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Appendix B-5.26 Summary of 1987 Friedrich’s Pond Study
5.26 Friedrich’s Pond Watershed Management Plan

5.26.1 General Information

Friedrich’s Pond is located in the City of Lake Elmo, approximately 2 miles east of Stillwater Road (CSAH 6) and 500 feet south of the Union Pacific Railroad tracks. The pond is classified under the U.S. Fish and Wildlife Circular 39 classification system as a Type 4 wetland. The Friedrich’s Pond watershed is approximately 360 acres, including upstream landlocked areas. The watershed is entirely within the City of Lake Elmo. Figure 5.26-1 shows the Friedrich’s Pond watershed. Friedrich’s Pond is landlocked under normal hydrologic conditions.

The surface soils in the watershed consist of well-drained silt loam along the flat northern portions of the watershed and well-drained to excessively drained sandy loam in the remaining portions of the watershed. Approximately 25 percent of the land in the watershed is located within Lake Elmo Park Reserve. About half of the remaining area is residentially developed, with the portion of the watershed used for a mix of cultivated and pasture agricultural land uses. Future (2030) estimated land use is estimated to include single family and large-lot residential land use in all portions of the watershed not already established as park or natural areas. Figure 5.26-2 shows the current (2010) and estimated future (2030) land uses.

Use of the pond is limited to aesthetic viewing by area residents, and detaining and treating stormwater runoff. There is no public access to Friedrich’s Pond.
5.26.2 Water Quality Management Plan

The VBWD classified and will manage Friedrich’s Pond as a Low Priority waterbody (see Section 4.1 – Water Quality). This classification is based on the lack of public access and the likelihood that the Minnesota Pollution Control Agency (MPCA) may classify Friedrich’s Pond as a wetland (although it is currently listed as a shallow lake per the MPCA’s surface water data website). The VBWD’s management classification is similar to the low priority assigned to Friedrich’s Pond in the 2005 Plan and similar to the Level V (wetland) classification given to Friedrich’s Pond in the 1995 Plan.

The water quality of Friedrich’s Pond is poor, although data is limited. The VBWD has a non-degradation water quality policy which sets “action triggers” for all of its major waterbodies. Section 4.1 – Water Quality discusses the action triggers in more detail. Action triggers for VBWD lakes consider the following water quality parameters (summer average) relative to MPCA water quality standards and prior water quality data (i.e., trend analysis):

- Secchi disc depth
- Total phosphorus
- Chlorophyll a

Specific water quality implementation tasks for Friedrich’s Pond include the following.

1. The VBWD will cooperate with other entities to monitor the water quality of Friedrich’s Pond at the interval(s) specified in Section 4.1 – Water Quality for Low Priority waterbodies. As for all Low Priority waterbodies, the VBWD will perform additional monitoring or other actions on a case-by-case (see Table 4.1-6).

   The VBWD will evaluate the average summertime water quality (total phosphorus, chlorophyll a, and Secchi disc transparency) and compare it to applicable water quality standards (Table 4.1-1) and applicable action triggers (described in Section 4.1.7.5).

2. The VBWD will cooperate with other entities in support of macrophyte management efforts. VBWD efforts may include:

   - point-intercept surveys of aquatic vegetation
   - preparation of lake vegetation management plans (LVMP)
   - completion of Invasive Aquatic Plant Management (IAPM) Permit applications
   - design of herbicide treatment programs
   - participation in meetings with MDNR staff
other technical analysis

3. The VBWD will continue to implement its Rules and Regulations (2013, as amended) in the Friedrich’s Pond watershed. The VBWD Rules address water quality performance standards for development and redevelopment projects, as well as required vegetated buffers around VBWD lakes, streams, and wetlands. The VBWD Rules and Regulations are included in this Plan as Appendix A-4.5.

5.26.2.1 Water Chemistry

Water quality sampling has been conducted on Friedrich’s Pond in 2003, 2006, 2007 and 2008. Water quality samples are typically analyzed for total phosphorus and chlorophyll \(a\), which Secchi disc transparency is measured in the field at the time of sampling (see Appendix A-4.1 – Water Quality Background Information).

