Scenarios B and D were not analyzed in detail but recommendations for improvements were inferred from the results of Scenarios A and C.

As previously discussed, under 2030 background conditions future roadway improvements are necessary (see Figure 21-7 and Table 21-7). Scenarios A and C were analyzed first on this improved network (the roadway system with improvements to address 2030 background conditions) to determine if the level of service on the improved network would be adequate to serve Village development. The results are discussed below.

#### **Scenario A – with 2030 Background Improved Roadway Network**

Scenario A was first analyzed on the improved roadway network, as outlined in Table 21-7 for 2030 background conditions. The LOS results are shown in Figure 21-19 and discussed below.

##### *TH 5 and 39<sup>th</sup> Street*

The intersection of TH 5 and 39<sup>th</sup> Street operates at an overall LOS E during the a.m. peak hour LOS F during the p.m. peak hour. During the a.m. and p.m. peak hour, all northbound and southbound movements are projected to operate at LOS F. This suggests that some mitigation to the intersection will be necessary.

##### *TH 5 and Laverne Avenue*

The intersection of TH 5 and Laverne Avenue operates at an overall LOS A and E during the a.m. and p.m. peak hour, respectively. However, some of the side-street movements operate at LOS F during the peak periods. This failing LOS during the peak hours is because this intersection is controlled with side-street stop control. However, due to the close proximity of recommended signals at TH 5 and CSAH 17 and at TH 5 and 39<sup>th</sup> Street, additional control (all-way stop or traffic signal) is not recommended. There is an existing roadway network for northbound traffic to utilize the TH 5 and CSAH 17 intersection, which is assumed to be signalized under 2030 background conditions. This analysis assumed a portion of left-turn and through moving trips will divert to that signalized intersection.

##### *CSAH 17 (Lake Elmo Avenue north leg) and 39<sup>th</sup> Street*

This intersection is shown to operate at LOS F during the p.m. peak hour and LOS A during the a.m. peak hour. This failing LOS exhibited for the p.m. peak hour conditions is not due to insufficiencies at this intersection. It is due, in this instance, to back-ups experienced at the TH 5 and 39<sup>th</sup> Street intersection. Improvements are not recommended for this intersection since the observed congestion will be alleviated by improving the intersection of TH 5 and 39<sup>th</sup> Street.

The remaining intersections operate at LOS D or better for this scenario.

#### **Scenario C – with 2030 Background Improved Roadway Network**

As the scenario with the greatest trips generated, Scenario C was also analyzed on the improved roadway network from 2030 background conditions. The LOS results are shown in Figure 21-20 and discussed on the following page.

*TH 5 and 39<sup>th</sup> Street*

The intersection of TH 5 and 39<sup>th</sup> Street operates at an overall LOS F during the a.m. and p.m. peak hours. Each of the side-street northbound and southbound movements also operate at LOS F. This implies that mitigation will be needed at this intersection.

*TH 5 and Laverne Avenue*

Similarly at the intersection of TH 5 and Laverne Avenue, most movements of the side-street northbound and southbound approaches operate at LOS F during the a.m. and p.m. peak hours. Minor street left-turn movements are often difficult during peak periods at side street, stop-controlled intersections. The overall LOS at the intersection is at LOS A during the a.m. peak hour and LOS C during the p.m. peak hour. No additional measures, short of installing a traffic signal or a roundabout, would improve the LOS for the minor street left turns and thru movements and warrants for a signal or roundabout would not be met due to the low volumes on Laverne Street; therefore, no further mitigation is recommended for this scenario.

*CSAH 17 (Lake Elmo Avenue, north leg) and 39<sup>th</sup> Street*

The intersection of CSAH 17 (Lake Elmo Avenue) and 39<sup>th</sup> Street would have some movements at LOS F during the p.m. peak hour. However, this is due to traffic backing up into the intersection from the excessive delays at the intersection of 39<sup>th</sup> Street and TH 5, not because of excessive volumes or insufficient lane configurations at the CSAH 17 intersection. Once mitigation improvements (new signal) are made at the intersection of 39<sup>th</sup> Street and TH 5, it is expected that the intersection with CSAH 17 (Lake Elmo Avenue) will operate at satisfactory levels. Because the congestion is stemming from a nearby intersection, no further intersection improvements are recommended.

**Village Development Roadway Network Mitigation**

As identified in the 2030 improved roadway network analysis, some additional mitigation will be necessary to accommodate the planned Village development. In other words, the improvements that are necessary to achieve adequate levels of service for 2030 background conditions will not result in adequate levels of services when the Village development traffic is added to the system by 2030. The recommended mitigation roadway improvements are identical for all AUAR development scenarios and are described in Table 21-9 for each individual study intersection. Future traffic operations should be monitored based on new turn movement counts prior to construction of any intersection improvements.

**Table 21-9**  
**Recommended Roadway Improvements for Village Development (ALL Scenarios)**

<b>Intersection</b>	<b>Description</b>
TH 5 and 39 <sup>th</sup> Street	<ul style="list-style-type: none"> <li>•Install new traffic signal.</li> <li>•Additional eastbound right-turn lane.</li> <li>•Additional westbound left-turn lane.</li> <li>•New northbound approach with one through-left and an exclusive right-turn lane.</li> </ul>
TH 5 and Laverne Ave	<ul style="list-style-type: none"> <li>•Addition northbound and southbound right-turn lanes.</li> </ul>
TH 5 and CSAH 17 (Lake Elmo Ave S.)	<ul style="list-style-type: none"> <li>•Additional westbound right-turn lane to match eastbound approach.</li> <li>•Additional eastbound left-turn lane to match westbound approach.</li> <li>•New southbound approach with single through-right and left-turn lanes.</li> </ul>
TH 5 and CSAH 17 (Lake Elmo Ave N)	<ul style="list-style-type: none"> <li>•Additional eastbound right-turn lane to match westbound approach.</li> <li>•Additional westbound left-turn lane to match eastbound approach.</li> <li>•New northbound approach with single through-right and left-turn lanes.</li> </ul>
CSAH 17 (Lake Elmo Ave N) and 39 <sup>th</sup> Street	<ul style="list-style-type: none"> <li>•New eastbound approach with single lane for all movements.</li> <li>•Additional northbound and southbound left-turn lanes.</li> </ul>

Although this report recommends signalized intersections, an Intersection Control Evaluation (ICE) report should be completed for each intersection as improvements are needed. Additional turn lanes not identified for capacity reasons may also be desired at the study intersections with or without Village development. Turn lanes improve safety by removing the turning traffic from the through lane. For this reason, serious consideration should be given to providing left and right-turn lanes at future signalized intersections even if not required for capacity reasons.

### **Village Development Roadway Segment and Intersection Capacity Analysis**

#### **(with 2030 improved network and recommended Village development related improvements )**

The scenarios were analyzed the mitigated network (the roadway system with improvements to address 2030 background conditions and the Village development recommendations shown in Table 21-9) to determine the level of service on the mitigated network. The results are discussed on the following page.

#### **Scenario A – Mitigated Roadway Network**

The LOS results for Scenario A on the mitigated roadway network yield better results compared to unmitigated conditions. The LOS results for each intersection can be seen in Figure 21-21. All intersections now operate at acceptable levels of service during the a.m. and p.m. peak hours with the exception of some movements at the TH 5 and Laverne Avenue intersection.

Even though Laverne Avenue still experiences some individual movements at lower levels of service during the peak hours, the intersection is not recommended for signalization. This intersection is located too close to the future signalized intersection of CSAH 17 (Lake Elmo Avenue South) to meet MnDOT spacing guidelines. It was assumed that some traffic (particularly left turns and through movements) would divert to the adjacent signalized intersections during the peak hours.

#### **Scenario B – Mitigated Roadway Network**

Scenario B was not fully analyzed using the traffic engineering software, however the results can be inferred to fall between Scenarios A and C. The recommended mitigated roadway network for Scenario B is the same as the recommended network for Scenarios A and C, as described in Table 21-9.

#### **Scenario C – Mitigated Roadway Network**

Overall, the study intersections are expected to operate at satisfactory levels of service during the peak periods. The LOS results for each intersection can be seen in Figure 21-22. Some individual movements at the TH 5 and Laverne Avenue intersection are expected to operate at LOS F during the a.m. and p.m. peak hours. This intersection is recommended to remain side-street, stop-controlled due to the close proximity to the adjacent future signal at the CSAH 17 (south leg) intersection. It was assumed that a portion of drivers making left turns and through movements at the TH 5 and Laverne Avenue intersection would divert to the nearby signalized intersections.

#### **Scenario D – Mitigated Roadway Network**

Scenario D was not fully analyzed using the traffic engineering software, however the results can be inferred to fall between Scenarios A and C. The recommended mitigated roadway network for Scenario D is the same as the recommended network for Scenarios A and C, as described in Table 21-9.

## **OTHER TRANSPORTATION SYSTEM IMPROVEMENT CONSIDERATIONS**

The considerations outlined below apply to all the AUAR development scenarios.

### **Access Management**

The management of driveway and street access along roadways, particularly arterial and collector streets, is a very important component of maximizing the capacity and decreasing the crash potential along these road facilities. MnDOT and national studies have shown that as the density of access points increases, the traffic carrying capacity of the roadway decreases and the vehicular crash rate increases.

The development of an efficient network of local streets in the Village area could help alleviate the need for some of the access points that now exist on arterial roadways. Also, as major intersections are modified to improve operational efficiency and safety, it may be possible to consolidate or modify adjacent accesses. The City of Lake Elmo will need to work with MnDOT and Washington County to achieve the proper balance between access to future development and maintaining traffic flow. In Lake Elmo, TH 5 provides east-west travel through the city and also provides direct access to properties within the Village. This dual purpose causes a conflict between regional and local traffic movements which can contribute to congestion and safety problems. Continued access management on TH 5 through the city is necessary to provide safety and capacity through the AUAR area. Specifically, TH 5 is classified as a Minor Arterial, the purpose of which is to emphasize mobility through the AUAR study area over land access. The city should work to establish a frontage or backage road system, where feasible, along TH 5 to provide accesses to new development, rather than new access points along TH 5.

### **Non-Traditional Types of Intersection Control**

The peak hour analyses focused on traditional intersection improvements and controls such as additional turn lanes and traffic signal systems. There are, however, other types of intersection control that could provide the necessary capacity to accommodate the projected traffic volumes.

Before the implementation of any type of intersection control (signal, roundabout, or other), an Intersection Control Evaluation (ICE) report should be completed to address the appropriate measure of control for that specific intersection. This detailed report would identify the impacts and benefits of using different types of intersection control and discern the differences between them. The results and recommendations from this type of report will lead to the best intersection control for each particular intersection and its individual characteristics.

### Single-Lane/Multi-Lane Roundabout

An increasingly used alternative to a traffic signal is a roundabout, with either a single lane or multiple lanes. Roundabouts in Minnesota have experienced a growth in use due to safety and capacity benefits. In particular, a roundabout has benefits that traditional intersections do not, including:

- Lower speeds – the physical design of the roundabout forces drivers to slow through the intersection.
- Safer – low speeds combined with vehicles moving in the same direction contribute to fewer and less severe crashes.
- Less delay – in the right situations, roundabouts can significantly reduce delays and queues since vehicles are not required to stop. This is particularly beneficial during non-peak hours.
- Potentially less right-of-way impact – compared to an equivalent traditional signalized intersection, roundabouts could require less right-of-way. A traditional signal may require more right-of-way to accommodate the right and left-turn lanes and appropriate storage bays. Since roundabouts do not require turn lanes, right-of-way requirements are often reduced. However, a

roundabout will require more right-of-way in the center of the intersection compared to signalized intersections. The cumulative effects of necessary right-of-way are generally less with a roundabout.

Although roundabouts are not the answer in every situation, they have been shown to be a viable option that should be considered, specifically since roundabouts are discussed in the Village Master Plan.

### **Traffic Calming**

Residential traffic calming techniques can be a viable approach to decreasing volume and speed problems on residential streets. The goal of moving traffic efficiently and safely can be enhanced by implementing traffic calming techniques. Traffic calming techniques range from physical changes to the roadway system to traffic control techniques that uses signing and/or pavement markings. These techniques are most appropriate for roadways functionally classified as collectors (i.e., Lake Elmo Avenue south of TH 5) and local residential streets. A list of traffic calming techniques is provided below:

#### Physical changes to the street include:

- Street narrowing
- Curvilinear street
- Speed hump/bump
- Change in road surface material or color
- Streetscape material or landscape plantings
- Rumble strips

#### Traffic control techniques included:

- Police enforcement
- Marked crossways
- Turn restrictions
- Speed watch programs
- One-way streets
- Variable-speed display board

### **Transit Opportunities**

Future planning should consider future transit service for this area. Regularly scheduled transit, if properly accommodated, would help to reduce traffic volumes on the main roadways and provide people with more transportation options. The planned development in the AUAR area presents both the opportunity for transit and the development to support it.

Currently in this area, transit is available. The potential Village development and potential riders within those developments will help the city in discussions for future transit service expansions.

In an area without fixed route service, park-and-pool lots can provide motorists with non-traditional transportation alternatives. Park-and-pool activities have increased historically when dedicated parking facilities are provided.

Coordination between the City of Lake Elmo and transit service providers will help to determine suitable transit facilities and services. As an initial step in reducing single-occupant vehicles and developing transit demand, the City of Lake Elmo could also promote vanpool programs, such as those available through Metro Commuter Services. The city's upcoming city-wide transportation plan should further explore transit options throughout Lake Elmo. Sales tax may be available for transit improvements in this area.

### **Trail Systems**

Future development should provide a trail system that will connect to other area trail systems. The city's trail system plan is further discussed in response to AUAR Item 25 and the trail system map is shown on Figure 25-3. A fully developed trail system in this area would help to encourage walk and bicycle trips in order to help reduce certain types of vehicle trips. In addition, trails are increasingly seen as a recreation amenity desirable for residents of a community.

It is desirable to develop off-road trails that provide facilities for both bicyclists and pedestrians. Trails through parks and natural areas are always highly desirable routes as they provide a more scenic experience for the user. An off-road trail is one that is physically separated from motorized vehicular traffic by open space a barrier either within the roadway right-of-way or within an independent right-of-way.

In cases where funding of right-of-way is limited, an on-road bicycle lane or signed route can present a more economical solution. The provision of on-road bicycle lanes can be accomplished by re-striping existing roadways or with extra consideration during the design of a new roadway.

A distinction can also be made between pedestrian/commuter trails and recreational trails. Pedestrian/commuter trails generally connect residential areas to commercial, retail, or school facilities. Pedestrian/commuter trails tend to follow collector and arterial roadways, used by motor vehicle commuters, since the users of these trails generally seek out the most direct path to their destination.

Conversely, recreational trails tend to be off-road trails, which connect residential areas to parks, natural areas, and/or greenway corridors. These trails can provide a connection between parks and neighborhoods, as well as meander within parks. Recreation trails generally do not travel a direct route and are often located along rivers and streams or contained within parks and greenway corridors.

Trail crossing locations of arterial and collector roadways should be carefully considered to maximize trail user safety. Appropriate consideration should be given to signed crosswalks, signals, or grade separated crossing at each trail crossing.

#### MITIGATION SUMMARY

Table 21-10 provides a comparison of existing traffic volumes, estimated 2030 background traffic volumes (accounts for the steady growth in traffic that is predicted to occur due to development in the region -including development in Lake Elmo located outside the Village, but does not account for development within the Village), and 2030 cumulative traffic volumes (background traffic growth plus Village development) on the roadway network.

**Table 21-10**  
**Comparison of Average Daily Traffic (ADT)**

Roadway	Segment	2007 Existing ADT	2030 Background ADT	Cumulative 2030 ADT (Background + Village)			
				Scenario A	Scenario B	Scenario C	Scenario D
TH 5	West of CSAH 17 South	12,000	18,920	28,510	28,840	30,350	28,770
	Bet. CSAH 17 & CSAH 15	11,500	18,140	25,490	25,940	26,990	25,300
	Northeast of CSAH 15	16,600	26,180	30,330	31,370	31,950	31,320
CSAH 17	North of TH 5	3,100	4,890	7,570	8,230	9,080	8,450
	South of TH 5	3,650	7,480	8,190	8,460	8,950	8,530
CSAH 15	South of TH 5	10,700	15,770	18,700	19,090	19,650	19,240
30 <sup>th</sup> Street	Between CSAH 17 & CSAH 15	860	1,360	4,790	5,000	5,690	5,180
39 <sup>th</sup> Street	Between TH 5 & CSAH 17 North	690	1,090	4,670	4,970	5,710	4,900

Table 21-11 provides a summary of existing, 2030 background, and 2030 cumulative levels of service and highlights the recommended 2030 background improvements (without Village development) and Village development mitigation measures by study intersection and roadway segment. The recommended mitigation roadway improvements are identical for all AUAR development scenarios. In addition to these improvements other improvements to consider include:

- Access Management
- Non-traditional types of intersection control
- Traffic Calming
- Transit Opportunities
- Trail System

Table 21-11 Level of Service and Mitigation Summary																		
Intersection	EXISTING			2030 Background (without Village Development)			2030 Cumulative with Scenario A			2030 Cumulative with Scenario B			2030 Cumulative with Scenario C			2030 Cumulative with Scenario D		
	LOS (Critical movements)	LOS (Critical movements)	Recommended Improvements	LOS (Critical movements)	Recommended Mitigation	LOS (Critical movements)	Recommended Mitigation	LOS (Critical movements)	Recommended Mitigation	LOS (Critical movements)	Recommended Mitigation	LOS (Critical movements)	Recommended Mitigation	LOS (Critical movements)	Recommended Mitigation	LOS (Critical movements)	Recommended Mitigation	
TH 5/CSAH 15 (Manning Avenue)	AM: Overall C PM: Overall C	AM: Overall F PM: Overall F	Add second northbound left turn lane; add 2nd westbound left turn lane; add eastbound and westbound through lanes.	AM: Overall B PM: Overall C	No mitigation required beyond 2030 recommended improvements.	Similar to Scenario C	No mitigation required beyond 2030 recommended improvements.	AM: Overall D PM: Overall D	No mitigation required beyond 2030 recommended improvements.	Similar to Scenario C	No mitigation required beyond 2030 recommended improvements.	AM: Overall D PM: Overall D	No mitigation required beyond 2030 recommended improvements.	Similar to Scenario C	No mitigation required beyond 2030 recommended improvements.	Similar to Scenario C	No mitigation required beyond 2030 recommended improvements.	
TH 5/39th Street	AM: SB Left B PM: SB Left C	AM: SB Left E PM: F	Add westbound left turn lane; add eastbound and westbound through lanes.	AM: NB/SB F PM: NB/SB F	Install new traffic signal; add EB right-turn lane; add WB left-turn lane; add new NB approach with exclusive left-turn lane.	Similar to Scenario C	Install new traffic signal; add EB right-turn lane; add WB left-turn lane; add new NB approach with exclusive left-turn lane.	AM: NB/SB F PM: NB/SB F	Install new traffic signal; add EB right-turn lane; add WB left-turn lane; add new NB approach with exclusive left-turn lane.	Similar to Scenario C	Install new traffic signal; add EB right-turn lane; add WB left-turn lane; add new NB approach with exclusive left-turn lane.	AM: NB/SB F PM: NB/SB F	Install new traffic signal; add EB right-turn lane; add WB left-turn lane; add new NB approach with exclusive left-turn lane.	Similar to Scenario C	Install new traffic signal; add EB right-turn lane; add WB left-turn lane; add new NB approach with exclusive left-turn lane.	Similar to Scenario C	Install new traffic signal; add EB right-turn lane; add WB left-turn lane; add new NB approach with exclusive left-turn lane.	
TH 5/Laverne Avenue	AM: WB Left B PM: NB and SB Left C	AM: NB/SE F PM: WB Left E	Add eastbound/westbound right and left-turn lanes; add eastbound & westbound through lanes.	AM: SB Left thru F PM: NB/SB F	Add northbound and southbound right-turn lanes. <sup>1</sup>	Similar to Scenario C	Add northbound and southbound right-turn lanes. <sup>1</sup>	AM: SB Left thru F PM: NB/SB F	Add northbound and southbound right-turn lanes. <sup>1</sup>	Similar to Scenario C	Add northbound and southbound right-turn lanes. <sup>1</sup>	AM: SB Left thru F PM: NB/SB F	Add northbound and southbound right-turn lanes. <sup>1</sup>	Similar to Scenario C	Add northbound and southbound right-turn lanes. <sup>1</sup>	Similar to Scenario C	Add northbound and southbound right-turn lanes. <sup>1</sup>	
TH 5/CSAH 17 (Lake Elmo Ave S)	AM: NB Left D PM: NB F	AM: NB F PM: WB Left F	Install traffic signal; add eastbound and westbound through lanes.	AM: Overall B PM: Overall D	Add EB left-turn lane; add WB right-turn lane; add new SB approach with right-turn lane.	Similar to Scenario C	Add EB left-turn lane; add WB right-turn lane; add new SB approach with right-turn lane.	AM: Overall B PM: Overall D	Add EB left-turn lane; add WB right-turn lane; add new SB approach with right-turn lane.	Similar to Scenario C	Add EB left-turn lane; add WB right-turn lane; add new SB approach with right-turn lane.	AM: Overall B PM: Overall D	Add EB left-turn lane; add WB right-turn lane; add new SB approach with right-turn lane.	Similar to Scenario C	Add EB left-turn lane; add WB right-turn lane; add new SB approach with right-turn lane.	Similar to Scenario C	Add EB left-turn lane; add WB right-turn lane; add new SB approach with right-turn lane.	
TH 5/CSAH 17 (Lake Elmo Ave N)	AM: SB Left E PM: SB Left D	AM: SB F PM: SB F	Install traffic signal; add eastbound and westbound through lanes.	AM: Overall B PM: Overall C	Add EB right-turn lane; add WB left-turn lane; add new NB approach with exclusive left-turn lane.	Similar to Scenario C	Add EB right-turn lane; add WB left-turn lane; add new NB approach with exclusive left-turn lane.	AM: Overall B PM: Overall C	Add EB right-turn lane; add WB left-turn lane; add new NB approach with exclusive left-turn lane.	Similar to Scenario C	Add EB right-turn lane; add WB left-turn lane; add new NB approach with exclusive left-turn lane.	AM: Overall B PM: Overall C	Add EB right-turn lane; add WB left-turn lane; add new NB approach with exclusive left-turn lane.	Similar to Scenario C	Add EB right-turn lane; add WB left-turn lane; add new NB approach with exclusive left-turn lane.	Similar to Scenario C	Add EB right-turn lane; add WB left-turn lane; add new NB approach with exclusive left-turn lane.	
CSAH 17 (Lake Elmo Ave N)/39th Street	AM: Overall A PM: Overall A	AM: Overall F PM: Overall A	Vehicle delay due to downstream congestion at CSAH 17/TH 5; no improvements needed.	AM: Overall A PM: Overall F	No mitigation required.	Similar to Scenario C	No mitigation required.	AM: Overall A PM: Overall F	No mitigation required.	Similar to Scenario C	No mitigation required.	AM: Overall A PM: Overall F	No mitigation required.	Similar to Scenario C	Long delays due to downstream congestion on 39th Street; no mitigation required.	Similar to Scenario C	Long delays due to downstream congestion on 39th Street; no mitigation required.	
CSAH 15 (Manning Avenue)/30th Street	AM: WB Left & Thru C PM: EB & WB Left D	AM: EB LT E PM: WB F PM: EB/WB F	Install traffic signal; add EB and WB exclusive left-turn lanes; add NB and SB exclusive left-turn lanes.	AM: Overall C PM: Overall C	No mitigation required beyond 2030 recommended improvements.	Similar to Scenario C	No mitigation required beyond 2030 recommended improvements.	AM: Overall C PM: Overall C	No mitigation required beyond 2030 recommended improvements.	Similar to Scenario C	No mitigation required beyond 2030 recommended improvements.	AM: Overall C PM: Overall C	No mitigation required beyond 2030 recommended improvements.	Similar to Scenario C	No mitigation required beyond 2030 recommended improvements.	Similar to Scenario C	No mitigation required beyond 2030 recommended improvements.	
CSAH 17 (Lake Elmo Ave S)/30th Street	AM: Overall A PM: Overall A	AM: Overall A PM: NB E	Vehicle delay due to downstream congestion at CSAH 17/TH 5; no improvements needed.	AM: Overall A PM: Overall A	No mitigation required.	Similar to Scenario C	No mitigation required.	AM: Overall A PM: Overall A	No mitigation required.	Similar to Scenario C	No mitigation required.	AM: Overall A PM: Overall A	No mitigation required.	Similar to Scenario C	No mitigation required.	Similar to Scenario C	No mitigation required.	
TH 5: West of CSAH 17 (Lake Elmo Avenue S)	D	F	Widen to four through lanes.	D	No mitigation required beyond 2030 recommended improvements.	D	No mitigation required beyond 2030 recommended improvements.	D	No mitigation required beyond 2030 recommended improvements.	D	No mitigation required beyond 2030 recommended improvements.	D	No mitigation required beyond 2030 recommended improvements.	D	No mitigation required beyond 2030 recommended improvements.	C	No mitigation required beyond 2030 recommended improvements.	
TH 5: CSAH 17 (south) to CSAH 15 (Manning Ave)	D	F	Widen to four through lanes.	C	No mitigation required beyond 2030 recommended improvements.	C	No mitigation required beyond 2030 recommended improvements.	C	No mitigation required beyond 2030 recommended improvements.	C	No mitigation required beyond 2030 recommended improvements.	C	No mitigation required beyond 2030 recommended improvements.	C	No mitigation required beyond 2030 recommended improvements.	C	No mitigation required beyond 2030 recommended improvements.	
TH 5: NE of CSAH 15 (Manning Ave)	E	F	Widen to four through lanes.	D	No mitigation required beyond 2030 recommended improvements.	D	No mitigation required beyond 2030 recommended improvements.	D	No mitigation required beyond 2030 recommended improvements.	D	No mitigation required beyond 2030 recommended improvements.	D	No mitigation required beyond 2030 recommended improvements.	D	No mitigation required beyond 2030 recommended improvements.	D	No mitigation required beyond 2030 recommended improvements.	
CSAH 17: North of TH 5	A	C	No mitigation required.	B	No mitigation required.	C	No mitigation required.	C	No mitigation required.	C	No mitigation required.	C	No mitigation required.	C	No mitigation required.	C	No mitigation required.	
CSAH 17: South of TH 5	B	D	No mitigation required.	C	No mitigation required.	C	No mitigation required.	C	No mitigation required.	C	No mitigation required.	C	No mitigation required.	C	No mitigation required.	C	No mitigation required.	
CSAH 15 (Manning Ave): South of TH 5	B	E	Add second northbound left turn lane at TH 5.	D	No mitigation required beyond 2030 recommended improvements.	D	No mitigation required beyond 2030 recommended improvements.	D	No mitigation required beyond 2030 recommended improvements.	D	No mitigation required beyond 2030 recommended improvements.	D	No mitigation required beyond 2030 recommended improvements.	D	No mitigation required beyond 2030 recommended improvements.	D	No mitigation required beyond 2030 recommended improvements.	
30th Street: Between CSAH 17 & CSAH 15	A	A	No mitigation required.	C	No mitigation required.	C	No mitigation required.	C	No mitigation required.	C	No mitigation required.	C	No mitigation required.	C	No mitigation required.	C	No mitigation required.	
39th Street: Between TH 5 & CSAH 17 (north)	A	A	No mitigation required.	B	No mitigation required.	B	No mitigation required.	B	No mitigation required.	B	No mitigation required.	B	No mitigation required.	B	No mitigation required.	B	No mitigation required.	

