Dixon Watershed Management Plan

Prepared for
Solano County Water Agency

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WEST YOST & ASSOCIATES

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EXECUTIVE SUMMARY

For several years the City of Dixon (City) has been seeking adequate drainage outfall capacity for three of the City's drainage systems. These drainage systems discharge into agricultural drains (Figure ES-1), which are subject to routine flooding (Figure ES-2). The agricultural drains convey the City flow, and runoff from the adjacent fields, through channels serving the three regional watersheds and discharge into Hass Slough or Ulatis Creek.

A Regional Drainage Committee with members from the City, Dixon Resource Conservation District, Maine Prairie Water District, and Reclamation District No. 2068 (the agencies which provide drainage for the agricultural areas downstream of the City) was established. The goal of the Regional Drainage Committee was to cooperatively develop drainage projects that meet the needs of both the City and agricultural agencies by providing adequate outfall capacity for the City and reducing flooding of the agricultural areas. A hydrologic/hydraulic computer model of the drainage systems was developed to help plan and evaluate drainage projects for each of the regional watersheds. The planned improvements are summarized below for each of the three watersheds.

BASIN A AND LATERAL 1

Currently Basin A drains to Pond A, which is operated as a retention basin by the City with releases only when the downstream system is empty. Additional areas upstream of Pond A are planned for development in the near future, which will result in increased flow to Pond A. To accommodate the increased flow, the storage capacity of Pond A must be enlarged and an outfall must be constructed. The outfall must provide adequate capacity to convey the discharge from Pond A while also reducing downstream flooding.

Pond A Outfall Alignment Alternatives

For Basin A, three outfall alignments were evaluated and compared (see Figure ES-3), including:

- McCune Creek Alignment – crosses under the Union Pacific Railroad tracks, continues southwest down Porter Road, turns west and follows an alignment adjacent to the Weyand Irrigation Pipeline, crosses Batavia Road, parallels the Olsen Drain, and discharges to McCune Creek.

- Lateral 1 Alignment – runs east from the southeast corner of Pond A in an existing drainage ditch to Lateral 1 on the west side of State Highway 113. Lateral 1 currently drains to the south and discharges into the Dixon Main Drain. The reach of Lateral 1 south of the Dixon Main Drain drains to Ulatis Creek. Lateral 1 would be disconnected from the Dixon Main Drain and would be improved from Pond A to Ulatis Creek to convey the flow from Pond A, and drainage from the adjacent agricultural area.

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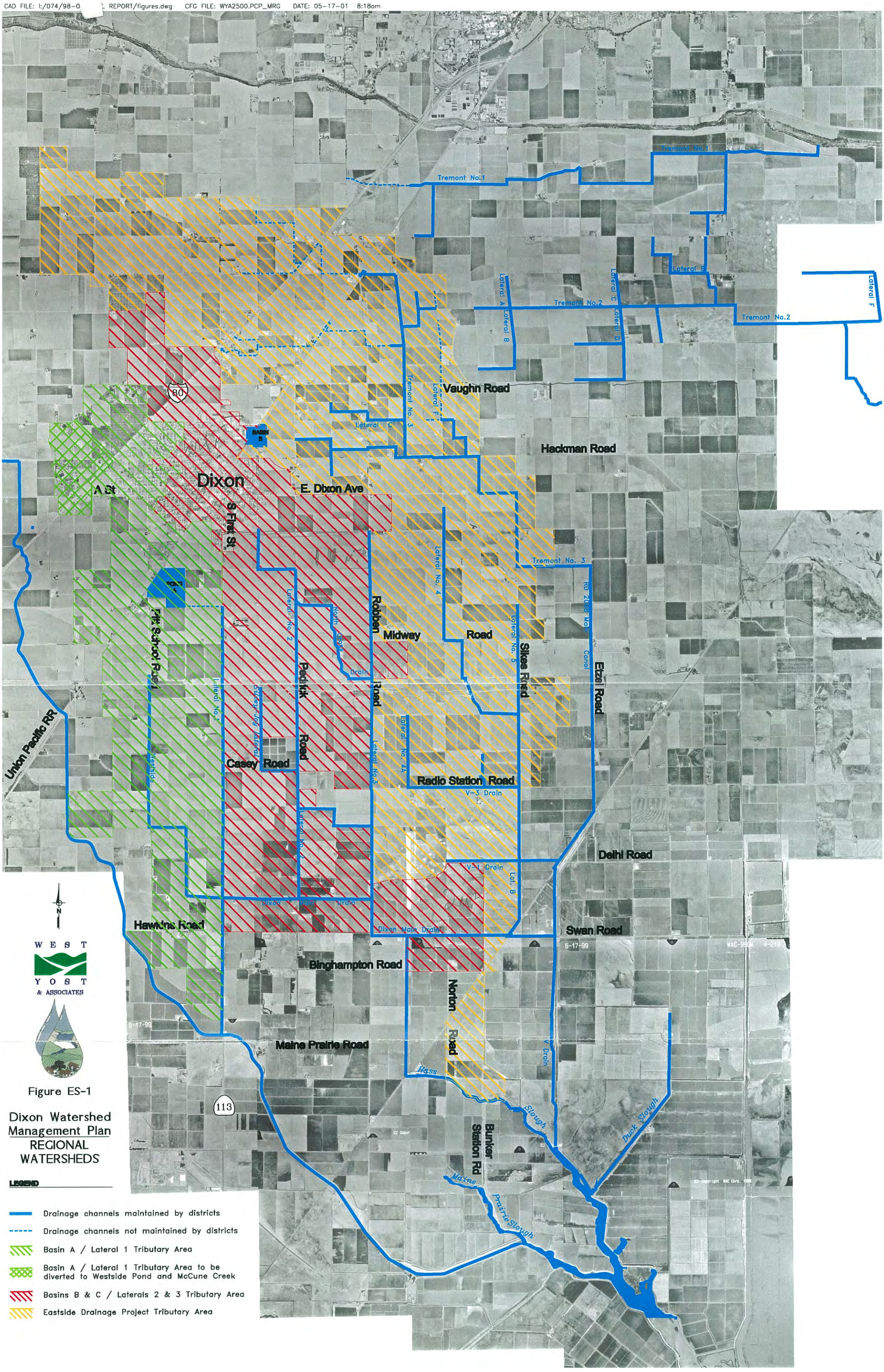

Figure ES-1

Dixon Watershed Management Plan
REGIONAL WATERSHEDS

LEGEND

- Drainage channels maintained by districts
- Drainage channels not maintained by districts
- Basin A / Lateral 1 Tributary Area
- Basin A / Lateral 1 Tributary Area to be diverted to Westside Pond and McCune Creek
- Basins B & C / Laterals 2 & 3 Tributary Area
- Eastside Drainage Project Tributary Area

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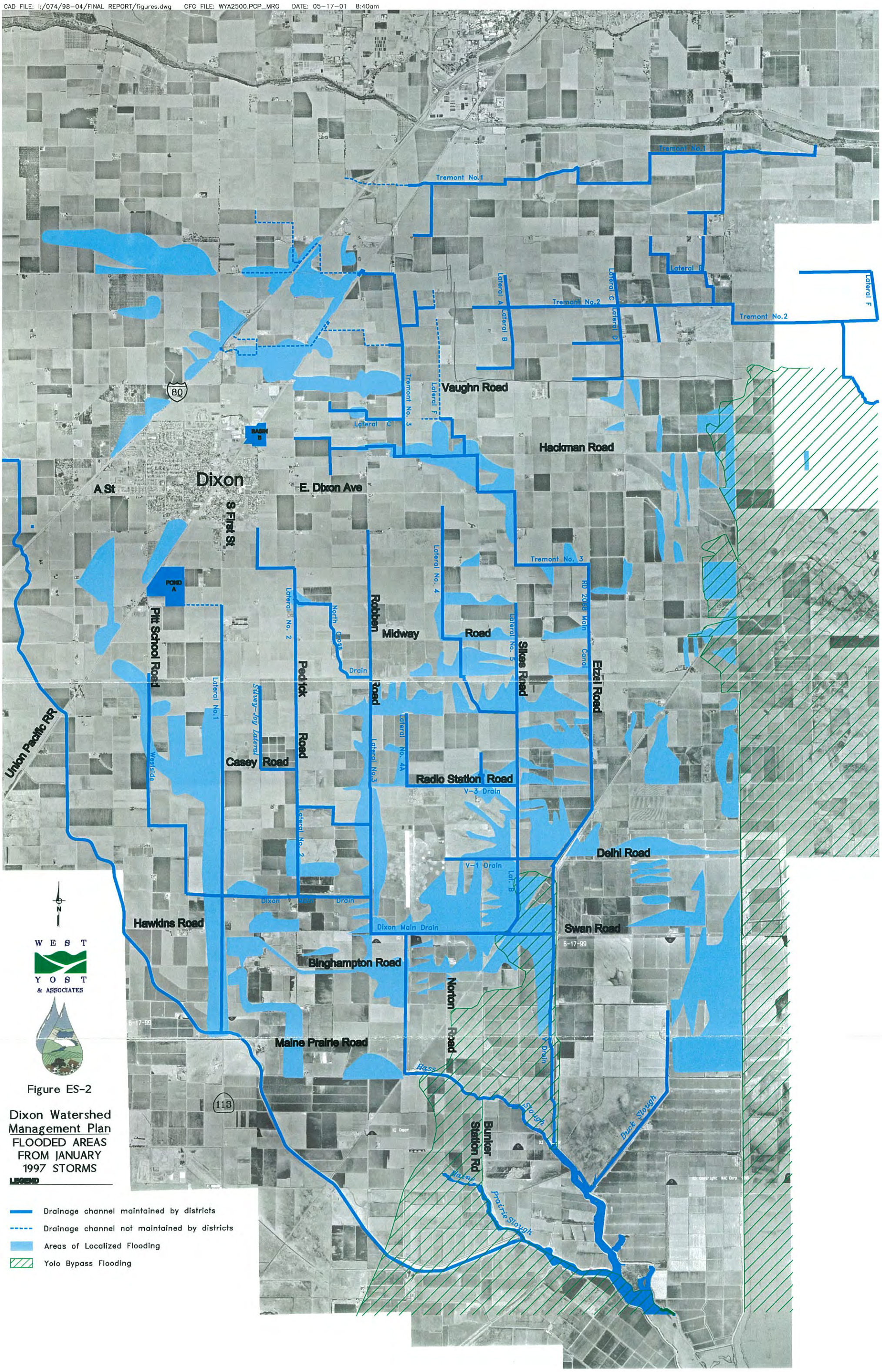
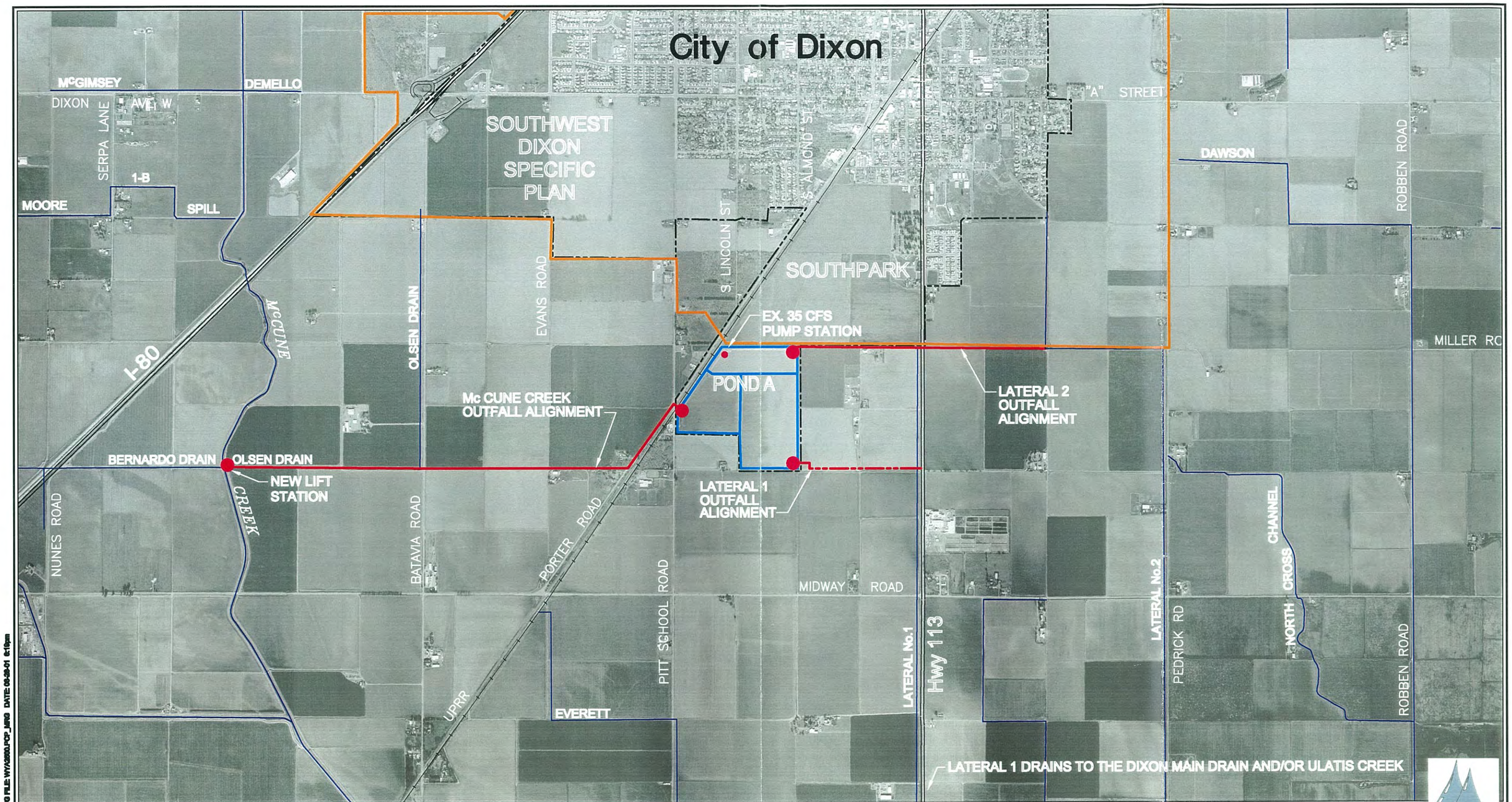


Figure ES-2

Dixon Watershed Management Plan
FLOODED AREAS FROM JANUARY 1997 STORMS

LEGEND

- Drainage channel maintained by districts
- Drainage channel not maintained by districts
- Areas of Localized Flooding
- Yolo Bypass Flooding



LEGEND

- GENERAL PLAN BOUNDARY
- DIXON CITY LIMITS
- DRAINAGE CHANNEL/CREEK
- BOUNDRY OF DETENTION PONDS
- PIPED OUTFALL ALIGNMENT
- OPEN CHANNEL OUTFALL ALIGNMENT
- NEW PUMP STATION LOCATIONS
- EXISTING PUMP STATION

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Figure ES-3

Dixon Watershed Management Plan

Pond A Outfall Alternatives Alignments

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- Lateral 2 Alignment – runs east from the northeast corner of Pond A in the future public street (to be constructed as part of the Southpark development), crosses State Highway 113, and continues east to Lateral 2 of the Dixon Resource Conservation District drainage system. Downstream improvements in Lateral 2, the North Cross Channel, Lateral 3, and the Dixon Main Drain would also be constructed.

Capital costs, annual operation and maintenance costs, and present value costs for each of these alignments are summarized in Table ES-1. As shown, the Lateral 1 Outfall Alignment has the lowest capital cost and the lowest total present value cost.

Table ES-1. Pond A Outfall Alignment Cost Summary, Million Dollars

Project	Capital Cost	Annual O&M Cost	Total Present Value Cost
McCune Creek Outfall Alignment	4.8	0.08	6.1
Lateral 1 Outfall Alignment	3.8	0.07	4.7
Lateral 2 Outfall Alignment	7.1	0.06	7.9

The Lateral 1 Outfall Alignment appeared to be the simplest to implement because it had the greatest support from Dixon Resource Conservation District and Maine Prairie Water District. It also appeared that the Lateral 1 Alignment could be implemented more quickly than the other alignments.

The Lateral 1 Alignment was selected by the Regional Drainage Committee as the preferred outfall for Pond A because it had the lowest cost and provided the greatest regional flood control benefit.

Pond A/Lateral 1 Project

The Pond A/Lateral 1 Project includes an expansion of the Pond A storage capacity and construction of the Lateral 1 outfall improvements. The Pond A improvements are shown on Figure ES-4, and the Lateral 1 outfall improvements are shown on Figure ES-5. These improvements are summarized below:

- Excavation of the east section of the current shallow portion of the existing pond from about 59 feet NAVD to a bottom elevation of 50.5 feet NAVD at the east edge and to 51.5 feet NAVD at the west edge. The expanded pond will have a total storage volume of over 640 ac-ft below the design water surface elevation of 61.0 feet NAVD. Wildlife viewing platforms could be added around the deep pond for viewing waterfowl.

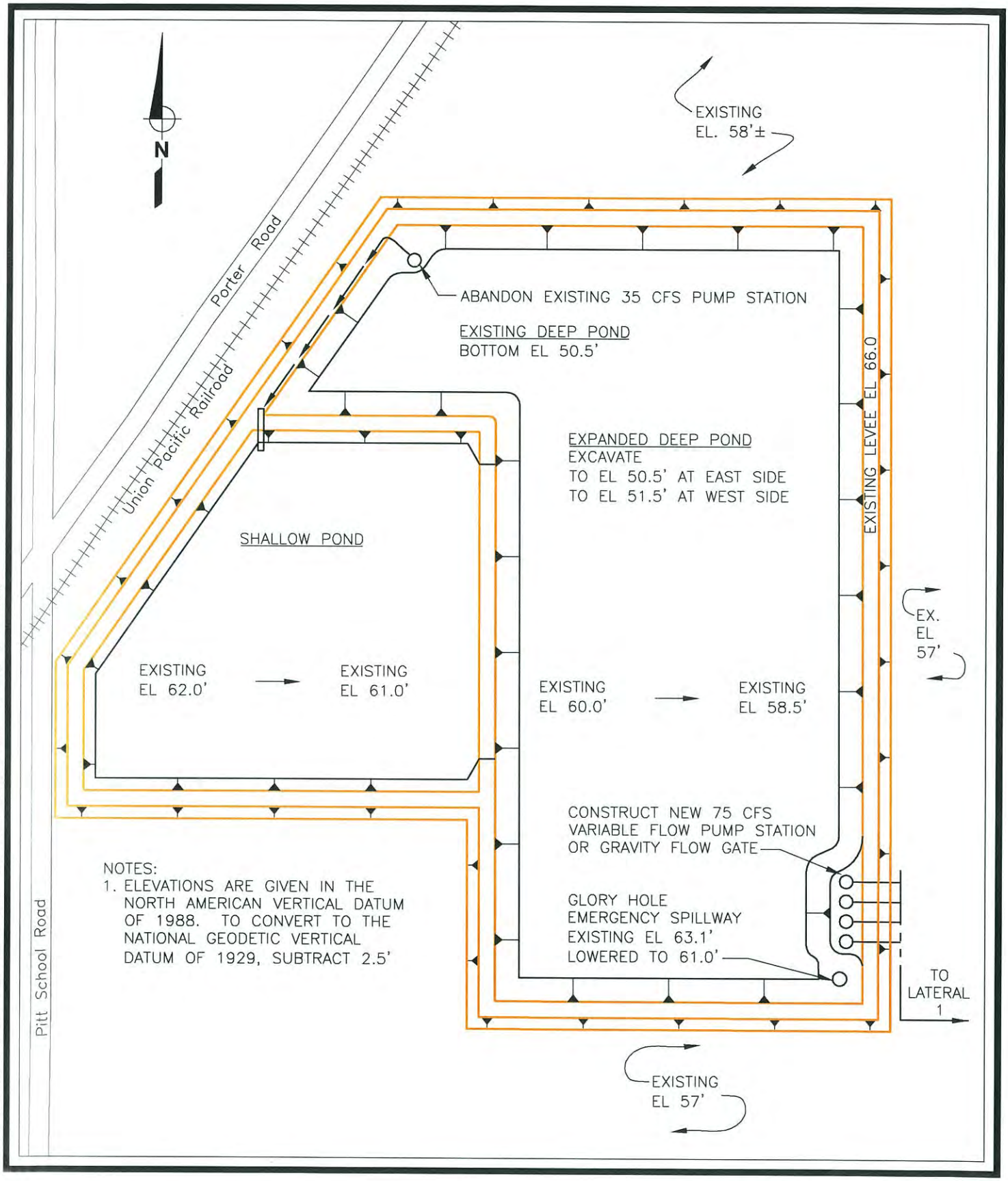

Figure ES-4

PROPOSED EXPANSION OF POND A
FOR THE LATERAL 1 OUTFALL

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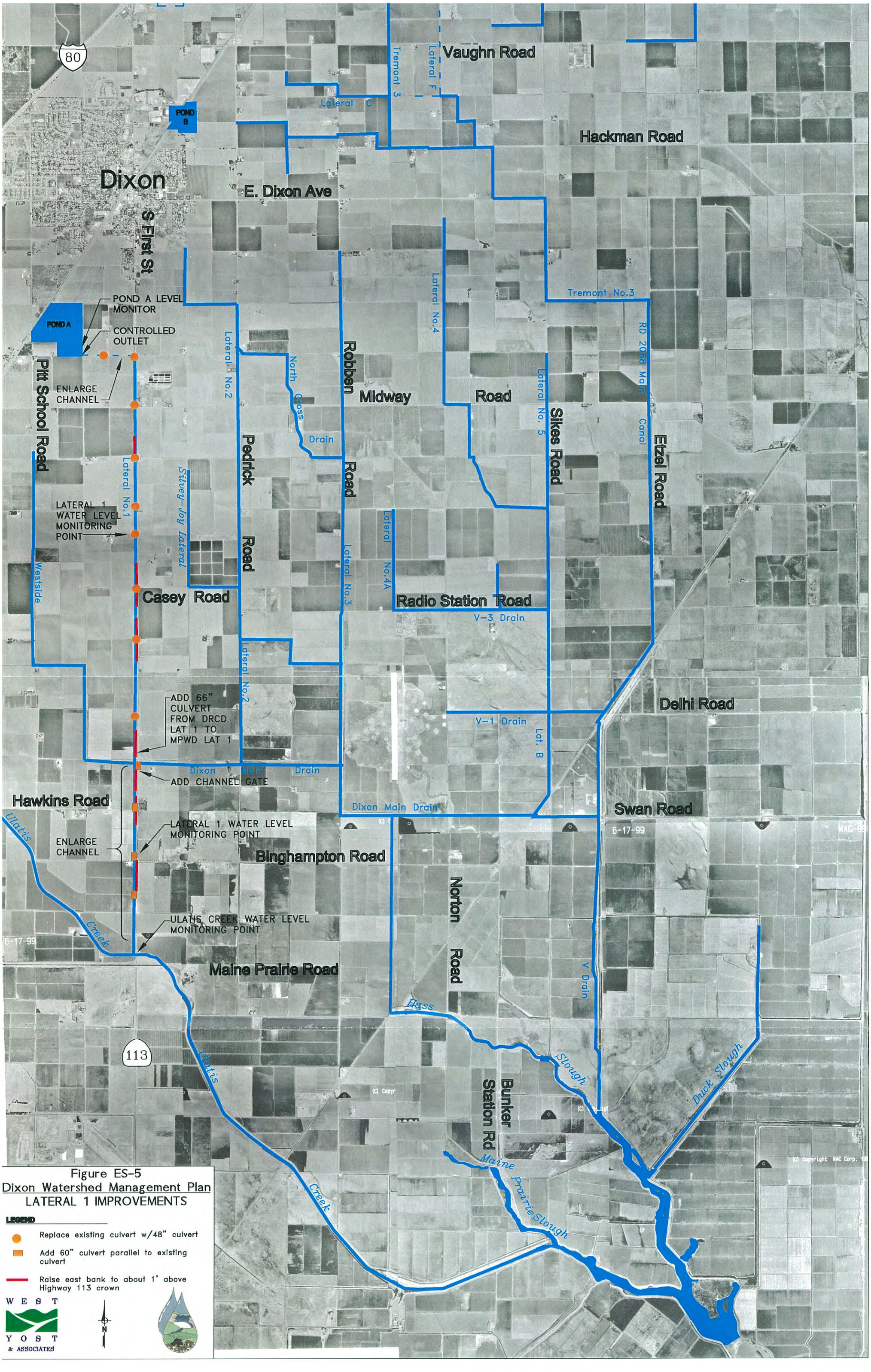

Figure ES-5
Dixon Watershed Management Plan
LATERAL 1 IMPROVEMENTS

LEGEND

- Replace existing culvert w/48" culvert
- Add 60" culvert parallel to existing culvert
- Raise east bank to about 1' above Highway 113 crown

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- The southwest section of the pond will not be excavated, and will only be used to store runoff for storms greater than a 100-year event. If at some time in the future, additional storage volume is required in Pond A, that volume would be obtained by excavation of the southwest section, regardless of the joint uses that may have been built in this area. Nevertheless, the southwest section will be ideal for joint uses such as uplands habitat, soccer fields, and softball fields.

- Construction of a variable discharge 75 cfs pump station or gravity discharge gate at the southeast corner of the deep pond which will discharge to the existing (to be enlarged) agricultural drainage channel leading to Lateral 1 (the current outfall of the overflow glory hole). Control of the pump station or gravity gate will be based on the water level in Pond A, the water level in Ulatis Creek, and the water level measured at two points in Lateral 1, as agreed upon by the involved agencies. If the water level exceeds set elevations in Ulatis Creek or in Lateral 1, a signal to reduce or stop the discharge will be sent to the pump station or gravity gate.

- Lowering of the elevation of the top of the glory hole from 63.1 feet NAVD to 61.0 feet NAVD. For storms larger than the 100-year event, the glory hole will be overtopped and a discharge to Lateral 1 and Ulatis Creek will occur regardless of the water level in Lateral 1 or Ulatis Creek.

- Use of the existing 18-inch and 12-inch outlets through the existing glory hole. The 18-inch diameter inlet is at elevation 58.5 feet (flow line), will begin to release at about a 70-year storm event, and will release a maximum of 12 cfs at a pond water elevation of 61 feet (greater than the 100-year level). The 12-inch diameter inlet is at elevation 59.2 feet (flow line), will begin to release at about an 80-year event, and will release a maximum of 2 cfs at a pond water elevation of 61 feet.

- Enlargement of the existing channel from the southeast corner of Pond A to Lateral 1.

- Along the Dixon Resource Conservation District Lateral 1, replacement of all existing culverts with 48-inch RCP culverts. Addition of a 66-inch RCP culvert from the Dixon Resource Conservation District Lateral 1 to the Maine Prairie Water District Lateral 1. Along the Maine Prairie Water District Lateral 1, replacement of existing culverts with twin 60-inch RCP culverts

- Addition of a slide gate on the end of the pipe from Lateral 1 to the Dixon Main Drain (under Highway 113). The gate will be closed in the winter and opened in the summer for irrigation water.

- Raising of the east bank of Lateral 1 at several locations to prevent flooding of Highway 113 and the farms east of Highway 113.

- Enlargement of the Maine Prairie Water District Lateral 1 channel bottom width from 6-8 feet to 12 feet, with two horizontal to one vertical side slopes, or another configuration with equivalent capacity.

- Addition of corrugated plastic field drains with risers, where needed, to drain each field west of Lateral 1 from Pond A to Ulatis Creek

- As part of Caltrans' Highway 113/Ulatis Creek Bridge widening project, Caltrans has removed all existing culverts from the Maine Prairie Water District Lateral 1 to Ulatis Creek and replaced them with a 10 feet wide by 5 feet tall box culvert. This box culvert has a flap gate to prevent back flow from Ulatis Creek to Lateral 1.

This project will accomplish the regional objectives of providing an outfall for Pond A and reducing the flooding along Lateral 1.

BASINS B/C AND LATERALS 2/3

A 1965 agreement between the City and the Dixon Resource Conservation District, limits the discharge from the City into Lateral 2 to the flow from 42-inch and 36-inch pipes (generally accepted to be 77.5 cfs). Based on results of this study, large storms result in discharges from the City to lateral 2 estimated to be in the range of 130 cfs (from a 5-year event) to 230 cfs (from a 100-year event), which clearly exceed the agreed upon limit. The City must detain flows from Basins B/C to the agreed upon limit of 77.5 cfs, or construct conveyance improvements to the downstream drains that would allow the City to discharge at a higher rate while reducing the downstream flooding.

Basins B and C drain into and through the Dixon Resource Conservation District channel system and the RD 2068 V-Drain, and ultimately into Hass Slough (see Figure ES-6). No feasible alternatives to this general alignment exist. Consequently, the Basins B/C and Laterals 2/3 alternatives involve evaluating different sized detention basins, different rates of discharge from the City into Lateral 2, and different downstream conveyance capacity improvements. The alternatives evaluated include:

- Full Detention Project – The City would discharge from Basins B/C to Lateral 2 at a maximum rate of 77.5 cfs. To achieve this maximum discharge, a 110 ac-ft detention basin would be constructed on a 40-acre site near the City outlet. No downstream conveyance improvements would need to be constructed. In figure ES-6 the basin is located just upstream of Pedrick Road; but the basin could actually be located anywhere along Lateral 2 upstream of the North Cross Channel.

- Balanced Detention and Conveyance Project – The City would discharge from Basins B/C to Lateral 2 at a maximum rate of 125 cfs. To achieve this maximum discharge, a 35 ac-ft detention basin would be constructed on a 10-acre site near the City outlet. Conveyance capacity improvements of 47.5 cfs would be constructed in the Dixon Resource Conservation District and Reclamation District 2068 channels along the alignment shown on Figure ES-6. The downstream end of this project would include a new channel from the Dixon Main Drain to Hass Slough. Capacity in this new channel would be shared by this project and the recommended Eastside Drainage Project (described later).

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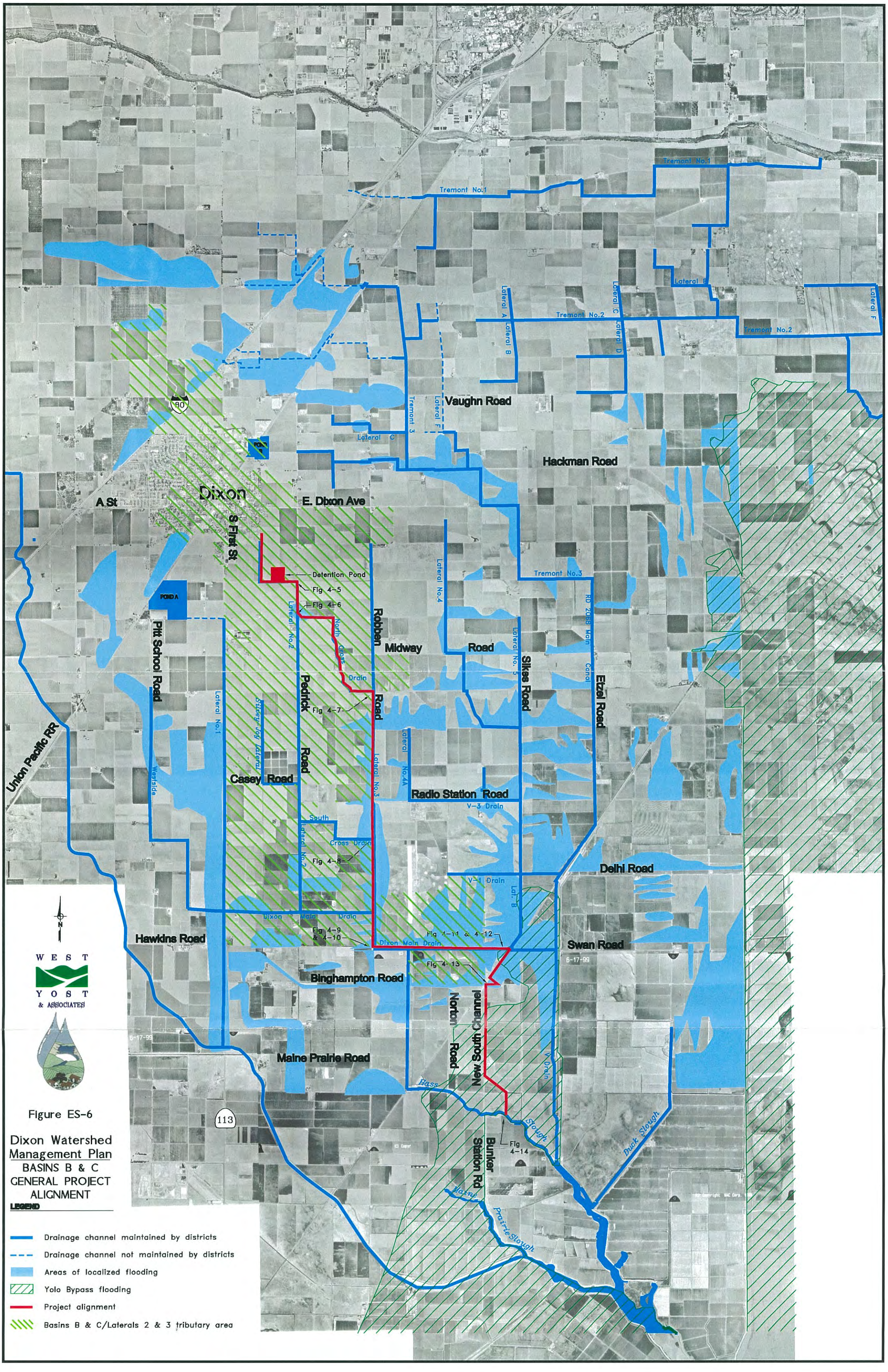

- Unrestricted Discharge Project – No detention basin would be constructed. Instead, the City would be allowed an unrestricted discharge (estimated at 230 cfs from a 100-year storm). Conveyance capacity improvements would be constructed along the Dixon Resource Conservation District and Reclamation District 2068 channels in the areas where flooding problems currently occur (along the alignment shown on Figure ES-6, but primarily downstream from the end of the North Cross Channel. In the areas where flooding is not a routine problem, minor or no conveyance improvements would be constructed. The downstream end of this project would include a new channel from the Dixon Main Drain to Hass Slough. Capacity in this new channel would be shared by this project and the recommended Eastside Drainage Project. The larger channels would include a low flow channel.

Capital costs, annual O&M costs, and present value costs for these outfall alternatives are summarized in Table ES-2. As shown, the Full Detention Project has the lowest capital cost, the lowest annual O & M cost, and the lowest total present value cost.

Table ES-2. Basin B/C and Lateral 2/3 Project Cost Summary, Million Dollars

Project	Total Capital Cost	Annual O&M Cost	Total Present Value Cost
Full Detention	1.5	0.02	1.7
Unrestricted Discharge	1.8	0.04	2.4
Balanced Detention/Conveyance	1.7	0.03	2.2

The Full Detention and Balanced Detention/Conveyance Projects include a detention pond located somewhere near the City. The detention pond in these projects could be configured to provide joint uses such as wetlands/uplands habitat, sports fields, playgrounds, jogging paths, and water quality treatment. The Unrestricted Discharge Project does not provide joint use opportunities near the City.

After evaluation of these alternatives, the following conclusions were reached.

- The Balanced Detention and Conveyance Alternative would convey increased flow to the lower agricultural area resulting in increased flooding. For this reason, this alternative is not recommended. This increased flooding could be mitigated by incrementally enlarging the channel moving downstream, which is essentially the same as the unrestricted discharge alternative.

- The Full Detention Alternative:

  – Results in the City complying with the current drainage agreement with DRCD, which limits the flow from the City to 77.5 cfs, but places no control on the duration of that flow.

- Provides the greatest opportunities for joint uses for the City.
- The pond area can be used as a mitigation site for developing areas within the City.
- Provides minimal benefit to the downstream agricultural community.
- Has a capital cost and total present value cost significantly lower than the Unrestricted Discharge Alternative.

- The Unrestricted Discharge Alternative.
  - Provides the greatest flood control benefit to the downstream agricultural community.
  - Has the highest capital cost.
  - Has the highest O&M cost.
  - Has no dual use benefits for the City.

The Regional Drainage Committee is currently evaluating these alternatives, and will select the preferred project.

THE EASTSIDE DRAINAGE PROJECT

The Northeast Quadrant of the City includes 585 acres of agricultural land that is scheduled for development in the future. About 2,700 acres of agricultural land north of Interstate 80 drains through the Northeast Quadrant. Current runoff from this area is estimated to range from about 30 cfs (from a 5-year storm) up to 100 cfs (from a 100-year storm). When this area is developed, the peak (undetained) runoff would be about 600 cfs. This area drains into the Dixon Resource Conservation District's Tremont 3 drain. The fields along the Tremont 3 drain and subsequent downstream drains are subject to routine flooding. Runoff from the Northeast Quadrant must be either detained to existing rates or lower, or downstream conveyance improvements must be constructed which will convey the increased flow from the Northeast Quadrant and reduce the downstream flooding.

Northeast Quadrant Outfall Alignment Alternatives

Five projects were evaluated to provide drainage for the Northeast Quadrant. These projects along with their associated zones of benefit, are shown schematically on Figure ES-7 and listed below:

- The New South Channel is part of Alternatives 4 and 5; consequently, it was evaluated independently and then included in Alternatives 4 and 5 by reference.
- Alternative 1 – Detention Basin in the Northeast Quadrant

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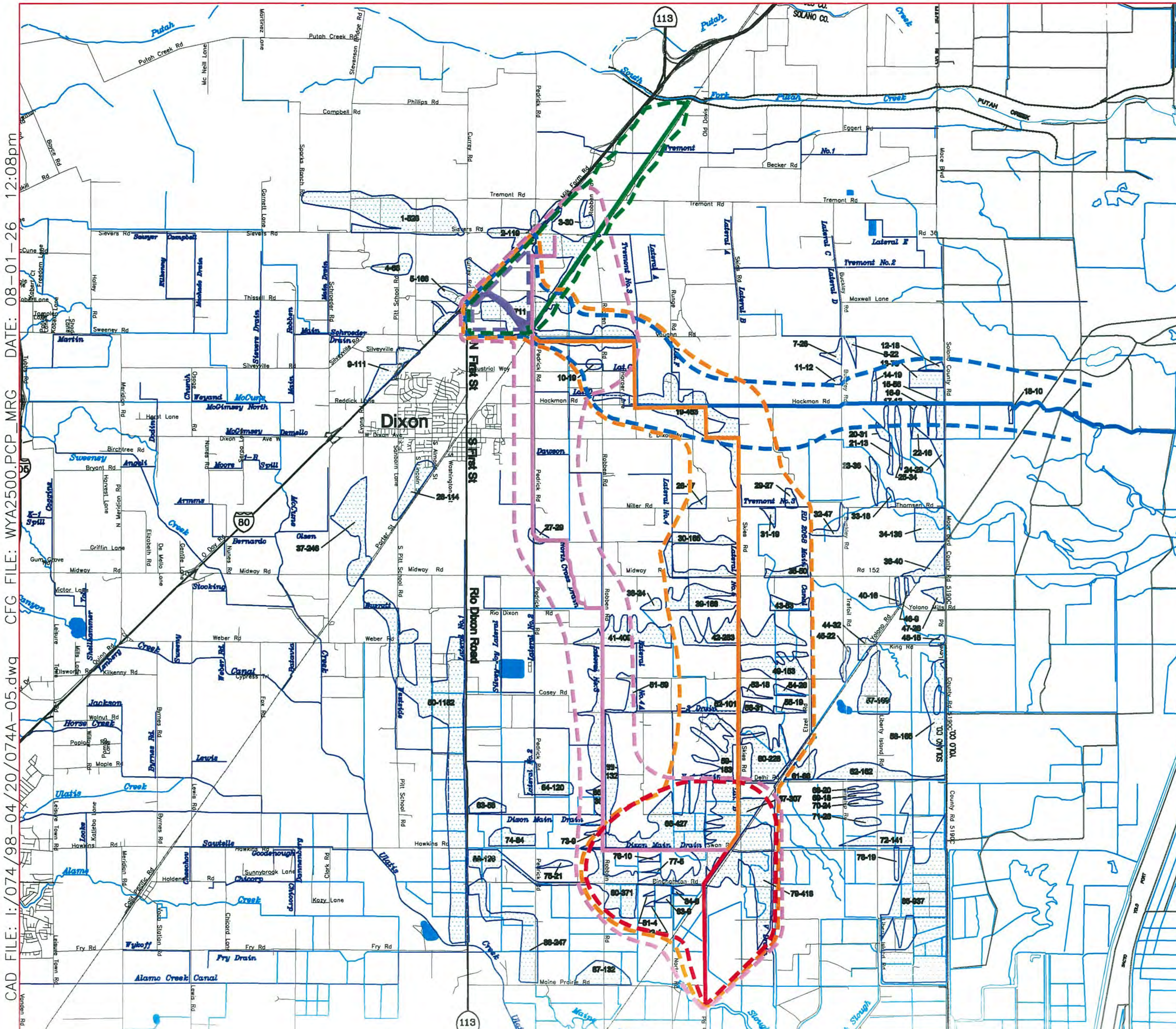

Figure ES-7

Dixon Watershed Management Plan

NORTHEAST QUADRANT OUTFALL ALTERNATIVES

LEGEND

LEVEE

AREAS OF LOCALIZED FLOODING

DRAINAGE OPTIONS

SOLID LINES ARE OPTION ALIGNMENT

DASHED LINES ARE APPROXIMATE BENEFIT AREA

NEW SOUTH CHANNEL (NSC)

PROJECT 1 – DETENTION BASIN IN NEQ

PROJECT 2 – NEQ PUMP STATION & OPEN CHANNEL TO PUTAH CREEK

PROJECT 3 – NEQ TO TREMONT 3 TO YOLO BYPASS TOE DRAIN

PROJECT 4 – NEQ TO TREMONT 3 TO LATERAL 5 TO NSC (INCLUDES NSC)

PROJECT 5 – NEQ TO NEW PEDRICK RD DITCH TO LATERALS 2 & 3 TO NSC (INCLUDES NSC)

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- Alternative 2 – Northeast Quadrant Drainage to Putah Creek
- Alternative 3 – Northeast Quadrant via Tremont 3 to Yolo Bypass Toe Drain
- Alternative 4 – Northeast Quadrant via Tremont 3 and Lateral 5 to the New South Channel
- Alternative 5 – Northeast Quadrant via New Pedrick Road Ditch to Laterals 2 and 3 to the New South Channel

Estimated capital costs, annual O&M costs, and present value costs for these projects are summarized in Table ES-3.

Table ES-3. Northeast Quadrant Outfall Alternative Cost Summary

Project	Total Capital Cost, million dollars	Annual O&M Cost, million dollars	Total Present Value Cost, million dollars	Flooded Acres Improved[a]	Cost per Flooded Acre Improved, dollars/acre
Alternative 1 – Detention Basin in the Northeast Quadrant (30 cfs discharge)	6.7	0.06	7.8	250	28,500
Alternative 2 – Northeast Quadrant Drainage to Putah Creek (130 cfs discharge)	9.3	0.05	10.1	530	19,100
Alternative 3 – Northeast Quadrant to Tremont 3 to Yolo Bypass Toe Drain (135 cfs discharge)	7.5	0.08	8.9	972	9,100
Alternative 4 – Northeast Quadrant to Tremont 3 to Lateral 5 to NSC (135 cfs discharge)	7.9	0.08	9.4	3,967	2,400
Alternative 5 – Northeast Quadrant to New Pedrick Rd Ditch to Laterals 2 and 3 to NSC (135 cfs discharge)	8.5	0.07	9.8	2,730	3,600

[a] Figure ES-7 shows the flooded acres improved by each alternative.

The lowest cost option is Alternative 1 – Detention Basin in the Northeast Quadrant. However, Alternative 1 provides almost no benefit to the downstream agricultural areas.

Alternative 2 has the highest cost and provides little benefit to the downstream agricultural areas.

Alternative 3 involves increasing the capacity of a natural creek through private property. Performing construction activities within this natural creek would probably cause significant

environmental problems; consequently, obtaining the necessary permits for Alternative 3 would be very difficult, and this project is not recommended.

Alternative 4 – Northeast Quadrant via Tremont 3 and Lateral 5 to New South Channel provides the greatest flood control benefit to the downstream agricultural community, and has the third lowest cost. Alternative 4 was selected by the Regional Drainage Committee as the preferred project and was evaluated in greater detail using the hydrologic/hydraulic computer model. Alternative 4 was renamed the Eastside Drainage Project.

In many ways, Alternative 5 is comparable to Alternative 4, but it provides less flood control benefit.

Eastside Drainage Project

The Eastside Drainage Project follows the same alignment as described for Alternative 4. The Northeast Quadrant detention basin size and channel/culvert capacities have been refined and re-evaluated using two options based on the rate of discharge from the Northeast Quadrant.

Eastside Drainage Project - 250 cfs Option

This project is shown on Figure ES-8, and includes:

- A 70 ac-ft detention basin (covering 10-acre site) located in or near the Northeast Quadrant, which detains flows greater than 250 cfs.

- Channel improvements that start out as a new channel with a bottom width of 12 feet along Vaughn Road. The channel size increases moving downstream. Just above the Tremont 3 culverts under Sikes Road, the channel is 32 feet wide. Just above the Dixon Main Drain, the channel width is 45 feet. These channels were sized with two horizontal to one vertical side slopes; however, to facilitate maintenance, the channels could be reconfigured to four horizontal to one vertical side slopes, and narrower bottom widths. The larger channels would include a low flow channel.

- The New South Channel, constructed as a wetlands habitat channel, with bottom width of 75 feet, a depth of 7 feet, and 4 horizontal to 1 vertical side slopes.

- Twin 60-inch RCP culverts (or an equivalent box culvert) along Vaughn Road and downstream to Sikes Road. Along Sikes Road (all the way to the Dixon Main Drain) the culverts would be triple 60-inch RCPs (or equivalent). Along the New South Channel, the culverts would be 5 parallel 60-inch RCPs (or equivalent). To help reduce overall project costs, where there are existing culverts with diameters of 48-inches or larger, they would be retained (substituting for one of the 60-inch RCPs). These culverts (and channels) have been sized to increase the overall capacity of the drainage system without inundating the downstream areas.

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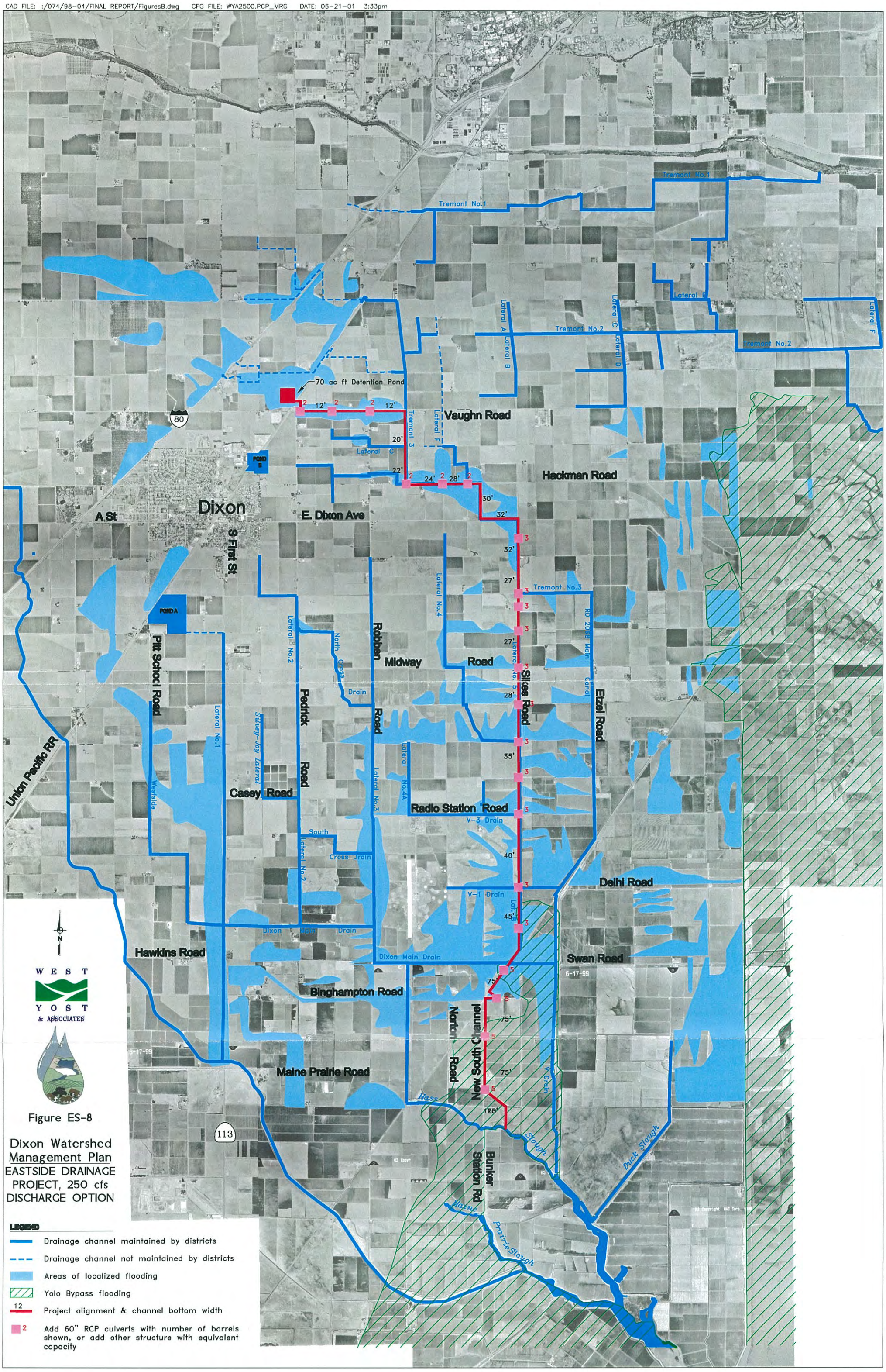


- At the Tremont 3 crossing under Sikes Road, a control structure will direct winter time runoff down the new channel. When flow in the new channel approaches the new channel capacity, flow will then also drain into Tremont 3. This structure will be reconfigured in the summer time to direct irrigation flow into Tremont 3 rather than into the new channel.

As shown on Figure ES-9, when the discharge from the Northeast Quadrant is below the allowed peak of 250 cfs, the unused capacity would be available to drain agricultural lands. The benefit to the agricultural community from this project thus occurs through the use of this available conveyance capacity.

Eastside Drainage Project – 600 cfs Option

This project is shown on Figure ES-10, and includes:

- No detention basin in the Northeast Quadrant.

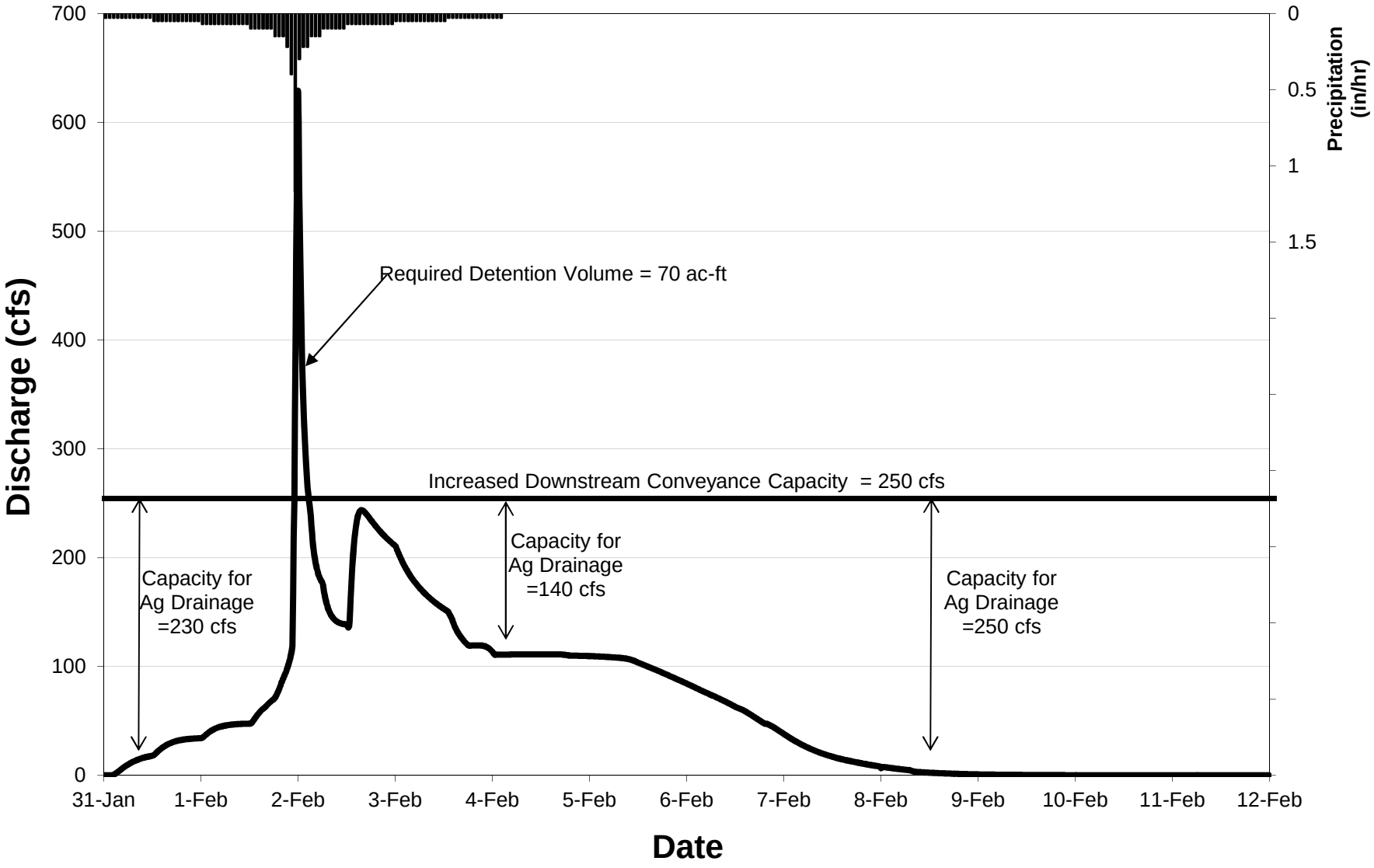
- Channel improvements that start out as a new channel with a bottom width of 40 feet along Vaughn Road. The channel size increases moving downstream. Just above the Tremont 3 culverts under Sikes Road, the channel is 63 feet wide. Just above the Dixon Main Drain, the channel width is 75 feet. These channels were sized with two horizontal to one vertical side slopes; however, to facilitate maintenance, the channels could be reconfigured to four horizontal to one vertical side slopes, and narrower bottom widths. These channels would include a low flow channel.

- The New South Channel constructed as a wetlands habitat channel, with a bottom width of 100 feet, a depth of 7 feet, and 4 horizontal to 1 vertical side slopes.

- At the Tremont 3 crossing under Sikes Road, a control structure will direct winter time runoff down the new channel. When flow in the new channel approaches the new channel capacity, flow will then also drain into Tremont 3. This structure will be reconfigured in the summer time to direct irrigation flow into Tremont 3 rather than into the new channel.

- Triple 60-inch RCP culvert (or an equivalent box culvert) along Vaughn Road. Along Hackman Road and downstream to Radio Station Road the culverts would be four parallel 60-inch RCPs (or equivalent). At Radio Station Road and downstream to the Dixon Main Drain, the culverts would be 5 parallel 60-inch RCPs (or equivalent). Along the New South Channel, the culverts would be 6 parallel 60-inch RCPs (or equivalent). To help reduce overall project costs, where there are existing culverts with diameters of 48-inches or larger, they would be retained (substituting for one of the 60-inch RCPs). These culverts and channels have been sized to increase the overall capacity of the drainage system without inundating the downstream areas.

Figure ES-9. Agricultural Benefit from the 250 cfs Discharge Option



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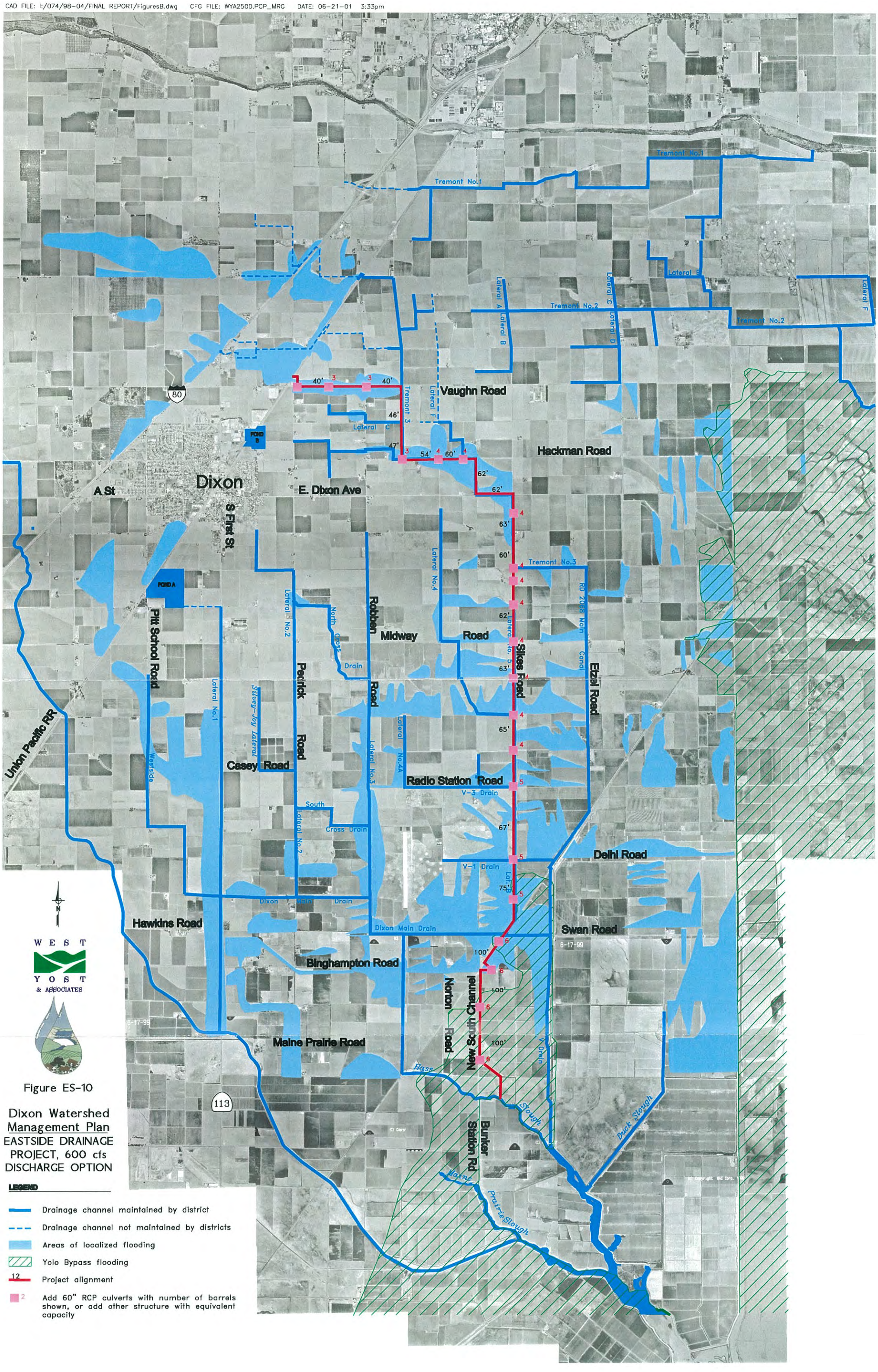

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Figure ES-10

Dixon Watershed Management Plan
EASTSIDE DRAINAGE PROJECT, 600 cfs DISCHARGE OPTION

LEGEND

- Drainage channel maintained by district
- Drainage channel not maintained by districts
- Areas of localized flooding
- Yolo Bypass flooding
- 12 Project alignment
- 2 Add 60" RCP culverts with number of barrels shown, or add other structure with equivalent capacity

As shown on Figure ES-11, when the discharge from the Northeast Quadrant is below the allowed peak of 600 cfs, the unused capacity would be available to drain agricultural lands. The benefit to the agricultural community from this project occurs through the use of this available conveyance capacity.

Cost estimates for these options are summarized in Table ES-4. The capital cost for the 250 cfs option is $2.3 million less than the 600 cfs option. The O&M cost for the 250 cfs option is $0.07 million lower than the 600 cfs option. The present value cost for the 250 cfs option is $3.4 million lower than the 600 cfs option.

Table ES-4. Eastside Drainage Project Cost Summary [a]

Project	Total Capital Cost million dollars	Annual O&M Cost, million dollars	Total Present Value Cost, million dollars
250 cfs option	5.6	0.09	7.0
600 cfs option	7.9	0.16	10.4

a Includes costs for detention pond and downstream conveyance facilities.

The 250 cfs option includes a 70 ac-ft detention pond located near the City, which would cover 10 acres of land. This detention pond could be configured to provide joint uses such as wetlands/uplands habitat, sports fields, playgrounds, and/or jogging paths, and water quality treatment. The 600 cfs option does not provide joint use opportunities near the City.

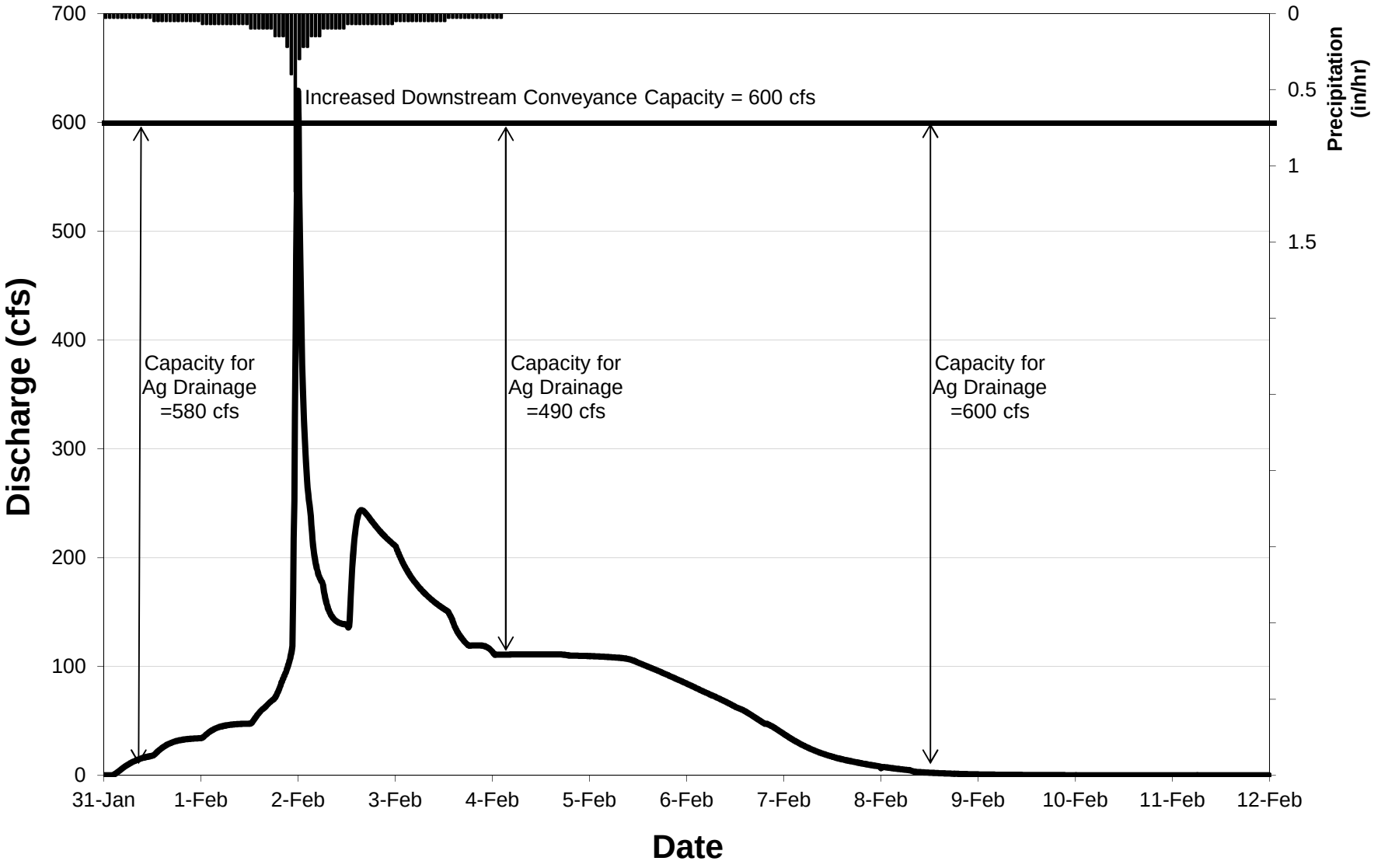
The Eastside Drainage Project alignment includes channels within the service areas of the Dixon Resource Conservation District and Reclamation District No. 2068, and along the border of the Maine Prairie Water District service area. These agencies have several operational considerations that must be accommodated in the final design of the selected option including:

- Channels currently convey irrigation water in the summer, and the ability to continue this is essential. This requirement results in the need for check dams at several locations in the channel system.

- At the point of discharge from the Dixon Resource Conservation District to Reclamation District No. 2068, the culverts should be sized to physically restrict the rate of discharge to the agreed upon discharge limits (either existing or revised limits defined in an amended agreement).

- At the Tremont 3 culverts under Sikes Road, a structure would be configured to direct low flows into the new channel. When flow in the new channel approaches the new channel capacity, it would then also drain into Tremont 3. In the summer time the structure would be reconfigured to direct irrigation water into Tremont 3 rather than into the new channel.

Figure ES-11. Agricultrual Benefit from the 600 cfs Discharge Option



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After the detailed evaluation of these projects, the following conclusions were reached:

- Both options provide adequate drainage for the Northeast Quadrant.
- The 250 cfs option has a lower capital cost, a lower annual O&M cost, and a lower total present value cost than the 600 cfs option.
- The 600 cfs option provides greater flood control benefit to the downstream agricultural community than the 250 cfs option.
- Use of the optional alignments for parts of this project may lower the project costs somewhat. The two potential optional alignments include:
  - Use of Lateral C instead of all or some of the new Vaughn Road channel.
  - A new channel (and required culverts) starting just downstream of the Tremont 3 culverts under Hackman Road and running due south to the upstream end of Lateral 4. Expansion of the Lateral 4 channel and culverts to the confluence with Lateral 5.

The preferred alternative to serve the Northeast Quadrant should be selected jointly by the City, Regional Drainage Committee, and the developers of the Northeast Quadrant.

CHAPTER 1. INTRODUCTION

In 1998 West Yost & Associates (WYA)[1] prepared a county-wide flood control master plan for the Solano County Water Agency (SCWA) that identified all the flooding problems in the County. In that master plan, the Dixon Area was identified as one of the high priority watersheds for receiving flood control improvements because of the high frequency and severity of flooding, and because the flooding in this area caused threats to human safety and damage to public works, infrastructure, and property.

The first step in implementing flood control improvements for this region was to develop the Dixon Watershed Management Plan (this document). The primary purpose of this study is to identify the causes of the flooding problems and develop solutions to the problems that are acceptable to all the involved agencies, including the City of Dixon (City), Dixon Resource Conservation District (DRCD), Maine Prairie Water District (MPWD), and Reclamation District No. 2068 (RD 2068). This study was sponsored and directed by SCWA, with all involved agencies contributing funding or in-kind services. All of these agencies have participated in the development of the flood control solutions described in this document.

The Dixon drainage area was divided into three watersheds, including Basin A and Lateral 1, Basins B/C and Laterals 2/3, and the Eastside Drainage Project Area. Over the last 20 years, several studies have evaluated flood control solutions for some of these areas. A regional drainage plan has never been developed that covers all three of the watersheds downstream of the City.

BACKGROUND

For several years the City has been seeking adequate outfall capacity for three of its drainage systems. These drainage systems, shown on Figure 1-1, discharge into agricultural drains which are subject to routine flooding, as shown on Figure 1-2. The agricultural drains convey the City flow, and runoff from the adjacent fields, through three regional watersheds and discharge into Hass Slough or Ulatis Creek.

A Regional Drainage Committee (RDC) was established with members representing the agencies that provide drainage for the downstream agricultural areas and the City. The goal of the RDC is to develop drainage projects that provide adequate outfall capacity for the City and reduce flooding in the agricultural areas.

The three regional watersheds are described below.

Basin A and Lateral 1

Currently the City Basin A drains to Pond A, which is operated as a retention basin with releases only when the downstream system is empty. Additional areas upstream of Pond A are planned for development in the future, which will result in increased flow to Pond A. To accommodate the increased flow, the storage capacity of Pond A must be enlarged and an outfall must be constructed. The outfall must have adequate capacity to both convey flow released from Pond A, while also reducing the downstream flooding of the fields along Lateral 1.

[1.] For easy reference, all abbreviations/acronyms are listed on the back cover.

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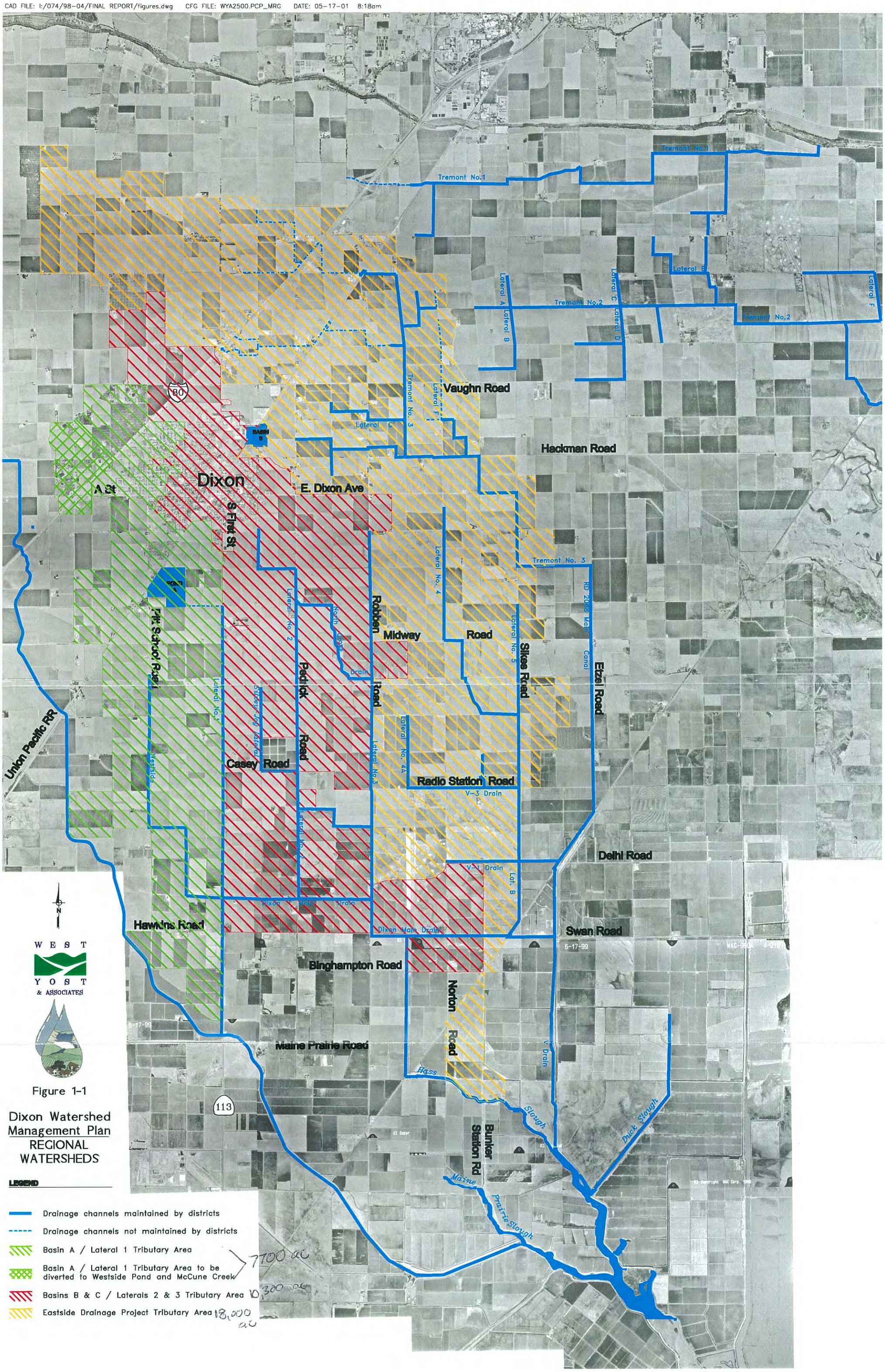

WEST YOST & ASSOCIATES

Figure 1-1

Dixon Watershed Management Plan
REGIONAL WATERSHEDS

LEGEND

- Drainage channels maintained by districts
- Drainage channels not maintained by districts
- Basin A / Lateral 1 Tributary Area
- Basin A / Lateral 1 Tributary Area to be diverted to Westside Pond and McCune Creek } 7700 ac
- Basins B & C / Laterals 2 & 3 Tributary Area 10,300 ac
- Eastside Drainage Project Tributary Area 18,000 ac

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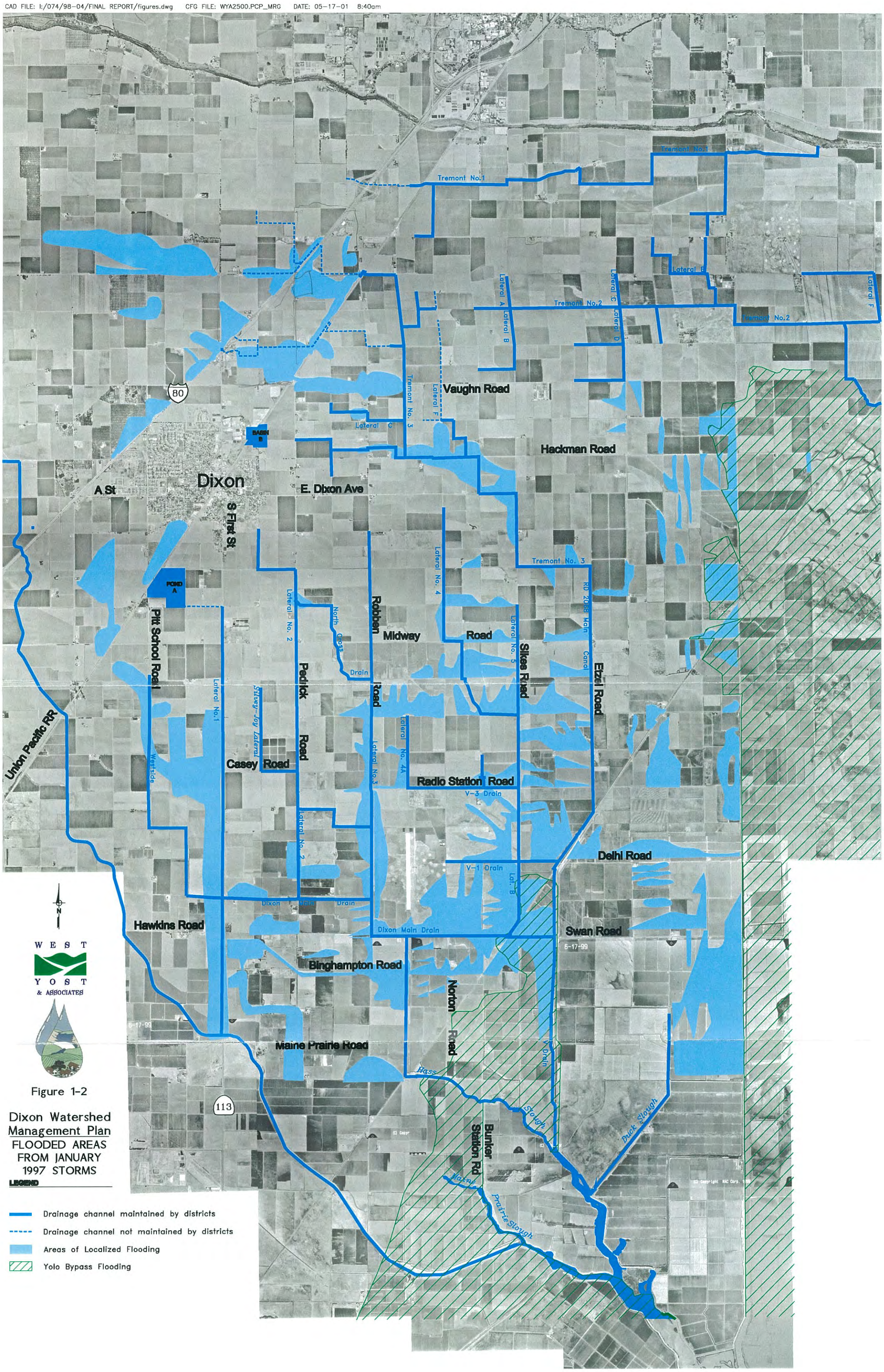

Figure 1-2

Dixon Watershed Management Plan
FLOODED AREAS FROM JANUARY 1997 STORMS

LEGEND

- Drainage channel maintained by districts
- Drainage channel not maintained by districts
- Areas of Localized Flooding
- Yolo Bypass Flooding

Basins B/C and Laterals 2/3

A 1965 agreement between the City and the DRCD, limits the discharge from the City into Lateral 2 to the flow from 42-inch and 36-inch pipes (generally accepted to be 77.5 cfs). Based on results of this study, large storms result in discharges from the City to lateral 2 estimated to be in the range of 130 cfs (from a 5-year event) to 230 cfs (from a 100-year event), which clearly exceed the agreed upon limit. The City must detain flows from Basins B/C to the agreed upon limit of 77.5 cfs, or construct conveyance improvements to the downstream drains that would allow the City to discharge at a higher rate while reducing the downstream flooding.