The most recent 10-year average summer water quality data is presented in Table 5.26-1. Available water quality data is presented graphically in Figure 5.26-3. There is insufficient data to identify statistically significant trends within the water quality data.

Table 5.26-1 Summary of Friedrich’s Pond summer average water quality

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>10-year Average (2004 – 2013)</th>
<th>Trend in Average</th>
<th>MPCA Standard(^1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus</td>
<td>ug/L</td>
<td>347</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Chlorophyll (a)</td>
<td>ug/L</td>
<td>66</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Secchi Disc Depth</td>
<td>m</td>
<td>0.42</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

\(^1\) MPCA eutrophication water quality standards are not applicable to wetlands

The 10-year averages of summer average total phosphorus, chlorophyll \(a\), and Secchi disc transparency exceed the MPCA’s water quality standards applicable to shallow lakes (see Table 5.26-1).

In 2011, the MPCA assessed Friedrich’s Pond with respect to the beneficial use of aquatic recreation, but did not report the assessed condition due to insufficient data.

5.26.2.2 Biological Data

The Friedrich’s Pond fishery is not currently managed by the MDNR. No survey or stocking programs are currently in place. Friedrich’s Pond does not have a fisheries-use classification and no fish consumption advisories are currently posted.
The MDNR’s Lakefinder website includes the most current data on Friedrich’s Pond and is available at: www.dnr.state.mn.us/lakefind/lake.html?id=82010800

While there are no phytoplankton (microscopic plants), or zooplankton (microscopic animals) data for Friedrich’s Pond, the VBWD conducted macrophyte (large aquatic plant) surveys on June 13, 2003, August 19, 2003, and June 4, 2009. The VBWD collects macrophyte data to identify the conditions of plant growth throughout the pond. Macrophytes are the primary producers in the aquatic food chain, converting the basic chemical nutrients in water and soil into plant matter through photosynthesis, which becomes food for all other aquatic life. While macrophytes can negatively impact the recreational use of a water body, they are critical to the ecosystem as fish and wildlife habitat.

Appendix A-5.26 includes the 2003 and 2009 macrophyte survey information. In 2003 the pond’s diverse plant community consisted of eleven to thirteen individual species. Three submerged species are tolerant of degraded conditions. Coontail (Ceratophyllum demersum) is tolerant of low light conditions. Elodea (Elodea Canadensis) is most abundant on fine sediments enriched with organic matter and flatstem pondweed (Potamogeton zosteriformis) is found in soft sediment (Borman et al., 1997). Plant growth was found throughout the pond during June and August.

In 2009 water levels were lower than in 2003 and all of the macrophytes observed were emergent species, such as cattail (Typha sp.) and bulrushes (Scirpus sp.). No floating or submerged macrophytes were observed.

The growth of two undesirable exotic (non-native) species in Friedrich’s Pond is of concern:

- Curlyleaf pondweed (Potamogeton crispus)
- Purple loosestrife (Lythrum salicaria)

A light growth of curlyleaf pondweed (CLP) was observed during June and August 2003 in the center of the pond. Once a pond becomes infested with CLP, this plant typically displaces native vegetation, thereby increasing its coverage and density. Curlyleaf pondweed begins growing in late August, grows throughout the winter at a slow rate, grows rapidly in the spring, and dies in early summer. Native plants that grow from seed in the spring are unable to grow in areas already occupied by curlyleaf pondweed, and are displaced by this plant. However, because both coontail and elodea overwinter and grow throughout the spring, these species may prevent the spread of CLP in Friedrich’s Pond. Because this plant was found in a single location in 2003, its growth was light, and it was not observed in the 2009 survey.

