# Section 7
# Problem Area Identification

## 7.1 Introduction

The analysis described in the previous sections of this report identified potential problem areas related to flooding and drainage, streambank stability, culvert capacity and blockage, and water quality. This section presents a description of the problem areas and the methods used to identify the potential problems.

A variety of flooding and drainage problems have been reported to the City of New Berlin by its residents and public officials. The problems are classified as either primary or minor according to whether they are located on the primary storm water management system or not. The flooding problems associated with primary and minor systems are discussed in Section 7.2. The storm water management plan will address the primary system problems only.

The hydraulic structure inventory, described in Section 4, evaluated culverts for various deficiencies including insufficient flow capacity, backwater effects, and road over topping. Section 7.3 presents the culverts identified as having deficiencies. In addition to capacity, another key problem concerning culverts is blockage or obstruction of culverts. During the inventory culverts were identified as partly or substantially blocked. A summary of the blocked culverts was submitted directly to the City of New Berlin for prompt maintenance.

Drainage problems were identified based on evaluation of 556 ditch segments located within the study area. A segment is a road ditch along one side from one road crossing to the next road crossing. Erosion, sedimentation, vegetation, trash, and standing water are the criteria under which possible drainage problems were identified. Drainage ditch problems are discussed in Section 7.4.

The streambank inventory, described in Section 4, evaluated the channel stability of the major streams within the City of New Berlin. Each reach was rated as either excellent, good, fair, or poor. The stream reaches rated as fair or poor are considered generally unstable and should be repaired and/or stabilized. Section 7.5 describes the unstable reaches.

The water quality analysis, described in Section 6, identified critical land uses which contribute a majority of the storm water pollutants and areas which are significant contributors of pollutants within the City of New Berlin. Industries which have the greatest potential for contributing significant storm water pollutant loadings are also identified. Section 7.6 describes the critical land uses, the areas which are significant storm water pollutant contributors, and the industrial areas which have the greatest potential for contributing significant storm water pollutant loadings.

## 7.2 Flooding Problem Areas

There is a wide range of perceived flooding and drainage problems experienced by the residents of New Berlin. Not all of these problems can be solved within the context of a storm water management plan, while other problems may not be cost effective to solve.

Flood problems are identified through citizen and City of New Berlin representative reports of nuisance ponding or property damage. Reports resulted primarily from incidents stemming from rainfalls on June 20 through 21, 1997; July 2, 1997; and August 6, 1998. However, several of the reported problems were well known prior to these storms. Generally, the reported problems fall into one of the following categories:

- Basement flooding - ranging from a few inches to several feet in depth.
- Yard flooding - by either ponded or moving water.
- Street flooding - due to overtopping at cross-drainage structures or ponding over storm inlets.
- Streambank and drainage way erosion.

The problem locations identified by residents and City of New Berlin Representatives are shown on Plate 1 in Appendix A. Table 7-1 presents a summary of the reported problems.

While these might all be problems worth solving, the cause of a particular problem may be such that the problem cannot be solved through storm water management improvements. Examples of problems for which solutions are beyond the scope of a storm water management plan include:

- Basement flooding caused by sump pump failure due to interruption of electrical service or inadequate sump pump capacity.
- Basement flooding is caused by sanitary sewer backup. This is either a sanitary sewer collection system maintenance problem or the result of illegal connections of sump pumps or storm water drains to the sanitary sewer.
- Street flooding during heavy rainfalls. Storm sewers and roadside ditches typically are designed to convey the 10-year storm. Rainfalls in excess of the 10-year volume will cause street and yard flooding up to six inches deep.
- Flood threats on structures or other improvements that have been constructed within the 100-year floodplain that has been delineated according to the FEMA flood insurance study procedures.

## Table 7-1: Flood Control and Drainage Problems Reported by City of New Berlin Residents and Representatives

| Subwatershed | Subbasin | Section | Map ID* | Problem Description | System | Likely Cause |
|---|---|---|---|---|---|---|
| Underwood Creek | 1A010 | 1 | B,N,BB | Overflow of box culvert entrance at 124th and Meadow Lane floods basements and back yards | Primary | Clogging of trash rack at culvert inlet and inlet grates along culvert |
| Underwood Creek | 1A010 | 1 | J | Flooded Basement at 1517 S. 124th Street | Primary | Inadequate clogged or surcharged inlets to enclosed channel |
| Underwood Creek | 1A020 | 1 | Z | Home in floodplain upstream of Elm Grove Road | Primary | Home located within Floodplain |
| Underwood Creek | 1A032 | 1 | AA | Overtopping of Arcadian Drive and Elm Grove Road | Primary | Inadequate culvert capacity |
| Upper Root River | 2E060 | 25 | G,U | House flooding upstream of Grange Road | Primary | Road grade higher than low water entry elevation of house. Backup from culvert floods house |
| Upper Root River | 2B010 | 12 | C | Road flooding on Lagoon Road north of Cleveland Avenue | Primary | Inadequate culvert capacity or obstructed by debris |
| Upper Root River | 2B010 | 12 | R | Washout of private bridge at 128th and Cleveland | Primary | Property straddles major tributary of Root River. Property is surrounded by 100-year floodplain. |
| Upper Root River | 2A020 | 1 | L | Yard flooding and erosion in back yards on north side of Park Avenue | Primary | Inadequate culvert capacity under downstream culvert |
| Deer Creek | 3A010 | 3 | M | Not Stated | Primary | Culvert under 164th north of 1545 164th is too small |
| Deer Creek | 3A010 | 3 | CC | Inadequate drainage of backyard at 1534 South 168th causing yard flooding | Primary | No drainage path |
| Calhoun Creek | 4C010 | 22 | H,DD | Yard or common area? Flooding at outlet of 60-inch storm sewer | Minor | Inadequate positive drainage toward main channel. Possible siltation problem |
| Calhoun Creek | 4A010 | 22 | T | Unspecified flooding problem on Mary Ross, Homestead and Selentine | Minor | Not determined |
| Poplar Creek | 6A041 | 15 | P | Yard flooding, driveway culverts washed out | Minor | Ditch capacity inadequate to handle large upstream tributary area |
| Poplar Creek | 6A041 | 15 | S | Erosion Problems on Poplar Creek Tributary | Minor | Cutting of stream banks |
| Upper Root River | 2A020 | 1 | F | Flooding of one house and several yards east of the intersection of Elm Grove and Honey Lane | Minor | Inadequate flow path toward main channel |
| Upper Root River | 2A020 | 1 | K | Yard flooding at 12913 Honey Lane | Minor | Inadequate driveway culvert |
| Upper Root River | 2A050 | 2 | A,W | Road flooding on Koestner Lane creates access problems and yard flooding | Minor | Inadequate flow path toward railroad |
| Underwood Creek | 1A031 | 2 | E | Basement and yard flooding at 1600 Sherwood Drive | Minor | Cemetery drainage flows through yards to reach street |
| Underwood Creek | 1A010 | 1 | Q | Yard flooding with possible ditch overflow to basement at 124th and Prospect | Minor | Yard is in former drainageway |
| Underwood Creek | 1A010 | 1 | D | Flooding southwest of the intersection of Elm Grove and Meadow Lane | Minor | Unclear |
| Underwood Creek | 1A032 | 1 | O | Road overtopping near 13075 Prospect Place | Minor | Insufficient Drainage |
| Upper Root River | 2B030 | 11 | FF | Yard flooding at 14520 Brian Drive | Minor | Insufficient Drainage |

- Flood threat on structures and other improvements during rainfall in excess of the 100-year events.