The Eastside Drainage Project (EDP)

The Northeast Quadrant (NEQ) of the City includes 585 acres of agricultural land that is scheduled for development in the near future. Current runoff from this area was estimated to range from about 30 cfs (from a 5-year storm) up to 100 cfs (from a 100-year storm) including agricultural runoff from north of Interstate 80. When this area is developed, the peak (undetained) runoff is expected to be about 600 cfs. The fields along the Tremont 3 drain and subsequent downstream drains are subject to routine flooding. As a condition of approval of development of the NEQ, runoff from the NEQ must either be detained to existing rates or downstream conveyance improvements must be constructed to convey the increased flow from the NEQ while also reducing downstream flooding.

PLANNING APPROACH & DESIGN CRITERIA

The City standard design criteria for sizing detention basins is to contain the runoff from a 100-year, 4-day storm. No specific design criteria was established for the downstream conveyance improvements. Instead, the following general planning approach was used: Provide the maximum regional flood control benefit subject to certain cost limitations.

Essentially, this means balancing use of detention basins (located in or near the City) with downstream conveyance improvements to maximize benefit and minimize costs. The downstream conveyance improvements provide greater regional benefit than the detention ponds. The benefit of the projects was evaluated through comparison of hydrographs/stagegraphs both with and without the project. Benefits result from a reduction in the maximum water level, the extent of flooding, and the duration of flooding. The cost limitations included limiting overall project costs to near that of the lowest cost option (which may or may not have provided the maximum benefit).

ELEVATION DATUMS

All elevations given in this report are based on the North American Vertical Datum of 1988 (NAVD). This datum is different from the National Geodetic Vertical Datum of 1929 (NGVD). To convert from NGVD to NAVD, add 2.5 feet to the NGVD elevation. To convert from NAVD to NGVD, subtract 2.5 feet from the NAVD elevation. Use of the correct datum is essential when planning, designing, and constructing drainage facilities. It appears that the official City Datum is the NGVD. Aerial surveying performed by Nolte & Associates for the Southwest Dixon Specific Plan Area appears to be based on the NGVD. The surveying done for development of Southpark appears to be based on the NGVD. Caltrans is currently using the NAVD in their projects.

DATA COLLECTION

The following individuals and agencies provided data in support of this study.

1. Stan Moorhead, consultant to and funded by DRCD, provided the following information:

    a. Cross-sections for DRCD Laterals 1, 2, 3 and the Dixon Main Drain. These cross sections were created using a hand level and rod, but were not tied to a common datum. The vertical relationship of these cross sections was estimated from USGS topographic maps and inground monuments.

    b. Culvert sizes for DRCD Laterals 1, 2, 3, and the Dixon Main Drain, including the culvert diameters and type. For many culverts, the length and maximum inlet head were also provided.

    c. The drainage patterns and discharge points from agricultural lands into Laterals 1, 2, and 3 and the Dixon Main Drain.

    d. Copies of existing maps and hydrologic models of the watershed.

2. Caltrans provided a paper copy of ½-meter contour mapping along Highway 113 from the City to Ulatis Creek. This topographic mapping was not sufficiently detailed to permit development of channel cross sections.

3. Mike Hardesty, General Manager of RD 2068 provided the following information (See Figure 1-3 for locations):

    a. US Army Corps of Engineers 2-foot contour mapping along Hass Slough from Cache Slough to Bunker Station Road and along the V-Drain from Hass Slough to beyond the RD 2068 Main Canal. This information was provided in an electronic format and was of sufficient detail to develop channel cross sections.

    b. Stage and or flow data for the following locations and time periods (locations are shown on Figure 1-3):

        — Pumping Station #1 – Stage data during the January 1997 storm and the February 1998 storm.

        — DMD at the V-Drain – Stage data during the February 1998 storm.

        — Tremont 3 at the Main Canal – Stage and flow data during the February 1998 storm.

    c. Photographs of flooded areas during the January 1997 and February 1998 storms.

4. MPWD provided photographs of flooded areas during the January 1997 storm.

5. Most of the drainage system was surveyed (see Figure 1-3). The survey information is provided in electronic format as an AutoCAD drawing in Appendix A. In the areas surveyed the following data was collected:

    a. Channels - cross sections every quarter to half mile

    b. Culverts – culvert size and material, flow line elevations, lengths, and overland release elevations

MODEL DEVELOPMENT AND VERIFICATION

XP-SWMM (Expert Storm Water Management Model) is a hydrologic/hydraulic computer model. This model was developed by a commercial vendor, and is based on the Environmental Protection Agency's Storm Water Management Model. This model automates the connection between the hydrologic and hydraulic calculations. It is Windows based and quite simple to use. It has exceptional quality output capabilities. For these reasons XP-SWMM was selected for use in this project.

The computer model for this project extends from the point of discharge from the City outfalls into the DRCD, through the DRCD system, and into the RD 2068 and/or the MPWD systems. The purpose of the modeling was to develop and evaluate improvements to the drainage system that would provide the City with discharge capacity and also reduce existing agricultural flooding problems.

The model represents a drainage system using a link-node structure. Nodes are the points at which hydrologic evaluations are performed (Figure 1-4 shows the subshed delineation) and the resulting hydrographs are entered into the hydraulic model. As shown on Figure 1-4, the model includes many of the channels and culverts in great detail. However, the channels and culverts that were not along a proposed project alignment were aggregated into a single subwatershed or included at a lower level of detail.

An existing conditions model was developed to provide a verification of the reasonableness of the computer model, by comparing its predicted results for a historical storm event with actual observed flooding conditions.

Storm Events

Two storms were used for calibration of the existing conditions model, including:

- The January 1-2, 1997 storm event was used because photographs of the flooding from this storm were available in both the RD 2068 and MPWD service areas. The hyetograph for this storm is presented in Figure 1-5, and is based on hourly rainfall data measured at the Dixon California Irrigation Management Information System (CIMIS) station. This storm appears to have a return frequency of about 15-years, as shown in Table 1-1. For comparison purposes, the hyetograph for the City 100-year, 4-day design storm is also shown on Figure 1-5.

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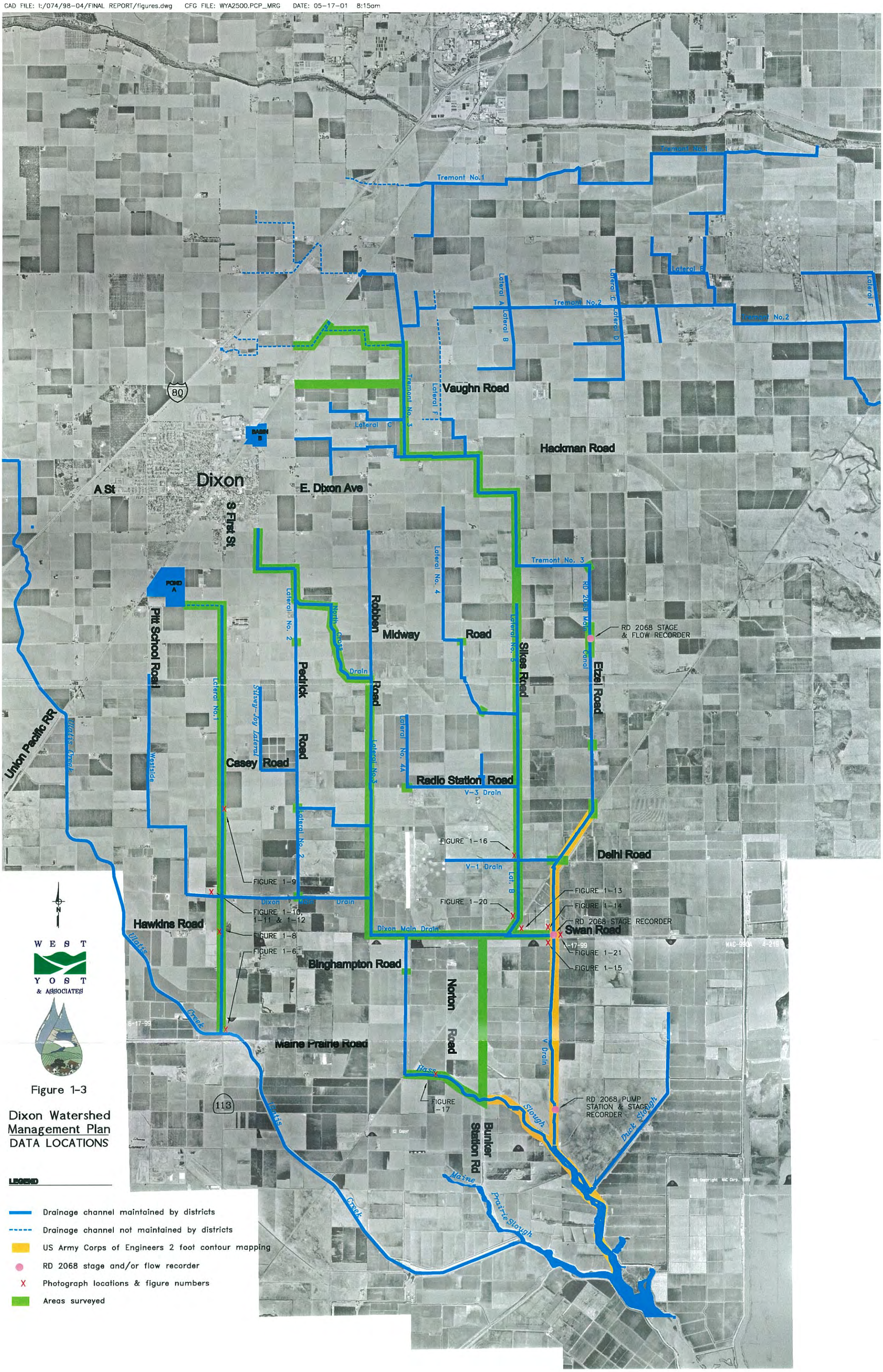

Figure 1-3

Dixon Watershed Management Plan
DATA LOCATIONS

- The February 2-5, 1998 storm was also used for calibration of the Tremont 3 section of the model. For this storm a gaged hydrograph at the discharge from Tremont 3 into the Main Canal and a gaged stagegraph for the DMD at the V-Drain were available. Photographs of flooding around the RD 2068 service area were also available. The hyetograph for this storm is presented in Figure 1-5, and is based on hourly rainfall data measured at the Dixon CIMIS station. This storm was about a 5-year event, as shown in Table 1-1.

Table 1-1. Analysis of Storm Events

	January 1-2, 1997 Storm Event		February 2-4, 1998 Storm Event	
Duration	Peak Rainfall, inches	Return Frequency, years	Peak Rainfall, inches	Return Frequency years
1-Hour	0.52	2-Year	0.69	5-Year
2-Hour	0.87	4-Year	0.96	5-Year
3-Hour	1.23	8-Year	1.13	5-Year
6-Hour	1.93	15-Year	1.39	4-Year
12-Hour	2.59	15-Year	1.92	4-Year
1-Day	2.91	7-Year	2.79	5-Year
2-Day	3.36	4-Year	3.57	5-Year

City Outfalls

City discharges into the DRCD system have been included in the model as described below.

Basin A – Hydrographs were developed for each of the major areas (subsheds) that currently drain into Pond A. These hydrographs were then routed through Pond A. Pond A was modeled to simulate normal operation, that is:

- Flow enters the deep pond and the deep pond begins filling.
- The deep pond pumps turn on at set water depths and pump into the shallow pond.
- The shallow pond fills until the glory hole overtops, at which point a discharge from Pond A to Lateral 1 occurs.

During the January 1-2, 1997 storm, the City did not discharge from Pond A into Lateral 1. Instead, all flow into Pond A was detained until January 6 when the flooding downstream had receded. On January 6th, the 12- and 18-inch gates were opened by the City to allow the upper pond to drain into Lateral 1. This was duplicated in the XP-SWMM model run for the January 1-2, 1997 storm.

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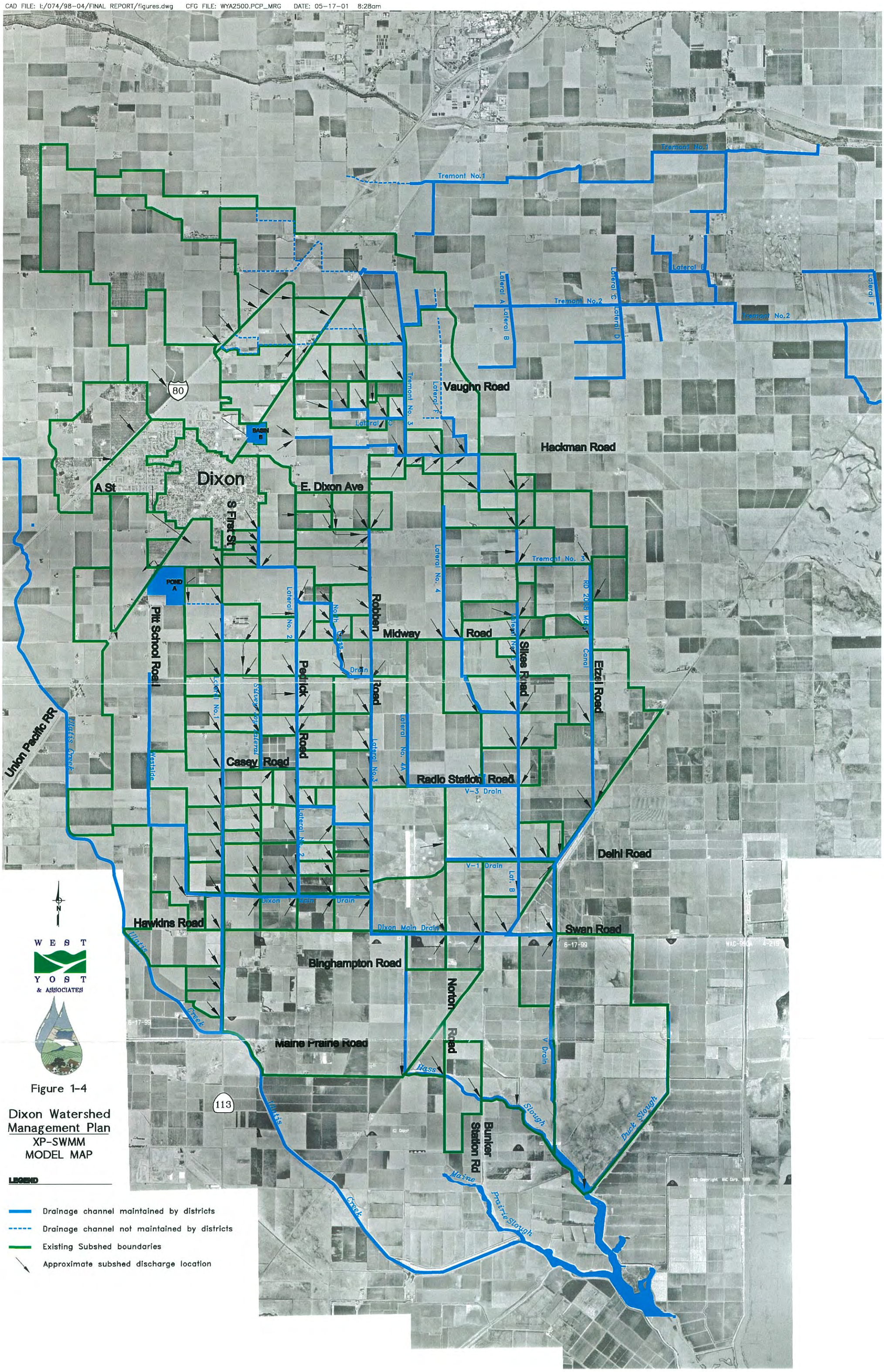


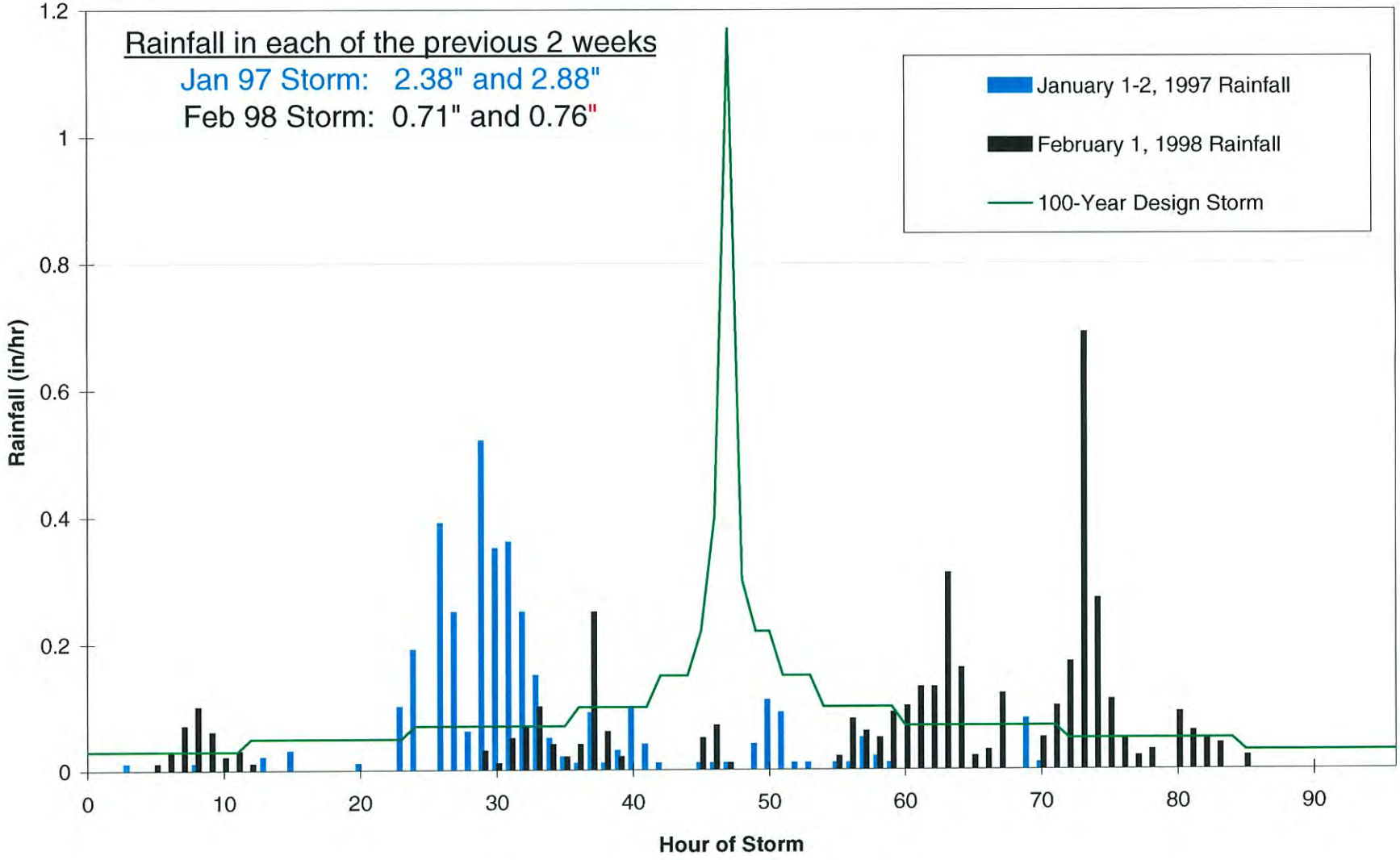
Figure 1-4

Dixon Watershed Management Plan
XP-SWMM MODEL MAP

LEGEND

- Drainage channel maintained by districts
- Drainage channel not maintained by districts
- Existing Subshed boundaries
- Approximate subshed discharge location

Figure 1-5. Storms Used for Model Calibration



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Basin B – Basin B has been included as a single subshed that drains into Pond B. A 25 cfs pump station pumps water out of Pond B, and discharges into Lateral 2.

Basin C – Basin C was divided into 18 subsheds corresponding to the subsheds delineated in the City's *Storm Drainage Report* (SDR). The storm drain pipe data was developed from design and as-built drawings.

Basin D – (the Northeast Quadrant)– This area was represented by one subshed north of Interstate 80 and two subsheds south of Interstate 80. Surface storage of flood water was accounted for north of Interstate 80 and within the NEQ.

Agricultural Runoff

Within the model, the agricultural area downstream of the City was divided into about 155 subsheds as shown on Figure 1-4. Runoff from these subsheds was modeled based on:

- Subshed area
- An average ground slope estimated to be 0.1 percent
- Manning's n of 0.02 for sheet flow over bare soil
- An impervious percentage of 5 percent to account for the roads, houses, buildings, ponded water, and other impervious areas
- An infiltration rate representing nearly saturated conditions (infiltration rates are discussed more in the calibration section of this chapter)

Downstream Tailwater Conditions

The major outflows in the modeled drainage system are discussed below.

Ulatis Creek Outfall – For the January 1-2, 1997 storm, the tail water condition for Ulatis Creek was developed based on observations/photographs provided by Ed Coffelt, as shown on Figure 1-6. The creek was assumed to be nearly empty before the storm began, the channel filled quickly and overtopped its banks (Elevation 35 feet) at about 10:00 AM, January 1, and by 12:00 noon, January 2 the water surface was back to an elevation of about 30 feet. After this point the water level was assumed to recede slowly. The Ulatis Creek tail water level for the 2-year storm was estimated to be below about 28 feet, which provides a free outfall for the flow from Lateral 1. The tail water for the 100-year storm was estimated based on a comparison with the January 1997 storm, as shown on Figure 1-6.

Cache Slough Outfall – The tail water elevations for the RD 2068 Hass Slough and Yolo Bypass pump stations are shown on Figure 1-7. The tail water elevation for Cache Slough was developed based on stage records at the RD 2068 Pump Station No. 1 (provided by Mike Hardesty).

Figure 1-6. Ulatis Creek Tail Water Elevation

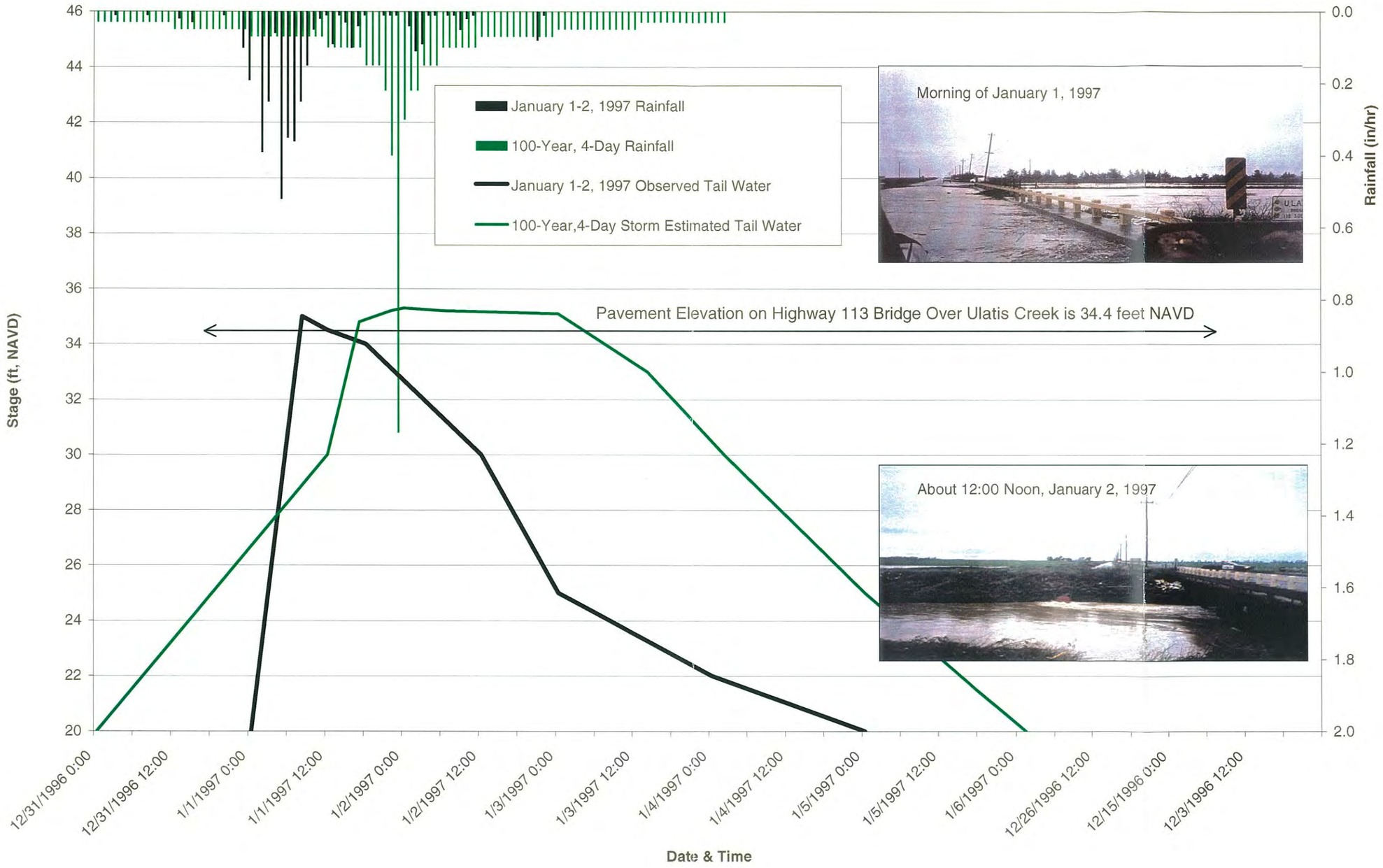
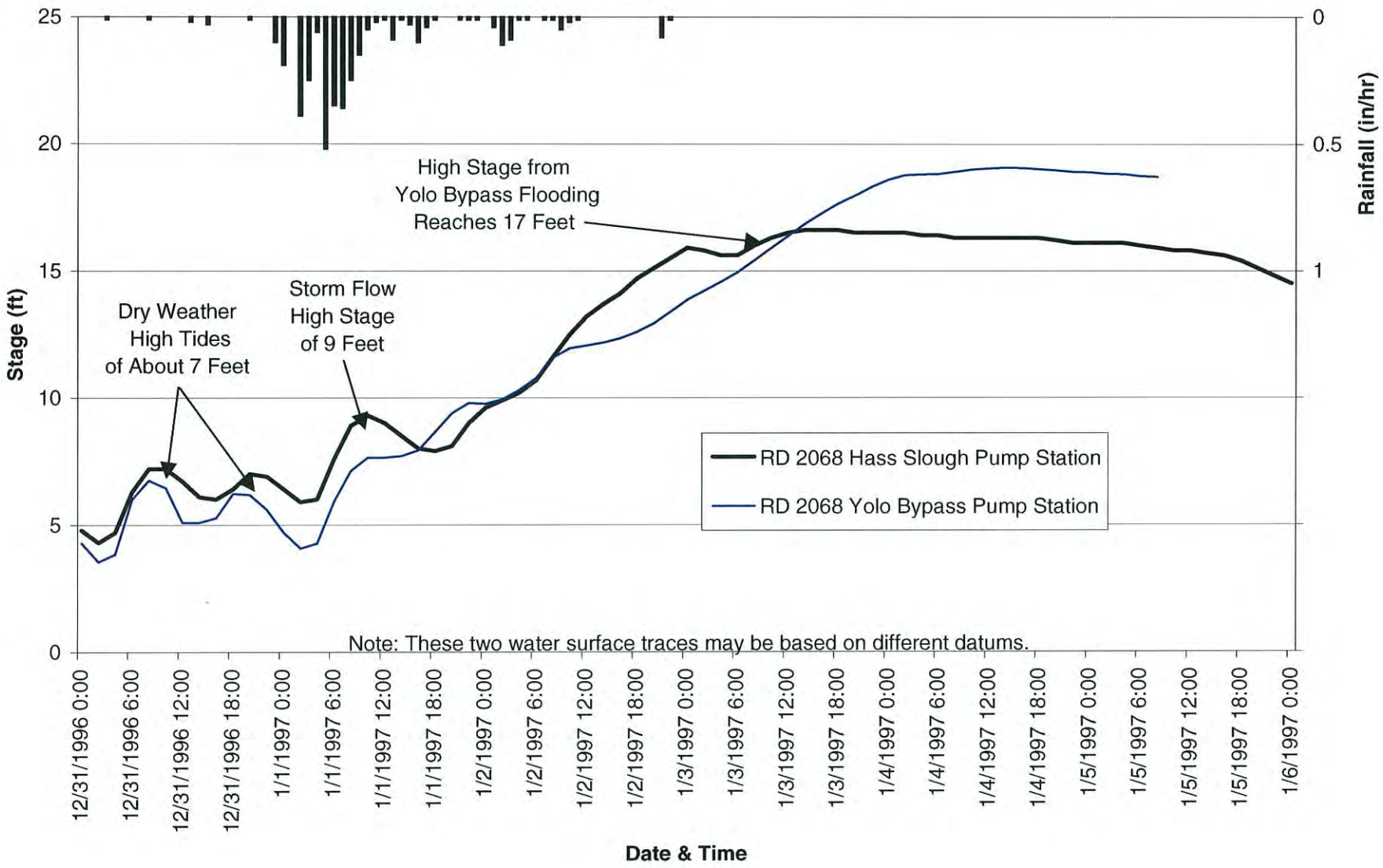


Figure 1-7. Cache Slough Tail Water Elevation



The tail water in Cache Slough and Hass Slough is controlled by two factors, runoff from the study area and flooding of the Yolo Bypass caused by high flow in the Sacramento River. Shown on Figure 1-7 is the hourly rainfall measured at the Dixon CIMIS station, and the peak stage from the storm flow, which is about 9 feet. After the storm flow receded and, coincidentally the tide dropped, flooding of the Yolo Bypass began to control the tail water elevation in Cache and Hass Sloughs, and the stage rose to about 17 feet. For the January 1-2, 1997 storm (a 15-year event) calibration model run, a constant tail water elevation of 9.5 feet was used. For the February 1998 storm event (a 5-year event) a constant tail water elevation of 8.5 feet was used. The purpose of this study was to address flooding from local runoff (from within the study area). Resolving flooding caused by flow in the Yolo Bypass was beyond the scope of this study. Consequently, use of tailwater elevations of 8.5 to 9.5 feet are appropriate, but use of a tail water of 17 feet is inappropriate.

Highway 113 Outfall – Flood flow from the MPWD Lateral 1 overtops both the east channel bank and Highway 113 near Hawkins and Binghampton Roads (see Figure 1-8). In the model, this flood flow was allowed to cross Highway 113 and then exit from the modeled system. This discharge can exceed the capacity of the channel and was modeled as a free discharge with no tail water condition, which means that flow over the highway was not restricted by a high water surface on the east side of the highway.

Tremont 3 at the Main Canal Outfall – A 24-inch CMP conveys runoff from Tremont 3 under the Main Canal. In the model, this flow was allowed to discharge through the 24-inch CMP under free outfall conditions.

MODEL VERIFICATION

The primary variables used to calibrate the model, as described below, were the subwatershed width and the infiltration rate.

Subwatershed Width

Subwatershed width is an input variable of the XP-SWMM model, and is related to the runoff overland flow length. The subwatershed width controls how quickly rainfall runs off the land surface. After calibration with the January 1997 and February 1998 storms, it appears that appropriate subwatershed width values are 1 to 2 feet per acre for agricultural areas, and about 10 feet per acre for urban areas.

Figure 1-8. Flooding over Highway 113 near Hawkins Road.

Infiltration Rate

The infiltration rate controls the total quantity of runoff from the land surface. The calibrated infiltration rates are presented in Table 1-2 and are significantly lower than traditional values (0.18 inches per hour for soil group B. and 0.05 inches per hour for Group D). This is probably because the fields are bedded in the fall and develop a crust that acts much like impervious cover, resulting in low infiltration rates and high runoff rates. The infiltration rates used for the design storms are also presented in Table 1-2. The design storm rates are near the low end of the calibrated rates, resulting in a reasonable, but conservative runoff rate for sizing the drainage facilities.

Table 1-2. Infiltration Rates[a]

Model Run	Hydrologic Group B Soils	Hydrologic Group D Soils
Jan 97		
Initial	0.100	0.040
Final	0.001	0.001
Feb 98		
Initial	0.200	0.040
Final	0.024	0.008
Design		
Initial	0.100	0.040
Final	0.004	0.002

[a] The initial rate represents the infiltration at the start of the storm. The final rate represents the infiltration as the ground becomes saturated.

Calibration Results

The model was calibrated in two separate efforts. The first was based on the January 1997 storm and focused on Laterals 1, 2, and 3 and the DMD. The second effort was based on the February 1998 storm event and focused on Tremont 3 and Lateral 5, and the V-Drain.

January 1997 Storm Event – Both Ed Coffelt and Mike Hardesty provided pictures of several locations flooded on January 1 and 2, 1997. Photographs of the observed flooding are presented in Figures 1-9 through 1-17, and the locations of the photographs are shown on Figure 1-3.

Figure 1-9. Lateral 1 About Half a Mile North of DMD.

Ground elevation of field is about 39.7 feet; top of levee is about 42.0 feet. Modeled maximum WSEL at this location is 42.1 feet.

Figure 1-10. Lateral 1 Just Upstream of the DMD.

Top of channel elevation is 39.5 feet, edge of Highway 113 elevation is 40.5 feet, and Highway 113 crown is 40.8 feet. The modeled maximum WSEL for the downstream end of Lateral 1 is 41.0 feet.

Figure 1-11. Lateral 1 at the End of the Westside Drain.

Ground surface at this location is about 40.5 feet. The modeled WSEL for the downstream end of the Westside Drain is 40.8 feet.

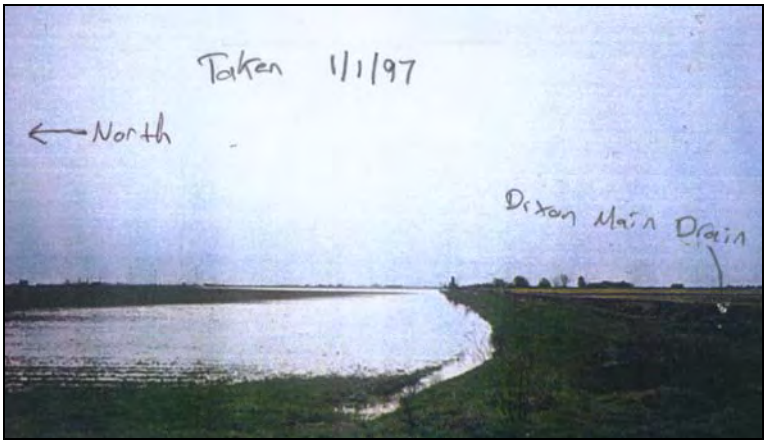


Figure 1-12. DMD at Highway 113.

The ground elevation in the field is 39.4 feet. The top of the south levee is at 40.8 feet. The model predicts a WSEL in the field of 40.1 feet, and at the upstream end of the DMD the model predicts a WSEL of 37.4 feet (2 feet below top of the south levee).

Figure 1-13. DMD at the Intersection of Sikes and Swan Roads.

The road elevation at this location is about 18.6 feet, but the model predicts a maximum WSEL of about 17.9 feet. Flooding of this intersection may be a result of the Yolo Bypass flooding rather than the modeled local runoff.

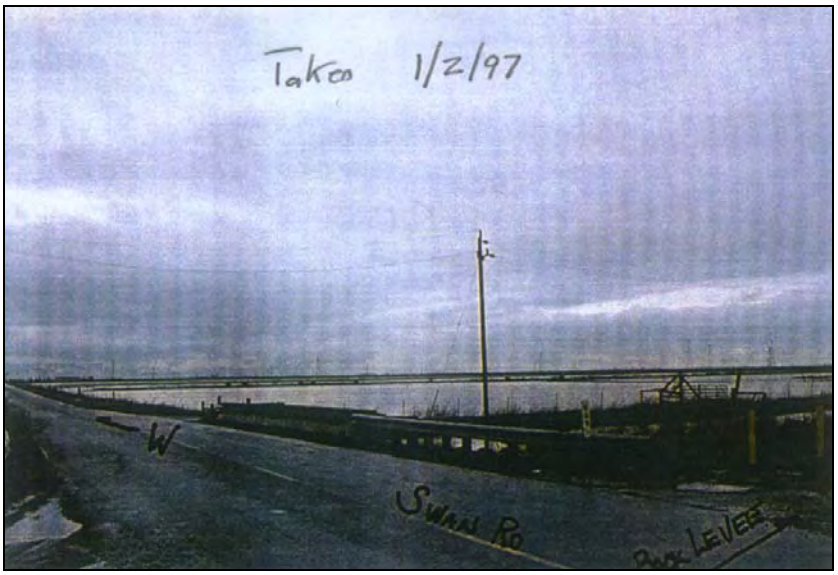


Figure 1-14. V-drain at Swan Road.

The field is at an elevation of about 16.7 feet, and Swan Road is at about 18.5 feet. The model predicts a maximum WSEL of about 16.1 feet. The WSEL on January 2, 1997 at this location may be controlled more by the flooding of the Yolo Bypass than the modeled local runoff.

Figure 1-15. DMD at the V Drain.

The field is at about elevation 15.2 feet. The top of the dirt road is at about elevation 17.2 feet. The model predicts a maximum WSEL at this location of 16.0 feet. The WSEL on January 2, 1997 at this location may be controlled more by the flooding of the Yolo Bypass than the modeled local runoff.

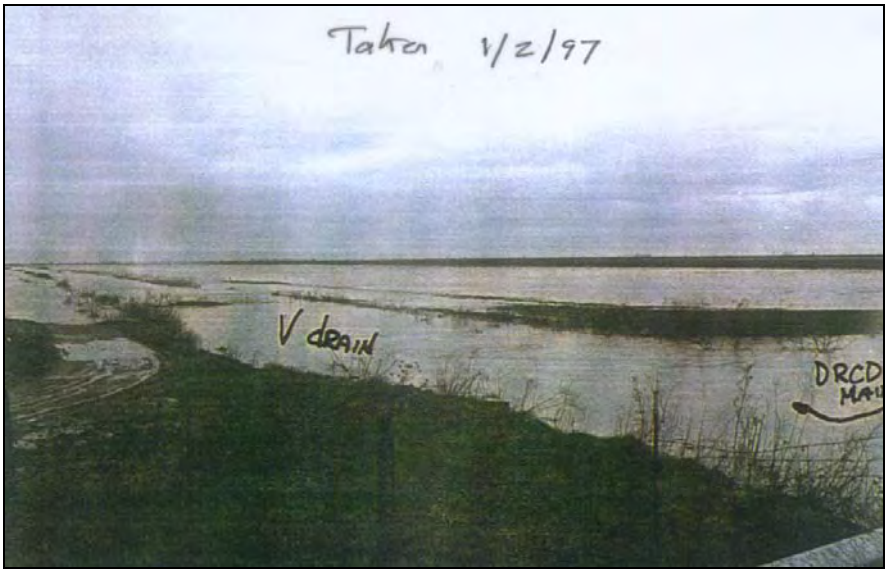


Figure 1-16. Lateral 5 at the Intersection of Sikes and Delhi Roads.

The elevation of this intersection is about 22.1 feet. The model predicts a maximum WSEL at this location of 22.1 feet.

Figure 1-17. Hass Slough Between Norton Road and Abandoned Railroad.

The ground surface is about 16.5 feet. The model predicts a maximum WSEL in Hass Slough at this location of about 15.4 feet.

February 1998 Storm Event – Stagegraphs, hydrographs, and photographs of the observed flooding from the February 1998 storm event are presented in Figures 1-18 through 1-21 and discussed below. The locations of these figures are shown on Figure 1-3.

Figure 1-18 - a hydrograph of the gaged and modeled flow discharged from Tremont 3 to the RD 2068 Main Canal. As shown, the modeled flows agree quite closely with the gaged flows. The peak flows differ by only about 5 cfs.

Figure 1-19 - a stagegraph of the DMD discharge into the V-Drain. As shown, the modeled stage at this location agrees quite closely with the gaged stage, with the difference in peak stage being about 0.6 foot.

Conclusion

The existing conditions model simulates the observed flooding reasonably well and it was thus used to simulate design storms and evaluate drainage projects with a reasonable degree of confidence.

Figure 1-18. Hydrographs of Tremont 3 Weir Discharge into the RD 2068 Main Canal

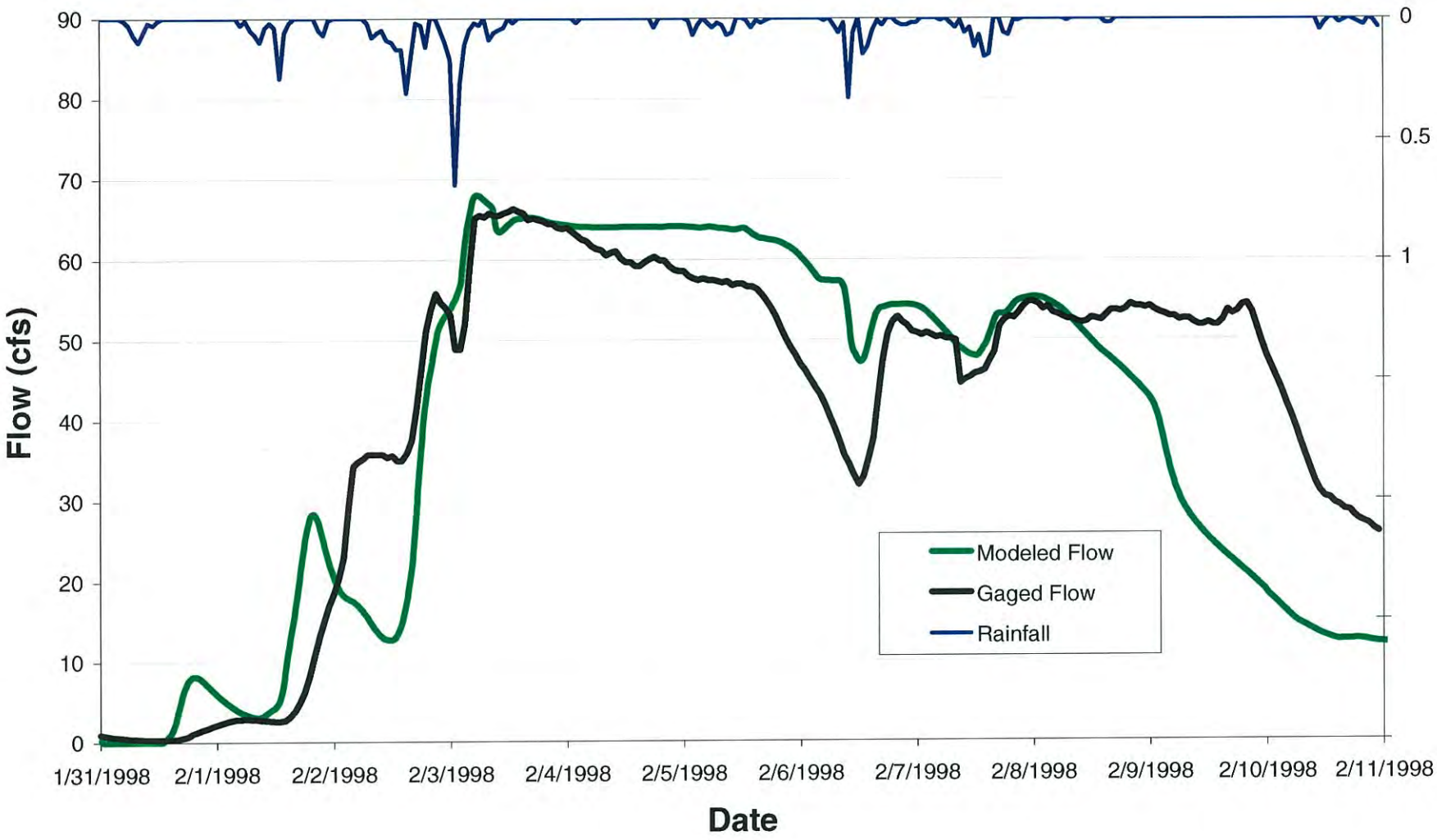


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Figure 1-19. Stagegraphs of the Dixon Main Drain at the V-Drain

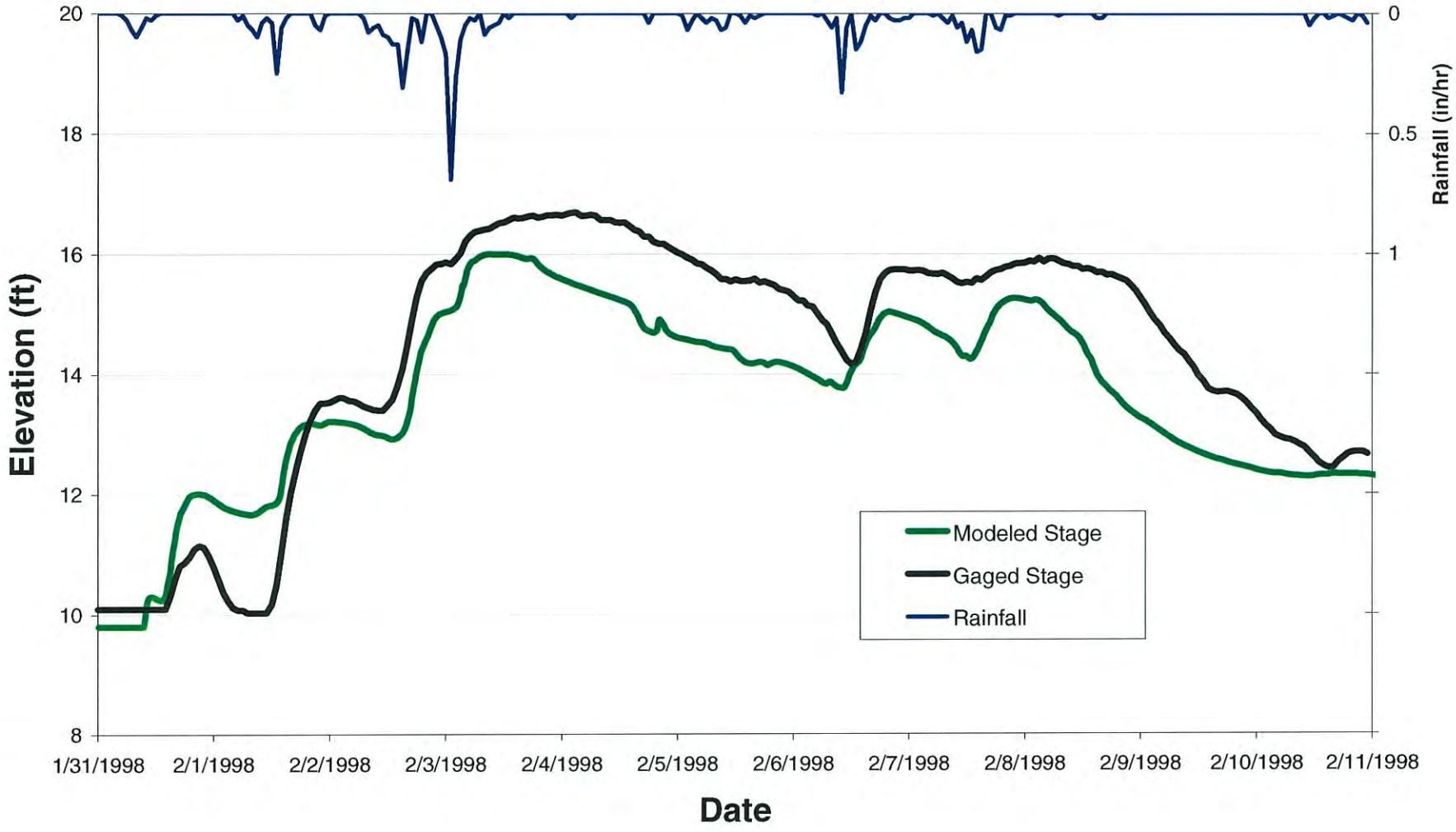

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Figure 1-20. Sikes Road at Abandoned Railroad.

Sikes Road has an elevation of about 19 feet. The modeled peak water surface elevation was 19.4 feet, which agrees closely with the observed flooding.

Figure 1-21. V-Drain at Swan Road Crossing.

The Top of the V-Drain Box Culverts Under Swan Road is at Elevation 17.0 Feet. The observed water level is about 16.5 feet. The modeled peak water level is about 15.6 feet, which agrees closely with the observed water level.

CHAPTER 2. POND A ALTERNATIVES

Basin A and Lateral 1 is the western most watershed in the Dixon Region. The upstream end of this watershed includes the City's Basin A and 760 acres of agricultural land west of Interstate 80. The City prepared a *Storm Drainage Report* (SDR) in March 1999. The SDR evaluated flood control improvements within the City, and identified potential outfall alignments from Pond A for runoff from the City. However, no outfall alignment was recommended and impacts from the City runoff along the alignments were not evaluated. This chapter refines the outfall analyses in the SDR, and resolves drainage issues for the Almond Street area and the Southpark Development.

SOUTH ALMOND STREET AREA DRAINAGE ALIGNMENT COST COMPARISON

In the SDR it was concluded that the South Almond Street Area should be drained to Pond A to help alleviate flooding in the South Almond Street Area and in the downstream area within the City. The recommended improvements included about 4,000 feet of 60-inch pipe through undeveloped land (from South Almond Street to Pond A) and were estimated to cost about $750,000 (page 4-15 of the SDR). This project was judged to be less expensive than improving the existing drainage system, which would have required about 5,000 feet of 60-inch pipe, at a cost of about $940,000.

At the time this improvement was proposed, the elevations of the streets and gutters in the Almond Street Area had not been surveyed. Following completion of the survey, it has been determined that if the Almond Street Area is connected to Pond A, the maximum Pond A water level must be lowered by over two feet to provide sufficient head to drain the Almond Street Area. Lowering of the Pond A maximum water level means that a larger area of Pond A must be excavated to provide the same detention storage. The additional excavation was estimated to be about 300,000 cubic yards, at a cost of approximately $900,000.

In 1999, City maintenance crews discovered and removed concrete blockages from the twin 48-inch pipes in Hall Park downstream of the connection with the 36-inch drain from the Almond Street Area. Removal of these blockages should reduce the extent and duration of flooding in the South Almond Street Area. However, because there have been no large storms since the blockages were removed, the magnitude of the reduction in flooding is untested at this time.

It is recommended that the South Almond Street Area not be diverted to Pond A because of the high cost ($1.65 million) and minimal drainage improvement that will result in the area.

SOUTHPARK DEVELOPMENT

The Southpark developer's engineer (Morton & Pitalo) recommends that Southpark drain to Pond A rather than Pond C/Lateral 2, because draining to Pond A is less expensive for the developer than draining to Pond C/Lateral 2. The southwest corner of the Southpark area is at an elevation of less than 58 feet NAVD. The maximum planned 100-year water surface elevation in Pond A is 61.0 feet NAVD. The southwest corner of Southpark is thus about three feet below the planned maximum Pond A water elevation. Morton & Pitalo engineers agree that one way to solve this problem would be to raise the ground surface elevation in the low areas of Southpark

using fill material, possibly from the Pond A excavation. This would be a mutually beneficial solution for the City and Southpark because it would solve the Southpark drainage problem and provide a nearby disposal site for the dirt excavated from Pond A. If the Southpark area cannot be raised enough to gravity drain into Pond A, a pump station could be constructed to lift runoff from Southpark into Pond A.

POND A OUTFALL COMPARISON

In the SDR it was recommended that an outfall be constructed for Pond A, and four potential outfall alignments were developed and compared. Two of the alignments drain to the west, with the preferred western alignment draining to McCune Creek. The other two alignments drain to the east to either Lateral 1 or Lateral 2 of the DRCD. Presented below is a more detailed comparison of these alignments.

The alternative Pond A outfall alignments are shown on Figure 2-1. The McCune Creek Alignment (MCA) would cross under the Union Pacific Railroad tracks, continue southwest down Porter Road, turn west and follow an alignment adjacent to the Weyand Irrigation Pipeline, cross Batavia Road, parallel the Olsen Drain, and discharge to McCune Creek.

The Lateral 1 Alignment (L1A) would run east from the southeast corner of Pond A in an existing drainage ditch to Lateral 1 on the west side of State Highway 113. Lateral 1 currently drains to the south and discharges into the DMD. The reach of Lateral 1 south of the DMD drains to Ulatis Creek. Lateral 1 would be disconnected from the DMD and would be improved from Pond A to Ulatis Creek to convey the flow from Pond A.

The Lateral 2 Alignment (L2A) would run east from the northeast corner of Pond A in the future public street (to be constructed as part of the Southpark development), cross State Highway 113, and continue east to Lateral 2 of the DRCD drainage system. Downstream improvements in Lateral 2, the North Cross Channel, Lateral 3, and the Dixon Main Drain would also be constructed.

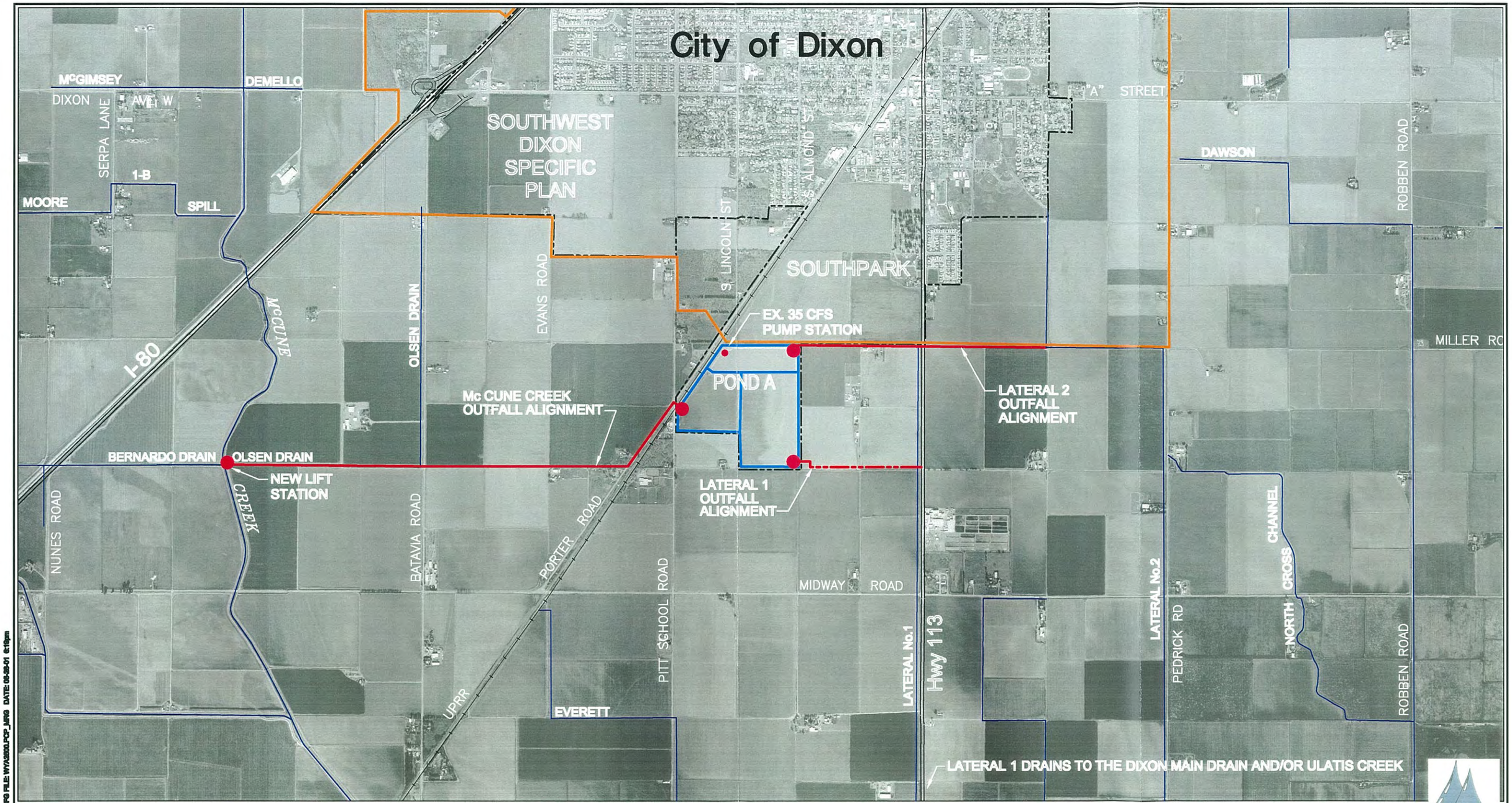
The costs, advantages, and disadvantages of these three alignment alternatives are compared below.

Capital Costs

The estimated capital cost for each of the three alternatives is presented in Table 2-1 and includes four major elements:

1. Pond A/Pump Station - The Pond A expansion cost is dependent upon selection of an outfall alignment because:

    a. Discharge rates are different for each outfall. The MCA discharge is 35 cfs, L1A is up to 75 cfs and L2A is 25 cfs. The required pumping capacity and resulting storage volume is thus different for each of the outfall alignments.



LEGEND

- GENERAL PLAN BOUNDARY
- DIXON CITY LIMITS
- DRAINAGE CHANNEL/CREEK
- BOUNDRY OF DETENTION PONDS
- PIPED OUTFALL ALIGNMENT
- OPEN CHANNEL OUTFALL ALIGNMENT
- NEW PUMP STATION LOCATIONS
- EXISTING PUMP STATION

N

Figure 2-1

Dixon Watershed Management Plan

Pond A Outfall Alternatives Alignments

WEST YOST & ASSOCIATES

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b. To prevent increased flooding in McCune and Ulatis Creeks, discharge from Pond A would have to be discontinued when the water level in either of these creeks is too high. Discharge through the MCA would have to be discontinued when the water level rises to within 1.5 feet of the top of bank (which is consistent with the design freeboard of 1.5 feet). Discharge through L1A would have to be discontinued when the water level rises to within 5.5 feet of the top of bank (see Appendix B), or when the water level in Lateral 1 is above the level of the adjacent fields. In a 100-year event, the duration of the pump shutdown time may be as long as 3 days. Discharge through the L2A would be continuous (no period of interruption) at 25 cfs (assuming construction of Pond C).

2. Outfall – The major differences are that the MCA requires a piped outfall and a second pump station to lift the water into McCune Creek, at a construction cost of about $280,000. The MCA outfall would be a 42-inch pipe from Pond A to McCune Creek. The outfall improvements for L1A would include purchasing and enlarging an existing privately owned ditch and culverts. The outfall improvements for L2A would include a 48-inch pipe from Pond A to Lateral 2.

3. Downstream Improvements – For the MCA it is assumed that no downstream improvements would be needed because no discharge would occur during periods of high stage in McCune Creek. For L1A the required improvements have been evaluated in detail and costs have been estimated. For L2A, the required downstream improvements (along Lateral 2, the North Cross Channel, Lateral 3, the Dixon Main Drain, and a share of the New South Channel) have only been preliminarily evaluated and costs estimated.

4. Pond C – The City has an agreement with DRCD permitting a maximum discharge estimated at 77.5 cfs into Lateral 2. Pond B discharges to Lateral 2 at a maximum rate of 25 cfs, leaving a maximum discharge from Basin C of 52.5 cfs. A Pond C incremental expansion cost is applied to L2A because under this option 25 cfs would be discharged from Pond A to Lateral 2, and the Pond C discharge would be limited to 27.5 cfs. With MCA and L1A, the Pond C discharge could be 52.5 cfs. This decreased discharge rate over the 4-day design storm results in a larger storage volume requirement for Pond C, which increases the construction cost of L2A by about $640,000.

As shown in Table 2-1, the total capital costs are estimated to be:

- MCA: $5.1 million
- L1A: $3.8 million
- L2A: $6.9 million

This cost comparison indicates that L1A is the preferred alternative, with a total capital cost about $1.3 million lower than the cost of MCA, and about $3.1 million lower than L2A.

This cost comparison is quite sensitive to the unit cost of excavation. The City of Sacramento currently uses a unit excavation cost for planning detention ponds of $3/cubic yard (CY) for dry excavation. The City's Pond B unit excavation cost was $2.55/CY in 1996. If the unit costs for excavation are significantly different than estimated in Table 2-1, the overall cost comparison could change significantly. The excavation unit costs used in Table 2-1 are $2/CY for Pond A because of its proximity to the assumed dirt-receiving site (Southpark). A unit excavation cost of $3/CY was used for Pond C because it is farther from the assumed dirt-receiving site. Other unit costs have been taken from the City's Pond B bid documents prepared by Teichert Construction. No costs have been included for mitigation of environmental impacts.

Annual Cost Comparison

As shown in Table 2-1, annual costs include pump station and detention pond operation and maintenance costs, pipe and channel maintenance costs, and discharge fees that cover channel O & M costs. Pump station O&M costs include estimated power requirements (at $0.08/kilowatt-hour) for an average rainfall year, and annual maintenance costs are assumed to be equal to 50 percent of the annual power cost. Detention pond maintenance costs are based on the City of Dixon historical costs for Pond A. Annual pipeline maintenance costs are based on one-half of one percent of the construction cost. The channel maintenance cost is based on clearing the channel annually at an estimated cost of $200 per foot of channel width per mile of channel length. The discharge fees are estimated in Table 2-2.

Present Value Cost Comparison

As shown in Table 2-1, the annual costs have been converted to a present value assuming a 20-year period, an inflation rate of 3 percent, and an interest rate of 6 percent (resulting in a 3 percent discount rate). The total present value cost for L1A at $4.9 million is the lowest, and is about $1.4 million lower than MCA ($6.3 million) and about $2.9 million lower than L2A ($7.8 million).

Other Issues

The other issues affecting the selection of an outfall alignment for Pond A are presented in Table 2-2. Institutional feasibility (the ability to develop and execute the required discharge, improvement, and maintenance agreements) may be the most important issue affecting selection of an outfall alignment for Pond A, possibly even superceding the cost analysis in importance, because this will control the estimated schedule for construction of the facilities.

For the MCA, an agreement with SCWA has already been developed and executed. Concurrence from the Natural Resource Conservation Service may be needed. Right-of-way must also be acquired.

Table 2-1. Cost Comparison for Pond A Outfall Alternatives

Item	Unit	McCune Creek Alignment			Lateral 1 Alignment			Lateral 2 Alignment		
		Quantity	Unit Cost, dollars	Estimated Cost	Quantity	Unit Cost, dollars	Estimated Cost	Quantity	Unit Cost, dollars	Estimated Cost
Capital Costs										
Pond A Improvements										
New Pump Station	Cubic Feet Per Second	35	8,000	280,000	75	8,000	600,000	25	8,000	200,000
Excavation	Cubic Yard	495,000	2	990,000	481,000	2	962,000	334,000	2	668,000
Levee & Maintenance Road	Lineal Foot	2,400	30	72,000	1200	30	36,000	2400	30	72,000
Riprap Levee Banks	Square Yard	38,400	13	499,200	30900	13	401,700	28800	13	374,400
6' Chain Link Fence	Lineal Foot	4,800	6	28,800	4800	6	28,800	3600	6	21,600
Concrete Overflow Weir	Lump Sum	1	10,000	10,000	1	10,000	10,000	1	10,000	10,000
Relocate SID 15" Turnout	Lineal Foot	1100	40	44,000			0			0
Pond A Expansion Subtotal				1,924,000			2,038,500			1,346,000
Pond A Outfall										
Railroad or Highway 113 Crossing (Bore & Jack)	Lump Sum	1	75,000	75,000			0	1	75,000	75,000
Pipe (42" pipe and deep trench for MCA, 48" pipe and shallow trench for L2A)	Lineal Foot	10,300	100	1,030,000			0	5,300	100	530,000
Right-of-way	Square Foot	257,500	0.2	51,500	130,000	0.2	26,000	132,500	0.2	26,500
Enlarge Existing Channel	Lineal Foot			0	2,600	10	26,000			0
Culverts	Each			0	2	15000	30,000			
New Lift Station (35 cfs for MCA only)	Cubic Feet Per Second	35	8,000	280,000			0			0
Outfall Structure	Lump Sum	1	15,000	15,000	1	10,000	10,000	1	10,000	10,000
Outfall Subtotal				1,451,500			92,000			641,500
Downstream Improvements										
Culverts	Each			0	12	15000	180,000	17	15000	255,000
Check Dams	Each			0	3	10000	30,000	5	10000	50,000
Channel Enlargement	Cubic Yard			0	18000	5	90,000	130000	5	650,000
Channel Gates	Each			0	1	9000	9,000			0
Field Drains	Each			0	22	1000	22,000	40	1000	40,000
Right of Way	Square Foot			0	285120	0.2	57,024	1203840	0.2	240,768
Share of New Shouth Channel	Lump Sum			0			0			400,000
Downstream Improvements Subtotal				0			388,024			1,635,768
Pond C Incremental Expansion	Cubic Yard			0			0	320,000	3	960,000
Subtotal				3,376,000			2,519,000			4,583,000
Contingency (20%)				675,000			504,000			917,000
Subtotal				4,051,000			3,023,000			5,500,000
Engineering/Admin/Legal (25%)				1,013,000			756,000			1,375,000
Total Capital Cost				**5,064,000**			**3,779,000**			**6,875,000**
Annual Costs										
Pump Station O&M				9,000			3,200			3,200
Detention Pond O&M				60,000			55,000			45,000
Pipeline/Channel Maintenance				5,200			1,000			2,000
Discharge Fees				6,000			11,000			6,000
Total Annual Cost				80,200			70,200			56,200
Present Value Analysis										
Capital Cost				5,064,000			3,779,000			6,875,000
Present Value of Annual Costs (3% for 20 years)				1,251,000			1,095,000			877,000
Total Present Value of Costs				6,315,000			4,874,000			7,752,000

Table 2-2. Pond A Outfall Alternatives Comparison Matrix

Issue	McCune Creek Alignment	Lateral 1 Alignment	Lateral 2 Alignment
Description of alignment (see Figure 2-1)	The alignment starts at the southwest corner of Pond A, crosses the Union Pacific Railroad tracks, continues southwest down Porter Road, turns west and follows an alignment adjacent to the Weyand Irrigation Pipeline, crosses Batavia Road and is pumped into the existing Olsen Drain open channel which discharges to McCune Creek.	The alignment starts at the southeast corner of Pond A, and heads east in an existing agricultural drainage ditch to the upstream end of Lateral 1 at State Highway 113.	The alignment starts in the northeast corner of Pond A, heads east in the future public street (to be constructed as part of he Southpark development), crosses State Highway 113 and continues east to Lateral 2.
Operational Considerations Pumping Requirements	Two new pump stations would be required as shown on Figure 2-1.	One new pump station would likely be required as shown on Figure 2-1, however, it may be possible to gravity drain most (or possibly all) of the stored water into Lateral 1.	One new pump station would be required as shown on Figure 2-1.
Channel Maintenance	The City would maintain no channels. Channel maintenance of the Ulatis Creek System would be covered by the annual discharge fee of $6,000 (see below).	Maintenance of the existing agricultural channel leading to Lateral 1 would be required. Channel maintenance for the Ulatis Creek System would be covered by the annual discharge fee of $6,000 (see below) and the DRCD discharge fee of $6,000.	The City would maintain no channels. DRCD System channel maintenance would be covered by the annual discharge fee of $6,000 (see below).
Discharge Flow Rate and Limitations	Allowable discharge is 35 cfs. No discharge is allowed when the freeboard in McCune Creek is less than 1.5 feet.	Allowable discharge is 75 cfs. It has been assumed that no discharge would be allowed when the freeboard in Ulatis Creek is less than 1.5 feet.	Allowable discharge assumed to be 25 cfs, which is a portion of the total allowable discharge from Basins A, B and C of 77.5 cfs.
Emergency Overflow	An emergency, overland release is not possible along this alignment because of the elevated train tracks and because of the increase in elevation from the pond to the discharge point (Olsen Drain). The existing Pond A emergency overflow could continue to be used.	The existing Pond A emergency overflow could continue to be used.	An emergency, overland release within the Southpark Street could be developed along this alignment with discharge to Lateral 1 or Lateral 2. Also, the existing Pond A emergency overflow could continue to be used.
Solving Other Flooding Problems) Flooding at Intersection of Porter Road and Pitt School Road	The drainage problem from the unincorporated agricultural area south of the City at the intersection of Porter Road and Pitt School Road could be resolved by tying into this proposed outfall.	This problem not solved by this alignment.	This problem not solved by this alignment.
Flooding of Panizza Property	The Storm Drain Master Plan states that the drainage problem at the Panizza property, a residence southwest of Dixon, could be resolved by tying into this proposed outfall. However, further research indicates this flooding problem may be due to high water surface elevations in McCune Creek. If true, this problem could not be solved by this outfall alignment.	This problem would not be affected by this outfall alignment.	This problem would not be affected by this outfall alignment.
Limited DRCD Discharge Capacity	Not discharging from Pond A to Lateral 2 would allow up to 77.5 cfs to be discharged from Basins B and C.	Not discharging from Pond A to Lateral 2 would allow up to 77.5 cfs to be discharged from Basins B and C.	Discharging from Pond A to the DRCD system will use 25 cfs of the total 77.5 cfs capacity, limiting the discharge from Basins B and C to 52.5 cfs.

Table 2-2. Pond A Outfall Alternatives Comparison Matrix, cont.

Issue	McCune Creek Alignment	Lateral 1 Alignment	Lateral 2 Alignment
Institutional Feasibility			
Discharge Agencies Involved	Solano County Water Agency (SCWA)	Dixon Resource Conservation District Maine Prairie Water District SCWA	Dixon Resource Conservation District Reclamation District 2068 SCWA
Discharge Fee	1% of Ulatis Project annual operations and maintenance costs. These costs are currently budgeted at $595,000. This results in an estimated annual fee of approximately $6,000.	Urban areas are charged four times the ordinary annual maintenance charge assessed by DRCD to farm land within its boundaries. Current farm land fee is $2 per acre, and the urban fee is $8 per acre (DRCD is considering a future fee increase which may double these numbers). Area / Acreage[a] / Annual Cost ($) Pond A / 120 / 1,000 South Park / 150 of 212 / 1,200 WASAD / 275 of 525 / 2,200 Almond Street Area / 0 of 154 / 0 Southwest Specific Plan Area / 200 of 260 / 1,600 Total / 745 / 6,000 [a] Areas within the 1965 drainage agreement boundary are excluded from this fee because they are covered by the City's current DRCD discharge fee. Although runoff from 820 acres of agricultural land north of I-80 would be detained in Pond A, the City would not pay the discharge fee for this runoff. This alignment would also require discharge to Ulatis Creek at an annual cost of $5,000 (based on the agreement between SCWA and the City).	Urban areas are charged four times the ordinary annual maintenance charge assessed by DRCD to farm land within its boundaries. Current farm land fee is $2 per acre, and the urban fee is $8 per acre (DRCD is considering a future fee increase which may double these numbers). Area / Acreage[a] / Annual Cost ($) Pond A / 120 / 1,000 South Park / 150 of 212 / 1,200 WASAD / 275 of 525 / 2,200 Almond Street Area / 0 of 154 / 0 Southwest Specific Plan Area / 200 of 260 / 1,600 Total / 745 / 6,000 [a] Areas within the 1965 drainage agreement boundary are excluded from this fee because they are covered by the City's current DRCD discharge fee. Although runoff from 820 acres of agricultural land north of I-80 would be detained in Pond A, the City would not pay the discharge fee for this runoff.
Right-of-Way Requirements	• Agreement with Union Pacific to cross railroad right-of-way. • Purchase of a 3,600' long 25' wide strip of right-of-way adjacent in Porter Road. • Purchase of a 4,200' long 25' wide strip of right-of-way adjacent to the Weyand Pipeline from up to three private property owners.	Purchase of a 2,600' long 25' wide right-of-way along the existing agricultural drainage ditch from Pond A to Lateral 1.	• Purchase of a 4,600' long 25' wide right-of-way in future Southpark street. • Purchase of a 3,000' long 25' wide right-of-way adjacent to right-of-way to be purchased for future sewer trunk line from one private property owner. • Agreement to cross Caltrans right-of-way for Highway 113.
Compatibility with Other Ongoing Projects			
Sewer Project	No effect	No effect	The outfall alignment follows a portion of the alignment for the South Dixon Sewer Trunk Line allowing for shared right-of-way and access roads.
Pond C Project	Discharge to McCune Creek would allow a greater discharge from Basin C into Lateral 2, resulting in a smaller detention volume for Pond C.	Discharge to Lateral 1 would allow a greater discharge from Basin C into Lateral 2, resulting in a smaller detention volume for Pond C.	Discharge to Lateral 2 would reduce the allowable discharge from Basin C resulting in a larger required detention volume for Pond C.

Table 2-2. Pond A Outfall Alternatives Comparison Matrix, cont.

Issue	McCune Creek Alignment	Lateral 1 Alignment	Lateral 2 Alignment
SCWA Regional Drainage Study	SCWA study of McCune and Ulatis Creeks will help determine when channel freeboard is adequate for discharge.	SCWA study of Ulatis Creek will help determine when channel freeboard is adequate for discharge.	The initial portion of this outfall alignment would not change if the SCWA Study shows there is capacity to discharge into Lateral 1 which is closer to Pond A than Lateral 2.
Southpark	No effect	No effect	This alignment would allow for right-of-way sharing with the sewer trunk line to be constructed with Southpark and a portion of this alignment will be located in a proposed Southpark Roadway.
Southwest Specific Plan Area	Discharge from West Pond, constructed within the Southwest Specific Plan area, and for Basin A will be with the same agency (SCWA) and under the same existing agreement.	Not discharging to McCune Creek may free up capacity for the West Pond discharge that receives drainage from the Southwest Specific Plan area.	Not discharging to McCune Creek may free up capacity for the West Pond discharge that receives drainage from the Southwest Specific Plan area.
Utility or Other Agency Conflicts	Agreement to cross Railroad right-of-way required. There is an existing petroleum pipeline and a fiber optic line in the railroad right-of-way that must be crossed.	Caltrans encroachment permit required	Caltrans encroachment permit required.

For L1A and L2A an agreement involving SCWA, DRCD, RD 2068, MPWD and the Natural Resource Conservation Service (NRCS) would be needed. This report is intended to facilitate development of such an agreement.

RECOMMENDATION

Based on all the issues discussed above including costs, regional flood control benefit, and constructability, L1A is recommended as the outfall for Pond A.

CHAPTER 3.
POND A LATERAL 1 RECOMMENDED PROJECT

The facilities, operational procedures and required performance for the Pond A/Lateral 1 Project are described in this Chapter.

FACILITIES

The existing Pond A storage capacity will be expanded (no additional land will be required) as schematically shown in Figure 3-1. Lateral 1 will be improved as shown on Figure 3-2. The improvements for Pond A and Lateral 1 are described below:

- Excavation of the east section of the current shallow portion of the existing pond from about 59 feet NAVD to a bottom elevation of 50.5 feet NAVD at the east edge and to 51.5 feet NAVD at the west edge. The expanded pond will have a total storage volume of over 640 ac-ft below the design water surface elevation of 61.0 feet NAVD. Wildlife viewing platforms could be added around the deep pond for viewing waterfowl.

- The southwest section of the pond will not be excavated, and will only be used to store runoff for storms greater than a 100-year event. If at some time in the future, additional storage volume is required in Pond A, that volume would be obtained by excavation of the southwest section, regardless of the joint uses that may have been built in this area. Nevertheless, the southwest section will be ideal for joint uses such as uplands habitat, soccer fields, and softball fields.

- An option to rip-rapping the pond levees would be use of vegetation for bank stabilization, which would cost less than riprap and improve the pond appearance.

- Abandon the existing 35 cfs pump station at the northwest corner of the pond.

- Construction of a variable discharge 75 cfs pump station or 75 cfs gravity discharge gate at the southeast corner of the deep pond which will discharge to the existing (to be enlarged) agricultural drainage channel leading to Lateral 1 (the current outfall of the overflow glory hole). Control of the pump station or gravity gate will be based on the water level in Pond A, the water level in Ulatis Creek, and the water level in Lateral 1.

- Lower the elevation of the glory hole top from 63.1 feet NAVD to 61.0 feet NAVD. In storms larger than the 100-year event, this glory hole will be overtopped and a discharge to Lateral 1 and Ulatis Creek will occur regardless of the water level in Lateral 1 or Ulatis Creek.