Purple loosestrife (Lythrum salicaria) was noted during August of 2003. Although not observed on June 13, 2003, a growth area was found along the south shore of the pond on August 19, 2003. Once a waterbody becomes infested with purple loosestrife, the plant typically displaces native vegetation and rapidly becomes the sole emergent species. Purple loosestrife was not observed during the June 4, 2009 survey.
Purple loosestrife can be effectively managed through the use of leaf-eating beetles, which reduce plant growth and seed production by feeding on the leaves and new shoots. The VBWD will consider partnering with the Minnesota Department of Natural Resources (DNR) to introduce leaf-eating beetles to the purple loosestrife area on the pond’s south side. Surveys could be conducted in the years following beetle release to track both beetle presence, and purple loosestrife demise. Additional beetles could be reintroduced at sites where purple loosestrife control was not adequate following initial beetle introduction.

The VBWD will continue to provide technical assistance to entities seeking to manage aquatic invasive species.

5.26.3 Water Quantity Management Plan

In 2003, Washington County contracted with the VBWD to develop a 100-year flood level for Friedrich’s Pond that would be approved by the Federal Emergency Management Agency (FEMA). The VBWD used a hydrologic and hydraulic model (XP-SWMM) to run a 50-year continuous simulation of the water levels of Friedrich’s Pond. A statistical analysis was then done on the resulting annual high water levels to determine the 1% probability flood level (i.e., the 100-year flood level). The study determined 100-year flood level of Elevation 913.1 (NAVD88 datum), which the VBWD currently uses as the 100-year flood elevation for management purposes. The FEMA Flood Insurance Rate Map (FIRM) for Washington County became effective in 2010 and lists the 100-year flood level for Friedrich’s Pond as 913 feet (NAVD88 datum). Prior to that detailed study, the VBWD had used its 100-year annual runoff method to establish a 100-year flood level of Friedrich’s Pond at Elevation 912.6.

The VBWD will continue to collect water level data for Friedrich’s Pond as staff or volunteer time and access allow. Figure 5.26-4 shows the historic observed water levels.

5.26.3.1 Drainage Patterns

The City of Lake Elmo’s April 1979 topographic mapping shows the natural runout level of Friedrich’s Pond to be at Elevation 919.0 (NGVD29 datum) near the railroad tracks and Stillwater Boulevard. From this point, water drains to Beutel Pond. Washington County’s 2000 two-foot topographic mapping also shows the runout point at Elevation 919. The theoretical outflow path of Friedrich’s Pond is shown in Appendix B-5.26. There is no evidence that Friedrich’s Pond has ever discharged from the runout point. The 100-year flood elevation (Elevation 913.1, NAVD88 datum) is well below the natural outlet elevation and below the elevation (917) at which the pond would overflow 31st Street North. The MDNR has not set an Ordinary High Water level (OHW) for this pond.

The low areas immediately south of the railroad tracks have a drainage area that includes almost all the land north of 31st Street North, east of Stillwater Boulevard and south of the railroad tracks, with the exception of a small area adjacent to Stillwater Boulevard. This area is essentially landlocked, but was theoretically included as tributary to Friedrich’s Pond.
The ponding areas on the north and south sides of the Union Pacific Railroad tracks appear to have the highest run-out elevations in the immediate area. The surface drainage of these low areas may, therefore, have an impact on the high water tables in the area.

Based on groundwater elevation and other geologic data, the VBWD determined that the ponds in the Friedrich’s Pond area (including Friedrich’s Pond, Beutel Pond and the ponds adjacent to the railroad between Stillwater Boulevard and 31st Street) have water surface levels above the regional surficial water table (i.e., they are perched). It is probable that there is some leakage from the perched water table into the regional water table. The groundwater elevation data also indicate that the regional water table rose approximately 10 feet between the years 1979 and 1986 and the local perched water table rose approximately 2 feet during the same period. The lowering of the head difference between the perched and regional water tables between 1979 and 1986 may have caused the seepage from Friedrich’s Pond to the regional surficial water table to decrease during that period.

The 1987 report suggested that the cause of the high groundwater and pond levels in the area was the above-average precipitation occurring in the watershed between 1977 and 1986. Since there were not any major developments in the Friedrich's Pond watershed prior to the high water, increased runoff caused by urbanization was probably not a factor in the higher water levels.