<sup>1</sup> Minor street left-turn movements are often difficult during peak periods at side street, stop-controlled intersections. No additional measures short of installing a traffic signal or a roundabout would improve the LOS for the minor street left turns and thru movements. Warrants for a signal or roundabout would not be met due to the low volumes on Laverne Street.

22. **Vehicle-Related Air Emissions.** Estimate the effect of the project's traffic generation on air quality, including carbon monoxide levels. Discuss the effect of traffic improvements or other mitigation measures on air quality impacts.

*AUAR Guidelines:* Although the Pollution Control Agency no longer issues Indirect Source Permits, traffic-related air quality may still be an issue if the analysis in item 21 indicates that development would cause or worsen traffic congestion. The general guidance provided for item 22 in EAW Guidelines still be followed for an AUAR. Questions about the details of air quality analysis should be directed to MPCA staff.

Carbon monoxide (CO) levels are elevated near roadway intersections due to the emission of this pollutant from the vehicles idling and passing by. The State of Minnesota has ambient CO standards that are designed to protect human health and the environment. The Standards are:

- 1-hour average: 30 parts per million (ppm); and
- 8-hour average: 9 ppm.

Concentrations near or above these levels are most likely to occur near intersections that are congested and have high traffic volumes. The Minnesota Department of Transportation has developed a screening method designed to identify intersections that may cause a CO impact above the State standards determined by the MPCA. This method requires an intersection to be heavily congested (Level of Service F) and have a traffic volume of greater than 77,200 vehicles per day in order to be considered to have the potential for causing CO air pollution problems. None of the intersections in the study area exceed these criteria under any of the scenarios. Therefore, no violation of the standards is anticipated.

23. **Stationary Source Air Emissions.** Describe the type, sources, quantities and compositions of any emissions from stationary sources of air emissions such as boilers, exhaust stacks or fugitive dust sources. Include any hazardous air pollutants (consult *EAW Guidelines* for a listing) and any greenhouse gases (such as carbon dioxide, methane, nitrous oxide) and ozone-depleting chemicals (chloro-fluorocarbons, hydrofluorocarbons, perfluorocarbons or sulfur hexafluoride). Also describe any proposed pollution prevention techniques and proposed air pollution control devices. Describe the impacts on air quality.

*AUAR Guidelines:* This item is not applicable to an AUAR. Any stationary source air emissions source large enough to merit environmental review requires individual review.

As stated in the AUAR guidelines above, this item is not applicable to an AUAR. Therefore, a response is not provided.

24. Dust, Air and Noise Impacts. Will the project generate odors, noise or dust during construction or during operation?  
 Yes  No  
 If yes, describe sources, characteristics, duration, quantities or intensity and any proposed measures to mitigate adverse impacts. Also identify locations of nearby sensitive receptors and estimate impacts on them. Discuss potential impacts on human health or quality of life. (Note: fugitive dust generated by operations may be discussed at item 23 instead of here.)

*AUAR Guidelines: Dust, odors, and construction noise need not be addressed in an AUAR, unless there is some unusual reason to do so. The RGU might want to discuss as part of the mitigation plan, however, any dust control or construction noise ordinances in effect. If the area will include or adjoin major noise sources, a noise analysis is needed to determine if any noise levels in excess of standards would occur, and if so, to identify appropriate mitigation measures. With respect to traffic generated noise, the noise analysis should be based on the traffic analysis of item 21.*

**TRAFFIC NOISE IMPACT ANALYSIS**

A traffic noise monitoring and modeling analysis was prepared for the four AUAR scenarios. The modeling analysis used the MNDOT Minnoise computer model and traffic estimates presented in AUAR Item 21. Additionally, noise monitoring was conducted within the AUAR area.

**Minnesota Noise Standards**

Minnesota Rules Chapter 7030 provide the Minnesota standards for noise. These standards describe the limiting levels of sound established on the basis of present knowledge for the preservation of health and welfare. These standards are designed to be consistent with sleep, speech, annoyance, and hearing conservation requirements for receivers within areas grouped according to land use activities. The Minnesota standards are as follows:

	<u>7:00 AM to 10:00 PM</u>		<u>10:00 PM to 7:00 AM</u>	
	L <sub>10</sub>	L <sub>50</sub>	L <sub>10</sub>	L <sub>50</sub>
NAC-1 (Residential)	65	60	55	50
NAC-2 (Commercial)	70	65	70	65
NAC-3 (Industrial)	80	75	80	75

L<sub>10</sub> means the sound level which is exceeded for 10 percent of the time for a one-hour period. L<sub>50</sub> means the sound level that is exceeded 50 percent of the time for a one-hour period. Sound levels are expressed in dBA. A dBA is a unit of sound level expressed in decibels and weighted for the purpose of approximating the human response to sound.

Minnesota Statutes, Section 116.07, Subd. 2a, exempt noise from local and county roads from the requirements of these noise rules unless full control of access to the road has been acquired.

**Noise Monitoring and Modeling Comparisons**

In order to help define existing project-area noise levels, and to check calibration on the Minnoise computer model, monitoring was conducted 100 feet from the center of Manning Avenue, north of TH 5.

Traffic counts were conducted during the monitoring periods and the data was entered into the Minnoise model to compare the actual monitored noise levels to the modeled noise levels. The following table presents the results of this comparison:

**Table 24-1  
Noise Monitoring Results and Comparison to Modeling**

Location	Date	Time	Decibels, A-Weighted					
			Monitored		Modeled		Difference	
			L <sub>10</sub>	L <sub>50</sub>	L <sub>10</sub>	L <sub>50</sub>	L <sub>10</sub>	L <sub>50</sub>
M1 – Manning Ave.	7/21/08	6:00 – 7:00 am	65.0	58.0	64.2	56.1	0.8	1.9
M1 – Manning Ave.	7/21/08	7:00 – 8:00 am	67.5	62.0	67.1	59.6	0.4	2.4

The field monitoring and modeled noise levels show good agreement.

### Noise Modeling Results

Using the Minnoise computer model and traffic and roadway information presented in AUAR Item 21 and Appendix E, existing and post-development noise levels generated by traffic on roadways serving the AUAR area were estimated. Noise impacts were estimated for hypothetical receptor locations (e.g., residential structures) at intervals from 50 to 2500 feet from the center of the following roadways:

- TH 5
- 30<sup>th</sup> Street
- CSAH 17 (Lake Elmo Avenue)
- Manning Avenue (TH 15)

The Minnoise model is a modified (modified by the Minnesota Department of Transportation) version of the Federal Highway Administration's Optima/Stamina model that is used to predict noise levels from highway projects and to assist with the development of noise barriers.

Noise level predictions were based on the following data and assumptions:

- The noise analysis was completed for the peak afternoon rush hour and the peak nighttime hour (6:00 am to 7:00 am).
- Traffic data for existing conditions and year 2030 cumulative development (2030 background conditions plus Village development) for the study was generated by Bonestroo.
- Shielding from natural or man-made barriers was not considered.
- The analysis assumed acoustically soft ground cover between the roadway and all receiver locations.
- Vehicle mix was provide by Bonestroo. Two percent heavy trucks was used for TH 5 and 1 percent was used for other roadways. Medium trucks were modeled at 2.6 percent.

A noise modeling analysis was conducted for the existing and 2030 cumulative traffic volumes for each scenario (2030 background conditions plus Village development). Noise impacts were determined at intervals from 50 feet to 2500 feet from each roadway. Tables 24-2 and 24-3 show the distance from each roadway where traffic noise impacts drop to below Minnesota residential daytime and nighttime compliance levels, respectively. Complete model results for the existing and 2030 conditions are provided in Appendix F.

**Table 24-2: Noise Modeling Results  
Distance to Achieve Minnesota Daytime Standards (feet)**

Alternative	Lake Elmo Drive											
	TH 5 West of 17 Dr.	West of Lake Elmo Dr.	East of Lake Elmo Dr.	West of Manning Dr.	East of Manning Dr.	North of TH 5	South of TH 5	South of 30 <sup>th</sup> Street	30 <sup>th</sup> Street East of Manning Dr.	West of Manning Dr.	Manning Drive North of 30 <sup>th</sup> Street	South of 30 <sup>th</sup> Street
Existing	200-250	50-100	100-150	150-200	200-250	<50	<50	<50	<50	<50	150-200	150-200
Scenario A	300-350	200-250	200-250	250-300	300-350	50-100	50-100	<50	<50	<50	250-300	250-300
Scenario B	300-350	200-250	200-250	250-300	250-300	50-100	50-100	<50	<50	<50	250-300	250-300
Scenario C	350-400	200-250	200-250	300-250	350-400	50-100	50-100	<50	<50	<50	250-300	250-300
Scenario D	350-400	200-250	200-250	300-350	350-400	50-100	50-100	<50	<50	<50	250-300	250-300

**Table 24-3: Noise Modeling Results  
Distance to Achieve Minnesota Nighttime Standards (feet)**

Alternative	Lake Elmo Drive											
	TH 5 West of 17 Dr.	West of Lake Elmo Dr.	East of Lake Elmo Dr.	West of Manning Dr.	East of Manning Dr.	North of TH 5	South of TH 5	South of 30 <sup>th</sup> Street	30 <sup>th</sup> Street East of Manning Dr.	West of Manning Dr.	Manning Drive North of 30 <sup>th</sup> Street	South of 30 <sup>th</sup> Street
Existing	550-600	400-450	350-400	500-550	600-650	50-100	50-100	50-100	<50	<50	450-500	450-500
Scenario A	800-900	550-600	550-600	800-900	800-900	150-200	150-200	100-150	50-100	50-100	700-800	700-800
Scenario B	900-1000	550-600	550-600	800-900	800-900	150-200	150-200	100-150	50-100	50-100	700-800	700-800
Scenario C	900-1000	600-700	700-800	800-900	800-900	150-200	150-200	100-150	50-100	50-100	700-800	700-800
Scenario D	900-1000	600-700	700-800	800-900	900-1000	150-200	150-200	100-150	50-100	50-100	700-800	700-800

**LAKE ELMO AIRPORT NOISE**

The Federal Aviation Administration (FAA) requires the DNL (Day Night Sound Level) noise metric to determine and analyze noise exposure and aid in the determination of aircraft noise and land use compatibility issues around United States airports. The DNL metric is calculated by cumulatively averaging sound levels over a twenty four-hour period. This average cumulative sound exposure includes the application of a 10-decibel penalty to sound exposures occurring during the nighttime (10:00 PM to 7:00 AM). The night sound exposures are increased by 10 decibels because nighttime noise is more intrusive.

The projected 2025 DNL noise contours for the Lake Elmo Airport are shown on Figure 24-1. In the case of airports located in the Minneapolis/St. Paul Metropolitan Area, the Metropolitan Council Development Guidelines in relation to airport noise exposure need to be considered. The Metropolitan Council Transportation Policy Plan (TPP) provides land use guidelines based on 4 noise zones around an airport. The Metropolitan Council Land Use Compatibility Guidelines for Aircraft Noise are provided in Table 24-4 and the following provides the Metropolitan Council's description of each noise zone and a discussion of the impact of the noise zones on the development scenarios:

- Zone 1 – Occurs on and immediately adjacent to the airport property. None of the AUAR area is located within Zone 1 of the Lake Elmo Airport. Existing and projected noise intensity in the zone is severe and permanent. It is an area affected by frequent landings and takeoffs and subjected to aircraft noise greater than 75 DNL. Proximity of the airfield operating area, particularly runway thresholds, reduces the probability of relief resulting from changes in the operating characteristics of either the aircraft or the airport. Only new, non-sensitive, land uses should be considered – in addition to preventing future noise problems the severely noise-impacted areas should be fully evaluated to determine alternative land use strategies including eventual changes in existing land uses.
- Zone 2 – Noise impacts are generally sustained, especially close to runway ends. Noise levels are in the 70 to 74 DNL range. None of the AUAR area is located within Zone 2 of the Lake Elmo Airport. Based upon proximity to the airfield the seriousness of the noise exposure routinely interferes with sleep and speech activity. The noise intensity in this area is generally serious and continuing. New development should be limited to uses that have been constructed to achieve certain exterior-to-interior noise attenuation and that discourage certain outdoor uses.
- Zone 3 – Noise impacts can be categorized as sustaining. Noise levels are in the 65 to 69 DNL range. In addition to the intensity of the noise, location of buildings receiving the noise must also be fully considered. Aircraft and runway use operational changes can provide some relief for certain uses in this area. Residential development may be acceptable if it is located outside areas exposed to frequent landings and takeoffs, is constructed to achieve certain exterior-to-interior noise attenuation, and is restrictive as to outdoor use. Certain medical and educational facilities that involve permanent lodging and outdoor use should be discouraged.

A small portion of the AUAR area located along TH 15 and immediately south of the rail road tracks are located in Zone 3 of the Lake Elmo Airport. This area is similar to the “RPZ” airport safety zone shown on Figure 9-2. This area is included as “Buffer Zone/Open Space” in Scenarios A, B, and C (see Figure 6-1) and is shown as “Greenbelt” in Scenario D (see Figure 6-2). No land use compatibility issues are anticipated given the proposed open space land use.

- Zone 4 – Defined as a transitional area where noise exposure might be considered moderate. Noise levels are in the 60 to 64 DNL range. The area is considered transitional since potential

changes in airport and aircraft operating procedures could lower or raise noise levels. Development in this area can benefit from insulation levels above typical new construction standards in Minnesota, but insulation cannot eliminate outdoor noise problems.

A portion of the AUAR area located along TH 15 and immediately surrounding rail road tracks is located in Zone 4 of the Lake Elmo Airport. This area is similar to the “A” and “B” airport safety zones shown on Figure 9-2. This area is included as “Buffer Zone/Open Space” and “New Residential” in Scenarios A, B, and C (see Figure 6-1) and is shown as “Greenbelt” in Scenario D (see Figure 6-2).

According to the Metropolitan Council’s land use compatibility guidelines, residential uses with individual entrances are considered *incompatible*. *Incompatible* is defined as “land uses that are not acceptable even if acoustical treatment were incorporated in the structure and outside uses restricted” (see Table 24-4). Multifamily residential structures with shared entrances are considered *provisional*. *Provisional* is defined as “uses that should be discouraged if at all feasible; if allowed, must meet certain structural performance standards to be acceptable according to Mn Statutes 473.192 (Metropolitan Area Noise Attenuation Act). Each local unit of government is responsible for implementing and enforcing the structural performance standards in its jurisdiction.

It is noted that the guidelines consider office and commercial uses to be *compatible*. *Compatible* is defined as “uses that are acoustically acceptable for both indoors and outdoors.” Educational, medical, schools, and hospitals are considered *conditional*. *Conditional* is defined as uses that should be strongly discouraged; if allowed, must meet the structural performance standards, and requires a comprehensive plan amendment for review under the Conditional Land Use Review Factors outlined in the Metropolitan Council’s 2030 Transportation Policy Plan.”

- Noise Buffer Zones - are additional areas that can be protected at the option of the affected community; generally, the buffer zone becomes an extension of noise Zone 4. A buffer zone, out to DNL55 is optional at those reliever airports with noise policy areas outside the Metropolitan Urban Service Area (MUSA) (e.g., unsewered areas not planned to receive sanitary sewer service). The Metropolitan Council suggests that the 60 DNL contour be used for planning purposes in areas inside the MUSA (e.g., areas developing with municipal sanitary sewer service). According to the Lake Elmo Comprehensive Plan, the AUAR area is proposed to be part of the MUSA.

The aircraft noise land use compatibility guidelines will be used to inform future land use decisions regarding the comprehensive plan. Within its statutory limits, the city needs to prepare an airport zoning ordinance to address building height, land use compatibility, structural performance standards, and noise buffers.

**Table 24-4  
Metropolitan Council Land Use Compatibility Guidelines for Aircraft Noise**

Metropolitan Council Land Use Compatibility Guidelines for Aircraft Noise										
Type of Development	Noise Exposure Zones									
	New Development or Major Redevelopment					Infill - Reconstruction or Additions to Existing Structures				
Land Use Category	1 DNL 75+	2 DNL 74-70	3 DNL 69-65	4 DNL 64-60	BZ	1 DNL 75+	2 DNL 74-70	3 DNL 69-65	4 DNL 64-60	BZ
<b>Residential</b>										
Single/Multiplex, with individual entrance	INCO	INCO	INCO	INCO		COND	COND	COND	COND	
Multiplex/Apartment, with shared entrance	INCO	INCO	COND	PROV		COND	COND	PROV	PROV	
Mobile Home	INCO	INCO	INCO	COND		COND	COND	COND	COND	
<b>Educational, Medical, Schools, Churches, Hospitals, &amp; Nursing Homes</b>										
	INCO	INCO	INCO	COND		COND	COND	COND	PROV	
<b>Cultural, Entertainment, &amp; Recreation</b>										
Indoor	COND	COND	COND	PROV		COND	COND	COND	PROV	
Outdoor	COND	COND	COND	COND		COND	COND	COND	COND	
<b>Office, Commercial, Retail</b>										
	COND	PROV	PROV	COMP		COND	PROV	PROV	COMP	
<b>Services</b>										
Transportation - Passenger Facilities	COND	PROV	PROV	COMP		COND	PROV	PROV	COMP	
Transient Lodging	INCO	COND	PROV	PROV		COND	COND	PROV	PROV	
Other Medical, Health, and Education	COND	PROV	PROV	COMP		COND	PROV	PROV	COMP	
Other Services	COND	PROV	PROV	COMP		COND	PROV	PROV	COMP	
<b>Industrial, Communication, &amp; Utilities</b>										
	PROV	COMP	COMP	COMP		PROV	COMP	COMP	COMP	
<b>Agriculture, Land/Water Area, &amp; Resource Extraction</b>										
	COMP	COMP	COMP	COMP		COMP	COMP	COMP	COMP	

Table Key:

- **COMP** – “Compatible” – uses that are acoustically acceptable for both indoors and outdoors.
- **PROV** – “Provisional” – uses that should be discouraged if at all feasible; if allowed, must meet certain structural performance standards to be acceptable according to MS473.192 (metropolitan area Noise Attenuation Act). Structures built after December 1983 shall be acoustically constructed so as to achieve interior noise levels as follows:
  - Residential, Educational and Medical = 45 dBA Interior Sound Level
  - Cultural, Entertainment, Recreational, Office, Commercial, Retail and Services = 50 dBA Interior Sound Level
  - Industrial, Communications, Utility, Agricultural Land, Water Area, Resource Extraction = 60 dBA Interior Sound Level

Each local governmental unit having land within the airport noise zones is responsible for implementing and enforcing the structural performance standards in its jurisdiction.
- **COND** – “Conditional” – uses that should be strongly discouraged; if allowed, must meet the structural performance standards, and requires a comprehensive plan amendment for review of the project under the Conditional Land Use Review Factors outlined in the Metropolitan Council’s 2030 Transportation Policy Plan, Appendix H, Table 5.
- **INCO** – “Incompatible” – land uses that are not acceptable even if acoustical treatment were incorporated in the structure and outside uses restricted.

Source: Metropolitan Council 2030 Transportation Policy Plan, Appendix H– December 15, 2004.

**RAILROAD NOISE**

A Union Pacific rail line runs through the AUAR area. According to Union Pacific, the rail line has an average use of 5 trains per day at 30 miles per hour (mph), with two trains operating at night. The trains have two to four diesel engines and 20 – 100 cars per train. In order to evaluate the noise impact of this rail line, the methodology prescribed by the US Department of Housing and Urban Development (HUD) in “The Noise Guidebook” was used, (September 1991 HUD-953-CPD(1)). HUD requires that projects developed with HUD assistance evaluate expected project noise levels at residences and compare them to HUD standards.

<b>HUD SITE ACCEPTABILITY STANDARDS</b>		
	<b>DNL</b>	<b>Special approvals and requirements</b>
<b>Acceptable</b>	Not exceeding 65 dB <sup>(1)</sup>	None
<b>Normally Unacceptable</b>	Above 65 dB but not exceeding 75 dB	Special Approvals Environmental Review Attenuation
<b>Unacceptable</b>	Above 75 dB <sup>(1)</sup>	Special Approvals Environmental Reviews Attenuation

Notes:  
<sup>(1)</sup> Acceptable threshold may be shifted to 70 dB in special circumstances. The attenuation measures in **Unacceptable** cases are granted on a case-by-case basis.

In conducting the impact assessment for this project, the following assumptions were used:

- 60 cars per train
- 3 diesel locomotives per train
- Average train speed of 30 mph
- Bolted tracks (not welded)
- Night operations (10:00 p.m. to 7:00 a.m.) are 40 percent of the 24-hour total

The HUD methodology was used to define the extent of the “Unacceptable” and “Normally Unacceptable” zones for 10 (current number) and 20 trains per day and for areas where whistles are used (defined as areas perpendicular to any point on the track between the whistle posts). The results of this analysis are summarized in the following table.

**Table 24-5  
 Railroad Noise Impact**

<b>No Whistle Zone</b>		<b>Whistle Zone</b>	
<b>Extent of Unacceptable Zone</b>	<b>Extent of Normally Unacceptable Zone</b>	<b>Extent of Unacceptable Zone</b>	<b>Extent of Normally Unacceptable Zone</b>
Less than 50 feet from track.*	Less than 50 feet from track.*	120-140 feet from track.	520-540 feet from track.

\*Homes less than 100 feet from the tracks often experience vibration issues.

## **MITIGATION SUMMARY**

### **Traffic Noise**

The city should establish residential structure setback standards in its zoning ordinance to ensure an adequate setback to major roads in the AUAR area to mitigate potential traffic-related noise on residential structures. Tables 24-2 and 24-3 provide a guide in establishing an appropriate setback in that it describes the distance within which noise standards are exceeded; however, these distances are not a recommended structure setback distance. The setbacks will be established by city ordinance and will consider the character of the setback area in that requiring vegetation or berms may mitigate noise and lessen the necessary structure setback distance to the roadway.

### **Airport Noise**

The aircraft noise land use compatibility guidelines will be used to inform future land use decisions regarding the comprehensive plan. Within its statutory limits, the city needs to prepare an airport zoning ordinance to address building height, land use compatibility, structural performance standards, and noise buffers. Any future development proposed to be located within the safety zones and noise contours/impact areas will be subject to the development restrictions within each safety zone (e.g., land use type, building height) and noise contours (e.g., land use type) established by state statute and the city. To minimize land use compatibility issues with the airport, the city will work with a Joint Airport Zoning Board comprised of two representatives from Lake Elmo, Baytown Township, West Lakeland Township, Washington County, and MAC to prepare an airport zoning ordinance prior to new development occurring within or near the safety zones and updated noise contours.

### **Railroad Noise**

The city needs to prepare adequate structure setback standards in its zoning ordinance to ensure an adequate setback to the railroad tracks. Table 24-5 provides a guide in establishing an appropriate setback in that it describes the distance within which HUD noise standards are exceeded; however, these distances are not a recommended structure setback distance. These setbacks will be established by city ordinance and will consider the character of the setback area in that requiring vegetation or berms may mitigate noise and lessen the necessary setback distance to the railroad.