This plan examines options for solving specific residential and street flooding problems that are caused by inadequate capacity of the Primary Storm Water Management System (PSMS) and erosion problems in PSMS channels. The plan also presents solutions for serious capacity deficiencies in the minor drainage system. The PSMS is defined as the system of ponds, open channels, overflows, and roadway crossing structures designed to convey floodwaters. The PSMS is usually designed to handle the 1 percent recurrence interval, or 100-year event without damage or threat to public safety. The minor system is designed to carry flows resulting from frequent or *A*everyday" rainfalls without disruption. The minor system consists of storm sewers, street inlets, roadside ditches, and driveway culverts. These minor system facilities are usually designed to convey the 10-year storm flow. Therefore, significant ponding and street flow should be expected in storms greater than the 10-year recurrence interval storm event.

In order to evaluate the flooding problems, a priority system was developed to differentiate varying degrees of problem severity. Priorities are based upon two factors: the cost-effectiveness of the project and whether storm water management improvements can adequately solve the problem. Primary problems encompass both factors. Minor problems meet either one or none of the priority factors. Recommended solutions are developed only for the primary problems.

## 7.2.1 Primary Flooding Problems

Seven primary problems were identified from the reported problems of the City of New Berlin. Each problem is associated with one or more map identification letters which represent specific citizen reports. This form of identification is based upon the time the problem was reported to the City of New Berlin. The map identification was used to mark the problem location on Plate 1 in Appendix A. The location and the type of flooding problem for each primary flooding problem is discussed below.

### 7.2.1.1 Problem Area UNDERWOOD1 - Underwood Creek at Meadow Lane (Map ID - A, B, J, N, BB)

Along Meadow Lane between 128th and 124th Street, the South Branch of Underwood Creek is enclosed in a rectangular storm sewer that is initially nine-feet wide by four-feet high, and is ultimately 14 feet wide where it discharges into the Greenfield Park Golf Course, east of 124th Street. There are numerous reports of house, yard, and street flooding associated with this enclosed channel.

### 7.2.1.2 Problem Area UNDERWOOD2

***Problem Area UNDERWOOD 2a - Underwood Creek near Elm Grove Road (Map ID - D, Z, AA)***

This problem involves overbank flooding of yards and homes along a reach of the South Branch of Underwood Creek beginning about 500 feet upstream of Arcadian Drive. The primary cause of the problem is that the properties are in or very close to the 100-year floodplain.

***Problem Area UNDERWOOD 2b - Gatewood Park (Map ID - E,X)***

This residential area consists of six streets east of Sunny Slope Road and South of Greenfield Avenue. Residents experience extensive yard and basement flooding due to slow drainage of the neighborhood and adjacent cemetery. The cause of the problem is mild roadside ditch slopes and inadequate outlet capacity under Sunny Slope Road.

### 7.2.1.3 Problem Area ROOT1 - Upper Root River - 130th Block of Park Avenue (Map ID - L)

One residence experiences flooding along Park Avenue due to inadequately sized downstream culvert at Graham Street. Also, inadequate drainage ditch capacity exists between Elm Grove Road and Honey Lane south to the golf course.

### 7.2.1.4 Problem Area ROOT2 - Upper Root River - 132nd Street to Lagoon Road Along Cleveland Avenue (Map ID - C, R)

Approximately 15 homes are within the floodplain in the area bounded by Cleveland Avenue, National Avenue, 124th Street, and 132nd Street. The inlet and outlet configuration of the culverts are not parallel to the stream at the eastern Lagoon Road culverts at Cleveland Avenue. Road flooding occurs on Lagoon Road north of Cleveland Avenue. A private bridge at 128th Street and Cleveland Ave. has been washed out.

### 7.2.1.5 Problem Area ROOT3 Upper Root River - LaSalle Drive and Grange Avenue (Map ID - G, U)

A structure located adjacent to a tributary of the Upper Root River near Grange Avenue experiences flooding. Although a citizen report indicates a problem at Grange Avenue, the problem is caused by inadequate culvert capacity downstream at St. Mary=s Drive.

### 7.2.1.6 Problem Area ROOT4 - Upper Root River - Honey Lane (Map ID - F, K)

Yard flooding and erosion are experienced by several residences along a tributary to the Upper Root River and also drainage problems along the railroad tracks north of Honey Lane near Elm Grove Road. The problem is due to inadequate drainage capacity and culvert capacity.

#### 7.2.1.7 Problem Area DEER1 - Deer Creek - Buena Park (Map ID - M, CC)

Six residences experience structural flooding. Several additional residences experience yard and basement flooding. The problem stems from backup from inadequate culverts, ditch capacity, and lot grading. The general area slope is very flat. In addition, most homes have sump pump discharge into the ditch. Lawn clippings and yard waste contribute to culvert blockages.

### 7.2.2 Minor System Flooding Problems

Storm Water flooding problems identified as resulting from deficiencies in the minor storm water drainage system are listed below. The New Berlin Storm Water Management Master Plan does not provide conceptual engineering solutions to minor system problems. Further study of these problem areas may be warranted based on City of New Berlin staff recommendations. It may not be cost effective to solve minor system problems based on the current level of damages.

- Deer Creek:

  <Inadequate local drainage in backyards between 164th and 168th Street and Roosevelt Avenue

- Underwood Creek:

  <Insufficient drainage from Highland Memorial Park
  <Lack of storm water conveyance at Gatewood Drive and Clover Knoll Place
  <Inadequate culvert capacity at Kostner Lane and C. & N.W. Railroad
  <Sediment and debris blockage of Sunny Slope Road culvert
  <Surcharging manhole at 13000 block of Greenfield Avenue
  <Insufficient ditch storage at 124th Street and Prospect Drive

- Poplar Creek:

  <Minor erosion on Poplar Creek between Calhoun Road and Victor Road
  <Drainage easement backup at 157th Street and Monterey Drive
  <Insufficient ditch storage at 158th Street and Santa Rosa Boulevard
  <Sediment and debris blockage at Calhoun Road and Salentine Drive

- Calhoun Creek:

  <Sediment and debris blockage at Sovereign Drive

- Upper Root River:

  <Parkwood Lane storm sewer capacity

## 7.3 Culvert Capacity Problems

The hydrologic and hydraulic computer modeling analysis, described in Section 5, included a capacity analysis of approximately 73 road crossing culverts in the primary system in the City of New Berlin. The SWMM representation simulated road crossing culverts which incorporate energy losses in the culvert barrel(s) as well as the culvert entrance and departure reaches. The model also accounts for backwater (ponding) behind the culverts and the possibility of road overtopping. The culverts were analyzed for the flow conditions generated by the 2-, 10-, 25-, and 100-year recurrence interval storm events. Culverts were evaluated for several potential deficiencies including insufficient flow, capacity, excessive backwater, and over road topping. The following criteria were employed in identifying primary system culvert capacity deficiencies:

- Overtopping of main arterials in the 100-year storm,
- Insufficient flow capacity for the 100-year storm, and
- Excessive backwater behind a culvert in a developed area.

The analysis results indicate that 32 of the primary culverts modeled have capacity deficiencies. Primary system culverts determined to have capacity deficiencies are presented in Table 7-2.

As part of the citywide culvert capacity analysis, described in Section 5, 715 culverts in the minor storm water management system were evaluated for capacity and level of service. Culverts in the minor or secondary storm water management system should provide at least 10-year capacity. Minor culverts determined to have capacity deficiencies are presented in Table 7-3. The analysis results indicate that approximately 83 culverts do not meet this criterion.