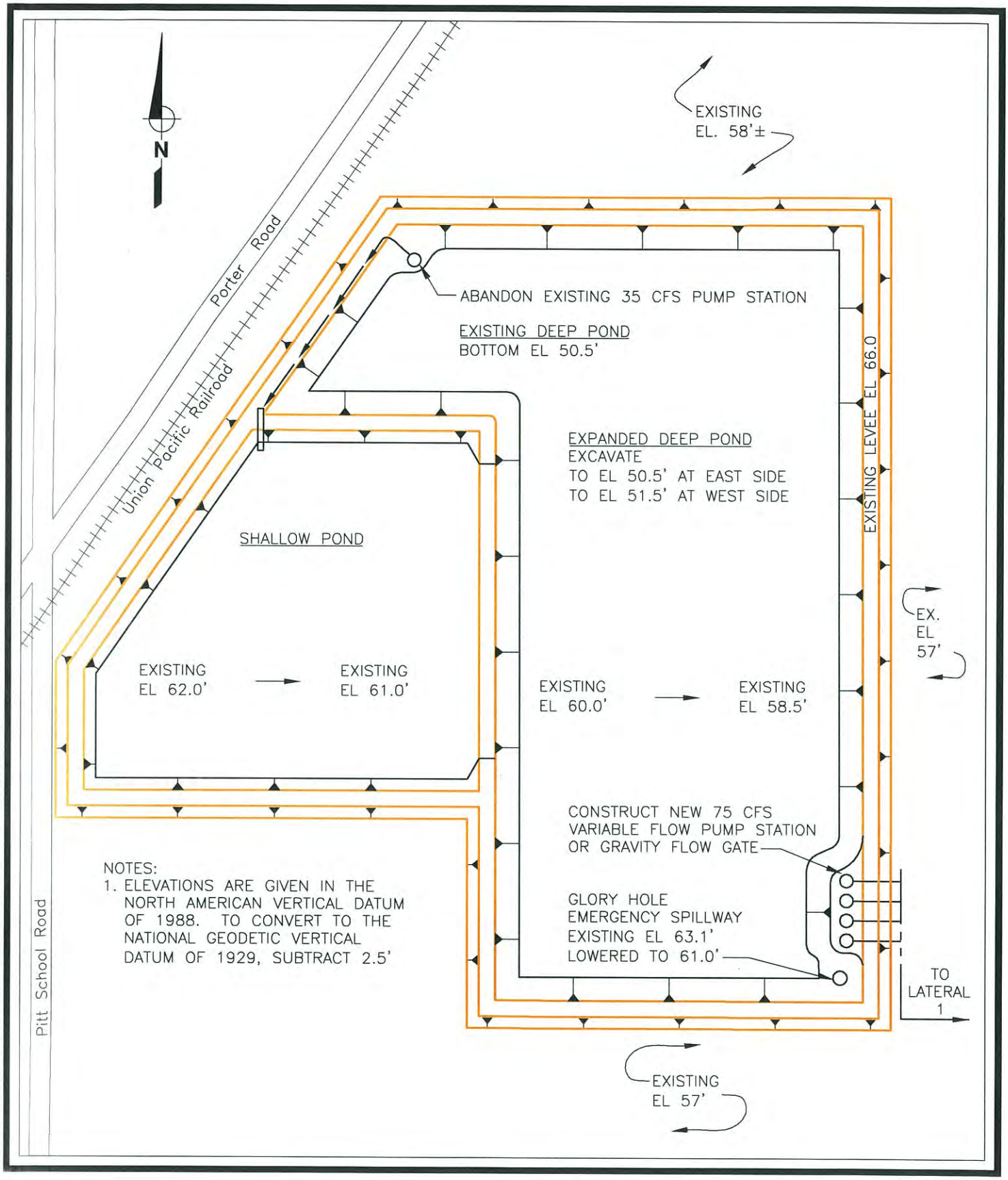

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Figure 3-1

PROPOSED EXPANSION OF POND A
FOR THE LATERAL 1 OUTFALL

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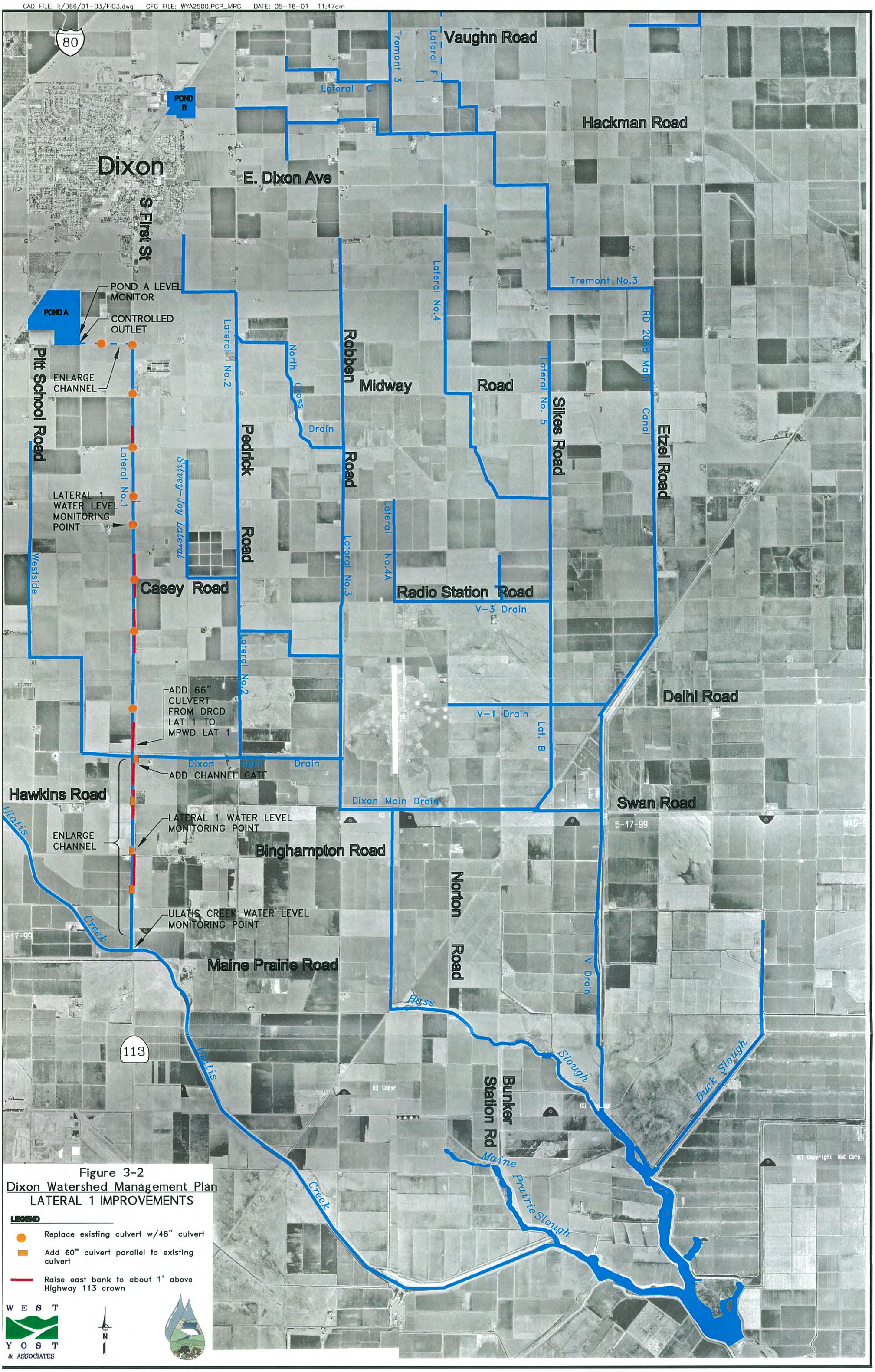


Figure 3-2
Dixon Watershed Management Plan
LATERAL 1 IMPROVEMENTS

LEGEND

- Replace existing culvert w/48" culvert
- Add 60" culvert parallel to existing culvert
- Raise east bank to about 1' above Highway 113 crown

WEST YOST & ASSOCIATES

N

- Use of the existing 18-inch and 12-inch outlets through the existing glory hole. The 18-inch diameter inlet is at elevation 58.5 feet (flow line), will begin to release at about a 70-year storm event, and will release a maximum of 12 cfs at a pond water elevation of 61 feet (greater than the 100-year level). The 12-inch diameter inlet is at elevation 59.2 feet (flow line), will begin to release at about an 80-year event, and will release a maximum of 2 cfs at a pond water elevation of 61 feet.

- Enlargement of the existing channel from the southeast corner of Pond A to Lateral 1.

- Along the DRCD Lateral 1, replace all existing culverts with 48-inch RCP culverts. Add a 66-inch RCP culvert from DRCD Lateral 1 to the MPWD Lateral 1. Along the MPWD Lateral 1, replace the existing culverts with twin 60-inch culverts.Add a slide gate to the end of the existing pipe from Lateral 1 to the Dixon Main Drain. The gate will be closed in the winter and opened in the summer for irrigation water.

- Raise the east bank of Lateral 1 at several locations to prevent flooding of Highway 113 and the farms east of Highway 113.

- Enlarge the MPWD Lateral 1 channel to a bottom width of 12 feet, and construct two horizontal to one vertical side slopes.

- Add 18-inch or 24-inch corrugated plastic field drains with risers, where needed, to drain each field west of Lateral 1 from Pond A to Ulatis Creek

- As part of Caltrans' Highway 113/Ulatis Creek Bridge widening project, Caltrans has removed all of the old culverts from the MPWD Lateral 1 to Ulatis Creek and replaced them with a 10-foot wide by 5-foot tall box culvert. This box culvert has a flap gate to prevent back flow from Ulatis Creek to Lateral 1.

OPERATION

The project will be operated to provide an outfall for Pond A and to reduce the flooding of fields along Lateral 1. Operational procedures that have governed the ongoing design of improvements are defined below:

- To account for high ground water around Pond A, an initial water elevation in Pond A of 51.5 feet NAVD was assumed. This water surface elevation is 0.5 feet above the existing deep pond bottom.

- The Pond A pumps will turn on at a Pond A water surface elevation of 51.8 feet (NAVD) and turn off at a water elevation of 51.5 feet (NAVD). A gravity release structure may be used rather than a pump station.

- As the water level in Ulatis Creek is rising, the pumps will shut off when the Ulatis Creek water elevation rises to 5.5 feet below the top of bank. The top of the Ulatis Creek bank is 34.0 feet NAVD. The pumps will begin to shut down at elevation 28.0 feet NAVD, and will be completely shut off at elevation 28.5 feet NAVD (see Appendix B). This will allow about 6 hours for the City water to pass through

Lateral 1 before Ulatis Creek reaches its design freeboard (1.5 feet of freeboard, or elevation 32.5 feet NAVD). As the water level in Ulatis Creek is falling, the pumps will turn on when the water level is 1.5 feet below the design freeboard (elevation 31.0 feet NAVD).

- When the water level in Lateral 1 is rising, the pumps will shut off if the water level in Lateral 1 rises above the adjacent field level. This will be monitored at two locations. The first location is at the upstream end of the culvert located 0.5 mile north of Casey Road. The field level is at 45.3 feet NAVD, the channel bottom is at elevation 41.4 feet NAVD, so the pumps will shut off if the water depth in Lateral 1 exceeds 3.9 feet at this location, and the pumps will turn back on when the water level drops below a depth of 3.9 feet at this location.

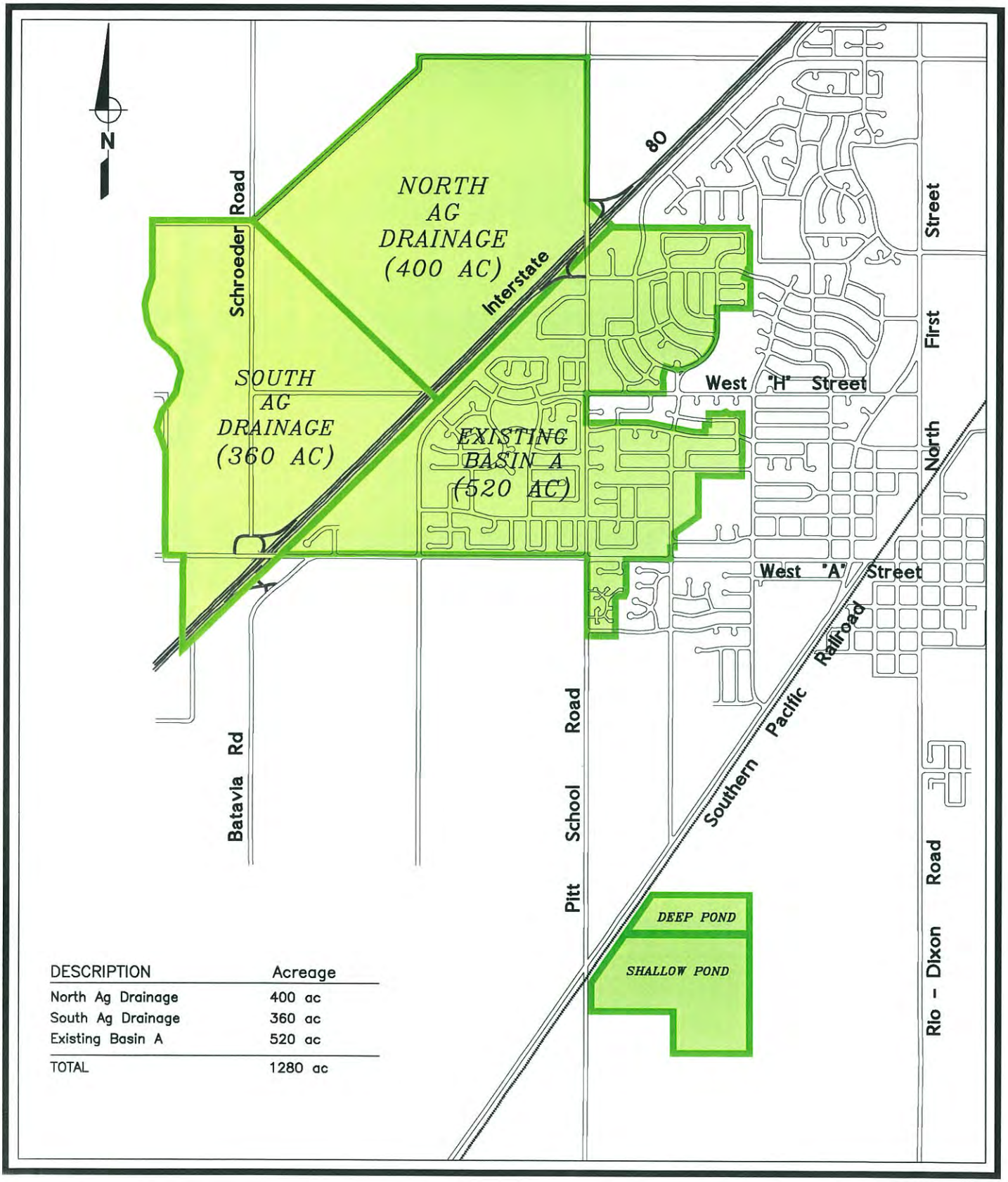
  The second location is at the upstream end of the culvert at Binghampton Road. The field level is at elevation 33.6 feet, the channel bottom will be excavated to elevation 29.4 feet NAVD, and so the pumps will shut off if the water depth in Lateral 1 exceeds 4.2 feet at this location. The pumps will turn back on when the water level drops below a depth of 4.2 feet at this location.

PROJECT PERFORMANCE

Runoff from 5 distinct areas will eventually drain to Pond A. The existing tributary area includes 1,280 acres as shown on Figure 3-3, and the future tributary area includes about 1,483 acres as shown on Figure 3-4. These future tributary areas include:

- Existing Basin A – 511 acres with an average impervious coverage of about 40 percent
- North Agricultural Drainage Area – 400 acres with an impervious coverage of about 5 percent
- Southpark – 212 acres with an impervious coverage of 40 percent (assumed at buildout)
- Southwest Dixon Area – 260 acres with an impervious coverage of about 40 percent (assumed at buildout).
- Agricultural Drainage Area within the General Plan Boundary – 100 acres. Although it is not currently scheduled for development, it may be developed at some time in the future. It was assumed that when this area is developed, it will drain to Pond A, so an impervious coverage of 40 percent was used.

The 100-year, 4-day design storm hydrographs for the discharge to Pond A from these areas are shown in Figure 3-5. Although design storms have no historical date associated with them, on most of the hydrographs and stagegraphs in this report, the time axis includes actual dates and times. This is done to simplify the translation of model results into report figures.



DESCRIPTION	Acreage
North Ag Drainage	400 ac
South Ag Drainage	360 ac
Existing Basin A	520 ac
TOTAL	1280 ac

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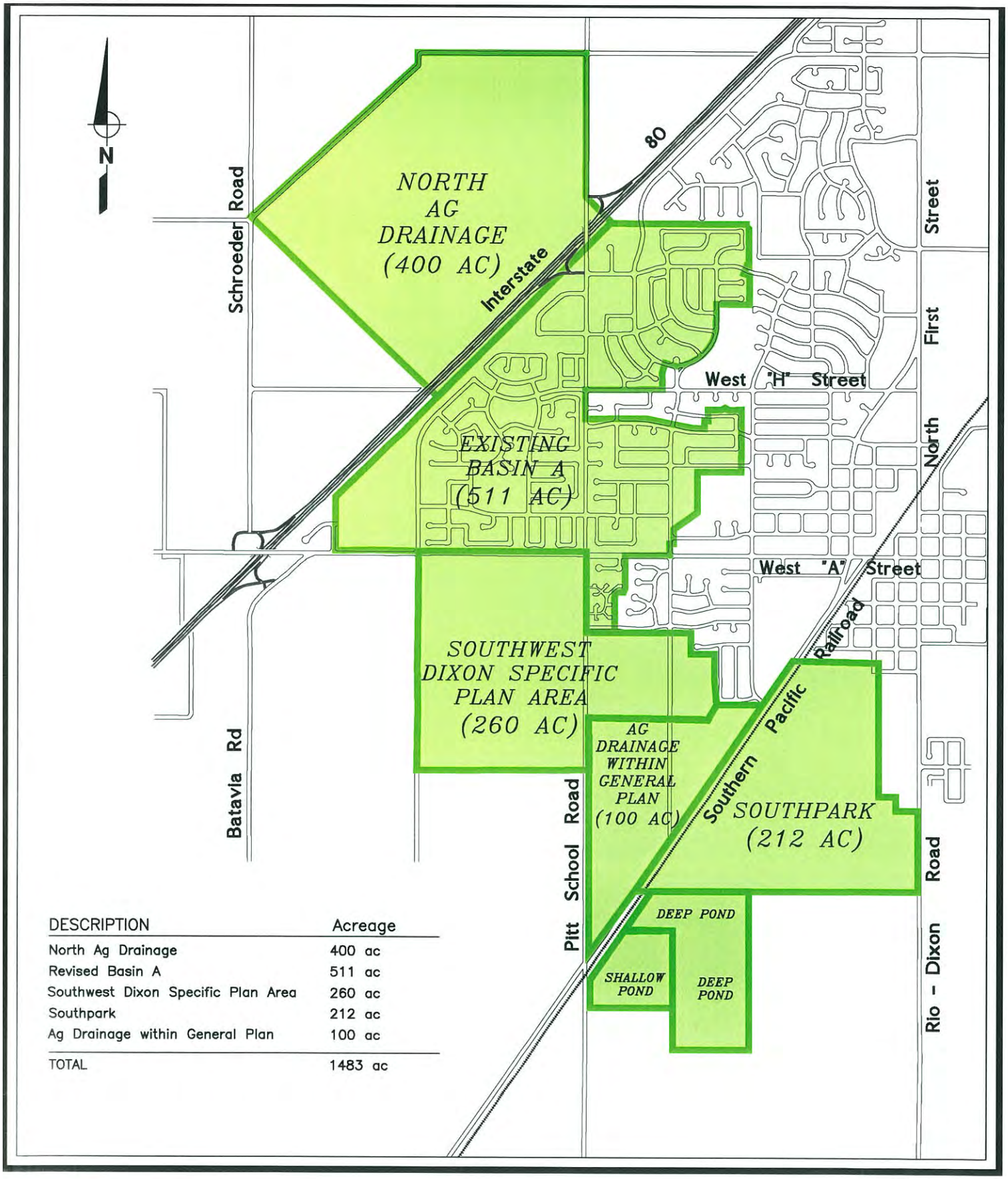
LEGEND:

Existing Pond A Drainage Areas

FIGURE 3-3

DIXON WATERSHED MANAGEMENT PLAN
EXISTING POND A DRAINAGE AREAS



DESCRIPTION	Acreage
North Ag Drainage	400 ac
Revised Basin A	511 ac
Southwest Dixon Specific Plan Area	260 ac
Southpark	212 ac
Ag Drainage within General Plan	100 ac
TOTAL	1483 ac

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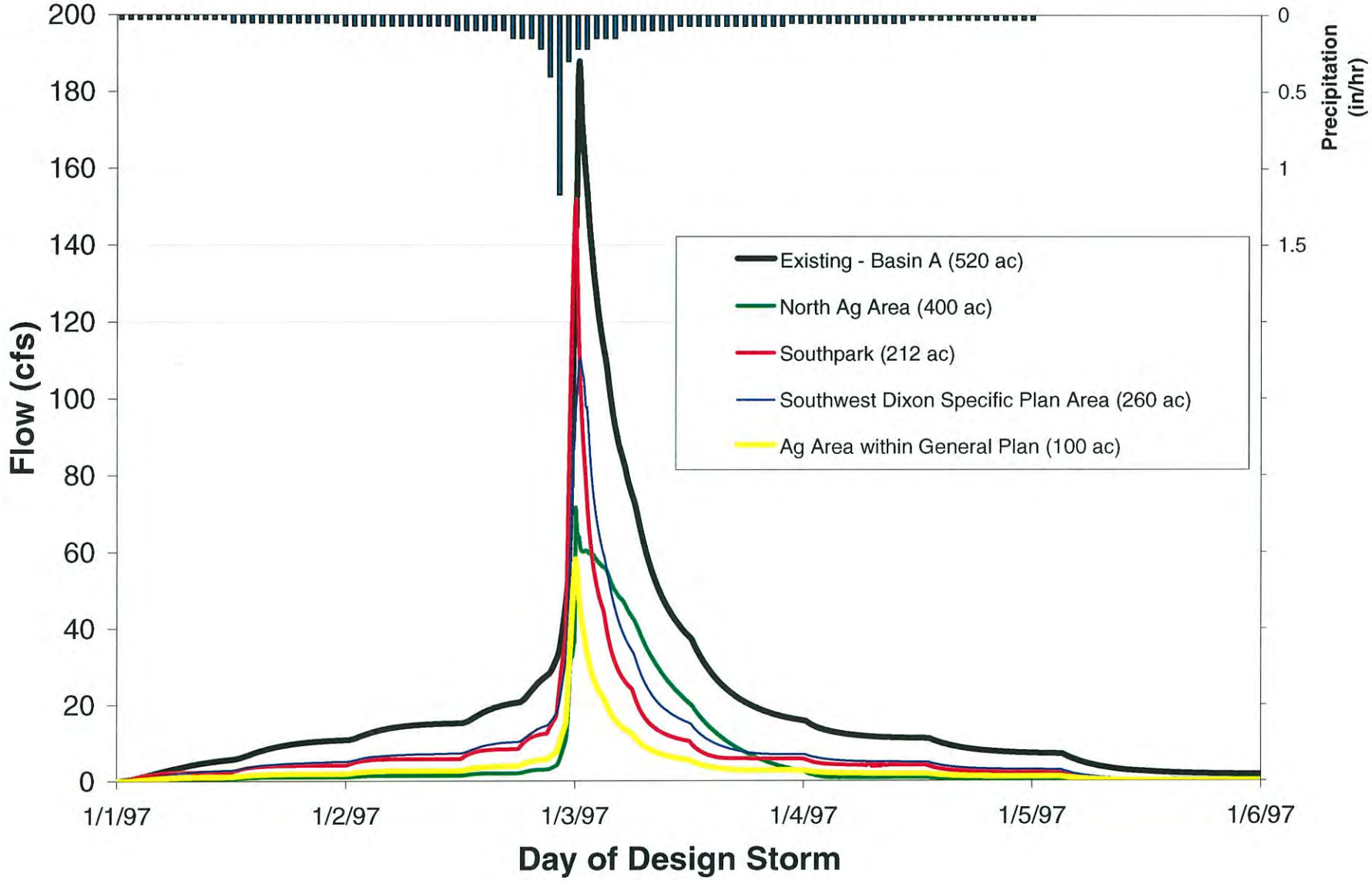
LEGEND:

Future Pond A Drainage Areas

Figure 3-4

DIXON WATAERSHED MANAGEMENT PLAN
FUTURE POND A
DRAINAGE AREAS

Figure 3-5. Pond A Tributary Hydrographs for the 100-Year, 4-Day Design Storm



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A stagegraph for Pond A is presented in Figure 3-6, with an initial water surface elevation in the pond of 51.5 feet NAVD (0.5 feet above the north section bottom). This stagegraph is for the 100-year, 4-day storm. The peak water surface elevation is 59.3 feet NAVD, which is 1.7 feet below the design water surface elevation of 61.0 feet NAVD.

The Pond A discharge hydrograph for the 100-year, 4-day storm is presented in Figure 3-7 for the design storm. The pumps turn on as the water level in Pond A rises to elevation 51.8 feet NAVD, and lower the water level down to 51.5 feet NAVD, and the pumps shut off. As the water level rises again, they turn back on. When the water level in Ulatis Creek rises above 28.5 feet NAVD, the pumps are completely shut off. About 3 days later, as the water level in Ulatis Creek drops, the pumps come back on and pump the water level back down to 51.5 feet NAVD.

Shown in Figure 3-8 is a 100-year, 4-day storm stagegraph for the DRCD Lateral 1 control point (0.5 mile north of Casey Road). The water level in Lateral 1 at this location stays below the field level when the pumps are running. The water level rises above the field level at the peak of the storm from just the runoff from the fields (note that the pumps are not running at this time). The pumps turn on again about 2.5 days after the peak of the storm, allowing time for the field to drain.

Shown in Figure 3-9 is a 100-year, 4-day storm stagegraph for the MPWD Lateral 1 control point at Binghampton Road. As shown, the water level in Lateral 1 at this location stays below the field level when the pumps are running. However, the water level rises above the field level at the peak of the storm from just the runoff from the fields (note that the pumps are not running at this time). The pumps turn on about 2.5 days after the storm, allowing time for the field to drain.

The 100-year, 8-day historical storm event (based on the February, 1986 storm) is used by the City as a check of the 100-year, 4-day design storm and was also simulated with the model. The Ulatis Creek tail water level for this storm was estimated by comparison with the January 1-2, 1997 storm and the 100-year, 4-day storm as shown in Figure 3-10. This estimated water level was used for control of the Pond A pumps. The results for this storm are presented in Figures 3-11 through 3-14. The proposed Pond A expansion provides adequate capacity for this storm.

As shown in Figure 3-6 the peak modeled water surface elevation is 59.3 feet NAVD for the 100-year, 4-day storm. As shown in Figure 3-11 the peak modeled water elevation is 60.0 feet NAVD for the 100-year, 8-day historical storm. The design water elevation for Pond A is 61.0 feet NAVD. The difference between the modeled water elevations and the design water elevation is intended as a margin of safety because hydrologic modeling is not a precise science. Some of the assumptions that affect the precision of hydrologic modeling include percentages of impervious areas not yet developed, extent of tributary areas, potential overland release points into or out of the tributary watersheds, and piping configurations. Because of the uncertainty in these assumptions, a margin of safety is provided. Future planning of drainage facilities tributary to Pond A should be based on the design water level for Pond A of 61.0 feet NAVD.

Figure 3-6. Stagegraph for Pond A

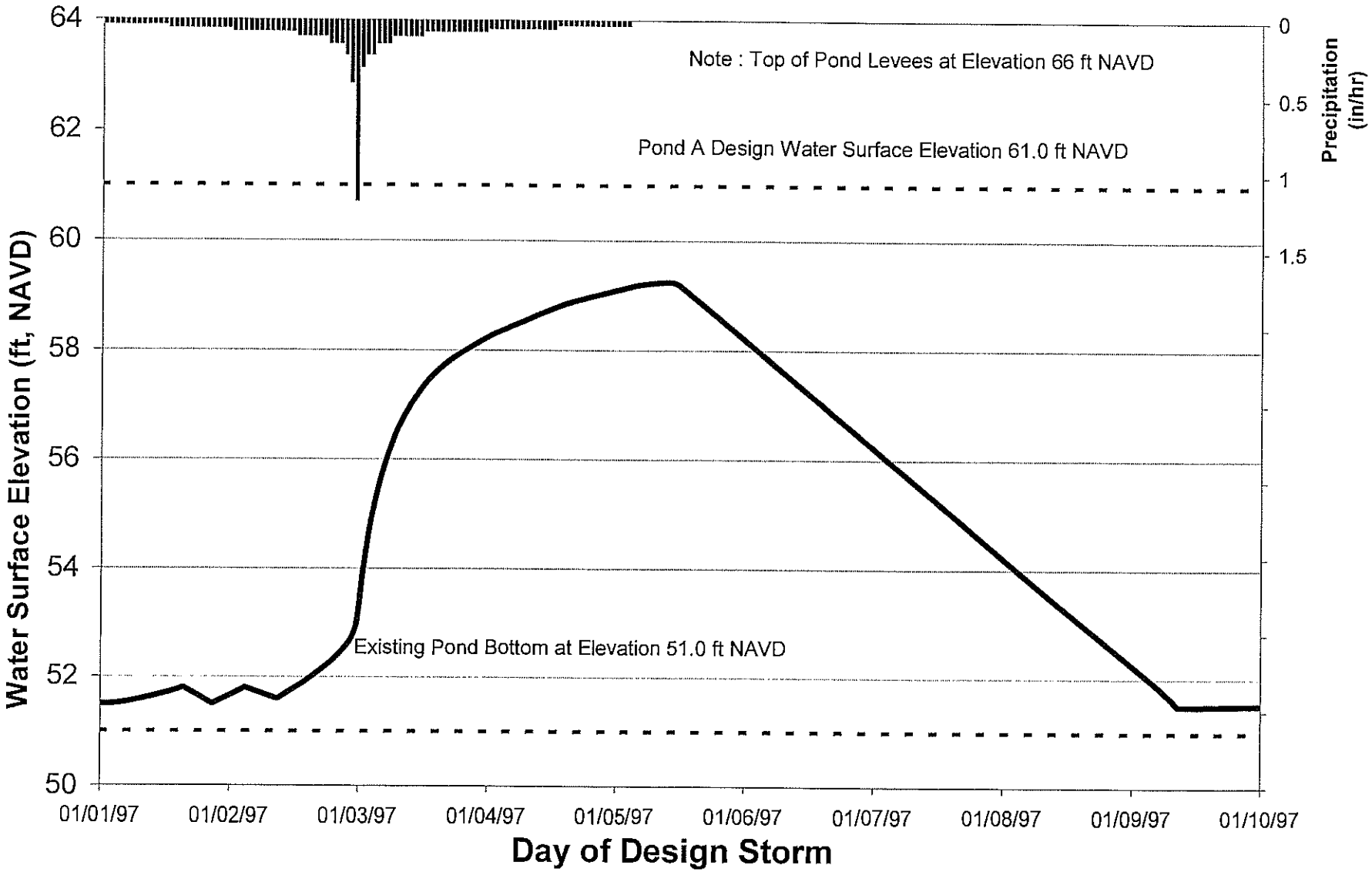

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Figure 3-7. Pond A Discharge Hydrograph

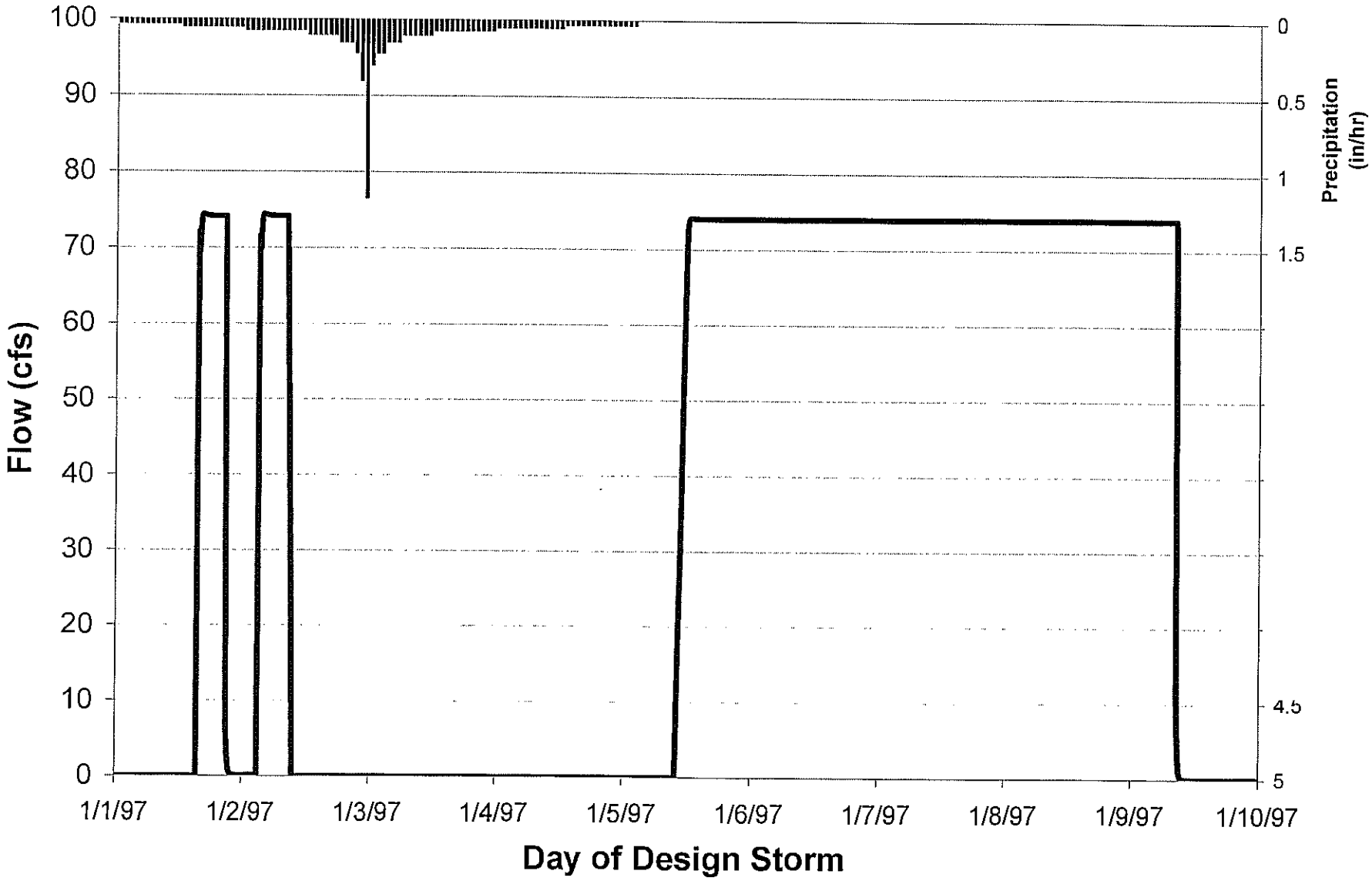

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Figure 3-8. Lateral 1 Stagegraph 0.5 Miles North of Casey Road At the DRCD Control Point

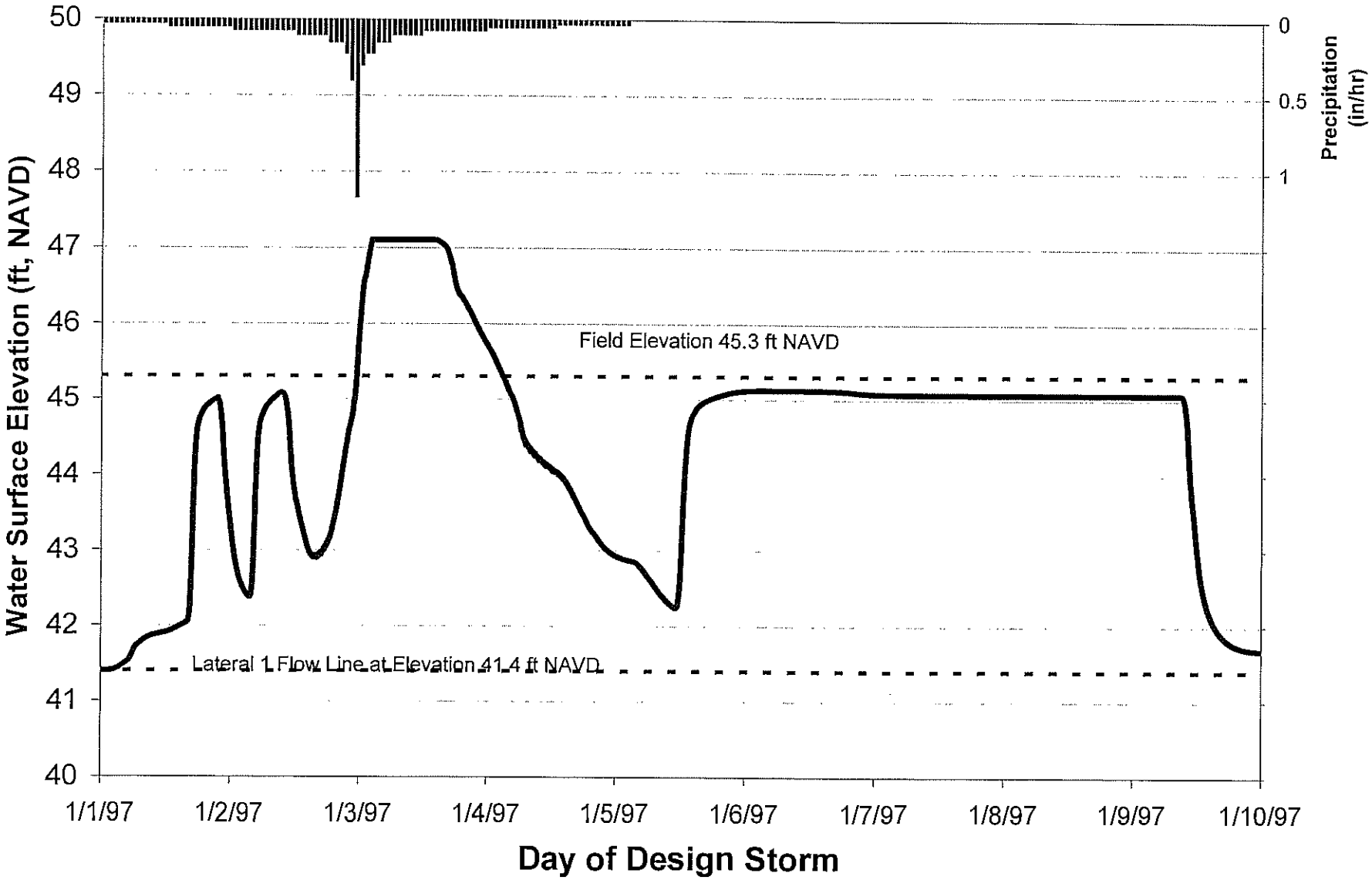

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Figure 3-9. Lateral 1 Stagegraph at Binghampton Road At the MPWD Control Point

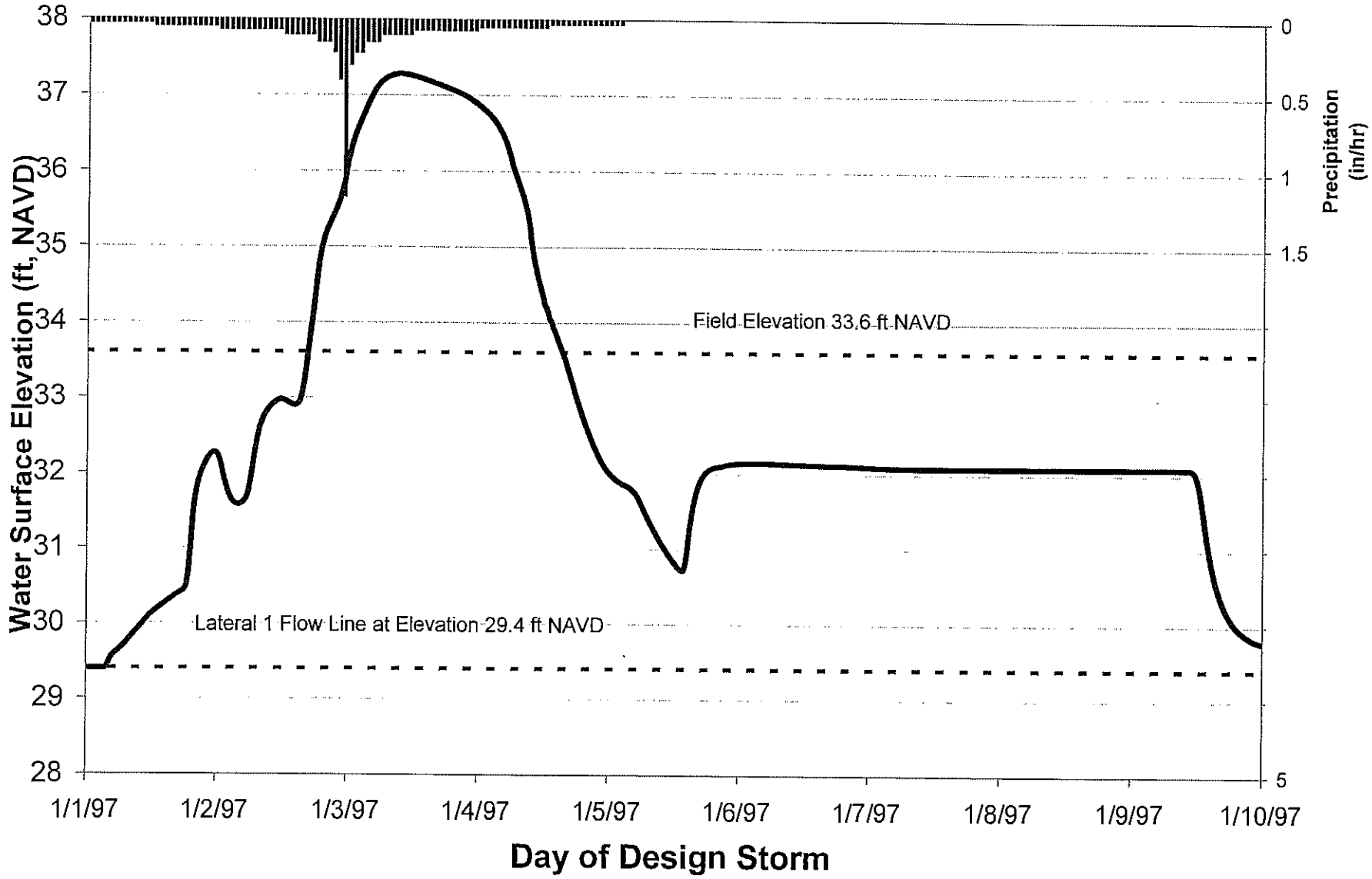

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Figure 3-10. Ulatis Creek Tail Water Elevation

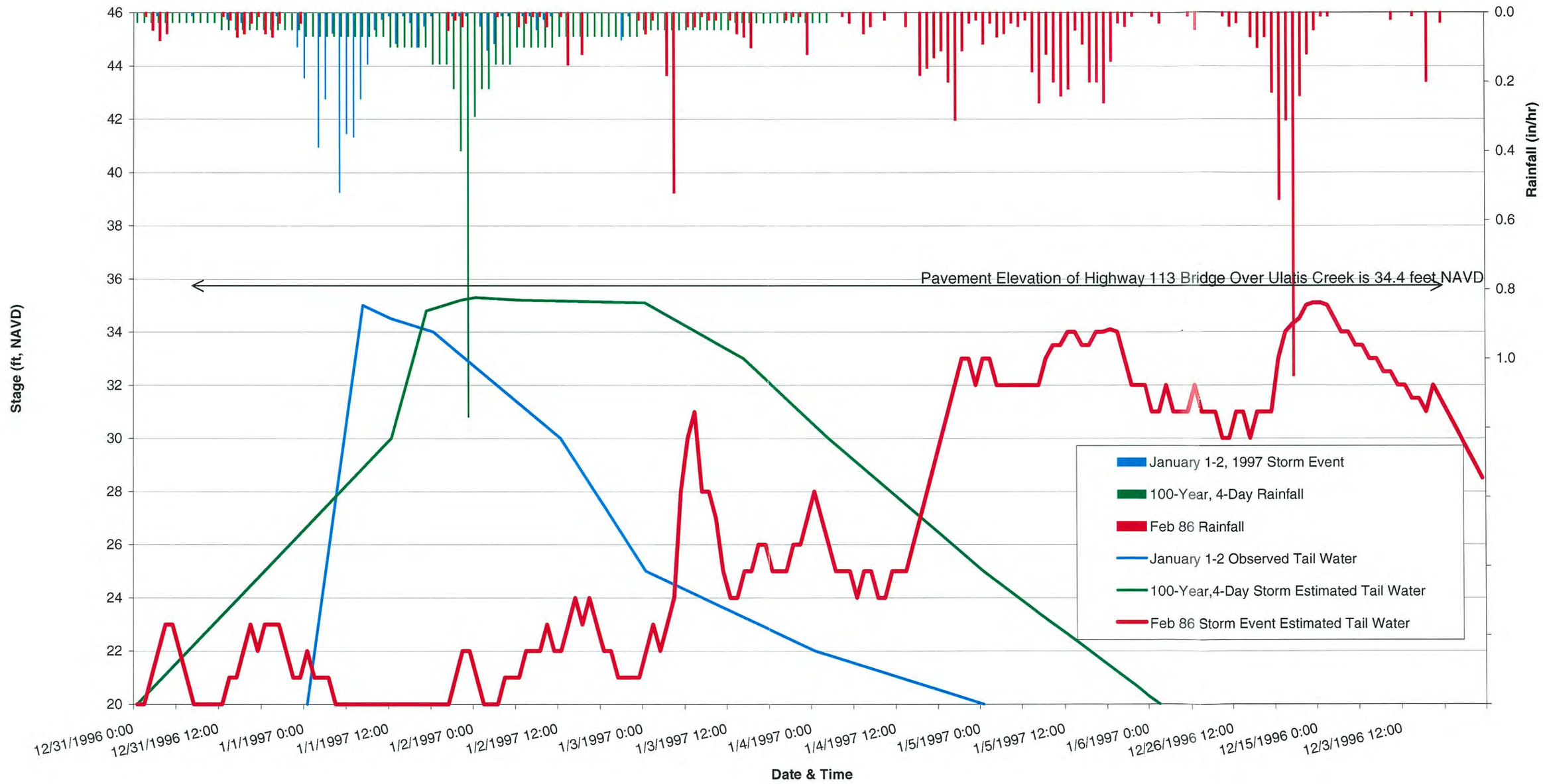

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Figure 3-11. Stagegraph for Pond A - February 1986 Storm

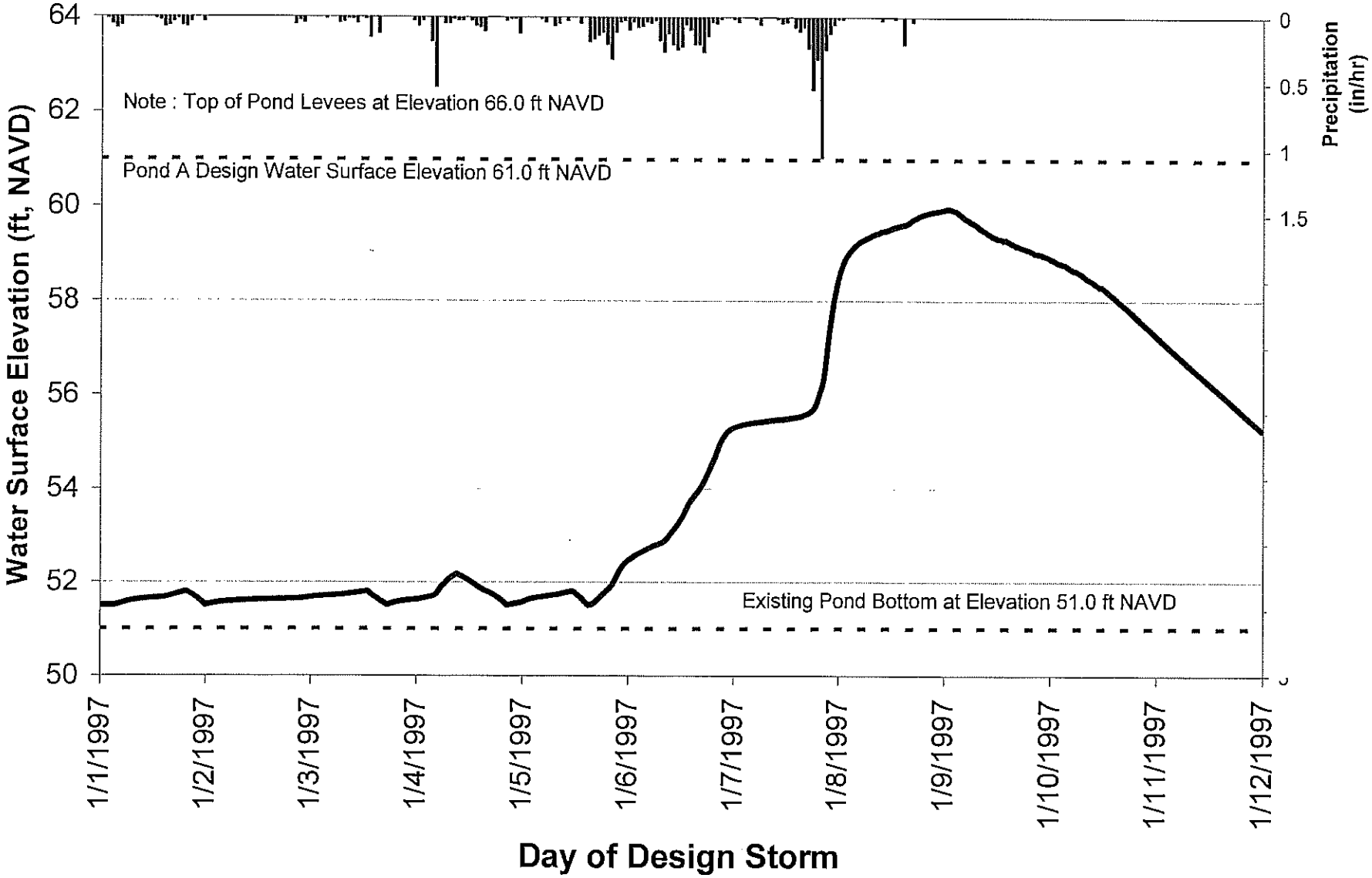

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Figure 3-12. Pond A Discharge Hydrograph for February 86 Storm

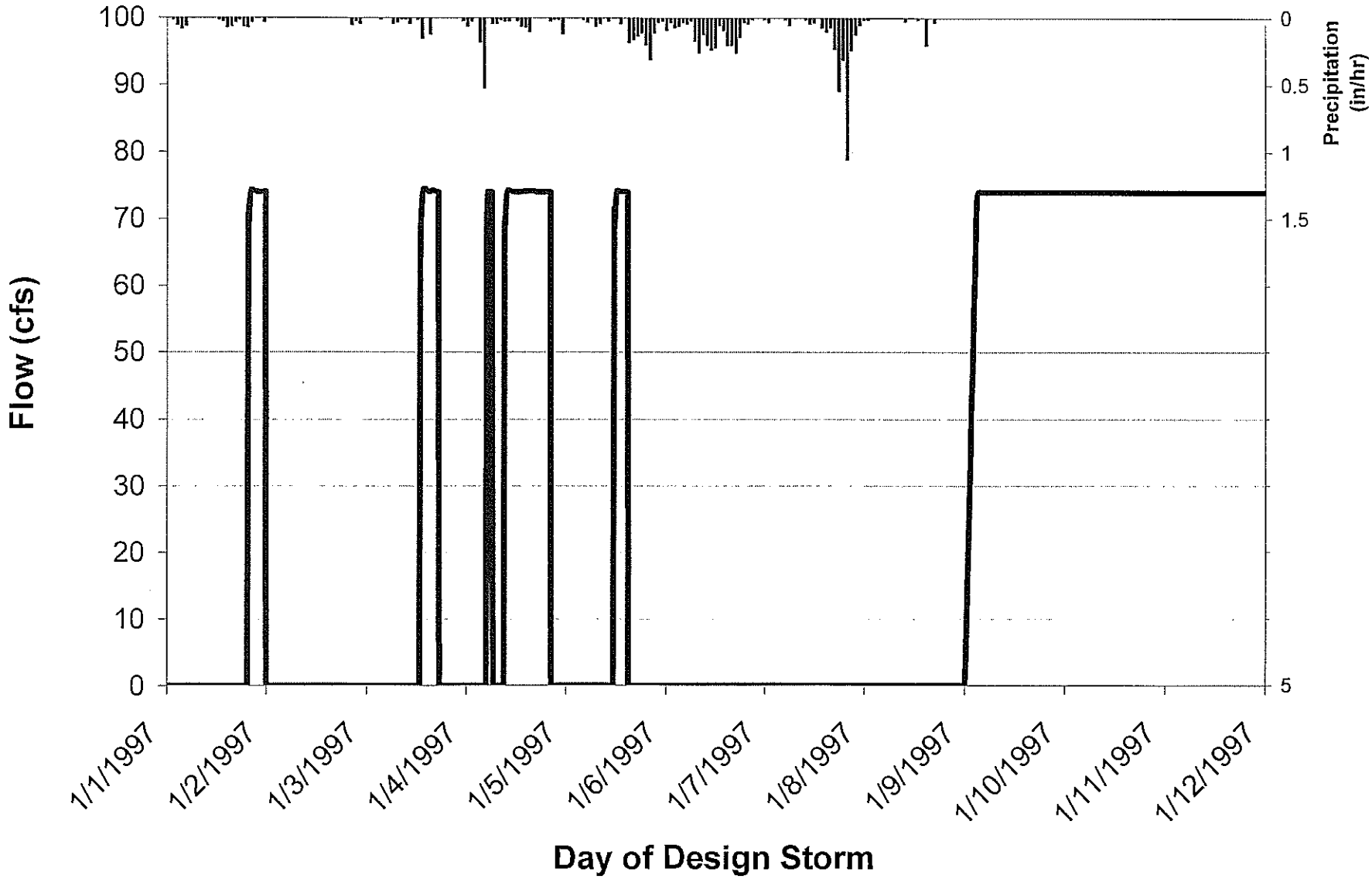

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Figure 3-13. Lateral 1 Stagegraph 0.5 Miles North of Casey Road At the DRCD Control Point for the February 1986 Storm

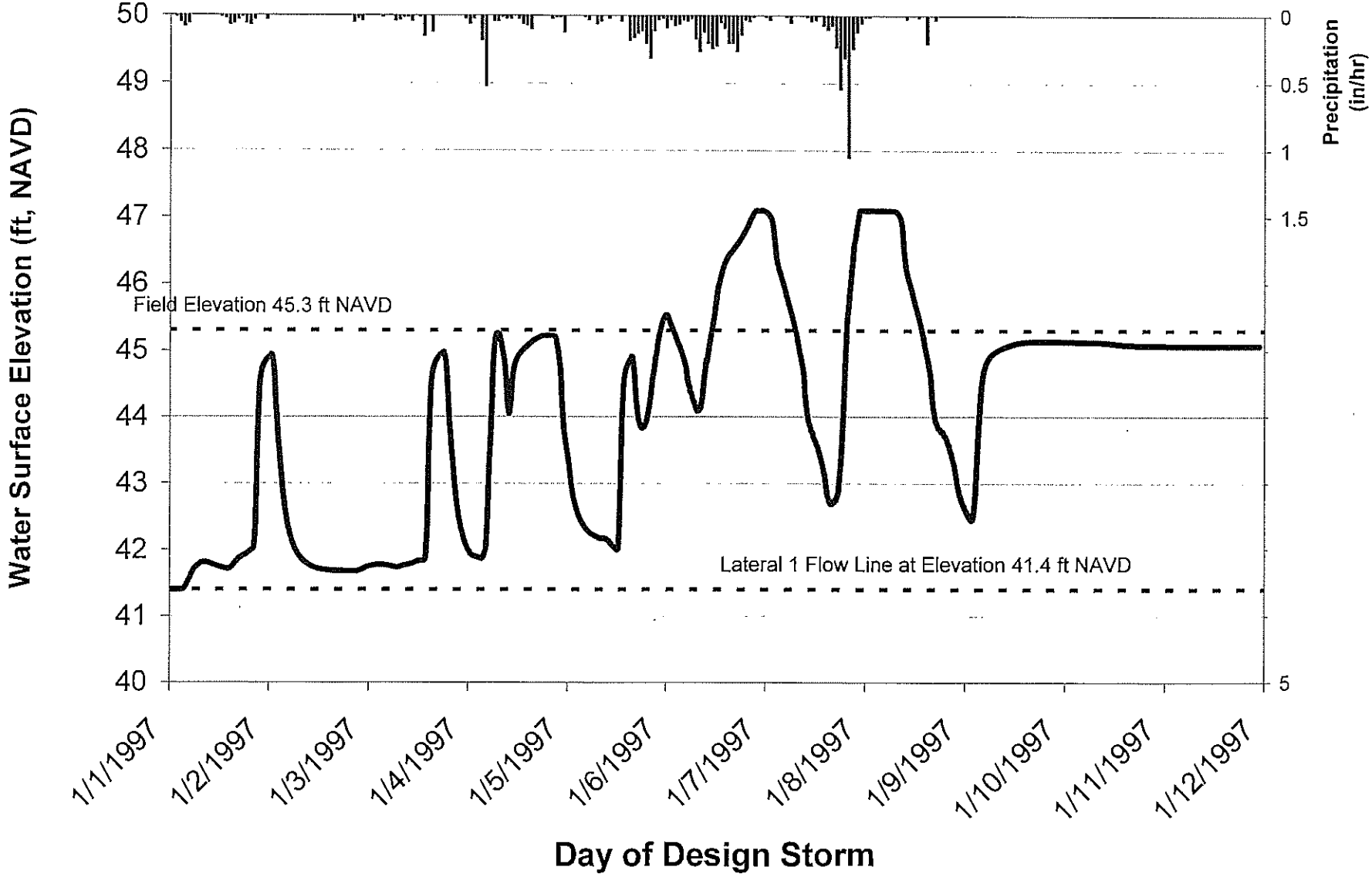

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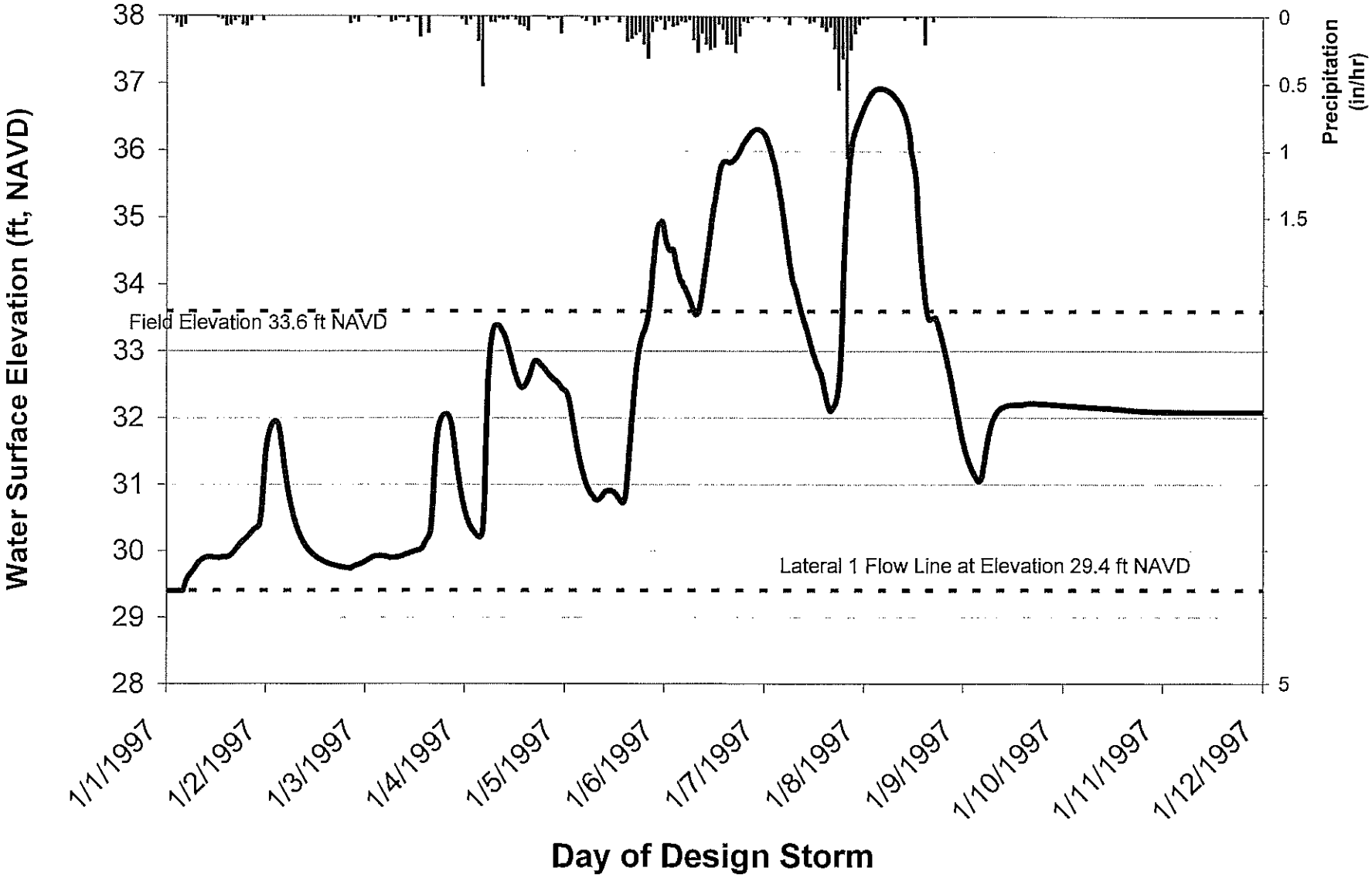
Figure 3-14. Lateral 1 Stagegraph at Binghampton Road At the MPWD Control Point for the February 1986 Storm



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EMERGENCY OVERFLOW

Storms larger than a 100-year even may result in discharge through the emergency overflow glory hole (at Elevation 61 ft NAVD). The existing glory hole has gated 18-inch and 12-inch holes through its side at elevations 58.5 feet and 59.2 feet, respectively. Additionally, the pump station or gravity release structure will have an emergency overflow outlet at elevation 62 feet NAVD.

The purpose of these emergency releases is to prevent overtopping, erosion, and collapse of the pond levee. Estimated emergency release from the pond are presented in Table 3-1

Table 3-1. Emergency Overflow Discharge

Water Surface Elevation, feet NAVD	Estimated Emergency Overflow, cfs
50.5 (Pond Bottom	0
53 (approximate 2-year water level)	0
55 (approximate 10-year water level)	0
59	1 cfs
60 (approximate 100-year water level)	9 cfs
61	14 cfs
62	43 cfs
63	192 cfs
64	400 cfs
65	646 cfs
66 (top of levee)	803 cfs

COST ESTIMATES

Presented in Table 3-2 are refined capital and annual operation and maintenance cost estimates. The estimated capital cost for the Pond A and Lateral 1 project is $3.8 million. The annual cost is estimated to be $0.07 million per year.

CONCLUSION

In conclusion, the proposed Pond A/Lateral 1 improvements provide 100-year detention and a 75 cfs discharge while also reducing the duration and extent of flooding of the agricultural areas along Lateral 1 and Highway 113.

Table 3-2. Cost Estimate Pond A and Lateral 1 Improvements

Item	Unit	Quantity	Unit Cost, dollars	Estimated Cost
Capital Costs				
Pond A Improvements				
Gravity Outlet Structure and Controls		LS	1	280,000
Excavation	Cubic Yard	720,000	2	1,440,000
Maintenance Road	Lineal Foot	3,600	15	54,000
Bank Stabilization (see Table 2)		LS	1	100,350
6' Chain Link Fence	Lineal Foot	8,400	6	50,400
Electrical Power Supply	Lump Sum	1	50,000	50,000
Subtotal				1,974,750
Joint Use and Landscaping (exclusive of bank stabilization)				
Slope Seeding	Acre	9	950	8,550
Riparian Planting - Willow Scrub	Acres	4	4,700	18,800
Riparian Planting - Woodland Habitat	Acres	5	4,550	22,750
Islands	Acres	2	1,000	2,000
Basin Bottom Planting	Acres	16	825	13,200
Wetland Edge Planting	Lineal Foot	7,000	2	14,700
Upland Habitat Planting	Acres	6	1,200	7,200
Irrigation	Lineal Foot	7,000	5	35,000
Spread 1' of Topsoil over Existing Cobbles	Cubic Yard	1	10,500	10,500
Subtotal				132,700
Downstream Improvements				
Energy Dissipator	Lump Sum	1	10,000	10,000
66" Culvert	Lineal Foot	80	150	12,000
60" Culvert	Lineal Foot	286	135	38,610
48" Culvert	Lineal Foot	319	110	35,090
3 x 5 Arch Pipe	Lineal Foot	50	120	6,000
Double width Headwalls for 60" and Ex. Culvert	Each	8	6,000	48,000
Headwalls for 66" Culvert	Each	2	4,100	8,200
Headwalls for 48" Culvert	Each	20	3,500	70,000
Check Dams	Each	4	10,000	40,000
Channel Enlargement	Cubic Yard	35,000	5	175,000
Channel Gates	Each	1	9,000	9,000
Field Drains with Flap Gates	Each	22	1,000	22,000
Right of Way	Square Foot	1,887,000	0.15	283,050
Subtotal				756,950
Subtotal				**2,864,000**
Contingency (15%)				429,600
Subtotal				3,293,600
Engineering/Admin/Legal (15%)				494,040
Total Capital Cost				**3,788,000**
Annual Cost				
Detention Pond O&M	Acre	80	800	64,000
Channel Maintenance	Ft*mile	48	200	9,600
Total Annual Cost				73,600
Present Value Analysis				
Capital cost				3,788,000
Present Value of Annual Costs (3% for 20 Years)				1,094,947
Total Present Value of Costs				4,882,947

CHAPTER 4. BASINS B/C AND LATERALS 2/3 ALTERNATIVES

A 1965 agreement between the City and the DRCD, limits the discharge from the City into Lateral 2 to the flow from 42-inch and 36-inch pipes (generally accepted to be 77.5 cfs). Based on results of this study, large storms result in discharges from the City to lateral 2 estimated to be in the range of 130 cfs (from a 5-year event) to 230 cfs (from a 100-year event), which clearly exceed the agreed upon limit. In this study, all participating agencies have agreed the City should investigate three options. The City can either:

- Detain flows from Basins B/C to limit the discharge into Lateral 2 to the agreed upon limit of 77.5 cfs.
- Construct conveyance improvements to the downstream drains that will allow the City to discharge at a higher rate and also reduce downstream flooding.
- Construct a combination of detention storage and downstream conveyance improvements.

These three options are discussed in detail in this chapter.

PROJECT DESCRIPTIONS

Basins B and C drain into and through the DRCD channel system and the RD 2068 V-Drain, which ultimately drains into Hass Slough (see Figure 4-1). No feasible alternatives to this general alignment exist. Consequently, Basin B/C and Laterals 2/3 project alternatives involve evaluating different sized detention basins, different rates of discharge from the City into Lateral 2, and different downstream conveyance capacity improvements to define the most cost-effective option. The alternatives evaluated include:

- Full Detention – The City would discharge from Basins B/C to Lateral 2 at a maximum rate of 77.5 cfs. To achieve this maximum discharge, a 110 ac-ft storage, off-line detention basin would be constructed near the City outlet. The basin would require an area of about 40 acres. No downstream conveyance improvements would be constructed. The potential detention basin is shown schematically in Figure 4-2. In this figure, the basin is located just upstream of Pedrick Road; but the basin could actually be located anywhere along Lateral 2 upstream of the North Cross Channel.

  Detention ponds are typically either off-line or on-line. An off-line detention pond is off to the side of the creek channel. When the flow in the creek exceeds the discharge limit, the excess flow is diverted from the creek channel into the detention pond. An on-line detention basin is on the creek channel. All creek flow enters the pond. The pond outlet is structured to release no more than the discharge limit.

- Balanced Detention and Conveyance – The City would discharge from Basins B/C to Lateral 2 at a maximum rate of 125 cfs. To achieve this maximum discharge, a 35 ac-ft storage, off-line detention basin would be constructed near the City outlet. This basin would require an area of about 10 acres. Conveyance capacity improvements of

47.5 cfs would be constructed in the DRCD and RD 2068 channels by adding 5 feet of channel bottom width and 42-inch culverts. The downstream end of this project includes a new channel from the DMD to Hass Slough. Capacity in this new channel would be shared by this project and the recommended Eastside Drainage Project (see Chapter 6). This project is illustrated in Figure 4-3.

- Unrestricted Discharge – No detention basin would be constructed. Instead, the City would be allowed an unrestricted discharge (estimated at 230 cfs from a 100-year storm). The discharge under this project is the same as the discharge that occurs currently under high flow conditions. Conveyance capacity improvements would be constructed along the DRCD and RD 2068 channels in the areas where flooding problems currently occur (see Figure 4-4). In the areas where flooding is not a routine problem, minor or no conveyance improvements would be implemented. The downstream end of this project includes a new channel from the DMD to Hass Slough. Capacity in this new channel would be shared by this project and the recommended Eastside Drainage Project (see Chapter 6). This project is illustrated in Figure 4-4.

MODEL RESULTS

The three projects were simulated using the XP-SWMM model. The results at key locations are presented in Figures 4-5 through 4-14 and discussed below. All these model results are for the 100-year, 4-day design storm event. The locations of the results are shown on Figure 4-1.

Presented in Figure 4-5 are hydrographs of the discharge from the City to Lateral 2 for the three project alternatives and for existing conditions. As shown, under the Full Detention Alternative the discharge is limited to 77.5 cfs, and under the Balanced Detention/Conveyance Alternative the discharge is limited to 125 cfs. The only change for the Unrestricted Discharge Alternative is the removal of the abandoned weir; consequently, the hydrograph, for this alternative is nearly the same as the existing conditions (base case) hydrograph.

Stagegraphs for Lateral 2 at the North Cross Channel are presented in Figure 4-6. The Full Detention and Balanced Detention and Conveyance Alternatives result in a lower peak water surface at this location. The Unrestricted Discharge Alternative results in no significant change to the peak water surface elevation at this location.

Stagegraphs for Lateral 3 at the end of the North Cross Channel are presented in Figure 4-7. All of the Alternatives reduce the peak water level and duration of field flooding at this location; however, the Unrestricted Discharge Alternative provides the greatest benefit.

Stagegraphs for Lateral 3 at the South Cross Channel are presented in Figure 4-8. At this location, the peak water surface elevation for all alternatives is about the same; however, the Unrestricted Discharge Alternative has the shortest duration of field flooding.