25. Sensitive Resources. Are any of the following resources on or in proximity to the site: If yes, describe the resource and identify any project-related impacts on the resource. Describe any measures to minimize or avoid adverse impacts

a. archeological, historical, or architectural resources?  Yes  No

*AUAR Guidelines: For an AUAR, contact with the State Historic Preservation Office is required to determine whether there are areas of potential impacts to these resources. If any exist, an appropriate site survey of high probability areas is needed to address the issue in more detail. The mitigation plan must include mitigation for any impacts identified.*

### CULTURAL RESOURCES ASSESSMENT

The 106 Group completed a cultural resources assessment for the Lake Elmo Village Area AUAR. The report, dated September 2007, is provided in Appendix G. The report details the background research and methods used to complete the study as well as provides conclusions and recommendations. Excerpts from the report are provided below; some of the text may have been slightly modified for use in this section.

#### Background

In early July of 2007 research of the SHPO files was conducted to identify the archaeological and architectural history information on file for the AUAR area. The file search provided information on previously identified archaeological sites and architectural history properties within one mile (1.6 kilometer [km]) of the AUAR area. The SHPO site files were then reviewed for archaeological site forms and previous archaeological survey reports within the AUAR area. Previously inventoried architectural history properties and reports from previously conducted surveys in the AUAR area were also reviewed. In addition, researchers examined historical maps of the AUAR area at the Minnesota Historical Society library, and historical aerial photographs at the University of Minnesota's Borchert Map Library.

#### Archaeology

A search of the SHPO files indicated that no archaeological sites have been reported (not field checked), or recorded (confirmed in the field) within the boundaries of the AUAR area.

In order to understand the character of the archaeology and place the Lake Elmo Village AUAR area in an archaeological context, previously recorded archaeological sites within one mile of the AUAR area were reviewed. Within this broader context study area, one archaeological site is recorded. A precontact mound, which is considered a potential burial site, is located immediately adjacent to the AUAR area to the north in the SE ¼ of the NE ¼ of Section 11. The mound (21WA0051) was reported in 1965 and verified by a professional field assessment in 1985 during which the mound was mapped, photographed, and a trench that was previously excavated in the mound was profiled (Lundquist and Tiers 1985). In addition, two shovel tests were excavated at 15 and 30 meters from the mound, but no artifacts were recovered. Excavation of additional shovel tests around the mound was recommended, especially to the south of the mound to determine the potential presence of a precontact village.

Although no archaeological sites have been reported within the boundaries of the AUAR area, 21WA0051 is very near the northern boundary line of the AUAR. There is the possibility that the mound or a portion of it falls within the AUAR area. None of the scenarios propose development in this vicinity.

### Architectural History

Based on the results of research at SHPO in early July of 2007, seven architectural history properties within the AUAR area have been inventoried (see Table 25-1). These seven properties were inventoried when the SHPO completed a survey of historical properties in Washington County circa 1979. One farmhouse adjacent to the AUAR area (WA-LEC-005) was also inventoried. No report of the 1979 survey was produced and the inventoried properties were not evaluated to determine their eligibility for listing on the National Register of Historic Places (NRHP).

Research indicated that one architectural history survey has been completed within the AUAR area. The 1992 cultural resources review for road expansion and construction noted in the previous section identified the Shiltgen Farm as a possible significant architectural history property. At the time of the review, the farm was surveyed because of concern that trees might be removed from the historic farmstead. This large farmstead is located along Stillwater Boulevard North, about one-quarter mile west of Lake Elmo Avenue North. The highway project report states that the Shiltgen Farm meets the eligibility criteria for listing on the NRHP (Petersen et al., 1993:301). However, this property does not have an inventory form on file at the SHPO and, after verifying with the SHPO, it has not been recorded in their database. None of the AUAR scenarios propose developing the Shiltgen Farm. Therefore, no impacts are anticipated.

At this time, SHPO records indicate that no architectural history properties within the Lake Elmo Village AUAR boundaries have been listed on or determined eligible for listing on the NRHP.

**Table 25-1**  
**Previously Inventoried Architectural History Properties**

<b>Inventory No.</b>	<b>Property Name</b>	<b>Address / T R S</b>	<b>Inventory Date</b>	<b>NRHP Eligibility</b>
WA-LEC-003	Farmhouse	NE corner, Kimbro and 43rd	1979	Not evaluated
WA-LEC-006	House	11178 Upper 33rd Ave.	1979	Not evaluated
WA-LEC-007	Birch Farmhouse	3443 Lake Elmo Ave.	1979	Not evaluated
WA-LEC-008	Joshua L. Taylor Bldg.	3394 Lake Elmo Ave.	1979	Not evaluated
WA-LEC-009	Grain Elevator	Lake Elmo Ave. at RR tracks	1979	Not evaluated
WA-LEC-010	Commercial Bldg.	Lake Elmo Ave.	1979	Not evaluated
WA-LEC-011	Lake Elmo Bank	3476 Lake Elmo Blvd.	1979	Not evaluated
<i>Adjacent inventoried properties</i>				
WA-LEC-005	Farmhouse	Hwy. 212	1979	Not evaluated

As part of the Lake Elmo 2000-2020 Comprehensive Plan, the city reviewed existing housing. The plan reported that the city had 526 pre-1960s housing units. The same section of the Comprehensive Plan (the Land Use Plan section) reported that in 1999, the Village Commission completed an inventory of the Old Village, and Thorbeck Architects completed an urban design study of the core area for the Old Village (City of Lake Elmo 2001). The inventory and urban design study were not available for review during this assessment.

### Results

#### *Archaeology*

There is the potential for finding intact precontact and contact period archaeological resources throughout the undisturbed portions of the AUAR area, including agricultural fields. The degree of potential, from low to high, depends on the natural conditions stated in the Methods section of the Cultural Resources

Assessment report (Appendix G), such as the area's location to prominent topographic features and sources of water.

Also noted in the Methods section, the potential for finding intact archaeological material is also higher near recorded sites. The precontact mound (21WA0051) located in the SE ¼ of the NE ¼ of Section 11 is immediately adjacent to the AUAR area. There is a higher potential for finding associated archaeological material near this burial site.

This initial assessment indicates that there is potential for intact post-contact archaeological resources within the AUAR area. The highest potential lies with the farmstead sites located intermittently along county roads. There is also potential for finding archaeological resources associated with public buildings such as a school or church. The potential historic significance of any post-contact archaeological resources that might exist, however, is unknown at this stage.

#### *Architectural History*

The 106 Group identified approximately 200 properties in the AUAR area that appear to be 45 years old or more (see Figure 2 of the Cultural Resources Assessment in Appendix G). Only seven properties have been previously inventoried (see Table 25-1). The historic property types vary, and include a functioning rail line, warehouses and a grain elevator, nineteenth and early twentieth century commercial buildings, elaborate and modest farmsteads, and houses dating from the late nineteenth century through the early 1960s.

There are many properties within the AUAR area that meet the initial criteria for listing on the NRHP, that is, they are at least 50 years old and they retain their historic integrity. Very few are in the official state inventory of historic properties, however. Two properties that are not in the state inventory, but have been recognized for their historic qualities are the Shiltgen Farm, which was recommended as a NRHP-eligible property in a 1992 road project review (see Section 3.2), and the North Star Farm, which is pictured on the cover of the context study of Washington County (Zellie 1999: see also pg. 93f). Other potentially significant properties are too numerous to mention.

### **Summary and Recommendations**

#### *Archaeological*

With the exception of the areas disturbed by historical and current commercial, residential, and transportation corridor construction, the entire AUAR area has the potential for containing precontact and contact period archaeological resources. Areas that meet the conditions described in the Methods section, such as close proximity to recorded archaeological sites, close proximity to significant bodies of water, and locations near topographically prominent landscape features, have a higher potential for discovery of precontact archaeological resources. Areas that have a low potential for discovery of precontact archaeological resources include inundated areas, former or existing wetland areas, poorly drained areas, and areas with a 20 percent or greater slope.

The highest potential for finding post-contact archaeological resources are the locations of existing or former farmsteads and possibly public buildings, as shown on a series of historic plat maps and aerial photographs. The post-contact archaeological resources could consist of building foundations, early and rudimentary structures, dump sites from early settlement, or privies, to name a few site types. These resources can reveal how early settlers utilized the resources, how they constructed their buildings, and how they interacted with the community. Ethnic characteristics can sometimes be revealed through house and barn designs, and building layout typical of different European countries. The archaeological resources of early public buildings may also reveal ethnic characteristics, as well as details about community interaction.

If ground disturbing activities are planned for the AUAR area, a Phase I archaeological survey would identify archeological properties and determine their potential eligibility for listing on the NRHP. If, during any ground disturbing activities, archaeological resources associated with the mound just outside the northern border of the AUAR area (Site 21WA0051) are discovered, certain steps are required because the mound is considered a burial site and is afforded special protection under the Minnesota Private Cemeteries Act. The Office of the State Archaeologist must be notified and the Minnesota Indian Affairs Council must be consulted if human remains are determined to be indigenous. Consultation with local American Indian tribes would also be recommended.

#### *Architectural History*

The AUAR area has the layout and characteristics of a small town, with a railroad running through the center of town and bisected by a small commercial district, surrounded by housing on lots laid out in a rectilinear grid, with working farms in the outlying areas. The architectural building stock varies widely from modest lake cabins, to elaborate high style residences, and from working farms, to well-preserved false front commercial buildings. The 106 Group identified more than 200 properties that contain buildings, structures and/or sites that appear to be at least 45 years of age or older within the AUAR area that may be significant. Only seven of these properties were inventoried in 1979, but not evaluated for eligibility regarding their listing on the NRHP. If any of these properties are to be impacted by future development within this area, further study of the individual properties, neighborhoods, and districts identified during the assessment is recommended in order to determine the historical significance of these properties and their potential eligibility for listing on the NRHP.

#### **MITIGATION SUMMARY**

There are a number of ways to proceed with decision-making regarding the potential archaeology and architectural history resources within the Lake Elmo Village AUAR area - all decisions made will be guided by existing legal requirements.

- 1) The Lake Elmo Heritage Preservation Commission should be consulted regarding any future developments in this area that may impact historic properties.
- 2) In all cases, sensitivity with and local efforts towards cooperation and dialogue with the community residents and the local Native American communities is paramount. Although no Native American burial mounds, sacred landscapes, or National Register eligible precontact archaeological sites are identified in the AUAR area to date, such places are considered sacred and meaningful to contemporary American Indian peoples.
- 3) Efforts should support appropriate levels of historical and archaeological surveys prior to future development, in order to prevent intentional or unintentional damage to, or destruction of, important cultural properties without due process and consideration. These efforts include the following:
  - When ground disturbing activities are planned for areas with a high potential for discovery of precontact archeological resources, Phase I archaeological survey will be required to identify archeological properties and determine their potential eligibility for listing on the NRHP. Areas with a high potential for discovery of precontact archeological resources are defined as:
    - within 500 ft. (150 m) of an existing or former water source of 40 acres (19 hectares) or greater in extent, or within 500 ft. (150 m) of a former or existing perennial stream;
    - located on topographically prominent landscape features;
    - located within 300 ft. (100 m) of a previously reported site; or

- located within 300 ft. (100 m) of a former or existing historic structure or feature (such as a building foundation or cellar depression).
  - More than 200 properties were identified that contain buildings, structures and/or sites that appear to be at least 45 years of age or older within the AUAR area. The age of over 45 years may mean that it is an architecturally significant property. Only seven of these properties were inventoried in 1979, but not evaluated for eligibility regarding their listing on the NRHP. Proposed future development should study any proposed impacts to properties at least 45 years of age or older in order to determine the historical significance of the property and their potential eligibility for listing on the NRHP.
- 4) Although there are no current plans for city involvement in any of the private development within the Village, the city may be involved in public activities. The city should be cognizant that if there is any public involvement in a future development within the Lake Elmo Village AUAR area the following Minnesota laws should be taken into account. Summaries of the laws are included in the Cultural Resources report in Appendix G.
- Minnesota Field Archaeology Act, 1963 (M.S. 138.31 – 138.42)
  - Minnesota Private Cemeteries Act, 1975 (M.S. 307.08)
  - Minnesota Historic Sites Act, 1965 (M.S. 138.661 - 138.6691)
- 5) If there is any federal involvement in a proposed future development through funding, permitting, loans or other federal action, there are a number of federal laws that apply, of which the National Historic Preservation is the most significant.
- **National Historic Preservation Act of 1966**  
Section 106 of the National Historic Preservation Act requires Federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on such undertakings. The State Historic Preservation Office acts on behalf of the Advisory Council in each state. The Section 106 process seeks to accommodate historic preservation concerns with the needs of Federal undertakings through consultation among the agency officials and other parties with an interest in the effects of the undertaking on historic properties, commencing at the early stages of project planning. The goal of consultation is to identify historic properties potentially affected by the undertaking, assess its effects, and seek ways to avoid, minimize or mitigate any adverse effects on historic properties. A Federal undertaking includes such activities as transfer of funds, issuing of permits, and providing loans, to name a few.

**b. prime or unique farmlands?**

Yes     No

*AUAR Guidelines: The extent of conversion of existing farmlands anticipated in the AUAR should be described. If any farmland will be preserved by special protection programs, this should be discussed.*

A large portion of the AUAR area, particularly north and east of the downtown, is designated as prime farmland. This is reflected in Figure 25-1. Prime farmland, as defined by the United States Department of Agriculture (USDA), is land that has the best combination of physical and chemical characteristics for

producing food, feed, forage, fiber, and oilseed crops and is available for use in these areas. The designation is not meant to include land that is urban or built up. Some additional areas are designated as prime farmland, if drained.

As shown below in Table 25-2, development under any of the potential scenarios would result in the conversion of prime farmland to urban development. Loss of farmland is an anticipated consequence of population growth, although it is noted that not all of the land that is designated prime farmland is currently in agricultural use.

Acres of prime farmland that will not be converted to development are also shown in Table 25-2. These acres include the Schiltgen Horse Farm as well as the acres within the proposed greenbelt/buffer area that will remain undeveloped.

As mentioned in Item 25a, the Schiltgen Farm has agricultural significance. The Shiltgen Farm was recommended as a NRHP-eligible property in a 1992 road project review.

**Table 25-2  
Potential Conversion of “Prime Farmland” Acres**

Condition	Existing Condition - Prime Farmland Acres	Conversion to Development	Prime Farmland Acres to Remain
Development Scenario A	756.33 ac	491.75 ac	264.58 ac
Development Scenario B	756.33 ac	491.75 ac	264.58 ac
Development Scenario C	756.33 ac	491.75 ac	264.58 ac
Development Scenario D	756.33 ac	259.37 ac	496.96 ac

**Table 25-3  
Potential Conversion of “Prime Farmland if Drained” Acres**

Condition	Existing Condition - Prime Farmland Acres	Conversion to Development	Prime Farmland Acres to Remain
Development Scenario A	89.77 ac	53.56 ac	36.21 ac
Development Scenario B	89.77 ac	53.56 ac	36.21 ac
Development Scenario C	89.77 ac	53.56 ac	36.21 ac
Development Scenario D	89.77 ac	27.46 ac	62.31 ac

c. designated parks, recreation areas, or trails?  
 Yes     No

*AUAR Guidelines: If development of the AUAR will interfere or change the use of any existing such resource, this should be described in the AUAR. The RGU may also want to discuss under this item any proposed parks, recreation areas, or trails to be developed in conjunction with development of the AUAR area.*

**PARKS AND RECREATION AREAS WITHIN AUAR AREA**

There are several existing park facilities within the Village AUAR area (see Figure 25-2). Following is a description of each park facility.

**Lions Park:** Lions Park is a fully developed 3.2-acre park located in the heart of the Village Area. It is an active recreation park and has a wide variety of recreation facilities. Park uses include picnicking,

lighted baseball field, lighted tennis courts, basketball court, volleyball court, hockey/ice skating rink, horseshoes, badminton, and a batting cage. Other facilities include off-street parking, concession stand/warming house, permanent restrooms, a drinking fountain, bleachers and a shelter. The shelter facilities make Lions Park a good meeting place for group activities. Each August, it is the site of the annual city celebration of Huff-n-Puff Days. This park is also the location of the Lake Elmo Center for the Arts which occupies a former city owned house in the northwest corner of the property. Development will not interfere or change the use of this park.

*Reid Park:* This 30-acre neighborhood park is located in the southern portion of the AUAR area. It contains a softball field, two play areas, and a bike/walking path that winds through a wooded area and around a pond. Passive uses of the park include picnicking, trails for walking and jogging, flora/fauna identification, and quiet/solitude; active uses include playgrounds, softball field, soccer/football field, and bike trails. Natural features include natural parkland, a pond, and a natural resource area. Other facilities include off-street parking and portable restrooms. Reid Park is also used during the annual Huff-n-Puff Days.

All scenarios propose development adjacent to Reid Park, which may interfere with some of the current passive uses of the park related to quiet/solitude. This interference may be caused by existing forested and woodland areas adjacent to the park (see Figure 10-1) being converted to residential uses, as proposed in all development scenarios (see Figures 6-1 and 6-2). The landscape (forests and woodlands) viewed from some natural areas of the park will change under all the proposed development scenarios, which may impact some of the existing natural areas within the park that provide quiet/solitude. This impact can be minimized by providing a buffer to Reid Park that protects existing forested and woodland areas.

*VFW Park:* This 3-acre facility is located northeast of Lions Park and is classified as a special use park. It is used extensively by little leagues and contains a lighted ball field for softball and baseball games. Other facilities include off-street parking, seasonal restrooms, bleachers and a batting cage. It is also used during the annual Huff-n-Puff Days. Development will not interfere or change the use of this park.

*Lake Elmo Elementary School:* This school is part of the Stillwater Area Schools District No. 834, and has the typical playground facilities and playfields of an elementary school. Scenarios A, B, and C identified the possible location for a new city hall adjacent to the school at the current auto dealership. This site is not being actively pursued by the city. The civic square associated with a new city hall is proposed to be located on a portion of the school's open fields. If the city decides to pursue a city hall and civic square in this location, then the city will need to consult with the school district regarding its long term plans for the open fields and the potential for using the open fields for the civic square.

#### **PARKS AND RECREATION AREAS NEAR AUAR AREA**

Several parks are located near to the AUAR area and may be used by residents within the AUAR boundary. Development of the AUAR area will not directly interfere or change the use of these facilities. The use of these parks could increase if adequate park and recreation facilities are not provided within the Village. However, all Scenarios provide for park and recreation areas.

*Tana Ridge Park:* Tana Ridge Park is a 5-acre neighborhood park located between two housing developments north of the AUAR area. It contains a softball field, soccer fields, and a playground. Passive uses include a picnic area and trails for hiking and biking. Access to the Tana Ridge Park would not be convenient from the Village unless a series of trails through the proposed border were developed. Tana Ridge Park is designed to be a neighborhood park

*Heritage Park:* Heritage Park is a neighborhood park consisting of 8 acres of undeveloped land located south of Reid Park on the shores of a large pond. With a trail and ample vegetative cover along the shoreline, this is a pleasant place for walking and enjoying nature. These trails may provide some passive recreation for some new Village residents.

*Sunfish Lake Park:* The city's Sunfish Lake Park is located outside the AUAR area on the northwest shore of Sunfish Lake. This 284-acre community park is considered by many to be the crown jewel of the Lake Elmo park system – an important symbol of the quiet, rural character of Lake Elmo. The park is primarily wooded and remains in its natural state. Park activities include hiking, cross country skiing, sliding, horseback riding, and picnicking. Park attendees have access to the lake by means of a park trail (the Rabbit Trail), and use the lake for fishing (mainly from shore), canoeing, and passive viewing, but there is no official public boat access to the lake. During the winter months, some park attendees cross country ski across the lake. Off-street parking and portable restrooms are available at the park. The city is in the process of protecting Sunfish Lake Park through a Minnesota Land trust conservation easement. The northwestern corner of the park was previously utilized for the Washington County Landfill and this section is controlled by the MPCA for remediation of hazardous substances. The city is currently working with the Minnesota Land Trust to obtain a conservation easement over Sunfish Lake Park.

*Lake Elmo Regional Park Reserve:* The Lake Elmo Regional Park is located just southwest of the AUAR area and is a Washington County facility. The Lake Elmo Park Reserve is 2,165 acres in size (3 ½ square miles) with 80 percent of its acreage set aside for preservation and protection. This 80 percent will eventually resemble the land as it was prior to the arrival of the settlers in the mid-1800s. This park reserve offers gently rolling hills with a variety of landscape types, including forest and prairie. Lake access for swimming and boating, camping, fishing, trails and play structures are available at this park. Other park uses include horseback riding, archery, orienteering and picnicking. Off-street parking (permit required) and restrooms are provided at the park.

#### **LOCAL PARKS PLAN**

In March of 2008, the City of Lake Elmo adopted the Lake Elmo Comprehensive Parks & Recreation Plan. The Plan provides a vision for the city's park system and is meant to guide city policymakers over the period of 2007-2030. The Plan describes existing parks and recreation areas and presents a guide for future development of parks and recreation areas in Lake Elmo. The city also has a Comprehensive Trail Guide Plan (November, 2005). Existing parks, trails and open space areas and proposed trails within and near the AUAR area are shown on Figure 25-2 (the source of the proposed trail alignments is the city's 2005 Comprehensive Trail Plan).

#### **FUTURE PARKS AND RECREATION AREAS**

The Park Plan recommends adding to the Lake Elmo parks system 13 neighborhood parks, one community park, one to two community sports complexes, two special use parks and a greenway. The 2030 Park Plan is shown on Figure 25-3. The Park Plan does not identify the proposed Buffer Zone/Open Space or Greenbelt as park as these areas are not specified as public space. Recommendations for additional park land were based on park system principles, demographic analysis, existing and planned land use patterns, existing and proposed trails, park service areas, level-of-service guidelines, and natural resources data. The Park Plan identifies search areas for the proposed additional park land. The search areas are intended to offer the city guidance as to where to obtain additional park land while allowing for flexibility as the potential for each park is evaluated on a case by case basis.

Within the Village AUAR area, search areas are identified for two neighborhood parks, one community park, one community sports complex, and one special use park. In addition, a city Greenway Corridor and a Washington County Greenway Corridor are indicated to potentially extend through the Village

AUAR area. Scenarios A, B, and C – based on the Village Master Plan – provide for these identified needs, except for the community park. Scenario D – based on the Comprehensive Plan – only provides for the community sports complex. A further discussion of the identified park and recreational needs within the AUAR area and a comparison of the Park Plan and the AUAR development scenarios follow.

### **Neighborhood Parks**

The Park Plan identified the need for two neighborhood parks north of Stillwater Blvd. within the AUAR area. The two neighborhood parks are included in Scenarios A, B, and C and are referred to as West and North Parks in the Master Plan. Scenario D does not include two additional neighborhood parks as the land use in the vicinity of the two parks is part of the greenbelt.

### **Community Park**

The Park Plan calls for the creation of one additional significant community park to be located in the Village: *A significant park shall be located at the heart of Lake Elmo and serve as a community gathering place and landmark.* The purpose of the park is to act as a gathering place for the entire community. Some of the features include walking paths, grassy open space, flower beds, decorative plantings, mature trees, ponds and streams, park benches, a playground, picnic areas, and possibly a bandshell for summer concerts. Its ideal location would be close to senior housing and it should provide opportunities for organized flower clubs and other civic groups to contribute to the quiet beauty of the park. It should also serve as a place for city celebrations, ice cream socials, a farmer's market, and other activities that will bring the people of Lake Elmo together.

The proposed search area for the community park is located south of Stillwater Blvd. near the intersection of Stillwater Blvd. and Manning Avenue. This park is not clearly identified in the Village Master Plan (Scenarios A, B, and C). However, the Special Use Park or Town Square as described in the Master Plan fulfills a part of not all of this function. (see special use park discussion below). Scenario D does not include a community park.

### **Special Use Park**

One special use park search area is identified in the Village Area. The Park Plan indicates it would consist of a civic square outside of the proposed new city hall, which is proposed to be located near Stillwater Blvd. near Lake Elmo Avenue. This special use park serves some of the same functions as the community park identified in the Park Plan. Scenarios A, B, and C provide for a civic square associated with the new city hall. A civic square would serve the Village Area residents, employees, and visitors as a meeting place and as a location for community events. Scenario D does not include a special use park.

### **Sports Complex**

For the Village Area Sports Complex, the Park Plan recommends the development of three soccer/football fields and three baseball/softball fields on approximately 20 acres. Fields in the Village Area would bring athletic competition to the center of the community and reinforce the Village Area as the center of the community. The lighted diamonds at Lions Park and VFW Park would continue to be used to meet Lake Elmo's needs for highly programmed playfields. All scenarios provide for this sports complex.

### **Greenway Loop/Trail**

The Park Plan recommends a greenway loop that fully utilizes the trails proposed in the Comprehensive Trail Guide Plan (2005). Figure 25-2 shows the proposed trail system within and near the Village. The greenway along with the trail system would provide for a highly connected park system and build new connections among rural and future more urban parts of the city. A recommended minimum width for the greenway is 25 feet, although 50 to 100 feet is more desirable. A wider greenway corridor would allow

more opportunities for encompassing natural areas and existing park lands, and provide space for landscaping, trees and resting places. Through the AUAR area, this greenway loop winds its way through the AUAR area along Lake Elmo Avenue, adjacent to Lions Park and VFW park, through planned mixed use areas, and then Tana Ridge Park located northeast of the AUAR area.