## 7.4 Drainage Ditch Problems

Drainage problems are identified through the examination of 556 ditch segments located within the New Berlin study area. Based on the inventory, ditches were evaluated based upon location, shape, and levels of erosion, sedimentation, vegetation, garbage, and standing water.

Upon field inspection, 32 locations are determined to be problem areas. Problem areas are defined as locations requiring maintenance operations for erosion, re-stabilization, clearing of sedimentation, or collection of trash deposits to ensure proper drainage. Table 7-4 presents the drainage ditch problem locations.

## 7.5 Streambank Problems

The streambank inventory, discussed in Section 4, classified approximately 34 miles of channel in the New Berlin study area. This inventory evaluated the channel stability

## Table 7-1: Flood Control and Drainage Problems Reported by City of New Berlin Residents and Representatives

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| Underwood Creek | 1A010 | 1 | J | Flooded Basement at 1517 S. 124th Street | Primary | Inadequate clogged or surcharged inlets to enclosed channel |
| Underwood Creek | 1A020 | 1 | Z | Home in floodplain upstream of Elm Grove Road | Primary | Home located within Floodplain |
| Underwood Creek | 1A032 | 1 | AA | Overtopping of Arcadian Drive and Elm Grove Road | Primary | Inadequate culvert capacity |
| Upper Root River | 2E060 | 25 | G,U | House flooding upstream of Grange Road | Primary | Road grade higher than low water entry elevation of house. Backup from culvert floods house |
| Upper Root River | 2B010 | 12 | C | Road flooding on Lagoon Road north of Cleveland Avenue | Primary | Inadequate culvert capacity or obstructed by debris |
| Upper Root River | 2B010 | 12 | R | Washout of private bridge at 128th and Cleveland | Primary | Property straddles major tributary of Root River. Property is surrounded by 100-year floodplain. |
| Upper Root River | 2A020 | 1 | L | Yard flooding and erosion in back yards on north side of Park Avenue | Primary | Inadequate culvert capacity under downstream culvert |
| Deer Creek | 3A010 | 3 | M | Not Stated | Primary | Culvert under 164th north of 1545 164th is too small |
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| Calhoun Creek | 4C010 | 22 | H,DD | Yard or common area? Flooding at outlet of 60-inch storm sewer | Minor | Inadequate positive drainage toward main channel. Possible siltation problem |
| Calhoun Creek | 4A010 | 22 | T | Unspecified flooding problem on Mary Ross, Homestead and Selentine | Minor | Not determined |
| Poplar Creek | 6A041 | 15 | P | Yard flooding, driveway culverts washed out | Minor | Ditch capacity inadequate to handle large upstream tributary area |
| Poplar Creek | 6A041 | 15 | S | Erosion Problems on Poplar Creek Tributary | Minor | Cutting of stream banks |
| Upper Root River | 2A020 | 1 | F | Flooding of one house and several yards east of the intersection of Elm Grove and Honey Lane | Minor | Inadequate flow path toward main channel |
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| Upper Root River | 2A050 | 2 | A,W | Road flooding on Koestner Lane creates access problems and yard flooding | Minor | Inadequate flow path toward railroad |
| Underwood Creek | 1A031 | 2 | E | Basement and yard flooding at 1600 Sherwood Drive | Minor | Cemetery drainage flows through yards to reach street |
| Underwood Creek | 1A010 | 1 | Q | Yard flooding with possible ditch overflow to basement at 124th and Prospect | Minor | Yard is in former drainageway |
| Underwood Creek | 1A010 | 1 | D | Flooding southwest of the intersection of Elm Grove and Meadow Lane | Minor | Unclear |
| Underwood Creek | 1A032 | 1 | O | Road overtopping near 13075 Prospect Place | Minor | Insufficient Drainage |
| Upper Root River | 2B030 | 11 | FF | Yard flooding at 14520 Brian Drive | Minor | Insufficient Drainage |

## Table 7-2: Culvert Capacity Analysis Results - Undersized Primary System Culverts

| Street Name | Subwatershed | Culvert ID# | Capacity (cfs) | Future Conditon Flow (cfs) | | | | Level of Protection | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 2yr | 10yr | 25yr | 100yr | Flow Capacity | Road Overtopping* |
| 124th Street | Root | 24.04.08/09 | 180 | 251 | 318 | 434 | 695 | <2 year | 2 year |
| 132nd Street | | 12.03.16/17 | 242 | 130 | 210 | 262 | 413 | <25 year | 25 year |
| 133rd Street | | 12.03.13/14 | 242 | 130 | 214 | 266 | 414 | <25 year | 25 year |
| Dakota Street | | 12.03.08 | 14 | 24 | 34 | 45 | 68 | <2 year | 100 year |
| 128th Street South | | 12.04.05 | 121 | 83 | 110 | 127 | 164 | <25 year | 25 year |
| 130th Street | | 12.04.03 | 121 | 93 | 132 | 195 | 266 | <10 year | 25 year |
| National Avenue | | 12.04.03 | 211 | 118 | 157 | 217 | 338 | <25 year | 2 year |
| 124th Street | | 12.04.07 | 187 | 87 | 121 | 160 | 287 | <100 year | 25 year |
| Coldspring Road | | 24.01.16 | 21 | 9 | 13 | 17 | 29 | <100 year | 100 year |
| Balboa Drive | | 25.04.08/09 | 118 | 82 | 118 | 154 | 251 | < 25 year | 25 year |
| Cherrytree Lane | | 25.01.19/20 | 218 | 84 | 118 | 156 | 277 | <100 year | 25 year |
| Radisson Court | | 25.01.12/13 | 210 | 94 | 138 | 170 | 275 | <100 year | 25 year |
| Frances Street | | 36.01.05 | 36 | 15 | 27 | 31 | 87 | < 100 year | 10 year |
| Beres Road | Calhoun | 28.04.15/14/13 | 444 | 148 | 297 | 461 | 825 | <25 year | <2 year |
| Calhoun Road | | 27.01.01/02 | 284 | 184 | 274 | 426 | 729 | <25 year | 2 year |
| Rock Freeway (I-43) | | 27.04.06/07 | 224 | 153 | 254 | 336 | 488 | <10 year | 25 year |
| Martin Road | | 33.03.05/02.05 | 118 | 59 | 90 | 120 | 197 | <25 year | 10 year |
| Greenfield Avenue | Deer | 03.01.16 | 1069 | 587 | 885 | 1060 | 1341 | <100 year | 100 year |
| C & NW Railroad | | 03.01.11/12 | 980 | 562 | 840 | 1006 | 1250 | <25 year | 100 year |
| Lincoln Avenue | | 03.04.05 | 527 | 397 | 617 | 744 | 1100 | <10 year | 10 year |
| Cleveland Avenue | | 10.03.01/02/03 | 999 | 750 | 1242 | 1530 | 2016 | <10 year | 100 year |
| James Drive | | 10.04.02/03/04 | 1128 | 600 | 1008 | 1269 | 1737 | <25 year | 100 year |
| National Avenue | | 14.02.06 | 366 | 185 | 313 | 398 | 547 | <25 year | 100 year |
| Cleveland Avenue | Poplar | 09.04.01/02 | 324 | 230 | 368 | 422 | 502 | <10 year | 100 year |
| Coffee Road | | 16.01.01/02/03 | 804 | 234 | 396 | 630 | 1179 | <100 year | 100 year |
| Observatory Road | | 21.01.01 | 105 | 157 | 239 | 302 | 357 | <2 year | 100 year |
| Cleveland Avenue | | 08.03.09/10 | 108 | 94 | 111 | 119 | 136 | <10 year | < 2 year |
| Willow Road | | 16.02.04 | 33 | 33 | 40 | 45 | 53 | 2 year | < 2 year |
| Gravel Road | | 05.03.09 | 15 | 6 | 8 | 14 | 27 | <100 year | 25 year |
| Lincoln Avenue | | 06.04.05 | 14 | 6 | 9 | 25 | 29 | <25 year | 10 year |
| Arcadian Drive | Underwood | 01.02.10 | 177 | 127 | 174 | 206 | 272 | <25 year | 50 year |
| Elm Grove Road | | 01.01.12 | 138 | 136 | 200 | 245 | 337 | <10 year | 2 year |

* Road overtopping can occur even though the flow capacity is not exceeded when there is backwater from downstream.