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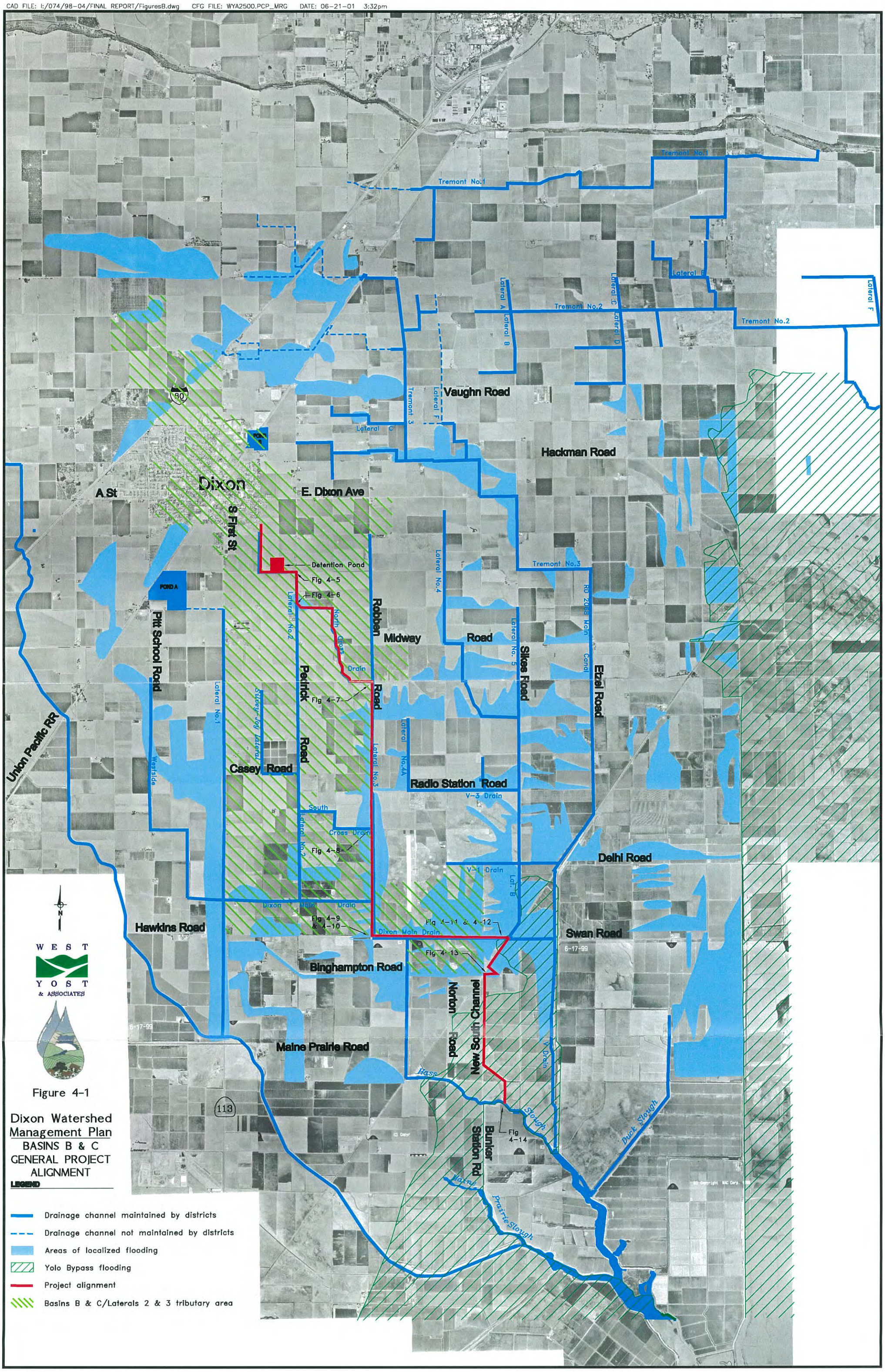

WEST YOST & ASSOCIATES

Figure 4-1

Dixon Watershed Management Plan
BASINS B & C
GENERAL PROJECT ALIGNMENT

LEGEND

- Drainage channel maintained by districts
- Drainage channel not maintained by districts
- Areas of localized flooding
- Yolo Bypass flooding
- Project alignment
- Basins B & C/Laterals 2 & 3 tributary area

Figure 4-2

Dixon Watershed Management Plan
FULL DETENTION ALTERNATIVE

LEGEND:

CHANNEL

POND

N

WEST YOST & ASSOCIATES

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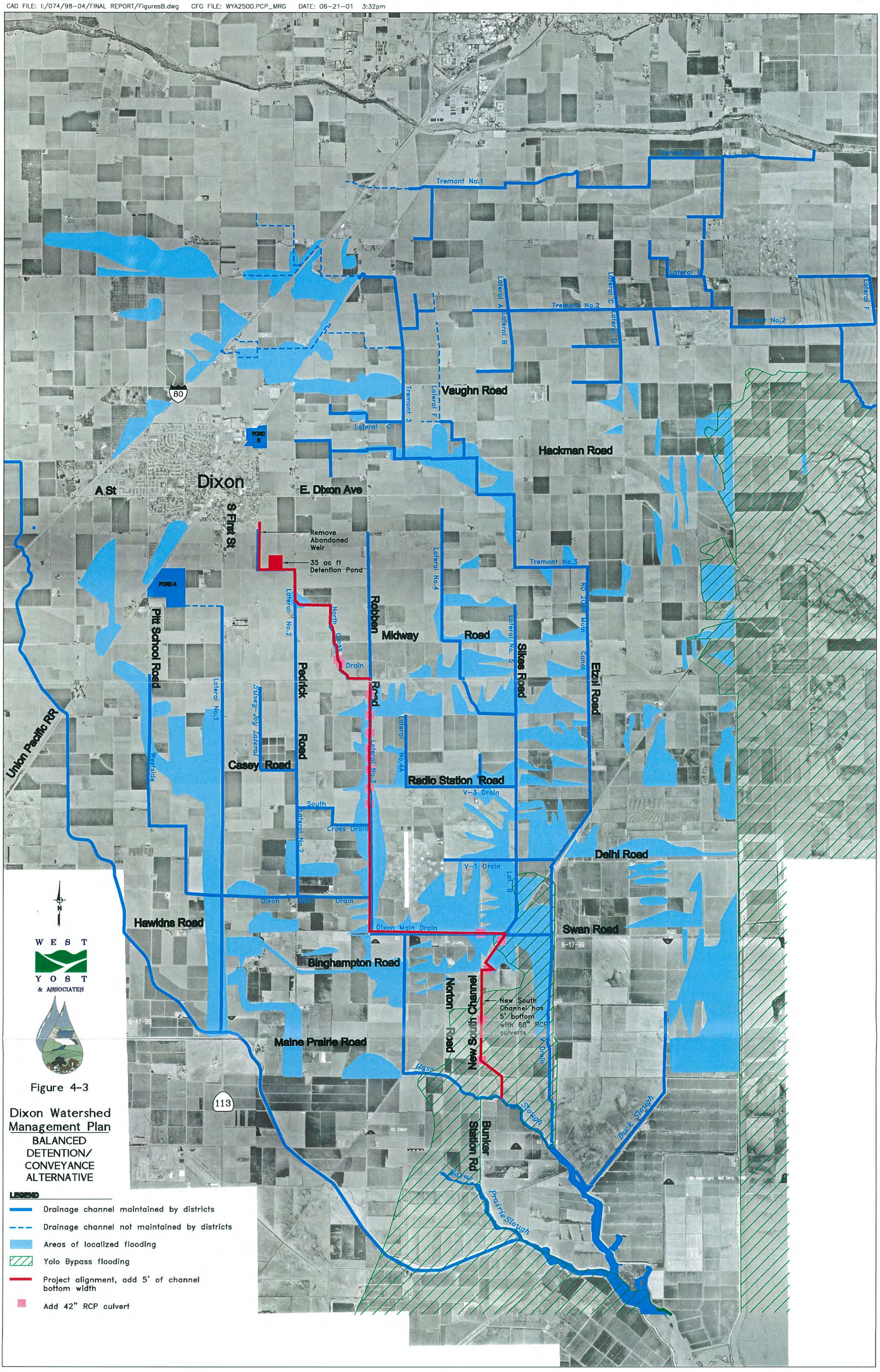

WEST YOST & ASSOCIATES

Figure 4-3

Dixon Watershed Management Plan

BALANCED DETENTION/ CONVEYANCE ALTERNATIVE

LEGEND

- Drainage channel maintained by districts
- Drainage channel not maintained by districts
- Areas of localized flooding
- Yolo Bypass flooding
- Project alignment, add 5' of channel bottom width
- Add 42" RCP culvert

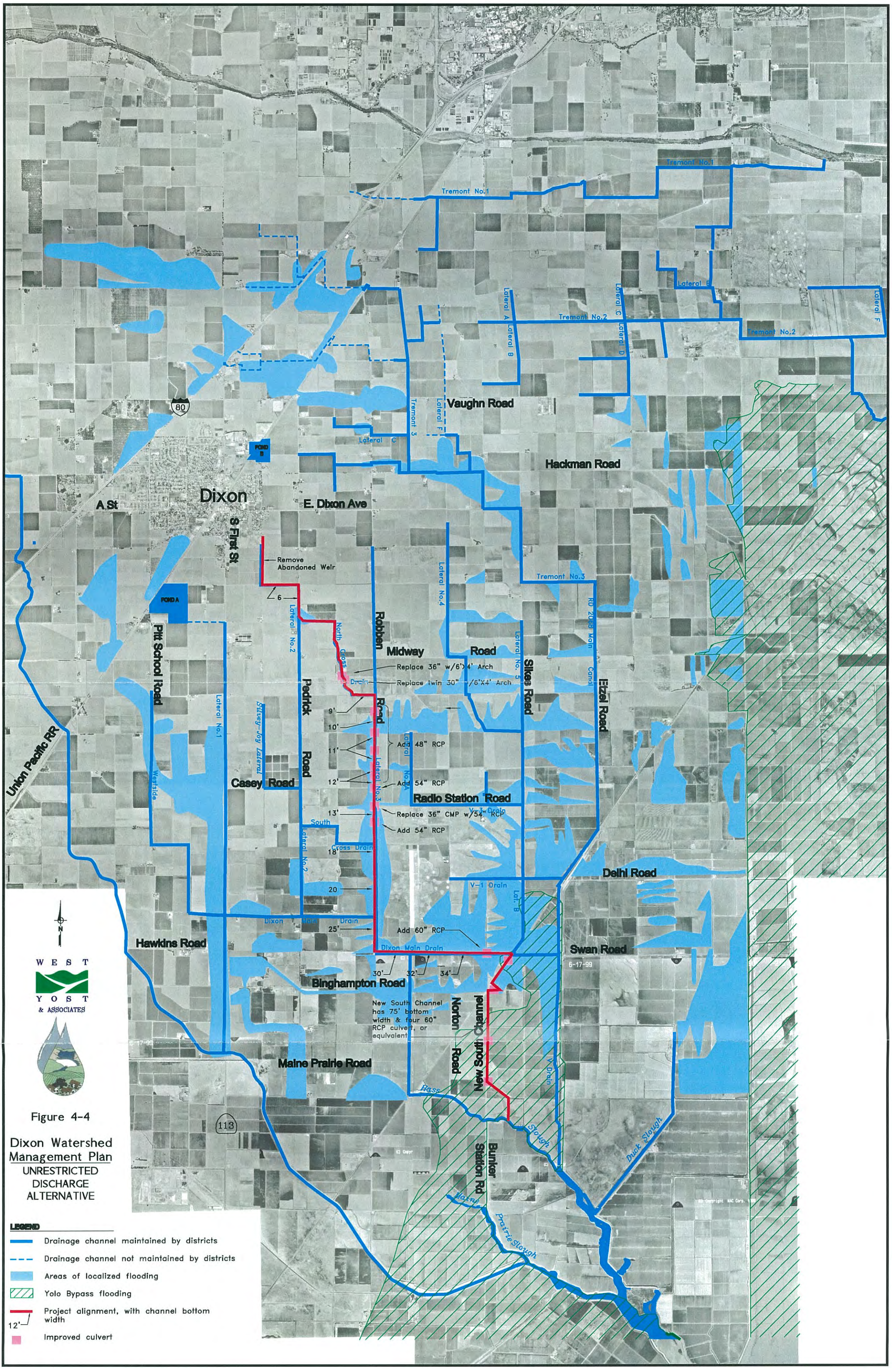
Tremont No.1
Tremont No.2
Tremont No.3
Lateral A
Lateral B
Lateral C
Lateral D
Lateral E
Lateral F
Vaughn Road
Hackman Road
Dixon
A St
S First St
E. Dixon Ave
80
POND B
POND A
Remove Abandoned Weir
Pitt School Road
Union Pacific RR
Lateral No.1
Lateral No.2
Lateral No.3
Lateral No.4
Lateral No.5
Lateral No.6
Stacey-Joy Lateral
Westside
Casey Road
Pedrick Road
Robben Road
Midway Road
Silkey Road
Etzel Road
RD 2068 Main Canal
North Cross Drain
South Cross Drain
Replace 36" w/6'X4' Arch
Replace twin 30" /6'X4' Arch
Add 48" RCP
Add 54" RCP
Radio Station Road
Replace 36" CMP w/54" RCP
Add 54" RCP
V-3 Drain
V-1 Drain
Delhi Road
Dixon Main Drain
Add 60" RCP
Swan Road
6-17-99
Hawkins Road
Binghampton Road
New South Channel has 75' bottom width & four 60" RCP culvert, or equivalent
Norton Road
New South Channel
Maine Prairie Road
Hass Slough
Duck Slough
Bunker Station Rd
Maine Prairie Slough
113
N
WEST YOST & ASSOCIATES
Figure 4-4
Dixon Watershed Management Plan
UNRESTRICTED DISCHARGE ALTERNATIVE
LEGEND
Drainage channel maintained by districts
Drainage channel not maintained by districts
Areas of localized flooding
Yolo Bypass flooding
Project alignment, with channel bottom width
Improved culvert

Figure 4-5. Basin/Pond C Discharge (Includes Pond B Discharge)

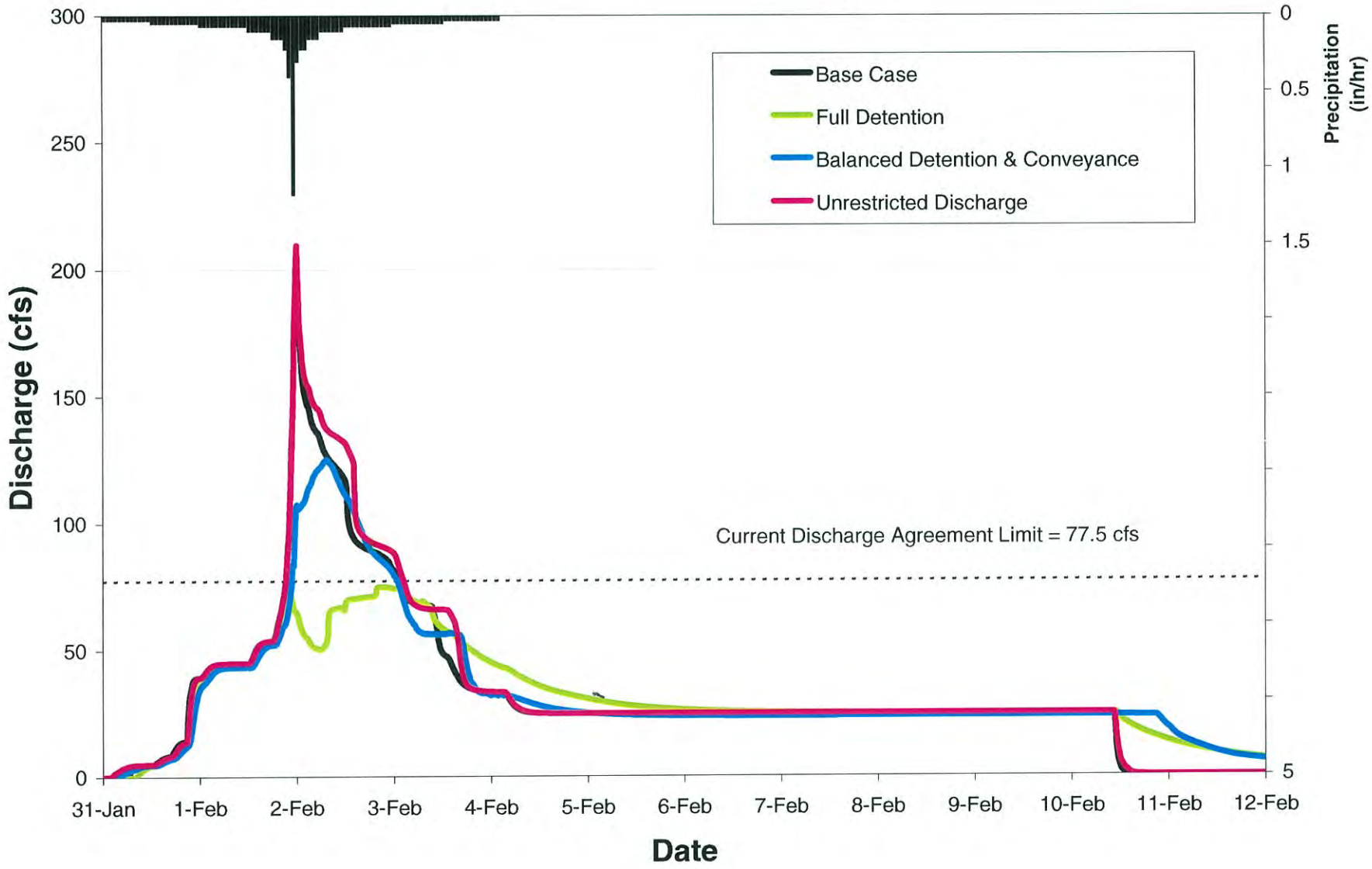

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Figure 4-6. Stage in Lateral 2 at the North Cross Channel

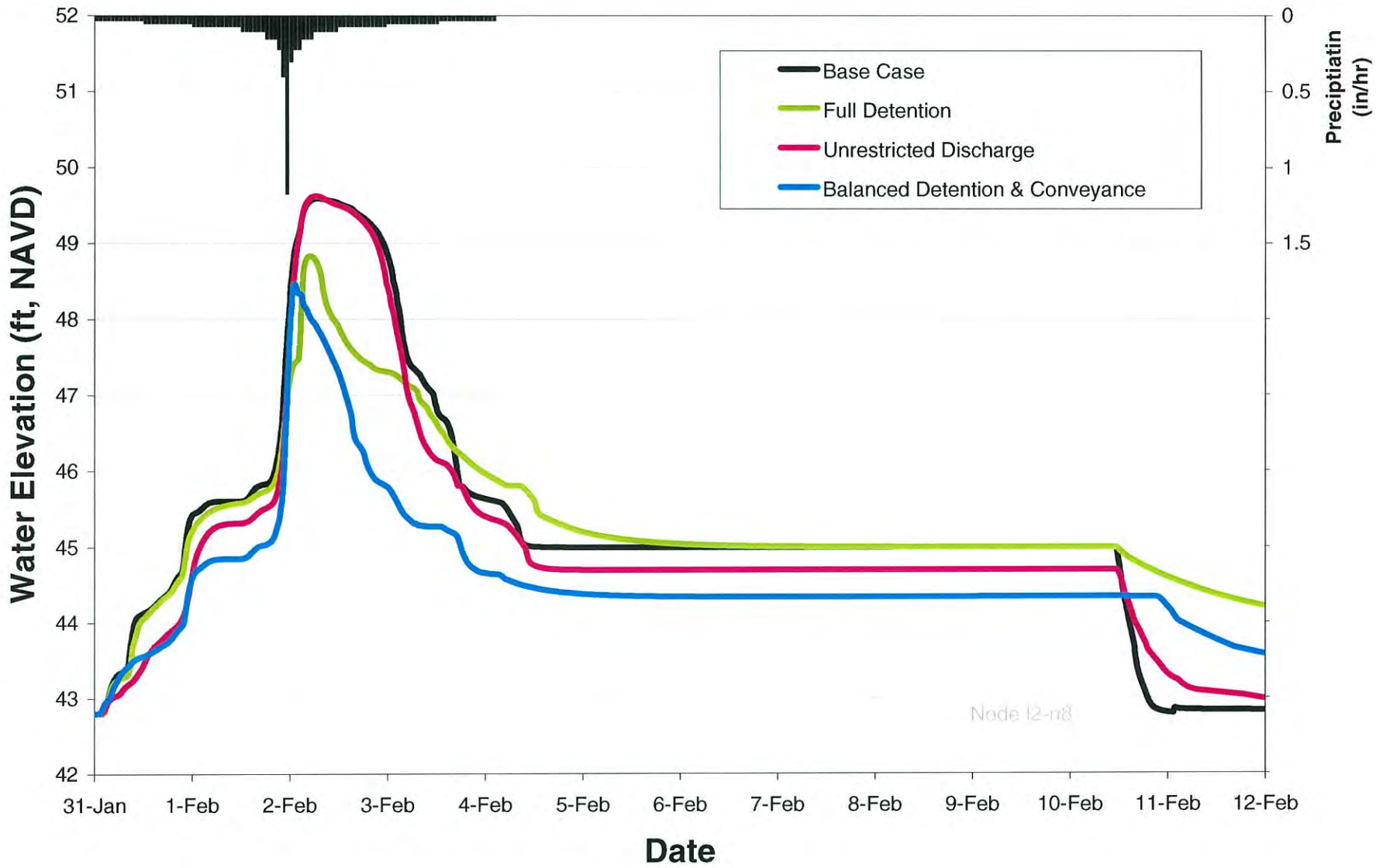

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Figure 4-7. Lateral 3 at the End of the North Cross Channel

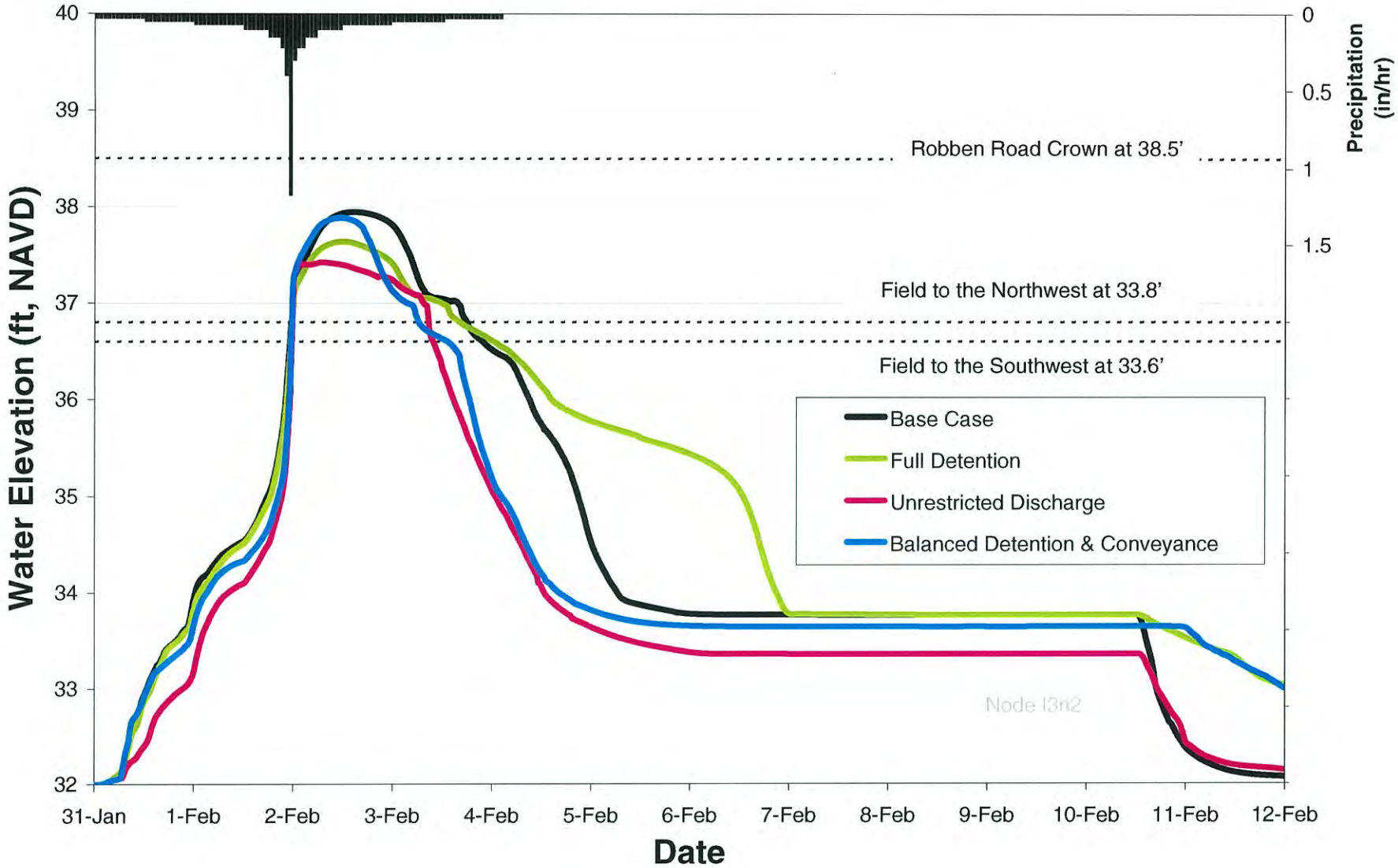

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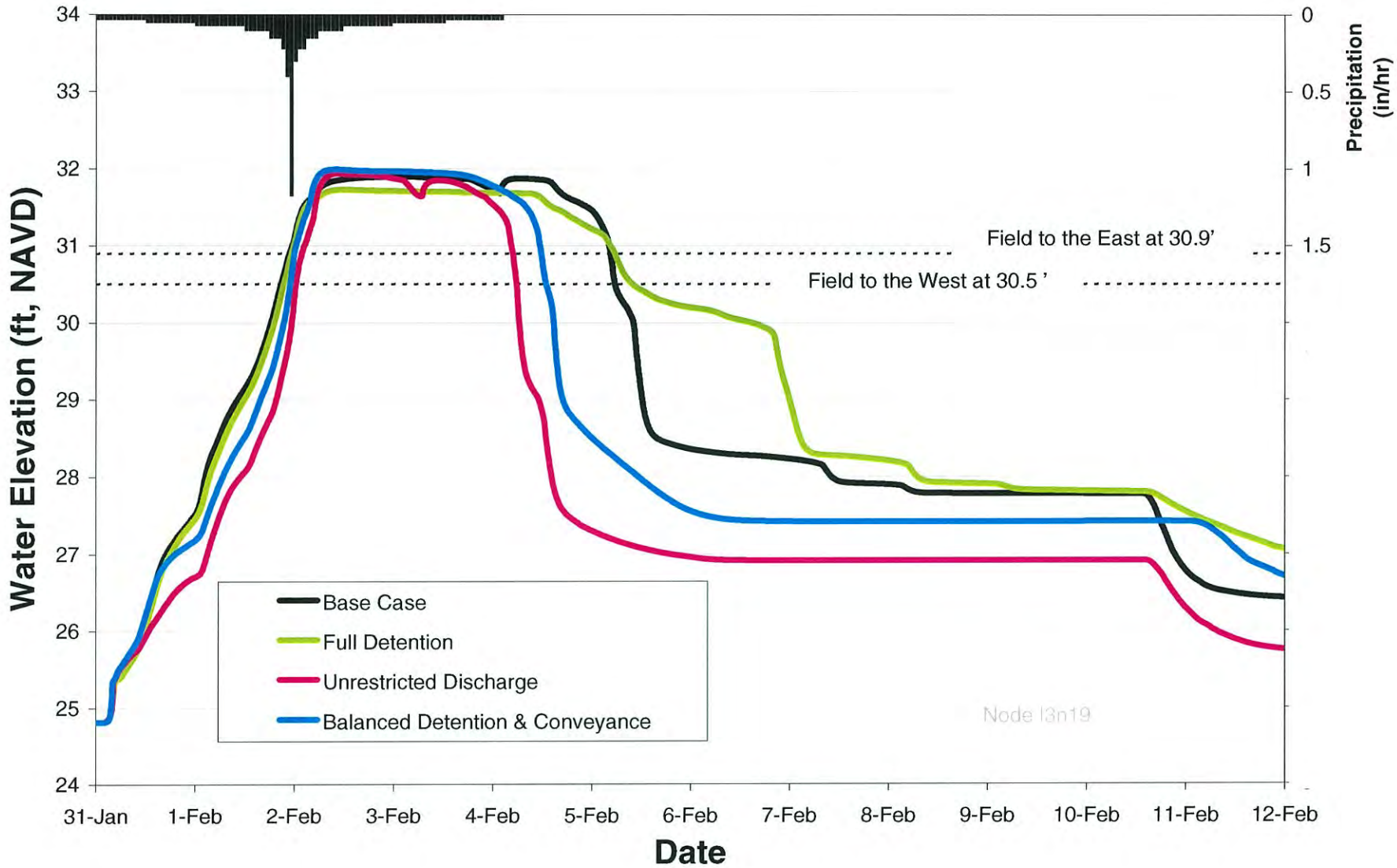
Figure 4-8. Lateral 3 at South Cross Channel



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Presented in Figure 4-9 are stagegraphs for the DMD at the bend to the east. As shown the Unrestricted Discharge Alternative provides the greatest reduction in the peak water level and the greatest reduction in the duration of field and road flooding. From this location, flood water flows to the south. Shown in Figure 4-10 are the hydrographs of this flooding flow. As shown, the Unrestricted Discharge Alternative virtually eliminates the flooding flow (the peak flow is under 2 cfs, which would probably be contained in the roadside ditches).

Stagegraphs for the DMD at the upstream end of the NSC are presented in Figure 4-11. Only the Unrestricted Discharge Alternative provides any improvement at this location. The Balanced Detention/Conveyance Alternative actually makes the extent of the flooding worse at this location by increasing the maximum water level by about half a foot. This increased flooding could be mitigated by incrementally enlarging the channel moving downstream, which is essentially the same as the unrestricted discharge option.

Hydrographs of the discharge into the NSC are presented in Figure 4-12. The NSC does not exist now; consequently, for the base case no discharge is shown. For the Full Detention Alternative, no downstream improvements would be constructed, so there would be no NSC. For the Balanced Detention and Conveyance Alternative and the Unrestricted Discharge Alternative the flow to the NSC is from both DRCD's DMD and RD 2068's Lateral B.

Presented in Figure 4-13 are stagegraphs for the NSC crossing of Bunker Station Road. Since there is currently no major channel at this location, there are no stagegraphs for the existing conditions or the Full Detention Alternative. Nevertheless, during a 100-year storm, flooding at this location would probably occur. The Balanced Detention and Conveyance Alternative results in flooding of the road and fields. The Unrestricted Discharge Alternative conveys the water through this area without causing any flooding.

Stagegraphs of Hass Slough at the end of the NSC are presented in Figure 4-14. The water level at this location is initially controlled by the downstream tail water elevation, which was set at 8.5 feet NAVD for the Base Case and the Unrestricted Discharge Alternative. For the Full Detention and Balanced Detention and Conveyance Alternatives the tail water was set at 9.5 feet NAVD (see the discussion of tail water conditions in Chapter 1). For all projects the peak water level is below the Hass Slough levees to the north and the south. The peak water levels are also well below the water levels created when the Yolo Bypass is flooded.

PROJECT COST ESTIMATES

Cost estimates for these projects are summarized in Table 4-1 and presented in detail in Tables 4-2 through 4-4.

Table 4-1. Basin B/C and Lateral 2/3 Project Cost Summary, Million Dollars.[(a)]

Project	Total Capital Cost	Annual O&M Cost	Total Present Value Cost
Full Detention	1.5	0.02	1.7
Unrestricted Discharge	1.8	0.04	2.4
Balanced Discharge/Conveyance	1.7	0.03	2.2

(a) Based on ENR 20-city construction Cost Index of 6281, representing 2001 dollars.

Figure 4-9. Dixon Main Drain at the Bend to the East

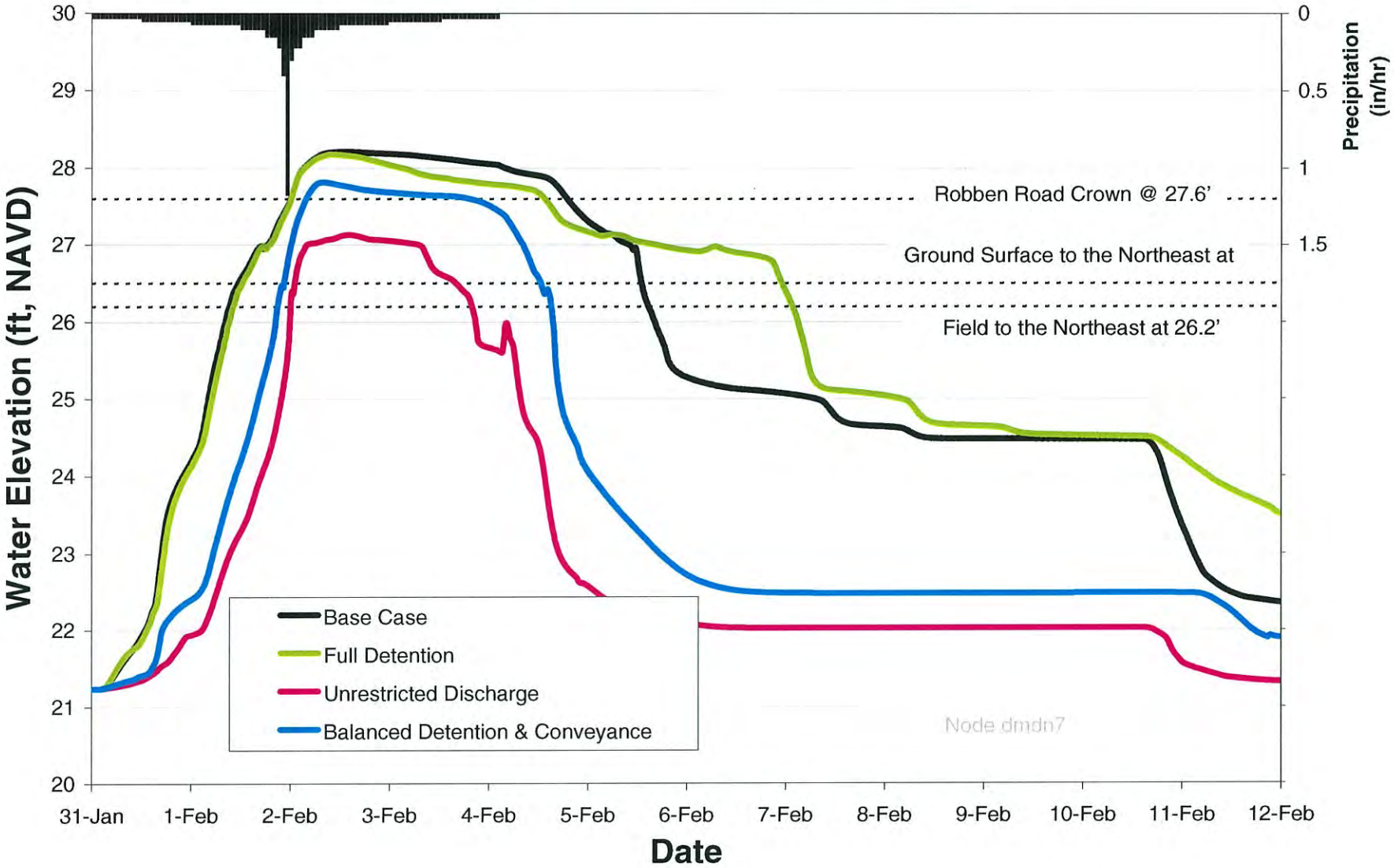

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Figure 4-10. Flooding Flow from Dixon Main Drain at Robben Road to the South

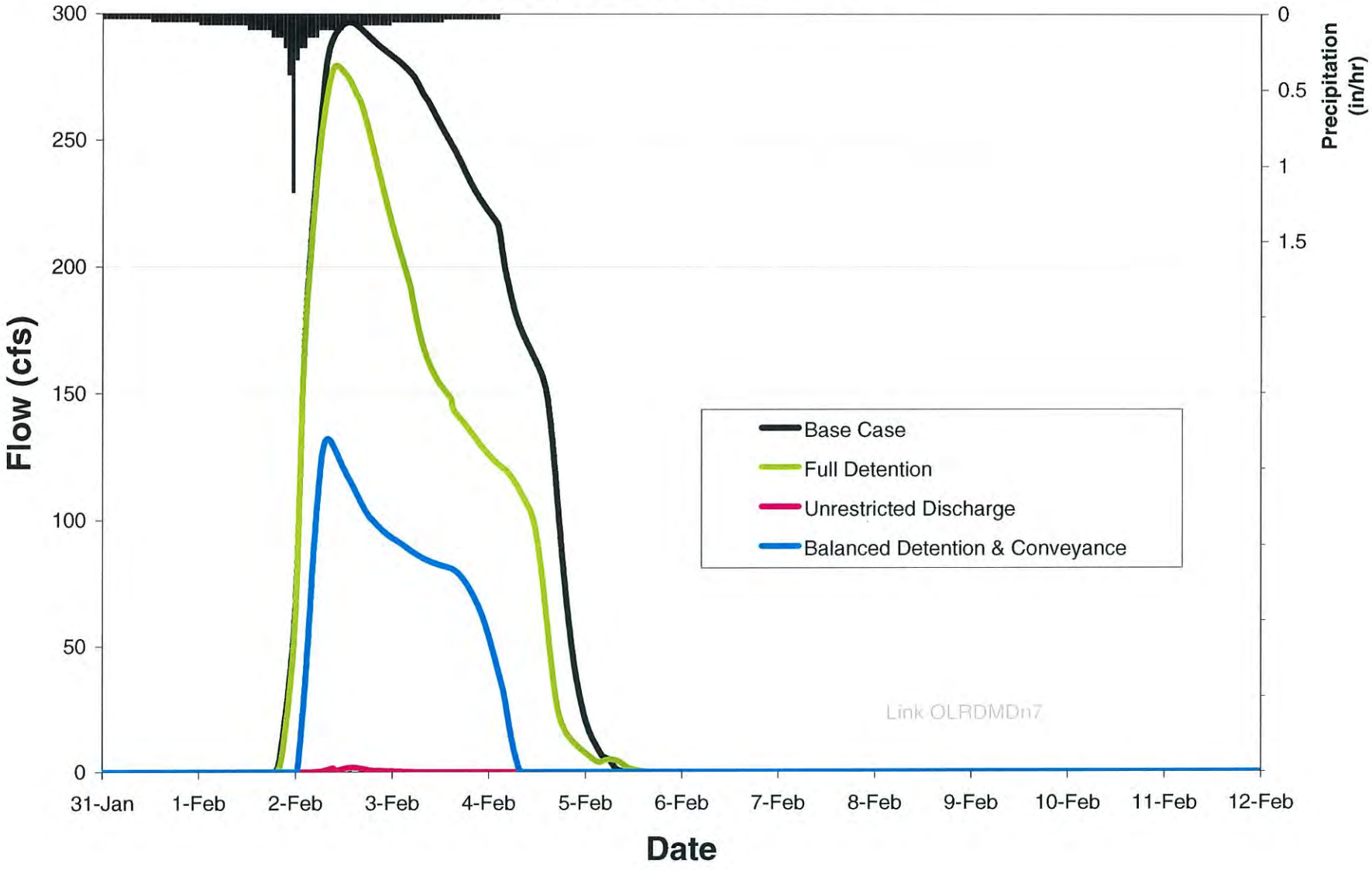

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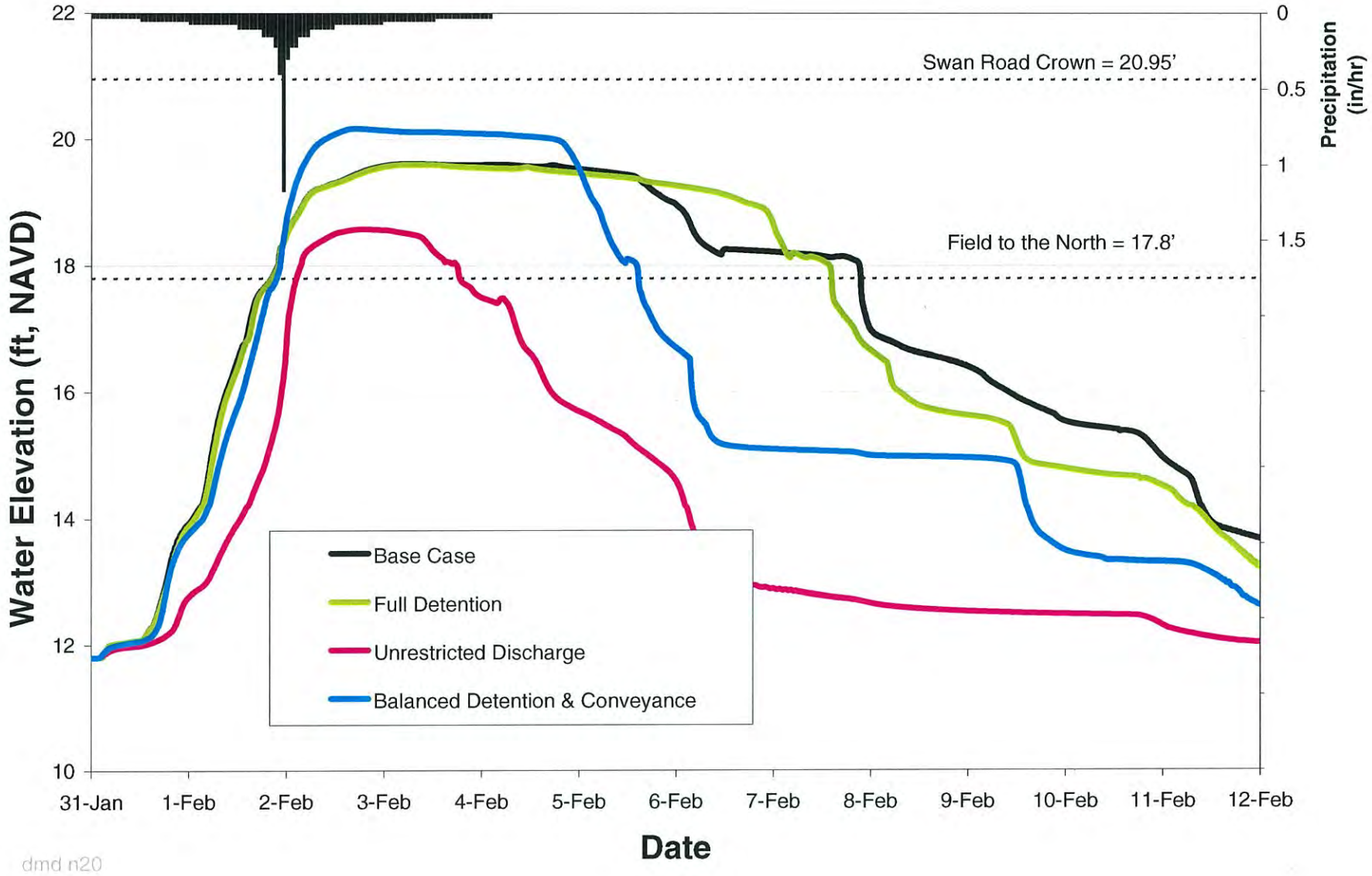
Figure 4-11. Stage in Dixon Main Drain at New South Channel



dmd n20

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Figure 4-12. Flow from the Dixon Main Drain into the New South Channel

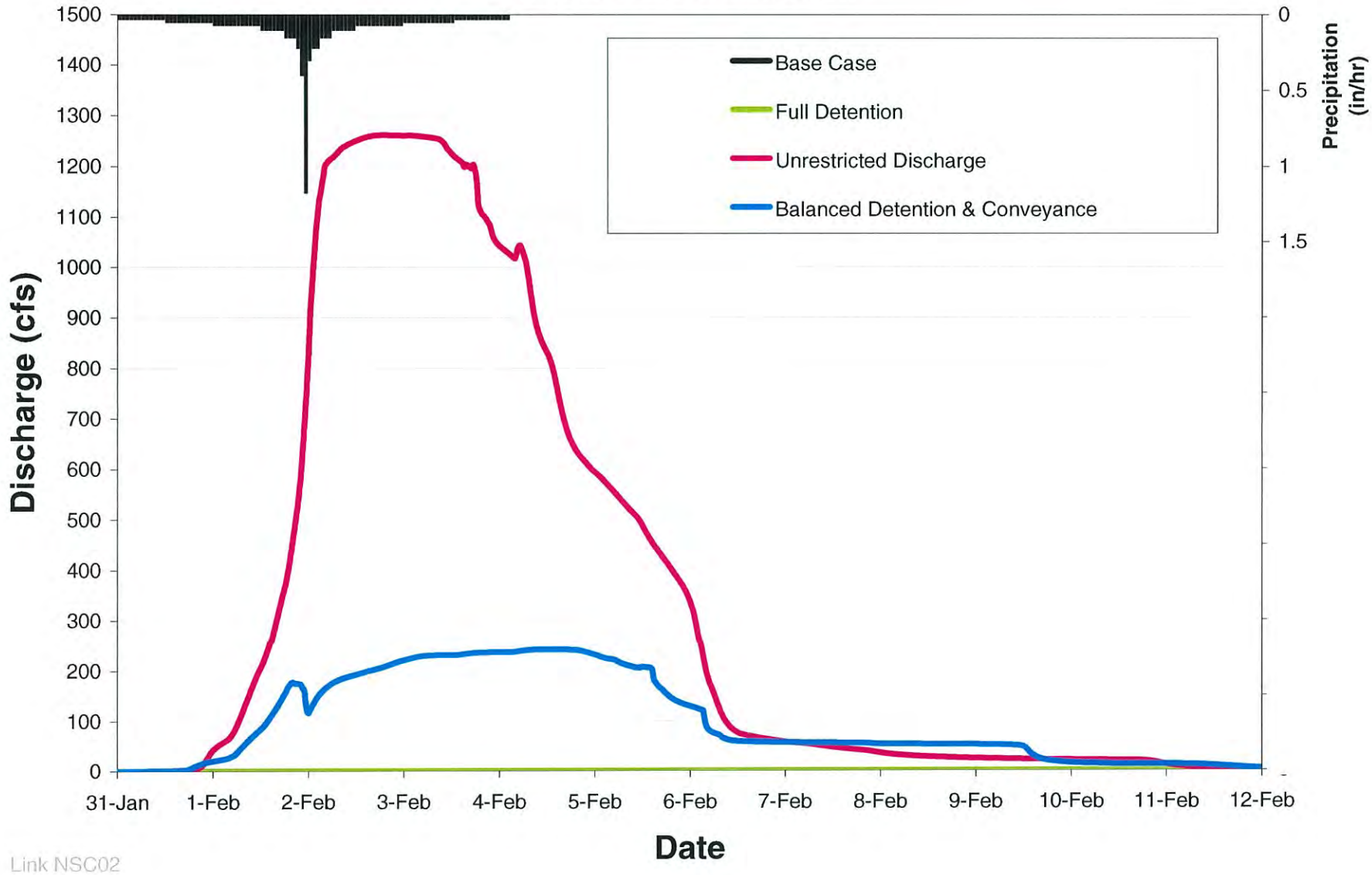

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Figure 4-13. Stage in the New South Channel at the North Crossing of Bunker Station Road

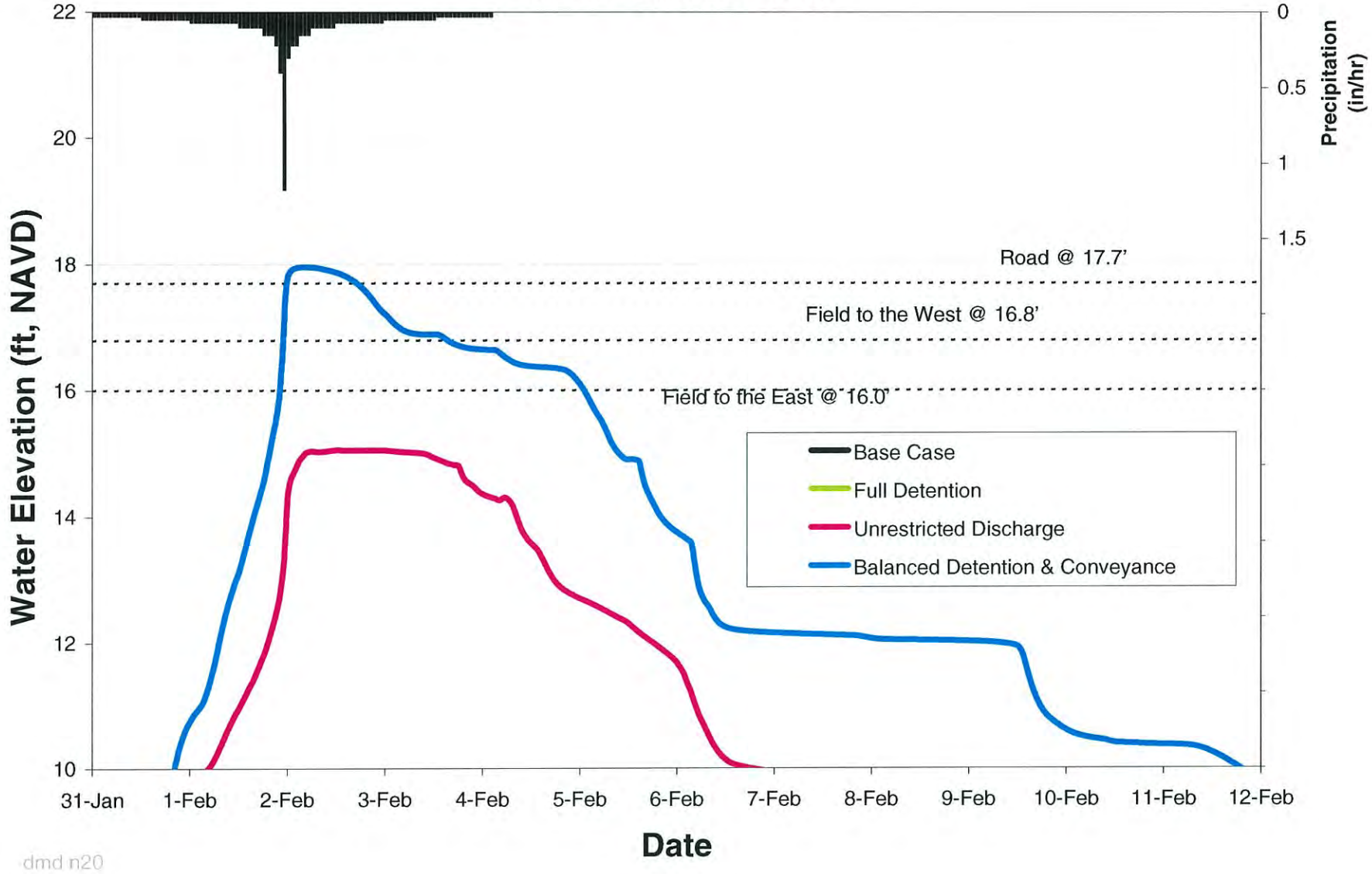

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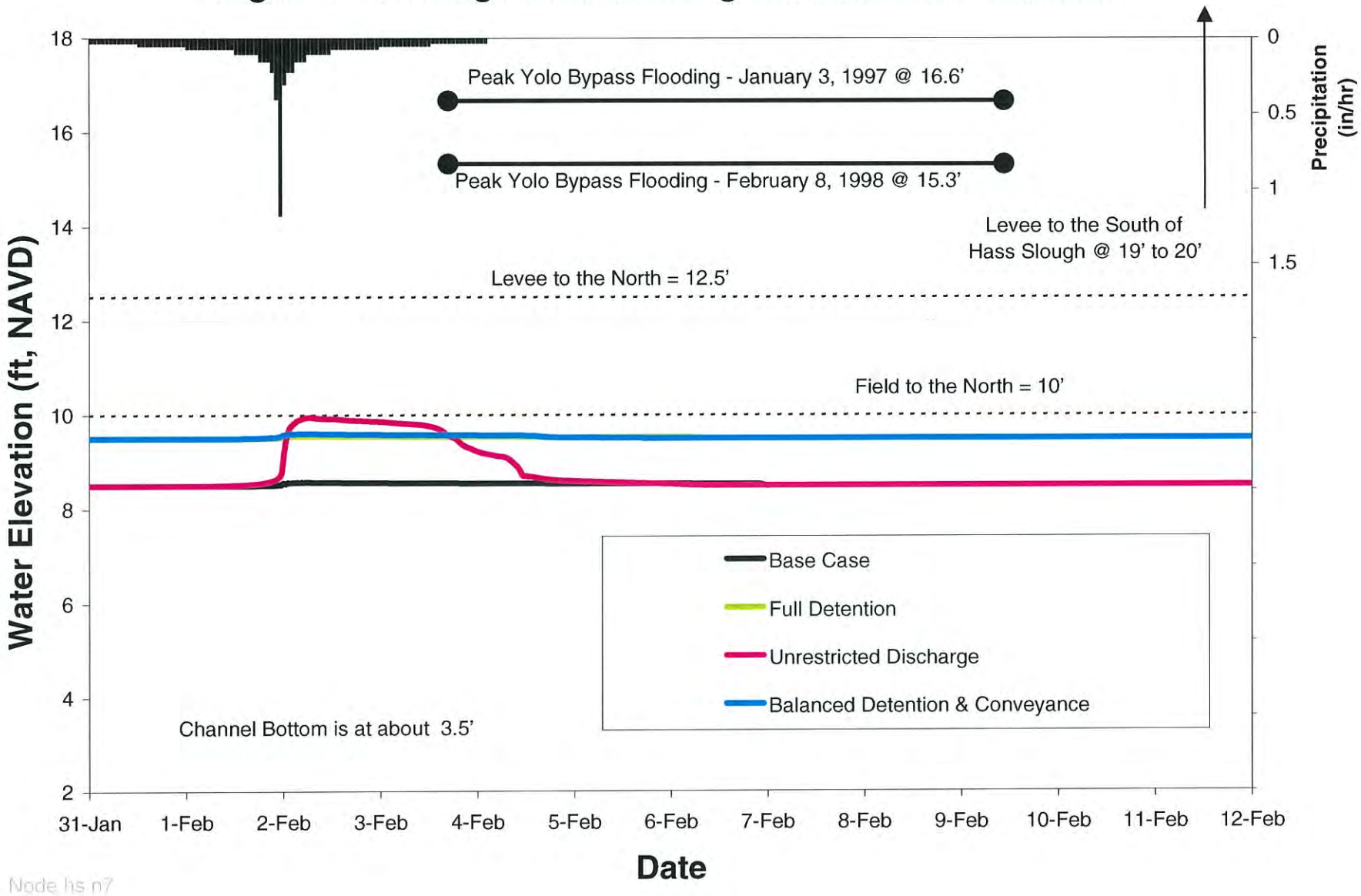
Figure 4-14. Stage in Hass Slough at New South Channel



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The Full Detention Alternative and the Balanced Detention/Conveyance Alternative have a comparable total capital cost of under $1.5 million. The Unrestricted Discharge Alternative capital cost is higher, at about $1.8 million. The Full Detention Alternative has the lowest annual O&M cost at $16,000 and the lowest total present value cost at $1.7 million.

Total capital costs include the construction cost, costs for contingencies (cost for unanticipated construction conditions or problems), and costs for engineering, legal, administrative, and environmental mitigation. The cost of contingencies is estimated at 20 percent of the construction cost for ponds, and 30 percent for channels, because the ponds are less likely to have unanticipated problems than the channels. The cost for engineering, legal, administration, and environmental mitigation is estimated at 25 percent of the construction cost for ponds and 35 percent for channels because ponds are simpler to implement (e.g., less potential for conflicts with existing utilities and fewer property owners with whom to negotiate right-of-way purchase).

The project costs are sensitive to the unit cost for excavation. For pond excavation a unit cost of $3/CY has been used. For channel excavation a unit cost of $5/CY has been used for the Balanced Detention/Conveyance Alternative because of the smaller excavation quantity and $3/CY for the Unrestricted Discharge Alternative because of the larger quantity. Actual excavation costs could be higher or lower depending on the disposal locations for the soil. Culvert costs have been estimated using a unit cost of $4/inch diameter/foot of length.

The NSC would be shared by the Basins B/C project and the EDP (see Chapter 6). The cost split is based on the increase of authorized urban runoff discharged into the system. For example, for the Basin B/C Unrestricted Discharge Alternative, the increase of authorized urban discharge would be 152 cfs (230 cfs minus 77.5 cfs). For the EDP – 250 cfs option, the increase of authorized urban discharge would be 250 cfs (the NEQ is not within the DRCD drainage fee area, so currently no discharge is authorized). Based on comparison of these authorized discharge rates, 37 percent of the NSC cost would be allocated to the Basins B/C project, and 63 percent to the EDP. For the balanced detention or conveyance option, the cost of the NSC is given in Table 4-4.

JOINT USES

The Full Detention and Balanced Detention/Conveyance Alternatives include detention ponds located somewhere near the City. The detention pond in these projects could be configured to provide joint uses such as wetlands/uplands habitat, sports fields, play grounds, and/or jogging paths.

The Unrestricted Discharge Alternative does not provide joint use opportunities near the City. The NSC (part of the Unrestricted Discharge Project) does, however, provide wetlands/uplands habitat opportunities.

WATER QUALITY

The Central Valley Water Quality Control Board (RWQCB) was contacted to determine if water quality basins would be required in the future. RWQCB staff (Leo Sarmiento) said that the requirements recently issued for the San Diego Area would soon be required in the Sacramento

Valley. Water quality ponds are identified in the San Diego order as a method of improving runoff quality.

One of the methods for sizing the water quality basins is contained in Appendix D of the *California Stormwater Best Management Practices Handbook – Industrial/Commercial* (1993). The pond should be sized to achieve a treated volume equal to 90 percent of the total runoff or more. The data for Basin C required for using this method are:

- Total Watershed Area = 808 acres
- Impervious Area = 291 acres (watershed is 36 % impervious coverage)
- Directly Connected Impervious Area = 233 acres (Assuming 80 percent of the impervious area is directly connected) Directly connected impervious area is defined as the area covered by pavement, buildings, and other impervious surfaces which drain directly into the storm drains without first flowing across a pervious area.)
- Directly connected percent impervious = 29 percent
- Required runoff capture rate = 90 percent (10 percent of runoff allowed to bypass pond)

From Appendix D of the *California Stormwater Best Management Practices Handbook – Industrial/Commercial* (1993), the storage volume requirement is 0.029 ac-ft of water quality pond volume per acre of watershed area. For Basin C (at 808 acres) the water quality pond should be at least 24 ac-ft. This volume should be drained from the water quality pond over a time period of at least 40 hours.

A water quality pond is intended to capture the first flush and continuous low flows. Off-line flood control basins (like these proposed for Basin C) are intended to bypass the first flush and low flow, and then capture just the flow above the allowed discharge rate. Although the two types of ponds have contradictory modes of operation, a pond configuration could be developed that provides treatment for water quality benefit with the lowest 2 or 3 feet, and flood control storage in the upper 4 or 5 feet. Such a configuration could result in a cost savings over constructing two separate basins. Consequently, if/when these requirements are implemented for the Sacramento Valley, compliance would be easier if flood conrol basins had already been constructed. The costs for a water quality pond were not included in the project costs presented above.

FUTURE DEVELOPMENT

Basin F is located east of the current City and west of Pedrick Road. This area is currently agricultural, and drains primarily to Lateral 2. Basin F is planned for development in the future. When developed, the peak runoff rate and the total runoff volume from Basin F will increase.

Table 4-2. Cost Estimate for the Full Detention Project

Item	Unit	Off Line Gravity Pond		
		Quantity	Unit Cost, dollars	Estimated Cost
Construction & Capital Costs				
Pond Improvements				
Excavation	Cubic Yard	207,000	3	621,000
Levee & Maintenance Road	Lineal Foot	3,880	30	116,400
Seed Pond Banks	Square Yard	24,880	1	24,880
6' Chain Link Fence	Lineal Foot	4,000	6	24,000
Concrete Overflow Weir	Cubic Yard	40	500	20,000
36 Inch Pond Discharge Pipe	Lineal Foot	100	144	14,400
Pond Discharge Pipe Flap Gate	Each	1	6,000	6,000
48 Inch Lateral 2 Culvert	LF	50	192	9,600
Relocate Existing Field Drainage	CY	3,000	3	9,000
Pond Construction Subtotal				845,000
Contingency (@ 20%)				169,000
Engineering, Legal, Admin, Environmental (@25%)				211,000
Land	Acre	40	6,000	240,000
Pond Total Capital Cost				1,465,000
Downstream Improvements				
Culverts	Each			-
Check Dams	Each			-
Channel Enlargement	Cubic Yard			-
Channel Gates	Each			-
Field Drains	Each			-
Right of Way	Acre			-
Share of New South Channel	Lump Sum			-
Excavation		49,000		-
Contingency (@ 30%)				-
Engineering, Legal, Admin, Environmental (@ 35%)				-
Downstream Improvements Total Capital Cost				-
Total Construction Cost				845,000
Total Capital Cost				1,465,000
Annual Costs				
Detention Pond O&M	Acre	20	800	16,000
Pipeline/Channel Maintenance	Ft*mile		200	-
Total Annual Cost				16,000
Present Value Analysis				
Capital Cost				1,465,000
Present Value of Annual Costs (3% for 20 years)				250,000
Total Present Value of Costs				1,715,000

Table 4-3. Cost Estimate for Unrestricted Discharge Project

Item	Unit	Off Line Gravity Pond		
		Quantity	Unit Cost, dollars	Estimated Cost
Construction & Capital Costs				
Water Qualtiy Pond Improvements				
Excavation	Cubic Yard		3	-
Levee & Maintenance Road	Lineal Foot		30	-
Seed Pond Banks	Square Yard		1	-
6' Chain Link Fence	Lineal Foot		6	-
Bypass Overflow Structure	Each		10,000	-
36 Inch Pond Discharge Pipe	Lineal Foot		144	-
Plant Wetlands Vegetation	Acre		5,000	-
Pond Construction Subtotal				-
Contingency (@ 20%)				-
Engineering, Legal, Admin, Environmental (@25%)				-
Land	Acre		6,000	-
Pond Total Capital Cost				-
Downstream Improvements				
Remove Weir at City Outlet	Lump Sum	1	10,000	10,000
Culverts	LF	375	264	99,000
Check Dams	Each	2	10,000	20,000
Channel Enlargement	Cubic Yard	85,000	3	255,000
Field Drains	Each	40	1,000	40,000
Share of New South Channel				
Culverts	LF	208	240	49,920
Excavation	CY	116,000	3	348,000
Plant Wetlands/Uplands Vegetation	Acre	26	5,000	130,000
Excavation		49,000		952,000
Land	Acre	47	4,000	188,000
Contingency (@ 30%)				286,000
Engineering, Legal, Admin, Environmental (@35%)				333,000
Downstream Improvements Total Capital Cost				1,759,000
Total Construction Cost				952,000
Total Capital Cost				1,759,000
Annual Costs				
Detention Pond O&M	Acre			-
Pipeline/Channel Maintenance (existing and enlarged width)	Ft*mile	210	200	41,937
Total Annual Cost				41,937
Present Value Analysis				
Capital Cost				1,759,000
Present Value of Annual Costs (3% for 20 years)				654,000
Total Present Value of Costs				2,413,000

Table 4-4. Cost Estimate for the Balanced Detention and Conveyance Project

Item	Unit	Off Line Gravity Pond		
		Quantity	Unit Cost, dollars	Estimated Cost
Construction & Capital Costs				
Pond Improvements				
Excavation	Cubic Yard	57,000	3	171,000
Levee & Maintenance Road	Lineal Foot	2,400	30	72,000
Seed Pond Banks	Square Yard	7,500	1	7,500
6' Chain Link Fence	Lineal Foot	2,500	6	15,000
Concrete Overflow Weir	Cubic Yard	40	500	20,000
36 Inch Pond Discharge Pipe	Lineal Foot	100	144	14,400
Pond Discharge Pipe Flap Gate	Each	1	6,000	6,000
48 Inch Lateral 2 Culvert	LF	40	192	7,680
Relocate Existing Field Drainage	CY	3,000	3	9,000
Pond Construction Subtotal				323,000
Contingency (@ 20%)				65,000
Engineering, Legal, Admin, Environmental (@25%)				81,000
Land	Acre	10	6,000	60,000
Pond Total Capital Cost				529,000
Downstream Improvements				
Culverts	LF	715	168	120,120
Check Dams	Each	2	5,000	10,000
Channel Enlargement	Cubic Yard	42,261	5	211,306
Field Drains	Each	40	1,000	40,000
Right of Way	Acre	6.4	6,000	38,400
Share of New South Channel				
Culverts	LF	135	168	22,680
Excavation	CY	49,000	5	245,000
Right of Way	Acre	12.1	3,000	36,324
Downstream Improvements Construction Subtotal	CY	40,605	5	723,829
Contingency (@ 30%)	Acre	21.2	3,000	217,000
Engineering, Legal, Admin, Environmental (@ 35%)				253,000
Downstream improvements Total Capital Cost				1,193,829
Total Construction Cost				1,046,829
Total Capital Cost				1,722,829
Annual Costs				
Detention Pond O&M	Acre	7	800	5,600
Pipeline/Channel Maintenance	Ft*mile	139	200	27,857
Total Annual Cost				33,457
Present Value Analysis				
Capital Cost				1,722,829
Present Value of Annual Costs (3% for 20 years)				522,000
Total Present Value of Costs				2,244,829

The focus of the Basin C study was to determine ways the City could comply with the 1965 discharge agreement limiting flow from the City to Lateral 2 to 77.5 cfs. Basin F is mostly outside the area covered by the 1965 agreement, and consequently was not included in the modeling as a developed area (it was included as an agricultural area).

The future development of Basin F and the resulting increase of runoff must be accommodated in whichever project is implemented by detaining runoff from this area to its current rate, or constructing additional downstream conveyance improvements.

CONCLUSIONS

Based on the results of the analysis of these alternatives, the following conclusions were reached:

- The Balanced Detention and Conveyance Alternative would convey increased flow to the lower agricultural area resulting in increased flooding. For this reason, this alternative is not recommended. This increased flooding could be mitigated by incrementally enlarging the channel moving downstream, which is essentially the same as the unrestricted discharge alternative.

- The Full Detention Alternative:

  — Results in the City complying with the current drainage agreement with DRCD, which limits the flow from the City to 77.5 cfs, but places no control on the duration of that flow.

  — Provides the greatest opportunities for joint uses for the City.

  — The pond area can be used as a mitigation site for developing areas within the City.

  — Provides minimal benefit to the downstream agricultural community.

  — Has a capital cost and total present value cost significantly lower than the Unrestricted Discharge Alternative.

- The Unrestricted Discharge Alternative.

  — Provides the greatest flood control benefit to the downstream agricultural community.

  — Has the highest capital cost.

  — Has the highest O&M cost.

  — Has no dual use benefits for the City.

CHAPTER 5.
NORTHEAST QUADRANT OUTFALL ALTERNATIVES

The NEQ includes about 585 acres of land that is planned for development at some time in the future. Development may occur quickly or may occur in phases over several years. In either case, an adequate drainage outfall must be planned and constructed before development occurs to prevent exacerbating downstream agricultural flooding problems. About 2,700 acres of agricultural land north of Interstate 80 drains through the NEQ. In this chapter, five potential outfall alternatives to serve the NEQ and convey the upstream agricultural runoff are evaluated and compared, including:

- New South Channel (NSC).
  This facility is part of Alternatives 4 and 5; consequently, it was evaluated independently and then included in Alternatives 4 and 5 by reference.
- Alternative 1 – Detention Basin in NEQ
- Alternative 2 – NEQ Pump Station and Open Channel to Putah Creek
- Alternative 3 – NEQ to Tremont 3 to Yolo Bypass Toe Drain
- Alternative 4 – NEQ to Tremont 3 to Lateral 5 to NSC
- Alternative 5 – NEQ to New Pedrick Road Ditch to Laterals 2 and 3 to NSC

The alignments and benefit areas for each alternative are presented on Figure 5-1. A preliminary evaluation and comparison of these alternatives is presented below. Based on the preliminary comparison, Alternatives 1 and 4 were selected for more detailed analysis (see Chapter 6). The five alternatives are described below, along with the NSC.

NEQ ALTERNATIVES

New South Channel

This facility is part of Alternatives 4 and 5; consequently, it was evaluated independently and then included in Alternatives 4 and 5 by reference. By itself, this project does not provide a complete drainage solution for the NEQ. Its function is to provide better drainage capacity to the agricultural area along the eastern half of the DMD and the southern reach of the V-2 Drain. It includes a new channel from the DMD to Hass Slough. The channel would have a 20-foot bottom width, 4H:1V side slopes, and a depth of 6.5 feet, which would give the channel a capacity of about 375 cfs.

Alternative 1 – Detention Basin in NEQ

This alternative provides drainage for the NEQ, but it does not improve the downstream agricultural flooding problems. Drainage from the NEQ would be controlled by detaining peak flows from the NEQ to current rates. As discussed in the SDR there are two culverts draining the NEQ, including a 36-inch CMP under Pedrick Road and a 36-inch CMP under Vaughn Road. The combined capacity of these culverts was estimated to be between 30 and 80 cfs. To achieve a discharge rate of 30 cfs from the NEQ, a detention storage volume of about 480 ac-ft (site would be about 76 acres) would be required. The design and location of such a detention basin would be defined when more detailed facilities planning is completed for the NEQ. On Figure 5-1 the basin is shown conceptually as a linear detention basin (as it was in the SDR).

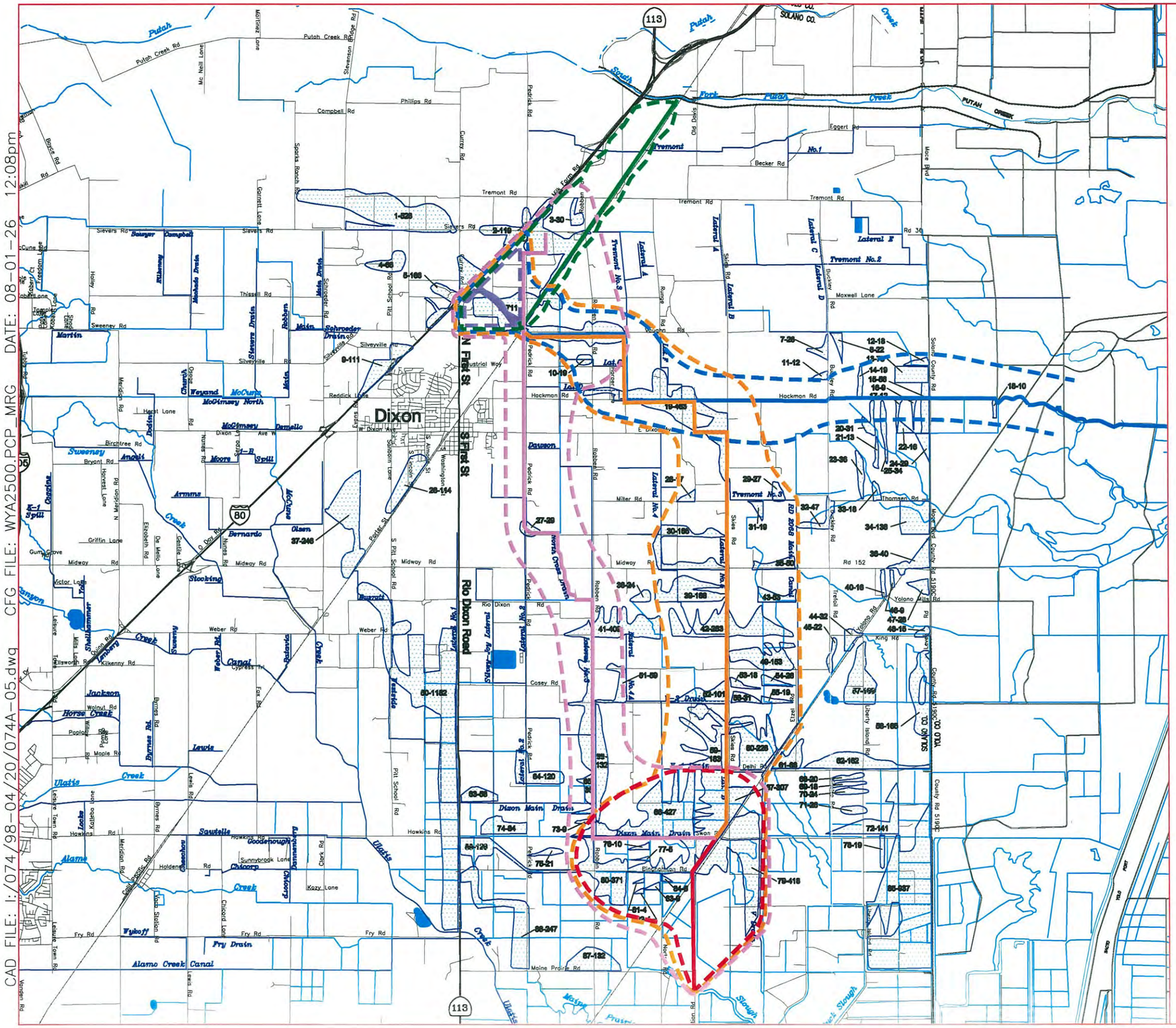

Figure 5-1

Dixon Watershed Management Plan

NORTHEAST QUADRANT OUTFALL ALTERNATIVES

LEGEND

- LEVEE
- AREAS OF LOCALIZED FLOODING

DRAINAGE OPTIONS

- SOLID LINES ARE OPTION ALIGNMENT
- DASHED LINES ARE APPROXIMATE BENEFIT AREA
- NEW SOUTH CHANNEL (NSC)
- PROJECT 1 – DETENTION BASIN IN NEQ
- PROJECT 2 – NEQ PUMP STATION & OPEN CHANNEL TO PUTAH CREEK
- PROJECT 3 – NEQ TO TREMONT 3 TO YOLO BYPASS TOE DRAIN
- PROJECT 4 – NEQ TO TREMONT 3 TO LATERAL 5 TO NSC (INCLUDES NSC)
- PROJECT 5 – NEQ TO NEW PEDRICK RD DITCH TO LATERALS 2 & 3 TO NSC (INCLUDES NSC)

N

WEST YOST & ASSOCIATES

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The assumed 30 cfs discharge is an estimate of the flow currently leaving the NEQ, but this discharge rate has been disputed in the past. In the future, this discharge might not be acceptable to DRCD and RD 2068. If a smaller discharge were allowed, then a larger basin would be required. The 480 ac-ft detention basin was intended as a stand-alone project that could be implemented without constructing downstream conveyance improvements.

Alternative 2 – NEQ Pump Station and Open Channel to Putah Creek

Runoff from the NEQ would be detained in a 280 ac-ft pond (a 48 acre site), and pumped at a rate no greater than 100 cfs from the pond through an open channel (an enclosed pipe could also be used) along the UPRR tracks to Putah Creek (about 21,000 feet). The open channel would have a bottom width of 8 feet, side slopes of 2H:1V, a depth of 6 feet, and a slope of 0.00065. This channel would have a capacity of about 150 cfs, which would accommodate a 100 cfs discharge from the NEQ and 50 cfs of inflow from the fields adjacent to the channel.

It was assumed that gravity flow in the channel from the NEQ to Putah Creek would not be possible and that a pump station would be required. It was assumed that 30 cfs would continue to drain from the NEQ through the culverts under Pedrick and Vaughn Roads to Tremont 3. The total discharge form the NEQ would be 130 cfs. The 30 cfs discharge to Tremont 3 is an estimate of the flows currently leaving the NEQ, but acceptance of this value has been disputed in the past.

Alternative 3 – NEQ to Tremont 3 to Yolo Bypass Toe Drain

Runoff from the NEQ would be detained in a 280 ac-ft pond (a 48 acre site) and discharged at a rate of 135 cfs from the pond through a new channel along Vaughn Road to Tremont 3. Tremont 3 would be enlarged to provide capacity for this additional flow to the point that the drain turns south leaving Hackman Road. From this point, a 2.0-mile segment of new channel along Hackman Road would be constructed to the east to Buckley Road. Starting at Buckley Road, improvements would be made to an existing ditch continuing east for 2.5 miles. This existing ditch discharges into a natural creek on private property. Little is known about the alignment through the private property, but it is assumed that improvements would be required all the way to the Toe Drain of the Yolo Bypass. The existing culverts under Pedrick and Vaughn Roads would be abandoned.

Alternative 4 - NEQ to Tremont 3 to Lateral 5 to NSC

Runoff from the NEQ would be detained in a 280 ac-ft pond (a 48 acre site) and discharged at a rate of 135 cfs from the pond through a new channel along Vaughn Road to Tremont 3. Tremont 3 would be enlarged to provide an additional 105 cfs capacity for this additional flow from Vaughn Road to the point where it crosses Sikes Road. At this point a new channel would be constructed south to Lateral 5. The entire length of Lateral 5 and the V-2 Drain would be enlarged to provide capacity for the increased flow. The V-2 Drain discharges into the DMD at the location of the NSC. The NSC (described above) would be a component of this alternative. The existing culverts under Pedrick and Vaughn Roads would be abandoned.

Alternative 5 – NEQ to New Pedrick Road Ditch to Laterals 2 and 3 to NSC

Runoff from the NEQ would be detained in a 280 ac-ft pond (a 48-acre site) and discharged at a rate of 135 cfs from the pond through a new channel along Pedrick Road to Lateral 2. Improvements would be made along Lateral 2 down to the North Cross Channel, along the North Cross Channel, along Lateral 3 to the DMD, and along the DMD to the NSC. The NSC (described above) would be a component of this project. The existing culverts under Pedrick and Vaughn Roads would be abandoned.

COST ESTIMATES

Capital cost estimates for the NSC and each alternative project are presented in Tables 5-1 through 5-6. These costs are strongly dependent on the unit excavation costs, which are discussed below:

- Excavation cost for detention basins and the NSC (large projects) has been estimated at $3/CY. It was assumed that the detention basins would be excavated with a large scraper and that the excavated material would be placed within about 1,500 feet of the excavation. For the NSC it was assumed that the excavation would be done with a scraper or bulldozer, and that the excavated material would be placed alongside the channel.

- For smaller channel excavation a unit cost of $5/CY was used. It was assumed that this excavation would be done with a backhoe, and that the dirt would be piled next to the channel and compacted into an access road.

Placing excavated material alongside the channel or near the detention basins would require purchase of larger rights-of-way, but would result in a significant overall cost reduction when compared to hauling the excavated material to a disposal site. This also allows the excavated material to be retained and used or sold at a later time.

Operation and maintenance costs for each project are also presented in Tables 5-1 through 5-6. The O&M cost estimates are based on the following unit costs:

- Open Channel O&M Cost – The annual O&M cost estimate used for the NSC is $5,000 per mile, and for all other channels is $3,000 per mile. This cost was developed based on the operational experience of RD 2068, and includes annual routine maintenance and an annualized value for repair of damage caused by large infrequent storm events.

- Detention Basin O&M Cost – The annual unit cost for pond O&M of $800 per acre is based on recent City of Dixon experience.

- Pump Station O&M – This cost includes power costs to operate the pumps (based on the volume of water pumped annually, and a power cost of $0.08/kW-Hr) and maintenance costs estimated to be 50 percent of the annual power cost.

In Tables 5-1 through 5-6 the annual O&M costs have been converted to a present value cost using a discount rate of 3 percent and duration of 25 years. The O&M present value cost is the amount of money that would have to be deposited in a bank account now in order to pay 25 years of annual O&M costs, assuming inflation causes the O&M payments to increase by 3 percent per year and that the bank account pays an interest rate of 6 percent. The present value cost is a single cost number that includes both the capital cost and the other O&M cost, and is used for comparison of the overall long-term cost of the alternatives.

New South Channel

The estimated capital cost for the NSC is about $1.1 million, and annual operation and maintenance cost is estimated to be about $11,500.

Alternative 1 – Detention Basin in NEQ

The estimated cost for a 480 ac-ft linear detention basin is $6.7 million. Critical cost assumptions include:

a. Design as a linear basin (as assumed in the SDR). A square basin with the same volume would reduce the capital cost by about $0.7 million.

b. The basin would be 8 feet deep. A deeper basin costs less than a shallow basin of the same volume; however, depth to groundwater in this area may dictate a shallow basin. If the assumed basin depth changes, the estimated costs would also change.

O&M is estimated to be about $61,000/year.

Table 5-1A. New South Channel Capital Cost Estimate

Item	Unit	Unit Cost	Quantity	Cost
Culverts Under Swan Road (Triple 66”) [(a)]	LF	264	240	63,400
Channel from Swan Road to Abandoned RR Trestle[(b)]	LF	33	2,500	83,300
Channel from RR Trestle to Highline Ditch Access Road	LF	33	3,100	103,200
Culverts Under Highline Ditch Access Road	LF	264	160	42,200
Channel to Private Driveway	LF	33	2,600	86,600
Culverts under Private Driveway	LF	264	160	42,200
Channel to Maine Prairie Road	LF	33	2,100	69,900
Culverts under Main Prairie Road	LF	264	200	52,800
Channel to Hass Slough Access Road	LF	33	1,800	59,900
Culverts Under Hass Slough Access Road	LF	264	200	52,800
Subtotal			13,060	656,000
Contingency @ 20%				131,200
Right of Way (Based on a 200’ width)	AC	3,000	60	180,000
Engineering, Administration, Legal @ 20%				131,200
Total				1,098,000

(a) Culvert unit cost based on $4/LF/in diameter.
(b) Channel unit cost based on 20’ bottom width, 4H:1V side slopes, depth of 6.5’, and excavation cost of $3/CY.