None of the scenarios identified this specific location for a greenway loop/trail. However, both the Master Plan (Scenarios A, B, and C) and the Comprehensive Plan (Scenario D) include guiding principles that discuss integrating development with parks, trails, and open space/greenways. Although none of the scenarios identified a specific greenway loop tied to the proposed trail system, each scenario includes a greenbelt/buffer between the Village and adjacent rural and semi-rural uses. The city will work with a variety of public and private partners to establish the greenbelt/buffer (i.e., property owners, builders/developers, agencies, non-profit organizations, etc.).

### **PARK DEDICATION**

Lake Elmo's subdivision regulations call for a dedication of a reasonable portion of the land to the city for public use as parks, playgrounds, trails, or open space when land is proposed for subdivision. The maximum percentage required ranges from 3% for non-residential uses to 10% for suburban residential uses of the total area being subdivided. In lieu of the land dedication, the city can elect to require the subdivider to contribute a cash equivalent payment to the city's Park and Open Space Fund, or may require the developer to satisfy the park land dedication requirement by a combination of land and cash contribution. In accordance with state statute:

Cash payments received must be used only for the acquisition and development or improvement of parks, recreational facilities, playgrounds, trails, wetlands, or open space based on the approved park systems plan. Cash payments must not be used for ongoing operation or maintenance of parks, recreational facilities, playgrounds, trails, wetlands, or open space" (Mn Stat. 462.358 Subd 2b (g)).

The following analysis reviews the maximum potential for park land dedication (acres) under each of the development scenarios. When development occurs, it is likely that developers may meet the park dedication requirements by providing a combination of land and cash. This means that the maximum potential for park land may not be realized as meeting the park needs of the community will likely involve park and recreation facility improvements in addition to the land needed to establish new parks. It is noted that specific park and recreation facility improvement costs for the park and recreation facilities identified in the Parks Plan and Master Plan are not available, nor is an AUAR required to analyze such costs

### **Scenarios A, B, and C**

The city's existing park dedication requirements apply to the total area being subdivided. The requirements do not apply a different dedication percentage for land being subdivided into lots for development verses outlots for open space or future park use. Therefore, the undeveloped portion of the Village AUAR area was included in the potential park dedication calculations presented in Tables 25-4 and 25-5. By applying the park land dedication requirement percentages the city could potentially obtain 64 acres of land through park land dedication in Scenarios A, B, and C (Table 25-4). In comparison, the Master Plan includes 35 acres of New Parks/Open Space. This suggests that an adequate amount of land could be obtained through existing park land dedication requirements to implement the Master Plan (Scenarios A, B, & C).

**Table 25-4**  
**Potential Acres Obtained through Park Dedication (Scenarios A, B, & C)**

<b>Masterplan Composite Land Use</b>	<b>Acres</b>	<b>Maximum Park Dedication %</b>	<b>Maximum Park Dedication Acres</b>
Mixed Use (Non-Residential)	16.46	3%	0.49
Mixed Use (Residential)	56.00	10%	5.60
New Residential	308.55	10%	30.85
New Civic/Institutional Development	16.47	3%	0.49
Buffer Zone, Open Space	226.02	10%	22.60
New Parks/Open Space	35.35	10%	3.54
<b>Total</b>	<b>658.85</b>	<b>-</b>	<b>63.58</b>

### Scenario D

Given the amount of land that could potentially be subdivided into lots for development and outlots for open space or future park use, the city could potentially obtain 90 acres of land through park dedication in Scenario D (Table 25-5). In comparison, the Comprehensive Plan includes 43 Public/Semi Public uses that could be included for uses such as a library, YMCA, art center, parks etc. (see Figure 6-2). This suggests that an adequate amount of land could be obtained through existing park land dedication requirements to implement the Scenario D.

**Table 25-5**  
**Potential Acres Obtained through Park Dedication (Scenario D)**

<b>Village Future Land Use Designation</b>	<b>Acres</b>	<b>Maximum Park Dedication %</b>	<b>Maximum Park Dedication Acres</b>
Village Residential High Density (VR/HD)	7	10%	0.7
Village Residential Low Density (VR/LD)	77	10%	7.7
Village Residential Mixed Use/Medium Density (VR MU/MD)	86	10%	8.6
Village Residential Public/Semi Public (VR P/S)	43	3%	1.29
Village Residential Green Belt (VR GB)	717	10%	71.7
<b>Total</b>	<b>923</b>	<b>-</b>	<b>89.99</b>

## RECREATIONAL LAKES

### Lake Elmo

The northern end of Lake Elmo is within the AUAR area. Existing development is limited to residential development in the "old village" area of the city and along Lake Elmo Avenue North (CSAH 17). Approximately half the shoreline and the local watershed of Lake Elmo are located within Lake Elmo Park Reserve. As a result, much of the shoreline and drainage area will remain undeveloped. Public access to Lake Elmo is located on its western shore, within the Lake Elmo Park Reserve. Therefore, lake users must pay the park entrance fee to use the public access. The lake is used heavily by park attendees, which numbered 248,000 during 1992. A 1990 creel survey completed by the Minnesota Department of Natural Resources (DNR) indicates recreational uses of the lake totaled 40,400 hours during the May through October period. The total recreational usage of the lake was 184 hours per acre during this period. Specific lake uses included:

- fishing was 107 hours/acre,
- runabout boating was 44 hours/acre,
- waterskiing was 14 hours/acre,
- pontoon boating was 8 hours/acre,
- canoeing was 3.5 hours/acre,
- sailing was 0.2 hours/acre, and
- other activities (i.e. jet skis, windsurfing, and paddle-boating) were 0.8 hours/acre.

Source: Valley Branch Watershed District Watershed Management Plan, 2005, Lake Elmo Watershed Management Plan, Barr Engineering Company

### **Sunfish Lake**

The eastern half of Sunfish Lake is within the AUAR area. As previously discussed, Sunfish Lake Park is located on the northwestern shore of the lake and the city is in the process of protecting the park through a Minnesota Land Trust conservation easement. A few residential lots are located on the lake's western shore, agricultural land is located on its eastern shore, and a cluster residential development is located on the north and northeast shores of the lake. Cattle were pastured along the eastern shore in the past and horses are currently pastured along the western shore. Area residents use the lake for boating (paddleboats, pontoons, and canoes), fishing, and aesthetic viewing purposes. Although there are no swimming beaches on the lake, some residents occasionally swim in the lake.

Source: Valley Branch Watershed District Watershed Management Plan, 2005, Sunfish Lake Watershed Management Plan, Barr Engineering Company

### **MITIGATION SUMMARY**

*Reid Park:* All scenarios propose development adjacent to Reid Park, which may interfere with some of the current passive uses of the park (e.g., quiet/solitude) along the park boundary. Appropriate buffers to the passive use areas of the park or placing the primary ecologically sensitive areas (containing forest, woods, and wetlands) adjacent to Reid Park within the greenbelt/buffer will mitigate impacts to the park.

*Lake Elmo Elementary School:* Scenarios A, B, and C identified the possible location for a new city hall adjacent to the school at the current auto dealership. This site is not being actively pursued by the city. The civic square associated with a new city hall is proposed to be located on a portion of the school's open fields. If the city decides to pursue a city hall and civic square in this location, then the city will need to consult with the school district regarding its long term plans for the open fields and the potential for using the open fields for the civic square.

*Proposed Community Park.* The proposed search area for the community park is located south of Stillwater Blvd. near the intersection of Stillwater Blvd. and Manning Avenue. This park is not clearly identified in the Village Master Plan (Scenarios A, B, and C). However, the Special Use Park or Town Square as described in the Master Plan fulfills a part of not all of this function. Scenario D does not include a community park.

*Greenway Loop/Trail.* None of the scenarios specifically identified a location for a greenway loop/trail. However, both the Master Plan (Scenarios A, B, and C) and the Comprehensive Plan (Scenario D) include guiding principles that discuss integrating development with parks, trails, and open space/greenways. Since a greenway loop/trail is desired in this location, future planning for Village development should include this greenway loop/trail.

Each scenario includes a greenbelt/buffer. The city will work with a variety of public and private partners to establish the greenbelt/buffer (i.e., property owners, builders/developers, agencies, non-profit organizations, etc.)

*Park Dedication.* The city's authority to obtain land and fees for parks is adequate to obtain the park land identified in the Park Plan and Master Plan. The current zoning ordinance requires a maximum of 10% for suburban residential uses and 3% for non-residential uses.

- Given the amount of land that could potentially be subdivided in Scenarios A, B, and C, the city could potentially obtain 64 acres of land through park dedication. In comparison, the Master Plan includes 35 acres of New Parks/Open Space.
- Given the amount of land that could potentially be subdivided in Scenario D, the city could potentially obtain 90 acres of land through park dedication. In comparison, the Comprehensive Plan includes 43 acres of Public/Semi Public uses.

The financial analysis of the development scenarios that will follow the AUAR process will assist the city in determining if the financial resources available to the city are sufficient to establish the desired park and recreation system.

**d. scenic views and vistas?**

Yes     No

*AUAR Guidelines: Any impacts on such resources present in the AUAR should be addressed. This would include both direct physical impacts and impacts on visual quality or integrity. EAW Guidelines contains a list of possible scenic resources (page 20).*

While there are no officially designated scenic views or vistas within the AUAR area, there are a number of features that could be considered scenic. The AUAR area contains open fields, wooded areas, ponds, lakes, and parks, all of which add scenic character to the area. All scenarios propose a greenbelt/buffer that will help maintain some of the existing views and vistas surrounding the Village. Also, preservation of the existing horse farm will protect a key view and gateway to the Village.

**e. other unique resources?**

Yes     No

26. Visual Impacts. Will the project create adverse visual impacts during construction or operation? Such as glare from intense lights, lights visible in wilderness areas and large visible plumes from cooling towers or exhaust stacks?  
 Yes  No  
If yes, explain.

*AUAR Guidelines: If any non-routine visual impacts would occur from the anticipated development covered by the review, this should be discussed here along with appropriate mitigation.*

No non-routine visual impacts have been identified that would occur from the development scenarios. However, the current ball fields within the Village have lighting that may cause light pollution on nearby properties. Nearby areas should be aware of the potential light pollution and address the potential effects through prudent site planning, screening, and buffers to minimize glare from the intense lights.

27. Compatibility with Plans. Is the project subject to an adopted local comprehensive plan, land use plan or regulation, or other applicable land use, water, or resource management plan of a local, regional, state or federal agency?  
 Yes  No  
 If yes, describe the plan, discuss its compatibility with the project and explain how any conflicts will be resolved. If no, explain.

*AUAR Guidelines: The AUAR must include a statement of certification from the RGU that its comprehensive plan complies with the requirements set out at 4410.3610, subpart 1. The AUAR document should discuss the proposed AUAR area development in the context of the comprehensive plan. If this has not been done as part of the responses to items 6, 9, 19, 22, and others, it must be addressed here; a brief synopsis should be presented here if the material has been presented in detail under other items. Necessary amendments to comprehensive plan elements to allow for any of the development scenarios should be noted. If there are any management plans of any other local, state, or federal agencies applicable to the AUAR area, the document must discuss the compatibility of the plan with the various development scenarios studied, with emphasis on any incompatible elements.*

**LAKE ELMO COMPREHENSIVE PLAN**

The City of Lake Elmo has adopted a Comprehensive Plan that complies with all the requirements set out in Mn Rules Chapter 4410.3610, subpart 1. Scenario D is based on the Comprehensive Plan. Scenario D deviates slightly from the Comprehensive Plan land use assumptions to review a scenario that is both consistent with the Comprehensive Plan and addresses the existing housing unit count error in the Comprehensive Plan. Appendix D includes the city attorney’s opinion regarding the housing unit requirements of the Comprehensive Plan. Table 27-1 shows the allocation of housing units, by land use category, for Scenario D and how the housing unit count error was addressed by increasing the amount of acres that could accommodate mixed use/medium density residential uses from 45 acres to 86 acres.

**Table 27-1  
Lake Elmo Comprehensive Plan**

Village Residential Land Use Designation	Acres	Allowed Density	
		(units/acre)	Potential Units
Village Residential High Density (VR/HD)	7	14.5	102
Village Residential Low Density (VR/LD)	77	3 to 4.4	231 - 339
Village Residential Mixed Use/Medium Density (VR MU/MD) <sup>1</sup>	86	5 to 6	430 -516
<b>Total</b>	<b>170</b>		<b>763 - 957</b>

Data Source: Lake Elmo Comprehensive Plan

<sup>1</sup> Comp Plan states that VR MU/MD allows for 45 acres of residential use at a density of 5 - 6 units/acre (the remaining 41 acres would presumably be for non-residential uses). The acreage was increased to address incorrect existing Village housing unit count.

Scenarios A, B, and C represent a new vision for the Village that is not covered by the adopted comprehensive plan. The implementation of any scenario consistent with the Master Plan will require an update to the adopted Comprehensive Plan. The city is aware of this requirement and will appropriately update the comprehensive plan after the completion of the AUAR process.

**COMPREHENSIVE PLAN UPDATE**

After the AUAR process is completed and the city obtains financial information regarding development scenarios, the city will select a preferred development scenario and will update the comprehensive plan to reflect this scenario (see Table 6-3. Tentative Timeline – Village Development Process). This will be a critical part of the city’s comprehensive plan update, which will be reviewed by the Metropolitan Council.

The comprehensive plan amendment will change what is in the current comprehensive plan for the Village. This is within the city’s authority to do as long as the city maintains the performance requirements set out in the MOU regarding: 24,000 population and 6,500 new RECs by 2030.

**LAKE ELMO COMPREHENSIVE PARKS AND RECREATION PLAN**

This plan was prepared and adopted after the completion of the 2005 Comprehensive Plan. A discussion of this plan and the compatibility of the development scenarios and the plan is provided in response to AUAR Item 25c – Designated parks, recreation areas, or trails.

**LAKE ELMO LAND USAGE ORDINANCE (TITLE XV)**

Lake Elmo has a code of ordinances that governs activities within the city. Title XV Land Usage contains numerous land use regulations addressing screening, lighting, landscaping, zoning, land subdivision (platting), shoreland management, flood control, etc. Any development within the AUAR area will be subject to the city code. The city will be updating its ordinances to address these areas related to urban and suburban development patterns associated with sewered development. Some of these areas are in practice now but need attention to fit potential new development patterns.

The city has adopted “holding zone” districts to reserve land in the Village for future development. The goal of each district is to ensure that properties do not subdivide in a manner inconsistent with plans for future development. These districts were established to provide the city with the time necessary to prepare the final zoning regulations governing development in the Village.

**VALLEY BRANCH WATERSHED DISTRICT 2005 – 2015 WATERSHED MANAGEMENT PLAN**

The Valley Branch Watershed District (VBWD) Watershed Management Plan (Plan) sets the vision, guidelines, and proposed tasks for managing surface water within the boundaries of the VBWD. The general purposes of a watershed district are to conserve natural resources through land use planning, flood control, and other conservation projects to protect the public health and welfare and for the wise use of the natural resources.

The VBWD Plan sets the course for the VBWD management of the water resources within the watershed. The VBWD Plan provides data and other background information, outlines the applicable regulations, assesses specific and watershed-wide issues, sets goals and policies for the VBWD and its resources, and lists implementation tasks to achieve the goals. The VBWD Plan also discusses the financial considerations of implementing the VBWD Plan and other funding sources that may be available to the VBWD.

All development will be subject to the VBWD Plan and the VBWD rules that implement the plan. No incompatibilities between the Scenarios and the Plan have been identified. Some of the specific VBWD requirements are further discussed in the response to AUAR Item 17 – Water Quality – Surface Water Runoff.

**METROPOLITAN COUNCIL 2030 REGIONAL DEVELOPMENT FRAMEWORK**

Generally, urbanization of the AUAR area is compatible with the regional policy document and the city's MOU with the Metropolitan Council. Lake Elmo contains both "Developing" areas and "Rural" areas. The accommodating sewerage growth in the AUAR area is compatible with regional policies including, but not limited to, providing life-cycle housing, planning centers that are desirable places to live, shop and do business, planning interconnected bicycle and pedestrian paths, and protecting locally significant natural resources.

28. Impact on Infrastructure and Public Services. Will new or expanded utilities, roads, other infrastructure or public services be required to serve the project?

Yes  No

If yes, describe the new or additional infrastructure or services needed. (Note: any infrastructure that is a connected action with respect to the project must be assessed in the EAW; Refer to *EAW Guidelines* for details.)

*AUAR Guidance: This item should first of all summarize information on physical infrastructure presented under other items (such as 6, 18, 19, and 22). Other major infrastructure or public services not covered under other items should be discussed as well -- this includes major social services such as schools, police, fire, etc. As noted above and in the "EAW Guidelines," the RGU must be careful to include project-associated infrastructure as an explicit part of the AUAR review if it is to be exempt from project-specific review in the future.*

If future development occurs as proposed under Development Scenarios A, B, C, or D, new utilities, roads and other infrastructure will be needed to serve the AUAR area. This AUAR identifies the infrastructure needed to support the four development scenarios. The sections that follow discuss the new infrastructure that would be needed and where appropriate, provide comparisons between the scenarios. Infrastructure needs are discussed in greater detail under AUAR Items 13 - Water, Item 17 – Surface Water, Item 18 - Wastewater, and Item 21-Traffic.

#### **ROADWAY NETWORK**

The current roadway network within the AUAR area is not sufficient to provide access to and through the Village for the predicted growth in traffic volumes for the year 2030. The year 2030 is the standard planning horizon year for traffic analyses conducted within the Twin Cities Metropolitan Area. The traffic study conducted for this AUAR showed that the traffic conditions predicted for the year 2030 (referred to as "2030 background conditions") with or without development in the AUAR area would necessitate improvements to the roadway network. The traffic report included in Appendix E and summarized in AUAR Item 21 identifies the roadways and intersections that may be impacted by 2030 background conditions (without development in the AUAR area) and by the four AUAR development scenarios. Appendix E and AUAR Item 21 also includes the recommended roadway improvements to mitigate the predicted impacts from 2030 background conditions (without development in the AUAR area) and from the four AUAR development scenarios. The following points regarding new infrastructure are summarized from that section.

#### **Transportation Improvements for 2030 Background Conditions (Without Village Development)**

Incremental improvements to the existing roadway network are necessary to mitigate the impacts from the amount of traffic that is predicated to pass through the AUAR area by the year 2030. These incremental improvements are necessary, with or without development in the AUAR area. Improvements recommended to mitigate the impacts from the four AUAR development scenarios are in addition to the improvements needed to address 2030 background conditions. The following are recommendations for improvements to mitigate 2030 background conditions:

**Table 28-1  
Recommended Roadway Improvements – 2030 Background Conditions  
(Without Village Development)**

<b>Intersection</b>	<b>Description<sup>1</sup></b>
TH 5 and CSAH 15 (Manning Avenue)	<ul style="list-style-type: none"> <li>•Additional left-turn lane to create dual northbound left-turn lanes</li> <li>•Additional eastbound and westbound through lanes creating four-lane section.</li> <li>•Additional left-turn lane to create dual westbound left-turn lanes.</li> </ul>
TH 5 and 39 <sup>th</sup> Street	<ul style="list-style-type: none"> <li>•Additional eastbound and westbound through lanes resulting in four-lane section.</li> <li>•Additional eastbound left-turn lane.</li> </ul>
TH 5 and Laverne Avenue	<ul style="list-style-type: none"> <li>•Additional eastbound and westbound through lanes.</li> <li>•Additional eastbound and westbound left-turn lanes.</li> </ul>
TH 5 and CSAH 17 (Lake Elmo Avenue South)	<ul style="list-style-type: none"> <li>•Install new traffic signal.</li> <li>•Additional eastbound and westbound through lanes creating four-lane section.</li> </ul>
TH 5 and CSAH 17 (Lake Elmo Avenue North)	<ul style="list-style-type: none"> <li>•Install new traffic signal.</li> <li>•Additional eastbound and westbound through lanes resulting in four-lane section.</li> <li>•Additional eastbound exclusive left-turn lane</li> </ul>
CSAH 15 (Manning Avenue) and 30 <sup>th</sup> St	<ul style="list-style-type: none"> <li>•Install new traffic signal.</li> <li>•Additional eastbound and westbound exclusive left-turn lanes.</li> <li>•Additional northbound and eastbound exclusive left-turn lanes.</li> </ul>

<sup>1</sup> Refer to Figure 21-7 for an illustration of the recommended improvements.

**Transportation Improvements for New Development**

In addition to the improvements needed to accommodate 2030 Background Conditions, all the four development scenarios are all predicted to require the following improvements:

**Table 28-2  
Recommended Roadway Improvements for Village Development (All Scenarios)**

<b>Intersection</b>	<b>Description</b>
TH 5 and 39 <sup>th</sup> Street	<ul style="list-style-type: none"> <li>•Install new traffic signal.</li> <li>•Additional eastbound right-turn lane.</li> <li>•Additional westbound left-turn lane.</li> <li>•New northbound approach with one through-left and an exclusive right-turn lane.</li> </ul>
TH 5 and Laverne Ave	<ul style="list-style-type: none"> <li>•Addition northbound and southbound right-turn lanes.</li> </ul>
TH 5 and CSAH 17 (Lake Elmo Avenue South)	<ul style="list-style-type: none"> <li>•Additional westbound right-turn lane to match eastbound approach.</li> <li>•Additional eastbound left-turn lane to match westbound approach.</li> <li>•New southbound approach with single through-right and left-turn lanes.</li> </ul>
TH 5 and CSAH 17 (Lake Elmo Avenue North)	<ul style="list-style-type: none"> <li>•Additional eastbound right-turn lane to match westbound approach.</li> <li>•Additional westbound left-turn lane to match eastbound approach.</li> <li>•New northbound approach with single through-right and left-turn lanes.</li> </ul>
CSAH 17 (Lake Elmo Avenue North) and 39 <sup>th</sup> Street	<ul style="list-style-type: none"> <li>•New eastbound approach with single lane for all movements.</li> <li>•Additional northbound and southbound left-turn lanes.</li> </ul>

**MUNICIPAL WATER SYSTEM**

Existing and future city water system needs are discussed under AUAR Item 13. The following points regarding recommended infrastructure are summarized from that section.

**Existing Water System Needs (Without Village Development)**

The existing city water system needs improvements to adequately serve the existing population. These existing needs are summarized in Table 28-3.

**Table 28-3  
Existing Water System Needs (Without Village Development)**

Existing Water System Issue Description	Existing Water System Improvement Needed
<b>Well Capacity.</b> Recent studies (2004 Comprehensive Water Plan, 2005 Comprehensive Plan) and daily water pumping records for the year 2007 suggest the city is currently deficient in “firm” well capacity. After the need for additional well capacity was documented in both 2004 and 2005, a number of Lake Elmo households connected to the city’s water system in 2006 due to PFC pollution issues with private wells.	The city should provide additional “firm” well capacity as soon as feasible to support the existing population, and before allowing any significant expansion of the water system to occur. Therefore, a new well is needed with or without Village development.
<b>Distribution System.</b> The existing Village water distribution system lacks good hydraulic transmission capability and redundancy due to the watermain size and lack of looping.	The water distribution system needed for new development, once constructed, should correct the deficiencies and weaknesses of the existing system (i.e. provide looping to create a more reliable source supply, increased capacity for better fire protection, provide better circulation of water).
<b>Water Pressure.</b> The Village water system is currently split between two pressure service areas, which may result in problems (for example if Well No. 2 is lost due to due to maintenance or failure). In that situation, it is possible that Well No. 1 may not have enough head (pressure) capacity to adequately fill the new elevated water tank to an acceptable level. This will present two potential problems to the water system - reduced pressures during the outage and potential loss of fire storage for the duration of the outage.	Neighboring communities may be able to supply water in an emergency, but during peak summer hour conditions, the available water may be limited. The city will evaluate emergency water supply sources in its forthcoming Comprehensive Water System Plan update.

**Water System Needs for New Development**

In addition to the existing water system improvements needed to address existing issues, the four development scenarios are predicted to require the following improvements:

**Table 28-4  
Additional Water Supply Needed (With Village Development)**

Scenario	Supply needed to address existing issues (without development)	Additional supply needed to satisfy AUAR area demands	Total Supply Needed
A	1 well	0 wells	1 well (same as existing needs)
B	1 well	1 well	2 wells
C	1 well	1 well	2 wells
D	1 well	1 well	2 wells

**Water Supply Planning**

Water supply needs must be evaluated for the system as a whole, not just a small part of the system (e.g., the Village Area). Growth elsewhere in the system could trigger much larger supply needs. When the updated Comprehensive Water System Plan is complete, it should address the supply and storage needs for the system as a whole, as well as provide a plan for the sizing and location of the distribution system components.

**STORMWATER SYSTEM**

Existing and future stormwater management needs are discussed under AUAR Item 17. The following points regarding recommended infrastructure are summarized from that section.

**Current Stormwater System Needs (Without Village Development)**

Most of the developable area within the AUAR area is currently used for agriculture. The AUAR area contains very little relief, which prevents effective drainage. Thus drainage for a large proportion of the AUAR area depends on agricultural drainage ditches.

Based on recommendations in the 2004 Downtown Area Flooding Analysis, two regional basins are proposed within the Downs Lake watershed to address existing stormwater management needs in the Village. One basin is proposed to be located in an existing agricultural ditch and the other adjacent to an existing low quality wetland. The location of any stormwater management treatment and conveyance areas within the vicinity of the Lake Elmo Airport must consider balancing the needs of stormwater management with airport safety as water fowl attracted to some stormwater management facilities present airport safety issues.