## Table 7 - 3: Culvert Capacity Analysis Results- Undersized Minor System Culverts

| CULVERT ID | Location | Size (inches) | Shape & Material | Length (feet) | Upstream Invert (feet) | Downstream Invert (feet) | Slope (ft/ft) | Capacity (cfs) | 100 yr Flow (cfs) | 10 yr Flow (cfs) | 10 yr Shortfall Shortfall (cfs) | Percent Short |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21.01.02 | OBSERVATORY & WOELFEL | 21X30 | ARCP | 120 | 898.62 | 898.42 | 0.0017 | 19 | 308 | 166 | 147 | 89% |
| 15.03.01 | CALHOUN | 30 | CMP | 57 | 869.22 | 868.97 | 0.0044 | 37 | 504 | 252 | 215 | 85% |
| 06.01.20 | C&NW RR | 24 | RCP | 53 | 827.35 | 826.97 | 0.0072 | 21 | 292 | 144 | 123 | 85% |
| 04.01.13 | C & NW RR | 18X24 | CMPA | 36 | 838.98 | 836.05 | 0.0814 | 13 | 117 | 58 | 45 | 78% |
| 25.01.23 | COURTLAND PARKWAY | 18X24 | ACMP | 56 | 854.71 | 852.53 | 0.0389 | 14 | 155 | 53 | 39 | 73% |
| 01.02.04 | GREENFIELD & 124th | 24 | RCP | 53 | 759.76 | 758.51 | 0.0236 | 21 | 177 | 79 | 58 | 73% |
| 16.01.11 | CALHOUN S. OF COFFEE | 30 | CMP | 57 | 869.22 | 868.97 | 0.0044 | 37 | 274 | 122 | 85 | 69% |
| 27.03.09 | BELOIT | 48 | RCP | 175 | 866.70 | 864.00 | 0.0154 | 121 | 691 | 396 | 275 | 69% |
| 106.03.10 | NATIONAL & CROWBAR | 24 | CMP | 70 | 956.59 | 955.61 | 0.0140 | 21 | 124 | 67 | 46 | 68% |
| 28.02.13 | BELOIT & TRIBUTARY | 30X42 | ACMP | 40 | 843.05 | 842.71 | 0.0085 | 48 | 226 | 140 | 92 | 66% |
| 08.03.07 | CLEVELAND & JOHNSON | 24 | CMP | 65 | 852.05 | 850.97 | 0.0166 | 21 | 135 | 62 | 40 | 65% |
| 29.02.02 | LAWNSDALE | 24 | CCP | 41 | 888.58 | 888.55 | 0.0007 | 21 | 133 | 60 | 39 | 65% |
| 25.04.29 | 124TH & JOLIET | 18X27 | ACMP | 43 | 815.02 | 814.58 | 0.0102 | 16 | 107 | 44 | 29 | 65% |
| 25.02.02 | RADISSON & MENARD | 18X27 | ACMP | 45 | 882.80 | 880.96 | 0.0409 | 14 | 116 | 40 | 25 | 64% |
| 13.03.19 | CRAWFORD & WILBUR | 24 | CMP | 71 | 818.90 | 818.21 | 0.0097 | 21 | 173 | 59 | 38 | 64% |
| 01.02.25 | NEEDHAM & 124th | 27 | RCP | 95 | 752.35 | 748.67 | 0.0387 | 29 | 177 | 79 | 50 | 64% |
| 32.01.12 | RACINE & JULIUS | 24 | RCP | 70 | 862.00 | 861.49 | 0.0073 | 21 | 103 | 58 | 37 | 63% |
| 04.04.01 | GREENFIELD | 24 | CMP | 45 | 838.79 | 832.58 | 0.1380 | 21 | 126 | 57 | 36 | 63% |
| 32.04.05 | GLENWOOD & TIMBERLANE | 21X27 | ACMP | 40 | 837.39 | 836.94 | 0.0112 | 20 | 68 | 53 | 33 | 62% |
| 32.01.08 | TERRACE & TIMBERLANE | 21X27 | ACMP | 40 | 848.64 | 847.30 | 0.0335 | 20 | 68 | 53 | 33 | 62% |
| 06.01.19 | C&NW RR | 48 | CONC | 34 | 827.13 | 827.01 | 0.0035 | 55 | 292 | 144 | 89 | 62% |
| 27.04.08 | I-43 & MOORLAND | 24 | RCP | 60 | 873.33 | 872.75 | 0.0097 | 21 | 94 | 54 | 33 | 60% |
| 11.02.16 | LINCOLN & BROOKSIDE | 24 | CMP | 60 | 863.49 | 863.00 | 0.0082 | 21 | 104 | 52 | 31 | 59% |
| 27.03.08 | BELOIT | 18X24 | ACMP | 49 | 872.80 | 872.50 | 0.0061 | 14 | 58 | 33 | 19 | 57% |
| 28.03.10 | MARTIN & EGOFSKE | 24 | CMP | 62 | 852.33 | 847.78 | 0.0734 | 21 | 84 | 49 | 28 | 56% |
| 21.01.01 | OBSERVATORY & WOELFEL | 36X72 | ACMP | 42 | 885.25 | 884.91 | 0.0081 | 105 | 343 | 239 | 134 | 56% |
| 16.03.01 | COFFEE & WOELFEL | 18X24 | ACMP | 47 | 872.42 | 872.25 | 0.0036 | 14 | 68 | 31 | 16 | 54% |
| 01.02.14 | PROSPECT & 124th | 30 | CMP | 30 | 760.57 | 760.57 | 0.0000 | 37 | 177 | 79 | 42 | 53% |
| 01.02.27 | PROSPECT PLACE & MILTON | 17X42 | ACMP | 35 | 813.37 | 810.33 | 0.0869 | 21 | 97 | 44 | 23 | 52% |
| 25.02.20 | I-43 ROCK FREEWAY | 30 | CMP | 443 | 868.21 | 861.23 | 0.0158 | 37 | 190 | 76 | 39 | 51% |
| 27.04.09 | I-43 & MOORLAND | 24 | RCP | 24 | 869.33 | 869.05 | 0.0117 | 21 | 75 | 43 | 22 | 51% |
| 25.04.12 | MARQUETTE AND MAGELLAN | 24 | CMP | 40 | 842.88 | 842.22 | 0.0165 | 21 | 146 | 43 | 21 | 50% |
| 01.01.04 | PROSPECT & CONRAD | 24 | CMP | 43 | 770.92 | 771.75 | -0.0193 | 10 | 44 | 20 | 10 | 48% |
| 105.02.04 | RACINE DRIVE (AVENUE) | 72 | CMP | 131 | 829.14 | 829.03 | 0.0008 | 333 | 1078 | 637 | 304 | 48% |
| 02.04.26 | LINCOLN & MEADOWMERE | 18X30 | ACMP | 46 | 842.71 | 842.05 | 0.0143 | 19 | 87 | 35 | 16 | 47% |
| 07.02.02 | AMOR & CLEVELAND | 30 | CMP | 81 | 855.78 | 854.64 | 0.0141 | 17 | 79 | 32 | 15 | 47% |
| 11.02.01 | CLEVELAND & PARKWAY | 30 | CMP | 96 | 870.76 | 870.36 | 0.0042 | 37 | 139 | 69 | 32 | 46% |
| 01.02.09 | PROSPECT & ELM GROVE | 24 | CMP | 40 | 807.62 | 807.09 | 0.0132 | 21 | 88 | 40 | 18 | 46% |
| 01.01.11 | GREENFIELD & ELM GROVE | 24 | CMP | 53 | 765.72 | 764.41 | 0.0248 | 21 | 88 | 40 | 18 | 46% |
| 12.04.05 | MONTANA & S.128TH | 48 | RCP | 55 | 759.45 | 758.84 | 0.0111 | 121 | 421 | 217 | 96 | 44% |
| 05.03.05 | BTWN LINCOLN & C&NW RR | 48 | RCP | 33 | 827.36 | 827.13 | 0.0070 | 121 | 438 | 216 | 95 | 44% |
| 01.04.03 | GRAHAM & TRIB | 15X27 | ACMP | 51 | 774.45 | 774.08 | 0.0073 | 13 | 66 | 23 | 10 | 43% |
| 29.01.06 | EGOFSKE & OVERLOOK | 27 | RCP | 40 | 898.87 | 897.00 | 0.0468 | 29 | 77 | 49 | 20 | 41% |
| 15.04.05 | ST. FRANCIS & TOP-O-HILL | 18X30 | ACMP | 43 | 904.80 | 904.38 | 0.0098 | 19 | 63 | 32 | 13 | 41% |