Table 5-1B. New South Channel Estimated Annual O&M Cost

Item	Unit	Unit Cost	Quantity	Cost
South Channel O&M	MILE	5,000	2.3	11,500
Present Value of O&M (based on a 3% discount rate for 25 years)				200,000

Table 5-2A. Capital Cost Estimate for Alternative 1 – Detention Basin in Northeast Quadrant

Item	Unit	Unit Cost	Quantity	Cost
Site Clearing	AC	1,000	76	76,000
Excavation	CY	3	840,000	2,520,000
Road Crossings - 72” RCP Culverts	LF	360	180	64,800
Levee & Maintenance Road	LF	30	15,000	450,000
Riprap Levee Banks	SY	13	53,700	698,100
6’ Chain Link Fence	LF	10	15,000	150,000
Concrete Overflow Weir	LS	10,000	1	10,000
Subtotal				3,969,000
Contingency @ 20%				794,000
Land Acquisition	AC	15,000	76	1,140,000
Engineering, Administration, Legal @ 20%				794,000
Total				6,697,000

Table 5-2B. Annual O&M Cost Estimate for Alternative 1 – Detention Basin in Northeast Quadrant

Item	Unit	Unit Cost	Quantity	Cost
Detention Pond O&M	ACRE	800	76	60,800
Present Value of O&M (based on a 3% discount rate for 25 years)				1,058,000

Table 5-3A. Capital Cost Estimate for Alternative 2 – NEQ Pump Station and Open Channel to Putah Creek

Item	Unit	Unit Cost	Quantity	Cost
Detention Pond				
Site Clearing	AC	1,000	48	48,000
Excavation	CY	3	484,000	1,452,000
Road Crossings - 72” RCP Culverts	LF	360	180	64,800
Levee & Maintenance Road	LF	30	14,700	441,000
Riprap Levee Banks	SY	13	51,700	672,100
6’ Chain Link Fence	LF	10	14,700	147,000
Concrete Overflow Weir	LS	10,000	1	10,000
Subtotal				2,835,000
Pump Station and Outfall				
Pump Station	CFS	8,000	100	800,000
Open Channel (b=8, 2H:1V, d=6, Q=150)	LF	22	21,000	462,000
Road Crossings - Twin 60” RCP Culverts	LF	480	400	192,000
Outlet Structure	LS	20,000	1	20,000
Field Drains	EA	1,000	20	20,000
Gravel Access Road	LF	30	42,000	1,260,000
Subtotal				2,754,000
Detention Pond, Pump Station, Outfall Total				5,589,000
Contingency @ 20%				1,117,800
Land Acquisition for Pond	AC	15,000	48	720,000
Land Acquisition for Outfall	AC	15,000	48	720,000
Engineering, Administration, Legal @ 20%				1,117,800
Total				9,265,000

Table 5-3B. Annual O&M Cost Estimate for Alternative 2 – NEQ Pump Station and Open Channel to Putah Creek

Item	Unit	Unit Cost	Quantity	Cost
Small Channel O&M	MILE	3,000	4	11,900
Detention Pond O&M	ACRE	800	48	38,400
Total Annual O&M Cost				50,300
Present Value of O&M (based on a 3% discount rate for 25 years)				875,220

Table 5-4A. Capital Cost Estimate for Alternative 3 – NEQ to Tremont 3 to Yolo Bypass Toe Drain

Item	Unit	Unit Cost	Quantity	Cost
Detention Pond				
Site Clearing	AC	1,000	48	48,000
Excavation	CY	3	484,000	1,452,000
Road Crossings - 72” RCP Culverts	LF	360	180	64,800
Levee & Maintenance Road	LF	30	14,700	441,000
Riprap Levee Banks	SY	13	51,700	672,100
6’ Chain Link Fence	LF	10	14,700	147,000
Concrete Overflow Weir	LS	10,000	1	10,000
Subtotal				2,835,000
Outfall				
New Channel from NEQ to Tremont 3	LF	22	8,000	176,000
Bore and Jack twin 60” RCP Culvert Under Railroad	LF	100	1,000	100,000
Culverts for new channel from NEQ to Tremont 3	EA	10,000	8	80,000
Enlarge Tremont 3 (b=18, 2H:1V, d=70)	LF	15	10,600	159,000
Culverts along Tremont 3	EA	10,000	4	40,000
New Channel from Tremont 3 to Buckley Road	LF	22	10,600	233,200
Culverts for new Channel from Tremont 3 to Buckley Road	EA	10,000	8	80,000
Enlarge Existing Ditch Along Hackman Road	LF	15	13,300	199,500
Culverts along Hackman Road	EA	10,000	12	120,000
Conveyance Through Private Property to Toe Drain	MILE	100,000	5	500,000
Field Drains	EA	1,000	40	40,000
Subtotal				1,728,000
Detention Pond and Outfall Total				4,563,000
Contingency @ 20%				912,600
Land Acquisition for Pond	AC	15,000	48	720,000
Land Acquisition for Outfall	AC	8,000	50	400,000
Engineering, Administration, Legal @ 20%				912,600
Total				7,508,000

Table 5-4B. Annual O&M Cost Estimate for Alternative 3 – NEQ to Tremont 3 to Yolo Bypass Toe Drain

Item	Unit	Unit Cost	Quantity	Cost
Small Channel O&M	MILE	3,000	13	39,100
Detention Pond O&M	ACRE	800	48	38,400
Total Annual O&M Cost				77,500
Present Value of O&M (based on a 3% discount rate for 50 years)				1,349,000

Table 5-5A. Capital Cost Estimate for Alternative 4 – NEQ to Tremont 3 to Lateral 5 to NSC

Item	Unit	Unit Cost	Quantity	Cost
Detention Pond				
Site Clearing	AC	1,000	48	48,000
Excavation	CY	3	484,000	1,452,000
Road Crossings - 72” RCP Culverts	LF	360	180	64,800
Levee & Maintenance Road	LF	30	14,700	441,000
Riprap Levee Banks	SY	13	51,700	672,100
6’ Chain Link Fence	LF	10	14,700	147,000
Concrete Overflow Weir	LS	10,000	1	10,000
Subtotal				2,835,000
Outfall				
New Channel from NEQ to Tremont 3	LF	22	8,000	176,000
Bore and Jack twin 60” RCP Culvert Under Railroad	LF	1,000	100	100,000
Culverts for new channel from NEQ to Tremont 3	EA	10,000	8	80,000
Enlarge Tremont 3 to New Det Basin (b=18, 2H:1V, d=70)	LF	15	21,100	316,500
Culverts along Tremont 3 to New Det Basin	EA	10,000	6	60,000
New Channel from Tremont 3 to Lateral 5	LF	22	5,300	116,600
Culverts for new Channel from Tremont 3 to Lateral 5	EA	10,000	2	20,000
Enlarge Lateral 5	LF	15	24,000	360,000
Culverts along Lateral 5	EA	10,000	8	80,000
Field Drains	EA	1,000	40	40,000
Subtotal				1,349,000
Detention Pond and Outfall Total				4,184,000
Contingency @ 20%				836,800
Land Acquisition for NEQ Pond	AC	15,000	48	720,000
Land Acquisition for Outfall	AC	8,000	32	256,000
Engineering, Administration, Legal @ 20%				836,800
Sub total (without New South Channel)				6,834,000
New South Channel (Lump sum from Table 5-1A)				1,098,000
Total				7,932,000

Table 5-5B. Annual O&M Cost Estimate for Alternative 4 – NEQ to Tremont 3 to Lateral 5 to NSC

Item	Unit	Unit Cost	Quantity	Cost
New South Channel	MILE	5,000	2	11,500
Small Channel O&M	MILE	3,000	11	33,200
Detention Pond O&M	ACRE	800	48	38,400
Total Annual O&M Cost				83,100
Present Value of O&M (based on a 3% discount rate for 25 years)				1,4487,000

Table 5-6A. Capital Cost Estimate for Alternative 5 – NEQ to New Pedrick Road Ditch to Laterals 2 and 3 to NSC

Item	Unit	Unit Cost	Quantity	Cost
Detention Pond				
Site Clearing	AC	1,000	48	48,000
Excavation	CY	3	484,000	1,452,000
Road Crossings - 72” RCP Culverts	LF	360	180	64,800
Levee & Maintenance Road	LF	30	14,700	441,000
Riprap Levee Banks	SY	13	51,700	672,100
6’ Chain Link Fence	LF	10	14,700	147,000
Concrete Overflow Weir	LS	10,000	1	10,000
Subtotal				2,835,000
Outfall				
Bore and Jack twin 60” RCP Culvert Under Railroad	LF	1,000	100	100,000
New Channel Along Pedrick Road	LF	22	20,300	446,600
Culverts for New Channel Along Pedrick Road	EA	10,000	16	160,000
Enlarge Lateral 2	LF	15	2,600	39,000
Culverts along Lateral 2	EA	10,000	1	10,000
Enlarge North Cross Channel	LF	22	9,500	209,000
Culverts along North Cross Channel	EA	10,000	3	30,000
Enlarge Lateral 3	LF	15	15,800	237,000
Culverts along Lateral 3	EA	10,000	8	80,000
Enlarge Dixon Main Drain	LF	15	12,100	181,500
Culverts Along Dixon Main Drain	EA	10,000	1	10,000
Field Drains	EA	1,000	50	50,000
Subtotal				1,553,000
Detention Pond and Outfall Total				4,388,000
Contingency @ 20%				877,600
Land Acquisition for NEQ Pond	AC	15,000	48	720,000
Land Acquisition for Outfall	AC	8,000	65	520,000
Engineering, Administration, Legal @ 20%				877,600
Sub total (without New South Channel)				7,383,000
New South Channel (Lump sum from Table 5-1A)				1,098,000
Total				8,481,000

Table 5-6B. Annual O&M Cost Estimate for Alternative 5 – NEQ to New Pedrick Road Ditch to Laterals 2 and 3 to NSC

Item	Unit	Unit Cost	Quantity	Cost
New South Channel	MILE	5,000	2	11,500
Small Channel O&M	MILE	3,000	11	34,300
Detention Pond O&M	ACRE	800	48	38,400
Total Annual O&M Cost				72,700
Present Value of O&M (based on a 3% discount rate for 25 years)				1,265,000

Alternative 2 – NEQ Drainage to Putah Creek

The estimated cost for this project is $9.3 million. Critical cost assumptions include:

a. Design as a linear basin. A square basin with the same volume would reduce the capital cost by about $0.7 million.

b. The basin would be 8 feet deep (48 acre site with 280 af ft storage). A deeper basin costs less than a shallow basin of the same volume, however, depth to groundwater in this area may dictate a shallow basin. If the assumed basin depth changes, the estimated costs would also change.

c. It was assumed, that gravity flow from the NEQ to Putah Creek would not be possible and that a pump station would be required. If gravity flow were possible, the cost for this project would decrease by about $1.1 million.

d. Because this alignment does not follow an existing road, it was assumed that a gravel maintenance road would be required along both sides of the channel. If wet weather access to the channel were not required, the cost for this project would decrease by about $1.8 million.

e. The conveyance facility from the detention pond to Putah Creek would be an open channel with a bottom width of 8 feet, 2H:1V side slopes, 6 feet deep, and a slope of 0.00065. This channel would have a capacity of about 150 cfs, which would allow for the 100 cfs discharge from the NEQ and 50 cfs of inflow from the adjacent fields. If this open channel were replaced with a 60-inch diameter pipeline, the cost would increase by about $2.3 million, and no field drainage would be accommodated along the alignment.

f. The conveyance facility from the detention pond to Putah Creek was sized as an open channel with a bottom width of 8 feet, 2H:1V side slopes. If this small channel was enlarged to a bottom width of 200 feet, it could serve as both a conveyance channel and a detention pond, which could reduce the cost of this option by as much as $2 million.

Annual O&M cost is estimated to be about $50,000.

Alternative 3 – NEQ to Tremont 3 to Yolo Bypass Toe Drain

The cost estimate for this project is $7.5 million. This project crosses about 5 miles of private property about which little is known. It was assumed that the conveyance through this private property (either physical improvements or purchase of a flowage easement) would be achieved for $100,000 per mile. Annual O&M cost would be about $78,000. Cost assumptions A and B from Alternative 2 apply here also.

Alternative 4 – NEQ to Tremont 3 to Lateral 5 to NSC

The capital cost estimate for this project was $7.9 million, and includes $1.1 million for the NSC. Annual O&M would be about $83,000. Cost assumptions A and B from Alternative 2 apply here also.

Alternative 5 – NEQ to New Pedrick Road Ditch to Laterals 2 and 3 to NSC

The capital cost estimate for this project was $8.5 million, and includes $1.1 million for the NSC. Annual O&M cost would be about $73,000. Cost assumptions A and B from Alternative 2 apply here also.

ALTERNATIVE COMPARISON

The drainage alternatives are compared in Table 5-7 and discussed below.

Costs

Costs are summarized in Table 5-7.

Alternative 1 has the lowest capital and present value costs, but it has the highest cost per acre of improved flooding.

Alternative 2 is based on the assumption of a 30 cfs discharge from the NEQ to Tremont 3. The 30 cfs discharge is an estimate of the flow currently leaving the NEQ, but continued acceptance of this flow has been disputed in the past. If a smaller discharge were required, the cost for this project would increase. For example, if the required discharge was 10 cfs, the detention storage would increase from about 480 ac-ft to about 640 ac-ft, and the estimated capital cost would increase to about $8 million.

Alternative 4 provides improved drainage for the largest flooding area, and has the lowest cost per acre of improved flooding.

Environmental Concerns

The primary environmental concerns for these alternatives appear to be:

- Alternatives 4 and 5 include construction of an outlet into Hass Slough (the New South Channel), which may require significant environmental mitigation.
- Alternatives 1 and 2 do not improve the downstream flooding of agricultural areas.
- Alternative 2 includes constructing an outlet and discharging to Putah Creek, which may require significant environmental mitigation.

- Alternative 3 assumes runoff can be conveyed through the private property east of Solano County. This could be a significant concern since much of this alignment may be a natural channel.

- Water quality impacts could be a concern for all alternatives.

- All of the alternatives include detention basins, which provide a mitigation site for development within the city and present dual use opportunities.

Right-of-Way/Land Acquisition

The required right-of-way and detention pond acreage is presented in Table 5-7. All the alternatives except Alternative 1 include long reaches of new or enlarged channel. These long reaches of channel require purchase of right-of-way from multiple landowners. Problems with acquisition of right-of-way from any of the landowners could result in significant delay or threaten the feasibility of the project. The costs for right-of-way purchase are included in the overall costs for each project.

Coordination with Basin/Pond C

As described in Chapter 4, the current discharge from the City Basin C to the DRCD Lateral 2 exceeds the agreed upon rate of 77.5 cfs. Compliance with this discharge rate could be achieved by construction of a detention basin (Pond C). An alternative to constructing Pond C is to construct improvements to the downstream conveyance facilities and increase the allowable discharge rates from the City up to 230 cfs.

If the discharge from Basin C can be increased, the funding designated for construction of Pond C could be used for improvements to Laterals 2 and 3, the DMD, or even for the NSC. If the Basin C discharge limit is increased, the NSC should be designed to accommodate increased flow from Laterals 2 and 3. Consequently, resolution of the fate of Pond C is required before planning for the NSC (Alternatives 4 and 5) can be completed. Additionally, for Alternative 5, resolution of this issue is required before planning of the improvements in Laterals 2 and 3 and the DMD.

Alternatives 1, 2 and 3 are independent of the consideration of Basin C.

Coordination with Milk Farm Project

A project is currently being planned for the Milk Farm area (just across I-80 from the NEQ). One of the problems preventing this project from proceeding is a lack of adequate drainage. The current plan for the Milk Farm is to provide on-site detention. Drainage for the Milk Farm Project could be provided by Alternatives 1 through 5. If the Milk Farm plan was revised to include less detention and increased discharge, the estimated costs for Alternatives 1 through 5 would increase somewhat to account for the additional flow from the Milk Farm. All alternatives must accommodate the runoff from the 2,700 acres north of Interstate 80, including the Milk Farm.

Table 5-7. Comparison of Alternatives

Evaluation Criteria	Alternative 1 Detention Basin in NEQ	Alternative 2 NEQ to Putah Creek	Alternative 3 NEQ to Tremont 3 to Yolo Bypass Toe Drain	Alternative 4 NEQ to Tremont 3 to Lateral 5 through New South Channel	Alternative 5 NEQ to New Pedrick Rd Ditch to Laterals 2 & 3 through New South Channel
Capital Cost Estimate ($ million)	6.7	9.3	7.5	7.9 (Includes NSC)	8.5 (Includes NSC)
Annual O&M Cost Estimate ($/yr)	61,000	50,000	78,000	83,000	73,000
Present Value Cost Estimate ($ million)	7.8	10.1	8.9	9.4	9.8
Agricultural Area Provided with Improved Drainage (flooded acres) (See Figure 1 for Delineation of Benefit Areas)	250	530	972	3,967	2,730
Present Value Cost per Improved Acre ($/acre)	28,500	19,100	9,100	2,400	3,600
Environmental Concerns	• Continued flooding of downstream agricultural areas • Discharge water quality	• Outlet to Putah Creek • Continued flooding of downstream agricultural areas • Discharge water quality	• Crossing of private property and conveyance through a natural stream • Discharge water quality	• Outlet into Hass Slough • Discharge water quality	• Outlet into Hass Slough • Discharge water quality
Right-of-Way/Land Acquisition Acreage	• 76 acres for detention pond	• 48 acres for NEQ pond • 28 acres for channel • 22 acres for dirt storage	• 48 acres for NEQ pond • 28 acres for channel • 22 acres for dirt storage	• 48 acres for NEQ pond • 27 acres for channel • 23 acres for dirt storage • 60 acres for South Channel	• 48 acres for NEQ pond • 36 acres for channel • 29 acres for dirt storage • 60 acres for South Channel
Potential Problems		Conflicts with underground utilities along tracks	Conveyance through private property	Natural gas pipelines along channel alignment	Natural gas pipelines along channel alignment
Coordination with Basin/Pond C	Independent of Basin C	Independent of Basin C	Independent of Basin C	New South Channel sizing dependent on Basin C/Lateral 2 & 3 Improvements	New South Channel and Lateral 2/3 sizing dependent on Basin C Improvements
Provide Drainage for the Milk Farm Area	Yes	Yes	Yes	Yes	Yes
Potential for receiving grant funding	Moderate Potential for NEQ Pond	Moderate Potential for NEQ Pond	Moderate Potential for NEQ Pond	• Moderate potential for NEQ pond • High Potential for South Channel	• Moderate potential for NEQ pond • High Potential for South Channel
Dual Use Potential	• Wetland/Upland habitat • Water quality enhancement • Ball fields	• Wetland/Upland habitat • Water quality enhancement • Ball fields	• Wetland/Upland habitat • Water quality enhancement • Ball fields	• Wetland/Upland habitat • Water quality enhancement • Ball fields	• Wetland/Upland habitat • Water quality enhancement • Ball fields

Potential for Receiving Grant Funding

A listing of potential grant funding sources for a drainage project for the NEQ was prepared for the Solano County Department of Environmental Management. The Solano County Department of Environmental Management work was funded by a grant from the U.S. Department of Commerce, Economic Development Administration. A copy of this TM is included in Appendix B. The potential exists to secure additional grant funding from the Department of Commerce for design or construction of facilities serving the NEQ (Alternatives 1 through 5).

Table 5-8. Potential Permits and Authorizations

Agency/Permit	Applicability	Requirements for Application
U.S. Army Corps of Engineers Section 404 Nationwide and Section 10 Individual Permits	Required when working in natural streams and rivers. Required for Alternatives: NSC 1, 2, 3, 4, and 5	Site Plan and Section Drawings Location Map CVRWQCB Sect. 401 Water Quality Certification (may be done concurrently) COE Application 4345 Environmental Documentation
Central Valley Regional Water Quality Control Board Section 401 Water Quality Certification	Required when working in natural streams and rivers if the construction area is less than 5 acres. Required for Alternatives: NSC 2, 3, 4, and 5	CEQA Certification Application Form and Fee Section 1600 Stream Alteration Agreement or note contact with CDFG Copy of COE Application 4345
Central Valley Regional Water Quality Control Board NPDES Discharge Permit	Required if construction area is greater than 5 acres. Required for Alternatives: NSC 1, 2, 3, 4, and 5	NPDES Application and Fee
California Department of Fish and Game Section 1600 Stream Alteration Permit	Required when natural streambed is to be altered by construction. Required for Alternatives: NSC 2, 3, 4, and 5	Environmental Documentation Application Form and Fee Project Location Map Site Plan
California State Reclamation Board Encroachment Permit	Required when construction alters levees. Required for Alternatives: 2 and 3	Permit Application Form Completed Questionnaire 4 copies of the Site Plan, Section Drawings, and Location Map 2 Photos of the Project Site Environmental Documentation
State Historic Preservation Officer and National Historic Preservation Section 106 Coordination	Required for construction. Required for Alternatives: NSC 1, 2, 3, 4, and 5	Archaeological Inventory Survey and Report
California Endangered Species Act (CESA) Consultation	Required for construction. Required for Alternatives: NSC 1, 2, 3, 4, and 5	State lead agency designated Threatened and endangered biological review
Endangered Species Act (ESA) Compliance	Required for construction. Required for Alternatives: NSC 1, 2, 3, 4, and 5	Federal lead agency designated Site Visit Threatened and endangered biological review

There are several potential sources for funding of constructed wetlands projects. The NSC could potentially include a significant area of constructed wetlands, while still serving as a conveyance channel. Similarly, the detention basins could also include constructed wetlands. A large channel (200 feet wide, see cost assumptions above) from the NEQ to Putah Creek could also be configured to include wetlands.

Permitting

A number of permits could be required as shown in Table 5-8. The permitting for most alternatives is comparable, except for Alternative 4. Because Alternative 4 may include enlarging a natural stream channel, permitting for this project could be more difficult and time consuming.

CONCLUSIONS

The following conclusions were reached as a result of this evaluation of the alternatives to provide a drainage outfall for the NEQ:

- Alternative 2 includes the shortest outfall length, and consequently may be the simplest to implement. Alternative 2 includes several assumptions that significantly impact the project cost (such as the requirement of a pump station). If these assumptions do not apply, the capital cost could be reduced by as much as $4 million, which would result in this project having the lowest capital cost.

- Alternatives 4 and 5 provide significant regional flood control benefit. Alternative 4 serves a larger agricultural area than Alternative 5 and is less expensive. Consequently, Alternative 4 was selected for evaluation in greater detail (see Chapter 6).

CHAPTER 6. EASTSIDE DRAINAGE PROJECT

The NEQ is planned for development at some time in the future. Before significant development can proceed, an adequate drainage outfall must be planned and constructed to handle runoff from the NEQ and the 2,700 acres of agricultural land north of Interstate 80 that drains through the NEQ. The Eastside Drainage Project (EDP) is intended to provide that outfall. In Chapter 5 several potential outfall alternatives were evaluated and compared. Alternative 4 was preferred because it provided the greatest agricultural flood control benefit. Alternative 4, as defined in Chapter 5, is described below:

> Alternative 4 – The existing culverts draining the NEQ under Pedrick and Vaughn Roads would be removed. Runoff from the NEQ would be detained in a 280 ac-ft pond (48-acre site) and discharged at a rate of 135 cfs through a new channel along Vaughn Road to Tremont 3. Tremont 3 would be enlarged to provide an additional 105 cfs capacity from Vaughn Road to the point where it crosses Sikes Road. At this point a new channel would be constructed running south to Lateral 5. The entire length of Lateral 5 and the V-2 Drain would be enlarged to provide capacity for the increased flow. The V-2 Drain discharges into the DMD at the location of the NSC. From this point, the NSC would run south to Hass Slough.

Alternative 4 was hydrologically and hydraulically evaluated with the XP-SWMM computer model. However, during calibration of the model it was determined that lower infiltration rates were appropriate, (see Page 1-15) which resulted in a required detention volume of 380 ac-ft (rather than 280 ac-ft). In the computer model, the additional 105 cfs of channel capacity was added by widening the channel bottom by 9 feet. The additional culvert capacity was provided by adding a 60-inch RCP at each existing culvert crossing. The NSC was included with a bottom width of 12 feet, a depth of 6 feet, and 2H:1V side slopes, for a capacity of 241 cfs (105 cfs allocated the EDP, and 136 cfs allocated to Basins B/C).

Through this evaluation, it was determined that adding the same increment of capacity (105 cfs) throughout the project alignment results in worsened flooding in the downstream areas (primarily in RD 2068). The increased conveyance capacity conveys the planned 105 cfs, but also allows more agricultural runoff from the upstream areas to enter the channel system. This additional agricultural runoff accumulates in the lower reaches of the system, resulting in worsened flooding. Consequently Alternative 4, as defined above, was considered unacceptable. It was determined that sizing of system conveyance capacity must increase moving downstream. Alternative 4 was refined (to accommodate the unplanned flow) into the two EDP alternatives described and evaluated below.

The detention basin in the NEQ (described in Chapter 5 as Alternative 1) had a volume of 480 ac-ft with a 30 cfs discharge rate. During calibration of the system model, it was determined that infiltration rates lower than had previously been used were more appropriate (see Page 1-17). The lower infiltration rates resulted in resizing this detention basin to about 1,200 ac-ft. The larger detention basin greatly increased the cost of this alternative, and it was excluded from further consideration.

FINAL EASTSIDE DRAINAGE PROJECT OPTION DESCRIPTIONS

Presented in Figure 6-1 is a comparison of estimated costs of detention and downstream conveyance versus discharge rate from the NEQ. As shown in the figure, if no discharge was allowed, a very large detention basin would be needed, costing about $14 million. If a discharge rate of 30 cfs was allowed (the estimated current discharge rate) with no downstream improvements, a large detention basin would be needed (about 1,200 ac-ft) and would cost about $10 million. The lowest cost option appears to be a 250 cfs discharge, along with channel/culvert capacity improvements of 250 cfs, and a moderate sized detention basin (70 ac-ft of storage covering a 10-acre). If no detention basin was required, downstream capacity improvements of 600 cfs would be required at a cost of about $7 million. This 600 cfs discharge rate option would provide the greatest flood control benefit to the downstream agricultural areas. Consequently, the two options evaluated in detail are the EDP - 250 cfs discharge option and the EDP - 600 cfs discharge option.

EDP - 250 cfs Option

This project is shown on Figure 6-2, and includes:

- A 70 ac-ft detention basin (covering 10 acres) located in or near the Northeast Quadrant, which detains flows greater than 250 cfs.

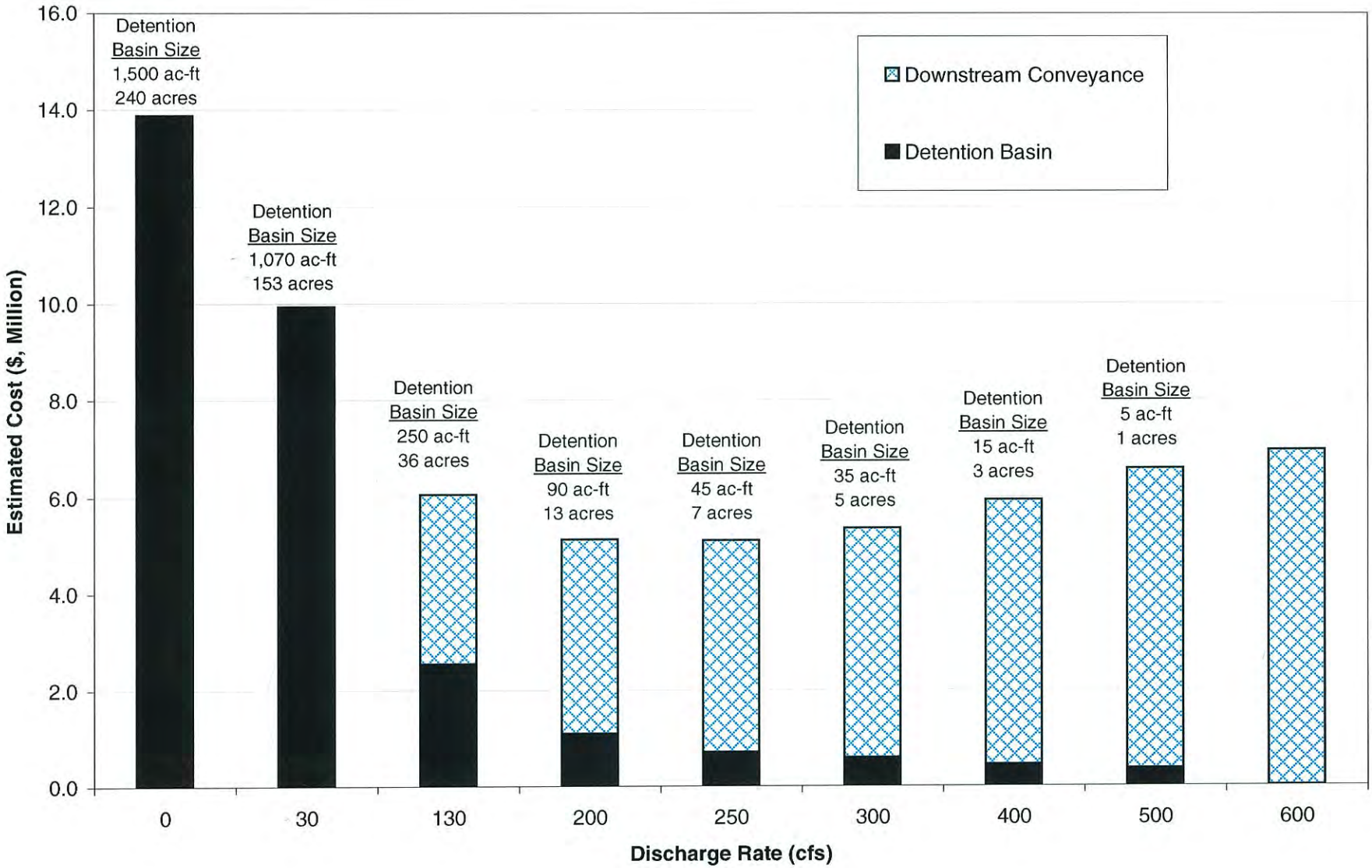
- Channel improvements that start out as a new channel with a bottom width of 12 feet along Vaughn Road. The channel size increases moving downstream. Just above the Tremont 3 culverts under Sikes Road, the channel is 32 feet wide. Just above the Dixon Main Drain, the channel width is 45 feet. These channels were sized with two horizontal to one vertical side slopes; however, to facilitate maintenance, the channels could be reconfigured to four horizontal to one vertical side slopes, and narrower bottom widths.

- The New South Channel, constructed as a wetlands habitat channel, with bottom width of 75 feet, a depth of 7 feet, and 4H:1V side slopes.

- Twin 60-inch RCP culverts (or an equivalent box culvert) along Vaughn Road and downstream to Sikes Road. Along Sikes Road (all the way to the Dixon Main Drain) the culverts would be triple 60-inch RCPs (or equivalent). Along the New South Channel, the culverts would be 5 parallel 60-inch RCPs (or equivalent). To help reduce overall project costs, where there are existing culverts with diameters of 48-inches or larger, they would be retained (substituting for one of the 60-inch RCPs). These culverts (and channels) have been sized to increase the overall coapacity of the drainage system without inundating the downstream areas.

- At the Tremont 3 crossing under Sikes Road, a control structure will direct winter time runoff down the new channel. When flow in the new channel approaches the new channel capacity, flow will then also drain into Tremont 3. This structure will be reconfigured in the summer time to direct irrigation flow into Tremont 3 rather than into the new channel.

Figure 6-1. Detention and Conveyance Cost Minimization for the Northeast Quadrant



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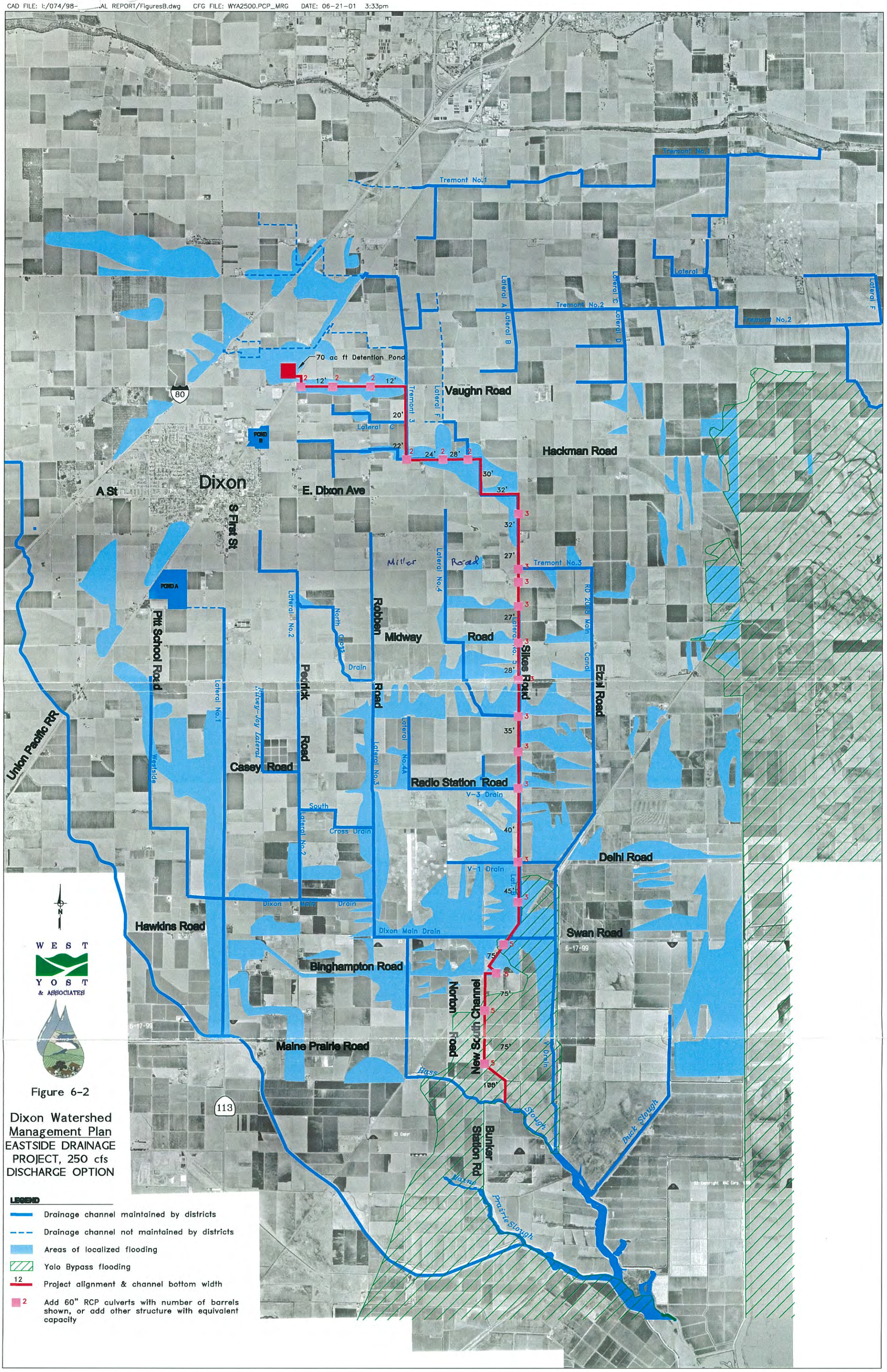


Figure 6-2

Dixon Watershed Management Plan
EASTSIDE DRAINAGE PROJECT, 250 cfs DISCHARGE OPTION

As shown on Figure 6-3, when the discharge from the Northeast Quadrant is below the allowed peak of 250 cfs, the unused capacity would be available to drain agricultural lands. The benefit to the agricultural community from this project thus occurs through the use of this available conveyance capacity.

Eastside Drainage Project – 600 cfs Option

This project is shown on Figure 6-4, and includes:

- No detention basin in the Northeast Quadrant.

- Channel improvements that start out as a new channel with a bottom width of 40 feet along Vaughn Road. The channel size increases moving downstream. Just above the Tremont 3 culverts under Sikes Road, the channel is 63 feet wide. Just above the Dixon Main Drain, the channel width is 75 feet. These channels were sized with two horizontal to one vertical side slopes; however, to facilitate maintenance, the channels could be reconfigured to four horizontal to one vertical side slopes, and narrower bottom widths.

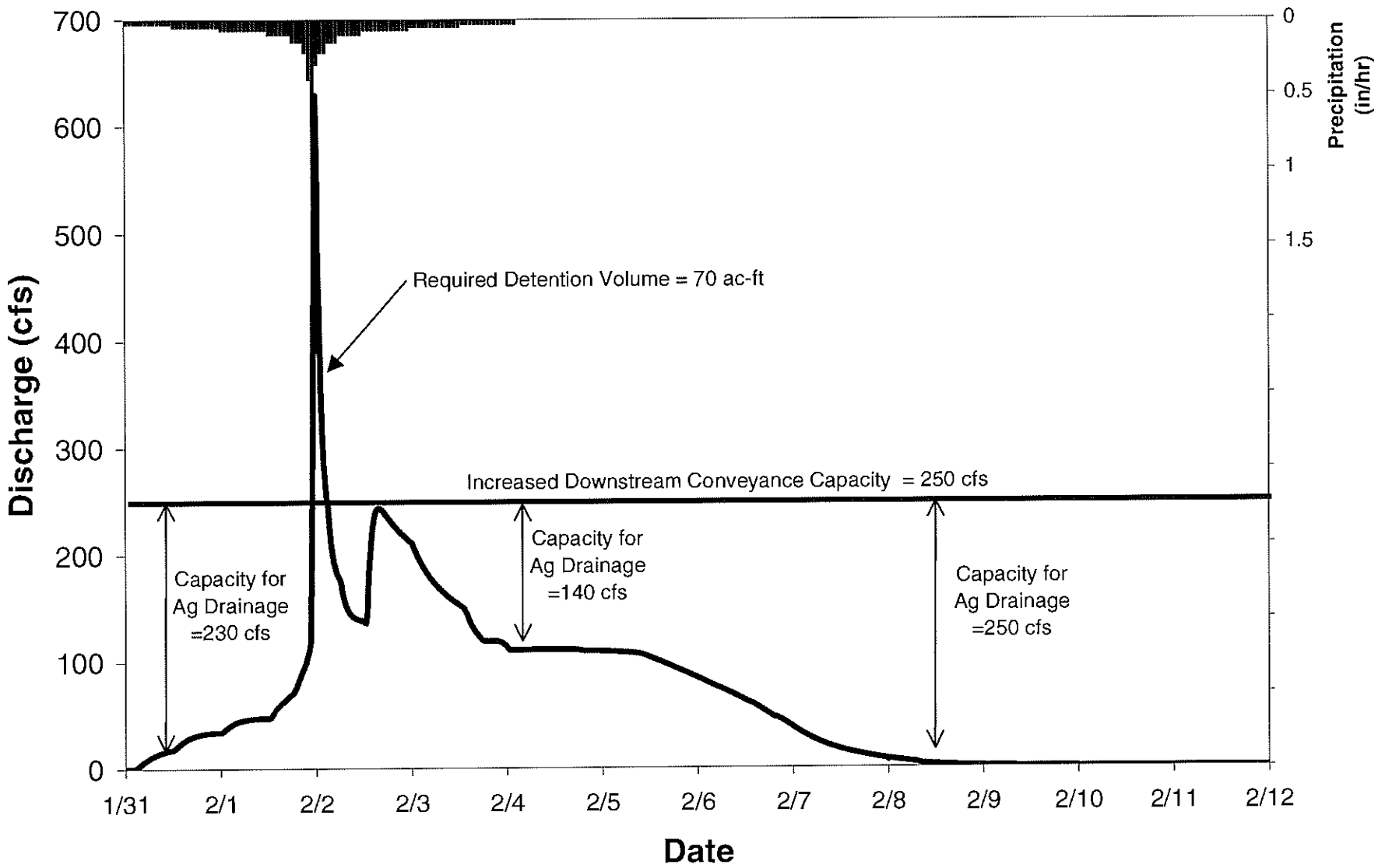
- The New South Channel constructed as a wetlands habitat channel, with a bottom width of 100 feet, a depth of 7 feet, and 4H:1V side slopes.

- At the Tremont 3 crossing under Sikes Road, a control structure will direct wintertime runoff down the new channel. When flow in the new channel approaches the new channel capacity, flow will then also drain into Tremont 3. This structure will be reconfigured in the summertime to direct irrigation flow into Tremont 3 rather than into the new channel.

- Triple 60-inch RCP culvert (or an equivalent box culvert) along Vaughn Road. Along Hackman Road and downstream to Radio Station Road the culverts would be four parallel 60-inch RCPs (or equivalent). At Radio Station Road and downstream to the Dixon Main Drain, the culverts would be 5 parallel 60-inch RCPs (or equivalent). Along the New South Channel, the culverts would be 6 parallel 60-inch RCPs (or equivalent). To help reduce overall project costs, where there are existing culverts with diameters of 48-inches or larger, they would be retained (substituting for one of the 60-inch RCPs). These culverts and channels have been sized to increase the overall capacity of the drainage system without inundating the downstream areas.

As shown on Figure 6-5, when the discharge from the NEQ is below the allowed peak of 600 cfs, the unused capacity would be available to drain agricultural lands. This available conveyance capacity will greatly reduce downstream flooding. In Figure 6-5 the peak discharge is about 630 cfs, which represents a totally free discharge from the NEQ. Storage in the channel within the NEQ, and backwater from the downstream channel actually reduce the peak discharge to about 600 cfs.

Figure 6-3. Agricultural Benefit from the 250 cfs Discharge Option



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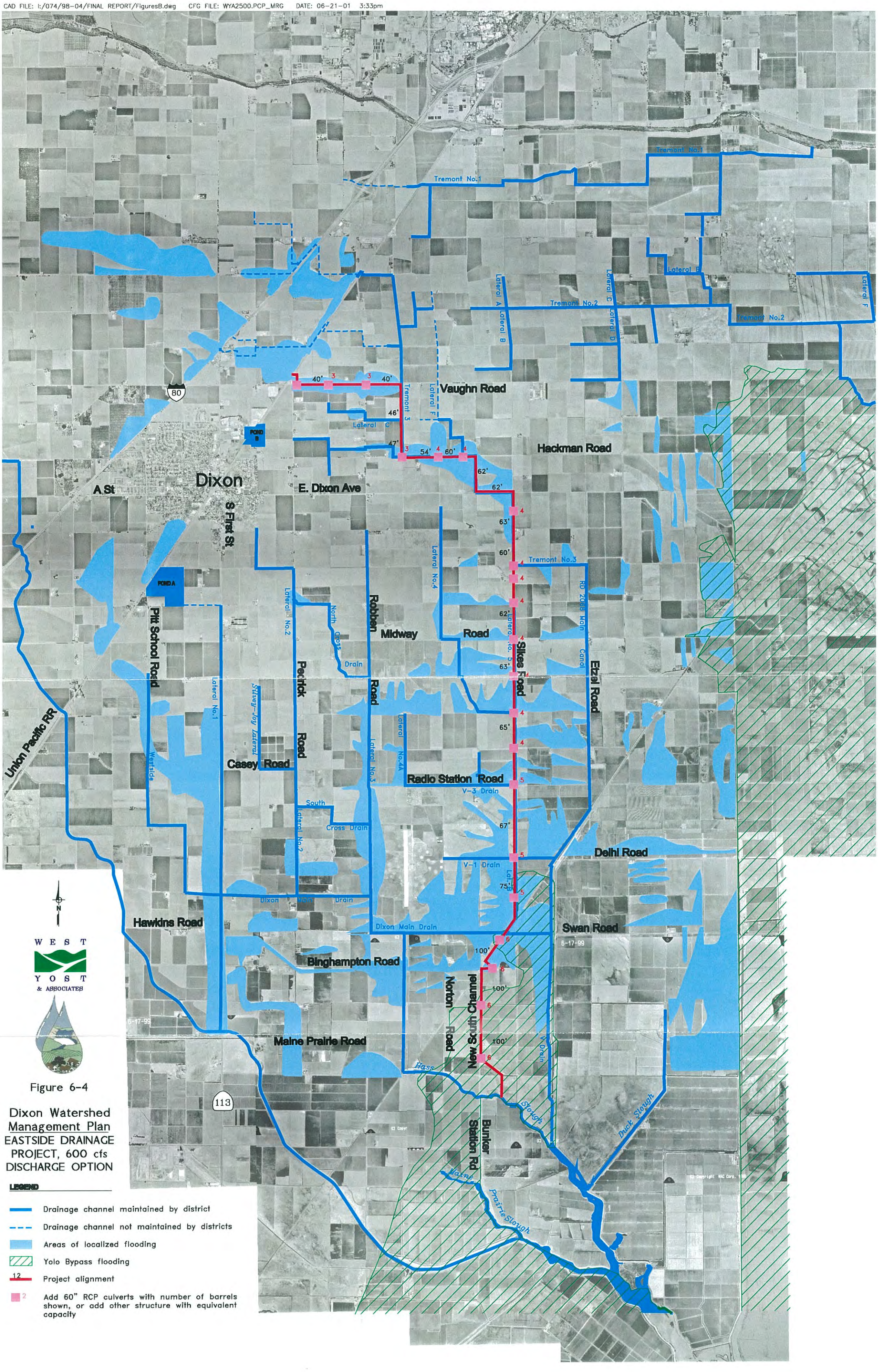

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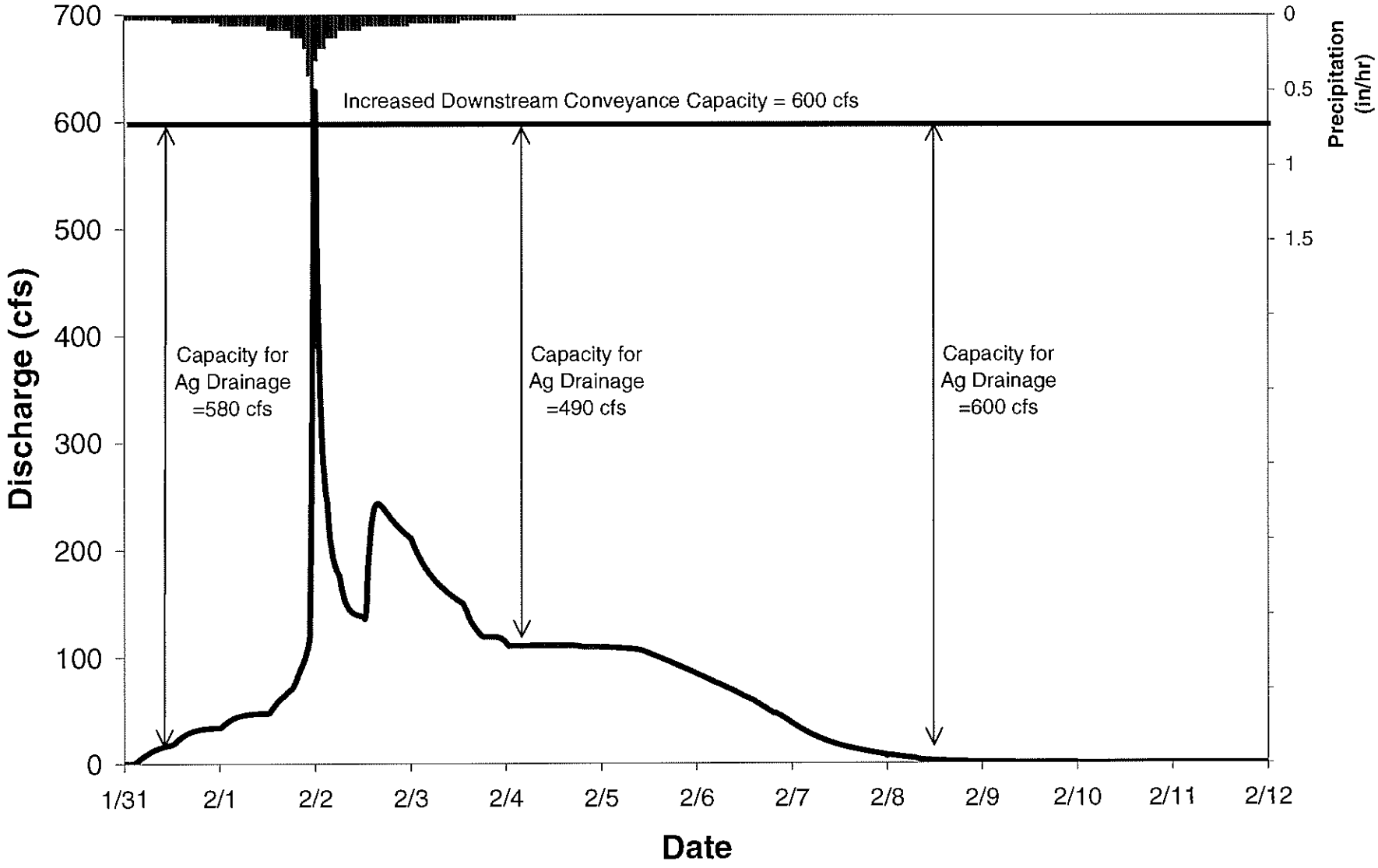
Figure 6-4

Dixon Watershed Management Plan
EASTSIDE DRAINAGE PROJECT, 600 cfs DISCHARGE OPTION

LEGEND

- Drainage channel maintained by district
- Drainage channel not maintained by districts
- Areas of localized flooding
- Yolo Bypass flooding
- 12 Project alignment
- 2 Add 60" RCP culverts with number of barrels shown, or add other structure with equivalent capacity

Figure 6-5. Agricultural Benefit from the 600 cfs Discharge Option



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MODEL RESULTS

The two EDP options and a base case representing existing conditions were evaluated using the 100-year, 4-day design storm with the XP-SWMM model. The locations of the reported model results discussed below are shown on Figure 6-6, and the results are shown on Figures 6-7 through 6-15.

Shown in Figure 6-7 are discharge hydrographs from the NEQ for the base case, the 250 cfs option, and the 600 cfs option. There is a culvert under the Union Pacific Railroad Tracks near Vaughn Road that has been open sometimes and plugged sometimes. The flooding along Vaughn Road occurs when this culvert is open, so modeling the base case, it was assumed that this culvert was open. There is a culvert under Pedrick Road north of the railroad tracks. In the base case there is about 105 cfs of flow through this culvert and over Pedrick Road. In the 250 cfs and 600 cfs options, the culvert was removed in the model. The improvement projects eliminated the flooding over Pedrick Road.

Stagegraphs for the new channel along the south side of Vaughn Road at Robben Road are presented in Figure 6-8. As shown, both of these options would eliminate flooding of the fields along Vaughn Road.

Stagegraphs for the enlarged Tremont 3 at the upstream side of the Hackman Road crossing are presented in Figure 6-9. The 250 cfs option would result in about the same peak water level as the base case, but the duration of the field flooding would be reduced by about 3 days. The 600 cfs option would eliminate the flooding over Hackman Road and reduce the duration of field flooding by about 5 days.

Presented in Figure 6-10 are stagegraphs for Tremont 3 at the Sikes Road crossing. As shown, both improvement options would eliminate flooding over Sikes Road and significantly reduce the duration of field flooding.

Both the improvement options include a segment of new channel from Tremont 3 at the Sikes Road crossing to Lateral 5 south of Midway Road. Shown in Figure 6-11 are stagegraphs for the new channel at the Upstream side of the Midway Road culverts. The 250 cfs option would not eliminate flooding of Midway Road, but would reduce the duration of field flooding by about 5 days. The 600 cfs option would eliminate flooding of Midway Road and reduce the field flooding by about 7 days.

Stagegraphs at Radio Station Road are presented in Figure 6-12. The 250 cfs option would eliminate flooding of Sikes Road, would not eliminate flooding of Radio Station Road, and would reduce the duration of field flooding by about 7 days. The 600 cfs option would eliminate flooding of both Radio Station Road and Sikes Road and reduces the duration of field flooding by about 8 days.

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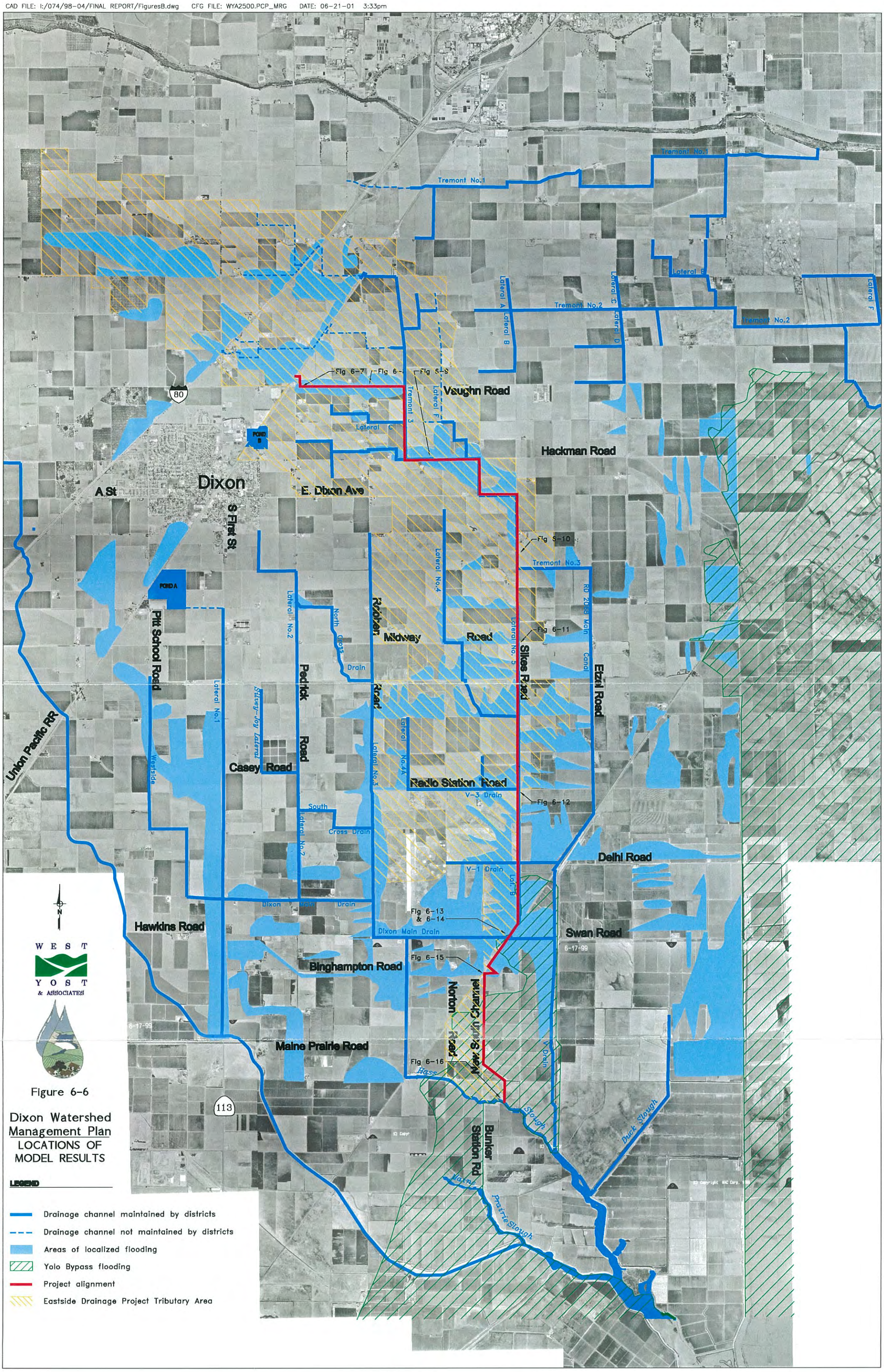

Figure 6-6

Dixon Watershed Management Plan
LOCATIONS OF MODEL RESULTS

LEGEND

- Drainage channel maintained by districts
- Drainage channel not maintained by districts
- Areas of localized flooding
- Yolo Bypass flooding
- Project alignment
- Eastside Drainage Project Tributary Area

Figure 6-7. Discharge from the Northeast Quadrant.

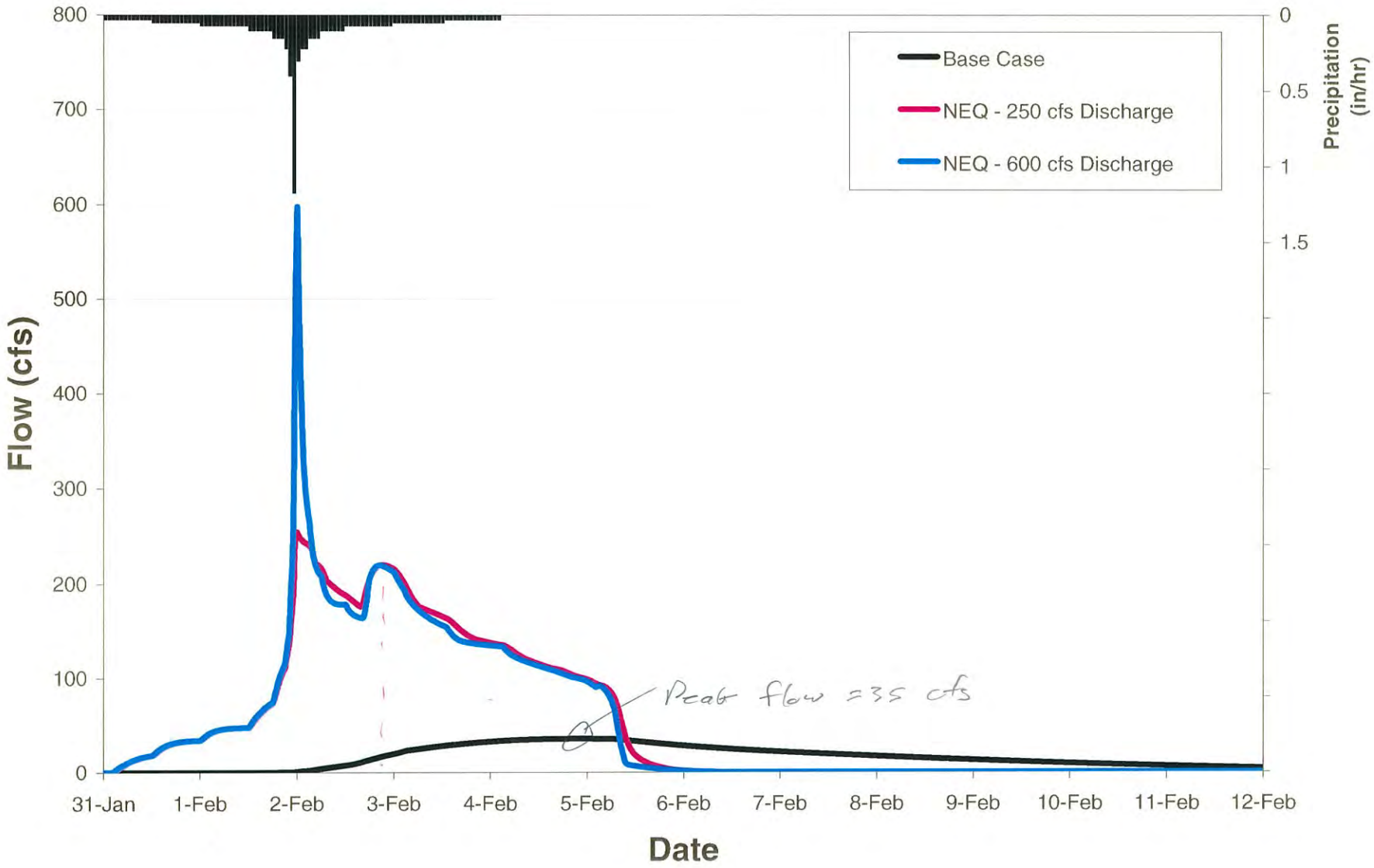

Figure 6-8. Stagegraphs at Vaughn and Robben Roads

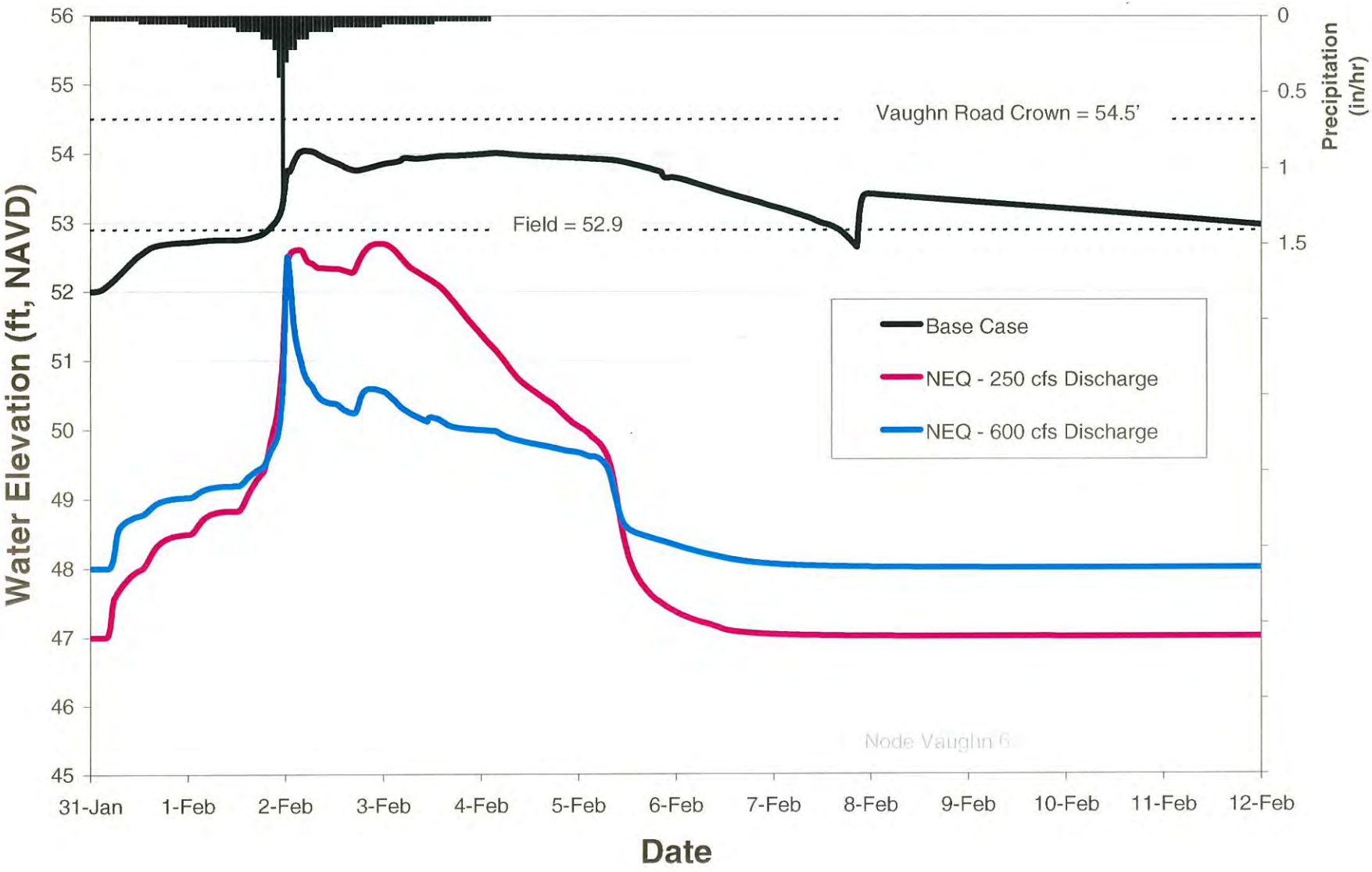

Figure 6-9. Stagegraphs of Tremont 3 at the Hackman Road Crossing

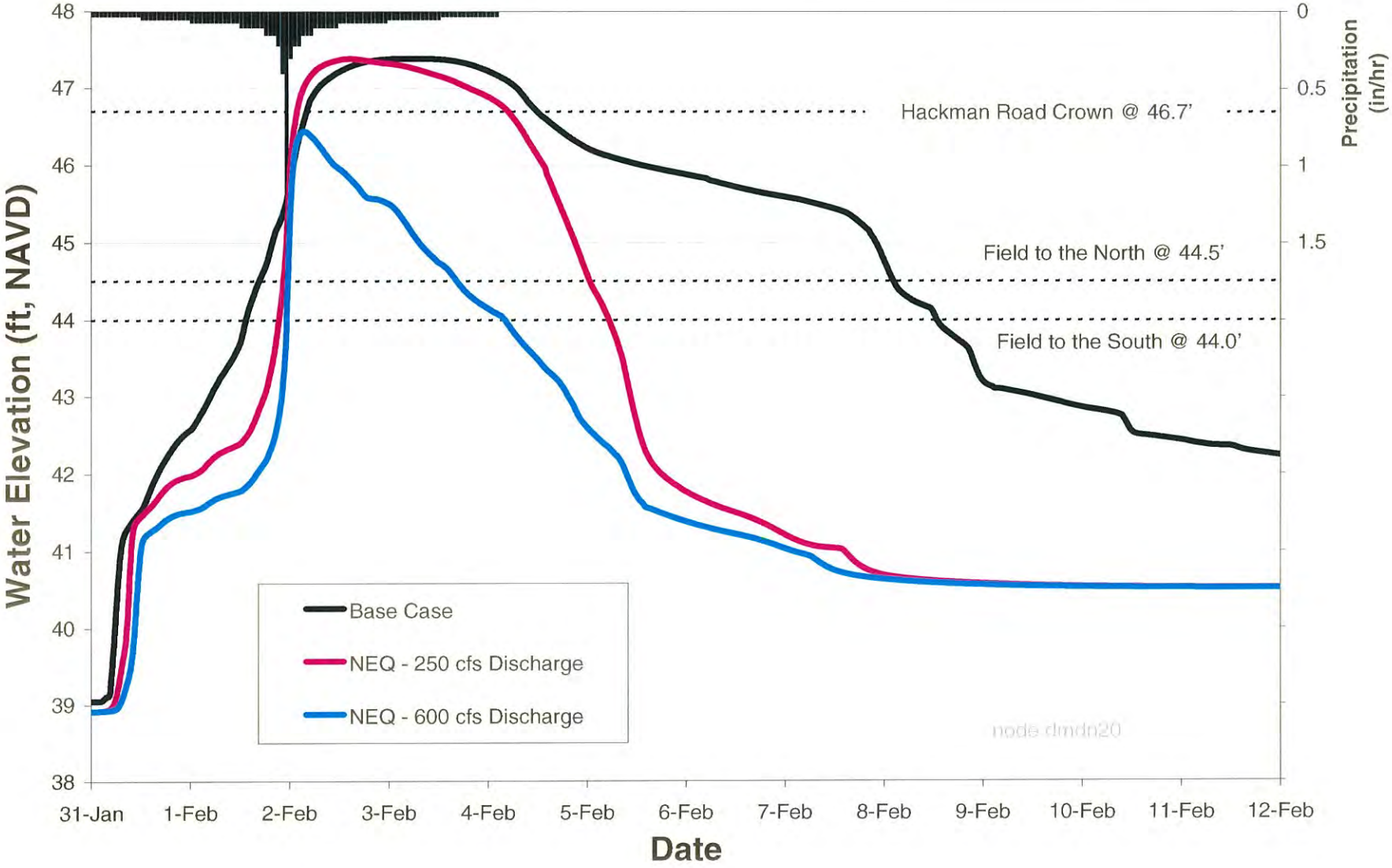

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Figure 6-10. Stagegraphs of Tremont 3 at the Sikes Road Crossing

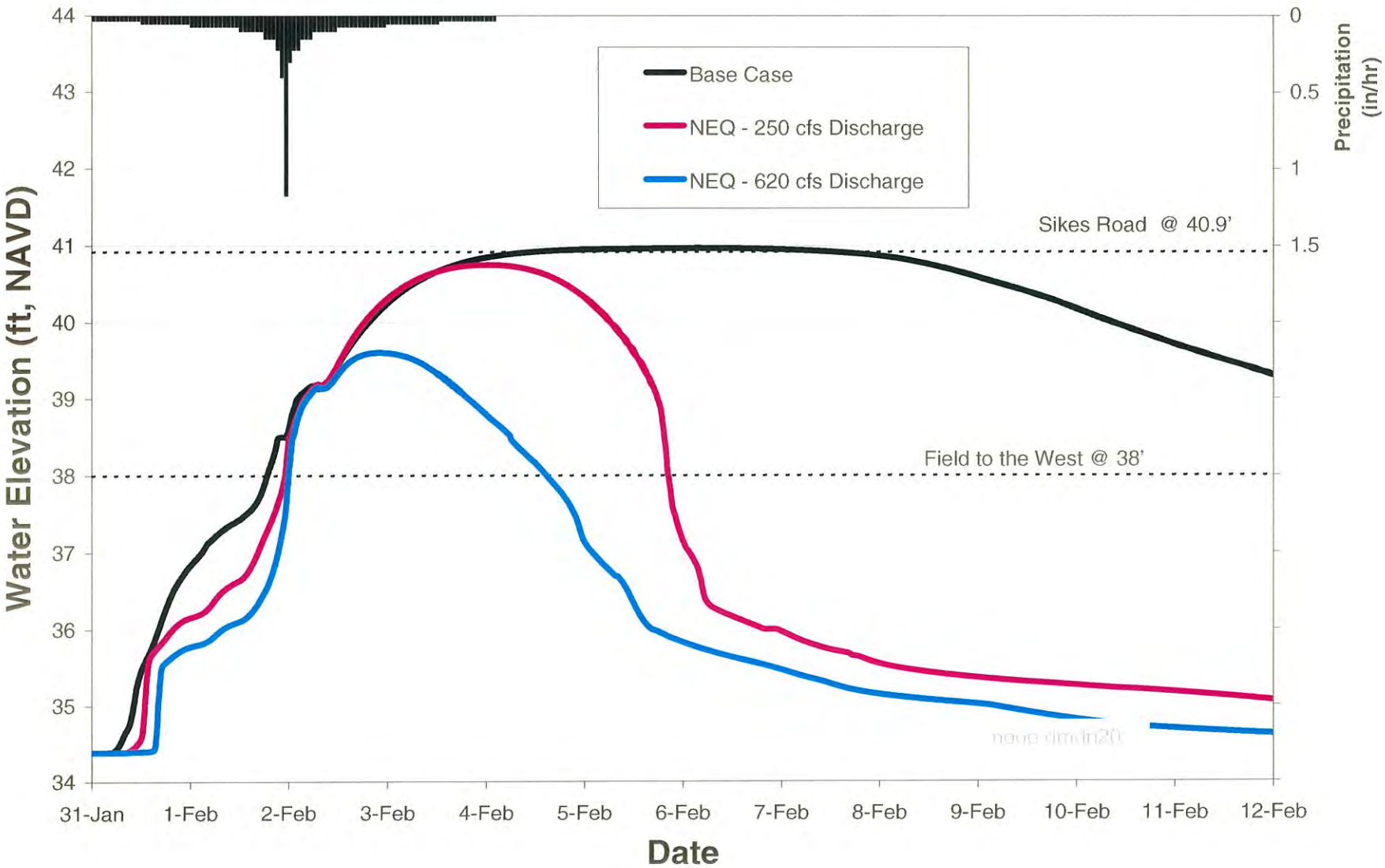

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Figure 6-11. Stagegraphs for the New Channel at Midway Road

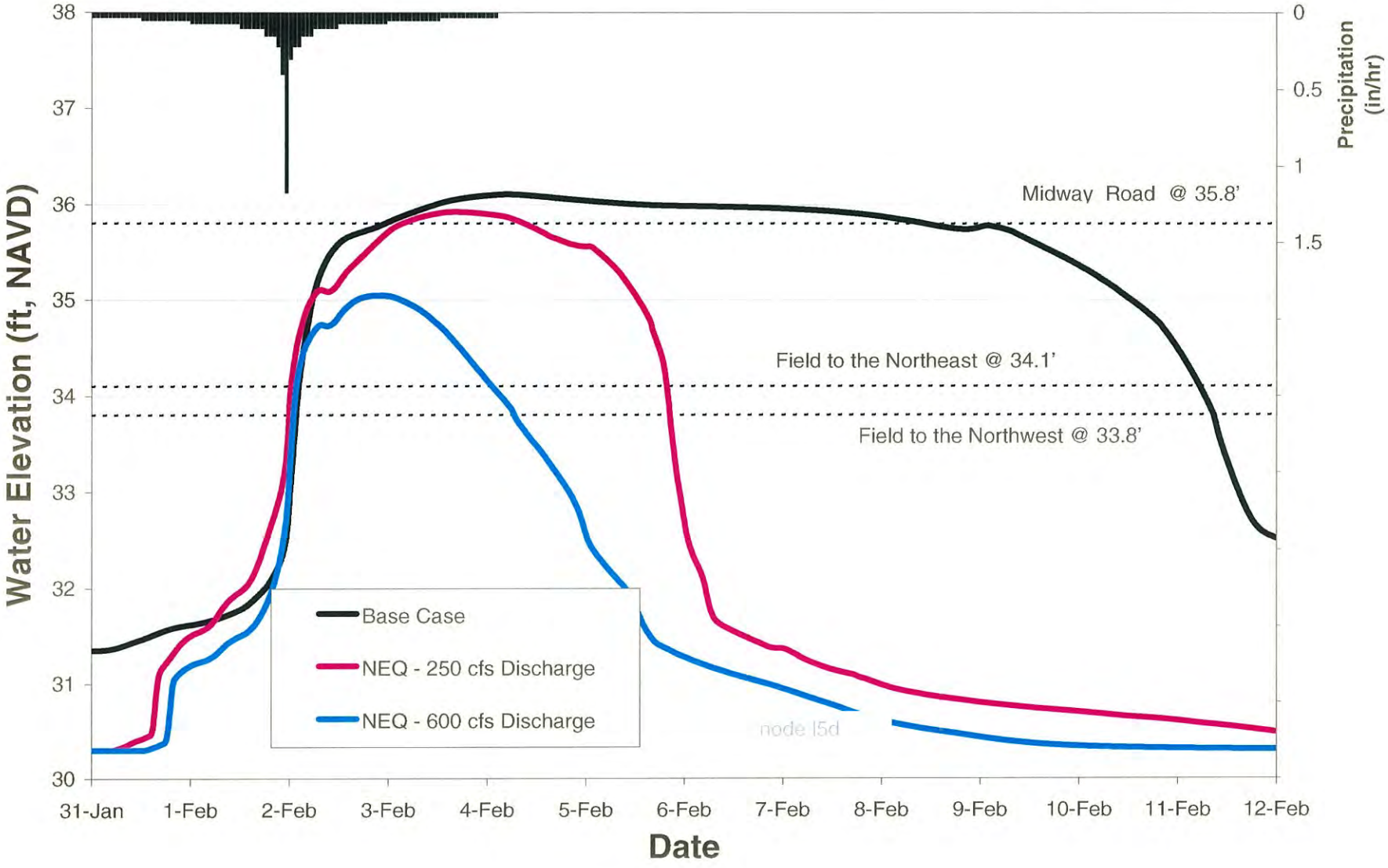

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Figure 6-12. Stagegraphs of Lateral 5 at Radio Station Road

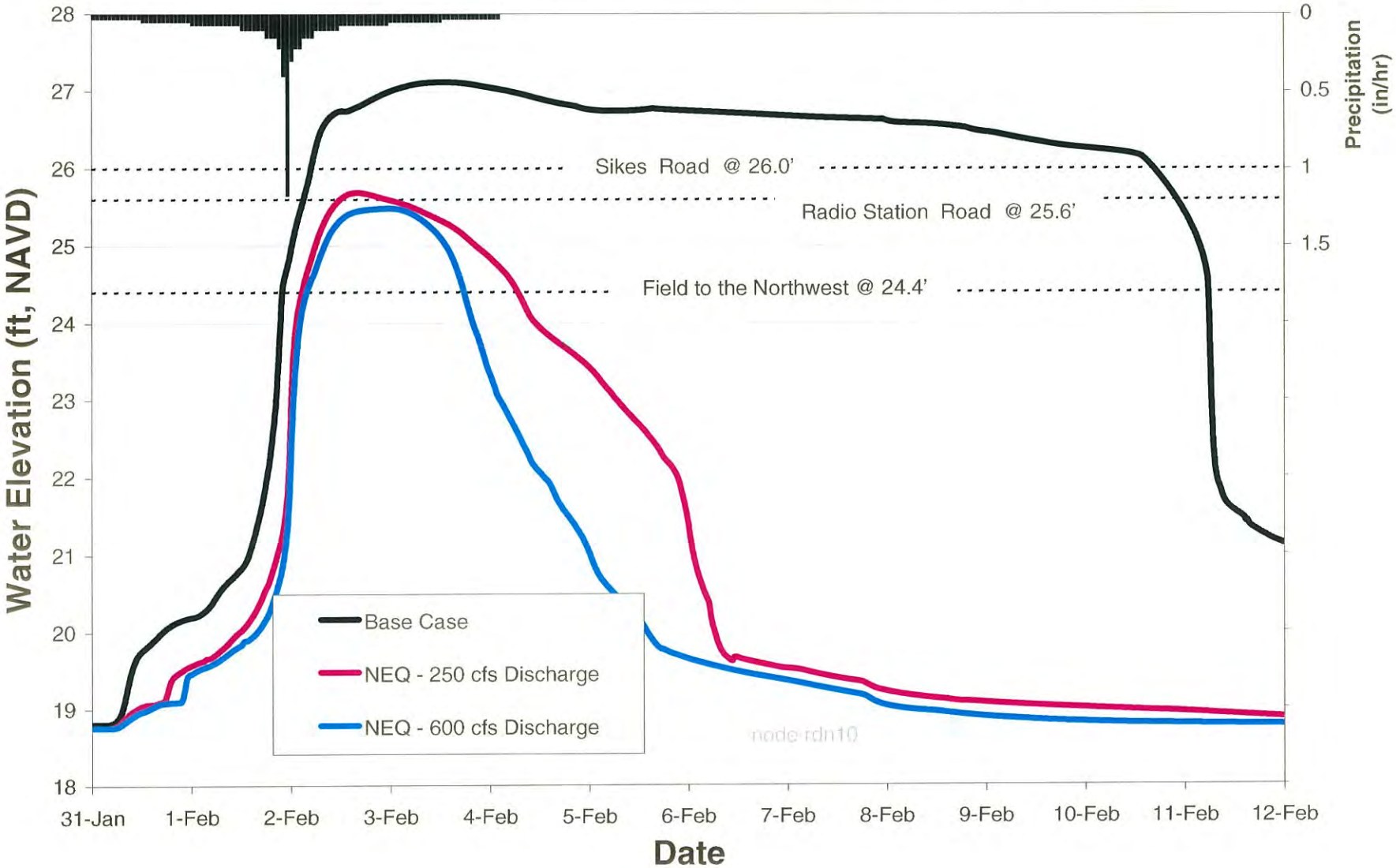

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Figure 6-13. Stagegraphs for the Dixon Main Drain at the New South Channel

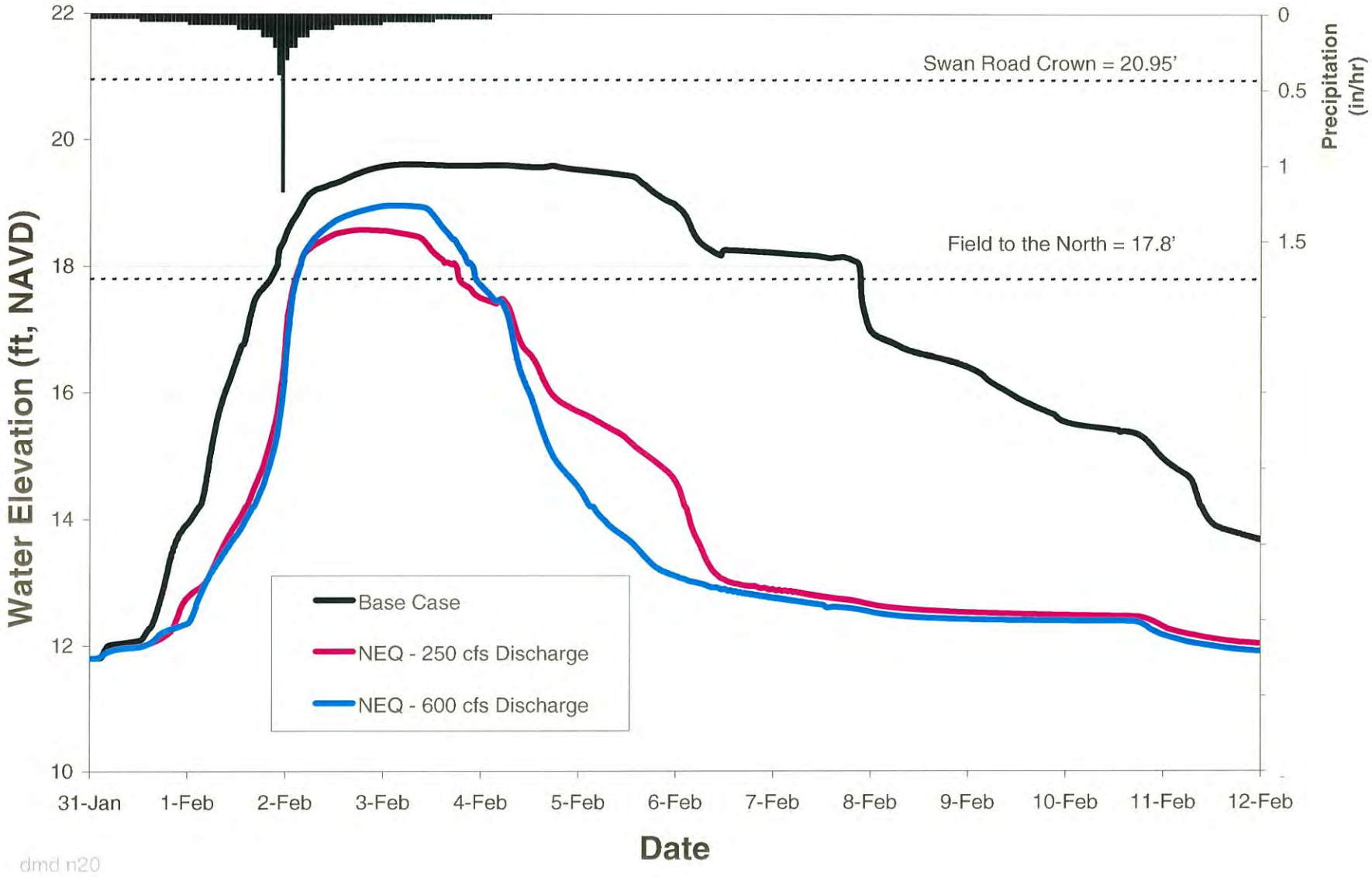

Figure 6-14. Discharge into the New South Channel

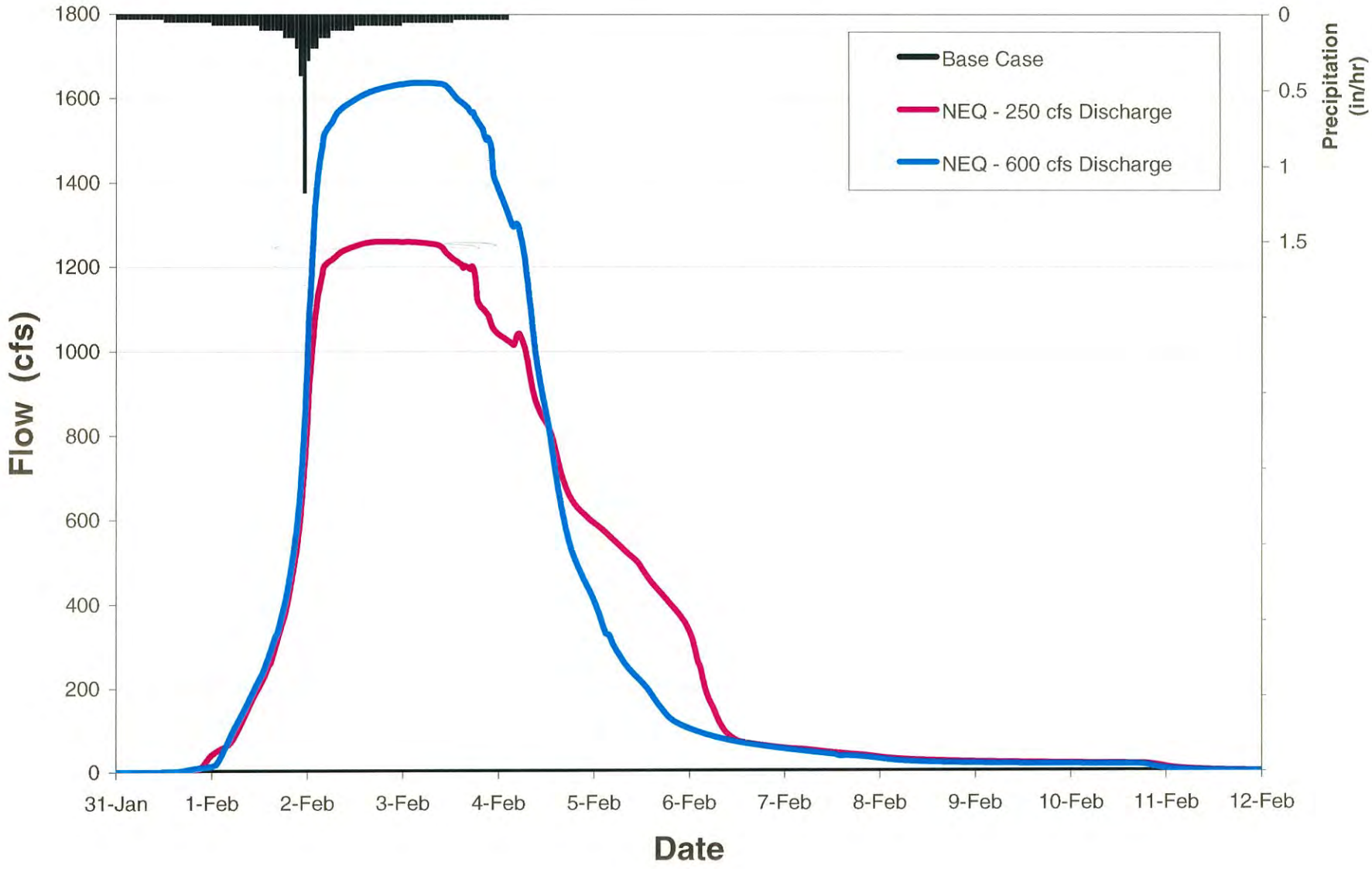

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Figure 6-15. Stagegraphs in the New South Channel at the North Crossing of Bunker Station Road

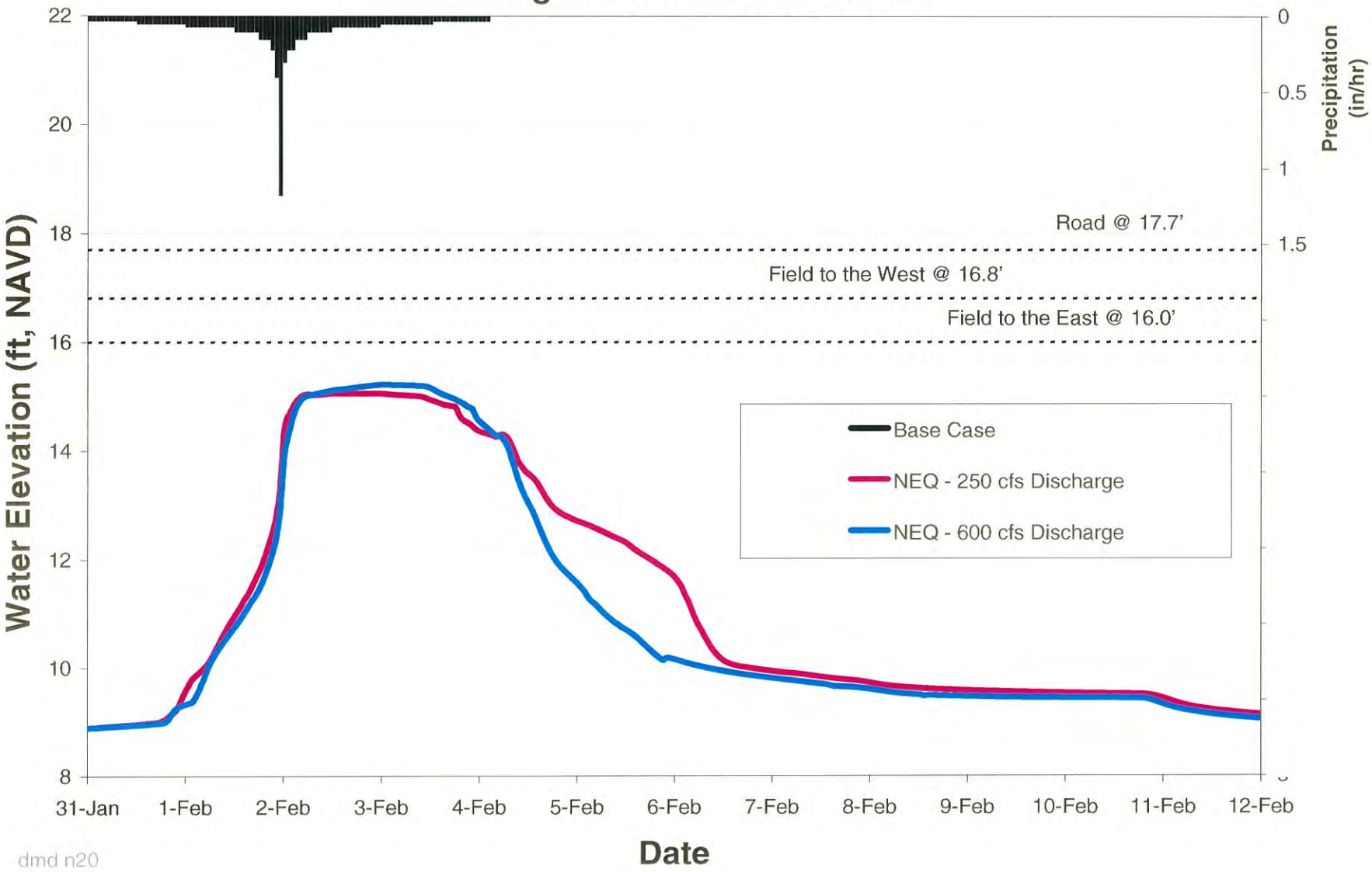

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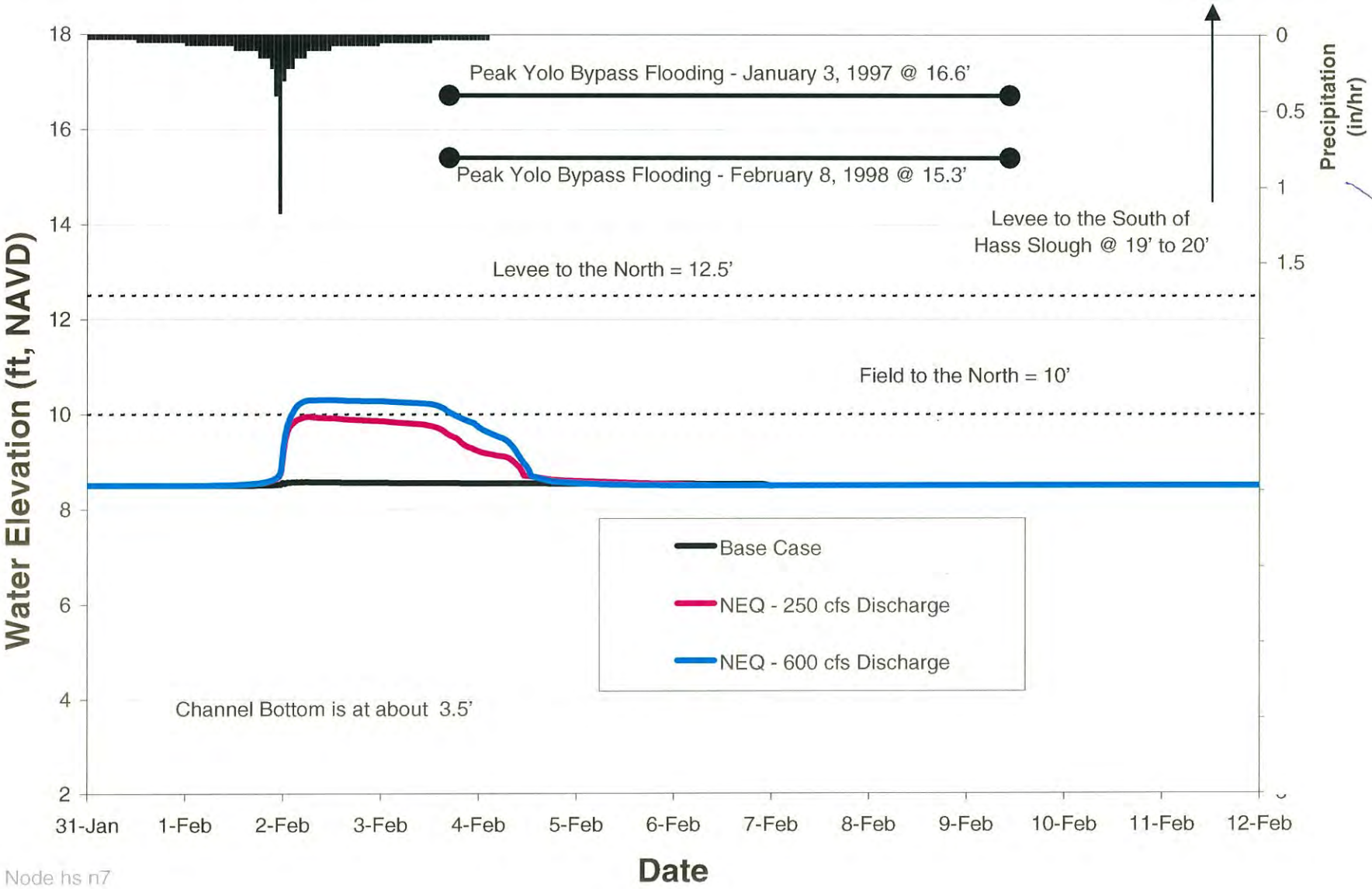
Figure 6-16. Stagegraphs in Hass Slough at New South Channel



Node hs n7

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Stagegraphs for the DMD at the NSC are presented in Figure 6-13. Both improvement projects would perform about the same at this location by reducing the duration of field flooding by about 4 days. The stage at this location is affected by the flow to this location from the EDP and from the Unrestricted Discharge Project for Basins B/C. About 866 cfs would reach this location from the Basin B/C project. About 750 cfs would reach this location from the EDP – 250 cfs option. About 1,170 cfs would reach this location from the EDP – 600 cfs option.