**Stormwater System Needs for Future Development**

An analysis has been completed to assess the potential impacts of development proposed in the AUAR area on receiving waters, and provide guidance on stormwater mitigation measures necessary to protect Downs Lake, Lake Elmo, Sunfish Lake, Goetschel Pond and Legion Pond.

*Stormwater Runoff Discharge Rate Control.* The majority of the land use changes proposed by the AUAR development scenarios occur in the Downs Lake watershed. Two regional basins are proposed within the Downs Lake watershed to address existing stormwater management needs in the Village (based on recommendations in the 2004 Downtown Area Flooding Analysis). The rate control analysis conducted for this AUAR showed that together the two regional basins could also serve to provide rate control for the 2, 10 and 100-year rainfall events for all four development scenarios, in addition to existing stormwater management needs downtown. With construction of the two proposed regional ponds, future discharge rates (with Village development) would be less than existing discharge rates (associated with runoff from existing land use, such as agriculture). Therefore, the regional stormwater basins recommended in the 2004 Downtown Area Flooding Analysis can address both existing downtown flooding issues and to provide rate control for new development.

Conservatively, the proposed size of the regional basins (2004 Downtown Area Flooding Analysis) assumed no infiltration practices will be incorporated with development to address volume control.

*Stormwater Volume Control.* The analysis completed for this AUAR intends to show that the development of the AUAR area can proceed in a manner that reduces or maintains existing volumetric discharge—thereby meeting Lake Elmo’s permit requirements in regard to the St Croix River and as an ancillary benefit, protecting other waters downstream of the AUAR area from impacts due to urbanization.

As indicated in AUAR Item 17 regarding volume control, the city currently relies on VBWD volume control requirements. VBWD requires the greater of 1-inch, 24-hour event runoff volumes to be less than or equal to existing conditions and infiltration systems sufficient to store the 0.5-inches of runoff from impervious surfaces. The analysis completed with the AUAR shows that application of the VBWD requirements would be adequate to maintain existing annual runoff volumes. The analysis

also considered if the VBWD requirements were adequate to mitigate for prolonged non-average wet periods, for a single large rainfall event and by calculating the 100-year HWL for landlocked basins based on VBWD's simplified method. Based on this analysis it is recommended that runoff volume facilities be constructed to not increase existing runoff volume for the 100-year event. This requires approximately 15% of the area to be utilized for infiltration.

The city will work with developers to provide runoff volume facilities adequate to not increase existing runoff volume for the 100-year rainfall event by implementing volume control best management practices (BMPs) on their sites. Developers will need to use volume management techniques to minimize the stormwater impacts by emphasizing water infiltration, valuing water as a resource and promoting the use of natural system to treat water runoff. Examples include:

- Special ditches, arranged in a series, that soak up more water
- Vegetated filter strips at the edges of paved surfaces
- Residential or commercial rain gardens designed to capture and soak in stormwater
- Porous pavers, concrete and asphalt
- Decreased and disconnected impervious, narrower streets
- Rain barrels and cisterns
- Green roofs
- Protection of natural areas
- Minimizing soil compaction and/or mitigating compacted areas
- Street trees that intercept rainfall, improve water quality, and facilitate stormwater infiltration/treatment

### **SANITARY SEWER SYSTEM**

The AUAR area is planned to be served with a new municipal sanitary sewer system. Wastewater is discussed in Item 18. The following is summarized from that section.

#### **Existing Sanitary Sewer System**

The AUAR area is not currently served by public sanitary sewer; it is served by private and city-owned 201 common wastewater systems. According to the Comprehensive Plan, the city plans to abandon all 201 systems within the Village after the planned sanitary sewer system is constructed and extended to the Village by 2030.

The estimated sanitary sewer flow generated by existing development in the Village is 0.112 million gallons per day (MGD). The estimated flow assumes that all existing Village development would connect to the new sanitary sewer by the year 2030. The existing flow estimate was based on applying the unit rates adopted in the Comprehensive Plan to the residential equivalent connections (RECs) for existing residential units (194 RECs), commercial (171 RECs) and institutional properties (47 RECs).

#### **New Sanitary Sewer Needs for Future Development**

Consistent with the *MOU* and the *Comprehensive Plan*, a public sanitary sewer system is planned to be constructed to serve new development in the Village.

Wastewater flows that would be expected under each of the four development scenarios are presented below:

- Scenario A – 0.206 MGD average flow (755 RECs)
- Scenario B – 0.315 MGD average flow (1,154 RECs)
- Scenario C – 0.479 MGD average flow (1,755 RECs)
- Scenario D – 0.253 MGD average flow (927 RECs)

The city has been exploring the potential schematic layout of the major sanitary sewer facilities required to extend sewer service into the AUAR area. Current plans call for a trunk sewer from the I-94 interceptor to 30<sup>th</sup> Street on the south end of the Village. The trunk sewer is proposed to follow Lake Elmo Avenue. It will be a forcemain sewer to 30<sup>th</sup> Street with gravity sewer serving properties within the AUAR area, see Figure 18-1. A major lift station would be located near 30<sup>th</sup> Street. The lift station is being designed to accommodate the projected initial low flow conditions and to allow for staged expansion based on the future growth.

The planned expansion of the city sewer system is based on Metropolitan Council Environmental Services (MCES) providing additional capacity to serve the anticipated development by construction of a new interceptor in northeast Woodbury, called the Lake Elmo East Interceptor. This interceptor has been designed and is currently under construction. The Northeast Regional lift station number 77 (Northeast Regional LS-77) that the interceptor will connect to is currently in the early stages of design. Sanitary flow from the AUAR area will discharge to the MCES Lake Elmo East interceptor, which will then discharge to the Northeast Regional LS-77.

The capacity of the Lake Elmo East Interceptor is 2.7 million gallons per day (MGD) design flow with a peaking factor of 2.7 results in a peak flow of 7.3 million gallons per day. Anticipated flows from Lake Elmo are being considered in the planning and design of the MCES facilities. Based on the estimated flow from existing development (0.112 MGD, or 412 RECs) and the four development scenarios (ranging from 0.206 MGD, or 755 RECs, for Scenario A to 0.479 MGD, or 1,755 RECs, for Scenario C), the facilities will have adequate capacity to serve Lake Elmo. The proposed major lift station and future trunk sanitary sewer lines will need to be sized to accommodate the flow from existing and future development in the AUAR area.

#### **PRIVATE UTILITIES**

All necessary utility services (natural gas, electricity, communications) are adequately sized to serve the AUAR area and currently located in or near the area. The primary utility providing electricity and natural gas to the AUAR area is Excel Energy. The primary telephone service provider is Qwest, although some residents and business also use cellular phone service as an alternative to Qwest. The cable provider is Comcast. Extension of the utility lines to serve new development will be coordinated with the appropriate utility companies as required.

#### **POLICE, FIRE AND EMERGENCY RESPONSE SERVICES**

Under any of the development scenarios, public safety services would likely need to expand and the current service delivery models would need to be evaluated to maximize efficiencies and meet expanded service demand.

#### **Police Protection**

The City of Lake Elmo contracts with the Washington County Sheriff's Office for police protection services. The current staffing model is four FTEs (full time equivalents) for 24 hour service, 7 days a week. The City of Lake Elmo contracts for 4 full time deputies working the following shifts:

- 1 full time Deputy working days
- 1 relief Deputy working days
- 1 full time Deputy working afternoons
- 1 relief Deputy working afternoons
- 1 full time Deputy working nights

In 2007, the Sheriff's Office responded to 5,385 calls for service in Lake Elmo. Washington County is currently evaluating their service and, depending on the results of the evaluation, may recommend increased coverage. In the future, plans are that the Sheriff's Deputies serving Lake Elmo will be operating out of the Lake Elmo city hall.

Generally in the Upper Midwest, there is a planning ratio of 1.1 law enforcement officer per 1000 residents. The actual number for a specific community varies based on community characteristics. Population density and call history (the number and nature of calls received in the past) are factors considered in determining an appropriate level of staffing needed to provide adequate services to a community. The type of law enforcement body to be utilized (a County Sheriff's Office or a municipal police department) will also be a factor in determining the number of staff needed. As previously indicated, the Washington County Sheriff's office is currently in the process of assessing their staffing needs for the communities they serve.

### **Fire Protection**

The city is served by a fire department that has a full time fire chief and up to 30 paid on call firefighters located in two fire stations. Fire station one is located in the heart of the Village on La Verne Avenue.

The department responds to all fire calls. In 2007, the department responded to 46 fire calls. The department also responds to designated C and D medical emergency calls in conjunction with Lakeview Hospital paramedics. The department responded to 244 rescue and emergency medical service calls in 2007. In addition, the department responded to 79 other calls for service.

The challenge of finding day time firefighter personnel exists in Lake Elmo as it does elsewhere. The city is exploring service delivery and staffing models (including going to duty crews and/or cross training in other departments (e.g. some police officers in Woodbury are trained as paramedics and firefighters)) to meet this challenge and assure fire protection. The city relies on mutual aid from surrounding communities for back up fire service, as do other cities in Washington County.

A Fire Protection Needs Study was completed in 2005 that addressed the current space and staff needs for the Lake Elmo fire department. This study indicated that the current fire stations are not located appropriately to efficiently serve the growing population of all of Lake Elmo. The study identified the necessity of a new station number 1 located outside the Village as well as a new station number 2. One station is recommended in the southern portion of the city, just east of the 10<sup>th</sup> Street/Keats Avenue intersection. A second new station is recommended in the northern part of the city in the northwest quadrant of the Keats Avenue/47<sup>th</sup> Street intersection. Modern fire stations are typically 10,000 to 15,000 square feet in size and include 3 to 5 bays to house vehicles.

In the future, the fire protection needs will increase with the anticipated growth through 2030 in the Village area, in the area south of Tenth Street along I-94, and in rural residential and open space developments throughout the city.

### **Emergency Medical Service**

The city's primary responder to medical emergencies is the Lakeview Hospital paramedic team.

### **PRIVATE UTILITIES**

All necessary utility services (natural gas, electricity, communications) are adequately sized to serve the AUAR area and currently located in or near the area. The primary utility providing electricity and natural gas to the AUAR area is Excel Energy. The primary telephone service provider is Qwest. Extension of

the utility lines to serve new development will be coordinated with the appropriate utility companies as required.

### **SCHOOL SYSTEM**

Based on current school district boundaries, students in the AUAR area would attend schools in the Stillwater Area Public Schools District #834. The District stretches 30 miles along the St. Croix River and covers approximately 150 sq miles. It serves 18 communities (13 cities and 5 townships) and has grown to 9,400 students. The District includes 10 elementary schools, 2 junior high schools, 1 high school and an Alternative Learning Center.

If attending school through the public school system, children from the AUAR area would attend Lake Elmo Elementary School (grades K-6), Oakland Junior High School (grades 7-9), and Stillwater Area High School (grades 10-12) in the Stillwater Area Public Schools District.

School District enrollment projections have been prepared for 2008-2012 and were presented by Assistant Superintendent Ray Queener November 29, 2007. The following information is taken from his presentation.

Enrollment projections consider housing trends, students attending elsewhere, and comparisons of past projections with actual enrollment. For 2007, projected enrollment as of October 1 was 8,887 students. Actual enrollment was 8,923 – 36 more students than projected and 80 more than projected in the budget model.

The housing market remains slow, locally and nationally. Between October 2006 and October 2007, 53% fewer homes were completed than had been estimated by builders. This housing trend, in addition to “overly optimistic” builder estimates, supports the District projection model’s use of a 50% reduction in new home estimates. The School District identified the attendance areas of Lake Elmo Elementary School and Oak-Land Junior High School as areas of significant growth potential. For the Lake Elmo Elementary attendance area, actual predicted housing starts (not reduced for market trends) are 276 new homes in 2008, 255 in 2009, 284 in 2010, 215 in 2011, and 134 in 2012, for a total of 1,164 new homes. However, the School District also indicated there are numerous developments in the Lake Elmo Elementary School attendance area with 30 or more lots left including City Walk (32 units and 34 affordable housing lots), Dancing Waters (347 lots), Farms of Lake Elmo (32 lots over 3 developments), Garden Gate (159 lots over 5 developments, including 10 affordable housing), Old Village (550 lots), Turnberry (42 lots), and Waters Edge (41 high density lots).

A total of 2,496 students, or 22% of total resident students, attend non School District 834 schools. Non School District 834 schools include charter, private, public, religious and home school. In the 2006-2007 school year, there was an increase of 113 students attending non School District 834 schools. In addition, the St Croix Preparatory Academy is seeking property to build a new school and they plan to add a grade level each year. St Ambrose increased enrollment by 100 students, 47 of whom came from within District 834 boundaries. Currently, 200 students from outside District 834 boundaries are enrolled in a District 834 school.

Assumptions of the enrollment projection model are:

- Single family = 0.75 students pr family
- High density = 0.30 students per family
- Affordable housing = 0.69 students per family

- Reduction of Builder's Estimate = 50%
- Percent of Builders Estimate = 50%

Table 28-5 depicts the number of students that could be expected from the AUAR area if each of the development scenarios were to progress to 100% build-out under the proposed development scenarios. The table also predicts the numbers that could be expected at 50% build-out. Note that actual development would be subject to market conditions and would likely be phased. Table 28-5 combines medium density with high density, based on direction by the School District and on the assumption that medium density would be multi-family townhomes and/or twinhomes. The development scenarios do not specifically address affordable housing.

**Table 28-5**  
**Student Population Projections**

<b>Development Scenario</b>	<b>Single Family Units (Number of students at 0.75 students/family)</b>	<b>Med-High Density Units (Number of students at 0.30 students/family)</b>	<b>Number of Students at 100% Build-out</b>	<b>Number of Students at 50% Build-out</b>
A	600 units (450 students)	0 units (0 students)	450 students	225 students
B	475 units (356 students)	525 units (158 students)	514 students	257 students
C	707 units (530 students)	893 units (268 students)	798 students	399 students
D	339 units (254 students)	567 units (170 students)	424 students	212 students

In addition to information obtained from the School District web site and the presentation, contacts were made to the School District office and the offices of Lake Elmo Elementary, Oak-Land Junior High and Stillwater Area High School. Table 28-6 presents the information that was provided.

**Table 28-6**  
**Schools serving the AUAR area**

<b>School</b>	<b>Student Capacity</b>	<b>Current Enrollment (2007)</b>	<b>Remaining Capacity</b>	<b>Projected Enrollment (2012)</b>	<b>Projected Remaining Capacity (2012)</b>	<b>Planned Expansion or New Construction</b>
Lake Elmo Elementary School	700	708	-8	664	36	None currently planned
Oak-Land Junior High School	1025	1016	9	993	32	None currently planned
Stillwater Area High School	2,400	2,206	193	2,075	325	None currently planned

School District enrollment projections for 2008-2012 predict a decline in enrollment for each of the next five years assuming housing starts remain at 50% of capacity. Developments continue to have significant capacity and slower build-outs. Given this trend, it is not anticipated that issues regarding school capacity are imminent. However, the School District will continue to monitor the situation and plans to re-examine the issue of building needs again in the 2008-2009 school year.

In general, boundaries for attendance at particular schools are adjusted periodically based on growth in the communities served by a school district, as well as school capacities and enrollment. Another option for school districts to manage enrollment is with open enrollment programs. In times when enrollment is nearing capacity for a particular school, the open enrollment option can be suspended. The School District 834 has assumed growth in the general AUAR area and has accounted for it in its enrollment projections.

29. Cumulative Potential Effects. Minnesota Rule part 4410.1700, subpart 7, item B requires that the RGU consider the "cumulative potential effects of related or anticipated future projects" when determining the need for an environmental impact statement. Identify any past, present or reasonably foreseeable future projects that may interact with the project described in this EAW in such a way as to cause cumulative impacts (Such future projects would be those that are actually planned or for which a basis of expectation has been laid). Describe the nature of the cumulative potential effects and summarize any other available information relevant to determining whether there is potential for significant environmental effects due to cumulative effects (or discuss each cumulative potential effect under appropriate item(s) elsewhere on this form).

*AUAR Guidelines: Because the AUAR process by its nature is intended to deal with cumulative potential effects from all future developments within the AUAR area, it is presumed that the responses to all items on the EAW form automatically encompass the impacts from all anticipated developments within the AUAR area.*

*However, the total impact on the environment with respect to any of the items on the EAW form may also be influenced by past, present, and reasonably foreseeable future projects outside of the AUAR area. The cumulative potential effect descriptions may be provided as part of the responses to other appropriate EAW items, or in response to this item.*

Cumulative potential effects within the AUAR area are addressed in each AUAR Item as indicated in the AUAR guidance above. It is necessary to "look" beyond the AUAR boundaries to address cumulative impacts within the AUAR. For example, the traffic analysis takes into account background traffic growth on area roadways that is not associated with development in the AUAR area. Likewise, watershed boundaries do not coincide with the AUAR boundary and the surface water analysis was not limited to the AUAR area.

The Village AUAR area is currently surrounded by a variety of land uses and there are no plans for developing areas adjacent to the Village in Lake Elmo. Therefore, no "reasonably foreseeable future projects" are being analyzed as part of this AUAR. In addition to the Village, the Comprehensive Plan established that areas south of 10<sup>th</sup> street would also accommodate sewered development. Developing areas south of 10<sup>th</sup> Street are the only "reasonably foreseeable future project" considered in response to AUAR Items. Both AUAR Items 13, Water Use, and 18, Wastewater, discuss infrastructure planning within the context of addressing the entire city. Cumulative impacts of developing the Village and South of 10<sup>th</sup> Street will be fully address when the city updates its Comprehensive Plan in 2009.

The Lake Elmo Airport is located adjacent to the AUAR area in Baytown Township. The Metropolitan Airports Commission (MAC) approved a Long Term Comprehensive Plan for the airport on October 22, 2008. The preferred alternative for airport expansion is considered a "reasonably foreseeable future project" that is discussed in this AUAR. The preferred alternative for expanding the airport is to extend the crosswinds runway from 2,497 feet to 3,200 feet and add 56 hanger spaces. The planned expansion does not change the safety zones for the airport within the AUAR area as the existing and proposed crosswinds runway safety zones are not located within the AUAR area. This AUAR discusses the safety zones and potential land use compatibility issues in response to Item 9 – Land Use. The predicted noise contours/impact area is anticipated to increase with the expansion project. Airport noise impacts are

discussed in response to AUAR Item 24 – Odors, Dust, and Noise Impacts. To minimize land use compatibility issues with the airport, the city will work with a Joint Airport Zoning Board to prepare an airport zoning ordinance prior to new development occurring within or near the safety zones and updated noise contours. The Joint Airport Zoning Board will be comprised of two representatives each from the City of Lake Elmo, Baytown and West Lakeland Townships, Washington County, and MAC. Areas adjacent to the AUAR area that are currently served by individual or community sewage treatment systems may desire to hookup to the sanitary sewer system at some point in the future. Considerations for these future hookups should be addressed in the city's Comprehensive Plan update.

30. Other Potential Environmental Impacts. If the project may cause any adverse environmental impacts which were not addressed by items 1 to 28, identify them here, along with any proposed mitigation.

*AUAR Guidelines: If applicable, this item should be answered as requested by the EAW form.*

31. Summary Of Issues (This section need not be completed if the EAW is being done for EIS scoping; instead, address relevant issues in the draft Scoping Decision document which must accompany the EAW.) List any impacts and issues identified above that may require further investigation before the project is commenced. Discuss any alternatives or mitigative measures that have been or may be considered for these impacts and issues, including those that have been or may be ordered as permit conditions.

*AUAR Guidelines: The RGU may answer this question as asked by the form, or instead may choose to provide an Executive Summary to the document that basically covers the same information. Either way, the major emphasis should be on potentially significant impacts, the differences in impacts between major development scenarios, and the proposed mitigation.*

An Executive Summary is provided at the beginning of this document

# Lake Elmo Village Area AUAR Final Mitigation Plan

*AUAR Guidelines: The draft and final AUAR document must include an explicit mitigation plan. It must be understood that the mitigation plan in the final document takes on the nature of a commitment by the RGU to prevent potentially significant impacts from occurring from specific projects. It is more than just a list of ways to reduce impacts -- it must include information about how the mitigation will be applied and assurance that it will. Otherwise, the AUAR may not be adequate and/or specific projects may lose their exemption from individual review. The RGU's final action on the AUAR must specifically adopt the mitigation plan; therefore, the plan has a "political" as well as a technical dimension.*

## **INTRODUCTION**

This Mitigation Plan is submitted as part of the Final AUAR to provide reviewers, regulators and prospective tenants or purchasers of land with an understanding of the actions necessary to protect the environment and limit potential impacts by future development projects. The potential impacts and mitigation strategies included in the Mitigation Plan were revised and expanded upon to address AUAR comments received.

This Mitigation Plan is intended to satisfy the AUAR rules that require the preparation of a "mitigation plan" that specifies measures or procedures that will be used to avoid, minimize, rectify, reduce, eliminate, or compensate for potential impacts of future development within the AUAR area<sup>1</sup>. Although mitigation strategies are discussed throughout the AUAR document, this Mitigation Plan will be formally adopted by the RGU as their action plan to avoid, minimize or prevent potentially significant environmental impacts.

The Lake Elmo City Council adopted the Final AUAR and Mitigation Plan on May 5, 2009. In accordance with Mn Rules, after the City Council adopts the Final AUAR and Mitigation Plan, future residential and commercial projects and associated infrastructure within the AUAR area that are consistent with the assumptions of the Final AUAR and that comply with the Mitigation Plan are exempt from further environmental review (i.e., EAW, EIS, AUAR).

The primary mechanism for mitigation of environmental impacts is the effective use of ordinances, rules, and regulations. Development will not be allowed to occur within the AUAR area until relevant plans and regulations have been updated to incorporate the recommendations outlined in this Mitigation Plan. A Mitigation Plan implementation summary table is provided to assist the city in carrying out these recommendations. The city is in the process of preparing a "Development Manual" that will contain the city's standards for development. The plan does not modify the responsibilities of regulatory agencies for implementing their respective regulatory programs, nor does it create additional regulatory requirements for agencies. The Mitigation Plan specifies the legal and institutional arrangements that will assure that the adopted mitigation measures are implemented.

The Mitigation Plan is organized by the AUAR Item numbers. Consistent with the EQB's AUAR Guidelines, each item lists the potential impacts and mitigation strategies (with additional discussion of mitigation strategies when appropriate), how mitigation will be applied and assured, and potential involvement of agencies. Table 8-1 from Item 8, Permits and Approvals Required, is included and will be adopted as part of the Mitigation Plan. In addition to the permits and approvals presented in the table, mitigation measures are presented for Items 9, 11-19, 21, 24-25, 27, and 28. The preparers of the AUAR determined that other AUAR Items did not represent significant environmental impacts that required mitigation measures that go beyond existing ordinance and regulatory requirements; or that the necessary mitigation measures were

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<sup>1</sup> Definition of **mitigation** from EQB rules (Mn Rules Chapter 4410.0200 Subp. 51) "Mitigation" means: (A) avoiding impacts altogether by not undertaking a certain project or parts of a project; (B) minimizing impacts by limiting the degree of magnitude of a project; (C) rectifying impacts by repairing, rehabilitating, or restoring the affected environment; (D) reducing or eliminating impacts over time by preservation and maintenance operations during the life of the project; (E) compensating for impacts by replacing or providing substitute resources or environments; or (F) reducing or avoiding impacts by implementation of pollution prevention measures.

presented under a different AUAR Item. If the mitigation strategies vary amongst the scenarios, then the strategy notes the applicable scenario. If a specific scenario is not identified, then the strategy applies to all scenarios.

## **ITEM 9. LAND USE**

### **Potential Impacts**

- Certain types of proposed land use (e.g., residential, commercial, institutional) may not be compatible with existing residential development within and adjacent to the Village.
- Certain types of land use may not be compatible with the adjacent Lake Elmo Airport safety zones.
- Contamination may impact the types of land uses that would be appropriate in certain areas.
- Construction and other development activities may encounter contamination associated with current or past land use (such as a gas station with underground storage tanks) or from material releases that may have occurred.
- Redevelopment activities may require the removal or abandonment of petroleum systems.

### **Mitigation Strategies**

The City will:

- 9.1 Follow the Village Master Plan guiding principles that address potential land use compatibility issues between the existing Village residences and business and the new development or redevelopment opportunities supported by the Master Plan composite land use map. These principles should continue to be followed as Village development planning continues (e.g., Comprehensive Plan, zoning, site plan requirements, design standards, etc.).
- 9.2 Review and update its official controls (e.g., zoning and subdivision ordinances) to ensure that the following requirements are adequate to address the potential land use compatibility issues identified in the AUAR including, but not limited to: building setbacks, screening, landscaping, noise, lighting, buffers, height, architectural controls, and design standards.
- 9.3 Require the establishment of buffers consisting of berms and/or trees and shrubs to shield residential and rural areas from more intensive land uses of commercial retail, office, institutional, and airport properties and between different types of residential uses (e.g., single family, townhomes, and condos).
- 9.4 Prepare an airport zoning ordinance prior to new development occurring within the vicinity of the safety zones and noise contours/impact areas. This ordinance will be prepared by a Joint Airport Zoning Board consisting of two representatives each of Lake Elmo, Baytown and West Lakeland Townships, Washington County, and MAC. Follow these land use restrictions for the airport safety zones and noise contours established by the Joint Airport Zoning Board for development proposed to be located within the safety zones and noise contours.
- 9.5 Prohibit development within the Runway Protection Zone (RPZ).
- 9.6 Develop an ordinance regarding structural performance standards for residential properties to reduce the potential for noise impacts.
- 9.7 Prohibit the establishment of waterfowl habitat located within the airport safety zones and discourage the creation of hazardous wildlife attractants within 5,000 feet of the Lake Elmo Airport (e.g., large stormwater ponds with mown grass edges). Any ponds or created wetlands that contain open water should be designed with emergent vegetation to minimize use by waterfowl. Stormwater management facilities located within the airport safety zones should utilize infiltration BMPs to manage stormwater.