## Table 7 - 3: Culvert Capacity Analysis Results- Undersized Minor System Culverts

| CULVERT ID | Location | Size (inches) | Shape & Material | Length (feet) | Upstream Invert (feet) | Downstream Invert (feet) | Slope (ft/ft) | Capacity (cfs) | 100 yr Flow (cfs) | 10 yr Flow (cfs) | 10 yr Shortfall Shortfall (cfs) | Percent Short |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 03.02.42 | ROOSEVELT & S. 167th | 24X36 | ACMP | 43 | 837.80 | 837.26 | 0.0126 | 33 | 117 | 57 | 23 | 41% |
| 32.01.11 | RACINE & JULIUS | 24 | RCP | 66 | 863.25 | 862.43 | 0.0124 | 21 | 62 | 35 | 13 | 39% |
| 10.02.10 | S. 170th & LINCOLN | 24 | ACMP | 54 | 846.51 | 845.71 | 0.0148 | 21 | 62 | 35 | 13 | 38% |
| 24.04.13 | BELOIT & FREEWAY | 24 | CMP | 106 | 869.79 | 869.34 | 0.0042 | 19 | 76 | 30 | 11 | 37% |
| 16.02.05 | THORNAPPLE | 20X28 | ACMP | 45 | 895.78 | 895.76 | 0.0004 | 17 | 58 | 26 | 9 | 35% |
| 26.02.08 | MOORLAND & I-43 | 24 | RCP | 184 | 862.49 | 861.63 | 0.0047 | 21 | 56 | 32 | 11 | 34% |
| 27.04.05 | ROCK I-43 | 24 | RCP | 84 | 893.48 | 893.10 | 0.0045 | 21 | 56 | 32 | 11 | 34% |
| 32.01.04 | TIMBERLANE & VISTA | 18X24 | ACMP | 45 | 864.32 | 864.03 | 0.0064 | 14 | 31 | 21 | 7 | 33% |
| 15.02.08 | VICTOR & CALHOUN | 3 @ 60" | CMP | 60 | 856.28 | 855.88 | 0.0067 | 633 | 1890 | 945 | 312 | 33% |
| 22.03.03 | SALENTINE & CALDWELL | 18X30 | ACMP | 47 | 851.24 | 850.87 | 0.0079 | 19 | 46 | 28 | 9 | 33% |
| 24.04.05 | ARMOUR & NORMAN | 21 | CMP | 57 | 866.13 | 865.92 | 0.0037 | 15 | 57 | 23 | 7 | 33% |
| 25.01.32 | LANGLADE & CTH I | 24X36 | ACMP | 43 | 858.33 | 858.24 | 0.0021 | 33 | 138 | 50 | 16 | 33% |
| 15.04.07 | ST. FRANCIS | 24 | CMP | 37 | 903.66 | 902.66 | 0.0270 | 21 | 63 | 32 | 10 | 32% |
| 11.02.04 | PARKWAY | 36 | RCP | 68 | 864.40 | 864.10 | 0.0044 | 59 | 174 | 87 | 28 | 32% |
| 01.02.20 | BERLIN | 21 | RCP | 110 | 823.78 | 823.67 | 0.0010 | 15 | 49 | 22 | 7 | 31% |
| 18.03.05 | RACINE & ORCHARD | 24 | CMP | 44 | 946.19 | 945.98 | 0.0048 | 21 | 65 | 30 | 9 | 29% |
| 03.02.30 | ADDISON &168th | 18X27 | ACMP | 238 | 850.33 | 846.69 | 0.0153 | 19 | 52 | 25 | 7 | 27% |
| 36.04.01 | JANESVILLE | 24 | CMP | 82 | 809.78 | 809.27 | 0.0062 | 21 | 75 | 28 | 7 | 25% |
| 25.03.18 | MENARD & GUERIN | 21X27 | ACMP | 51 | 876.52 | 875.88 | 0.0125 | 20 | 78 | 26 | 6 | 24% |
| 04.02.12 | CALHOUN | 24X36 | ACMP | 37 | 865.41 | 865.07 | 0.0092 | 33 | 88 | 43 | 10 | 23% |
| 28.03.08 | BERES & MARTIN | 20X30 | ACMP | 20 | 837.50 | 837.07 | 0.0215 | 20 | 44 | 25 | 5 | 21% |
| 18.03.08 | WOODLAND | 36X48 | CMP | 40 | 937.67 | 937.13 | 0.0135 | 80 | 217 | 101 | 21 | 21% |
| 11.04.20 | CLEVELAND & SUNNYSLOPE | 18X30 | ACMP | 62 | 839.23 | 838.40 | 0.0134 | 19 | 58 | 23 | 5 | 20% |
| 02.04.13 | WOODLAND | 24X36 | ACMP | 46 | 847.12 | 847.02 | 0.0022 | 33 | 102 | 41 | 7 | 18% |
| 10.04.01 | RYERSON & 30' UTILITY EASEMENT | 42X54 | ACMP | 79 | 852.99 | 851.82 | 0.0148 | 104 | 250 | 125 | 21 | 17% |
| 03.01.15 | C&NW RR & TRIB | 36X58 | ACMP | 42 | 836.85 | 836.77 | 0.0019 | 105 | 260 | 126 | 21 | 17% |
| 28.04.05 | SATURN | 21X27 | ACMP | 41 | 863.42 | 862.83 | 0.0144 | 20 | 35 | 24 | 4 | 17% |
| 02.04.28 | LINCOLN & BROOKLAND | 24X32 | ACMP | 57 | 848.42 | 845.87 | 0.0447 | 29 | 87 | 35 | 6 | 16% |
| 10.04.05 | 160th 20' DRAINAGE EASEMENT | 24 | CMP | 9 | 860.09 | 860.02 | 0.0078 | 21 | 50 | 25 | 4 | 14% |
| 25.03.06 | ANDRAE & GRANGE | 27X42 | ACMP | 38 | 858.82 | 857.98 | 0.0221 | 46 | 155 | 53 | 7 | 14% |
| 15.04.06 | ST. FRANCIS & 159th | 18X30 | ACMP | 49 | 905.76 | 905.27 | 0.0100 | 19 | 42 | 21 | 2 | 12% |
| 15.01.03 | RIVIERA & MONTERREY | 18X30 | ACMP | 40 | 874.83 | 874.44 | 0.0097 | 19 | 42 | 21 | 2 | 12% |
| 11.03.02 | CLEVELAND & 152nd | 24 | CMP | 35 | 886.36 | 885.40 | 0.0274 | 21 | 46 | 24 | 3 | 12% |
| 11.03.06 | CLEVELAND & 149th | 24 | CMP | 53 | 874.83 | 874.42 | 0.0077 | 21 | 46 | 24 | 3 | 12% |
| 12.03.08 | DAKOTA & MONTANA | 15x30 | ACMP | 44 | 794.07 | 792.96 | 0.0252 | 14 | 54 | 16 | 2 | 11% |
| 03.03.08 | LINCOLN AVE UTILITY & RR & DRAINAGE | 30X42 | ACMP | 33 | 842.94 | 842.66 | 0.0085 | 54 | 122 | 61 | 7 | 11% |
| 28.03.09 | EGOFSKE & BERES | 24X36 | ACMP | 86 | 837.84 | 836.46 | 0.0160 | 33 | 65 | 37 | 4 | 10% |
| 36.01.06 | FRANCES & ST. MARY'S | 2 @ 36x132 | CONC | 41 | 805.20 | 805.03 | 0.0041 | 498 | 1476 | 554 | 56 | 10% |
| 15.01.06 | SANTA ROSA BLVD | 32X48 | ACMP | 38 | 880.59 | 880.50 | 0.0024 | 76 | 168 | 84 | 8 | 10% |