Several residents hypothesized that increased water levels in City Park Pond, located approximately one mile northeast of Friedrich’s Pond, caused the high water levels in Friedrich’s Pond. The higher regional water table, as previously noted, was an additional factor in reducing seepage from Friedrich’s Pond, which could have been partially affected by City Park Pond.

5.26.3.2 Water Quantity Issues and History

At the 100-year flood level of approximately Elevation 913.1, the VBWD estimates that several basements in the Friedrich’s Pond area would be flooded. Several structures not already flooded would also be threatened at this flood level. Seven homeowners along 31st Street North and one South of Friedrich’s Pond on Jonquil Avenue North reported having water in their basements during 1986. All of those houses have their estimated basement elevation below the November, 1986 Friedrich’s Pond level with the exception of the house at 9098 31st Street North. The close proximity of this house to one of the ponds near the railroad tracks is probably the cause of its water problem. The water surface of this pond was at Elevation 913.5 in November, 1986. Low structures flooded in 1986 are described in greater detail in Appendix B-5.26.

If Friedrich’s Pond reached its 100-year flood elevation, the surrounding water table would likely be higher than it was in 1986. Under such conditions, additional homes and structures adjacent to Friedrich’s Pond would be affected.

The high groundwater table in 1986 also affected septic systems. Only one resident reported septic tank failure, but treatment efficiencies were probably greatly reduced by the submergence of tanks and drainfields. No data are available on actual elevations of septic systems.
In response to a request by Friedrich’s Pond area residents, VBWD completed a report in 1987 (Barr, 1987) addressing flooding and high water level problems in the area. Information from that report is summarized in Appendix B-5.26.

In 2013, the National Oceanographic and Atmospheric Administration (NOAA) published Atlas 14, Volume 8 (see Section 4.7.6). Atlas 14 contains updated precipitation data for Minnesota and supersedes data used to establish the 100-year flood level for Friedrich’s Pond. Within the VBWD, the 100-year, 24-hour event within the VBWD increased from 6.0 inches to 7.3 inches. The VBWD plans to update the 100-year flood level for VBWD waterbodies, including Friedrich’s Pond, to reflect Atlas 14 precipitation data and other current data sources. These updates may result in an increased flood level, which may place additional structures within the floodplain.

5.26.4 Groundwater

Some private wells within the Friedrich’s Pond watershed were tested in 2004-2005 for perflourochemicals (PFCs). The Minnesota Pollution Control Agency suspects that the Washington County Landfill, located about a mile north of Friedrich’s Pond, is a source of the PFCs. More information regarding the MPCA’s and Minnesota Department of Health’s groundwater investigation in the area is discussed in Section 4.26.6.

5.26.5 References


Borman, S., R. Korth, and J. Temte. 1997. Through the Looking Glass ... A Field Guide to Aquatic Plants. Wisconsin Lakes Partnership (Cooperative Extension of the University of Wisconsin—Extension and the Wisconsin Department of Natural Resources). Stevens Point, WI.

Figure 5.26-2
FRIEDRICH’S POND WATERSHED
CURRENT (2010) AND FUTURE (2030) LAND USE
2015-2025 Watershed Management Plan
Valley Branch Watershed District

Current (2010) Land Use
- Farmstead
- Seasonal/Vacation
- Single Family Detached
- Manufactured Housing Park
- Single Family Attached
- Retail and Other Commercial
- Park, Recreational or Preserve

Future (2030) Land Use
- Agricultural
- Rural or Large-Lot Residential
- Single Family Residential
- Multifamily Residential
- Commercial

1 inch = 1,000 feet

Source: Metropolitan Council 2010
Figure 5.26-3

Friedrich's Pond Water Quality
2015 - 2025 Watershed Management Plan
Valley Branch Watershed District
Observed data in NGVD29 datum
100-year flood level in NAVD88 datum
Pond is landlocked
Entire Water Body Dry: Summer 2009
Appendix A-5.26 Additional Macrophyte Information
• Macrophyte growth throughout entire pond
• Macrophyte densities estimated as follows: 1 = Light; 2 = Moderate; 3 = Heavy