- 9.8 Require developers to assess the potential presence of environmental hazards due to past site use prior to development activities. At the time specific development is proposed, a Phase I ESA and possibly follow-up subsurface investigation may be warranted to determine if contamination is present. If contamination is discovered prior to or during the course of development, the developer or other responsible party will be required to address the situation in accordance with MPCA rules.
- 9.9 Work with the MPCA to ensure the removal of all above ground or underground storage tanks and associated underground piping in accordance with applicable state and federal laws.
- 9.10 Work with the MPCA and developers to ensure that any party that may discover residual petroleum contamination shall follow state law and report the information to the MPCA for further investigation and potential remediation.

**How Mitigation will be Applied and Assured**

Mitigation will be regulated through the city’s development approval and permitting process. Proposed master development plans, planned unit development and subdivision applications, plats, and/or site plans must address relevant mitigation measures prior to final approval by the city. Implementation of mitigation measures will be assured through developer agreements with the city, which will require a financial security for land and infrastructure improvements and/or revoke the right to acquire building permits until all relevant mitigation measures have been addressed.

**Involvement by Other Agencies**

Metropolitan Council review is required for any Comprehensive Plan updates or amendment that will address land use changes for the AUAR area. According to MAC, the airport ordinance will be prepared by a Joint Airport Zoning Board comprised of two representatives each from Lake Elmo, Baytown Township, West Lakeland Township, Washington County, and MAC. The FAA has developed guidelines for potential wildlife attracting sources that lie within the vicinity of airports. FAA Advisory Circular 150/5200-33B is on file at City Hall. The city will consult with MAC and will refer to the FAA guidelines prior to approving activities that could result in establishing wildlife habitat considered hazardous to airports. If contamination is discovered during development, it must be reported to the State Duty Officer, and follow-up work must be coordinated with the Minnesota Pollution Control Agency.

**ITEM 11. FISH, WILDLIFE, ECOLOGICALLY SENSITIVE RESOURCES**

**Potential Impacts**

- All scenarios propose to convert natural and semi-natural land cover types (forests, woodlands, and herbaceous areas) to urban uses (see Figure 10-1). The majority of these areas are located adjacent to Reid Park.
  - Scenarios A, B, and C result in a loss of 63 acres of forest (a 52% reduction from existing conditions) 18 acres of woodlands (a 77% reduction), and 24 acres of herbaceous areas (a 25% reduction). The amount of potential land cover conversion is the same for Scenarios A, B, and C as they include the same protection area.
  - Scenario D results in a loss of 61 acres of forest (a 51% reduction from existing conditions) 16 acres of woodlands (a 70% reduction), and 23 acres of herbaceous areas (a 23% reduction).
- All scenarios propose to convert prime farmland to urban uses.
- All scenarios propose to impact ecologically sensitive resources (see Figure 11-3). The majority of these areas are located adjacent to Reid Park.
- All scenarios may impact the use of property as wildlife habitat. Development will likely affect wildlife species of agricultural and old field habitats more so than forest/wooded and wetland

habitats because the majority of development will occur on open uplands and wetlands are protected by various federal, state, and local regulations (see Figures 10-2 and 10-3). However, forest/woodland habitats adjacent to Reid Park are proposed for development in all four scenarios.

### **Mitigation Strategies**

The City will:

- 11.1. Revisit the location of the Buffer Zone/Opens Space (Scenarios A, B, and C) or the Greenbelt (Scenario D) to consider the inclusion of primary ecologically sensitive resources (e.g., primary areas adjacent to Reid Park). This may be compensated by considering the removal of non-ecologically sensitive resources that have been identified for open space. Any modifications to the buffer will also need to address mitigating land use compatibility issues discussed in AUAR Item 9.
- 11.2. Require developers to focus development to areas with lower habitat value areas (agricultural land).
- 11.3. Work with property owners and developers to keep remnant natural areas intact.
- 11.4. Promote the establishment of corridors to connect wildlife habitat on and off site. These corridors can be created as multi-functional greenway corridors that provide for wildlife movement, open space, trails, and areas for surface water management (e.g., infiltration BMPs).
- 11.5. Work with property owners and developers to enhance natural areas on site (through activities such as invasive brush removal, native wildflower seeding, and similar)
- 11.6. Encourage property owners and developers to restore hydrology and vegetation of wetlands that are currently farmed for habitat or stormwater management, where appropriate.
- 11.7. Work with property owners and developers to protect steep slope areas.
- 11.8. Require public land dedication of primary ecologically sensitive areas through the subdivision process, to the extent practical.
- 11.9. Require that cash in lieu of public land dedication for subdivisions within the AUAR area be spent within the AUAR area to purchase, restore, and/or maintain priority natural open space areas. This must be balanced with the park needs of the Village discussed in AUAR Item 25.
- 11.10. Consider provisions for conserving secondary ecologically sensitive areas (see Figure 11-3) during the development review process.
- 11.11. Work with agencies, non-profit organizations and developers to establish mechanisms for ecological restoration, management, stewardship, and education.
- 11.12. Work with property owners and developers to encourage farmers markets and community gardens that can provide local access to food systems.
- 11.13. Create a tree/woodland preservation policy. This policy will require the evaluation of tree/woodland quality.
- 11.14. Require the use of conservation development design and/or Low Impact Development (LID) principles and that neighborhood development and buildings incorporate Leadership in Energy Efficiency and Design (LEED) principles, or their equivalent (i.e., Minnesota Green Communities, B3, etc.).

## *Additional Discussion of Mitigation Strategies*

### **Conservation of Ecologically Sensitive Areas (ESA) throughout the AUAR Area**

Ecologically Sensitive Areas (ESA, see Figure 11-3) provide the foundation for most of the conservation objectives within the AUAR area. The overall conservation objectives include:

- Conserving the most significant primary ecologically sensitive areas within the Village;
- Protect these conserved ecologically sensitive areas from adjacent land uses by implementing buffering; and
- Connect ecologically significant natural resources via multi-functional greenway corridors.

The AUAR area will be developed in phases over the course of many years. Likewise, the conservation of ecologically sensitive resources will need to be phased in as development occurs. This can be accomplished only through a cooperative partnership between private land owners, developers, and the City. Through the AUAR process, the City has made its conceptual conservation objectives known. Conservation implementation will occur over time through future plans and policy decisions by the City (e.g., land use plans, parks and open space plans, park and open space dedication requirements, zoning ordinance requirements, etc.). Conservation objectives for the Village will be set forth in future plans and ordinances and implementation of these objectives will largely take place through the development review process.

### Buffers

Buffers are a valuable conservation tool. Ecological restoration and management of buffer areas can mitigate potential impacts to conserved ESAs. Long-term protection of buffer areas can be achieved through a variety of methods, including conservation easements, deed restrictions, and restrictive covenants. Establishing the buffer and open space areas in the Village, including the location, size, and configuration of such areas, will be considered during the Village development process through comprehensive planning, zoning ordinance updates, and site design.

The establishment of buffer areas should consider:

- Allowing performance-based buffers that may include minimum and/or average widths;
- The quality of the habitat and the habitat needs of targeted wildlife groups;
- Compensating for impacts to ESAs; and
- Providing for restoration and management of buffer areas.

Every project can and must incorporate conservation development design and/or Low Impact Development (LID) techniques. The extent to which buffer systems can be created, and the specifics of each buffer, will be determined on a case by case basis. For example, a 100-foot buffer may be feasible on a large development site; however, such a buffer may constitute a large percentage of a smaller development site as to make the project economically unfeasible. In such cases, a 100-foot buffer may be unreasonable. Every development site will be examined for the potential for appropriate, feasible buffering of sensitive areas.

### Multifunctional Greenway Corridors

Multifunctional greenway corridors are also integral to the effectiveness of the City's conservation objectives. Greenway corridors have been identified in both the Village Master Plan and the City's Parks and Recreation System Plan. These corridors are conceptual; it is likely that their location and alignment will change as individual properties are developed. However, appropriate location, design, establishment, linkage and management of these greenway connections is critical to ensuring that the mitigation goals are fully met as development proceeds in the AUAR area.

These greenways can provide ecological and wildlife habitat corridors, regional stormwater collection and conveyance, and passive recreational opportunities for people. Determining the location of multifunctional greenway corridors requires the integration of locational information from the following:

- Existing utility easements for stormwater management, including existing ditch and drainage systems, major underground conveyance systems, and existing stormwater management ponds;
- Existing trail easements and proposed trail corridors and linkages proposed in the City's Park and Recreation System Plan and the Village Master Plan;
- Location of conservation easements and protected areas that can be part of a multifunctional greenway corridor without acquiring an interest in the land;
- Analysis of an individual development site using conservation design and LID principles. Where there is convergence of the following features in a development site, there is an opportunity to establish a multifunctional greenway corridor. These features include:
  - the location of existing drainageways and wetlands;
  - depressional areas that are suitable for conveying and storing stormwater runoff;
  - steep slopes that may become unstable and susceptible to erosion due to development; and
  - existing ESAs shown on Figure 11-3

Opportunities to establish multifunctional greenway corridors exist at locations where these elements co-occur, or are adjacent or near to each other. In addition, land that lies between these elements present opportunities to create linkages. Individual developments should consider the context surrounding them in order to identify whether multifunctional greenway corridors can or do exist within the development and/or extend off-site to adjacent lands. As the development of the AUAR area proceeds, the City will refine potential multifunctional greenway corridors through discussions with developers as a way to implement conservation objections.

The specific design criteria of the multifunctional greenway corridors will vary, depending on the nature of the particular corridor. Certain greenway corridors may warrant design for specific wildlife species, may provide certain stormwater management opportunities, or may need to accommodate different types of trails or passive recreational uses. Design considerations may include corridor width, appropriate vegetation structure, human access and use, and whether or not it is appropriate for a corridor to cross a particular type of roadway.

Ecological restoration and management of the multifunctional greenway corridors will provide conservation benefits. Long-term protection of multifunctional greenway corridors can be achieved through a variety of methods, including conservation easements, deed restrictions, and restrictive covenants.

Habitat fragmentation will be minimized during development of the AUAR area through adherence to conserving ESAs and other mitigation strategies in this document. Wildlife habitat quality and natural plant community integrity would be improved through ecological restoration and management planning and implementation. These activities should be implemented to the extent practical in all open space areas, focusing first on the larger blocks of higher quality habitat. New developments represent opportunities to plan and carry out ecological restoration and management. Ecological restoration, enhancement, and/or expansion will help mitigate potential impacts on wildlife, rare features, and from stormwater, and if these activities are planned, scheduled, and carried out at the recommended broad scale, will likely result in a net increase in conservation and ecological benefits within the AUAR area compared with existing conditions.

### **Implementing Conservation Objectives within a Proposed Development Project Site**

To achieve the city's conservation objectives, the City will require future project proposers to do two things simultaneously:

- 1) plan for ecological stormwater management (e.g. infiltration BMPs) and natural resource conservation within the development project site, and
- 2) provide land, finances, and/or construction activities to implement this mitigation plan.

Within a proposed development project site, tools to help achieve the conservation objectives include:

- Conservation development design and LID techniques
- Clustering/density transfers within a project site
- Park dedication and other gifts
- Conservation easements, deed restrictions, and protective covenants
- Management planning, stewardship funding, and ecological education programs

Conservation development design and/or LID principles will be required of new developments with an emphasis on ecological stormwater management (e.g., infiltration BMPs) and natural resource conservation. The city will require neighborhood development and buildings to incorporate Leadership in Energy Efficiency and Design (LEED) principles, or their equivalent (i.e., Minnesota GreenStar, B3, etc.).

Density transfers within a specific development site can help achieve natural resource conservation through clustering of development in appropriate areas. Land protection will be required through park dedication and/or conservation easements to ensure long term protection of ESAs. Within a specific development project, a stormwater utility easement will be placed on the elements of the regional stormwater management system.

A management plan and funding source will be required to ensure long-term perpetuation of the conserved or restored resources and in the ecological stormwater management system. Ecological education, provided by the city or developer, may be required for a specific development project (e.g., educational pamphlets, signage, Home Owner Association workshops, etc.).

#### **How Mitigation will be Applied and Assured**

Mitigation will be regulated through the city's development approval and permitting process. Proposed master development plans, planned unit development and subdivision applications, plats, and/or site plans must address relevant mitigation measures prior to final approval by the city. Implementation of mitigation measures will be assured through developer agreements with the city, which will require a financial security for land and infrastructure improvements and/or revoke the right to acquire building permits until all relevant mitigation measures have been addressed.

#### **Involvement by Other Agencies, if applicable**

Non-profit conservation organizations such as the Minnesota Land Trust, the Trust for Public Lands, or The Conservation Fund could potentially hold conservation easements, or hold joint conservation easements with the city and ensure compliance through annual field inspections.

### **ITEM 12. WATER RESOURCES: WETLANDS**

#### **Potential Impacts**

- The exact location of wetlands has not been delineated throughout the AUAR area. All four scenarios propose to preserve the majority of the areas containing known wetlands within open space. However, developers may propose to impact existing wetlands .
- Wetlands may be incorporated into the stormwater management system; however, prior to discharge to any wetland within the AUAR area compliance with WCA, MPCA NPDES, and VBWD requirements for bounce, inundation and runout control are required.
- None of the four development scenarios propose direct impacts to DNR public waters.

## Mitigation Strategies

The City will:

- 12.1 Work the property owners, developers, and VBWD to achieve the goal of no wetland impacts.
- 12.2 Work with VBWD to require that wetlands be delineated in accordance with the Corps of Engineers Wetlands Delineation Manual and classified according to Wetlands of the United States (Circular 39) and Wetlands and Deepwater Habitats of the United States.
- 12.3 Require developers to apply for applicable wetland permits to obtain authorization for wetland alterations under WCA and Section 404 prior to project construction if development activities will impact a jurisdictional wetland.
- 12.4 Work with VBWD to mitigate areas of wetland impacts according to the requirements of the Wetland Conservation Act and VBWD rules. A sequencing analysis (following these principles in descending order: avoiding, minimizing, rectifying, reducing, and replacing the wetland) is required for any proposed wetland impact.
- 12.5 Require developers to submit wetland permit applications and replacement plans, as appropriate, to the Minnesota Board of Water and Soil Resources, Valley Branch Watershed District, and the City of Lake Elmo.
- 12.6 Require developers to follow the VBWD requirements for wetland alterations.
- 12.7 Work with property owners and developers to preserve as many wetlands as feasible.
- 12.8 Work with developers to avoid totally filling wetlands.
- 12.9 Use VBWD wetland function and value assessment and classification system to evaluate and minimize potential wetland impacts.
- 12.10 Work with VBWD and developers to avoid or minimize indirect impacts on wetlands by:
  - Protecting wetland recharge areas, where feasible.
  - Maintaining drainage area for wetlands.
  - Promoting infiltration and/or filtration of surface runoff prior to reaching wetlands.
  - Establishing and maintaining buffers of native vegetation that meet or exceed the WCA, VBWD, or city standards.

### How Mitigation will be Applied and Assured

Individual projects within the AUAR area that propose altering a jurisdictional wetland will be required to follow the sequencing process of wetland avoidance, minimization, rectification, and mitigation as outlined in the *Wetlands Conservation Act* (WCA) if wetlands are altered. Wetland permit applications will need to be prepared and submitted by the developer/landowner to the appropriate regulatory agencies to obtain authorization for wetland alterations under the WCA prior to project construction. The typical replacement ratio is 2.5:1. According to the Wetland Conservation Act, if impacts cannot be avoided, the impacted wetland must be replaced at a 2:1 minimum ratio if the replacement wetland is created in advance of the impact and the replacement wetland is of the same type as the impacted wetland. The minimum replacement ratio goes up to 2.5:1 for impacts when the replacement wetland is not constructed in advance of the impact and when the replacement wetland is of a different type of wetland than the impacted wetland. Detailed wetland alteration and replacement plans are not yet available for developments within the AUAR area. Wetland replacement will be designed to expand upon existing on-site wetlands.

Wetland mitigation is regulated by VBWD and will be further assured through the city's development approval and permitting process. Proposed master development plans, planned unit development and subdivision applications, plats, and/or site plans must address relevant mitigation measures prior to final approval by the city. Implementation of mitigation measures will be assured through developer agreements with the city, which will require a financial security for land and infrastructure improvements and/or revoke the right to acquire building permits until all relevant mitigation measures have been addressed.

### **Involvement by Other Agencies**

The VBWD, as the Local Governmental Unit, will continue to administer the Wetland Conservation Act (WCA) on behalf of the City with opportunities for review and comment by members of the WCA Technical Evaluation Panel (TEP), the Army Corps of Engineers, and other state and federal agencies. Any fill of a public water or wetland will involve appropriate governmental jurisdiction including VBWD and DNR.

## **ITEM 13. WATER USE**

### **Potential Impacts**

- The future increase in population, households, and jobs impacts the City's current water supply system as the existing system does not have sufficient capacity to serve existing or projected growth.
- The existing water supply system lacks "firm" well capacity
- The existing Village water distribution system lacks good hydraulic transmission capability and redundancy due to the watermain size and lack of looping.
- The existing Village water system is currently split between two pressure service areas, which may result in problems (for example if Well No. 2 is lost due to maintenance or failure). In that situation, it is possible that Well No. 1 may not have enough head (pressure) capacity to adequately fill the new elevated water tank to an acceptable level. This will present two potential problems to the water system - reduced pressures during the outage and potential loss of fire storage for the duration of the outage.
- Abandoned private water wells are a potential conduit for groundwater pollution

### **Mitigation Strategies**

The City will:

- 13.1 Provide additional "firm" well capacity as soon as feasible to support the existing population, and before allowing any significant expansion of the water system to occur.
- 13.2 Evaluate emergency water supply sources in its forthcoming Comprehensive Water System Plan update.
- 13.3 Monitor water usage and not permit new development to proceed if it exceeds the capacity of the water supply and distribution system.
- 13.4 Construct the water supply and distribution system in accordance with Minnesota Department of Health standards and with the goals, policies, and recommendations set forth in the City's Comprehensive Water System Plan.
- 13.5 Add a well to accommodate Scenarios B, C, or D. Final determinations on the need for new wells to serve development will occur after the city selects a development scenario for the Village after the AUAR and financial analysis is completed.
- 13.6 Locate wells in appropriate areas identified in the ground-water modeling and well siting study.

- 13.7 Construct watermains in the Village Area in accordance with the Comprehensive Water System Plan that is being updated for the entire city. The water distribution system needed for new development, once constructed, should correct the deficiencies and weaknesses of the existing system (i.e. provide looping to create a more reliable source supply, increased capacity for better fire protection, provide better circulation of water).
- 13.8 Implement regular inspection and maintenance schedules for water supply facilities to ensure a reliable public water supply. In the near future, perform routine inspection, maintenance, and repair if needed for Well No. 2 well pumps.
- 13.9 As necessary, amend the city's Comprehensive Water System Plan and Capital Improvement Plan to be consistent with future amendments or updates to the Comprehensive Plan that would necessitate expansions or alterations to the water system. Water supply needs must be evaluated for the system as a whole, not just a small part of the system (e.g., the Village Area). Growth elsewhere in the system could trigger much larger supply needs. When the updated Comprehensive Water System Plan is complete, it should address the supply and storage needs for the system as a whole, as well as provide a plan for the sizing and location of the distribution system components.
- 13.10 Prepare a Wellhead Protection Plan amendment for new wells and follow the adopted wellhead protection plans for Lake Elmo and adjoining communities.
- 13.11 Require abandoned private wells to be sealed in compliance with the Minnesota Department of Health regulations
- 13.12 Require that the installation of any private individual wells be constructed and installed in accordance with the Minnesota Department of Health regulations (Minnesota Well Code).
- 13.13 Develop and implement water conservation policies which are intended to attenuate peak water demands throughout the City.

#### **How Mitigation will be Applied and Assured**

Development of the future water supply infrastructure will be designed in accordance with the recommendations set forth in the City of Lake Elmo's Comprehensive Water System Plan update. Installation of municipal water supply wells will be constructed in accordance with Minnesota Department of Health regulations (Minnesota Well Code) to ensure the water supply system meets federal and state public drinking water standards. The city will follow the Minnesota Department of Health's wellhead protection planning process, which involves:

- Delineating the wellhead protection area and drinking water supply management area;
- Assessing the vulnerability of the well; and
- Creation of a Wellhead Protection Plan including goals, objectives, plan of action, evaluation program, and contingency plan.

The Minnesota Department of Health (MDH) also requires the city to submit a preliminary wellhead protection area delineation and an assessment of land uses associated with the proposed protection area with their construction plan for approval. The city will coordinate with the MDH to ensure that a new water supply system meets all applicable regulations.

Mitigation will be regulated through the city's development approval and permitting process. Proposed master development plans, planned unit development and subdivision applications, plats, and/or site plans must address relevant mitigation measures prior to final approval by the city. Implementation of mitigation measures will be assured through developer agreements with the city, which will require a financial security

for land and infrastructure improvements and/or revoke the right to acquire building permits until all relevant mitigation measures have been addressed.

### **Involvement by Other Agencies**

Amendments to the City's Water Supply and Distribution Plan will be reviewed by the Metropolitan Council and reviewed and approved by the Department of Health. The Department of Health also reviews and approves Wellhead Protection Plan amendments and consults with the Department of Agriculture, Department of Natural Resources, and Minnesota Pollution Control Agency before approving the plans. In addition, the public water supplier must submit the Wellhead Protection Plan amendments to local units of government wholly or partially within the wellhead protection area and the Metropolitan Council for review and comment.

## **ITEM 14. WATER-RELATED LAND USE MANAGEMENT DISTRICTS**

### **Potential Impacts**

- The City's floodplain ordinance is not consistent with the draft floodplain update maps prepared by VBWD and FEMA.
- Development may impact floodplain areas.
- The City's shoreland ordinance does not address sewered residential development. Scenarios A, B, and C propose development in non-riparian shoreland areas.

### **Mitigation Strategies**

The City will:

- 14.1 Update its floodplain ordinance to achieve consistency with updated floodplain mapping.
- 14.2 Require that any development proposed in an area designated as floodplain comply with City, VBWD and/or FEMA floodplain regulations.
- 14.3 Update its shoreland ordinance to address sewered residential development in the event that sewered development is allowed within shoreland areas.

### **How Mitigation will be Applied and Assured**

The city will update its Floodplain and Shoreland District ordinances prior to allowing any development within the updated floodplain areas or any new sewered residential development in shoreland areas.

### **Involvement by Other Agencies**

Development within a floodplain area will require review and approval by the VBWD, the City, and potentially FEMA for compliance with floodplain regulations. Shoreland ordinance amendments must be reviewed and approved by the DNR.

## **ITEM 16. EROSION AND SEDIMENTATION**

### **Potential Impacts**

- Construction activities that involve moving soil and/or removing vegetative ground cover may cause erosion and sedimentation impacts, including sedimentation issues in downgradient streams, lakes, and wetlands.
- Inadequate erosion control could provide a vehicle for invasive plant species traveling with the sediment and compromise native habitats.

- Chemical pollutants including, but not limited to, nutrients, pesticides, and herbicides could travel with eroded sediment to downgradient streams, lakes, and wetlands.

### **Mitigation Strategies**

The City will:

- 16.1 Require project proposers to acquire NPDES/SDS General Stormwater Permit for Construction Activity from the MPCA prior to initiating earthwork.
- 16.2 Require project proposers to meet the erosion and sediment control regulations in all applicable regulations, ordinances and rules of the city, MPCA, and Valley Branch Watershed District.
- 16.3 Require project proposers to minimize runoff, improve the quality of runoff, and provide erosion control through BMPs and other low impact development techniques including:
  - Reduce impervious surfaces (e.g., use narrow roads, efficient road layout, permeable pavement);
  - Break up impervious surfaces to allow opportunities for infiltration;
  - Use ecological stormwater management techniques, such as vegetated swales, infiltration systems, and biofilter wetlands;
  - Provide energy dissipation and outfall stabilization; and
  - Establish and maintain vegetated buffers around aquatic resources.
  - Minimize exposed soils. Phase grading of the site.
  - Avoid compaction of soil disturbance in areas with high infiltration capacity soils.
  - Avoid grading and exposure of soils on steep slopes.
  - Divert construction site runoff away from proposed retention and infiltration BMPs.
  - Conduct regular inspections (in partnership with the VBWD) and enforce compliance with the NPDES permit
- 16.4 Provide construction oversight to ensure designed sediment and erosion control measures are being implemented.
- 16.5 Require preservation of natural buffers in steep slope areas around perimeter of AUAR area.
- 16.6 Encourage the use of rain water gardens on individual lots and parking lots.
- 16.7 Require use of larger bioswales for larger commercial parking lots.
- 16.8 Encourage incorporating subsurface flow wetland systems into overall development plans.

### **How Mitigation will be Applied and Assured**

Mitigation will be regulated through the city's development approval and permitting process. Proposed master development plans, planned unit development and subdivision applications, plats, and/or site plans must address relevant mitigation measures prior to final approval by the city. Implementation of mitigation measures will be assured through developer agreements with the city, which will require a financial security for land and infrastructure improvements and/or revoke the right to acquire building permits until all relevant mitigation measures have been addressed.