**Table 7-4: Summary of Drainage Ditch Problem Areas**

| Subwatershed | Section | Location | Depth | Width | Shape | Identified Problem |
|---|---|---|---|---|---|---|
| Calhoun Creek | 26 | North side of Beloit Road, west of Small Road | 2'-5' | 5'-10' | U | Bottom erosion, trash accumulation |
| Deer Creek | 2 | South side of Rogers Drive, east of Valley Spring Court | 1'-2' | 5'-10' | V - U | Bottom Erosion |
| Deer Creek | 2 | North side of Gatewood Drive, east of Woodside Drive | 1'-2' | 5'-10' | V | Bottom erosion, sedimentation, standing water |
| Deer Creek | 3 | South side of Rogers Drive, west of Deer Creek | 2'-5' | 5'-10' | flat | Bottom and side erosion, sedimentation, trash accumulation, standing water |
| Deer Creek | 3 | South Side of Greenfield Avenue, between Calhoun and Moorland Roads | 2'-5' | 5'-10' | V - U | Bottom erosion, trash accumulation |
| Deer Creek | 2 | South side of Greenfield Avenue, east of Moorland Road | 2'-5' | 5'-10' | U | Bottom erosion, trash accumulation |
| Deer Creek | 3 | North and east side of Carriage Lane, south of Greenfield Ave. west of Coach Light | 2'-5' | 5'-10' | flat to U | Bottom erosion |
| Deer Creek | 9 | West side of Calhoun Road, south of Lincoln Avenue | 2'-5' | 5'-10' | V - U | Bottom and side erosion, sparse/dry vegetation |
| Deer Creek | 15 | North side of El Dorando Drive, west of Moorland Road | 2'-5' | 5'-10' | flat to U | Bottom erosion |
| Deer Creek | 10 | East side of 162nd Street, north of Glendale Drive | 2'-5' | 5'-10' | flat to V | Bottom and side erosion, sedimentation, trash accumulation |
| Deer Creek | 10 | East side of 170th Street, north of Glendale Drive | 2'-5' | 5'-10' | flat to V | Bottom and side erosion, sedimentation, trash accumulation, standing water |
| Deer Creek | 11 | South side of Cleveland Avenue, between 149th and 152nd Street | 2'-5' | 5'-10' | V - U | Bottom erosion and trash accumulation |
| Deer Creek | 10 | South side of Lincoln Avenue, east of 170th Street | 2'-5' | 5'-10' | V - U | Bottom erosion |
| Poplar Creek | 11 | South side of Graylog Lane, east of Ranke Lane | 1'-2 | 5'-10' | V - U | Bottom erosion |
| Poplar Creek | 16 | North side of Coffee Road, west of Calhoun Road | 2'-5' | 5'-10' | V - U | Bottom and side erosion, sedimentation, trash accumulation, sparse vegetation |
| Poplar Creek | 4 | South side of Greenfield Avenue, east of Ridgeway Road | 1'-2' | 5'-10' | V | Bottom erosion, standing water |

**Table 7-4: Summary of Drainage Ditch Problem Areas**

| Subwatershed | Section | Location | Depth | Width | Shape | Identified Problem |
|---|---|---|---|---|---|---|
| Poplar Creek | | East side of Calhoun Road, north of Observation Road | 2'-5' | 5'-10' | flat to V | Bottom erosion |
| Poplar Creek | 14 | West side of Spruce Road at Crimson Lane | 2'-5' | 5'-10' | | to be determined |
| Poplar Creek | 16,21 | Woelfel Road, south of Coffee Road | 2'-5' | 5'-10' | V | Bottom and side erosion, sedimentation |
| Tess Corners Creek | 25,26 | East side of Sunny Slope Road, north and south of Grange Avenue | 2'-5' | 5'-10' | | Area is under construction, erosion |
| Underwood Creek | 1 | West side of Sunny Slope Road, south of Gatewood Drive | 2'-5' | 5'-10' | U | Bottom erosion, sedimentation, standing water, trash accumulation |
| Underwood Creek | 2 | South side of Greenfield Avenue, at Woodside Drive | 2'-5' | 5'-10' | V | Bottom and side erosion, standing water |
| Underwood Creek | 1 | South side of Greenfield Avenue, east of Parkview Avenue | 2'-5' | 5'-10' | U | Bottom erosion, trash accumulation |
| Upper Root River | 1 | West side of Old Oak Lane at Park Avenue | 2'-5' | 5'-10' | V - U | Bottom and side erosion, standing water |
| Upper Root River | 12 | South Side of Cardinal Parkway at Sunny Slope Road | 2'-5' | 5'-10' | V - U | Bottom erosion, sedimentation, standing water |
| Upper Root River | 14 | East side of Glen Park Road, North of Butternut | 2'-5' | 5'-10' | | to be determined |
| Upper Root River | 13 | West side of 124th Street, north of Wilbur Drive | 2'-5' | 5'-10' | flat to V | Bottom erosion, sedimentation |
| Upper Root River | 13 | North side of Howard Avenue, east of Sunny Ridge | 2'-5' | 5'-10' | flat to V | Bottom and side erosion, trash accumulation |
| Upper Root River | 2 | South side of Park Avenue, west of Sunny Slope Road | 1'-2' | 5'-10' | V - U | Bottom Erosion |
| Upper Root River | 1 | South side of Honey Lane, east of Sunny Slope Road | 1'-2' | 5'-10' | V - U | Bottom Erosion |
| Upper Root | 1 | West side of 124th Street, south of Graham Street | 2'-5' | 5'-10' | V | Bottom and side erosion, sedimentation, sparse and uprooted vegetation, trash accumulation |
| Upper Root River | 24 | North side of Beloit Road, east of Armor Avenue | 2'-5' | 5'-10' | flat to U | Bottom erosion, trash accumulation |