Submerged Aquatic Plants:
- Curlyleaf pondweed
- Narrowleaf pondweed
- Flatstem pondweed
- Coontail
- Elodea

Floating Leaf:

Emergent:
- Water smartweed
- Cattail
- Blue flag iris
- Spikerush
- Common bur-reed
- River bulrush

No Aquatic Vegetation Found:

Scientific Name
- Potamogeton crispus
- Potamogeton spp. (narrowleaf)
- Potamogeton zosteriformis
- Ceratophyllum demersum
- Elodea canadensis
- Polygonum amphibium
- Typha spp.
- Sparganium eurycarpum

Common Name
- Curlyleaf pondweed
- Narrowleaf pondweed
- Flatstem pondweed
- Coontail
- Elodea
- Water smartweed
- Cattail
- Blue flag iris
- Spikerush
- Common bur-reed
- River bulrush
**Submerged Aquatic Plants:**

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curlyleaf pondweed</td>
<td>Potamogeton crispus</td>
</tr>
<tr>
<td>Narrowleaf pondweed</td>
<td>Potamogeton spp. (narrowleaf)</td>
</tr>
<tr>
<td>Flatstem pondweed</td>
<td>Potamogeton zosteriformis</td>
</tr>
<tr>
<td>Coontail</td>
<td>Ceratophyllum demersum</td>
</tr>
<tr>
<td>Elodea</td>
<td>Elodea canadensis</td>
</tr>
</tbody>
</table>

**Floating Leaf:**

- Curlyleaf pondweed

**Emergent:**

- Water smartweed
- Cattail
- Blue flag iris
- Spikerush
- Common bur-reed
- River bulrush
- Arrowhead
- Purple loosestrife

**No Aquatic Vegetation Found:**

- Potamogeton crispus 1
- Potamogeton spp. (narrowleaf) 2-3
- Elodea canadensis 3
- Sagittaria spp.
- Sparganium eurycarpum
- Lythrum salicaria

- Macrophyte growth throughout entire pond
- Macrophyte densities estimated as follows: 1 = Light; 2 = Moderate; 3 = Heavy

**Water Quality Monitoring Location**

- Not to scale

---

FRIEDRICH'S POND
MACROPHYTE SURVEY
AUGUST 19, 2003
FIELD NOTES:
- Macrophyte densities estimated as follows:
  1=light; 2=moderate; 3=heavy
- No macrophytes found in water body
- Dense fibrous algal mats
- Emergent plant growth - species listed - sporadic around entire pond perimeter
Appendix B-5.26  Summary of 1987 Friedrich’s Pond Study
Appendix B-5.26 Summary of 1987 Friedrich’s Pond Study

At the 100-year flood level of approximately Elevation 913.1, the VBWD estimates that several basements in the Friedrich’s Pond area would be flooded. Several structures not already flooded would also be threatened at this flood level. A tabulation of homes and other structures which could be threatened by high water levels is shown in Table B-5.26-1. Figure B-5.26-1 shows the location of the houses and corresponding estimated basement elevations as identified by their number in Table 5.26-1. Residents of house numbers 1-6, 8 and 12 reported having water in their basements during 1986. All of those houses have their estimated basement elevation below the November, 1986 Friedrich’s Pond level with the exception of the house at 9098 31st Street North. The close proximity of this house to one of the ponds near the railroad tracks is probably the cause of its water problem. The water surface of this pond was at Elevation 913.5 in November, 1986. In response to a request by Friedrich’s Pond area residents, VBWD completed a report in 1987 addressing flooding and high water level problems in the area.

Flood Protection Options

The 1987 report reviewed the following options for managing the flooding in the Friedrich’s pond neighborhood:

- Gravity outlet options
- Pumped outlet options
- Floodproofing
- Flood insurance
- Doing nothing

Gravity Outlets and Routes

Controlling the level of Friedrich's Pond with a permanent gravity outlet would be a solution to the high water levels in the area of Friedrich's Pond. Lowering the pond water level would also lower the levels of the water table and the ponds adjacent to the railroad tracks.