### **Involvement by Other Agencies, if applicable**

The MPCA must approve a NPDES/SDS General Stormwater Permit for Construction Activity permit application prior to initiating earthwork. The MPCA and VBWD have approved Best Management Practices (BMPs) that are appropriate for erosion and sedimentation control. VBWD reviews and approves Erosion and Sediment Control Plan.

**ITEM 17. WATER QUALITY: SURFACE WATER RUNOFF**

**Potential Impacts**

- Development may increase runoff rate and volume, and decrease the quality of runoff flowing into receiving waters, including Down’s Lake and the St. Croix River.
- Development may result in bank failure and erosion in streams and drainage ditches.
- Development may result in de-watering of streams and wetlands by limiting infiltration and groundwater recharge.
- Development may result in algal blooms, including toxic blue-green algae, due to high nutrient concentrations in stormwater runoff.
- Development may result in thermal pollution of water bodies as stormwater runoff may have relatively high temperatures after flowing over impervious surfaces.

**Mitigation Strategies**

The City will:

- 17.1 Continue to address stormwater runoff volume management, rate control, and water quality treatment measures for the entire city through its Surface Water Management Plan (SWMP) update in compliance with the pertinent agency regulations.. The city is in the process of updating its Surface Water Management Plan by May 29, 2009 as part of its required 2030 Comprehensive Plan update.
- 17.2 Complete ongoing maintenance of proposed and existing stormwater facilities.
- 17.3 Construct ponds 519 and 520 to alleviate existing downtown flooding issues and address rate control and potentially the volume management and water quality treatment goals for the AUAR area. The estimated size of the ponds for each scenario is shown in the following table. Implementing stormwater management techniques throughout the Village that decrease estimated stormwater volumes may reduce the estimated size of these ponds. Any ponds that contain open water should be designed with emergent vegetation to minimize use by waterfowl.

Scenario	Pond	Footprint at HWL (ac)	Flood Storage (ac-ft)
A	519	7.1	30.5
	520	24.7	59.1
B	519	7.1	30.5
	520	24.8	59.3
C	519	7.1	30.6
	520	24.8	59.6
D	519	7.0	28.4
	520	24.7	56.9

- 17.4 Conduct the “Discharge to Waters with Restricted Discharges Assessment” required by its MS4 permit to determine if there are feasible and prudent alternatives to the discharge, such as diversion from the St. Croix River watershed, infiltration, or other alternatives. The city is required to modify the city’s Storm Water Pollution Prevention Plan (SWPPP) to incorporate these findings and submit the SWPPP to the MPCA for approval.
- 17.5 Work with developers to provide runoff volume facilities adequate to not increase runoff volume from existing conditions as calculated by the VBWD simplified method for determining 100-year high water levels for landlocked basins. This requires approximately 15% of the area to be utilized for infiltration in order to mitigate for the runoff volume.

- 17.6 Work with developers to provide pretreatment upstream of volume management facilities.
- 17.7 Encourage utilization of volume management techniques to minimize the stormwater impacts by emphasizing water infiltration, valuing water as a resource and promoting the use of the natural drainage system to treat water runoff. Some examples include:
- Special ditches, arranged in a series, that soak up more water
  - Vegetated filter strips at the edges of paved surfaces
  - Residential or commercial rain gardens designed to capture and soak in stormwater
  - Porous pavers, concrete and asphalt
  - Decreased and disconnected impervious, narrower streets
  - Rain barrels and cisterns
  - Green roofs
  - Protection of natural areas
  - Minimizing soil compaction and/or mitigating compacted areas
  - Street trees that intercept rainfall, improve water quality, and facilitate stormwater infiltration/treatment
- 17.8 Complete the MPCA requirements for Outstanding Resource Value Waters by the end of 2009. Through this process, the City will determine the requirements necessary to meet this regulation

#### **How Mitigation will be Applied and Assured**

Mitigation will be regulated through the city's development approval and permitting process. Proposed master development plans, planned unit development and subdivision applications, plats, and/or site plans must address relevant mitigation measures prior to final approval by the city. Implementation of mitigation measures will be assured through developer agreements with the city, which will require a financial security for land and infrastructure improvements and/or revoke the right to acquire building permits until all relevant mitigation measures have been addressed.

#### **Involvement by Other Agencies, if applicable**

Proposed development projects within the AUAR area will need to submit development plans for approval by the City of Lake Elmo, the VBWD and for projects greater than 1 acre, the Minnesota Pollution Control Agency (MPCA). The VBWD has rules relating to stormwater management plans, erosion control plans, floodplain alteration, drainage systems, and other development activities. VBWD will require permit applicants to provide proof that: 1) the runoff volume difference between proposed and existing conditions is captured, 2) the proposed infiltration facility can infiltrate at the designed rate, and 3) the runoff volume can be infiltrated within 48 hours. The MPCA has rules in its General Construction Permit regarding stormwater management and erosion control. Compliance with MPCA ORVW, MS4 and TMDL requirements will be necessary prior to development. Other state laws and statutes may also apply to proposed projects, which may require involvement by additional agencies.

### **ITEM 18. WATER QUALITY: WASTEWATER**

#### **Potential Impacts**

- No municipal sanitary sewer system currently services the Village and future growth as planned in the adopted Comprehensive Plan (2005) and the accepted Village Master Plan will require connection to the MCES system and the establishment of City sanitary sewer facilities.

## **Mitigation Strategies**

The City will:

- 18.1 Construct the major infrastructure improvements needed to establish the wastewater system (i.e. lift station, forcemain, and trunk system) in accordance with the Comprehensive Sanitary Sewer Plan and Capital Improvement Plan.
- 18.2 Monitor wastewater flows and not permit new development to proceed if it exceeds the capacity of the wastewater system.
- 18.3 Size the proposed major lift station adequately to accommodate the flow from development within the AUAR area. The range of predicted flow is from 0.318 mgd to 0.591 mgd (or 1,165 to 2,164 RECs).
- 18.4 Size the proposed future trunk sanitary sewer adequately to accommodate the flow from the AUAR area.
- 18.5 Adequately phase capacity improvements.
- 18.6 Amend the Comprehensive Sanitary Sewer Plan and Capital Improvement Plan to be consistent with any amendments to the Comprehensive Plan that would necessitate expansions or alterations to the sanitary sewer system and regional capacity needs.

### **How Mitigation will be Applied and Assured**

These strategies together will provide assurance that the City's wastewater system is adequate to transport the wastewater to the regional collection system. The following discussion describes the process for achieving each mitigation strategy.

#### Monitor wastewater flows

- Lake Elmo has developed a staging plan as part of its Comprehensive Sanitary Sewer Plan. That staging plan is based upon a number of factors, including wastewater collection capacity. The city will adhere to this plan, as amended to guarantee that additional wastewater generation does not exceed the collection capacity.
- Each proposed development will be required to provide a detailed projection of wastewater generation and flows. These calculations will be checked by the City's Engineering Consultant.
- As development occurs, the City will monitor actual wastewater flows to compare actual flows with projected flows.
- If flows exceed projections, the city will phase development to assure that adequate infrastructure is available to serve development.
- The City will create a year-end report to evaluate wastewater increases by major sewer lines and overall system usage in relation to capacity. Results of this assessment will become the targets for growth for the following year.

#### Construct the major infrastructure improvements needed to expand the capacity of the wastewater system

- Lake Elmo will develop a capital improvement program for wastewater collection system. The Capital Improvement Program will be tied to the staging plan of the Comprehensive Sewer Plan, as amended.
- If actual flows exceed projections, the city can accelerate collection system expansions to address additional flows.

- Any expansion of the collection system would, if necessary, be coordinated with the Metropolitan Council Environmental Services.
- The City will require developers to construct the local wastewater collection system

Phasing of capacity improvements.

- Lake Elmo will strive to follow its staging plan by monitoring actual wastewater flows and by a combination of appropriately phasing development or expanding collection systems.
- The City will update its capital improvement plan for wastewater collection yearly based upon actual growth and actual wastewater generation.
- The City will require developers either to construct parts of the collection system or pay for improvements or expansions to the collection system, where appropriate.

Comprehensive Sanitary Sewer Plan Amendments

- Amendments to Lake Elmo Sanitary Sewer Plan will be based upon its Comprehensive Plan, which contains staging areas with timing and geographic limits.

**How Mitigation will be Applied and Assured**

Mitigation will be regulated through the city’s development approval and permitting process. Proposed master development plans, planned unit development and subdivision applications, plats, and/or site plans must address relevant mitigation measures prior to final approval by the city. Implementation of mitigation measures will be assured through developer agreements with the city, which will require a financial security for land and infrastructure improvements and/or revoke the right to acquire building permits until all relevant mitigation measures have been addressed.

**Involvement by Other Agencies**

Sanitary Sewer Plans and amendments must be submitted to the Metropolitan Council for review.

**ITEM 19. GEOLOGIC HAZARDS AND SOIL CONDITIONS**

**Potential Impacts**

- The presence of defined Special Well Construction Areas (SWCAs) delineated by the Minnesota Department of Health may restrict some development activities and prohibit certain types of infrastructure (such as wells) within the area.

**Mitigation Strategies**

The City will:

- 19.1 Require that developers adhere to restrictions or prohibitions mandated by the MDH within SWCAs.
- 19.2 Site any future wells in accordance with MDH restrictions and prohibitions and the city’s ground-water modeling and well siting study.

**How Mitigation will be Applied and Assured**

Mitigation will be regulated through the city’s development approval and permitting process. Proposed master development plans, planned unit development and subdivision applications, plats, and/or site plans must address relevant mitigation measures prior to final approval by the city. Implementation of mitigation measures will be assured through developer agreements with the city, which will require a financial security for land and infrastructure improvements and/or revoke the right to acquire building permits until all relevant mitigation measures have been addressed.

**Involvement by Other Agencies, if applicable**

The MDH will be consulted if needed regarding development within SWCAs. The locations of future City wells will require approval by the MDH; Water appropriations from future wells would require the City’s water appropriation permit from the DNR to be amended.

**ITEM 21. TRANSPORTATION**

**Potential Impacts**

- Regional background traffic is expected to increase and will interact cumulatively with Village development traffic. Current intersections and road capacities will not be adequate to prevent congestion related to background traffic growth.
- Future growth and expansion in the AUAR will increase traffic to/from the AUAR area. Current intersections and road capacities will not be adequate to prevent congestion related to Village development.
- Projected traffic levels could adversely impact alternative travel modes without reasonable accommodations (sidewalk/bicycle network, bus stops).

**Mitigation Strategies**

The City will:

- 21.1 Continue to work with the State and County to ensure appropriate roadway system improvements are made to satisfy expectations contained within this AUAR in light of actual future development projects. The predicted traffic levels may or may not occur; therefore, all of the predicted improvements may not be necessary to serve Village development (i.e., the growth rate of the metro area may slow due to economic conditions, less commercial use than analyzed may be built, etc.)

21.1.1 Roadway improvements to serve estimated 2030 Background Conditions (without Village development) are shown in the following table:

<b>Intersection</b>	<b>Description<sup>1</sup></b>
TH 5 and CSAH 15 (Manning Avenue)	<ul style="list-style-type: none"> <li>•Additional left-turn lane to create dual northbound left-turn lanes</li> <li>•Additional eastbound and westbound through lanes creating four-lane section.</li> <li>•Additional left-turn lane to create dual westbound left-turn lanes.</li> </ul>
TH 5 and 39 <sup>th</sup> Street	<ul style="list-style-type: none"> <li>•Additional eastbound and westbound through lanes resulting in four-lane section.</li> <li>•Additional eastbound left-turn lane.</li> </ul>
TH 5 and Laverne Avenue	<ul style="list-style-type: none"> <li>•Additional eastbound and westbound through lanes.</li> <li>•Additional eastbound and westbound left-turn lanes.</li> </ul>
TH 5 and CSAH 17 (Lake Elmo Avenue South)	<ul style="list-style-type: none"> <li>•Install new traffic signal.</li> <li>•Additional eastbound and westbound through lanes creating four-lane section.</li> </ul>
TH 5 and CSAH 17 (Lake Elmo Avenue North)	<ul style="list-style-type: none"> <li>•Install new traffic signal.</li> <li>•Additional eastbound and westbound through lanes resulting in four-lane section.</li> <li>•Additional eastbound exclusive left-turn lane</li> </ul>
CSAH 15 (Manning Avenue) and 30 <sup>th</sup> St	<ul style="list-style-type: none"> <li>•Install new traffic signal.</li> <li>•Additional eastbound and westbound exclusive left-turn lanes.</li> <li>•Additional northbound and eastbound exclusive left-turn lanes.</li> </ul>

<sup>1</sup> Refer to Figure 21-7 an for illustration of the recommended improvements.

21.1.2 Roadway improvements to serve estimated Village development for all scenarios is shown in the following table:

Intersection	Description
TH 5 and 39 <sup>th</sup> Street	<ul style="list-style-type: none"> <li>•Install new traffic signal.</li> <li>•Additional eastbound right-turn lane.</li> <li>•Additional westbound left-turn lane.</li> <li>•New northbound approach with one through-left and an exclusive right-turn lane.</li> </ul>
TH 5 and Laverne Ave	<ul style="list-style-type: none"> <li>•Addition northbound and southbound right-turn lanes.</li> </ul>
TH 5 and CSAH 17 (Lake Elmo Avenue South)	<ul style="list-style-type: none"> <li>•Additional westbound right-turn lane to match eastbound approach.</li> <li>•Additional eastbound left-turn lane to match westbound approach.</li> <li>•New southbound approach with single through-right and left-turn lanes.</li> </ul>
TH 5 and CSAH 17 (Lake Elmo Avenue North)	<ul style="list-style-type: none"> <li>•Additional eastbound right-turn lane to match westbound approach.</li> <li>•Additional westbound left-turn lane to match eastbound approach.</li> <li>•New northbound approach with single through-right and left-turn lanes.</li> </ul>
CSAH 17 (Lake Elmo Avenue North) and 39 <sup>th</sup> Street	<ul style="list-style-type: none"> <li>•New eastbound approach with single lane for all movements.</li> <li>•Additional northbound and southbound left-turn lanes.</li> </ul>

21.1.3 A summary of recommended roadway improvements are shown in the table on page 172 and are identical for all Scenarios.

- 21.2 Monitor traffic growth and require all new development to conduct a traffic impact analysis to determine how the roadways will be affected and if improvements to the area roadway network will be necessary. Improvements could include major segmental changes, traffic control changes, lane additions, lane widening, or other improvements.
- 21.3 Work with appropriate road authorities to mitigate the impact of the additional traffic on the regional system.
- 21.4 Prioritize alternative travel modes within the Village and require project proposers to address alternative travel modes (e.g., bus, bicycle, and pedestrian foot-traffic) by identifying appropriate and safe accommodations in developer’s site plans and in the city’s plans for trails and transit.
- 21.5 Address the recommendations of the Safe Routes to Schools Study currently underway, as appropriate, during the Village development process.
- 21.6 Consider the need for additional infrastructure improvements in future updates or amendments to the Comprehensive Plan and Village Master Plan. Submit the plan updates to the appropriate agencies (i.e., FHWA, Mn/DOT, Metropolitan Council, etc.).
- 21.7 Achieve effective traffic operations within the city by requiring that site plans make use of access management practices that promote safe, effective traffic flow.
- 21.8 Continue to coordinate capital improvement programming with applicable transportation authorities.
- 21.9 Work with appropriate road authorizes and developers to implement traffic calming measures, where appropriate, prior to or during development of a future project.
- 21.10 Work with MnDOT and the County to identify right-of-way needs for future expansion of the state and county road system.
- 21.11 Work to enhance the character of Stillwater Blvd. as a key community roadway.

Level of Service and Mitigation Summary																
Intersection	2030 Background (without Village Development)				2030 Cumulative with Scenario A			2030 Cumulative with Scenario B			2030 Cumulative with Scenario C			2030 Cumulative with Scenario D		
	EXISTING LOS (Critical movements)	LOS (Critical movements)	Recommended Improvements	Recommended Mitigation	LOS (Critical movements)	Recommended Mitigation	LOS (Critical movements)	Recommended Mitigation	LOS (Critical movements)	Recommended Mitigation	LOS (Critical movements)	Recommended Mitigation	LOS (Critical movements)	Recommended Mitigation	LOS (Critical movements)	Recommended Mitigation
TH 5/CSAH 15 (Manning Avenue)	AM: Overall C PM: Overall C	AM: Overall F PM: Overall F	Add second northbound left turn lane; add 2nd westbound left turn lane; add eastbound and westbound through lanes.	No mitigation required beyond 2030 recommended improvements.	Similar to Scenario C	No mitigation required beyond 2030 recommended improvements.	AM: Overall D PM: Overall D	No mitigation required beyond 2030 recommended improvements.	Similar to Scenario C	AM: Overall D PM: Overall D	No mitigation required beyond 2030 recommended improvements.	Similar to Scenario C	No mitigation required beyond 2030 recommended improvements.	Similar to Scenario C	No mitigation required beyond 2030 recommended improvements.	No mitigation required beyond 2030 recommended improvements.
TH 5/39th Street	AM: SB Left B PM: SB Left C	AM: SB Left E PM: NB/SB F PM: F	Add westbound left-turn lane; add eastbound and westbound through lanes.	Install new traffic signal; add EB right-turn lane; add WB left-turn lane; add new NB approach with exclusive left-turn lane.	Similar to Scenario C	Install new traffic signal; add EB right-turn lane; add WB left-turn lane; add new NB approach with exclusive left-turn lane.	AM: NB/SB F PM: NB/SB F PM: F	Similar to Scenario C	Similar to Scenario C	AM: NB/SB F PM: NB/SB F PM: F	Install new traffic signal; add EB right-turn lane; add WB left-turn lane; add new NB approach with exclusive left-turn lane.	Similar to Scenario C	Similar to Scenario C	Similar to Scenario C	Install new traffic signal; add EB right-turn lane; add WB left-turn lane; add new NB approach with exclusive left-turn lane.	Similar to Scenario C
TH 5/Laverne Avenue	AM: WB Left B PM: NB and SB Left C	AM: NB/SB F PM: NB/SB F PM: WB Left E	Add eastbound/westbound right and left-turn lanes; add eastbound & westbound through lanes.	Add northbound and southbound right-turn lanes. <sup>1</sup>	Similar to Scenario C	Add northbound and southbound right-turn lanes. <sup>1</sup>	AM: SB Left/Thru F PM: NB/SB F PM: F	Similar to Scenario C	Similar to Scenario C	AM: NB/SB F PM: NB/SB F PM: F	Add northbound and southbound right-turn lanes. <sup>1</sup>	Similar to Scenario C	Similar to Scenario C	Similar to Scenario C	Add northbound and southbound right-turn lanes. <sup>1</sup>	Similar to Scenario C
TH 5/CSAH 17 (Lake Elmo Ave S)	AM: NB Left D PM: NB F	AM: NB F PM: NB F PM: WB Left F	Install traffic signal; add eastbound and westbound through lanes.	Add EB left-turn lane; add WB right-turn lane; add new SB approach with right-turn lane.	Similar to Scenario C	Add EB left-turn lane; add WB right-turn lane; add new SB approach with right-turn lane.	AM: Overall B PM: Overall D	Similar to Scenario C	Similar to Scenario C	AM: Overall B PM: Overall C	Add EB left-turn lane; add WB right-turn lane; add new SB approach with right-turn lane.	Similar to Scenario C	Similar to Scenario C	Similar to Scenario C	Add EB left-turn lane; add WB right-turn lane; add new SB approach with right-turn lane.	Similar to Scenario C
TH 5/CSAH 17 (Lake Elmo Ave N)	AM: SB Left E PM: SB Left D	AM: SB F PM: SB F	Install traffic signal; add eastbound and westbound through lanes.	Add EB right-turn lane; add WB left-turn lane; add new NB approach with exclusive left-turn lane.	Similar to Scenario C	Add EB right-turn lane; add WB left-turn lane; add new NB approach with exclusive left-turn lane.	AM: Overall B PM: Overall C	Similar to Scenario C	Similar to Scenario C	AM: Overall B PM: Overall C	Add EB right-turn lane; add WB left-turn lane; add new NB approach with exclusive left-turn lane.	Similar to Scenario C	Similar to Scenario C	Similar to Scenario C	Add EB right-turn lane; add WB left-turn lane; add new NB approach with exclusive left-turn lane.	Similar to Scenario C
CSAH 17 (Lake Elmo Ave N)/39th Street	AM: Overall A PM: Overall A	AM: Overall F PM: Overall A	Vehicle delay due to downstream congestion at CSAH 17/TH 5; no improvements needed.	No mitigation required.	Similar to Scenario C	Long delays due to downstream congestion on 39th Street; no mitigation required.	AM: Overall A PM: Overall F	Similar to Scenario C	Similar to Scenario C	AM: Overall A PM: Overall F	Long delays due to downstream congestion on 39th Street; no mitigation required.	Similar to Scenario C	Similar to Scenario C	Similar to Scenario C	Long delays due to downstream congestion on 39th Street; no mitigation required.	Similar to Scenario C
CSAH 15 (Manning Avenue)/30th Street	AM: WB Left & Thru C PM: EB & WB Left D	AM: EB LT E PM: WB F PM: EB/WB F	Install traffic signal; add EB and WB exclusive left-turn lanes; add NB and SB exclusive left-turn lanes.	No mitigation required beyond 2030 recommended improvements.	Similar to Scenario C	No mitigation required beyond 2030 recommended improvements.	AM: Overall C PM: Overall C	Similar to Scenario C	Similar to Scenario C	AM: Overall C PM: Overall C	No mitigation required beyond 2030 recommended improvements.	Similar to Scenario C	Similar to Scenario C	Similar to Scenario C	No mitigation required beyond 2030 recommended improvements.	Similar to Scenario C
CSAH 17 (Lake Elmo Ave S)/30th Street	AM: Overall A PM: Overall A	AM: Overall A PM: NB E	Vehicle delay due to downstream congestion at CSAH 17/TH 5; no improvements needed.	No mitigation required.	Similar to Scenario C	No mitigation required.	AM: Overall A PM: Overall A	Similar to Scenario C	Similar to Scenario C	AM: Overall A PM: Overall A	No mitigation required.	Similar to Scenario C	Similar to Scenario C	Similar to Scenario C	No mitigation required.	No mitigation required.
Roadway Segment																
TH 5, West of CSAH 17 (Lake Elmo Avenue S)	D	F	Widen to four through lanes.	No mitigation required beyond 2030 recommended improvements.	D	No mitigation required beyond 2030 recommended improvements.	D	No mitigation required beyond 2030 recommended improvements.	D	No mitigation required beyond 2030 recommended improvements.	No mitigation required beyond 2030 recommended improvements.	D	No mitigation required beyond 2030 recommended improvements.	C	No mitigation required beyond 2030 recommended improvements.	No mitigation required beyond 2030 recommended improvements.
TH 5, CSAH 17 (south) to CSAH 15 (Manning Ave)	D	F	Widen to four through lanes.	No mitigation required beyond 2030 recommended improvements.	C	No mitigation required beyond 2030 recommended improvements.	C	No mitigation required beyond 2030 recommended improvements.	C	No mitigation required beyond 2030 recommended improvements.	No mitigation required beyond 2030 recommended improvements.	C	No mitigation required beyond 2030 recommended improvements.	C	No mitigation required beyond 2030 recommended improvements.	No mitigation required beyond 2030 recommended improvements.
TH 5, NE of CSAH 15 (Manning Ave)	E	F	Widen to four through lanes.	No mitigation required beyond 2030 recommended improvements.	D	No mitigation required beyond 2030 recommended improvements.	D	No mitigation required beyond 2030 recommended improvements.	D	No mitigation required beyond 2030 recommended improvements.	No mitigation required beyond 2030 recommended improvements.	D	No mitigation required beyond 2030 recommended improvements.	D	No mitigation required beyond 2030 recommended improvements.	No mitigation required beyond 2030 recommended improvements.
CSAH 17: North of TH 5	A	C	No mitigation required.	No mitigation required.	B	No mitigation required.	B	No mitigation required.	C	No mitigation required.	No mitigation required.	C	No mitigation required.	C	No mitigation required.	No mitigation required.
CSAH 17: South of TH 5	B	D	No mitigation required.	No mitigation required.	C	No mitigation required.	C	No mitigation required.	C	No mitigation required.	No mitigation required.	C	No mitigation required.	C	No mitigation required.	No mitigation required.
CSAH 15 (Manning Ave)/South of TH 5	B	E	Add second northbound left turn lane at TH 5.	No mitigation required beyond 2030 recommended improvements.	D	No mitigation required beyond 2030 recommended improvements.	D	No mitigation required beyond 2030 recommended improvements.	D	No mitigation required beyond 2030 recommended improvements.	No mitigation required beyond 2030 recommended improvements.	D	No mitigation required beyond 2030 recommended improvements.	D	No mitigation required beyond 2030 recommended improvements.	No mitigation required beyond 2030 recommended improvements.
30th Street: Between CSAH 17 & CSAH 15	A	A	No mitigation required.	No mitigation required.	C	No mitigation required.	C	No mitigation required.	C	No mitigation required.	No mitigation required.	C	No mitigation required.	C	No mitigation required.	No mitigation required.
39th Street: Between TH 5 & CSAH 17 (north)	A	A	No mitigation required.	No mitigation required.	B	No mitigation required.	B	No mitigation required.	B	No mitigation required.	No mitigation required.	B	No mitigation required.	B	No mitigation required.	No mitigation required.