**Table 7-5: Summary of Stream Reaches with the Most Significant Streambank Stability Concerns**

| Subwatershed and Stream Reach Designation | Reach Length (miles) | Location | Overall Stream Rating | Streambank Stability Concern |
|---|---|---|---|---|
| Upper Root River - A Designation | 0.1 | Tributary to Root River from point 0.2 mile east of New Berlin Hills Golf Course property line northeast 0.1 mile | Poor | Poor landform slope cutting; fair mass wasting, debris jam potential, and vegetative bank protection |
| Upper Root River - C Designation | 0.1 | Tributary to Root River from pond north 0.1 mile to point extending south of Dakota St. and east of 134th St. | Poor | Poor landform slope and vegetative bank protection; fair mass wasting, debris jam potential, obstructions, cutting, and deposition |
| Upper Root River-A Designation | 0.1 | Tributary to Root River from point 0.1 mile west of New Berlin Hills Golf Course property line east to New Berlin Hills Golf Course property line | Fair | Fair landform slope, debris jam potential, vegetative bank protection, obstructions, cutting, and deposition |
| Tess Corners Creek - A Designation | 0.1 | Tributary to Root River from College Ave. north 0.1 mile | Fair | Poor debris jam potential, vegetative bank protection, and obstructions; fair cutting |
| Upper Root River - B Designation | 0.1 | Tributary to Root River from point 0.4 mile east of Sunny Slope Rd. southeast 0.1 mile | Fair | Poor landform slope; fair cutting and deposition |
| Upper Root River - A Designation | 0.1 | Tributary to Root River from point 0.3 mile east of New Berlin Hills Golf Course property line north 0.1 mile | Fair | Poor landform slope; fair mass wasting, debris jam potential, and vegetative bank protection |
| Poplar Creek | 0.8 | From Cleveland Ave. south to corner of Calhoun Rd. and Victor Rd. | Fair | Poor obstructions; poor/fair debris jam potential and vegetative bank protection; fair channel capacity, cutting, and deposition |
| Upper Root River - A Designation | 0.1 | Tributary to Root River from point 0.1 mile east of New Berlin Hills Golf Course property line east 0.1 mile | Fair | Poor mass wasting; fair landform slope and debris jam potential |
| Tess Corners Creek - A Designation | 0.1 | Tributary to Root River between Grange Ave. and College Ave. | Fair | Fair vegetative bank protection, cutting, and deposition |
| Calhoun Creek - B Designation | 0.2 | Tributary to Calhoun Creek from point 0.2 mile south of Beloit Rd. southwest 0.2 mile to pond in Calhoun Park | Fair | Fair debris jam potential, obstructions, cutting, and deposition |
| Underwood Creek - A Designation | 1.0 | Tributary to Underwood Creek from corner of Meadow Ln. and Sunny Slope Rd. east to storm sewer under Meadow Ln. | Fair | Poor/fair cutting; fair landform slope, debris jam potential, vegetative bank protection, and deposition |
| Upper Root River - D Designation | 0.1 | Tributary to Root River from point extending southwest of Manitoba Ave. north 0.1 mile | Fair | Fair landform slope, mass wasting, vegetative bank protection, and cutting |
| Upper Root River - G Designation | 0.1 | Tributary to Root River from point extending northeast of White Ct. southeast 0.1 mile to corner of Howard Ave. and 128th St. | Fair | Fair debris jam potential, vegetative bank protection, and cutting |

**Table 7-5: Summary of Stream Reaches with the Most Significant Streambank Stability Concerns**

| Subwatershed and Stream Reach Designation | Reach Length (miles) | Location | Overall Stream Rating | Streambank Stability Concern |
|---|---|---|---|---|
| Upper Root River - C Designation | 0.2 | Tributary to Root River form point extending south of Dakota St. and east of 134th St. northeast to 133rd St. | Fair | Poor vegetative bank protection; poor/fair landform slope and cutting; fair mass wasting |
| Poplar Creek - F Designation | 0.6 | Tributary to Poplar Creek from Cleveland Ave. northwest to junction with Poplar Creek | Fair | Poor/fair debris jam potential; fair landform slope, vegetative bank protection, obstructions, and cutting |
| Deer Creek | 0.2 | From point south of 162nd St. east 0.6 mile to point between Glendale Dr. and Cleveland Ave. | Fair | Fair landform slope, mass wasting. cutting, and deposition |
| URR-A Designation | 0.3 | Tributary to Root River from point 0.2 mile west of 124th St. in New Berlin Hills Golf Course east 0.3 mile | Fair | Fair landform slope, debris jam potential, obstructions, and deposition |
| Deer Creek Designation | 0.1 | From Cleveland Ave. south 0.1 mile | Fair | Poor landform slope; fair debris jam potential and obstructions |
| URR-A Designation | 0.2 | Tributary to Root River from Meadowlark Dr. east to point 0.1 mile west of New Berlin Hills Golf Course | Fair | Fair debris jam potential, vegetative bank protection, cutting, and deposition |
| URR-D Designation | 0.5 | Tributary to Root River from point extending west of Ohio Dr. east to Highpointe Dr. | Fair | Fair obstructions, cutting, and deposition |
| Poplar Creek Designation | 1.3 | From junction with tributary UF-E southeast 1.3 miles | Fair | Fair debris jam potential, vegetative bank protection, cutting, and deposition |
| CC-B Designation | 0.5 | Tributary to Calhoun Creek from I-43 south to Westridge Dr. | Fair | Fair debris jam potential and vegetative bank protection |
| Deer Creek Designation | 0.6 | From National Ave. northwest 0.6 mile | Fair | Poor obstructions; fair landform slope, debris jam potential, cutting, and deposition |
| Deer Creek Designation | 0.2 | From junction with tributary DC-C north 0.2 mile | Fair | Poor obstructions; fair landform slope and cutting |
| CC-B Designation | 0.7 | Tributary to Calhoun Creek from I-43 northwest 0.7 mile | Fair | Fair debris jam potential, vegetative bank protection, obstructions, and deposition |
| CC-C Designation | 0.3 | Tributary to Calhoun Creek from I-43 north to point extending east of Dale Dr. | Fair | Fair landform slope and debris jam potential |