The Project 1007 Tri-Lakes outlet pipe discharges to Beutel Pond. The outlet for Beutel Pond can carry up to a 60 cubic feet per second (cfs) discharge from the south end of the pond to the north fork of Raleigh Creek. Since any of the proposed outlets from Friedrich’s Pond will eventually discharge to Project 1007, either to Beutel Pond or to Raleigh Creek, a major consideration is the effect an outlet would have on the improvements installed as part of Project 1007. Those improvements were designed to solve problems identified in the 1987 VBWD water management plan. Since the Friedrich’s Pond problems were not evident at that time, no downstream capacity was included for Friedrich’s Pond discharges to the system. This means that Friedrich’s Pond discharges would have to take place during off-peak times when excess system capacity is available.
A second constraint is the cooperative agreement between the Minnesota Department of Transportation (MnDOT) and the VBWD for use of the I-94 drainage system as part of Project 1007. VBWD is obligated to maintain certain discharge rates and volumes and any addition to the upstream drainage area would probably have to be reviewed and approved by MnDOT.

Two possible routes for a gravity outlet were examined in the 1987 report. The first route would run from the north bank of Friedrich’s Pond, under 31st Street, and along the south side of the railroad to Beutel Pond west of Stillwater Boulevard. The project would "equalize" the levels between Beutel and Friedrich’s Ponds with a normal elevation of approximately 909.0 feet (NGVD29 datum). The outlet from Beutel Pond would have to be lowered from its current elevation of 911.5 to 909.0, which would require a MDNR permit. The MDNR’s Ordinary High Water level (OHW) for Beutel Pond is at Elevation 915.9 (NGVD29 datum). The outlet would not have a major effect on the operation of the Project 1007 improvements. Since Beutel Pond water levels can vary from approximately Elevation 911.5 to Elevation 915.2, a gate could be provided east of Stillwater Boulevard to prevent backflow from Beutel Pond during periods of large discharges from Project 1007. When Beutel Pond exceeds Elevation 913, it will back up into the north railroad track area. If high water levels persisted in Beutel Pond, the gate would have to remain closed for an extended period of time until Beutel Pond water levels returned to normal and the gate could be reopened. During such a gate closure period, the Friedrich’s Pond water level might rise. The cost for this option was estimated to be approximately $110,000 in the 1987 report. The cost included excavation, pipe installation, gate installation, restoration, some easements, and other miscellaneous costs.

The second possible route for an outlet that was identified in the 1987 report would begin at the western side of Friedrich’s Pond where there is a natural low point at Elevation 923. The Washington County 2000 topography shows this point at Elevation 919.9. This point is shown on Figure B-5.26-2. The route would run south of Janero Avenue North and west under Jamley Avenue to a small wetland just west of Jamley Avenue. An outlet from the wetland would be installed to direct water under Ivy Avenue and to Raleigh Creek. Providing this wetland with an outlet may help alleviate problems experienced by adjacent homeowners. No gate would be required since water levels in the creek would be much lower than those of Friedrich’s Pond. The 1987 report estimated the cost of this option to also be approximately $110,000. The cost estimate included excavation, pipe installation, restoration, easements, and other miscellaneous costs.

**Pump Outlets and Routes**

Because of the high cost of gravity drainage relative to the amount of potential damage and available funding, the 1987 report investigated pumping as a lower cost alternative. Two pumping routes were investigated.

The first route investigated involved pumping from the south side of the railroad embankment to the north side. This is the shortest outlet route and some pumping was done in this manner by a local resident. The profile of the flow path on the north side of the railroad tracks is shown on Figure B-5.26-3; the location of the profile is shown on Figure B-5.26-4. However, this route was not pursued as a permanent solution because of one major disadvantage. Drainage north of the railroad tracks
cannot be improved without lowering the existing 58-inch span culvert under the railroad embankment. In addition, a railroad license for placement of a pipe through the railroad embankment would cost approximately $12,000, in 1987 dollars.