Hydrographs of the discharge into the NSC are presented in Figure 6-14. The NSC does not exist now; consequently, for the base case no hydrograph is shown.

Presented in Figure 6-15 are stagegraphs for the north crossing by the NSC of Bunker Station Road. There is no stagegraph for the base case. Both improvement options would perform about the same at this location, and would not cause any field flooding.

Stagegraphs of Hass Slough at the end of the NSC are presented in Figure 6-16. The water level at this location is initially controlled by the downstream tail water elevation, which was set at 8.5 feet NAVD for the base case, and for both of the improvement options. Under both improvement options, the stage at this location would stay below the north levee (at about elevation 12.5 feet) and well below the south levee (at about elevation 19 feet). Also, for both improvement options, the peak water level would be below that experienced when the Yolo Bypass is flooded (up to elevations of 15 to 16 feet).

PROJECT COST ESTIMATES

Cost estimates for these projects are summarized in Table 6-1 and presented in Tables 6-2 and 6-3.

Table 6-1. EDP Option Cost Summary.

Project	Total Capital Cost, dollars million	Annual O&M Cost, dollars million	Total Present Value Cost, dollars million
250 cfs option	5.6	0.09	7.1
600 cfs option	7.9	0.16	10.4

The capital cost for the 250 cfs option is $2.3 million lower than for the 600 cfs option. The O&M cost for the 250 cfs option is $0.07 million lower than the 600 cfs option. The present value cost for the 250 cfs option is $3.3 million lower than the 600 cfs option.

Total capital costs include the construction cost, costs for contingencies (cost for unanticipated problems), and costs for engineering, legal, administration, and environmental mitigation. The cost of contingencies is estimated at 20 percent of the construction cost for ponds and 30 percent for channels because the ponds are less likely to have unanticipated problems than the channels. The cost for engineering, legal, administration, and environmental mitigation is estimated at 25 percent of the construction cost for ponds and 35 percent for channels because ponds are simpler to implement (e.g., less potential for conflicts with existing utilities and fewer property owners with whom to negotiate right of way purchase).

Table 6-2. Cost Estimate for Eastside Drainage Project - 250 cfs Option

Item	Unit	Off Line Gravity Pond		
		Quantity	Unit Cost $	Estimated Cost
Construction & Capital Costs				
Pond Improvements				
Excavation	Cubic Yard	120,000	3	360,000
Levee & Maintenance Road	Lineal Foot	2,200	30	66,000
Seed Pond Banks	Square Yard	12,222	1	12,222
6' Chain Link Fence	Lineal Foot	2,300	6	13,800
Concrete Overflow Weir	Cubic Yard	40	500	20,000
60 Inch Pond Discharge Pipe	Lineal Foot	100	240	24,000
Pond Discharge Pipe Flap Gate	Each	1	8,000	8,000
Twin 60 Inch Pedrick Road Culvert	LF	120	240	28,800
Pond Construction Subtotal				533,000
Contingency (@ 20%)				107,000
Engineering, Legal, Admin, Environmental (@25%)				133,000
Land	Acre	10	5,000	50,000
Pond Total Capital Cost				823,000
Downstream Improvements				
60 Inch Culverts	LF	1,060	240	254,400
Check Dams	Each	2	10,000	20,000
Channel Enlargement	Cubic Yard	448,000	3	1,344,000
Field Drains	Each	50	1,000	50,000
Share of New South Channel				
Culverts	LF	353	240	84,720
Excavation	CY	197,000	3	591,000
Plant Wetlands/Uplands Vegetation	Acre	46	5,000	230,000
Downstream Improvements Construction Subtotal				2,574,000
Land	Acre	140	4,000	560,000
Contingency (@ 30%)				772,000
Engineering, Legal, Admin, Environmental (@ 35%)				901,000
Downstream improvements Total Capital Cost				4,807,000
Total Construction Cost				3,107,000
Total Capital Cost				5,630,000
Annual Costs				
Detention Pond O&M	Acre	10	800	8,000
Pipeline/Channel Maintenance (existing and enlarged width)	Ft*mile	423	200	84,600
Total Annual Cost				92,600
Present Value Analysis				
Capital Cost				5,630,000
Present Value of Annual Costs (3% for 20 years)				1,445,000
Total Present Value of Costs				7,075,000

Table 6-3. Cost Estimate for Eastside Drainage Project - 600 cfs Option

Item	Unit	Off Line Gravity Pond		
		Quantity	Unit Cost $	Estimated Cost
Construction & Capital Costs				
Pond Improvements				
Excavation	Cubic Yard			-
Levee & Maintenance Road	Lineal Foot			-
Seed Pond Banks	Square Yard			-
6' Chain Link Fence	Lineal Foot			-
Concrete Overflow Weir	Cubic Yard			-
60 Inch Pond Discharge Pipe	Lineal Foot			-
Pond Discharge Pipe Flap Gate	Each			-
Twin 60 Inch Pedrick Road Culvert	LF			-
Pond Construction Subtotal				-
Contingency (@ 20%)				-
Engineering, Legal, Admin, Environmental (@25%)				-
Land	Acre			-
Pond Total Capital Cost				-
Downstream Improvements				
60 Inch Culverts	LF	1,700	240	408,000
Check Dams	Each	2	20,000	40,000
Channel Enlargement	Cubic Yard	771,000	3	2,313,000
Field Drains	Each	100	1,000	100,000
Share of New South Channel				
Culverts	LF	460	240	110,400
Excavation	CY	286,000	3	858,000
Plant Wetlands/Uplands Vegetation	Acre	75	5,000	375,000
Downstream Improvements Construction Subtotal				4,204,000
Land	Acre	234	4,000	936,000
Contingency (@ 30%)				1,261,000
Engineering, Legal, Admin, Environmental (@35%)				1,471,000
Downstream improvements Total Capital Cost				7,872,000
Total Construction Cost				4,204,000
Total Capital Cost				7,872,000
Annual Costs				
Detention Pond O&M	Acre			-
Pipeline/Channel Maintenance (existing and enlarged width)	Ft*mile	807	200	161,400
Total Annual Cost				161,400
Present Value Analysis				
Capital Cost				7,872,000
Present Value of Annual Costs (3% for 20 years)				2,518,000
Total Present Value of Costs				10,390,000

The project costs are sensitive to the unit cost for excavation. For pond excavation a unit cost of $3/cubic yard was used. For channel excavation a unit cost of $3/CY was used because of the large size of the channels.

The NSC would be shared by the EDP options and the possible project for Basins B/C (see Chapter 4, the Unrestricted Discharger Option). The cost split was based on the proportional share of the increase of authorized urban discharge into the system. For the Basin B/C Unrestricted Discharge option, the increase of authorized urban discharge would be 152 cfs (230 cfs minus 77.5 cfs). For the EDP – 250 cfs option, the increase of authorized urban discharge would be 250 cfs (the NEQ is not currently within the DRCD drainage fee area). These increases in authorized discharge result in 37 percent of the NSC cost allocated to the Basins B/C project and 63 percent allocated to the EDP – 250 cfs option. For the EDP – 600 cfs option, all of the incremental cost for enlarging the channel from a bottom width of 75 feet to 100 feet was allocated to the EDP – 600 cfs option.

JOINT USES

The 250 cfs option would include a detention pond located somewhere within or near the City. This detention pond could be configured to provide joint uses such as wetlands/uplands habitat, community gardens, sports fields, play grounds, and/or jogging paths. The 600 cfs option would not include a detention basin and does not provide joint use opportunities near the City. The NSC (part of both options) would provide wetlands/uplands habitat opportunities.

WATER QUALITY

Sacramento RWQCB staff (Leo Sarmiento) said that the requirements recently issued for the San Diego Area would soon be required in the Sacramento Valley. Water quality basins are identified in the San Diego order as one method of improving the quality of storm drainage.

One of the methods for sizing the water quality basins is contained in Appendix D of the *California Stormwater Best Management Practices Handbook – Industrial/Commercial* (1993). The water quality pond should be sized to achieve a volume treated of 90 percent or more of the total runoff. The required data for the NEQ and upstream tributary areas using this method are:

- Total Watershed Area = 3,300 acres
- Impervious Area (NEQ at 85% impervious, agricultural area at 5% impervious) = 645 acres
- Directly Connected Impervious Area (Assuming 80 percent of the impervious area is directly connected) = 516 acres
- Directly connected percent impervious = 16 percent
- Required runoff capture rate = 90 percent (10 percent of runoff allowed to bypass pond)

From Appendix D of the *California Stormwater Best Management Practices Handbook – Industrial/Commercial* (1993), the storage volume requirement should be 0.022 ac-ft of water quality pond volume per acre of watershed area. For the NEQ (at 3,300 acres) the water quality pond should be at least 73 ac-ft (10-acre site). This volume should be drained from the water quality pond over a time period of at least 40 hours.

Water quality ponds are intended to capture and treat the first flush and low flows. Off-line flood control basins, as discussed above, are intended to bypass the first flush and low flow, and then capture just the peak flow above the allowed discharge rate. Although the two types of ponds have contradictory modes of operation, a pond configuration could be developed that provides water quality treatment volume in the lowest 2 or 3 feet and flood control storage in the upper 4 or 5 feet. Such a configuration could result in a total cost savings over constructing two separate basins. Consequently, if/when these requirements are implemented for the Sacramento Valley, compliance would be easier if flood control basins had already been constructed. No cost for a water quality treatment basin was included in the cost estimates above.

OPERATIONAL CONSIDERATIONS

The EDP alignment includes channels within the service areas of DRCD and RD 2068 and along the border of the MPWD service area. These agencies have several operational considerations that must be accommodated in the final design of the selected option including:

- The channels are currently used to convey irrigation water in the summer, and the ability to continue to do so is essential. This requirement results in the need for check dams at several locations in the channel system.

- At the point of discharge from DRCD to RD 2068, the culverts should be sized to physically restrict the rate of discharge to the agreed upon limits (either existing or revised limits).

- At the Tremont 3 culverts under Sikes Road, the project should be configured to direct low flows into the new channel. When flow in the new channel approaches the new channel capacity, flow should then also drain into Tremont 3. In the summer time irrigation waters must be directed into Tremont 3.

OPTIONAL ALIGNMENTS

No houses or other buildings should be impacted by the EDP. Irrigation wells, irrigation pipelines, fiber optic cables, and natural gas wells and pipelines exist along much of the project alignment. These existing utilities will causes significant conflicts with the EDP.

Two potential optional alignments exist that may reduce the number of required culverts and the potential for conflicts with the existing utilities. These optional alignments include:

- Use of Lateral C instead of all or some of the new Vaughn Road channel.

- A new channel (and required culverts) starting just downstream of the Tremont 3 culverts under Hackman Road and running due south to the upstream end of Lateral 4. Expansion of the Lateral 4 channel and culverts to the confluence with Lateral 5.

CONCLUSIONS

The following conclusions were reached after analysis of alternatives for the EDP:

- Both options provide drainage for the NEQ.

- The 250 cfs option has a lower capital cost, a lower annual O&M cost, and a lower total present value cost than the 600 cfs option.

- The 600 cfs option provides greater flood control benefit to the downstream agricultural community than the 250 cfs option.

- Use of the optional alignments should be evaluated in greater detail to determine their potential to eliminate conflicts with existing utilities and to reduce the number of required culverts.

CHAPTER 7 - OPERATIONS AND MAINTENANCE

To operate and maintain the facilities described in the previous chapters, a Joint Powers Authority (JPA) should be formed. The JPA governing boards will be elected/appointed officials of the following agencies: City, MPWD, RD 2068, and DRCD.

The MPWD, RD 2068, and DRCD currently maintain drainage channels that will be included in the recommended projects. Each agency will continue to maintain the channels that they currently maintain. New channel segments will be assigned to the agencies that are maintaining the adjacent facilities. All project maintenance will be done by the existing agencies through a combination of public agency staff and private contractors.

The JPA will assign each agency a segment of the project facilities to maintain. Work will be charged to the JPA, at approved rates, and the JPA will reimburse each agency for the work performed.

ANNUAL WORK PLAN

Each Spring, the members of the Technical Advisory Committee of the JPA should conduct a field tour to inspect all JPA facilities. They will review the maintenance work completed in the current year and develop maintenance priorities for the upcoming year. They will identify needed rehabilitation, betterment, or capital projects in an annual work plan. This annual work plan will serve as the basis for budgeting for the JPA. The work plan and the budget will be approved by the governing board of the JPA.

COST ALLOCATION

There will be some type of urban stormwater collection system and/or detention pond at the upstream ends of the JPA facilities. These ponds and any facilities upstream will be maintained by the City at the City's cost. The JPA facilities will start downstream of the City collection system/detention ponds. The easements for JPA facilities will be held by the JPA, although initially the easements may be acquired along Lateral 1 by the City while the JPA is forming.

Maintenance costs will be allocated between the City, DRCD, MPWD and RD 2068 based upon a formula included in the JPA documents. The Solano Irrigation District may also contribute to maintenance. Solano County will be asked to provide certain in-kind services because the JPA facilities benefit the County road system.

ADMINISTRATIVE COSTS

The bookkeeping function was estimated to cost $15,000 per year. The bookkeeper will be responsible for receiving funds from member agencies and disbursing funds for maintenance work completed by each agency and any other administrative costs identified.

The treasurer function will be performed (tentatively) by the City at no cost to the JPA. The treasurer will arrange for banking services for the JPA and an annual audit. The treasurer will also be responsible for any audit reports necessary of the JPA.

A contingency fund for obtaining legal and engineering assistance of $10,000 per year was included in the estimated budget. The liability insurance cost was estimated to be $5,000 per year.

The total administrative cost was estimated to be $30,000 per year following the completion and start-up of the three projects.

MAINTENANCE COSTS

An estimated average annual O&M cost for JPA facilities is $2,400 per mile. The actual size (width and depth) of the channel varies significantly at different locations along the JPA facilities. At the upstream ends the bottom widths of channels will be as small as four feet. At the downstream end, the NSC bottom width will be 75 or 100 feet. The unit cost of $2,400 per miles was judged to be an expected average cost to maintain the JPA facilities. There will be 28.1 miles of the JPA facilities at full build-up, which results in a total annual O&M cost of $67,440 per year. Table 7-1 contains a breakdown of system mileage to be maintained by the member agencies, and Table 7-2 contains an estimate of the cost to maintain these facilities.

The O&M costs will be phased in over time. The Lateral 1 Project will be the first to be built, with the other two projects built later.

Table 7-1. JPA Facility Maintenance Responsibility[(a)]

Lateral 1 Project		
DRCD	3.2 miles	Lateral 1 to MPWD boundary
MPWD	3.1 miles	MPWD boundary to Ulatis Creek
	6.3 miles	
Pond C Lateral 2/3 Project (Includes New South Channel)		
DRCD	6.4 miles	Pond C to Dixon Main Drain
MPWD	2.3 miles	Dixon Main Drain to New South Channel
RD 2068	2.5 miles	New South Channel
	11.2 miles	
Eastside Drainage Project		
DRCD	8.6 miles	NE Quadrant Pond to Lateral 4
RD 2068	2.0 miles	Lateral 4 to New South Channel
	10.6 miles	
Total	28.1 miles	

(a) Allocation tentatively based on discussions of agency managers.

Table 7-2. Estimated Maintenance Costs [(a)]

Project	Miles of Channel	Maintenance Costs, dollars
Lateral 1	6.3	15,120
Pond C Lateral 2/3	11.2	26,880
Eastside Drain	10.6	25,440
Total	28.1	67,440

[(a)] Based on system wide average estimated cost of $2,400/mile, not applicable to specific channels.

APPENDIX A

Survey Data

Provided in this appendix is a compact disk containing all of the survey data collected for this project. The survey data was collected using the following datums:

- Vertical Datum: North American Vertical Datum of 1988.
- Horizontal Datum: The North American Datum of 1983, using the California State Plane Coordinate System - Zone 2.

APPENDIX B

Analysis of the Rate of Rise and fall of Ulatis Creek

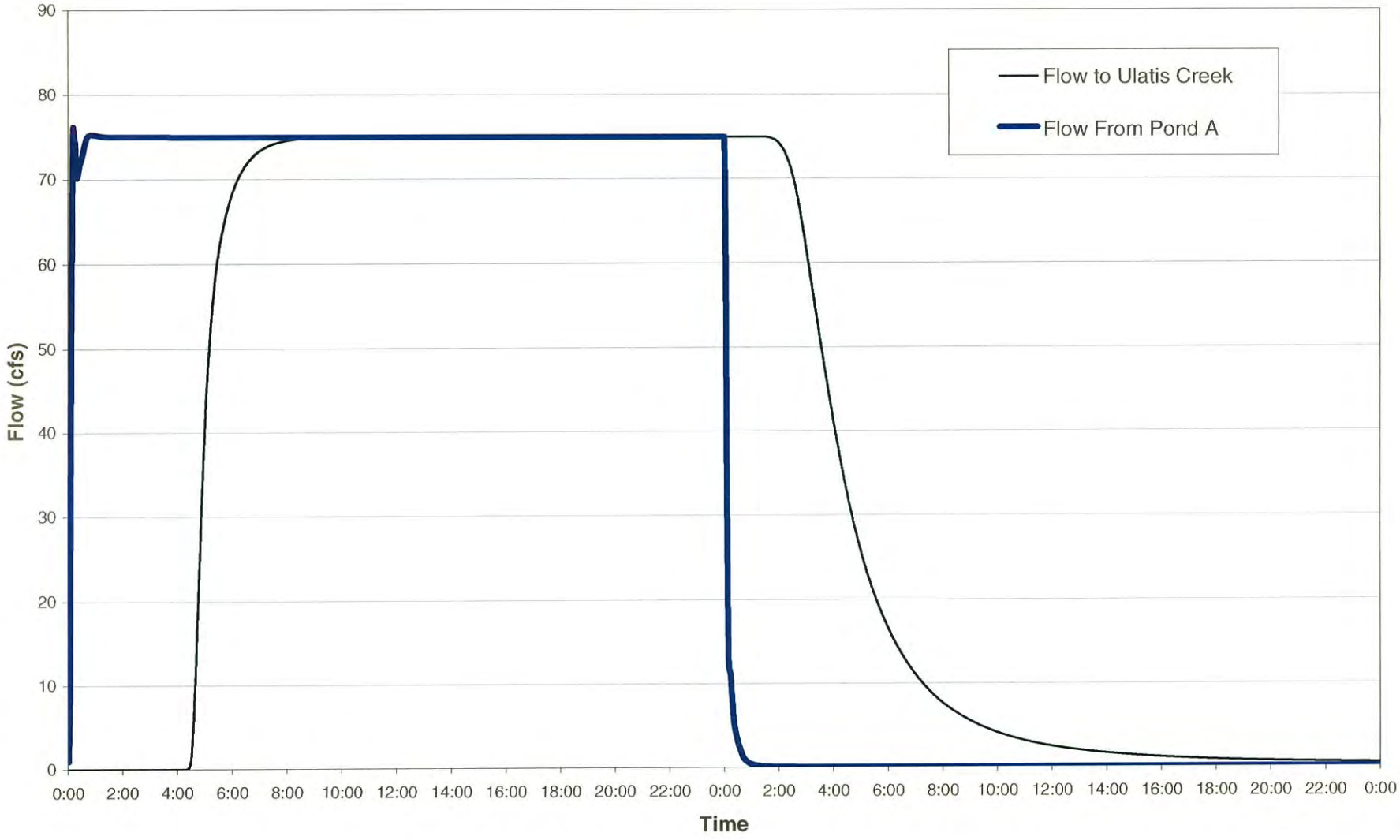
On August 21, 2000, at the Maine Prairie Water District, the planned improvements for Pond A and Lateral 1 were presented to the public. One of the concerns expressed (by Mr. Mike Dannenberg) was that there would be a delay in the flow reduction when a signal was sent from Ulatis Creek to Pond A to shut off the pumps. Water already released from Pond A but had not yet entered Ulatis Creek would contribute to increased flooding as it drained Lateral 1 to Ulatis Creek. An analysis of this problem and the proposed operational procedures to eliminate the problem are presented below.

Presented in Figure B-1 are the model results of a simulation of a discharge from Pond A with no rainfall or runoff. Hydrographs for the Pond A release and for the discharge from Lateral 1 to Ulatis Creek are presented. Based on these model results, it takes about 6 hours for a change in the pumping rate to be realized at the discharge into Ulatis Creek.

Shown in Figure B-2 are stagegraphs for Ulatis Creek at Maine Prairie Road (about 1 mile downstream of Highway 113) and Ulatis Creek at Leisure Town Road (about 7 miles upstream of Highway 113). Information for the stagegraph at Maine Prairie Road was collected by Mr. Mark Martinson of the Solano Irrigation District. The only information available was the time of start of rise of the water level, and the time and height of the peak water level. Based on this stagegraph, the rate of rise of the water level is about 0.67 foot per hour. Information for the stagegraph at Leisure Town Road is from the City of Vacaville, and is presented in 20 minute intervals. Based on this stagegraph, the rate of rise of the water level is about 0.39 foot per hour. A weighted average (weightings inversely proportional to distances from Highway 113) of these rates of rise is 0.64 foot per hour.

The time for the water released from Pond A to pass through Lateral 1 is about 6 hours. In 6 hours, Ulatis Creek would rise about 4.0 feet. To allow time for the water released from Pond A into Lateral 1 to drain into Ulatis Creek, the Ulatis Creek water level to shut down the Pond A discharge should be set at about 4.0 feet below the design water level in Ulatis Creek. The design freeboard in Ulatis Creek is 1.5 feet. Thus, the shut off level in Ulatis Creek should be about 5.5 feet below the top of bank, which is 28.5 feet NAVD.

Figure B-1. Timing of Flow from Pond A to Ulatis Creek



DRAFT

New South Channel Conceptual Design

Prepared for

Solano County Water Agency

December 2002

WEST YOST & ASSOCIATES

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PROJECT DESCRIPTION

The New South Channel (NSC) is the downstream end of a larger drainage project intended to provide an outfall for the Northeast Quadrant of Dixon and to reduce flooding of agricultural lands. The currently proposed alignment of the NSC is shown as a thick blue line on Figure 1 (all figures and tables are presented at the end of this report). Figure 1 also shows the four road crossings of the NSC. A typical cross section of the channel is shown on Figure 2, along with the location of the triple 60-inch culverts in relation to the channel. The channel characteristics are described below:

- Channel depth = 6.5 feet
- Channel bottom width = 12 feet
- Channel side slopes = 4 horizontal to 1 vertical
- Channel invert slope = 0.000497
- Assumed Manning's Roughness = 0.040

Based on these characteristics, the capacity of the channel will be about 410 cfs, assuming a water depth of 6 feet (half a foot of freeboard). All road crossings will be triple 60-inch RCP culverts with headwalls (bell ends of the pipes in the upstream headwall).

ALTERNATIVE ALIGNMENTS

At the north end of the NSC, an alternative alignment was considered but rejected (shown as a thin blue line on Figure 1). This alignment is considered to be more problematic because it would result in more conflicts with underground utilities and would have a greater impact on wetlands and other valuable habitats. Final resolution of this northern alignment may depend upon the preferences of the affected landowners.

At the south end of the NSC, alternative alignments were considered but rejected (shown as thin blue lines on Figure 1. The western-most alignment was considered because it is shorter. However, this western-most alignment results in 300 cfs of additional flow in Hass Slough downstream of Bunker Station Road. Hass Slough just below Bunker Station Road has a smaller channel (smaller than downstream of the proposed outlet of the NSC) and is heavily overgrown. This additional flow would raise the water surface elevation at Bunker Station Road by about 1 foot for the January 1997 storm (about a 15-year storm). In contrast, the proposed NSC alignment results in almost no increase of the water surface level at Bunker Station Road. Final resolution of the southern alignment may depend upon the preferences of the affected landowners.

EASTSIDE DRAINAGE PROJECT

The NSC is intended to be the downstream end of a larger drainage project called the Eastside Drainage Project (EDP). The EDP is intended to provide an outfall for the Northeast Quadrant (NEQ) of Dixon. Based on the 405 ac-ft of detention storage planned within the NEQ (as described by Greg Bardini, Morton & Pitalo Inc. on June 3, 2002), a peak discharge of about 132 cfs is anticipated from the NEQ (for the 100-year, 4-day storm). This peak discharge includes the

estimated current discharge of about 22 cfs (through the 30-inch culvert under the railroad) and an increase of about 110 cfs resulting from the development of the NEQ.

To ensure the NSC would be consistent with the rest of the EDP, the required EDP facilities were preliminarily sized, as shown on Figure 3. The EDP, including the NSC, was modeled with the XP-SWMM model of the January 1 – 2, 1997 storm. Table 1 presents the water surface elevations and flows at various locations throughout the project with and without the EDP. Figures 4 through 10 shown stagegraphs and hydrographs at several locations throughout the EDP and the NSC. As shown, the EDP provides for increased flows and results in lower water surface elevations throughout its alignment as modeled for the January 1-2, 1997 storm.

PROPERTY OWNERS

The owners of the property that may be affected by the NSC project are shown on Figure 11. All of these property owners have been contacted in person or through a letter. Initial meetings with two of the property owners have been conducted to discuss the project. Summaries of these meetings are presented below.

Mort Triplett

This meeting was held on October 30, 2002 at the Main Prairie Water District (MPWD) office. Mort Triplett, Meda Benefield, and Doug Moore were in attendance. Provided below is a summary of the discussion.

- Mr. Triplett would like the project to provide him with a water supply in the summer. He thinks he should not accept the negative aspects of having a drainage channel along his property without also receiving the benefit of a summertime water supply.
- If the project occurs, Mr. Triplett would prefer to provide an easement across his land, rather than a complete sale of the land.
- In order for Mr. Triplett to use water from the channel, a check-up structure would be required at a convenient location.
- Mr. Triplett is very concerned about the project causing a drainage problem on his property (where no problem currently exists).
- Additional road crossings may be needed at one or two locations.
- The two triangular areas at the southeast corner of Mr. Triplett's property are in the CREP program. This program is a wildlife program. As part of this program, Mr. Triplett provides water to these areas. This land is committed to this program for 5-year increments. It is not clear how this commitment would affect the NSC project.
- Near the downstream end of the NSC, Mr. Triplett would prefer to have the channel turn east as far north as possible rather than continue south through the property owned by Claire Le.

Manual Brazil

This telephone discussion was held on November 15, 2002 between Manual Brazil and Doug Moore. Mr. Brazil's property is along the northern alternative alignment. Provided below is a summary of the discussion.

- The need for the channel is to provide the City of Dixon with additional drainage capacity for the Northeast Quadrant and at the same time reduce the flooding of agricultural areas along the new channel.
- The channel may include wildlife habitat areas, which could result in a wider channel and right-of-way.
- A right-of-way wider than 100 feet may be required to provide room for a future enlargement of the channel.
- Mr. Brazil would require that the project include a new fence separating his property from the channel.
- Mr. Brazil would like to have use of some of the dirt from the project; however the quantity of dirt he could use is unknown at this time.
- His fields would have to be provided adequate drainage into the channel.
- Culverts would have to be constructed along the north side of his property to provide access to his property from Swan Road.
- Mr. Brazil is not opposed to the project if he is compensated at a fair rate for his land or for an easement across his land. When the fair market rate is known, we should contact Mr. Brazil again with the information. Additionally, the project must not disturb too much of his property.

VALUE ENGINEERING

A value engineering review of several aspects of the project has been completed to help ensure the project has the lowest possible cost, the highest possible capacity, and can reasonably be maintained, as described below:

Road Crossings

To help reduce the costs and provide the maximum potential capacity, three alternative road crossing configurations were evaluated, including reinforced concrete pipe (RCP) culverts, reinforced concrete box (RCB) culverts, and railroad car bridges. Although the channel is planned for a capacity of 380 cfs (with a Manning's N of 0.040), the road crossings were sized for a maximum possible flow of 507 cfs (assuming the channel may be kept at a Manning's N of 0.030). The estimated costs of the three alternatives are described below and summarized in Table 2.

- RCP culverts – Triple 66-inch RCP culverts with the groove end embedded in the upstream headwall would have a total inlet controlled capacity of 579 cfs, or about 72 cfs more than needed. Triple 60-inch RCP culverts with the groove end embedded in the upstream headwall would have a total inlet controlled capacity of 528 cfs, or about 21 cfs

more than needed. Consequently, triple 60-inch RCP culverts were selected for the NSC. California Concrete Pipe (Brian Douglas, (206) 446-4212) was contacted for the materials cost for this pipe, and 60-inch RCP has a delivered cost of about $92/LF.

- RCB culverts – Twin 7 ft wide by 5 ft tall RCB culverts would have a total inlet controlled capacity of about capacity of 518 cfs, or about 11 cfs more than needed. The materials cost for a 7 ft by 5 ft RCB is about $335/LF delivered.
- Railroad Car Bridges – The Skipp Gibbs Company was contacted (a retailer of railroad car bridges). They estimated that a triple wide (26 feet wide, just barely adequate for two 12 ft travel lanes) would cost $44,000 installed including slab footings. However, Paul Wiese (the Engineering Manager for the Solano County Transportation Department) was also contacted. Mr. Wiese has no experience using railroad car bridges, and did not think they would be acceptable to the Solano County Transportation Department.

The total installed costs of these alternatives are summarized in Table 2. As shown, the 60-inch RCP culverts have the lowest total cost, and are recommended for the NSC project.

Channel Configuration

The channel configuration has been reviewed to ensure it can be reasonably maintained. The side slopes have been lowered to 4 Horizontal to 1 vertical to ensure the banks can be mowed rather than requiring maintenance with an excavator and spraying of chemical herbicides.

A low flow channel has been added to allow the bottom of the channel to dry out sufficiently that it can be mowed rather than requiring maintenance with an excavator and use of chemical herbicides.

These modifications of the project will increase the total cost slightly, but will significantly reduce the long-term maintenance cost of the channel.

GRANTS

With appropriate enhancement, the NSC project may be eligible for several grants. Some of these are described below:

Flood Protection Corridor Program (FPCP)

The FPCP was established with the passage of Proposition 13, and is administered by the California Department of Water Resources. Approximately $30 million is available for the year 2002-2003 grant cycle. This grant program provides money for projects that demonstrate a significant reduction of peak flood flows, flood stage, flood risk or potential flood damage. Eligible projects must also provide agricultural land preservation and/or wildlife habitat protection or enhancement. Local agencies or nonprofit organizations with an interest in flood control may apply. Applications are due February 14, 2003.

Wildlife Conservation Board Grants

The Wildlife Conservation Board (WCB) provides grants under several programs. The costs associated with including wildlife habitat features in the NSC may be eligible for funding through the following WCB programs:

- Land Acquisition Program
- Public Access Program
- California Riparian Habitat Conservation Program
- Inland Wetlands Conservation Program
- Habitat Enhancement and Restoration Program

Grant applications are considered quarterly throughout the year. California Department of Fish and Game staff can help determine which grant programs are most appropriate for the NSC project.

PERMITS

A discussion of the potential required permits for the project is presented below:

US Army Corps of Engineers – Clean Water Act, Section 404 Permit

This permit is likely required based on information from the USACE web site (www.spk.usace.army.mil/cespk-co/regulatory/) and discussions with the USACE staff on other projects. Because the downstream end of this project is within a tidal zone, it will not be eligible for permitting under a nationwide permit. Consequently, an individual permit will be required. The individual permit issuance process usually requires several months. The process includes:

- A pre-application meeting/tour with the USACE staff to describe the project and confirm this permit is required.
- A wetland delineation with approval of the delineation by the USACE.
- Submittal of a permit application to the USACE, including an evaluation of alternatives and identification of appropriate mitigation.
- The permit fee is dependent on the size of the project, but will probably be in the range of $500 to $1,000.

Regional Water Quality Control Board – Clean Water Act, Section 401 Certification

This certification is required. The application should be submitted as soon as design drawings and the environmental review are completed. The application should include a project description, one set of the construction plans, and a copy of the EIR (or reference to the State Clearing House Number). The permit requires about two months to obtain. The fee for the permit application is $500.

Regional Water Quality Control Board – NPDES Construction Permit

This permit is required. To obtain the permit, a Stormwater Pollution Prevention Plan must be developed and submitted. The permit requires less than a month to obtain. The fee for this permit is $500.

California Fish and Game – Stream Bed Alteration Agreement

California Department of Fish and Game staff (Jenny Marr, 916-358-2842) indicated that this agreement would be needed. The application should be submitted as soon as design drawings and

the Environmental review are completed. The application includes forms FG2023 and FG2024, a map of the project area, and one set of the construction plans. A copy of the certified EIR should also be included. The fee for the agreement application is $1,390.50.

California Department of Water Resources, Reclamation Board – Enroachment Permit

Reclamation Board staff (Samual Brandon – (916) 653-6491) has indicated that Hass Slough is under the Reclamation Board jurisdiction and that this project will require a Reclamation Board encroachment permit. They will evaluate the project for effects on the levees and on the discharge (flow) to Hass Slough.

When design drawings are ready, the application should be submitted (along with the drawings and the conceptual design report and environmental review). The review process takes about 50 days. They will issue a permit, and there will likely be conditions of approval included with the permit. There is no cost for submitting the application. The permit application can be obtained at www.recbd.ca.gov/, click on DWR Applications, select application 3615, and complete parts A and B.

Solano County Department of Transportation – Encroachment Permit

This permit is required for the culverts under Swan Road and Bunker Station Road. A single application for all the culverts is adequate. The design drawings for the culvert crossings should be included with the application. A fee of $210 must also be submitted with the application (a check written to Solano County Transportation Department).

US Fish and Wildlife Service Biological Opinion

Because of the potential to impact Giant Garter Snake habitat, a US Fish and Wildlife Biological Opinion will be required.

INITIAL ENVIRONMENTAL STUDY

An initial environmental study and biological evaluation were completed. These documents are presented in Appendix A. Significant wetlands and endangered/threatened species impacts are anticipated.

POTENTIAL ENVIRONMENTAL/WETLAND/HABITAT FEATURES

Restoration-Resource, Inc. (RRI) has provided preliminary habitat design sketches, and these are presented in Figures 12, 13, 14, and 15. Additionally, RRI has provided preliminary planting pallets, and these are provided in Tables 3, 4, and 5. The plant communities are described below.

Solano Prairie

With this plant community, we are attempting to recreate the historic, locally native grassland community, as might be found at or near the Jepson Prairie. With Purple Needlegrass as the dominant member, the re-created prairie will be located at the 10-foot grassland buffer – at the outside edges of the drainage right-of-way. This buffer will permit equipment access for occasional channel maintenance, and will also buffer neighboring farmland from shade caused by

woodland planting in the corridor. During the two-year establishment period, the grasses will be mowed annually at a 6-inch height, and receive a broadleaf herbicide application. The herbicide will target broadleaf agricultural weeds such as Mustard, Bindweed, Prickly Oxtongue, and non-native thistles. In the third season and beyond, experiments in wildflower planting can be executed, and prescribed fire could be used for non-native weed control.

Upland Refugia

The purpose of the upland refugia is to create a drier wildlife habitat area, as an island along the habitat corridor that can be saturated or flooded for several months of the year. These areas could be made from the piles of excavated spoils material, placing as much topsoil as possible on the surface of the mound. This plant community will be representative of an oak savanna, and will include a variety of shrubby species in patches to add another suite of birds that will take advantage of this corridor. Establishment could be similar to that of the Solano Prairie, and should include a temporary drip irrigation system for tree establishment over two to three years.

Riparian Woodland

The riparian woodlands are narrow bands of trees to be placed at the upper elevations in the drainage channel. They provide nesting and roosting habitat along the drainage corridor, and will tend to have open understories and large, singular trunks. The trees may be pruned, if desired, so that their lowest branch is above the top of channel. Riparian woodland may extend from a point three feet below the top of bank up to the 10-foot Solano Prairie buffer. The Woodland may feature excavated benches that could increase the channel capacity during peak flows. Black Willow and Cottonwood will be planted in wetter areas, while Valley Oak will be planted in locations that range from wet to dry. The trees should be irrigated for two to three years with a temporary drip irrigation system. At the upper portions of the woodland, out of the drainage channel, a number of shrubs could be placed to provide numerous species of birds with escape cover, feeding roosting and nesting opportunities.

Seasonal Wetland

Wide, low excavated benches alongside of the drainage channel could contain seasonal wetland pools. These pools will be fed from high water in the channel as well as from surface drainage directed into the pool with vegetated swales in the Riparian Woodland bands along the corridor. Seasonal wetland plants may also be located in these swales. Below the high water elevation of the pools will be a submerged bench to be planted mainly with Alkali Bulrush, a lower-growing plant than the Common Tule. Outside of the bench could be planted a ring of sedges and round-stemmed rushes. A four-foot deep pool will be at the center of the basin, which could create an area of open water. It is expected that the wetland could go dry at some point in the summer season, leaving a mud flat in the center.

Willow Thicket

The willow thicket is an important wildlife habitat component, set away from the primary drainage area. We included the less aggressive and shrubby willows in this community. As a transitional planting zone, it is located between the seasonal wetland and the riparian woodland. The dense and low planting could provide important bird habitat. It is expected that no irrigation will be needed for

the willow thicket. By including native California blackberry and wild grape to the plant palette, significant wildlife habitat and aesthetic values will be added to the willow thicket.

Drainage Channel

There are two planting areas located in the drainage channel: The Side Slopes and the Channel Bottom. The native plants selected for these locations will hold the channel soils in place during high flows, but also will tend to be flexible and flatten down to allow for less drag against the water flows. An important plant to be established in this area is Saltgrass. Saltgrass tends to create a rhizomatous turf mat, effectively protecting against erosion. Often found in this area, Saltgrass would be planted in patches along the drainage channel. Another extremely important rhizomatous plant common to naturally occurring drainage ways is Creeping Wild Rye. Because of its commercial availability and, unfortunately, the lack of availability of salt grass propagules, Creeping Wild Rye will be the most significant component of this planting area.

Vernal Pools

Some vernal pools may be destroyed by the construction of the South Channel. The material (plants and soil, in as undisturbed a fashion as possible) from these pools should be salvaged and reapplied as an inoculum in created pools. These pools could be located in slight depressions in the existing grade. Some drainage swales might also be planted with vernal pool inoculum. If possible, inoculum should be acquired from higher-quality pools as a research experiment to see if rare vernal pool wildflowers can be established in the restored pools.

Wildflowers

Wildflowers and a wide variety of broadleaf native plants are an important component of healthy wildlife habitats. The restoration of wildflowers in California habitats is an area worthy of more ongoing research, and we suggest that this work continue with the Dixon South Channel. Current practice for restoration of wildflowers in local grasslands has been to establish the native grasses first, and eliminate the non-native weed stock as best as possible. Following this step, wildflowers are introduced to areas in which thick planting of native grasses has been "burned" back with an application of herbicide. More research is needed to determine the best manner to replicate what may have been the pre-Columbian native California prairies and savannas.

EXISTING INFRASTRUCTURE

Underground natural gas and liquid petroleum pipelines exist in the proposed and alternative alignments, and the depth below the ground surface of these pipelines is unknown (the pipeline owners could not provide that information). Buried fiber optic cables also exist within the proposed and alternative project alignments. Conflicts with these underground facilities are anticipated, and the costs to relocate them included in the project budget.

Above ground power lines also exist within the project alignment. However, these facilities can be avoided and significant conflicts are not anticipated.

ADDITIONAL WORK TO BE COMPLETED

This draft report was issued at this time to help facilitate negotiations between the City of Dixon

and the involved agricultural agencies. The full scope of the conceptual design evaluation has not been completed. The remaining tasks to be competed include:

- Final resolution of the alternative alignments
- Initial meetings or telephone discussions with all of the potentially affected landowners.
- Value engineering review to minimize environmental/wetland/habitat impacts.
- Further evaluation of inclusion of habitat elements to mitigate the environmental/wetland/habitat impacts and to generate environmental/wetland/habitat benefits.
- A wetlands delineation
- A more detailed evaluation of the underground pipelines and fiber optic cable.
- Preparation of detailed aerial photography and one-foot contour mapping of the final project alignment.

Table 1. Summary of Model Results

Location	Model Node	Without EDP & NSC		With EDP & NSC	
		Water Elevation, ft NAVD 1988	Flow, cfs	Water Elevation, ft NAVD 1988	Flow, cfs
30-inch RR Crossing	nnx49a	58.9	22	56.1	135
Tremont 3 at Vaughn Road	nnx37	51.7	97	50.5	154
Tremont 3 at Hackman Road	nnx28a	46.3	266	46.2	330
Tremont 3 above Sikes Road	nnx22	39.6	215	38.8	260
Tremont 3 under Sikes Road			101		82
New Channel			NA		120
Lateral 4 at Lateral 5	rdn8	28.4	50	28.2	120
Lateral B at the V-3 drain	rdn11	24.2	196	22.7	304
Lateral B at Delhi Road	rdn13	20.0	91	19.1	239
Flow in channel to the east			96		68
Dixon Main Drain at Lateral B	dmdn20	18.6	266	17.0	154
Flow into NSC			NA		298
Outlet of NSC at Hass Slough	Hs-n7	8.5	NA	8.6	332
Flow in Hass Slough			398		644

Table 2. Comparison of Road Crossing Optious for a 50 ft wide Road Crossing

Item	30-60 inch RCP	2 – 7' by 5' RCB	RR Car Bridge
RCP/RCB/Bridge	$16,560	$40,200	$44,000
Excavation and Backfill	400 CY @ $25 = $10,000	300 CY @ $25 = $7,500	300 CY @ $3 = $900 (no backfill)
Headwalls (CY of concrete)	20 CY @ $800 = $16,000	12 CY @ $800 = $10,000	NA
Total (rounded)	$43,000	$58,000	$45,000

TABLE 3. HERBACEOUS – Seed Mixes

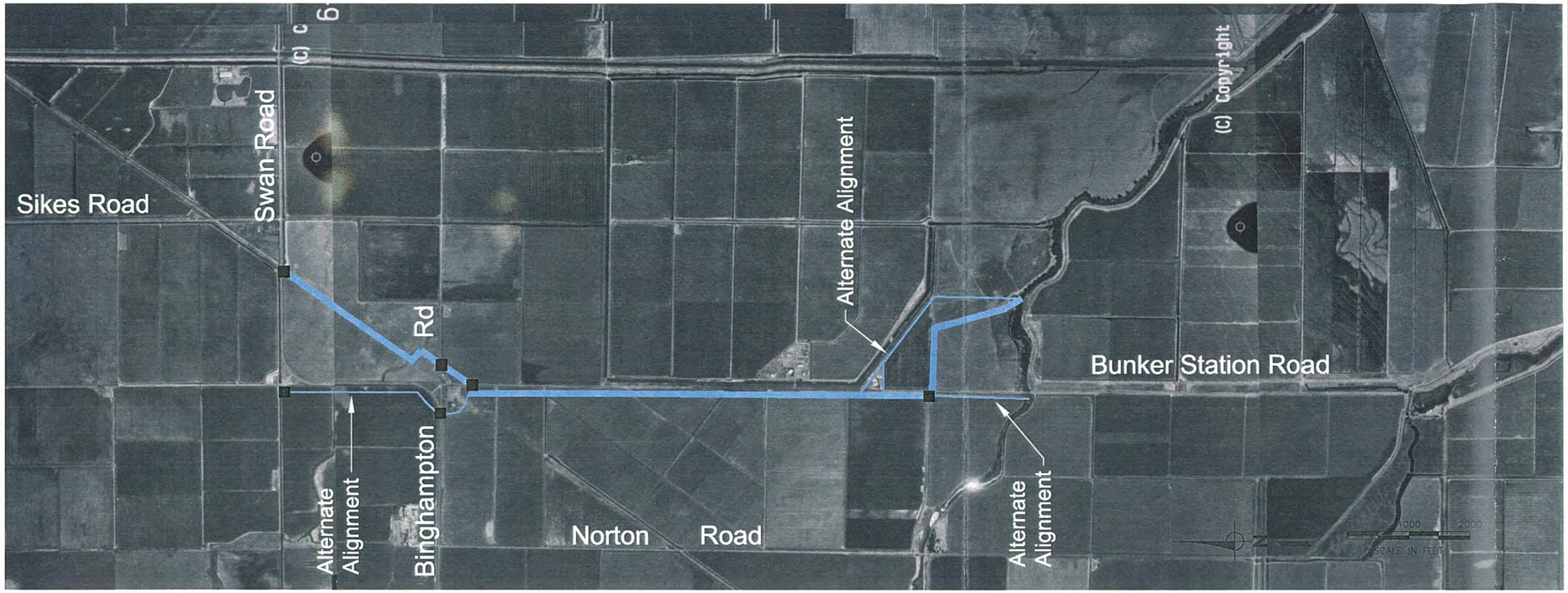
Habitat Type	Common Name	Species Name	Lbs/Ac
Solano Prairie	Purple Needlegrass	*Nassella pulchra*	7
	Nodding Needlegrass	*Nassella cernua*	4
	Blue Wildrye	*Elymus glaucus*	3
	California Oniongrass	*Melica californica*	3
	One-sided Bluegrass	*Poa secunda*	5
	California Barley	*Hordeum californicum*	3
		Total	25
Habitat Type	**Common Name**	**Species Name**	**Lbs/Ac**
Upland Refugia	Purple Needlegrass	*Nassella pulchra*	8
	Blue Wildrye	*Elymus glaucus*	4
	Slender Wheatgrass	*Elymus trachycaulus*	3
	California Oniongrass	*Melica californica*	5
	Big Squirreltail	*Elymus multisetus*	2
	Idaho Fescue	*Festuca idahoensis*	3
		Total	25
Habitat Type	**Common Name**	**Species Name**	**Lbs/Ac**
Riparian Woodland	Creeping Wildrye	*Leymus triticoides*	5
	Meadow Barley	*Hordeum brachyantherum*	3
	Slender Wheatgrass	*Elymus trachycaulus*	7
	California Oniongrass	*Melica californica*	5
	Bent Grass	*Agrostis exerata*	2
	Slender Hairgrass	*Deschampsia elongata*	2
	Deergrass	*Muhlenbergia rigens*	1
		Total	25
Habitat Type	**Common Name**	**Species Name**	**Lbs/Ac**
Channel Side Slope	Creeping Wildrye	*Leymus triticoides*	10
	Blue Wildrye	*Elymus glaucus*	4
	Meadow Barley	*Hordeum brachyantherum*	7 6
		Total	21
Habitat Type	**Common Name**	**Species Name**	**Lbs/Ac**
Channel Bottom	Creeping Wildrye	*Leymus triticoides*	8
	Meadow Barley	*Hordeum brachyantherum*	10
		Total	18
Habitat Type	**Common Name**	**Species Name**	**Lbs/Ac**
Wildflowers/Broadleafs	Miniature Lupine	*Lupinus bicolor*	TBD
	Yarrow	*Achillea millefolium*	TBD
	Other species, locally collected or propagated		TBD
		Total	TBD

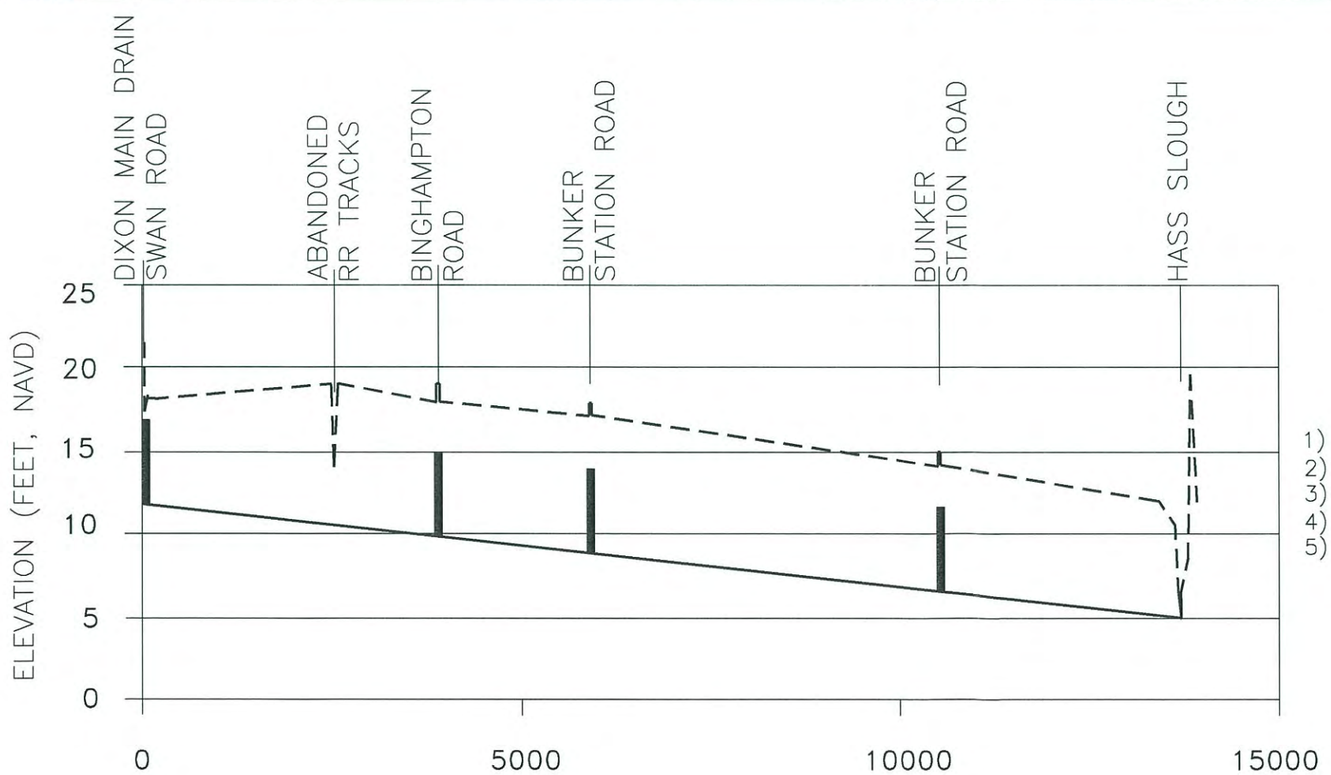
TABLE 4 . HERBACEOUS – Container Plants

Habitat Type	Common Name	Species Name	Qty/Ac	Container
Riparian Woodland	Deergrass	*Muhlenbergia rigens*	100	1 gallon
	Creeping Wildrye	*Leymus triticoides*	25	1 gallon
	California Hibiscus	*Hibiscus californica*	25	DP 40
		Total	150	
Habitat Type	Common Name	Species Name	Qty/Ac	Container
Seasonal Wetland	Barbara Sedge	*Carex barbarae*	25	Plug
	Alkali Bulrush	*Scirpus maritimus*	100	Plug
	Slender Sedge	*Carex praegicilis*	25	Plug
	Soft Rush	*Juncus effussus*	50	Plug
	Flat Bladed Rush	*Juncus xiphioides*	25	Plug
	Spikerush	*Eleocharis macrastachya*	25	Plug
		Total	250	
Habitat Type	Common Name	Species Name	Qty/Ac	Container
Channel Side Slope	Saltgrass	*Distichlis spicata*	100	Plug
		Total	100	
Habitat Type	Common Name	Species Name	Qty/Ac	Container
Channel Bottom	Baltic Rush	*Juncus balticus*	50	Plug
	Spike Rush	*Eleocharis macrastachya*	50	Plug
		Total	100	

TABLE 5. WOODY PLANTS

Habitat Type	Common Name	Species Name	Qty/Ac	DP 40	T-Pot4
Upland Refugia	Valley Oak	*Quercus lobata*	45	67%	33%
	Coyote Brush	*Bacharis pillularis*	20	100%	
	Wild Rose	*Rosa californica*	30	100%	
	Wild Lilac	*Ceanothus sp.*	15		100%
	Interior Live Oak	*Quercus wislizenii*	15	67%	33%
		Total	125		
Habitat Type	Common Name	Species Name	Qty/Ac	DP 40	T-Pot4
Riparian Woodland	Valley Oak	*Quercus lobata*	40	67%	33%
	Black Willow	*Salix goodingii*	10		100%
	Wild Rose	*Rosa californica*	15	100%	
	Cottonwood	*Populus fremontii*	20		100%
	Mule Fat	*Bacharis viminea*	20	100%	
		Total	105		
Habitat Type	Common Name	Species Name	Qty/Ac	DP 40	T-Pot4
Willow Thicket	Cottonwood	*Populus fremontii*	15		100%
	Black Willow	*Salix goodingii*	15	67%	33%
	Red Willow	*Salix laevigata*	50	100%	
	Yellow Willow	*Salix lasiandra*	50	100%	
	Blackberry	*Rubus californica*	20	100%	
	Wild Grape	*Vitis californica*	30	100%	
	Mule Fat	*Bacharis viminea*	20	100%	
	Buttonbush	*Cephalanthus occidentalis*	20	100%	
		Total	220		





CHANNEL DIMESIONS

1) BOTTOM WIDTH = 12'
2) DEPTH = 6.5'±
3) SIDE SLOPE = 4H:IV
4) RIGHT-OF-WAY WIDTH = 100'
5) EXCAVATED MATERIAL WILL BE PLACED ALONGSIDE THE CHANNEL

LEGEND:

PLAN

- PROPOSED NEW CHANNEL/WETLAND
- ALTERNATE CHANNEL ALIGNMENT
- ROAD CROSSING

PROFILE

- PROPOSED FLOW LINE
- EXISTING GROUND & PROPOSED TOP OF BANK
- TRIPLE BARREL 60" CULVERT

Figure 1

NEW SOUTH CHANNEL CONCEPTUAL DESIGN

PROPOSED AND ALTERNATE ALIGNMENTS

WEST YOST & ASSOCIATES

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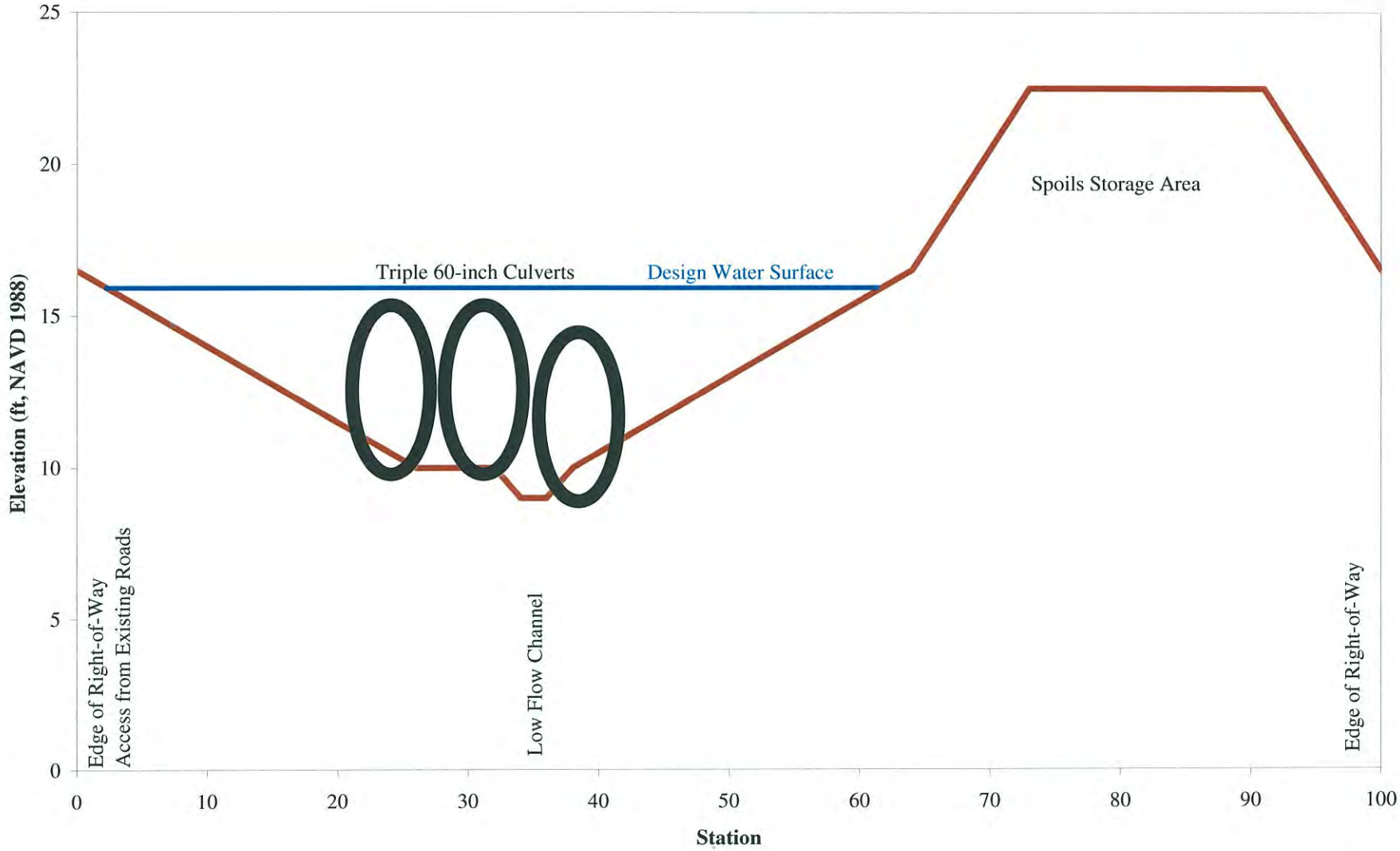
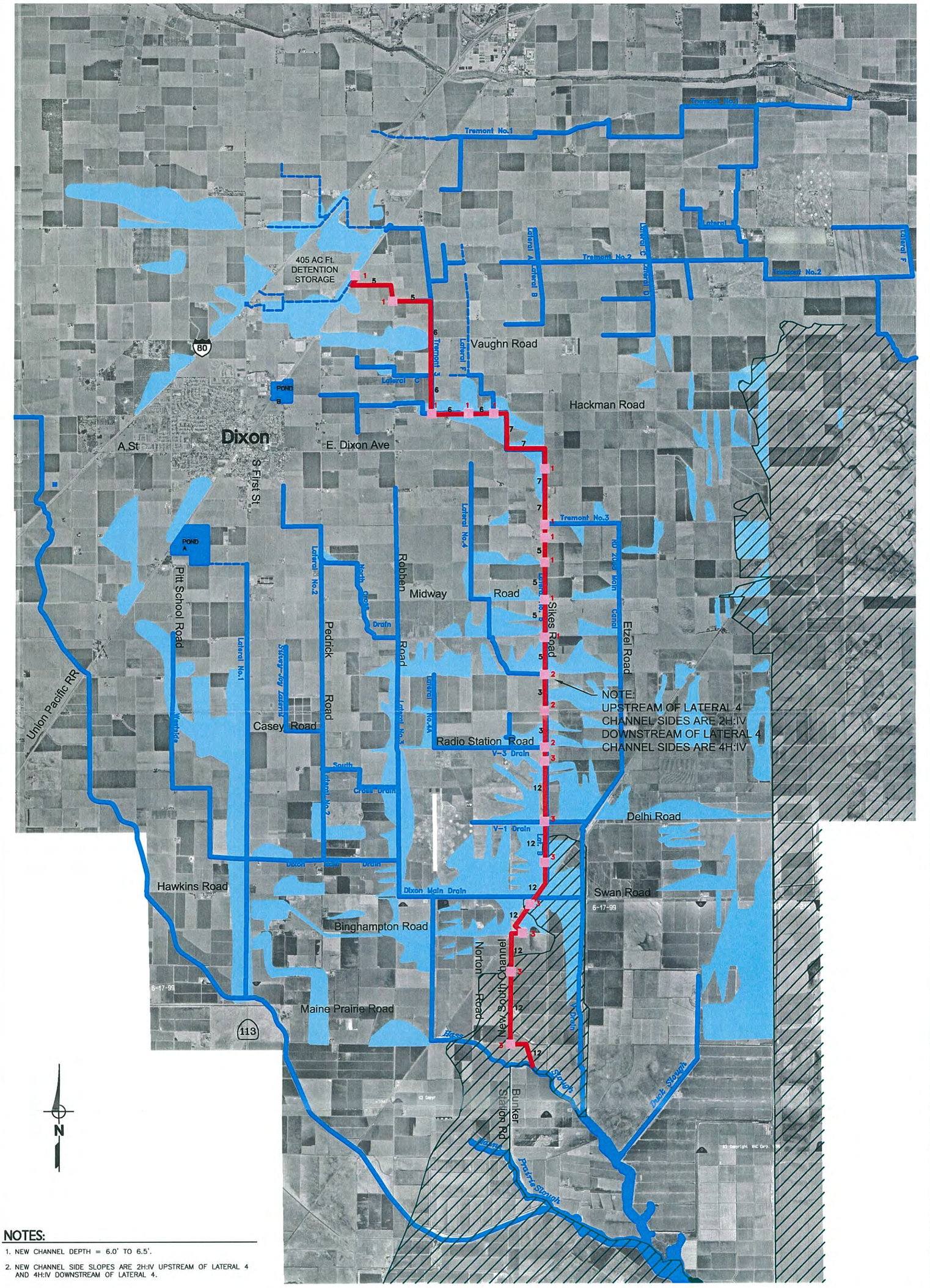
Figure 2. New South Channel Cross Section





NOTES:

1. NEW CHANNEL DEPTH = 6.0' TO 6.5'.
2. NEW CHANNEL SIDE SLOPES ARE 2H:IV UPSTREAM OF LATERAL 4 AND 4H:IV DOWNSTREAM OF LATERAL 4.