**Table 7-5: Summary of Stream Reaches with the Most Significant Streambank Stability Concerns**

| Subwatershed and Stream Reach Designation | Reach Length (miles) | Location | Overall Stream Rating | Streambank Stability Concern |
|---|---|---|---|---|
| UF-A Designation | 1.4 | Tributary to Poplar Creek from Cleveland Ave. north 1.4 miles | Fair | Poor vegetative bank protection; fair landform slope, debris jam potential, obstructions, cutting, and deposition |
| Poplar Creek Designation | 0.1 | From Calhoun Rd. west 0.1 mile | Fair | Fair landform slope and cutting |
| CC-B Designation | 0.1 | Tributary to Calhoun Creek from Beloit Rd. northeast 0.1 mile | Fair | Fair debris jam potential and vegetative bank protection |
| CC-H Designation | 0.4 | Tributary to Calhoun Creek from Linnie Lac southwest 0.4 mile to point extending north of College Ave. | Fair | Fair vegetative bank protection and obstructions |
| URR-B Designation | 0.3 | Tributary to Root River from point extending north of Tammy Ln. east 0.3 mile to point 0.1 mile east of Sunny Slope Rd. | Fair | Fair vegetative bank protection and depostion |
| Poplar Creek Designation | 0.7 | From junction with tributary UF-L northeast 0.7 mile | Fair | Poor debris jam potential; fair obstructions and cutting |
| URR-D Designation | 0.1 | Tributary to Root River from beginning near Long Acre Dr. east 0.1 mile | Fair | Fair deposition |
| URR-E Designation | 0.2 | Tributary to Root River from 132nd St. east 0.2 mile | Fair | Fair landform slope, vegetative bank protection, and cutting |
| CC-A Designation | 1.0 | Tributary to Calhoun Creek from junction with CC-B and CC-C north 1.0 mile | Fair | Fair landform slope, debris jam potential, and vegetative bank protection |
| CC-C Designation | 0.2 | Tributary to Calhoun Creek from Bener Rd. southwest 0.2 mile | Fair | Fair landorm slope |
| CC-G Designation | 0.1 | Tributary to Calhoun Creek from junction with CC-H northwest to I-43 | Fair | Fair vegetative bank protection |
| UF-F Designation | 0.2 | Tributary to Poplar Creek from Willow Rd. northwest to New Berlin West High School | Fair | Fair debris jam potential and vegetative bank protection |
| UF-H Designation | 0.2 | Tributary to Poplar Creek from junction with UF-L east 0.2 mile | Fair | Fair vegetative bank protection |

**Table 7-5: Summary of Stream Reaches with the Most Significant Streambank Stability Concerns**

| Subwatershed and Stream Reach Designation | Reach Length (miles) | Location | Overall Stream Rating | Streambank Stability Concern |
|---|---|---|---|---|
| URR-F Designation | 0.2 | Tributary to Root River from Cleveland Rd. north 0.2 mile to beginning of concrete lining on northern wall of creek | Fair | Fair vegetative bank protection |
| URR-F Designation | 0.1 | Tributary to Root River from Cleveland Rd. southwest to 128th St. | Fair | Fair vegetative bank protection |
| Deer Creek Designation | 0.1 | From point 0.1 mile north of Glendale Rd. north 0.1 mile | Fair | Fair landform slope, cutting, and deposition |
| URR-D Designation | 0.1 | Tributary to Root River from point extending between National Ave. and Cleveland Ave. north 0.1 mile to point extending west of Montana Ave. | Fair | Fair landform slope, vegetative bank protection, obstructions, and cutting |

and prioritized streambank reaches which require stabilization measures. Based on the inventory, each reach was classified as excellent, good, fair or poor. Only the streams classified as fair and poor are identified as potential problem areas that will be addressed in the Storm Water Management Master Plan for New Berlin. The streambank inventory identified about 13.4 miles of streambank which were classified as fair and 0.2 miles of streambank which were classified as poor. The streambank problem areas are described in Table 7-5 and shown on Plate 1 in Appendix A.

## 7.6 Water Quality Problems

The water quality analysis, described in Section 6, was conducted to estimate the amount of pollutants discharged to the major streams within New Berlin. Based on the annual pollutant loadings generated by the analysis, critical land uses, land uses which contribute a majority of the storm water pollutants, were identified.

The critical land uses are presented in Table 7-6.

**Table 7-6: Critical Land Uses in New Berlin by Pollutant**

| Pollutant | Critical Land Use – (% of total annual load) | |
|---|---|---|
| | **Existing Land Use Conditions** | **Future Land Use Conditions** |
| **Sediment** | Agriculture (30%); Extractive (21%); Residential (19%) | Residential (28%); Extractive (24%); Agricultural (14%) |
| **Phosphorous** | Agricultural (47%); Residential (14%); Park (10%); Institutional (9%) | Agriculture (21%); Park (25%); Residential (22%) |
| **Lead** | Highway/Arterial (35%); Commercial (24%); Residential (20%); Industrial (16%) | Highway/Arterial (26%); Commercial (26%); Industrial (23%); Residential (21%) |
| **Copper** | Residential (37%); Highway/Arterial (18%); Commercial (15%); Industrial (15%) | Residential (40%); Industrial (21%) Commercial (16%); Highway/Arterial (14%) |
| **Zinc** | Industrial (43%); Commercial (16%); Highway/Arterial (15%) | Industrial (50%); Commercial (15%); |

Based on an overall consideration of the pollutant loadings, areas which are significant contributors of pollutants within New Berlin are identified and presented on Table 7-7.

**Table 7-7: Significant Storm Water Pollutant Contributor Areas**

| Area | Contributing Land Use | Pollutants of Concern |
|---|---|---|
| Critical Land Use<br>Areas throughout the City of New Berlin | - Industrial areas<br>- Agricultural areas<br>- Residential<br>- Highways and Arterials<br>- Developing and redeveloping areas | Various |
| Rock Freeway | Highway | Metals |
| Industrial Park | Industrial<br>Commercial | Metals |
| 6C010 - Northwest area of Poplar Creek Subwatershed | Industrial<br>Extractive<br>Agricultural | Metals<br>Phosphorous<br>Sediment |
| 5A020 - Southeast area of Tess Corners Creek Subwatershed | Agricultural<br>Commercial | Sediment<br>Phosphorous<br>Metals |
| 4C010 - Northern area of Calhoun Creek Subwatershed | Residential<br>Highway<br>Agricultural | Metals<br>Phosphorous<br>Sediment |
| 7D010 & Various - Northern area of Mill Creek Subwatershed | Extractive | Sediment |

The industrial analysis, described in Section 6, further evaluated the pollutant loadings from industries within New Berlin. Based on the analysis, the industries with the greatest potential for contributing significant storm water pollutant loadings are summarized in Table 7-8. Extractive industries are included in the listing based on the study area analysis.

**Table 7-8: Summary of Industries Considered Potential Significant Contributors of Storm Water Pollutants**

| Industrial Category | Activity Areas of Concern | |
|---|---|---|
| Fabricated Metal Products | < Metal Preparation<br>< Parts Cleaning<br>< Surface Treatment<br>< Galvanizing<br>< Heavy Equipment Use and Storage<br>< Equipment Maintenance<br>< Storage of Uncoated Structural Steel | < Painting<br>< Storing Galvanized Steel directly on the Ground<br>< Vehicle/Equipment Traffic<br>< Cleaning Equipment and Vehicles<br>< Storage Areas<br>< Equipment Usage<br>< Above Ground Storage Tanks |
| Transportation Equipment | < Outdoor Material Loading / Unloading | < Outdoor Material and Equipment Storage |
| Land Transportation | < Vehicle and Equipment Maintenance<br>< Outdoor Vehicle and Equipment Storage and Parking<br>< Vehicle and Equipment Washing Areas | < Painting Areas<br>< Liquid Storage<br>< Cold Weather Activities<br>< Improper Connections to Storm Sewer |
| Electronic, Electrical, Photographic and Optical | < Outdoor Loading / Unloading | < Outdoor Materials Storage |
| Printing and Publishing | < Plate Preparation<br>< Printing<br>< Stencil Preparation for Screen Printing | < Clean Up<br>< Material Handling: transfer, storage, and disposal<br>< Photo Processing |
| Mineral Mining and Processing (extractive) | < Site Preparation<br>< Mineral Extraction<br>< Mineral Processing | < Equipment and Vehicle Maintenance<br>< Reclamation Activities |

*Source: USEPA Final National Pollutant Discharge Elimination System Storm Water Multi Sector General Permit for industrial Activities, Notice: Federal Register, September 29, 1995*