The second route investigated was along the south side of the railroad. Under this proposal, a channel would be excavated from Station 0+00 to Station 4+80, as shown on Figure 5.26-5. A 24-inch culvert would be installed through the high ground from Station 4+80 to Station 7+80. A second channel would be excavated from the culvert outlet at 7+80 across the pond to Station 12+50. At this point, a pump station would be installed in a manhole and a force main would be placed to discharge to the existing culvert under Stillwater Boulevard (CSAH 6). Any detrimental effects of such a project on wetlands would require analysis and mitigation.

The 1987 report estimated the cost of this alternate to be $91,250 for pumping with a three-phase electric pump. When the pumps are operating, maintenance and electricity costs were estimated to be $1,600 per month in 1987. These costs could be reduced if pumping were done by a rented diesel pump. However, operating costs would be much higher. Construction costs were estimated to be $77,250 while operating costs were estimated to be $3,400 per month in 1987.

Both estimates included $36,400 (1987 cost estimate) for connecting the ponds on the south side of the track to Friedrich’s Pond by a 24-inch diameter gravity equalizer pipe, as previously described. It would provide relief for residences near Friedrich’s Pond and would also reduce the fluctuations of the ponds adjacent to the railroad.

**Floodproofing**

The 1987 report also considered floodproofing as an alternative. Floodproofing refers to protection of homes from flooding by improvement of the homes as opposed to projects directly affecting lake levels. Since most homes in the study area are affected by high groundwater levels, two basic approaches could be used. The first involves abandoning and filling the basement and constructing a utility room to compensate for the lost area. This requires extensive replacement of electrical, sewer and water connections, as well as replacement of the furnace and associated duct work. Water heaters, water softeners and washers and dryers would need to be relocated. Cost of such work is usually well above $15,000 per home (1987 cost estimate).

A second possible floodproofing approach would be construction of high capacity sump pump systems with emergency power supply and standby pumps. Costs of this approach were estimated to range from $5,000 to $15,000 per home in the 1987 report. A major problem with using this approach in the Friedrich’s Pond area is that no nearby water body other than Friedrich’s Pond exists for discharge of the pumped water.

A pumping project could be instituted to lower Friedrich’s Pond on a one-time basis without permanent improvements. In the 1987 report, the estimated cost of such a project was approximately $15,000, if easement costs could be kept to near zero, and if the irrigation pipe from the former VBWD Lake Jane pumping project could be installed on a volunteer basis by local residents.
Flood Insurance
For residents immediately adjacent to ponds, the National Flood Insurance Program may offer some protection. Premiums under this program are subsidized and can offer substantial coverage of homes and contents.

Do Nothing
A final alternative offered in the 1987 report is that local residents consider doing nothing or continue self-help activities such as pumping and minor filling. While the inconveniences may be difficult to tolerate, they do not involve large increases in taxes or assessments. The long-term record indicates that the neighborhood does not have severe problems under normal rainfall conditions. The installation of Project 1007 may have helped to improve the situation, since the normal level of Beutel Pond was lowered from Elevation 912 to Elevation 911.5.
### Table B-5.26-1  Homes near Friedrich’s Pond Affected by High Water