<sup>1</sup> Minor street left-turn movements are often difficult during peak periods at side street, stop-controlled intersections. No additional measures short of installing a traffic signal or a roundabout would improve the LOS for the minor street left turns and thru movements. Warrants for a signal or roundabout would not be met due to the low volumes on Laverne Street.

**How Mitigation will be Applied and Assured**

The City will implement an on-going traffic management plan to monitor traffic volume growth and any operational issues that may develop in and around the AUAR area. This monitoring program is intended to give the City, County and other agencies the opportunity to evaluate future development projects within the AUAR area and their cumulative impacts on the transportation system. A traffic impact study will be required for all developments within the AUAR area. To maintain consistency, the traffic impact study will use the following methodology:

- a. Use a traffic simulation model to determine operational traffic impacts for the proposed development.
- b. Identify the deficiencies and reasonable mitigation measures that are related to the development. Address consistency or lack of consistency with City of Lake Elmo subdivision and zoning ordinances, Land Use Plan element of Comprehensive Plan, and the City’s Transportation Plan.
- c. If no reasonable mitigation measures are agreed upon or are unfeasible, the intensity or timing of the proposed development would be staged so as to not overly burden the transportation system. For example, if it is determined that full-build out of a proposed development project would overly burden the transportation system, then varying degrees of development, i.e., 75%, 50%, 25% would be analyzed. As surrounding infrastructure is improved, the remaining portion of a proposed development could be evaluated to determine if it could be constructed. This is intended to address the cumulative traffic impacts that occur within the AUAR area.

Mitigation will be regulated through the city’s development approval and permitting process. Proposed master development plans, planned unit development and subdivision applications, plats, and/or site plans must address relevant mitigation measures prior to final approval by the city. Implementation of mitigation measures will be assured through developer agreements with the city, which will require a financial security for land and infrastructure improvements and/or revoke the right to acquire building permits until all relevant mitigation measures have been addressed.

**Involvement by Other Agencies, if applicable**

There are a number of potential transportation improvements and issues that have been identified as part of this AUAR. Numerous agencies will be responsible in varying degrees to implement the identified improvements. The following table identifies the improvement(s) and the responsible agencies to initiate and oversee implementation.

**Responsible Agencies for Implementation of Improvements**

General Improvement	Primary Agency	Additional Agencies
State and County Roadways	Mn/DOT, Washington County	City of Lake Elmo
Local/Frontage Roadways	City of Lake Elmo	--
Access Control	FHWA, Mn/DOT, Washington County, City of Lake Elmo	--
Transit	Metro Transit, Washington County	City of Lake Elmo
Bicycle/Pedestrian	City of Lake Elmo, Washington County	Mn/DOT
Air/Noise	Minnesota Pollution Control Agency	Mn/DOT, Washington County, City of Lake Elmo

If the City or Washington County proceed with plans for the installation of a signal at Manning Avenue and 30<sup>th</sup> Street, the plans must be reviewed by MAC and the FAA prior to installation. The intersection lies in the approach to Runway 4, and the signals need to be designed to not be an obstruction to this approach surface. A Notice of Construction or Alteration form, must be submitted to the FAA, with a copy to MAC, for a determination to ensure no hazard is created.

## **ITEM 24. NOISE**

### **Potential Impacts**

- Noise levels related to traffic increase may rise above existing levels
- Single family residential uses are proposed within noise exposure zone 4, which are considered incompatible according to Metropolitan Council guidelines.
- Railroad noise and vibrations may affect Village development. The extent of the noise impact depends on if development is located in a no whistle zone or a whistle zone as shown in Table 24-5.

### **Mitigation Strategies**

The City will:

- 24.1 Establish residential structure setback standards in its zoning ordinance to ensure an adequate setback to major roads in the AUAR area to mitigate potential traffic-related noise on residential structures. Tables 24-2 and 24-3 provide a guide in establishing an appropriate setback in that it describes the distance within which noise standards are exceeded; however, these distances are not a recommended structure setback distance. These setbacks will be established by city ordinance and will consider the land use proposed and characteristics of the setback area in that requiring vegetation or berms may mitigate noise and lessen the necessary structure setback distance to the roadway.
- 24.2 Use the aircraft noise land use compatibility guidelines to inform future land use decisions regarding the comprehensive plan. Within its statutory limits, the city needs to prepare an airport zoning ordinance to address building height, land use compatibility, structural performance standards, and noise buffers.
- 24.3 Prepare adequate structure setback standards in its zoning ordinance to ensure an adequate setback to the railroad tracks. The Village has coexisted with the railroad tracks - they are part of the historic and existing Village character. Table 24-5 provides a guide in establishing an appropriate setback in that it describes the distance within which HUD noise standards are exceeded; however, these distances are not a recommended structure setback distance. These setbacks will be established by city ordinance and will consider existing built structure setbacks in the Village, the character of the setback area in that requiring vegetation or berms may mitigate noise and lessen the necessary setback distance to the railroad.
- 24.4 Require that builders provide appropriate disclaimers to potential home buyers regarding the potential noise from traffic, the airport, and/ or the railroad tracks, as applicable.

### **How Mitigation will be Applied and Assured**

Mitigation will be regulated through the city's development approval and permitting process. Proposed master development plans, planned unit development and subdivision applications, plats, and/or site plans must address relevant mitigation measures prior to final approval by the city. Implementation of mitigation measures will be assured through developer agreements with the city, which will require a financial security for land and infrastructure improvements and/or revoke the right to acquire building permits until all relevant mitigation measures have been addressed.

### **Involvement by Other Agencies, if applicable**

According to MAC, the airport ordinance will be prepared by a Joint Airport Zoning Board comprised of two representatives from Lake Elmo, Baytown Township, West Lakeland Township, Washington County, and MAC.

## **ITEM 25. CULTURAL RESOURCES**

### **Potential Impacts**

- Intentional or unintentional damage to, or destruction of, important archaeological sites and historic properties without due process and consideration.

### **Mitigation Strategies**

The City will:

- 25.1 Be guided by existing legal requirements in decision-making regarding potential cultural resources.
- 25.2 Follow State and Local laws and regulations regarding cultural resources.
- 25.3 Consider reconvening the Lake Elmo Heritage Preservation Commission, an agent of the City, regarding future developments in this area that may impact historic properties.
- 25.4 Maintain an open dialogue and cooperate with local Native American communities and residents of Lake Elmo regarding potential cultural resources.
- 25.5 Require that the following steps and procedures involved in the identification and analysis of any archaeological sites is followed prior to development
  - Require project proposers to conduct a Phase I archaeological survey, if a development falls within an area that is considered to have a high potential for discovery of precontact archaeological resources. The objective of the archaeological fieldwork is to determine if there are archaeological sites in the areas identified as having high potential for such, and define the extent of those sites that may be impacted by development plans. Areas with a high potential for discovery of precontact archeological resources are defined as:
    - within 500 ft. (150 m) of an existing or former water source of 40 acres (19 hectares) or greater in extent, or within 500 ft. (150 m) of a former or existing perennial stream;
    - located on topographically prominent landscape features;
    - located within 300 ft. (100 m) of a previously reported site; or
    - located within 300 ft. (100 m) of a former or existing historic structure or feature (such as a building foundation or cellar depression).
  - Conduct a Phase II archaeological survey. If archaeological resources are uncovered that may be eligible for listing on the National Register of Historic Places (NRHP) a Phase II survey should be conducted. The objective of the investigation is to determine whether archaeological resources are eligible for listing on the NRHP.
  - Plan for avoidance or conduct Phase III data recovery. If a significant archaeological site is identified that will be impacted by development, avoidance is recommended. If this is not possible, then a data recovery of the site should occur.
  - If human remains are recovered at any time during archaeological investigation or development, all activities must stop and consultation initiated with the Office of the State Archaeologist and Minnesota Indian Affairs Council.

### **How Mitigation will be Applied and Assured**

If a development application falls within an area that is considered to have a high potential for archaeological sites, the city will require that the above steps and procedures involved in the identification and analysis of any archaeological sites is followed prior to development. Mitigation will be regulated through the City's development approval and permitting process. Proposed master development plans, planned unit development and subdivision applications, plats, and/or site plans must address relevant mitigation measures prior to final approval by the city. Implementation of mitigation measures will be assured through developer agreements with the city, which will require a financial security for land and infrastructure improvements and/or revoke the right to acquire building permits until all relevant mitigation measures have been addressed.

### **Involvement by Other Agencies, if applicable**

The Office of State Archaeologist (OSA) and Minnesota Historical Society make recommendations for the preservation of archaeological sites endangered by construction or development on all public lands. The OSA issues licenses, with the concurrence of the Minnesota Indian Affairs Council, for all archaeological investigations associated with public funding or on public land. Section 106 of the National Historic Preservation Act requires Federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on such undertakings. The State Historic Preservation Office (SHPO) acts on behalf of the Advisory Council in each state.

## **ITEM 25. PARKS AND RECREATION**

### **Potential Impacts**

- Development may impact areas of existing and future park, open space, and recreation lands.
- Lands suitable for future parks, open space, and recreation areas may be lost to development.

### **Mitigation Strategies**

The City will:

- 25.6 Work with the Stillwater Area Schools District No. 834 regarding the location of a proposed civic square on a portion of the Lake Elmo Elementary School site.
- 25.7 Work with the County, adjacent local governments, and other applicable agencies to plan for trails and connectivity of park lands and recreation areas.
- 25.8 Require that developers adhere to park dedication requirements.
- 25.9 Require developers to restore any areas of parks, trail, or recreation lands directly impacted by development-related construction activities.
- 25.10 Work to implement the recommendations of the recent parks and trails plan, including the development of a community park within the Village Area.

### **How Mitigation will be Applied and Assured**

The City will review development plans for compliance with park dedication requirements and where land dedication is not feasible, will negotiate a cash fee in-lieu of land. Fees collected will be used for activities within the Village Area to enhance existing parks, trails and recreation areas or to purchase land for these uses and/or open space preservation. The City will review development plans with respect to the goals and objectives outlined in the recently adopted parks and trails plans to ensure that land identified for future parks, trails and recreation areas is not lost.

### **Involvement by Other Agencies, if applicable**

Other agencies or entities that may be involved include the DNR, Mn/DOT, Washington County, adjacent local government units, and the Stillwater Area Schools District.

## **ITEM 27. COMPATIBILITY WITH PLANS**

### **Potential Impacts**

- Scenarios A, B, and C are not consistent with the adopted Comprehensive Plan or Zoning Ordinance.

### **Mitigation Strategies**

The City will:

- 27.1 Use the information contained in the AUAR during future considerations of updates or amendments to the adopted Comprehensive Plan and Zoning Ordinance. Any future consideration of amendments or updates to the Comprehensive Plan and Ordinances would follow the city's set procedures and guidelines for such amendments.

### **How Mitigation will be Applied and Assured**

The City will update its Comprehensive Plan and ordinances prior to allowing development to proceed within the Village. Mitigation will be regulated through the city's development approval and permitting process. Proposed master development plans, planned unit development and subdivision applications, plats, and/or site plans must address relevant mitigation measures prior to final approval by the city. Implementation of mitigation measures will be assured through developer agreements with the city, which will require a financial security for land and infrastructure improvements and/or revoke the right to acquire building permits until all relevant mitigation measures have been addressed.

### **Involvement by Other Agencies, if applicable**

The Metropolitan Council will be involved by providing technical assistance and reviewing Comprehensive Plan Amendments.

## **ITEM 28. INFRASTRUCTURE – POLICE, FIRE AND EMERGENCY RESPONSE**

### **Potential Impacts**

- Development may exceed the capacity of the City's Fire Department to respond in a timely manner to emergency situations.
- Development may exceed the capacity of the Washington County Sheriff's Office to respond in a timely manner to emergency situations.

### **Mitigation Strategies**

The City will:

- 28.1 Continue to address the recommendations in the fire protection needs study, as appropriate.
- 28.2 Continue exploring service delivery and staffing models (including going to duty crews and/or cross training in other departments) to meet this challenge and assure fire protection. The city relies on mutual aid from surrounding communities for back up fire service, as do other cities in Washington County.
- 28.3 Review the study being completed by Washington County Sheriff's Office regarding their staffing needs for the communities they serve.
- 28.4 Continue to work with the Washington County Sheriff's Office to ensure the City's law enforcement needs are accommodated.
- 28.5 Periodically evaluate the capacity of the Washington County Sheriff's Office to provide adequate law enforcement services to Lake Elmo as growth occurs.

- 28.6 Consider working with neighboring communities to establish cooperative emergency response services, including police and fire.

**How Mitigation will be Applied and Assured**

The City will evaluate the results of the staffing needs studies being completed by the Lake Elmo Fire Department and the Washington County Sheriff’s Office and take appropriate action to ensure that the City’s needs are accommodated. If needed, or to supplement the systems currently in place, the City will work with neighboring communities to establish cooperative emergency response services.

**Involvement by Other Agencies, if applicable**

Other agencies that are currently involved in assisting Lake Elmo with emergency response services or may provide assistance in the future include the Washington County Sheriff’s Office and neighboring local governments.

**PERMITS AND APPROVALS REQUIRED (AUAR ITEM 8).**

Major permits and approvals likely to be required by the anticipated types of development projects are listed in the following table. Depending on the type of project, the applicant for each permit or approval will vary - applicants may be developers, property owners, or the city.

Unit of Government	Type of Application
United States Army Corps of Engineers	Section 404 Permit
	Letter of No Wetland Jurisdiction
Federal Aviation Administration	Notice of Construction Alternation (Form 7460-1A) and determination of no hazard for construction in excess of allowed heights in the forthcoming airport ordinance
Minnesota Pollution Control Agency	National Pollutant Discharge Elimination Systems (NPDES) Permit/General Stormwater Construction Permit
	Sewer Extension Permit
	MS-4 permit amendment, if needed
	CWA Section 401 Water Quality Certification
	Future review and permitting pending US EPA approval of Lake St Croix and Lake Pepin TMDL Implementation Plans
Minnesota Department of Transportation	Permit for work in State Highway right-of-way, if proposed
	Right-of-way access permit, if proposed
Minnesota Department of Natural Resources	Water Appropriation Permit for new municipal well, if needed
	Temporary Water Appropriation Permit for construction dewatering
	Public Waters Work Permit (for work within a DNR Public Water)
	Water Appropriation Permit (#1961-1031) Modification, to increase usage beyond the permitted amount (60 mg/yr.)
Minnesota Department of Health	Permit for new municipal water well
	Permit to abandon and seal private wells, if necessary
	Permit for watermain construction
Washington County Highway Department	Utility Permit to install utilities within County road right-of- ways
	Permit to work in County roadways
	Permit for new accesses to County roadways, if proposed

Unit of Government	Type of Application
Valley Branch Watershed District (VBWD)	Development Review and Approval/Permitting – land alterations, impervious surface creation, work below the established 100-year flood level, discharge of municipal or industrial water or wastewater to a surface water drainage system, erosion control plan, grading plan, stormwater management plan, landscape/vegetation plan, etc.
	Wetland Delineation Boundary Confirmation
	Permit for wetland impacts under Minnesota Wetland Conservation Act
	Certificate of Wetland Exemption for temporary impacts due to linear utility extensions
Metropolitan Council	Sewer Permit to Connect
	Comprehensive Plan Updates and Amendments
City of Lake Elmo	Comprehensive Plan Updates and Amendments
	Rezoning
	Conditional Use Permit
	Preliminary Plat
	Site Plan Review
	PUD
	Park Dedication
	Final Plat
	Sign Permit
	Developer Agreements
	Building Plan Review
	Design Guidelines, if adopted
	Utility permit for work in road right-of-ways
	Building permit
	Excavation and grading permit if moving more than 50 cu yds of material not in conjunction with a building permit
	Driveway permit
	Fence permit, if proposed
	Certificate of occupancy
Other permits, as required	

All required permits and approvals will be obtained prior to development of the Village as appropriate. Any necessary permits or approvals that are not listed in the table above were unintentionally omitted, and some listed may not be necessary.

**MITIGATION PLAN IMPLEMENTATION SUMMARY**

A Mitigation Plan implementation summary is provided assist reviewers in understanding when major mitigation strategies will be implemented as the Village planning and development process moves forward. Development will not be allowed to occur within the AUAR area until relevant city plans and regulations have been updated to incorporate the recommendations outlined in this Mitigation Plan. The tentative timeline for the Village development process is provided in the following table (repeated from AUAR Item 6, Table 6-5) and the mitigation plan implementation summary table is provided on the following pages.

**Tentative Timeline - Village Development Process**

January 2005	2005 – 2006	2006 to April 2007	Spring, Summer 2007	April 2007 to date	Fall, 2007	Feb, March 2008	April 1, 2008	April 2009
Memo of understanding w Metro Council	Comp plan	Develop and accept Village Master Plan	I-94 to 30 <sup>th</sup> Street forcemain sewer project design	AUAR process underway	Financial feasibility analysis of sewer system demonstrate s feasible	AUAR Development Scenarios	Order AUAR	Complete AUAR /adopt mitigation plans for the scenarios

May to June 2009	Summer 2009	Fall, Winter 2009	Fall, Winter 2009	, Fall, Winter 2009	Fall, Winter 2009
Financial Analyses of Development Scenarios to determine costs of each development scenario. Including the mitigation, amenities and infrastructure costs to be born by developers.	Select a development scenario that meets environmental, financial and the land use planning principles in the Village Master Plan	Develop and adopt financial policies for paying for development – focus on policies for new development but make sure the fiscal system is feasible into the future and not isolated	Develop and adopt a Village comprehensive plan amendment to reflect the chosen development scenario	Develop and adopt Village zoning code and subdivision requirements and design elements to reflect selected development scenario	Develop capital improvement plan for the timing of public improvements for the long term implementation and the financing of public improvements and amenities

Fall 2009 (1)	December 2009 (1)	March 2010 (1)	2010	2010	2010	2010 and beyond
Get formal developer commitment to provide financial guarantees for sewer to the Village and new development according to the plan.	Order forcemain to the Village to serve new development, if financial commitments are made up front and housing market will support the cost of construction.	Begin construction of forcemain to the Village.	Negotiate development agreements with developers for new development	Develop infrastructure to support development in new Village as part of developer's responsibility.	Begin new Village development along the east side of the Village	Revisit fiscal policies, annually revisit the capital improvement plan for timing future public improvements and revisit land use controls through zoning when needed to clarify and improve

(1) This is subject to change depending upon the developers' ability to pay up front for the infrastructure and guarantee housing market to cover costs.

## Mitigation Plan Implementation Summary

Major Steps in the Village Development Process	Major AUAR Mitigation Strategies to be Addressed
<p><b>Comprehensive Plan Update</b></p>	<ul style="list-style-type: none"> <li>● Use the information contained in the AUAR during future considerations of updates or amendments to the adopted Comprehensive Plan. Any future consideration of amendments or updates to the Comprehensive Plan would follow the city’s set procedures and guidelines for such amendments</li> <li>● Follow the Village Master Plan guiding principles</li> <li>● Select a development scenario for the Village</li> <li>● Use the aircraft noise land use compatibility guidelines to inform future land use decisions</li> <li>● Prepare city-wide plans for transportation, sanitary sewer, water supply and distribution, and surface water management that address the mitigation strategies in this AUAR within the context of city-wide needs</li> <li>● Continue to address stormwater runoff volume management, rate control, and water quality treatment measures for the entire city through its Surface Water Management Plan update in compliance with the pertinent agency regulations.</li> <li>● Conduct the “Discharge to Waters with Restricted Discharges Assessment” required by its MS4 permit to determine if there are feasible and prudent alternatives to the discharge, such as diversion from the St. Croix River watershed, infiltration, or other alternatives.</li> </ul>
<p><b>Update Official Controls</b>  (Zoning and Subdivision Code, Site Plan Requirements, Design Guidelines, Development Standards)</p>	<ul style="list-style-type: none"> <li>● Use the information contained in the AUAR during future considerations of updates or amendments to the zoning and subdivision ordinances, including design requirements for stormwater management facilities. Any future consideration of amendments or updates to ordinances would follow the city’s set procedures and guidelines for such amendments</li> <li>● Follow the Village Master Plan guiding principles</li> <li>● Ensure that the following requirements are adequate to address potential land use compatibility issues including, but not limited to: building setbacks, screening, landscaping, noise, lighting, buffers, height, architectural controls, and design standards</li> <li>● Prepare an airport zoning ordinance through a Joint Airport Zoning Board</li> <li>● Prepare requirements for protecting and conserving environmentally sensitive areas and establishing multi-functional greenway corridors that provide for wildlife movement, open space, trails, and areas for surface water management</li> <li>● Develop and implement water conservation policies</li> <li>● Prepare an updated floodplain ordinance</li> <li>● If sewered development is allowed within shoreland areas, prepare an updated shoreland ordinance</li> <li>● Establish residential structure setback standards in its zoning ordinance to ensure an adequate setback to major roads and the railroad in the AUAR area to mitigate potential noise on residential structures</li> <li>● Created a tree/woodland preservation policy</li> </ul>

**Mitigation Plan Implementation Summary (continued)**

<b>Major Steps in the Village Development Process</b>	<b>Major AUAR Mitigation Strategies to be Addressed</b>
<p><b>Development Review and Approval Process</b></p> <p>This step occurs after:</p> <p>(1) The city develops a capital improvement plan for the timing of public improvements for the long term implementation and the financing of public improvements and amenities, AND</p> <p>(2) Get formal developer commitment to provide financial guarantees for sewer to the Village and new development according to the plan.</p>	<ul style="list-style-type: none"> <li>• Follow the Village Master Plan guiding principles</li> <li>• Apply the updated official controls</li> <li>• Require developers to assess the potential presence of environmental hazards due to past site use prior to development activities</li> <li>• Revisit the location of the Buffer Zone/Opens Space/Greenbelt to consider the inclusion of primary ecologically sensitive resources</li> <li>• Require wetlands delineations</li> <li>• Monitor water usage and not permit new development to proceed if it exceeds the capacity of the water supply and distribution system</li> <li>• Construct ponds 519 and 520 to alleviate existing downtown flooding issues and provide rate control for new development. Implementing stormwater management techniques throughout the Village that decrease estimated stormwater volumes may reduce the estimated size of these ponds.</li> <li>• Provide runoff volume facilities adequate to not increase existing runoff volume for the 100-year event.</li> <li>• Provide pretreatment upstream of volume management facilities.</li> <li>• Encourage utilization of volume management techniques to minimize the stormwater impacts by emphasizing water infiltration, valuing water as a resource and promoting the use of natural system to treat water runoff.</li> <li>• Construct the major infrastructure improvements needed to establish the wastewater system (i.e. lift station, forcemain, and trunk system) in accordance with the Comprehensive Sanitary Sewer Plan and Capital Improvement Plan.</li> <li>• Continue to work with the State and County to ensure appropriate roadway system improvements are made to satisfy expectations contained within this AUAR in light of actual future development projects. The predicted traffic levels may or may not occur; therefore, all of the predicted improvements may not be necessary to serve Village development</li> <li>• Prioritize alternative travel modes within the Village (e.g., bus, bicycle, and pedestrian foot-traffic) by identifying appropriate accommodations</li> <li>• Consider reconvening the Lake Elmo Heritage Preservation Commission</li> <li>• When ground disturbing activities are planned for areas with a high potential for discovery of precontact archeological resources, a Phase I archaeological survey will be required in areas that meet the conditions described in the methods section of Appendix G, such as close proximity to recorded archaeological sites, close proximity to significant bodies of water, and locations near topographically prominent landscape features</li> <li>• Work to implement the recommendations of the recent parks and trails plan, including the development of a community park within the Village Area</li> <li>• All required permits and approvals will be obtained prior to development of the Village as appropriate</li> </ul>

### **GENERAL IMPLEMENTATION TOOLS:**

- All development must comply with the Comprehensive Plan, as amended. The Comprehensive Plan will guide the permitted land use, zoning, utility extensions, and other development activities.
- Approval of future planned unit developments (PUDs), together with the development agreements, which include specific requirements.
- Execution of future developer's agreements under the City of Lake Elmo subdivision ordinances.
- Enforcement of the permitting requirements of all applicable local, state, and federal agencies.
- Update the AUAR in five years, or earlier, if certain conditions or assumptions change in accordance with Mn Rules 4410.3610, subp. 3.
  - Five years have passed since the RGU adopted the original environmental analysis document and plan for mitigation or the latest revision. This item does not apply if all development within the area has been given final approval by the RGU.
  - A comprehensive plan amendment is proposed that would allow an increase in development over the levels assumed in the environmental analysis document.
  - Total development within the area would exceed the maximum levels assumed in the environmental analysis document.
  - Development within any subarea delineated in the environmental analysis document would exceed the maximum levels assumed for that subarea in the document.
  - A substantial change is proposed in public facilities intended to service development in the area that may result in increased adverse impacts on the environment.
  - Development or construction of public facilities will occur on a schedule other than that assumed in the environmental analysis document or plan for mitigation so as to substantially increase the likelihood or magnitude of potential adverse environmental impacts or to substantially postpone the implementation of identified mitigation measures.
  - New information demonstrates that important assumptions or background conditions used in the analysis presented in the environmental analysis document are substantially in error and that environmental impacts have consequently been substantially underestimated.
  - The RGU determines that other substantial changes have occurred that may affect the potential for, or magnitude of, adverse environmental impacts