LEGEND:

- Drainage channel maintained by district
- Drainage channel not maintained by districts
- Areas of localized flooding
- Yolo Bypass flooding
- 12 Project alignment and channel bottom width
- 2 Add 60" RCP culverts with number of barrels shown, or add other structure with equivalent capacity

Figure 3

New South Channel
Conceptual Design

EASTSIDE DRAINAGE PROJECT AND NEW SOUTH CHANNEL, 135 cfs NEQ DISCHARGE OPTION

WEST YOST & ASSOCIATES

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Figure 4. Discharge from the Northeast Quadrant

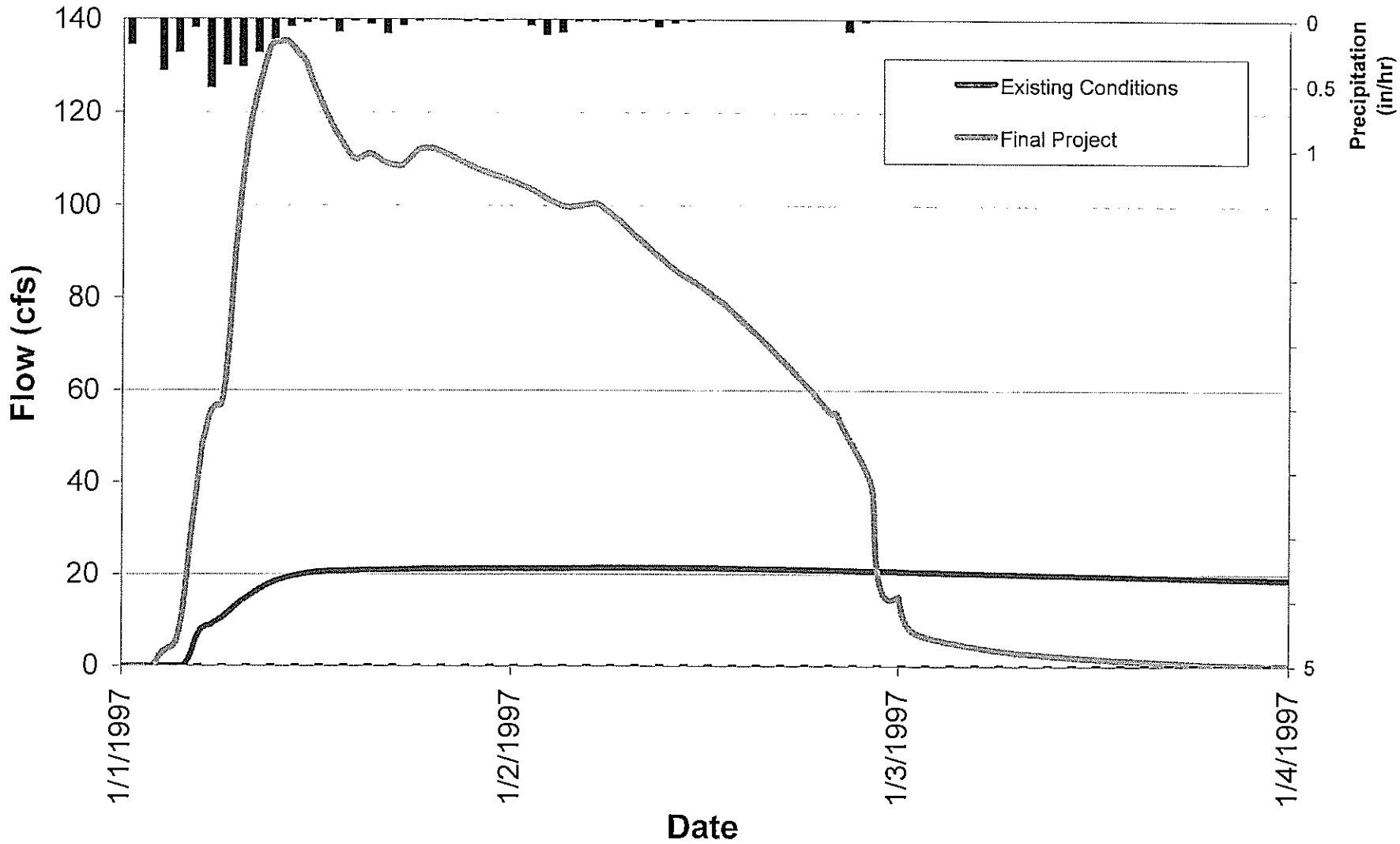


Figure 5. Stagegraph of Tremont 3 at Hackman Road

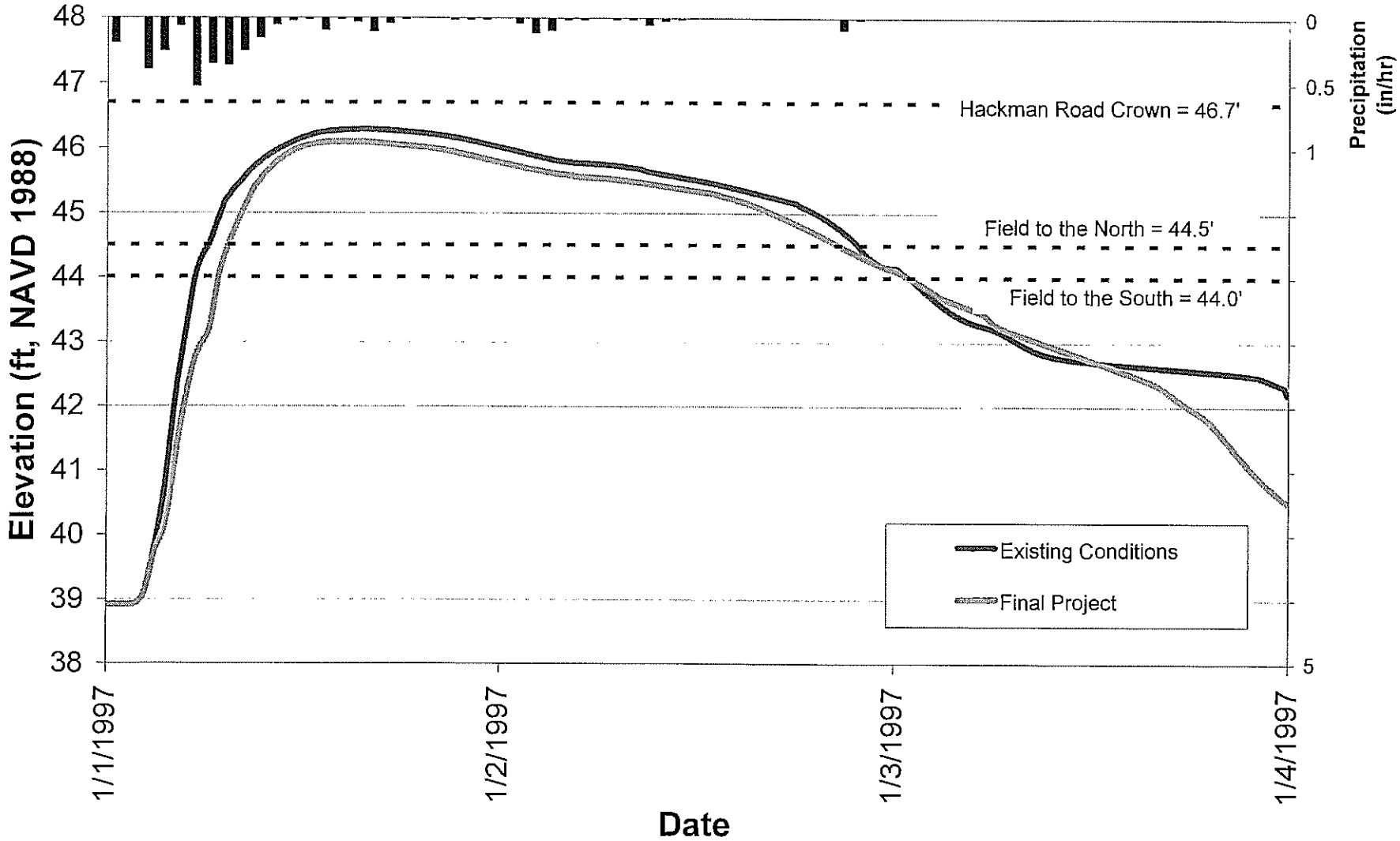


Figure 6. Stagegraph of Tremont 3 at Sikes Road Crossing

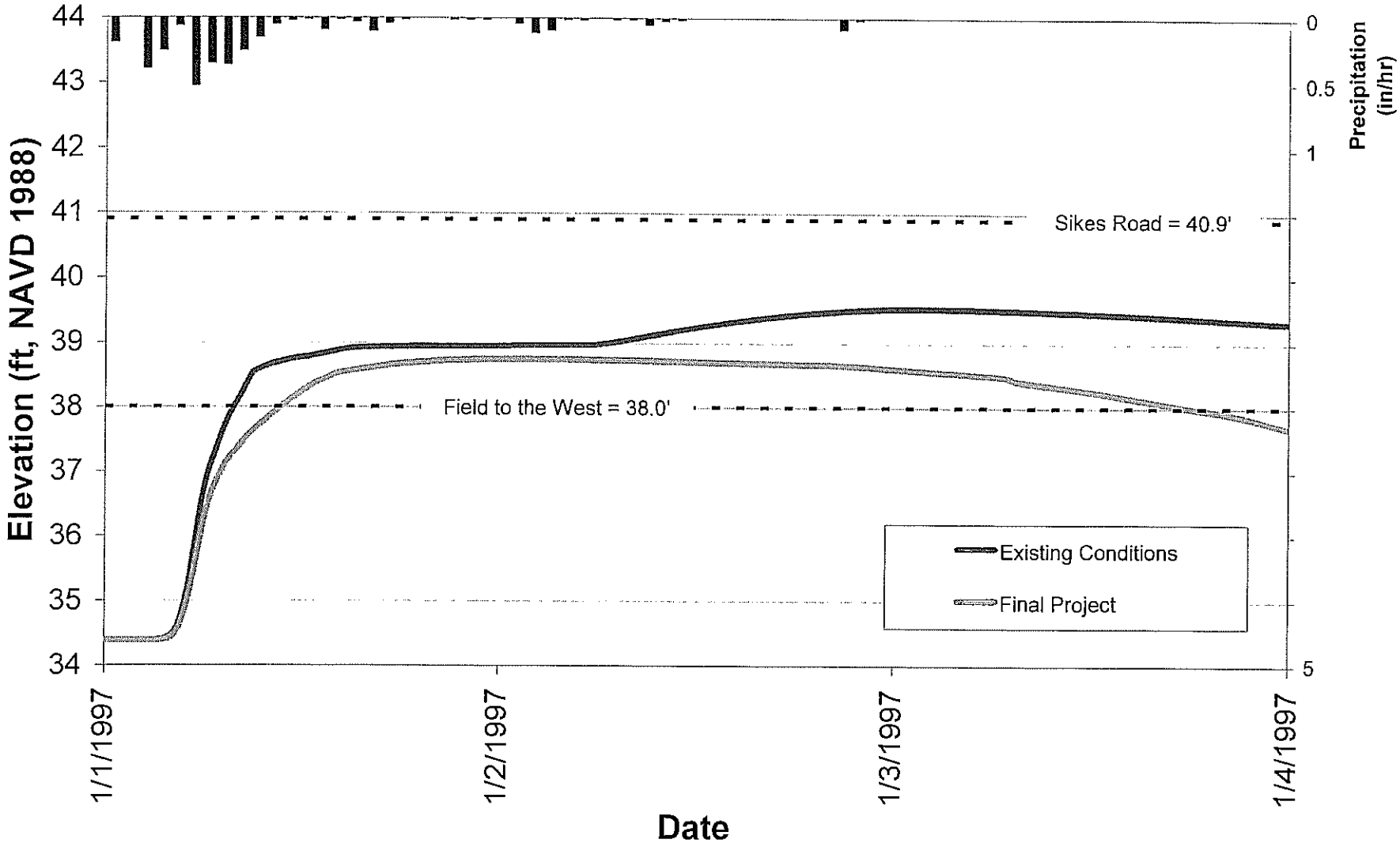


Figure 7. Stagegraph of Lateral 5 at Radio Station Road

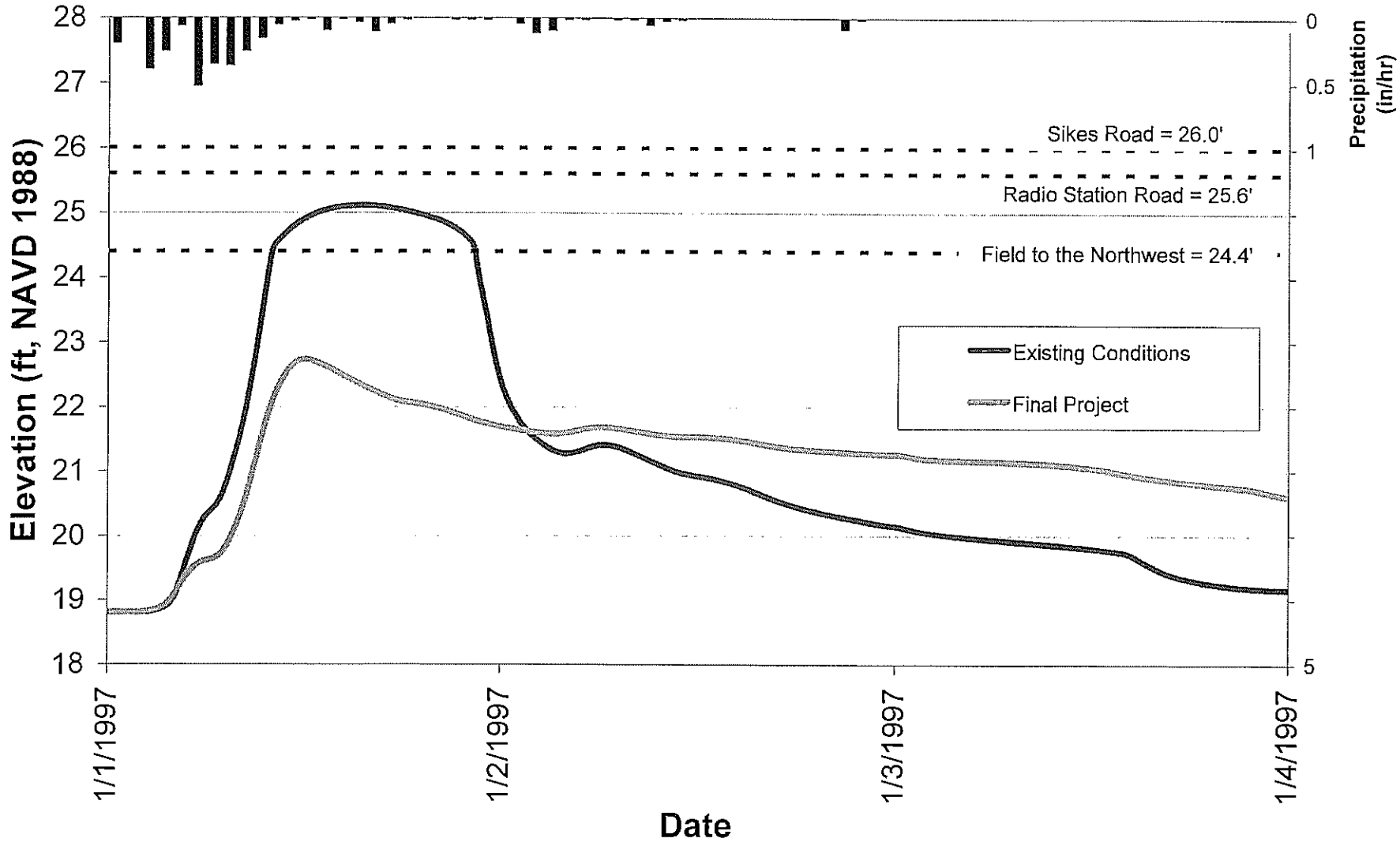


Figure 8. Stagegraph of Dixon Main Drain at New South Channel

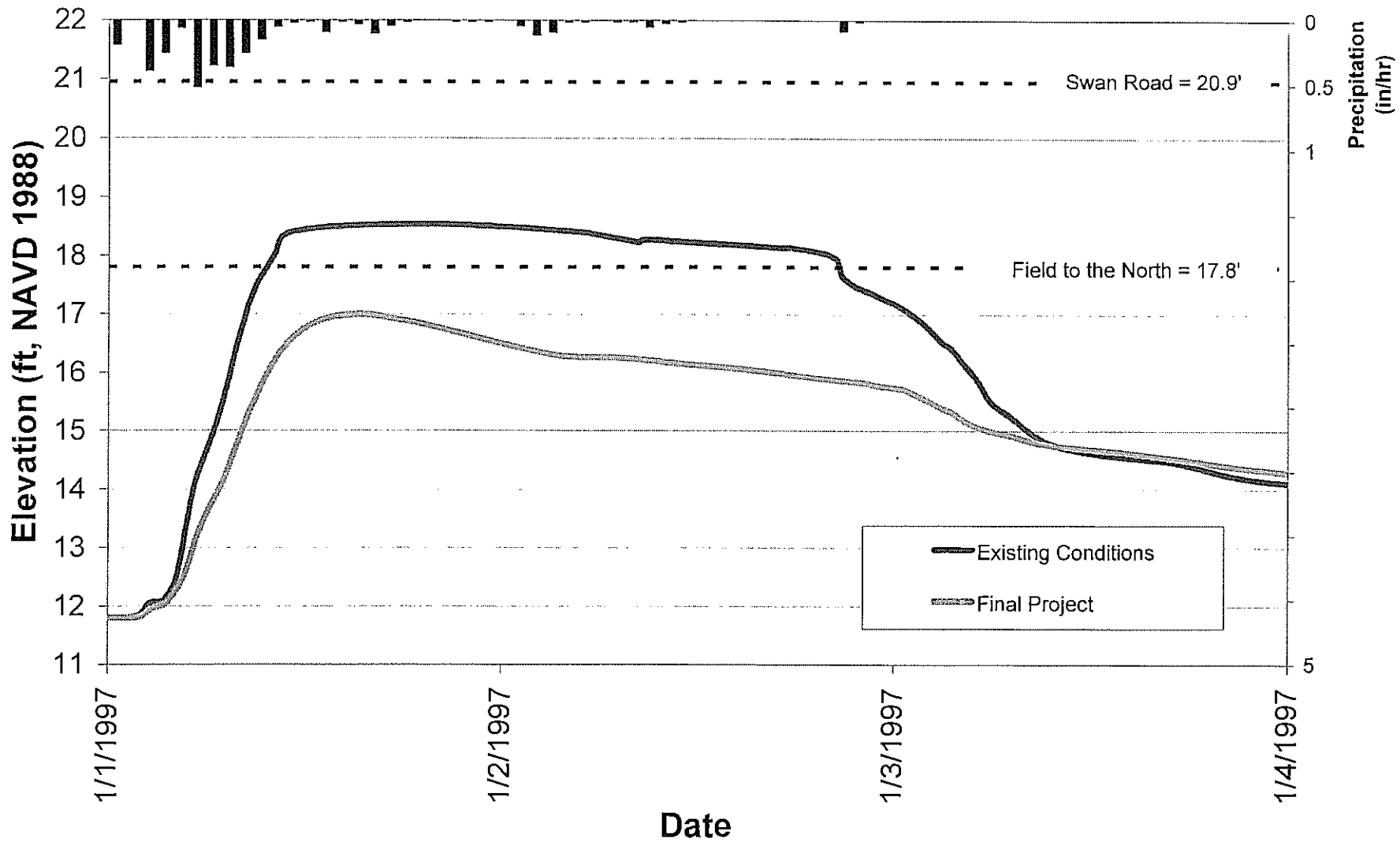
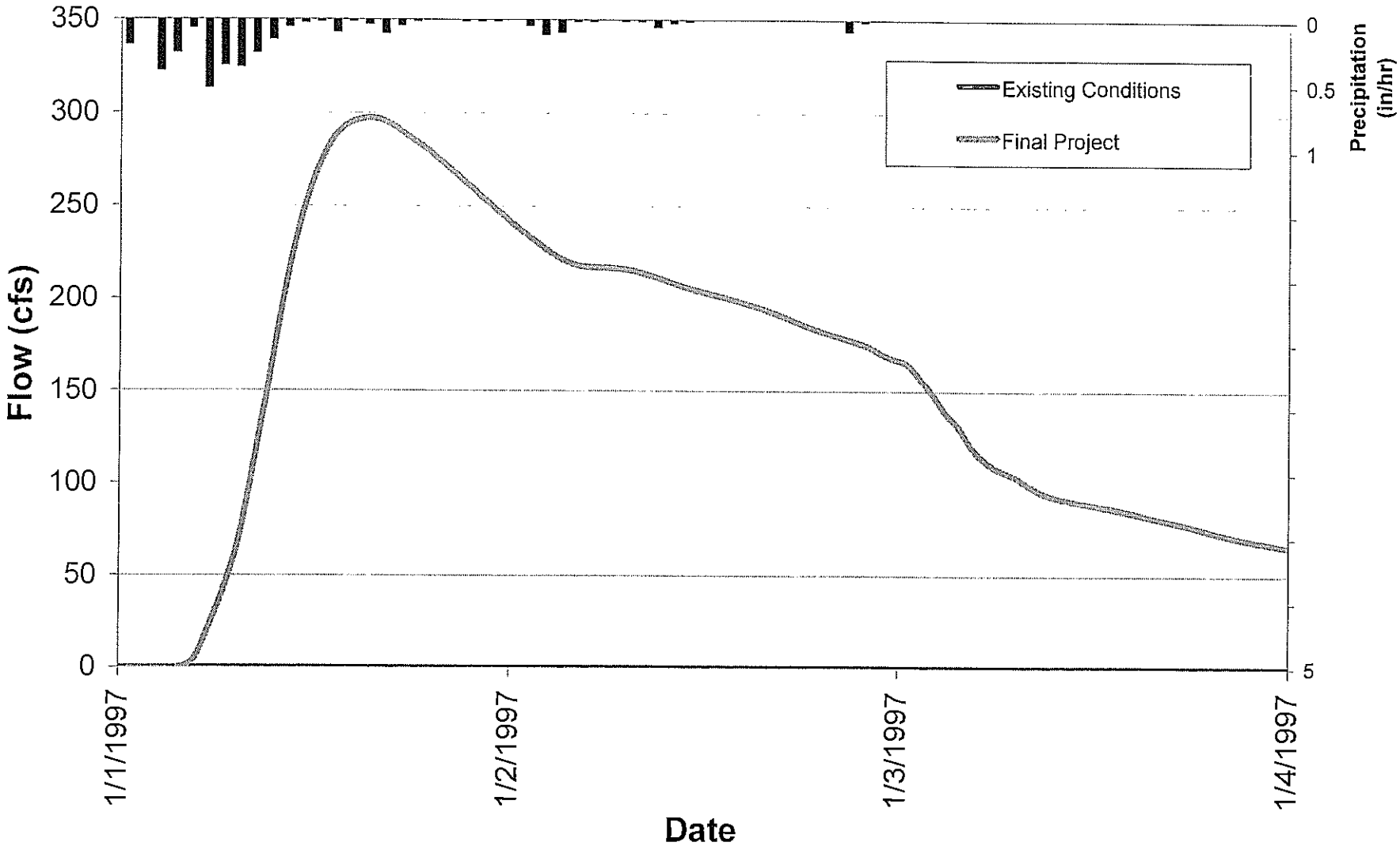


Figure 9. Discharge into the New South Channel



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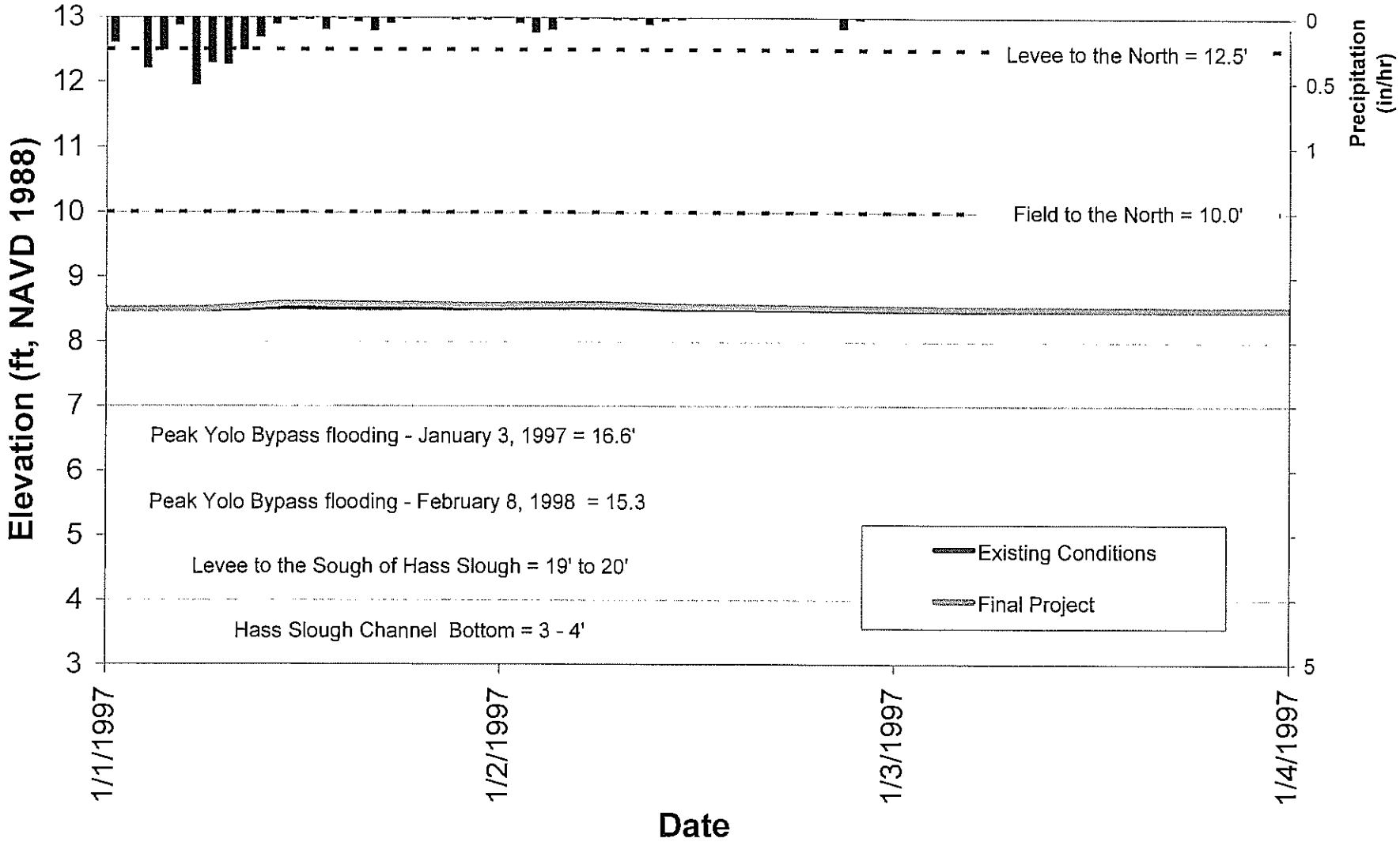
Solano County Water Agency
New South Channel Conceptual Design

Figure 10. Stagegraph of Hass Slough at New South Channel



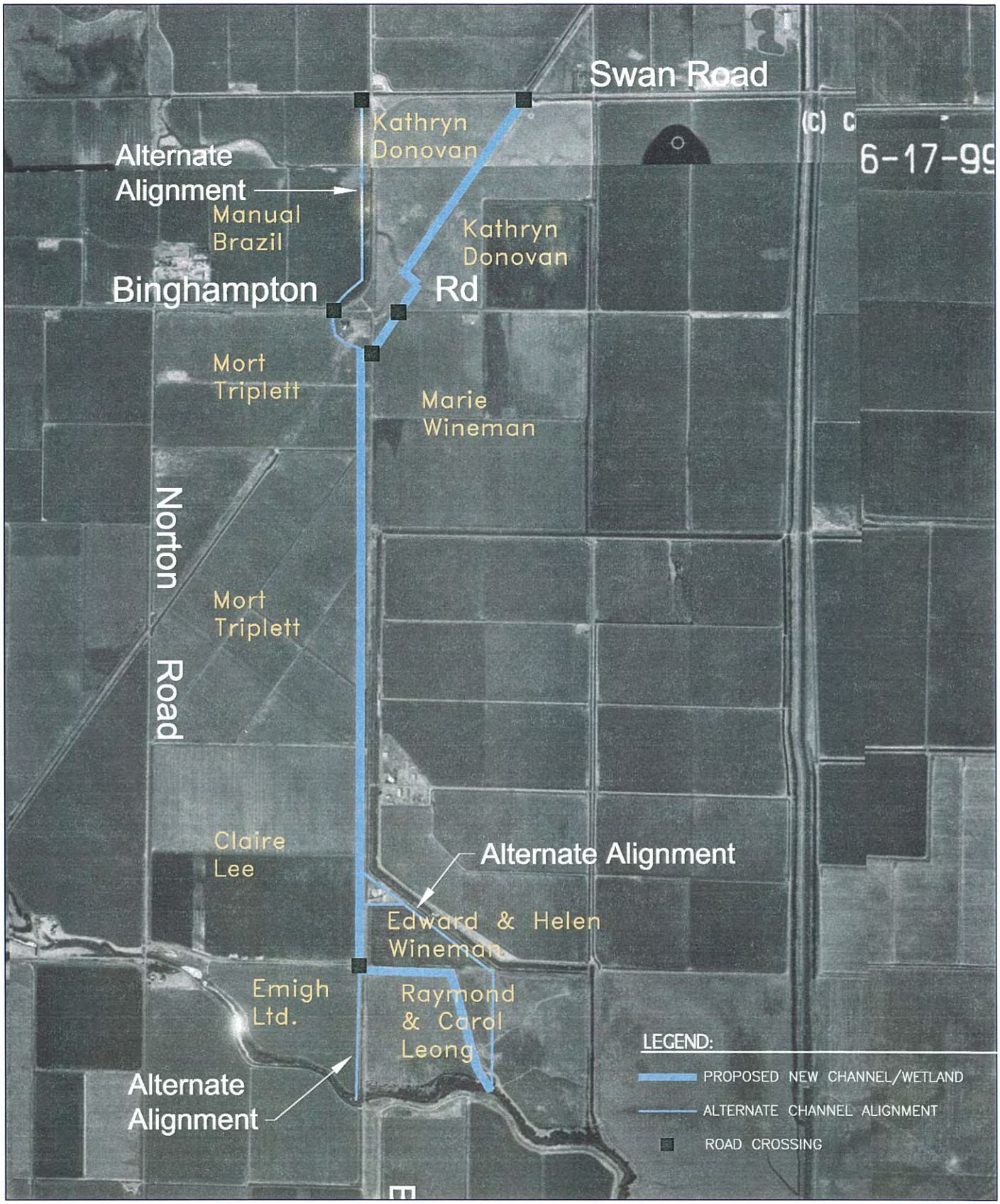


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Figure 11

NEW SOUTH CHANNEL CONCEPTUAL DESIGN

PROPERTY OWNERS

WEST YOST & ASSOCIATES

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Figure 12. Plan View of Straight Channel

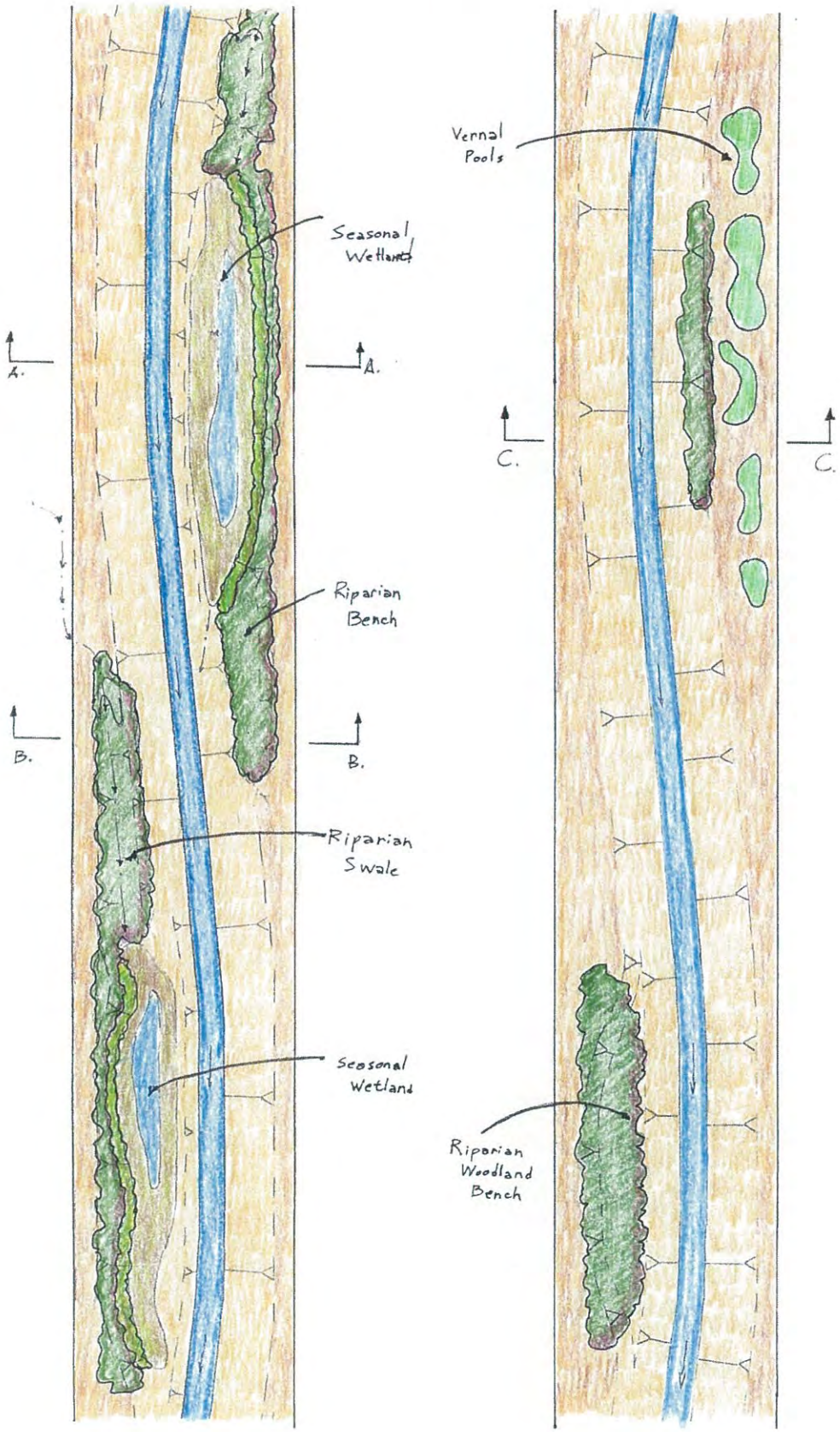


Figure 13. Plan View of Channel Bends

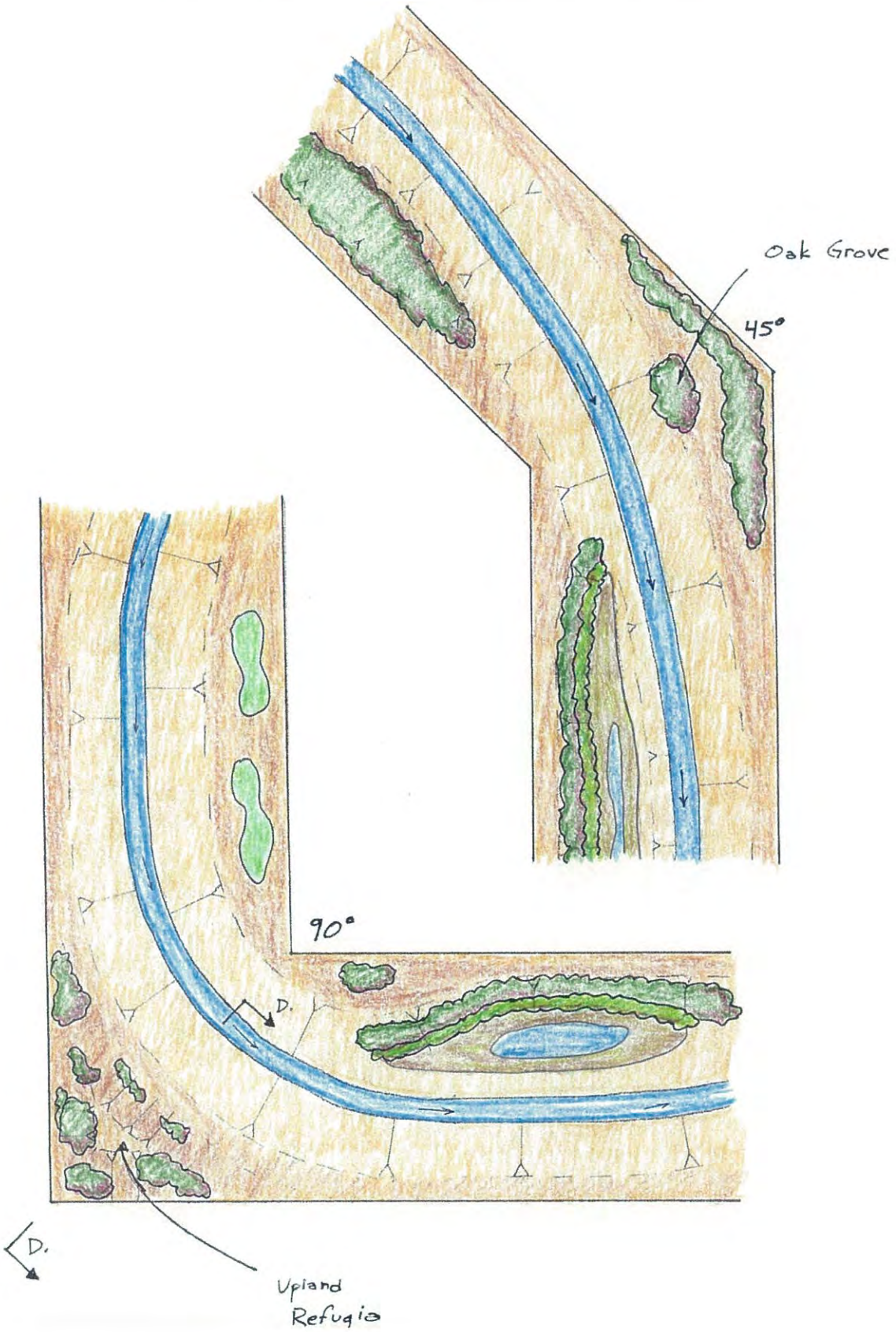


Figure 14. Channel Sections

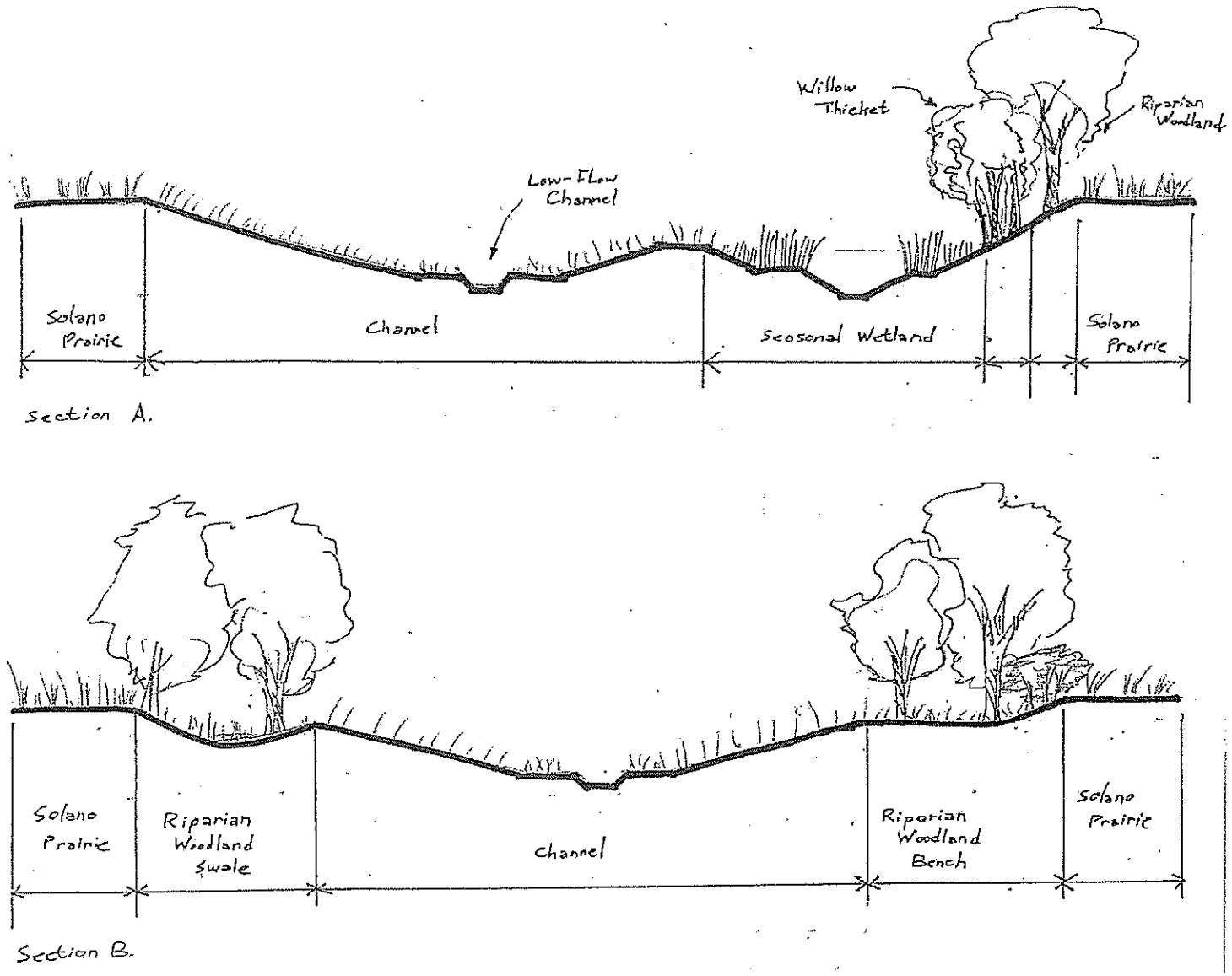
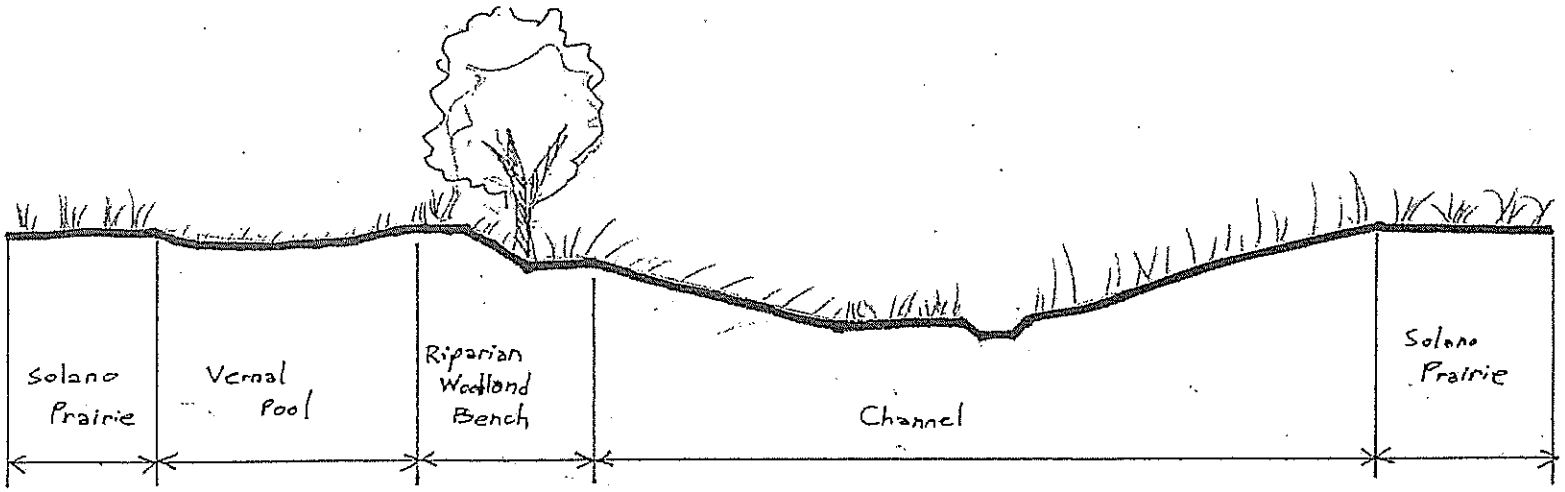


Figure 15. Channel Sections



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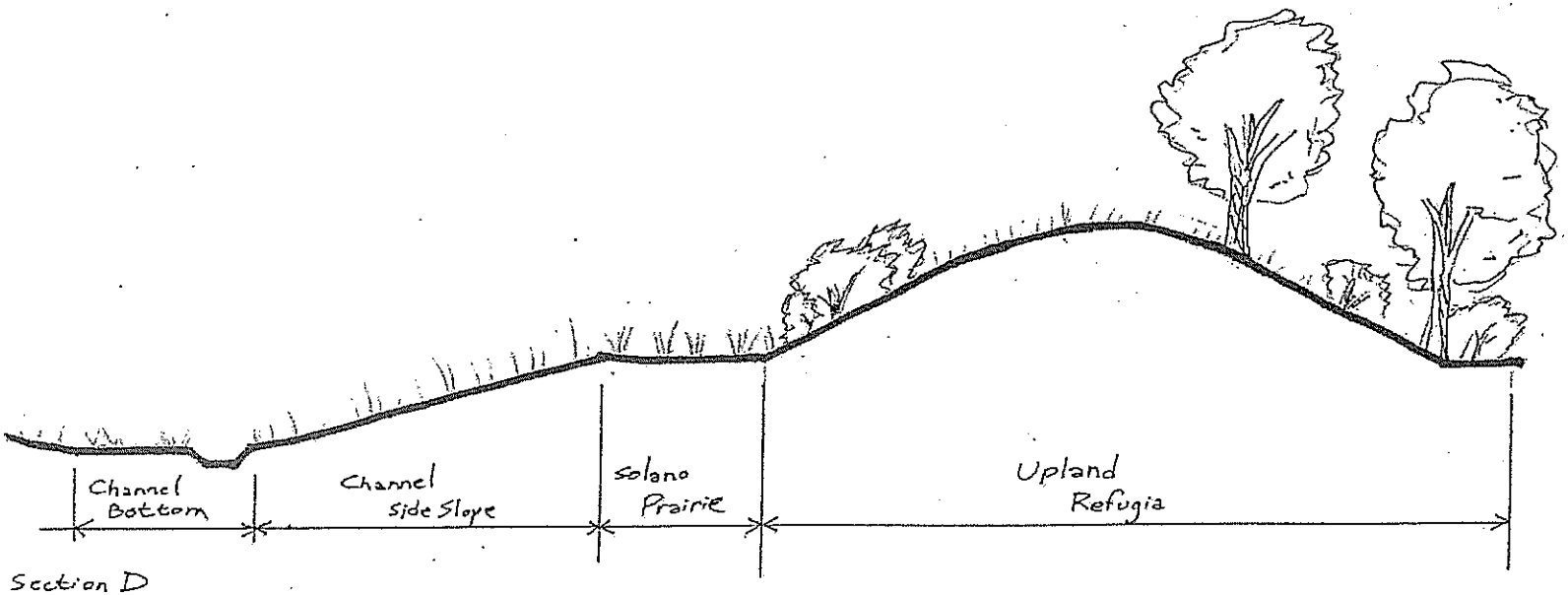

Section D

WEST YOST
ASSOCIATES
Consulting Engineers

June 22, 2006

Mr. John Currey
Secretary, Dixon Watershed Joint Powers Authority
Dixon Resource Conservation District
1170 North Lincoln Street, Suite 110
Dixon CA 95620

Project No.: 298-00-05-01

SUBJECT: Conceptual Design of the New South Channel, Enlarging the Dixon Main Drain and V-Drain, and the Three Mile Extension

Dear John:

West Yost Associates is pleased to present this conceptual design report (CDR). The City of Dixon (City), the Dixon Resource Conservation District, Reclamation District 2068, and the Main Prairie Water District have created the Dixon Regional Watershed Joint Powers Authority (JPA). The first project to be constructed by the JPA is the New South Channel (NSC, as identified in the JPA document) or a comparable channel. The goal of this CDR was to update the cost estimates for the NSC and evaluate an alternative alignment. The alternative alignment evaluated is enlarging the Dixon Main Drain and V-Drain (DMDVD). By comparing the NSC with the alternative alignment, this CDR is intended to identify a preferred alignment so that the project can proceed into detailed design.

This CDR presents sizing calculations and analysis of two different flow rates for both proposed alignments. A capacity of 375 cfs represents the flow rate identified in the JPA document that could be constructed with a grant of $1.1 million from the City (based on a cost estimate prepared in 2002). A capacity of 494 cfs is the flow rate needed south of Swan Road for the JPA recommended Eastside Drainage Project.

Lastly, this CDR is intended to present the final sizing calculations for the Three Mile Extension (3ME), based on regional planning work competed previously.

The locations of the Dixon Regional Watershed channels, including the 3ME, the NSC, the Dixon Main Drain (DMD), the RD 2068 V-Drain, the RD 2068 Intake Canal, and Hass Slough are shown on Figure 1. This CDR includes the following sections:

1. Spreadsheet analysis of the NSC for a capacity of 375 cfs and a capacity of 494 cfs.

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2. Spreadsheet analysis of enlarging the Dixon Main Drain and V-Drain (DMDVD Alignment) as an alternative to the NSC for a capacity increase of 375 cfs and an increase of 494 cfs.
3. Evaluation of the capacity of the V-Drain under the railroad car bridge.
4. Spreadsheet analysis of the 3ME consistent with the JPA Recommended Eastside Drainage Project.
5. Cost estimates.
6. XP-SWMM modeling results.
7. A summary of environmental issues.
8. A comparison of alternatives and an alignment recommendation.
9. Outstanding issues.

SPREADSHEET ANALYSIS - NSC CAPACITY OF 375 CFS AND 494 CFS

NSC Capacity 375

Presented in Table 1 are calculations using Manning's equation to size the NSC for a capacity of just over 375 cfs. As shown, the channel would have a bottom width of 10 feet, side slopes of 4H:1V, a depth of 6.5 feet (water depth of 6 feet and a freeboard of 0.5 feet), a slope of 0.000497 ft/ft, and a Manning's n value of 0.040. This n-value is reasonable for a channel that will have standing water (from high tides) like the NSC will for much of its length. For this channel, the culvert crossings would include triple 60-inch culverts (or a hydraulically equivalent structure), with headwalls encasing the bell end of the pipe in the upstream headwall.

The material excavated from this channel would be stockpiled adjacent to the channel. The cross sectional area of the channel is 234 square feet. The stockpile would be 10 feet tall, with 2H:1V side slopes, and an 8-foot top width. The cross sectional area of the stockpile is about 280 square feet. The stockpile area is 20 percent larger than the channel area because the stockpile would not be compacted. The stockpile would be interrupted at road crossings and/or other possible locations. There would be a maintenance road 12 feet wide between the channel and the stockpile.

NSC Capacity 494 cfs

Presented in Table 2 are calculations using Manning's equation to size the NSC for a capacity of just over 494 cfs. In this case, the bottom width would be 18 feet instead of 10 feet, but the other channel dimensions would be the same as for the 375 cfs channel. The culvert crossings would include four 60-inch culverts (or a hydraulically equivalent structure). The stockpile would be 10 feet tall, with 2H:1V side slopes, and a 15-foot top width.

SPREADSHEET ANALYSIS - ENLARGING DIXON MAIN DRAIN AND V-DRAIN (DMDVD) TO AN INCREASED CAPACITY OF 375 CFS AND 494 CFS

DMDVD Capacity 375

Presented in Table 3 is a spreadsheet analysis of enlarging the Dixon Main Drain and V-Drain (DMDVD) Alignment to provide an increase in capacity of 375 cfs. In Table 3, the yellow lines represent culverts and the white lines represent open channels. This spreadsheet analysis assumes constant hydraulic grade line slopes along the entire lengths of DMD and V-Drain. It also excludes head losses at the culverts and at the railroad car bridge. Nevertheless, it represents a reasonable analysis for comparison with the spreadsheet analysis of the NSC.

Dixon Main Drain

For this spreadsheet analysis, the DMD was divided into three segments between the Swan Road Culverts and the V-Drain. With a Manning's n value of 0.040, the existing capacities of these segments were 198 cfs, 209 cfs, and 316 cfs (from upstream to downstream), with an average capacity of 240 cfs.

These capacities are reasonably consistent with the contractual discharge of 252 cfs from DRCD to RD 2068 at the end of the DMD. The capacities would be very close to the DRCD-RD 2068 contractual limit if a Manning's n value of 0.030 was used, however, it is not known what n-value was used in the original planning of the DMD. The value of 0.040 was used for this analysis to reflect the conditions that may actually occur (summertime flows that allow for significant weed growth) and to provide an equivalent comparison with the previous planning work for the NSC.

For planning the enlargement of the DMD, a target capacity of 615 cfs was used for the entire length of channel between the Swan Road Culverts and the V-Drain. This target capacity is 375 cfs greater than the average existing capacity of 240 cfs. There is very little additional tributary area along this reach of the DMD, so it is reasonable to provide a consistent capacity along this reach of channel. This increase in capacity would be achieved by providing a bottom width of 6 to 8 feet, increasing the channel depth by about 2 feet, and reducing the side slope of the south bank to 4H:1V. The north bank (next to Swan Road) would not be changed. The details of the channel enlargement are presented in Table 3.

V-Drain

For this spreadsheet analysis, the V-Drain was divided into eight segments between the Swan Road Culverts and the RD 2068 intake canal. With a Manning's n value of 0.040, the existing capacities of these segments ranged from 673 cfs to over 1,900 cfs, with an average capacity of 1,132 cfs.

For planning of the enlargement of the V-Drain, a target capacity of 1,518 cfs was used for the entire length of the V-Drain. This target capacity includes the average capacity of 1,132 cfs, the increase of 375 cfs, and 11 cfs for the runoff from the local tributary areas. This is not intended to place a limit on the runoff from the adjacent properties to 11 CFS. This increase in capacity would be achieved by providing a bottom width of 26 to 40 feet, increasing the channel depth at some locations by up to about 1.5 feet, and reducing the side slope of the west bank to 4H:1V.

The east bank (next to the RD 2068 Main Canal) would not be excavated. The details of the channel enlargement are presented in Table 3.

RD 2068 Intake Canal

The existing capacity of the RD 2068 Intake Canal ranges from about 1,730 cfs to over 4,000 cfs. This capacity is at least 212 cfs greater than the target capacity for the V-Drain, and would provide more than adequate capacity for the additional tributary area of less than 1.5 square miles. Consequently, based on this spreadsheet capacity analysis, no improvements would be required for the intake canal. At the discharge from the V-Drain to the Intake Canal, the V-Drain makes a 90 degree bend, which causes erosion of the channel bank and levee on the east side of the Intake Canal. The degree of the bend would be reduced significantly to reduce the erosion of east channel bank/levee.

DMD VD Capacity 494 cfs

Presented in Table 4 is a spreadsheet analysis for enlarging the DMDVD Alignment to provide an increase in capacity of 494 cfs. In Table 4, the yellow lines represent culverts and the white lines represent open channels.

Dixon Main Drain

For planning this enlargement of the DMD, a target capacity of 734 cfs was used for the entire length of channel between the Swan Road Culverts and the V-Drain. This target capacity is 494 cfs greater than the average existing capacity of 240 cfs. This increase in capacity would be achieved by providing a bottom width of 7.5 to 12.5 feet, increasing the channel depth by about 2 feet, and reducing the side slope of the south bank to 4H:1V. The north bank (next to Swan Road) would not be changed. The details of the channel enlargement are presented in Table 4.

V-Drain

For planning the enlargement of the V-Drain, a target capacity of 1,637 cfs was used for the entire length of the V-Drain. This target capacity includes the average capacity of 1,132 cfs, the increase of 494 cfs, and 11 cfs for the runoff from the local tributary areas. This increase in capacity would be achieved by providing a bottom width of 31 to 45 feet, increasing the channel depth at some locations by up to about 1.5 feet, and reducing the side slope of the west bank to 4H:1V. The east bank (next to the RD 2068 Main Canal) would not be changed. The details of the channel enlargement are presented in Table 4.

RD 2068 Intake Canal

The existing capacity of the RD 2068 intake canal ranges from about 1,730 cfs to over 4,000 cfs. Consequently, based on this spreadsheet capacity analysis, no improvements would be required for the intake canal. However, the degree of the bend in the V-drain at the discharge into the intake canal would be reduced significantly.

CAPACITY OF THE V-DRAIN UNDER THE RAILROAD CAR BRIDGE

The location of the existing private railroad car bridge over the V-drain is shown on Figure 1. Cross sections of the V-Drain at the upstream and downstream ends of the bridge are shown in Figure 2. Also shown on Figure 2 is a cross section of the V-Drain about 200 feet downstream of the bridge. The cross sectional area under the bridge is about 286 square feet.

Presented in Table 5 is a summary of the estimated head loss through the railroad car bridge along the V-Drain for flow rates of 1,132 cfs (average existing capacity of the V-Drain), 1,518 cfs (an increased capacity of 375 cfs), and 1,637 cfs (an increased capacity of 494 cfs). This analysis includes an entrance loss (based on a K_e of 0.2), a friction loss for flow under the bridge (with a Manning's n of 0.040) and an exit loss (based on K_{ex} of 1.0). Under existing conditions, for a flow rate of 1,132 cfs, the head loss under the bridge would be about 0.2 feet. For a flow rate of 1,518 cfs, and the V-Drain enlarged for this increased flow, the head loss for the bridge would be about 0.4 feet. For a flow rate of 1,637 cfs, and the V-Drain enlarged for this increased flow, the head loss for the bridge would be about 0.5 feet.

The available head loss for the hydraulic grade line along the length of the V-drain is about 6.5 feet. Even at a flow rate of 1,637 cfs, the head loss through this bridge represents less than 10 percent of the available head. This headloss could be included in the spreadsheet capacity analyses presented above without significantly changing the findings of the analyses.

As shown in Table 5, the water velocity for this range of flows ranges 4.0 to 5.7 feet per second. This velocity exceeds the typical maximum flow rate for earth lined channels of about 4 to 5 feet per second. The sides of the channel under the bridge are concrete, and can withstand this higher velocity. The channel bottom should be over excavated and riprap should be placed to prevent erosion of the channel bottom.

Consequently, it is concluded that the bridge provides adequate conveyance capacity for the range of flows that are under consideration, and the bridge does not need to be replaced.

SPREADSHEET ANALYSIS - 3ME CONSISTENT WITH THE JPA RECOMMENDED EASTSIDE DRAINAGE PROJECT

Presented in Table 6 is a spreadsheet analysis of the 3ME that is consistent with the planning of the JPA Recommended Eastside Drainage Project. In Table 6, the yellow lines represent culverts and the white lines represent open channels. As shown, targeted channel capacities range from 344 cfs to 474 cfs. The actual channel capacities rage from 343 cfs to over 500 cfs. This channel would have bottom widths of 4 to 12 feet, side slopes of about 2H:1V on the east side (along Sikes Road) and 4H:1V on the west side. The channel would have depths of 6 to 7 feet. The actual channel capacities exceed the target capacities somewhat to ensure that the channel continues to get larger moving downstream as additional areas drain into the channel.

The culverts upstream of Radio Station Road would be double barrel 72-inch RCP culverts (or an equivalent other structure if adequate cover is not available). The Radio Station Road and downstream culverts would be triple 72-inch RCP culverts (or an equivalent structure). Conspan Bridge structures were also considered for this channel, but the cost for the bridges was about

5 percent higher than for the pipes. A cost differential of 5 percent is within the error of this level of cost estimating. Consequently, if there are reasons to shift to the Conspan bridges as the project progresses through detailed design, the cost differential would not be significant.

COST ESTIMATES

Construction and total capital cost estimates for the NSC with capacities of 375 cfs and 494 cfs are presented in Tables 7 and 8. As shown in Table 7, the total estimated capital cost for the NSC with a capacity of 375 cfs is $1.55 million. As shown in Table 8, the total estimated capital cost for the NSC with a capacity of 494 cfs is $1.81 million. These cost estimates include costs for construction of the channel and culverts, a sediment basin, and revegetation of the disturbed areas. The cost estimated does not include contingency (to be consistent with the agreement in the JPA document).

Construction and total capital cost estimates for the DMDVD Alignment with increases in capacity of 375 cfs and 494 cfs are presented in Tables 9 and 10. As shown in Table 9, the total capital cost for an increase in capacity of 375 cfs is $1.74 million. As shown in Table 10, the total capital cost for an increase of capacity of 494 cfs is $1.90 million. These cost estimates include costs for construction of the channel and culverts, a sediment basin, and revegetation of the disturbed areas. The cost estimated does not include contingency (to be consistent with the agreement in the JPA document).

Both the NSC and the DMDVD alignments cross existing underground transmission pipelines for oil, fuel and gas and other utilities. The NSC alignment crosses these utilities at the old railroad crossing and the DMDVD alignment crosses them at Swan Road. The depth of the existing pipelines at the crossings cannot be determined from the available as built information, so the extent of any conflicts cannot be determined at this time. Both alignments also cross smaller existing utilities. Existing utilities will need to be located in the in field in order to determine the extent of the conflict with the proposed channels. An allowance of $80,000 for Existing Facilities Conflicts is included in the cost estimate for both alignments. This cost could increase or decrease depending on the actual depth of the existing facilities at the crossing. Because the major potential for conflict for both alignments is with the same transmission pipelines, it has been assumed that the cost will be the same with both alignments.

Attachment A presents a cost comparison for use of multi-barrel 60-inch RCPs versus using Conspan precast bridges. As shown by this analysis, the cost of the Conspan bridges is about 6 to 21 percent lower than 60-inch RCPs. Attachment A also compares the cost of using multi barrel corrugated metal pipe (CMP) versus multi barrel RCPs. As discussed in Attachment A the initial construction cost with CMPs is 20 to 29 percent lower than RCPs, however the CMPs will most likely require replacement at least once over the project's design life. When replacement cost is included, the CMP option is actually 15 to 20 percent higher than the CMP.

These cost estimates for the DMDVD Alignment include costs for purchasing easements in addition to the existing easements. At this time, documentation of the width of existing easements for the DMD has not been located, and it has been assumed that an easement over the entire channel will be required. For the V-Drain, the existing easement covers both the main canal and the V-Drain (Mike Hardesty, December 28, 2005), and includes:

- For 1 mile south of Swan Road, the easement is 182.5 feet. The width of the main canal, from toe to toe is about 180 feet, so it has been assumed that the easement covers the main canal, and does not cover the V-Drain. For this reach, it has been assumed that an easement covering the entire V-Drain and stockpile will be needed.
- From 1.0 to 1.75 miles south of Swan Road, the easement gradually increases in width from 182.5 to 280 feet. In this reach, the main canal and the V-drain have a combined width of about 250 feet. For this reach, it has been assumed that, on the average, there is an easement covering the eastern 50 feet of the V-drain, and an additional easement is needed.
- From 1.75 miles south of Swan Road to about the RD 2068 pumping plant, the easement width is 280 feet. In this reach, the main canal and the V-drain have a combined width of about 250 to 270 feet. In this reach, it has been assumed that the existing easement covers 100 feet of the V-Drain, and an additional easement is needed.
- South of the RD 2068 pumping plant, the easement width is 250 feet. The intake canal and levee range in width from about 200 to 240 feet. For this reach, it has been assumed that the existing easement covers 30 feet of the V-Drain, and an additional easement is needed.

At this time, RD 2068 may own easements beyond those identified above, but documentation of additional easements has not yet been located. The unit cost for acquiring easement was estimated to be $7,000 per acre. No appraisals of property valves were done for either alignment.

The level of accuracy for cost estimates in the planning stages of a project is plus or minus 20 percent. In these estimates several factors contribute to the level of accuracy. As stated above, the extent of conflicts with existing utilities cannot be determined at this time. The height of groundwater in the different areas has not been verified through geotechnical investigation, so assumptions made in the estimates as to the amount of wet and dry excavation will have an impact on the estimated cost. Also, additional easement documentation may be located for the V-Drain. Cost of construction will fluctuate with the economy as will the cost of land and easement acquisition.

The estimated cost of the DMDVD Alignment is 11 percent higher than the estimated cost of the NSC for capacities of 375 cfs and 5 percent higher for capacities of 494 cfs. The difference in cost between the two alignments falls within the level of accuracy of the estimate; therefore, the project cost for the two alignments is essentially the same.

Presented in Table 11 are construction and total capital cost estimates for the 3ME. As shown, the estimated construction cost is $790,000 and the estimated capital cost is $1.28 million. The construction cost includes an $80,000 allowance for relocating one half to one mile of existing gas feeder pipeline. The actual cost for this work could increase or decrease. The pipeline will need to be located in the field in order to determine the extent of any conflicts. It is also possible that the owner of the pipeline would be obligated to relocate it (or a section of it) free of charge. The total capital cost includes $252,000 for purchase of easements. If existing easements can be documented and if the easements are adequate for enlarging the channel, then this cost would be reduced.

The project costs for the DMDVD, the NSC, and the 3ME could be reduced by eliminating the wingwalls/headwalls from the project designs.

XP-SWMM MODEL RESULTS

Preliminary modeling results for the DMDVD Alignment are presented in Attachment B. These results include profiles of the DMD, V-Drain, and RD 2068 Intake Canal (from the Swan Road Culverts to Hass Slough).

- Attachment B1 presents a profile for existing conditions with a steady state flow of 240 cfs in the DMD and a steady state flow of 775 cfs in the V-Drain. A tail water elevation in Hass Slough of 8.5 feet was assumed, which represents a very high tide, but not flooding of the Yolo Bypass. A Manning's n value of 0.040 was used. As shown, at this flow rate the walkway over the V-Drain would have been overtopped by about 1.5 feet. The private railroad car bridge would have had about 1.6 feet of freeboard.
- Attachment B2 presents a profile for existing conditions with a steady state flow of 240 cfs in the DMD and a steady state flow of 1,132 cfs in the V-Drain. A tail water elevation in Hass Slough of 8.5 feet was assumed. A Manning's n value of 0.040 was used. As shown, at this flow rate the walkway over the V-Drain would have been overtopped by about 2.6 feet. The private railroad car bridge would have had about 0.4 feet of freeboard.
- Attachment B3 presents a profile for the DMDVD Alignment with the capacity increased by 375 cfs, with a steady state flow of 615 cfs in the DMD and a steady state flow of 1,518 cfs in the V-Drain. A tail water elevation in Hass Slough of 8.5 feet was assumed. A Manning's n value of 0.040 was used. As shown, at this flow rate the walkway over the V-Drain would have been overtopped by about 0.6 feet. The private railroad car bridge would have had less than 0.1 foot of freeboard.

ENVIRONMENTAL ISSUES

An evaluation of potential biological resources was prepared by Jones and Stokes to help determine if the NSC or DMDVD alignments would present significantly different potential biological impacts. In the *Biological Resource Evaluation for the New South Channel Project* (December 2005) it was determined that for most biological/permitting issues, the alignments are not significantly different. However, there is potential vernal pool fairy shrimp habitat along the NSC Alignment and none along the DMDVD Alignment. Similarly, it was determined that there is potential California tiger salamander habitat along the NSC Alignment and none along the DMDVD Alignment. These are minor differences in potential habitat, the actual presence of the species was not determined. It was concluded that given the level of evaluation, in terms of biological resources, the DMDVD Alignment and the NSC Alignment are not significantly different.

COMPARISON OF NSC AND DMDVD ALIGNMENT

A comparison of the NSC and DMDVD are presented in Table 12. As discussed above, the costs for the two alignments are essentially the same.

Based on cost and other technical issues such as channel performance and biological issues there is no clearly preferred alignment. Several of issues are the same with both alignments but the issue will affect different landowners or entities. An example of this is the difficulty of acquiring right-of-way.

Please call if you have any questions or comments.

Sincerely,

WEST YOST ASSOCIATES

Douglas T. Moore
Principal Engineer

DTM:nmp

attachments

ATTACHMENT A

Comparison of BridgeTek Conspan Bridge Systems with Multi-Barrel Culverts

Provided in A1 through A6 are cost comparison of BridgeTek Conspan Bridge Systems with multi-barrel 60-inch culverts. These comparisons are discussed below.

- Table A1 – This table provides a comparison for a 32-foot road crossing using triple 60-inch RCP culverts versus a single 6-foot by 14-foot Conspan Bridge.

  The cost of culverts is based on $5 per inch diameter per lineal foot. Also included is the cost for cast in place headwalls. As shown, the total cost for the pipe crossing is $52,800. Twin 72-inch pipes were also considered, but they would not provide quite the same capacity as triple 60-inch pipes, may present problems achieving adequate cover, and would only cost slightly less than the equivalent Conspan unit.

  The selected Conspan bridge structure provides about the same flow area (for all Conspan bridges, it was assumed that the bridge footings would be buried 1 foot deep) as the triple culverts, but because the Conspan unit is a single barrel, the capacity of the Conspan unit would be about 10 percent greater than the RCP culverts (typical of all the Conspan units in these comparisons). As shown, the cost for the Conspan unit is about $49,700, which is about 6 percent lower than the cost of the pipe crossing. However, at this level of analysis, this cost differential is essentially insignificant.

  Table A1 also shows initial construction cost if corrugated metal pipe (CMP) is used in place of RCP. The cost of CMP pipe is based on approximately $3 per inch diameter per lineal foot. Construction costs using CMP are about 20% less than RCP. However, the life expectancy of CMP is less than half that of RCP. The CMP will most likely require replacement at least once over the projects' design life. If the cost of pipe replacement in present dollars is included, the cost of the CMP alternative is 15% greater than that of the RCP alternative.

- Table A2 – This table provides a comparison for an 80-foot road crossing using triple 60-inch RCP culverts versus a single 6-foot by 14-foot Conspan bridge. As shown, the cost for the Conspan unit is about 7 percent lower than the cost of the pipe crossing. However, at this level of analysis, this cost differential is essentially insignificant. If CMP is used initial construction cost is reduced by 27%, however, CMP will most likely require replacement at least once over the projects' design life. If the cost of pipe replacement in present dollars is included, the cost of the CMP alternative is 20% greater than that of the RCP alternative.

- Table A3 – This table provides a comparison for a 32-foot road crossing using five 60-inch RCP culverts versus a single 7-foot by 20-foot Conspan bridge. As shown, the cost for the Conspan unit is about 6 percent lower than the cost of the pipe crossing. However, at this level of analysis, this cost differential is essentially insignificant. If CMP is used initial construction cost is reduced by 21%, however, CMP will most likely require replacement at least once over the projects' design life. If the cost of pipe replacement in present dollars is included, the cost of the CMP alternative is 15% greater than that of the RCP alternative.

- Table A4 – This table provides a comparison for an 80-foot road crossing using five 60-inch RCP culverts versus a single 7-foot by 20-foot Conspan bridge. As shown, the cost for the Conspan unit is about 15 percent lower than the cost of the pipe crossing. If CMP is used initial construction cost is reduced by 28%, however, CMP will most likely require replacement at least once over the projects' design life. If the cost of

pipe replacement in present dollars is included, the cost of the CMP alternative is 20% greater than that of the RCP alternative.

- Table A5 – This table provides a comparison for a 32-foot road crossing using six 60-inch RCP culverts versus a single 7-foot by 24-foot Conspan bridge. As shown, the cost for the Conspan unit is about 13 percent lower than the cost of the pipe crossing. If CMP is used initial construction cost is reduced by 22%, however, CMP will most likely require replacement at least once over the projects' design life. If the cost of pipe replacement in present dollars is included, the cost of the CMP alternative is 16% greater than that of the RCP alternative.
- Table A6 – This table provides a comparison for an 80-foot road crossing using six 60-inch RCP culverts versus a single 7-foot by 24-foot Conspan bridge. As shown, the cost for the Conspan unit is about 21 percent lower than the cost of the pipe crossing. If CMP is used initial construction cost is reduced by 29%, however, CMP will most likely require replacement at least once over the projects' design life. If the cost of pipe replacement in present dollars is included, the cost of the CMP alternative is 21% greater than that of the RCP alternative.

Use of Conspan bridges appears to provide a moderate cost savings (6 to 20 percent) over use of equivalent area RCP pipes. Additionally, the Conspan bridge units would provide slightly more capacity than the pipe systems since the Conspan Bridge units are a single barrel (versus multi-barrels).

Use of Railroad car bridges was considered in the December 2002 *New South Channel Conceptual Design Report* prepared for the Solano County Water Agency, and it was concluded that use of Railroad car bridges was not cost efficient in comparison to piped systems. Based on updated railroad car bridge costs, the previous conclusion appears to still be valid.

Based on this analysis, Conspan Bridge units have been included in the conceptual design of the NSC and DMDVD and have been included in the NSC and DMDVD cost estimates.