<table>
<thead>
<tr>
<th>No.</th>
<th>Name (From 1995 VBWD Plan)</th>
<th>Address</th>
<th>Structure</th>
<th>First Floor Elev.</th>
<th>Estimated Basement Elev.</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Friedrich, Thomas R.</td>
<td>9098 31st Street N.</td>
<td>House</td>
<td>919.8</td>
<td>913.0</td>
<td>Water in basement</td>
</tr>
<tr>
<td>2</td>
<td>Delander, Donald &amp; Joan</td>
<td>9148 31st Street N.</td>
<td>House</td>
<td>917.1</td>
<td>910.3</td>
<td>Water in basement</td>
</tr>
<tr>
<td>3</td>
<td>Magnuson, Douglas C. &amp; Weiss, K. A.</td>
<td>9198 31st Street N.</td>
<td>House</td>
<td>916.4</td>
<td>909.6</td>
<td>Water in basement</td>
</tr>
<tr>
<td>4</td>
<td>Arcand, Thomas &amp; Michelle</td>
<td>9202 31st Street N.</td>
<td>House</td>
<td>914.8</td>
<td>908.0</td>
<td>No water in basement</td>
</tr>
<tr>
<td>5</td>
<td>Neurer, Eugene M.</td>
<td>9240 31st Street N.</td>
<td>House</td>
<td>914.8</td>
<td>908.0</td>
<td>No water in basement</td>
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<td>6</td>
<td>Jarosch, Katherine L.</td>
<td>9260 31st Street N.</td>
<td>House</td>
<td>918.4</td>
<td>911.6</td>
<td>Water in basement</td>
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<td>7</td>
<td>Sterbenk, Theodore P.</td>
<td>9141 31st Street N.</td>
<td>House</td>
<td>919.8</td>
<td>913.0</td>
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<td>8</td>
<td>Knoblauch, Arthur &amp; Gloria</td>
<td>9181 31st Street N.</td>
<td>House</td>
<td>917.9</td>
<td>911.1</td>
<td>Has had water in basement</td>
</tr>
<tr>
<td>9</td>
<td>Friedrich, Paul &amp; Charlene</td>
<td>9343 31st Street N.</td>
<td>House</td>
<td>--</td>
<td>913.6</td>
<td></td>
</tr>
<tr>
<td>9a</td>
<td></td>
<td></td>
<td>Shed 911.5*</td>
<td>911.5*</td>
<td>N.A.</td>
<td></td>
</tr>
<tr>
<td>9b</td>
<td></td>
<td></td>
<td>Garage E. of House</td>
<td>911.8</td>
<td>N.A.</td>
<td></td>
</tr>
<tr>
<td>9c</td>
<td></td>
<td></td>
<td>Small Shed NE of House</td>
<td>912.7</td>
<td>N.A.</td>
<td></td>
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<tr>
<td>10</td>
<td>Friedrich, Jimmy &amp; Nancy</td>
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<td>--</td>
<td>--</td>
<td>919.1</td>
<td></td>
</tr>
<tr>
<td>10a</td>
<td></td>
<td></td>
<td>S. Shed</td>
<td>913.5</td>
<td>N.A.</td>
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</tr>
<tr>
<td>10b</td>
<td></td>
<td></td>
<td>Middle Shed</td>
<td>912.2*</td>
<td>N.A.</td>
<td></td>
</tr>
<tr>
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<td></td>
<td>No. Shed</td>
<td>913.4</td>
<td>N.A.</td>
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<td>Friedrich, Earl</td>
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<td></td>
<td>Metal Shed</td>
<td>915.9</td>
<td>N.A.</td>
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<tr>
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<td></td>
<td>Stone Building</td>
<td>914.6</td>
<td>N.A.</td>
<td></td>
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<tr>
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<td></td>
<td>White Shed Next to Trailer</td>
<td>916.4</td>
<td>N.A.</td>
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<td></td>
<td>Trailer House</td>
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<td>N.A.</td>
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</tr>
<tr>
<td>11e</td>
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<td></td>
<td>Small Shed Near Pond</td>
<td>913.0</td>
<td>N.A.</td>
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<td>12</td>
<td>Grothe, Jack &amp; Emily</td>
<td>9350 31st Street N.</td>
<td>House</td>
<td>916.1</td>
<td>910.5</td>
<td>8” water in basement</td>
</tr>
</tbody>
</table>

*Includes sand placed in shed.
Figure B-5.26-2

LOCAL DRAINAGE FEATURES
Valley Branch Watershed District

100 yr. Flood Plain
Pipe
Open Channel
Theoretical Run-out Path

Approximate Scale in Feet

2000 Topography Shows El. 917
Figure B-5.26-3

PROFILE OF FLOW PATH ALONG NORTH SIDE OF R.R. TRACKS
Valley Branch Watershed District
Figure B-5.26-5
PROFILE OF FLOW PATH ALONG SOUTH SIDE OF R.R. TRACKS
Valley Branch Watershed District