Table A1. Cost Comparison of Triple 60-inch Culverts with a 6-foot by 14-foot BridgeTek Conspan System for a 32-foot Road Crossing

Item	Unit	Unit Cost, dollars	Quantity	Cost, dollars
Triple 60-Inch Concrete Culvert for a 32-foot Road Crossing				
60-inch RCP (including pavement replacement)	LF	300.00	96	28,800
Headwall	LF	12,000.00	2	24,000
Subtotal				52,800
Triple 60-Inch CMP Culvert for a 32-foot Road Crossing				
60-inch RCP (including pavement replacement)	LF	190.00	96	18,240
Headwall	LF	12,000.00	2	24,000
Subtotal				42,240
BridgeTech Conspan 6' x 14' Bridge, Length = 32 feet (effective flow area is equal to triple 60-inch culverts)	Lump Sum	22,600.00	1	22,600
BridgeTech Conspan 6' x 14' wingwalls	LF	8,600.00	2	17,200
Strip footing for bridge and wingwalls	LF	50.00	64	3,200
Excavation	CY	10.00	171	1,707
Pavement Replacement	SF	8.00	624	4,992
Subtotal				49,699

Table A2. Cost Comparison of Triple 60-inch Culverts with a 6-foot by 14-foot BridgeTek Conspan System for a 80-foot Road Crossing

Item	Unit	Unit Cost, dollars	Quantity	Cost, dollars
Triple 60-Inch Concrete Culvert for a 32-foot Road Crossing				
60-inch RCP (including pavement replacement)	LF	300.00	240	72,000
Headwall	LF	12,000.00	2	24,000
Subtotal				96,000
Triple 60-Inch CMP Culvert for a 32-foot Road Crossing				
60-inch CMP (including pavement replacement)	LF	190.00	240	45,600
Headwall	LF	12,000.00	2	24,000
Subtotal				69,600
BridgeTech Conspan 6' x 14' Bridge, Length = 32 feet (effective flow area is equal to triple 60-inch culverts)	Lump Sum	53,900.00	1	53,900
BridgeTech Conspan 6' x 14' wingwalls	LF	8,600.00	2	17,200
Strip footing for bridge and wingwalls	LF	50.00	200	10,000
Excavation	CY	10.00	356	3,556
Pavement Replacement	SF	8.00	624	4,992
Subtotal				89,648

Table A3. Cost Comparison of Five 60-inch Culverts with a 7-foot by 20-foot BridgeTek Conspan System for a 32-foot Road Crossing

Item	Unit	Unit Cost, dollars	Quantity	Cost, dollars
Triple 60-Inch Concrete Culvert for a 32 foot Road Crossing				
60-inch RCP (including pavement replacement)	LF	300.00	160	48,000
Headwall	LF	18,000.00	2	36,000
Subtotal				84,000
Triple 60-Inch CMP Culvert for a 32 foot Road Crossing				
60-inch CMP (including pavement replacement)	LF	190.00	160	30,400
Headwall	LF	18,000.00	2	36,000
Subtotal				66,400
BridgeTech Conspan 7' x 20' Bridge, Length = 32 feet (effective flow area is equal to five 60-inch culverts)	Lump Sum	29,200.00	1	29,200
BridgeTech Conspan 7' x 20' wignwalls	LF	18,000.00	2	36,000
Strip footing for bridge and wingwalls	LF	50.00	100	5,000
Excavation	CY	10.00	213	2,133
Pavement Replacement	SF	8.00	780	6,240
Subtotal				78,573

Table A4. Cost Comparison of Five 60-inch Culverts with a 7-foot by 20-foot BridgeTek Conspan System for a 80-foot Road Crossing

Item	Unit	Unit Cost, dollars	Quantity	Cost, dollars
Triple 60-Inch Culvert for a 32 foot Road Crossing				
60-inch RCP (including pavement replacement)	LF	300.00	400	120,000
Headwall	LF	18,000.00	2	36,000
Subtotal				156,000
Triple 60-Inch Culvert for a 32 foot Road Crossing				
60-inch CMP (including pavement replacement)	LF	190.00	400	76,000
Headwall	LF	18,000.00	2	36,000
Subtotal				112,000
BridgeTech Conspan 7' x 20' Bridge, Length = 80 feet (effective flow area is equal to five 60-inch culverts)	Lump Sum	73,000.00	1	73,000
BridgeTech Conspan 6' x 14' wignwalls	LF	18,000.00	2	36,000
Strip footing for bridge and wingwalls	LF	50.00	200	10,000
Excavation	CY	10.00	640	6,400
Pavement Replacement	SF	8.00	780	6,240
Subtotal				131,640

Table A5. Cost Comparison of Six 60-inch Culverts with a 7-foot by 24-foot BridgeTek Conspan System for a 32-foot Road Crossing

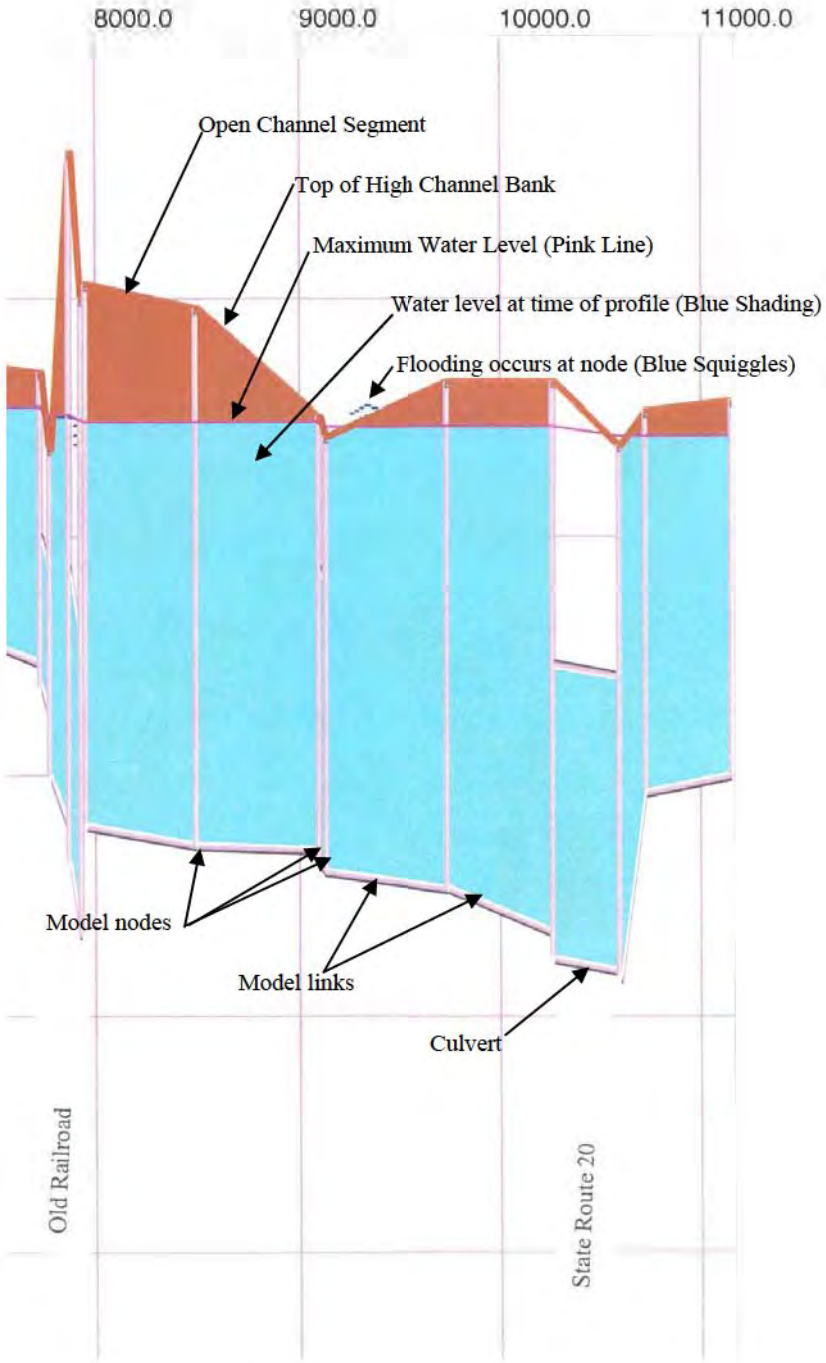
Item	Unit	Unit Cost, dollars	Quantity	Cost, dollars
Triple 60-Inch Concrete Culvert for a 32 foot Road Crossing				
60-inch RCP (including pavement replacement)	LF	300.00	192	57,600
Headwall	LF	20,000.00	2	40,000
Subtotal				97,600
Triple 60-Inch CMP Culvert for a 32 foot Road Crossing				
60-inch CMP (including pavement replacement)	LF	190.00	192	36,480
Headwall	LF	20,000.00	2	40,000
Subtotal				76,480
BridgeTech Conspan 7' x 24' Bridge, Length = 32 feet (effective flow area is equal to six 60-inch culverts)	Lump Sum	32,300.00	1	32,300
BridgeTech Conspan 7' x 24' wignwalls	Each	19,000.00	2	38,000
Strip footing for bridge and wingwalls	LF	50.00	100	5,000
Excavation	CY	10.00	242	2,418
Pavement Replacement	SF	8.00	884	7,072
Subtotal				84,790

Table A6. Cost Comparison of five 60-inch Culverts with a 7-foot by 24-foot BridgeTek Conspan System for a 80-foot Road Crossing

Item	Unit	Unit Cost, dollars	Quantity	Cost, dollars
Triple 60-Inch Concrete Culvert for a 32 foot Road Crossing				
60-inch RCP (including pavement replacement)	LF	300.00	480	144,000
Headwall	LF	18,000	2	36,000
Subtotal				180,000
Triple 60-Inch CMP Culvert for a 32 foot Road Crossing				
60-inch CMP (including pavement replacement)	LF	190.00	480	91,200
Headwall	LF	18,000	2	36,000
Subtotal				127,200
BridgeTech Conspan 7' x 24' Bridge, Length = 80 feet (effective flow area is equal to six 60-inch culverts)	Lump Sum	80,800	1	80,800
BridgeTech Conspan 7' x 24' wignwalls	Each	19,000	2	38,000
Strip footing for bridge and wingwalls	LF	50	200	10,000
Excavation	CY	10.00	604	6,044
Pavement Replacement	SF	8.00	884	7,072
Subtotal				141,916

ATTACHMENT B

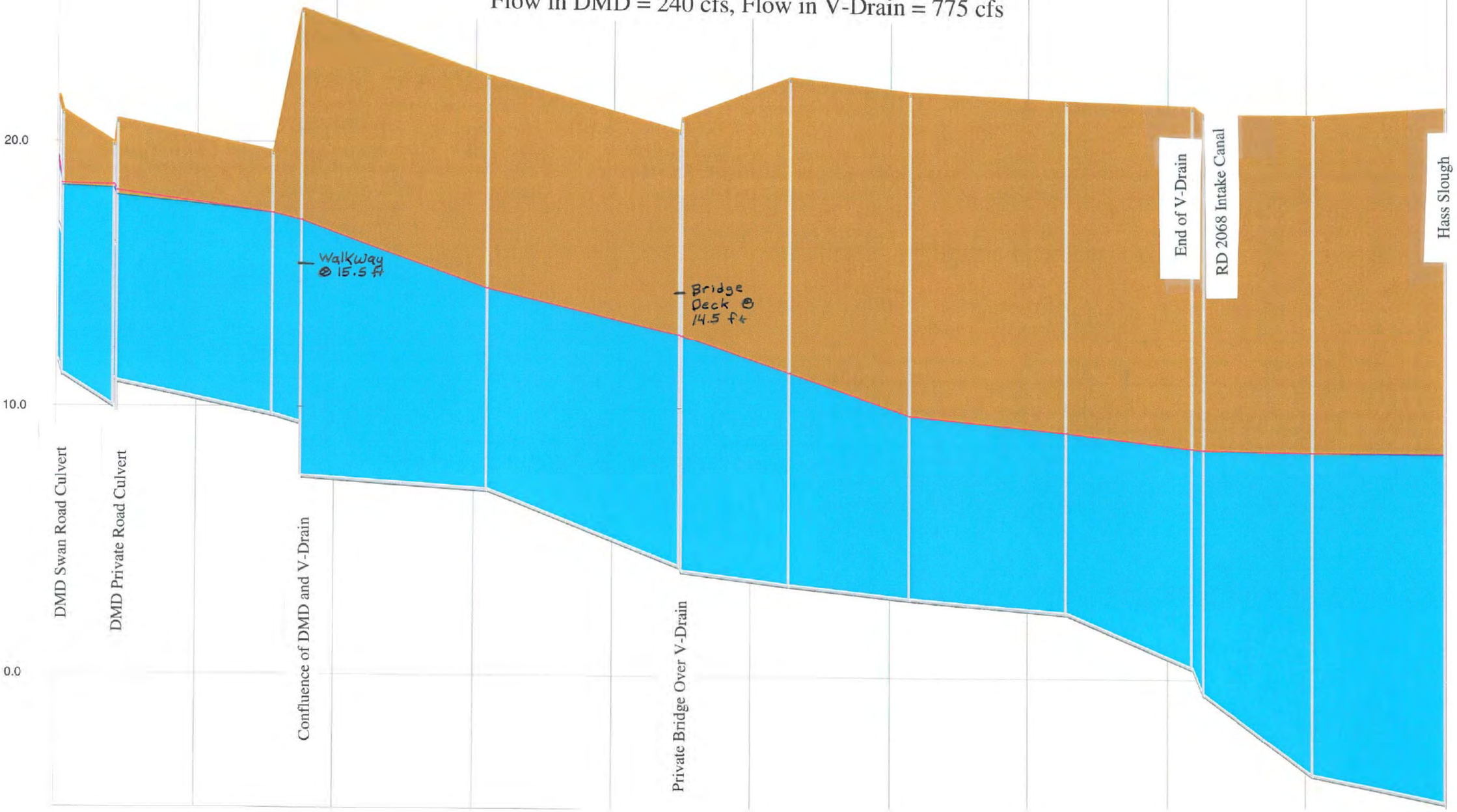
Preliminary Model Results



Attachment B1

Existing Conditions

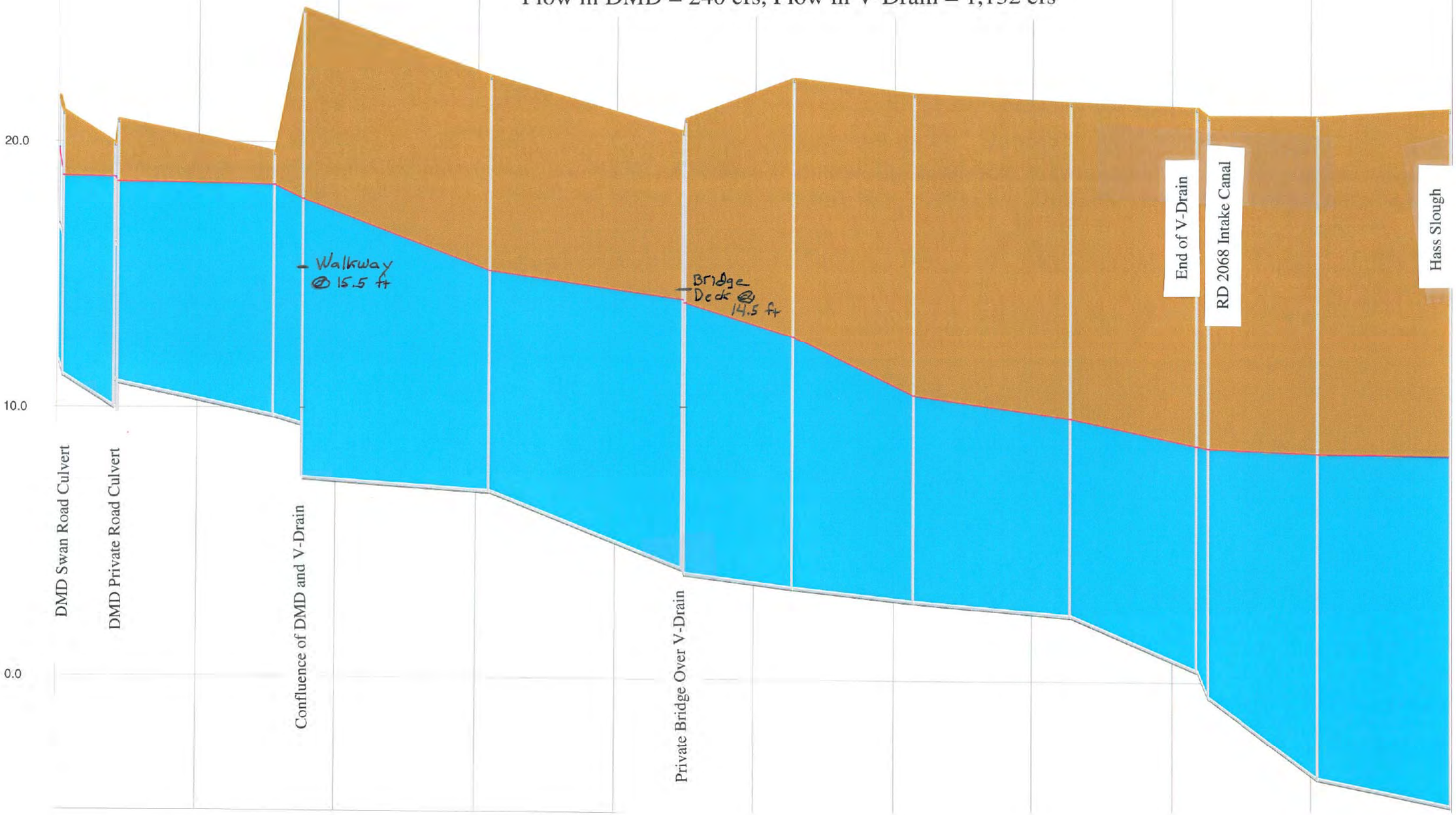
Flow in DMD = 240 cfs, Flow in V-Drain = 775 cfs



Attachment B2

Existing Conditions

Flow in DMD = 240 cfs, Flow in V-Drain = 1,132 cfs



Attachment B3

Increased Capacity by 375 cfs

Flow in DMD = 615 cfs, Flow in V-Drain = 1,518 cfs

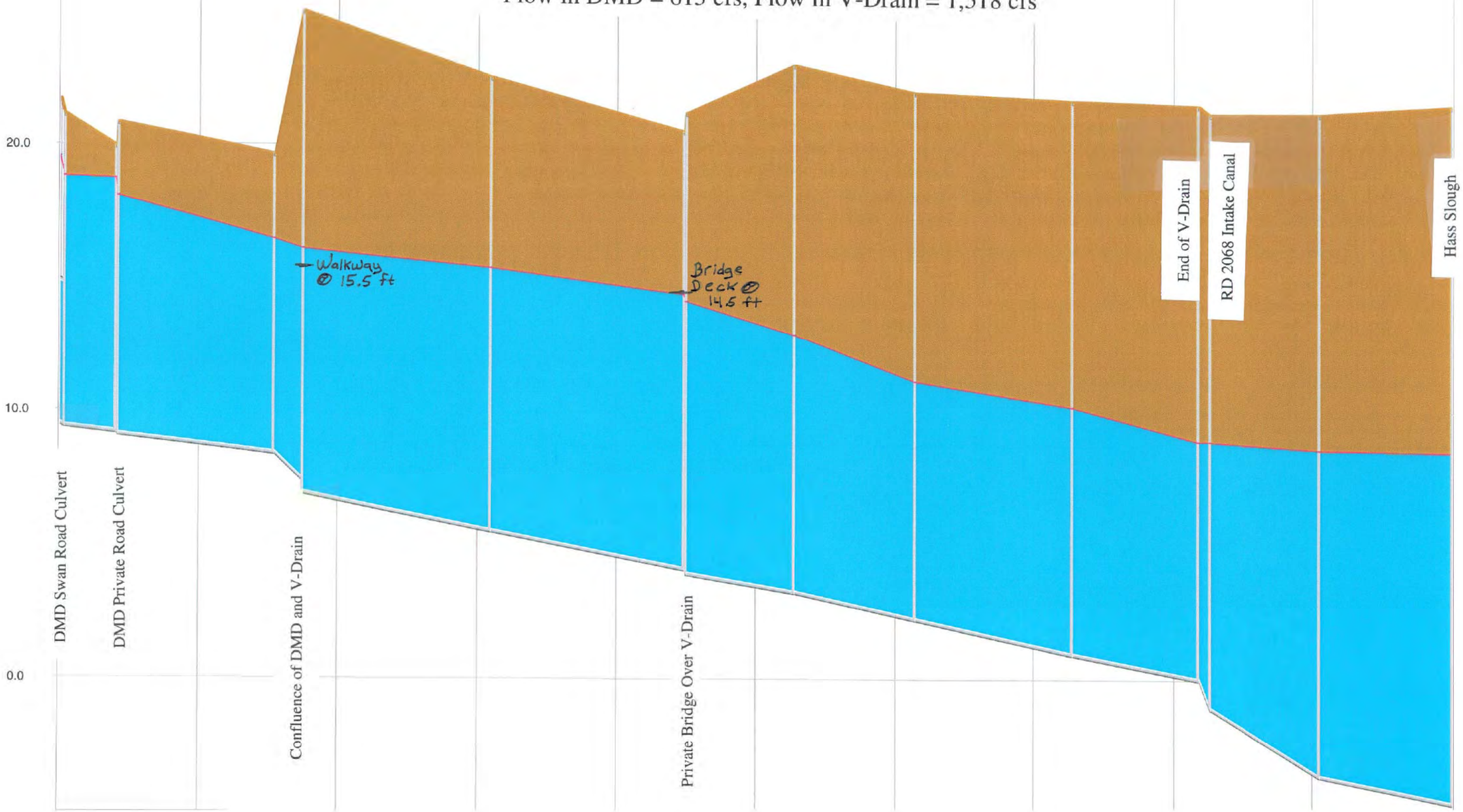


Table 1. Spreadsheet Analysis of NSC for a Capacity of 375 cfs.

Required Channel Variables	
Channel bottom width, feet	10
Left Side Slopes (H:V)	4.00 : 1
Right Side Slopes (H:V)	4.00 : 1
Channel Slope, ft/ft	0.000497
Manning's n	0.040
Estimated Depth, feet	6.00
Channel Results	
Flow Area, square feet	204
Wet Perimeter, feet	59.5
Hydraulic Radius, feet	3.43
Velocity, feet/second	1.89
Flow, cfs	385
Top Width, feet	58
Culverts	
Culvert Crossing	Triple 60-Inch
Area of Single 60-Inch, square feet	19.6
Area of Triple 60-Inch, square feet	58.8
Velocity, feet/second	6.4
Headloss, feet	0.8

Table 2. Spreadsheet Analysis of NSC for a Capacity of 494 cfs.

Required Channel Variables			
Channel bottom width, feet	18		
Left Side Slopes (H:V)	4.00	:	1
Right Side Slopes (H:V)	4.00	:	1
Channel Slope, ft/ft	0.000497		
Manning's n	0.040		
Estimated Depth, feet	6.00		
Channel Results			
Flow Area, square feet	252		
Wet Perimeter, feet	67.5		
Hydraulic Radius, feet	3.73		
Velocity, feet/second	2.00		
Flow, cfs	504		
Top Width, feet	66		
Culverts			
Culvert Crossing	Four 60-Inch		
Area of Single 60-Inch, square feet	19.6		
Area of Triple 60-Inch, square feet	78.4		
Velocity, feet/second	6.3		
Headloss, feet	0.8		

Table 3. Dixon Main Drain and V-Drain

Existing Condition																												
Equivalent XP-SWMM Model Link	Survey Section	Left Side Slope, _H:1V	Right Side Slope, _H:1V	Bottom Width, feet	Effective Depth, feet	Channel Top Width feet	Flow Area, square feet	Upstream Invert Elevation, feet NAVD	Downstream Invert Elevation, feet NAVD	Length, feet	Channel / Hydraulic Grade Line Slope, feet/feet	Manning's n	Normal Flow Velocity, feet/sec	Normal Flow Capacity, cfs	Culvert 1 Diameter, feet	Culvert 1 n	Culvert 1 Length, feet	Culvert 2 Diameter, feet	Culvert 2 n	Culvert 2 Length, feet	Left Side Slope, _H:1V	Right Side Slope, _H:1V	Bottom Width, feet	Effective Depth, feet	Flow Area, square feet	Upstream Ground Surface Elevation, feet NAVD	Upstream Invert Elevation, feet NAVD	Downstream Invert Elevation, feet NAVD
Clv dmd20	Surv 37							11.8		70					5	0.015	70	5	0.015	70						21.4	11.8	11.4
838	838	1.54	1.71	4.8	6.55	30	101.2	11.3	11.1	700	0.000518	0.04	1.9	193.7							1.54	4	6	8.74	264.0	18.3	9.5	9.3
Clv dmd22	Surv betw 37, 38							11.1		30		0.04			5	0.015	30	5	0.015	30						18.6		
838.5	838	1.54	1.71	4.8	6.77	31	107.0	11	9.9	2150	0.000518	0.04	2.0	208.7							1.54	4	7	8.62	266.2	18.6	9.2	8.5
838.6	839	1.84	2.1	8.7	6.82	40	151.0	9.9	9.8	400	0.000518	0.04	2.1	316.4							1.84	4	8	8.3	267.6	17.5	8.5	7.5
512 (Note 3)	COE 512	2	1	22	8.12	50	277.5	7.5	7	2570	0.000450	0.04	2.4	672.9							2	4	40	8.74	578.8	16.5	7	5.6
513	COE 513	2	3.2	23	7.52	66	320.0	7	4.2	2660	0.000450	0.04	2.3	731.6							2	4	40	8.95	598.3	14.5	5.6	4.2
513.2	As measured	0.65	0.65	25	9		277.7	4.2	4	20	0.000450	0.04	2.6	722.5							0.65	0.65	25	9	277.7	14.5	4.2	4
515	COE 515	4.6	2.9	13	9.18	86	435.4	4	3.5	1500	0.000450	0.04	2.4	1027.3							4.6	4	26	9.18	601.1	14.5	4	3.3
516	COE 516	2	4.7	13	8.95	77	384.7	3.5	3	1660	0.000450	0.04	2.3	896.0							4	4	26	9.39	596.8	14.5	3.3	2.3
518	COE 518	6.8	3.1	44	8.74	135	762.7	3	2.5	2160	0.000450	0.04	2.5	1935.4							6.8	4	26	9.61	748.6	14.5	2.3	1
520	COE 520	4.3	3.4	33	8.3	101	539.1	2.5	0.5	1740	0.000450	0.04	2.4	1318.2							4.3	4	26	9.83	656.6	12.5	1	0.1
522	COE 522	4.3	3.4	33	9.53	110	664.2	0.5	-0.5	160	0.000450	0.04	2.6	1752.5							4.3	4	26	10.05	680.5	14.5	0.1	-0.5
523	COE 523	2.8	3	33	10.05		624.6	-0.5	-3.5	1500	0.000450	0.04	2.8	1736.2							2.8	3	33	10.05	624.6	13.5	-0.5	-3.5
524	COE 524	3.4	4.4	47	12.84		1246.5	-3.5	-5	1830	0.000450	0.04	3.2	4033.2							3.4	4.4	47	12.84	1246.5	12.5	-3.5	-5
												DMD Average =		240														
												V-DrainAverage =		1132														

Table 4. Dixon Main Drain and V-Drain

Existing Condition																												
Link	Survey Section	Left Side Slope, _H:1V	Right Side Slope, _H:1V	Bottom Width, feet	Effective Depth, feet		Flow Area, square feet	Upstream Invert Elevation, feet NAVD	Downstream Invert Elevation, feet NAVD	Length, feet	Channel / Hydraulic Grade Line Slope, feet/feet	Manning's n	Normal Flow Velocity, feet/sec	Normal Flow Capacity, cfs	Culvert 1 Diameter, feet	Culvert 1 n	Culvert 1 Length, feet	Culvert 2 Diameter, feet	Culvert 2 n	Culvert 2 Length, feet	Left Side Slope, _H:1V	Right Side Slope, _H:1V	Bottom Width, feet	Effective Depth, feet	Flow Area, square feet	Upstream Ground Surface Elevation, feet NAVD	Upstream Invert Elevation, feet NAVD	Downstream Invert Elevation, feet NAVD
Clv dmd20	Surv 37							11.8		70					5	0.015	70	5	0.015	70						21.4	11.8	11.4
838	838	1.54	1.71	4.8	6.55	30	101.2	11.3	11.1	700	0.000518	0.04	1.9	193.7							1.54	4	7.5	8.74	277.1	18.3	9.5	9.3
Clv dmd22	Surv betw 37, 38							11.1		30		0.04			5	0.015	30	5	0.015	30						18.6		
838.5	838	1.54	1.71	4.8	6.77	31	107.0	11	9.9	2150	0.000518	0.04	2.0	208.7							1.54	4	11.5	8.62	305.0	18.6	9.2	8.5
838.6	839	1.84	2.1	8.7	6.82	40	151.0	9.9	9.8	400	0.000518	0.04	2.1	316.4							1.84	4	12.5	8.3	304.9	17.5	8.5	7.5
512 (Note 3)	COE 512	2	1	22	8.12	50	277.5	7.5	7	2570	0.000450	0.04	2.4	672.9							2	4	45	8.74	622.5	16.5	7	5.6
513	COE 513	2	3.2	23	7.52	66	320.0	7	4.2	2660	0.000450	0.04	2.3	731.6							2	4	45	8.95	643.1	14.5	5.6	4.2
513.2	As measured	0.65	0.65	25	9		277.7	4.2	4	20	0.000450	0.04	2.6	722.5							0.65	0.65	25	9	277.7	14.5	4.2	4
515	COE 515	4.6	2.9	13	9.18	86	435.4	4	3.5	1500	0.000450	0.04	2.4	1027.3							4.6	4	31	9.18	647.0	14.5	4	3.3
516	COE 516	2	4.7	13	8.95	77	384.7	3.5	3	1660	0.000450	0.04	2.3	896.0							4	4	31	9.39	643.8	14.5	3.3	2.3
518	COE 518	6.8	3.1	44	8.74	135	762.7	3	2.5	2160	0.000450	0.04	2.5	1935.4							6.8	4	31	9.61	796.6	14.5	2.3	1
520	COE 520	4.3	3.4	33	8.3	101	539.1	2.5	0.5	1740	0.000450	0.04	2.4	1318.2							4.3	4	31	9.83	705.7	12.5	1	0.1
522	COE 522	4.3	3.4	33	9.53	110	664.2	0.5	-0.5	160	0.000450	0.04	2.6	1752.5							4.3	4	31	10.05	730.7	14.5	0.1	-0.5
523	COE 523	2.8	3	33	10.05		624.6	-0.5	-3.5	1500	0.000450	0.04	2.8	1736.2							2.8	3	33	10.05	624.6	13.5	-0.5	-3.5
524	COE 524	3.4	4.4	47	12.84		1246.5	-3.5	-5	1830	0.000450	0.04	3.2	4033.2							3.4	4.4	47	12.84	1246.5	12.5	-3.5	-5
												DMD Average =		240														
												V-DrainAverage =		1132														

Notes

1. Overburden assumed to be 10 percent of the channel excavation.
2. Channel top width = left side slope * Effective depth * right side slope * Effective depth + bottom width + 4 feet. The 4 feet is added to account for the fact that one bank is 1 to 2 feet higher that the other bank and is consequently 2 to 4 feet wider
3. The slope for the Hydraulic Grade Line for links 512 through 524 are based on a drop of the top of bank from 14.5 feet (at X513) to 12.5 feet (at X524) over a distance of 12,000 feet
4. At junction of DMD and V-Drain, increase target capacity by 11 cfs for runoff from 640 acres.
5. Typical tides are between Elevationations 2.5 and 7.5 feet NAVD.

Alignment with 375 cfs Capacity Increase

Enlarged Channel

Length, feet	Channel / Hydraulic Grade Line Slope, feet/feet	Manning's n	Normal Flow Velocity, feet/sec	Normal Flow Capacity, cfs	Target Capacity, cfs	Increase in Channel Capacity, cfs	Number of Culvert Barrels	Culvert Diameter, feet	Culvert n	Culvert Length, feet	Change of Channel Area, square feet	Over-burden Area (Note 1) square feet	Channel Excavation, cubic yards	Channel Top Width (Note 2), feet	Increase in Channel Top Width feet	Road/Dirt Stockpile Width, feet	Required Easement Width, feet	Easement, acres	Vegetative Bank Stabilization Area, acres	Location
70							5	5.0	0.015	80								0.000	0.000	DMD Culverts Under Swan Road
700	0.000518	0.04	2.3	614.3	615	421					162.9	16.3	4645	58.4	28.3	40.0	70.0	1.125	1.260	DMD Channel along Swan Road
30		0.04					5	5.0	0.015	25				4.0			70.0	0.048	0.054	DMD Culvert under Private Road
2150	0.000518	0.04	2.3	620.5	615	406					159.2	15.9	13944	58.8	28.0	40.0	70.0	3.455	3.887	DMD Channel Along Swan Road
400	0.000518	0.04	2.3	617.3	615	299					116.6	11.7	1900	60.5	20.9	40.0	70.0	0.643	0.739	DMD Channel Along Swan Road
2570	0.000450	0.04	2.6	1519.4	1518	845					301.2	30.1	31539	96.4	46.1	42.0	80.0	4.720	5.808	V-Drain at Swan Road
2660	0.000450	0.04	2.7	1591.1	1518	786					278.3	27.8	30161	97.7	31.6	42.0	80.0	4.885	4.885	V-Drain
20	0.000450	0.04	2.6	722.5	1518	0	RR Bridge							40.7		42.0	80.0	0.037	0.037	V-Drain at RR Car Bridge
1500	0.000450	0.04	2.5	1500.3	1518	491					165.7	16.6	10125	108.9	23.1	42.0	80.0	2.755	2.755	V-Drain
1660	0.000450	0.04	2.5	1517.3	1518	622					212.1	21.2	14347	105.1	28.2	42.0	80.0	3.049	3.049	V-Drain
2160	0.000450	0.04	2.5	1884.2	1518	0					-14.1	-1.4	-1242	133.8	-0.7	42.0	80.0	3.967	3.967	V-Drain
1740	0.000450	0.04	2.6	1708.1	1518	200					117.5	11.7	8327	111.6	10.7	42.0	80.0	3.196	3.196	V-Drain
160	0.000450	0.04	2.6	1792.5	1518	0					16.3	1.6	106	113.4	3.0	42.0	80.0	0.294	0.294	V-Drain at Bend
1500	0.000450	0.04	2.8	1736.2	1518						0.0	0.0	0	95.3		42.0	80.0	0.551	0.551	RD 2068 Intake Channel
1830	0.000450	0.04	3.2	4033.2	1518						0.0	0.0	0	151.2				0.000	0.000	RD 2068 Intake Channel
												Total DMD	20489					5.3	5.9	
												Total V-Drain	93363					23.5	24.5	

Alignment with 494 cfs Capacity Increase

Enlarged Channel

Length, feet	Channel / Hydraulic Grade Line Slope, feet/feet	Manning's n	Normal Flow Velocity, feet/sec	Normal Flow Capacity, cfs	Target Capacity, cfs	Increase in Channel Capacity, cfs	Number of Culvert Barrels	Culvert Diameter, feet	Culvert n	Culvert Length, feet	Change of Channel Area, square feet	Over-burden Area (Notte 1) square feet	Channel Excavation, cubic yards	Channel Top Width (Note 2), feet	Increase in Channel Top Width feet	Road/Dirt Stockpile Width, feet	Required Easement Width, feet	Easement, acres	Vegetative Bank Stabilization Area, acres	Location
70							6	5.0	0.015	80								0.000	0.000	DMD Culverts Under Swan Road
700	0.000518	0.04	2.4	654.7	734	540					176.0	17.6	5019	59.9	29.8	44.0	75.0	1.205	1.349	DMD Channel along Swan Road
30		0.04					6	5.0	0.015	25			0	4.0		0.0	75.0	0.052	0.058	DMD Culvert under Private Road
2150	0.000518	0.04	2.4	740.9	734	525					198.0	19.8	17341	63.3	32.5	44.0	75.0	3.702	4.307	DMD Channel Along Swan Road
400	0.000518	0.04	2.4	731.2	734	418					153.9	15.4	2509	65.0	25.4	44.0	75.0	0.689	0.817	DMD Channel Along Swan Road
2570	0.000450	0.04	2.7	1658.1	1637	964					344.9	34.5	36115	101.4	51.1	45.0	80.0	4.720	6.280	V-Drain at Swan Road
2660	0.000450	0.04	2.7	1735.2	1637	905					323.1	32.3	35011	102.7	36.6	45.0	80.0	4.885	4.885	V-Drain
20	0.000450	0.04	2.6	722.5	1637	915	RR Bridge						0	40.7		45.0	80.0	0.037	0.037	V-Drain at RR Car Bridge
1500	0.000450	0.04	2.5	1645.3	1637	610					211.6	21.2	12930	113.9	28.1	45.0	80.0	2.755	2.755	V-Drain
1660	0.000450	0.04	2.6	1668.1	1637	741					259.1	25.9	17522	110.1	33.2	45.0	80.0	3.049	3.049	V-Drain
2160	0.000450	0.04	2.6	2038.8	1637						33.9	3.4	2986	138.8	4.3	45.0	80.0	3.967	3.967	V-Drain
1740	0.000450	0.04	2.6	1870.2	1637	319					166.6	16.7	11811	116.6	15.7	45.0	80.0	3.196	3.196	V-Drain
160	0.000450	0.04	2.7	1960.5	1637						66.6	6.7	434	118.4	8.0	45.0	80.0	0.294	0.294	V-Drain at Bend
1500	0.000450	0.04	2.8	1736.2	1637						0.0	0.0	0	95.3		45.0	80.0	0.551	0.551	RD 2068 Intake Channel
1830	0.000450	0.04	3.2	4033.2	1637						0.0	0.0	0	151.2				0.000	0.000	RD 2068 Intake Channel
												Total DMD	24869				Total DMD	5.6	6.5	
												Total V-Drain	116809				Total V-Drain	23.5	25.0	

Table 5. Evaluation of Headloss Through Existing Railroad Car Bridge over the V-Drain

Flow Condition	Flow Rate, cfs	Water Velocity under Bridge, fps	Friction Loss HGL Slope	Friction Loss, feet	Entrance Loss (Ke =0.2)	Water Velocity at Section 515, fps	Exit Loss (Kex = 1)	Total Head Loss for Bridge
Average Existing Capacity	1132	3.95	0.0011	0.022	0.049	2.40	0.153	0.20
Plus 375	1507	5.26	0.0019	0.038	0.086	2.50	0.333	0.42
Plus 494	1626	5.68	0.0022	0.044	0.100	2.50	0.404	0.51

Table 6. Three Mile Extension to be Consistent w

		Existing Condition																									
Link	Survey Section	Left Side Slope, _H:1V	Right Side Slope, _H:1V	Bottom Width, ft	Effective Depth, ft	Flow Area, square feet	Upstream Invert Elev, ft NAVD	Downstream Invert Elev, ft NAVD	Length, ft	Channel / HGL Slope, ft/ft	Manning's n	Normal Flow Velocity, ft/sec	Normal Flow Capacity, cfs	Culvert 1 Diameter, ft	Culvert 1 n	Culvert 1 Length, ft	Culvert 2 Diameter, ft	Culvert 2 n	Culvert 2 Length, ft	Left Side Slope, _H:1V	Right Side Slope, _H:1V	Bottom Width, ft	Effective Depth, ft	Flow Area, square feet	Upstream Ground Surface Elevation, ft NAVD	Upstream Invert Elevation, ft NAVD	Downstream Invert Elevation, ft NAVD
Cnl rdn9	NX13	1.8	1.6	4	3.76	39.1	24.43	21.97	2600	0.000946	0.035	2.1	83.2							2	3.8	4	6	128.4	29.2	22.19	19.73
650														4	0.015	30											
651	NX12	1.4	1.2	5	6.45	86.3	21.92	18.81	2600	0.001196	0.035	3.3	281.7							2	4	10	6.45	189.3	29.0	19.63	18.81
CMP rdn10														3	0.026	30											
CP rdn11											0.035			4	0.015	35											
cnl rdn12	NX8	1.6	1.6	8	4.8	75.3	17.8	15.32	5100	0.000486	0.035	1.9	143.1							2	4	10	6	168.0	24.3	17.8	14.2
RCP rdn13														4	0.015	25											
TRPrdn13.6	NX5	2.2	2.2	7	5	90.0	15.46	13.42	2150	0.000949	0.035	2.7	239.3							2.2	4	10	6.5	196.0	21.5	14.1	12.9
cnx4b														4	0.026	40											
cnx4 (Note 1)	NX4	1.1	1.7	9	4.5	68.9	14.11	14.5	1400	0.000700	0.035	2.2	154.2							2	4	12	7	231.0	19.7	12.8	12.3
cnx3	NX3	1.3	2.7	8	5.1	92.8	14.5	14.2	1200	0.000250	0.035	1.4	129.7							2	4	12	7	231.0	19.8	12.3	11.8

Notes
1. This segment has an adverse slope, the slope of the HGL from the model was used.
2. Channel top width = left side slope * effective depth * right side slope * effective depth + bottom width + 4 feet. The 4 feet is added to account for the fact that one bank is 1 to 2 feet higher that the other bank and is consequently 2 to 4 feet wider.
3. Road and Dirt Stockpile Width equals the maximum of the change of channel area and the overbuden area divided by 3 (pile up to 3 feet deep plus 6 feet for side slopes or 12 feet for a road).

vith The JPA Recommended Eastside Draiange Project

Enlarged Channel

Length, ft	Channel / HGL Slope, ft/ft	Manning's n	Normal Flow Velocity, ft/sec	Normal Flow Capacity, cfs	Target Capacity, cfs	Increase in Channel Capacity, cfs	Number of Culvert Barrels	Culvert Dia, ft	Culvert n	Culvert Length, ft	Change of Channel Area, square feet	Over-burden Area square feet	Channel Excavation, cubic yards	Channel Top Width (Note 2), ft	Road/Dirt Stockpile Width (Note 3), ft	Total Easement Width, ft	Easement, ac	Vegetative Bank Stabilization Area (Note 5), ac	Location
2600	0.000946	0.035	2.8	360.0	344.0	276.7					89.3	7	9276	42.8	38.1	100.0	5.969	5.969	Start of 3-Mile Extension
							2	6.0	0.015	32						100.0	0.073	0.073	
2600	0.000315	0.035	1.8	343.1	344.0	61.4					103.0	0	9916	52.7	40.3	100.0	5.969	5.969	
							2	6.0	0.015	32						100.0	0.073	0.073	
		0.035					3	6.0	0.015	32						100.0	0.073	0.073	Culvert under Radio Station Road
5100	0.000706	0.035	2.6	437.1	409.0	294.0					92.7	0	17517	50.0	36.9	100.0	11.708	11.708	
							3	6.0	0.015	24						100.0	0.055	0.055	Culvert under Delhi Road
2150	0.000558	0.035	2.4	474.3	474.0	234.9					106.0	0	8439	54.3	41.3	100.0	4.936	4.936	
							3	6.0	0.015	40						100.0	0.092	0.092	
1400	0.000357	0.035	2.1	475.1	474.0	321.0					162.2	2.2	8522	58.0	60.8	120.0	3.857	3.857	
1200	0.000417	0.035	2.2	513.2	474.0	383.5					138.2	34	7652	58.0	63.4	120.0	3.306	3.306	End of 3-Mile Extension at the DMD
												Total	61322				36	36	

Table 7. Preliminary Cost Estimate for the New South Channel with a Capacity of 375 cfs

Item	Unit	Unit Cost, dollars	Quantity	Cost, dollars
1. BridgeTech Conspan 6' x 14' Bridge (effective flow area is equal to triple 60-inch culverts)	LF	895	56	50,120
2. Channel from Swan Road to Abandoned RR Tressle (2,500 feet)	CY	3.50	21,667	75,833
3. Channel from RR Tressle to Binghampton Road (1,300 feet)	CY	3.50	11,267	39,433
4. BridgeTech Conspan 6' x 14' Bridge (effective flow area is equal to triple 60-inch culverts)	LF	895	32	28,640
5. Channel Just East of Bunker Station Road (1,900 feet)	CY	3.50	16,467	57,633
6. BridgeTech Conspan 6' x 14' Bridge (effective flow area is equal to triple 60-inch culverts)	LF	895	32	28,640
7. Channel Just West of Bunker Station Road (4,600 feet)	CY	3.50	39,867	139,533
8. BridgeTech Conspan 6' x 14' Bridge (effective flow area is equal to triple 60-inch culverts)	LF	895	32	28,640
9. Channel to Hass Slough Access Road (3,200 feet, wet excavation)	CY	6.00	26,000	156,000
10. Connect to Hass Slough (wet excavation)	CY	6.00	1,733	10,400
11. Headwalls/Wingwalls	Each	12,000	8	96,000
12. Existing Facilities Conflicts	Lump Sum	80,000	1	80,000
13. Sediment Basin	CY	3.50	26,000	91,000
14. Vegetative Erosion Control	Acre	2,000	41	81,180
Subtotal (rounded up)				970,000
Right of Way	Acre	7,000	41	284,131
Environmental Evaluation/Mitigation and Permitting @ 10 %				97,000
Engineering, Administration, Legal @ 20 %				194,000
Total (rounded up)				1,550,000

Table 8. Preliminary Cost Estimate for the New South Channel with a Capacity of 494 cfs

Item	Unit	Unit Cost, dollars	Quantity	Cost, dollars
1. BridgeTech Conspan 7' x 14' Bridge (effective flow area is equal to five 60-inch culverts)	LF	1,070	56	59,920
2. Channel from Swan Road to Abandoned RR Tressle (2,500 feet)	CY	3.50	26,481	92,685
3. Channel from RR Tressle to Binghampton Road (1,300 feet)	CY	3.50	13,770	48,196
4. BridgeTech Conspan 7' x 14' Bridge (effective flow area is equal to five 60-inch culverts)	LF	1,070	32	34,240
5. Channel Just East of Bunker Station Road (1,900 feet)	CY	3.50	20,126	70,441
6. BridgeTech Conspan 7' x 14' Bridge (effective flow area is equal to five 60-inch culverts)	LF	1,070	32	34,240
7. Channel Just West of Bunker Station Road (4,600 feet)	CY	3.50	48,726	170,541
8. BridgeTech Conspan 7' x 14' Bridge (effective flow area is equal to five 60-inch culverts)	LF	1,070	32	34,240
9. Channel to Hass Slough Access Road (3,200 feet, wet excavation)	CY	6.00	31,778	190,667
10. Connect to Hass Slough (wet excavation)		6.00	2,119	12,711
11. Headwalls/Wingwalls	Each	15,000	8	120,000
12. Existing Facilities Conflicts	Lump Sum	80,000	1	80,000
13. Sediment Basin	CY	3.50	31,778	111,222
14. Vegetative Erosion Control	Acre	2,000	45	89,198
Subtotal (rounded up)				1,150,000
Right of Way	Acre	7,000	45	312,194
Environmental Evaluation/Mitigation and Permitting @ 10 %				115,000
Engineering, Administration, Legal @ 20 %				230,000
Total (rounded up)				1,810,000

Table 9. Preliminary Cost Estimate for the DMDVD Alignment with a Capacity Increase of of 375 cfs

Item	Unit	Unit Cost, dollars	Quantity	Cost, dollars
Dixon Main Drain Improvements				
1. BridgeTech Conspan 7' x 20' Bridge at Swan Road (effective flow area is equal to five 60-inch culverts)	LF	1,200	64	76,800
2. BridgeTech Conspan 7' x 20' Bridge at Private Road (effective flow area is equal to five 60-inch culverts)	CY	1,200	32	38,400
3. Channel Excavation from Swan Road to V-Drain (dry excavation)	CY	3.50	20,500	71,750
4. Headwalls/Wingwalls	Each	18,000	4	72,000
5. Relocate Existing Private Pump	Each	5,000	1	5,000
6. Existing Facilities Conflicts	Lump Sum	80,000	1	80,000
7. Vegetative Erosion Control	acre	2,000	5.9	11,800
DMD Construction Cost (rounded up)				360,000
V-Drain Improvements				
8. Channel Excavation (Assumed 50% dry excavation)	CY	3.50	46,700	163,450
9. Channel Excavation (Assumed 50% wet excavation)	CY	6.00	46,700	280,200
10. Check Dam in V-Drain near Swan Road	Lump Sum	20,000	1	20,000
11. Sediment Basin	CY	3.50	30,000	105,000
12. Sediment Basin Inlet and Outlet (BridgeTech Conspan 6' x 14' Bridge, no headwalls)	LF	895	48	42,960
13. Reconstruct Irrigation Channel	CY	5	20,000	100,000
14. Vegetative Erosion Control	Acre	2,000	54	108,000
V-Drain Construction Cost				820,000
Construction Cost Total				1,180,000
DMD Right-of-Way/Easement	acre	7,000	5.3	37,100
V-Drain Right-of-Way/Easement	Acre	7,000	23.5	164,500
Environmental Evaluation/Mitigation and Permitting @ 10 %				118,000
Engineering, Administration, Legal @ 20 %				236,000
Total (rounded up)				1,740,000

Table 10. Preliminary Cost Estimate for the DMDVD Alignment with a Capacity Increase of of 494 cfs

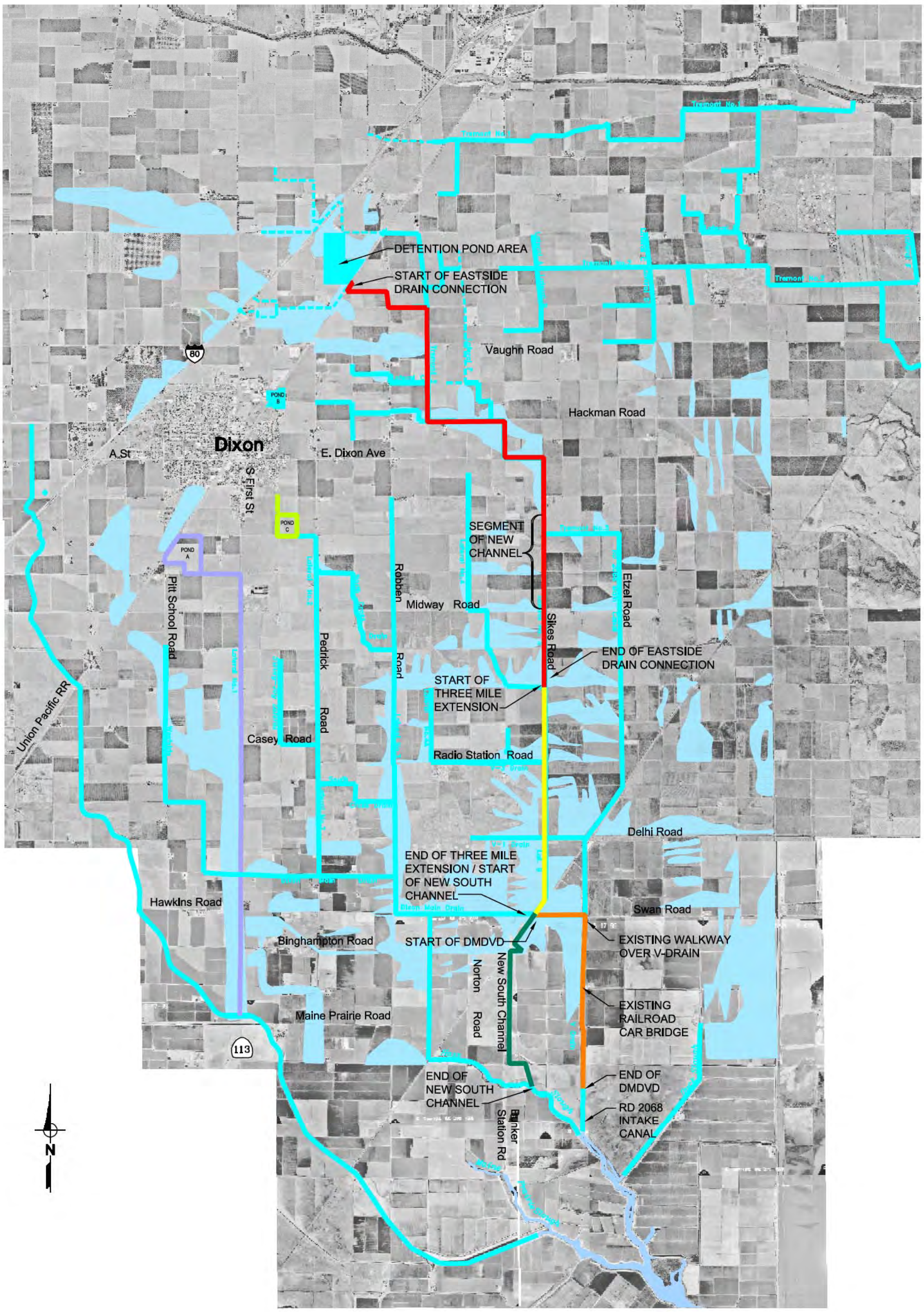
Item	Unit	Unit Cost, dollars	Quantity	Cost, dollars
Dixon Main Drain Improvements				
1. BridgeTech Conspan 7' x 24' Bridge at Swan Road (effective flow area is equal to six 60-inch culverts)	LF	1,300	64	83,200
2. BridgeTech Conspan 7' x 24' Bridge at Private Road (effective flow area is equal to six 60-inch culverts)	CY	1,300	32	41,600
3. Channel Excavation from Swan Road to V-Drain (dry excavation)	CY	3.50	24,900	87,150
4. Headwalls/Wingwalls	Each	19,000	4	76,000
5. Relocate Existing Private Pump	Each	5,000	1	5,000
6. Existing Facilities Conflicts	Lump Sum	80,000	1	80,000
7. Vegetative Erosion Control	acre	2,000	6.5	13,000
DMD Construction Cost				390,000
V-Drain Improvements				
8. Channel Excavation (Assumed 50% dry excavation)	CY	3.50	58,400	204,400
9. Channel Excavation (Assumed 50% wet excavation)	CY	6.00	58,400	350,400
10. Check Dam in V-Drain near Swan Road	Lump Sum	20,000	1	20,000
11. Sediment Basin	CY	3.50	35,000	122,500
12. Sediment Basin Inlet and Outlet (BridgeTech Conspan 6' x 14' Bridge, no headwalls)	LF	895	48	42,960
13. Reconstruct Irrigation Channel	CY	5	20,000	100,000
14. Vegetative Erosion Control	Acre	2,000	34.1	68,200
V-Drain Construction Cost				910,000
Construction Cost Total				1,300,000
DMD Right-of-Way/Easement	acre	7,000	5.6	39,200
V-Drain Right-of-Way/Easement	Acre	7,000	23.6	165,200
Environmental Evaluation/Mitigation and Permitting @ 10 %				130,000
Engineering, Administration, Legal @ 20 %				260,000
Total (rounded up)				1,900,000

Table 11. Preliminary Cost Estimate for the Three Mile Extension

Item	Unit	Unit Cost, dollars	Quantity	Cost, dollars
1. Twin 72-Inch Culverts	LF	456	128	58,337
2. Triple 72-Inch Culverts	CY	360	288	103,680
3. Headwalls for Twin Culverts	Each	14,000	4	56,000
4. Headwalls for Triple Culverts	Each	16,000	6	96,000
5. Channel Excavation	CY	3.50	61,300	214,550
6. Relocate Existing Irrigation Channel	CY	5.00	6,000	30,000
7. Field Drains	Each	1,000	8	8,000
8. Existing Facilities Conflicts	Lump Sum	80,000	1	80,000
9. Vegetative Erosion Control	Acre	2,000	36	72,000
10. Contingency at 10 percent	Lump Sum	71,857	1	71,857
Subtotal (rounded up)				790,000
Right of Way	Acre	7,000	36	252,000
Environmental Evaluation/Mitigation and Permitting @ 10 %				79,000
Engineering, Administration, Legal @ 20 %				158,000
Total (rounded up)				1,280,000

Table 12. Comparison of SNC and DMDVD Alignment

Issue	New South Channel (NSC)		Dixon Main Drain V-Drain (DMDVD)	
	375 cfs Alternative	494 cfs Alternative	375 cfs Alternative	494 cfs Alternative
Construction Cost	$0.97 million	$1.15 million	$1.18 million	$1.30 million
Capital Cost (Construction cost plus easements, environmental, engineering, administration and legal costs).	$1.55 million	$1.81 million	$1.74 million	$1.90 million
Level of Accuracy for Cost Estimate.	plus or minus 20%	plus or minus 20%	plus or minus 20%	plus or minus 20%
Capital Cost Range (within level of accuracy).	$1.24 to $1.86 million	$1.45 to $2.17 million	$1.39 to $2.09 million	$1.52 to $2.28 million
Permitting	CWA Section 404 (USACE Permit) CWA Section 401 (RWQCB Certification) CDFG Stream Bed Alteration Agreement NPDES Construction Permit County Road Encroachment Permit		CWA Section 404 (USACE Permit) CWA Section 401 (RWQCB Certification) CDFG Stream Bed Alteration Agreement NPDES Construction Permit County Road Encroachment Permit Reclamation Board Permit	
Biological Issues	Differences are Insignificant.		Differences are Insignificant.	
Potential for future disputes about flooding along project alignment.	New channel in an area not currently subject to flooding (except when the Yolo Bypass is flooded) may increase potential for disputes.		Adding flows to an existing channel in an area currently subject to flooding may increase potential for disputes.	
Potential for future disputes about damage to irrigation pumps from the introduction of new trash and debris.	Greater - because this is a new channel may carry trash to pumps that are relatively free of trash now.		Lesser - because trash is already conveyed along this existing alignment. Also, these pumps already have a trash screen.	
Potential to increase sediment near existing pump station.	Potential exists to increase sediment conveyed by the JPA project at Mr. Winemans intake.		Potential to decrease sediment at RD 2068 intake because a sediment basin is included in the project.	
Channel Maintenance - Sediment	Sedimentation of channel may be less than typical since NSC will be dry in the summer.		Sedimentation in channel may increase since the larger wider drainage channel will be used for irrigation, however higher winter flow may flush sediment out of the channel.	
Potential to reduce impact to RD 2068 Levee at end of V-Drain.	No improvement possible.		Improvement would be achieved.	
Potential to impact residence at Hass Slough and Bunker Station Road.	NSC may impact this residence.		No impact.	
Difficulty of Acquiring Easements.	Easement acquisition issues will not be known until all landowners have been contacted.		Easement acquisition issues will not be known until all landowners have been contacted.	
Redundancy	Second channel provides redundancy.		Single channel offers no redundancy.	



LEGEND:

- DRAINAGE CHANNEL MAINTAINED BY DISTRICT
- DRAINAGE CHANNEL NOT MAINTAINED BY DISTRICT
- AREAS OF LOCALIZED FLOODING
- POND A/LATERAL 1 PROJECT
- POND C/HIGHSCHOOL PROJECT
- EASTSIDE DRAIN
- 3-MILE EXTENSION
- NEW SOUTH CHANNEL
- DIXON MAIN DRAIN/V-DRAIN ALIGNMENT (DMDVD)

Figure 1

Dixon Watershed JPA
New South Channel & Three Mile Extension
Conceptual Design
REGIONAL DRAINAGE FACILITIES

WEST YOST & ASSOCIATES

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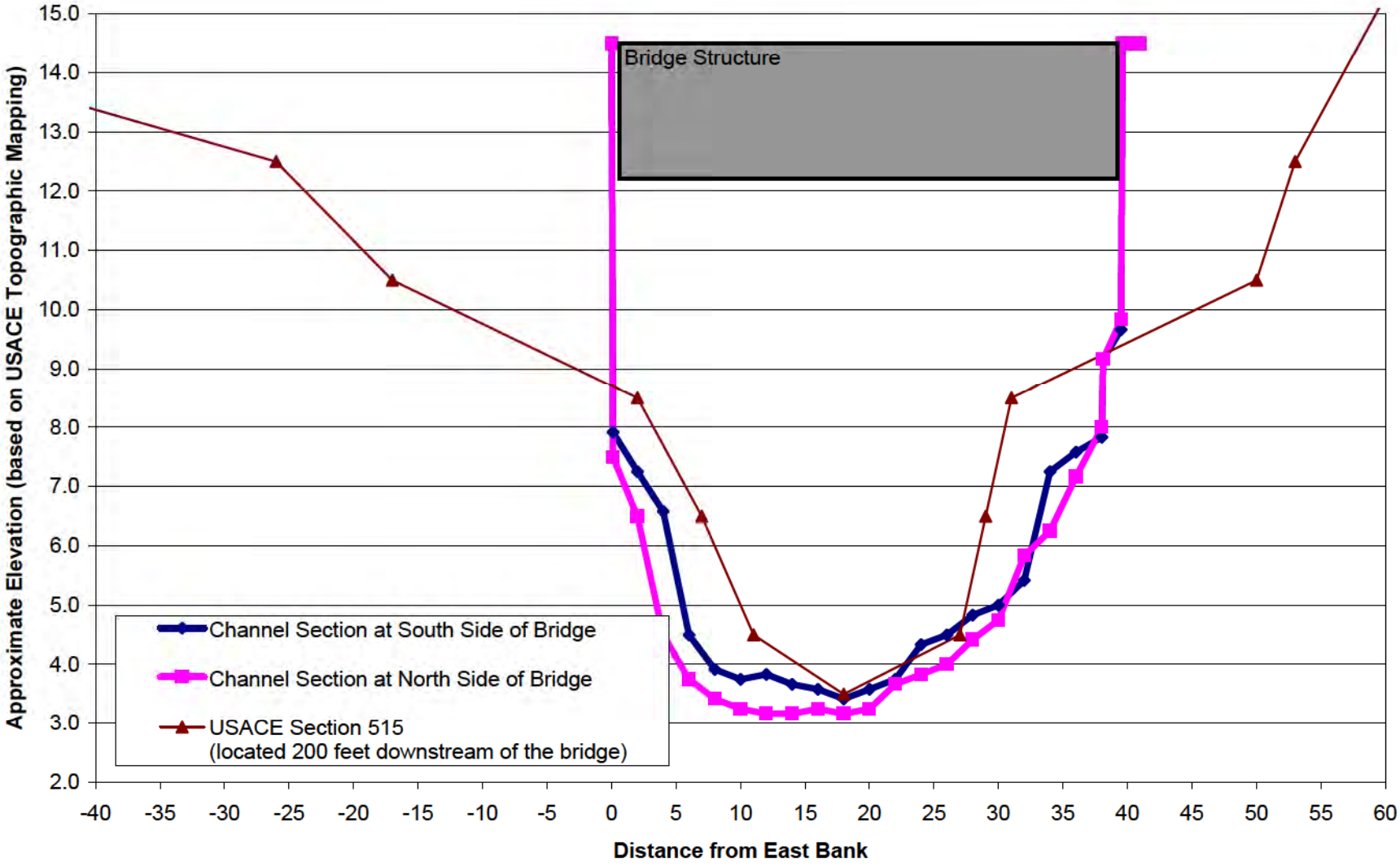
Figure 2. Railroad Car Bridge Over the V-Drain



WEST YOST
ASSOCIATES
Consulting Engineers

September 13, 2006

Mr. John Currey
Secretary, Dixon Watershed Joint Powers Authority
Dixon Resource Conservation District
1170 North Lincoln Street, Suite 110
Dixon CA 95620

Project No.: 298-00-05-01

SUBJECT: Dixon Main Drain and V-Drain Project Recommendations

Dear John:

West Yost Associates is pleased to present this letter which:

- Recommends the Dixon Main Drain and V-Drain (DMD-VD) alignment versus the New South Channel alignment, as described in the Conceptual Design Report (CDR).
- Recommends the project design provide an increase in capacity of 375 cfs along the Dixon Main Drain and V-Drain alignment as described in the CDR.
- Recommends a project bidding approach that will allow the project to be designed, bid, and constructed to provide the greatest possible capacity (up to 375 cfs) for the available funding of $1.3 million ($1.1 million project cost and $0.2 million contingency).

These recommendations are based on the discussions and consensus of the Technical Advisory Committee and West Yost Associates (WYA) at a meeting on August 15, 2006. Each of these recommendations is described further below:

DMD-VD ALIGNMENT RECOMMENDATION

The DMD-VD alignment is recommended (versus the New South Channel alignment) for the following reason (see Figure 1 of the CDR):

1. Property owner preferences – In written and verbal correspondence Mr. Wineman expressed a preference for the DMD-VD alignment over the NSC alignment. In verbal correspondence Mr. Triplett expressed a preference for the DMD-VD alignment over the NSC alignment since he did not see advantage to his property from the NSC alignment. The Technical Advisory Committee agreed that complying with the land owners preferences may facilitate land acquisition and decrease the overall time required to implement the project.

2. Additional discussions with Mike Hardesty indicated that RD 2068 has done major sediment removal from their intake channel on approximately a ten year schedule. Additionally, up to twice annually, debris and sediment are removed from the area immediately adjacent to the trash screen. Rather than construct the sediment basin, they would consider dealing with sediment accumulation through periodic maintenance. The periodic maintenance would be funded through the JPA as envisioned in the JPA document. Also, as part of the DMD-VD, currently accumulated sediment would be removed. This change reduces the estimated cost of the project by about $150,000. Alternatively, Mr. Wineman has requested a more complex/expensive sediment basin than was previously envisioned for the NSC alignment. In the additional discussions with Mike Hardesty, he indicated that the DMD-VD project will also need to protect the RD 2068 main intake pump station by constructing improvements to the existing trash rack and constructing screens around the existing pump station. In the attached cost estimate, it has been assumed that RD 2068 will contribute 50 percent of the cost of the improvements to the existing trash rack.
3. Rather than construct five 60-inch culverts at the DMD crossing of a private access road, a railroad car bridge will be installed. The Dixon Unified School District has a railroad car bridge available at the new High School Site and have indicted that it would be available for the DMD-VD project. Use of this railroad car bridge reduces the cost of this channel-road crossing significantly.
4. The DMD-VD crosses through an area that has routine flooding problems now, but the flooding will be reduced by the project. In contrast, the NSC alignment results in a new channel through an area that is relatively free of flooding, and consequently will not receive benefit from the project.
5. The DMD-VD alignment will reduce the potential for erosion and scour of the RD 2098 levee.
6. The DMD-VD alignment will not impact the house along Bunker Station Road at Hass Slough.

PROJECT DESIGN SHALL PROVIDE AN INCREASE IN CAPACITY OF 375 CFS.

The project shall be designed to provide an increase of 375 cfs over the average existing capacity of the DMD, which will increase the DMD capacity from 240 cfs to 615 cfs. Similarly, it shall be designed to provide an increase of 375 cfs over the average existing capacity of the V-Drain, which will increase the V-Drain capacity from 1,132 cfs to 1,518 cfs (which includes 11 cfs for local runoff).

Because the existing DMD and V-Drain segments currently have varying capacities, this approach will result greater increases in capacity in some segments than in other segments. However, it will lead to a channel system with consistent capacities throughout its length.

PROJECT BIDDING APPROACH

The estimated construction and capital costs for the recommended project shown in Table 1, and the total capital cost is $1.52 million. The available budget for the project is $1.1 million and an additional contingency budget of $0.2 million is available, for a total available budget of $1.3 million. To address this budget shortfall, the project bid documents will be prepared in a format that will allow for the JPA to select what project elements to exclude from the project to achieve the maximum capacity (up to 375 cfs) for $1.3 million. For example, use of corrugated metal pipes will cost less than use of concrete pipes, but concrete pipes have a longer useful life span. The bid documents will be prepared with bid items for both concrete pipes and corrugated metal pipes, and the JPA can select corrugated metal pipes or concrete pipes. Similarly, the culverts could be constructed with or without headwalls to save additional money. By using this approach, the JPA can select options for the project that lead to the greatest possible capacity (up to 375 cfs) for the available budget.

Please call if you have any questions or comments.

Sincerely,

WEST YOST ASSOCIATES

Douglas T. Moore
Principal Engineer

DTM:nmp

attachment

Table 1. Preliminary Cost Estimate for the DMDVD Alignment with a Capacity Increase of of 375 cfs

Item	Unit	Unit Cost, dollars	Quantity	Cost, dollars
Dixon Main Drain Improvements				
1. Triple 60-inch RCP (in addition to the twin 60-inch RCPs)	LF	300	192	57,600
2. Railroad Car Bridge (Twin railroad car bridge asumed to be donated by Dixon School District)	Each	15,000	1	15,000
3. Channel Excavation from Swan Road to V-Drain (dry excavation)	CY	3.50	20,500	71,750
4. Headwalls/Wingwalls	Each	12,000	2	24,000
5. Relocate Existing Private Pump	Each	5,000	1	5,000
6. Existing Facilities Conflicts	Lump Sum	80,000	1	80,000
7. Vegetative Erosion Control	acre	1,000	8.0	8,000
DMD Construction Cost (rounded up)				270,000
V-Drain Improvcmcnts				
8. Channel Excavation (Assumed 50% dry excavation)	CY	3.50	46,700	163,450
9. Channel Excavation (Assumed 50% wet excavation)	CY	6.00	46,700	280,200
10. Check Dam in V-Drain near Swan Road	Lump Sum	20,000	1	20,000
11. Replace Wood Trash Rack with Steel Trash Rack at RD 2068 Pump Station (Assume 50 percent of this cost funded by RD 2068)	lbs	5	15,000	37,500
12. Add Trash Rack/Fencing ($5,000 for fencing) to RD 2068 Pump Station	lbs	5	11,600	63,000
13. Reconstruct Irrigation Channel	CY	5	20,000	100,000
14. Riprap at Existing Railroad Car Bridge	CY	180	80	14,400
15. Vegetative Erosion Control	Acre	1,000	54	54,000
V-Drain Construction Cost				740,000
Construction Cost Total				1,010,000
DMD Right-of-Way/Easement	Acre	7,000	5.3	37,100
V-Drain Right-of-Way/Easement	Acre	7,000	23.5	164,500
Environmental Evaluation/Mitigation and Permitting @ 10 %				101,000
Engineering, Administration, Legal @ 20 %				202,000
Total (rounded up)				1,520,000

Eastside Drain Project
Conceptual Design Report

Prepared for

Dixon Watershed
Joint Powers Authority

January 2008

WEST YOST
ASSOCIATES
Consulting Engineers

298-00-07-02

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INTRODUCTION

The Eastside Drain Project is a regional drainage project intended to provide an outfall for the Northeast Quadrant of Dixon and to reduce flooding of agricultural lands. This Conceptual Design Report is intended to provide a brief and comprehensive description of the project. The report includes the following four sections:

- Project Location and Channel Cross Sections
- Project Description
- Project History
- Project Cost Estimate

PROJECT LOCATION AND CHANNEL CROSS SECTIONS

Figure 1 is an aerial photograph of the project area with the Eastside Drain Project alignment delineated. Figures 2 and 3 show cross sections of the channels taken at six locations. There are three segments to the project: Eastside Drain Connection, 3-Mile Extension and Dixon Main Drain V-Drain. These three segments make up the Eastside Drain project.

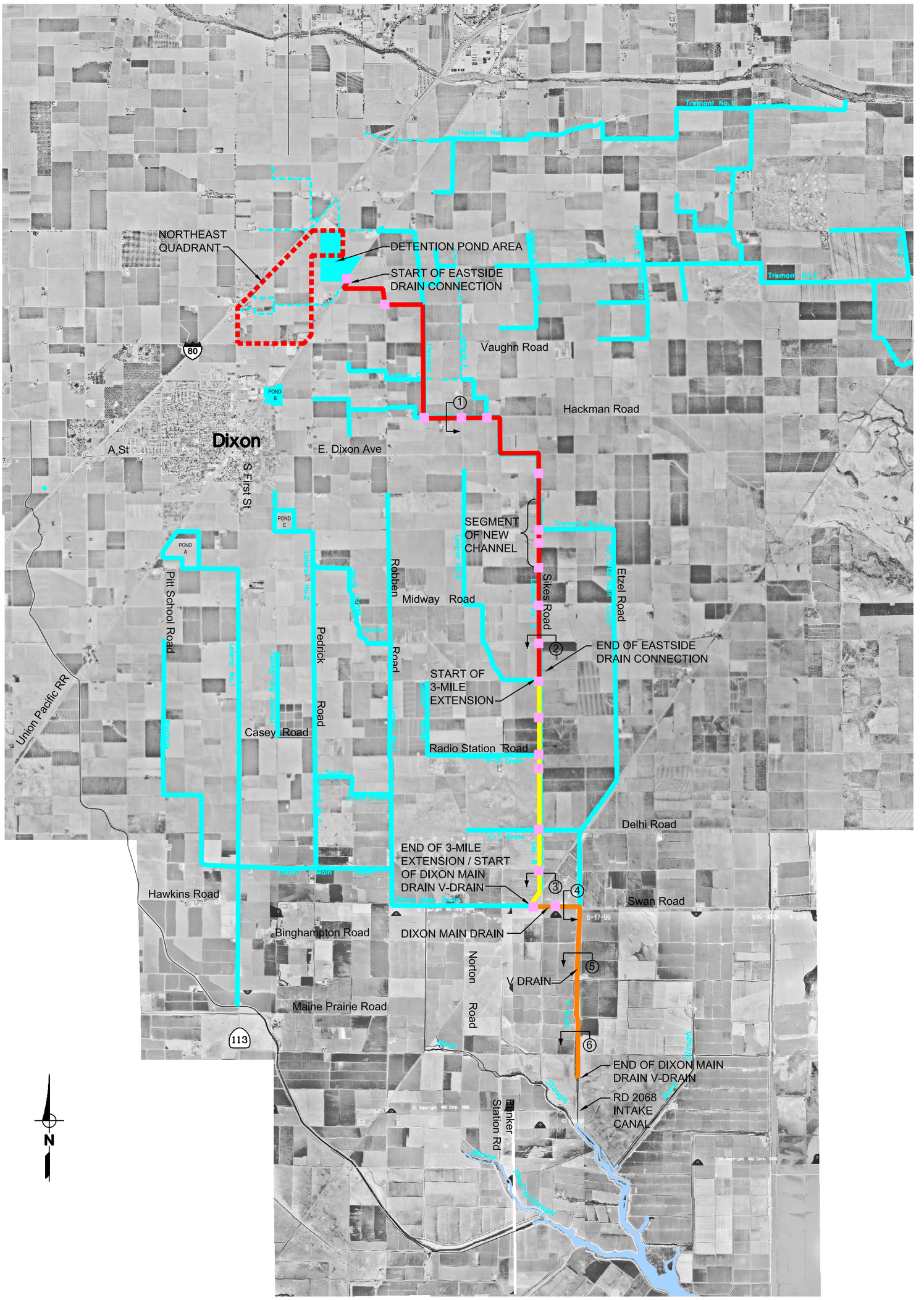
PROJECT DESCRIPTION

The Eastside Drain Project is a regional drainage project intended to provide an outfall for the Northeast Quadrant of Dixon and to reduce flooding of agricultural lands. The alignment of the Eastside Drain Project is shown on Figure 1. The Eastside Drain Project and the upstream tributary projects consist of the following elements:

Detention Storage Upstream of the Railroad (Not A Part of the Eastside Drainage Project)

A 478 ac-ft detention basin will provide storage and water quality treatment for runoff from the Northeast Quadrant of Dixon and Basin D. The location of The Northeast Quadrant is shown in Figure 1. The location of Basin D is shown on Attachment A, which is Figure 2-2 from the Dixon Storm Drainage Report (West Yost Associates, March 1999). Storm water will discharge from the basin at a rate of 140 cubic feet per second (cfs). During off peak times, when downstream channels have capacity, the discharge from the basin could be increased to a maximum of 214 cfs. The detention basin discharge would be through a new 42-inch culvert constructed under the railroad. The location of the detention basin is shown in Figure 1.

The owners or developers of the Northeast Quadrant would fund, plan, design, acquire property, and construct this detention storage basin. The basin would have to comply with all of the City of Dixon's design criteria.



LEGEND:

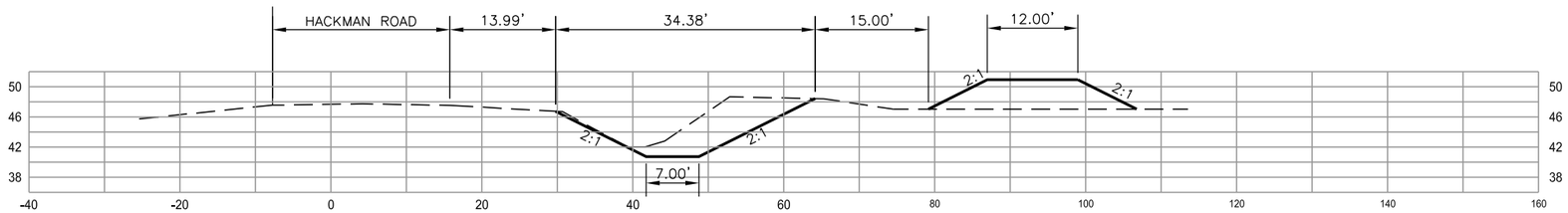
- DRAINAGE CHANNEL MAINTAINED BY DISTRICT
- DRAINAGE CHANNEL NOT MAINTAINED BY DISTRICT
- EASTSIDE DRAIN CONNECTION
- 3-MILE EXTENSION
- DIXON MAIN DRAIN V-DRAIN
- CULVERT(S)
- CROSS SECTION LOCATION (SEE FIGURES 2 AND 3)

Figure 1

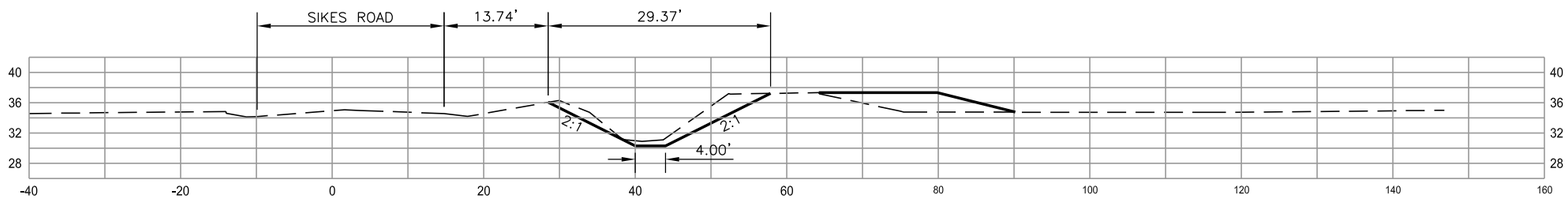
Dixon Watershed JPA
Eastside Drain Project
Alignment

WEST YOST & ASSOCIATES

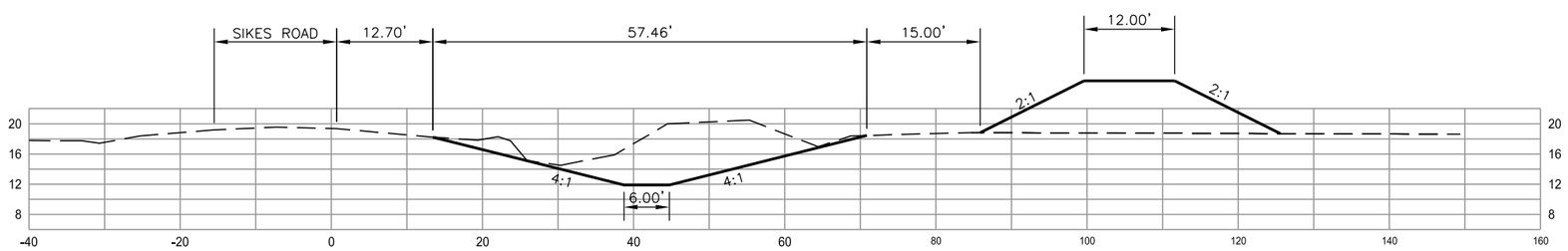
N:\Clients\298 Dixon RWJPA\00-07-02 Main Drain and V-Drain\CAD\Figures\East Side Drain Report\JPAFacilitesFig.dwg 10-11-07 10:17:12 AM myoung



SECTION 1, TYPICAL SECTION ALONG EASTSIDE DRAIN CONNECTION (LOCATED ADJACENT TO HACKMAN ROAD)



SECTION 2, TYPICAL SECTION ALONG EASTSIDE DRAIN CONNECTION (LOCATED ADJACENT TO SIKES ROAD)



SECTION 3, TYPICAL SECTION ALONG THREE MILE EXTENSION (LOCATED ADJACENT TO SIKES ROAD)

0 10 20
SCALE IN FEET

Figure 2

Dixon Watershed JPA
Eastside Drain Project
Eastside Drain Connection and 3-Mile Extension Cross Sections

WEST YOST ASSOCIATES
Consulting Engineers

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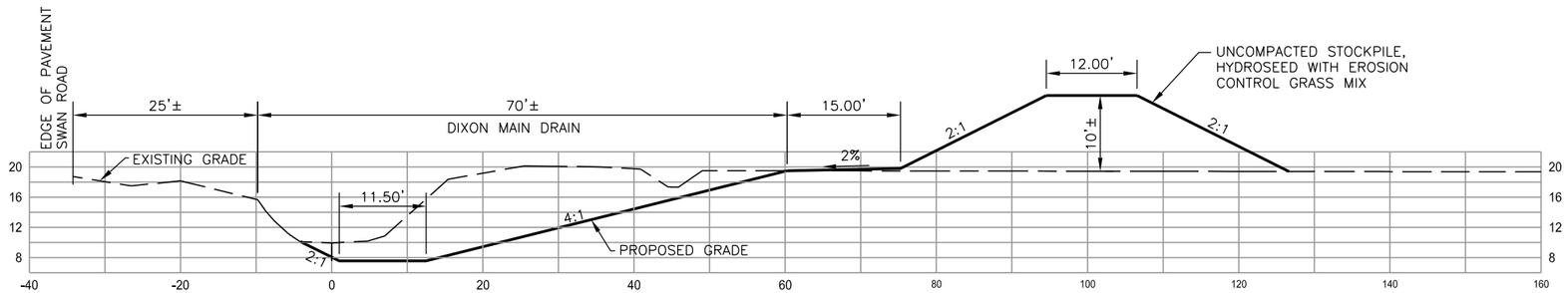
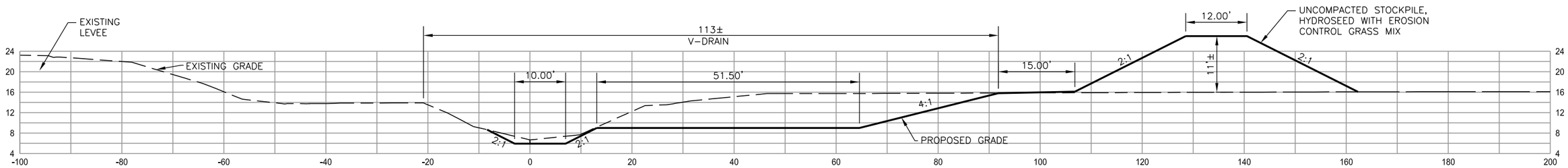
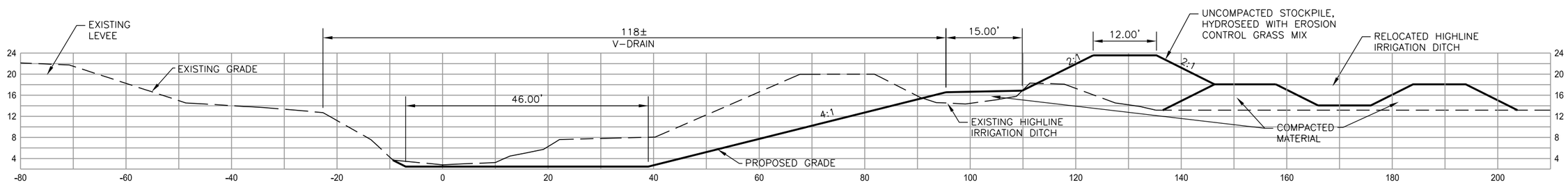


SECTION 4, TYPICAL SECTION ALONG DIXON MAIN DRAIN (LOCATED ADJACENT TO SWAN ROAD)



SECTION 5, TYPICAL SECTION ALONG V-DRAIN NORTH OF ACCESS BRIDGE



SECTION 6, TYPICAL SECTION V-DRAIN SOUTH OF ACCESS BRIDGE

0 10 20
SCALE IN FEET

Figure 3

Dixon Watershed JPA
Eastside Drain Project
Main Drain and V-Drain Cross Sections

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Consulting Engineers

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Eastside Drain Connection

A new channel will be constructed from the railroad tracks to Tremont 3. The existing Tremont 3 channel from the new channel to the point that Tremont 3 crosses Sikes Road would be enlarged. The enlarged channel will provide 214 cfs of increased conveyance capacity above the original design capacity of Tremont 3. (The Dixon Resource Conservation District's (DRCD) original design capacity of Tremont 3 is 11cfs per square mile of tributary area.) The total capacity of the enlarged channel will be 245 cfs at the upstream end. Capacity will be added to the channel as it flows south and more tributary drainage area is added. At the point where Tremont 3 crosses Sikes Road the total capacity will be 314 cfs.

At this point the total flow splits and 100 cfs continues under Sikes Road in the original Tremont 3 facility while 214 cfs will flow south in a new channel. This new channel will join the existing Lateral 5 which will be enlarged. From the start of the new channel to start of the Three Mile Extension the total capacity of the channel will increase from 214 cfs to 253 cfs as the tributary area increases. Along this channel 60-, 66- and 72-inch culverts will be constructed at roadway crossings. The location of the Eastside Drain Connection is shown in Figure 1 and cross sections are shown in Figure 2.

The cost to construct the Eastside Drain Connection would be paid for by the developers of the Northeast Quadrant through Storm Drainage Facilities Impact Fees collected by the City of Dixon.

The 3-Mile Extension

The 3-Mile Extension begins at the end of the Eastside Drain Connection where Lateral 4 enters the channel. The required total capacity at this point is 344 cfs (253 cfs from the Eastside Drain Connection plus 91 cfs from Lateral 4). Capacity will be added to the 3-Mile Extension (at a rate of 26 cfs per square mile) as it flows south and tributary drainage area is added. The downstream end of this segment will have a capacity of 494 cfs. Along this channel twin and triple 72-inch culverts will be constructed at roadway crossings. A 7' x 24' conspan structure will be constructed at the Swan Road crossing. The location of the 3-Mile Extension is shown in Figure 1, and cross sections are shown in Figure 2.

At Delhi Road an existing culvert under Sikes Road will divert about 105 cfs eastward in an existing channel to the V-Drain. This existing culvert and channel will remain when the 3-Mile Extension is constructed.

The cost to construct the 3-Mile Extension would be funded with a $200,000 grant from the Solano County Water Agency to the JPA and money from the Northeast Quadrant developers through Storm Drainage Facilities Impact Fees collected by the City of Dixon.

Dixon Main Drain and V-Drain

The 3-Mile Extension joins the Dixon Main Drain at Swan Road. The existing Dixon Main Drain channel will be enlarged to provide an increase of capacity of about 494 cfs to provide a capacity of 734 cfs throughout this reach of the DMD. The Dixon Main Drain has little tributary area, so no incremental increase in capacity will be provided. The Dixon Main Drain joins the V-Drain about 0.6 miles to the east. The V-Drain will also be enlarged to provide an additional capacity of about 494 cfs plus an additional 11 cfs capacity for additional adjacent tributary area for a total increase of 505 cfs. This increase provides the V-Drain with a capacity of 1,637 cfs throughout the length of this reach of the V-Drain. Culverts and check dams along the channels alignment will be replaced to accommodate the larger channel. The location of the Dixon Main Drain and V-Drain is shown in Figure 1, and cross sections are shown in Figure 3.

The cost to construct the Dixon Main Drain and V-Drain will be funded with a contribution of up to $1.32 million from the City of Dixon and money paid by the Northeast Quadrant developers through Storm Drainage Facilities Impact Fees collected by the City of Dixon.

Currently, improvements to enlarge the Dixon Main Drain and V-Drain by an initial additional capacity of 375 cfs are being designed. Construction of this incremental improvement project is anticipated for summer of 2008. The cost of increasing the capacity of the channel by 375 cfs is being funded by the $1.32 million contribution from the City of Dixon. Additional future improvements to increase the capacity by the total 494 cfs will be funded through fees as described above.

PROJECT HISTORY

Provided below is a summary of the historical engineering studies leading to the development of the Eastside Drain Project:

Tremont 3 Drain Preliminary and Reconnaissance Report (Early 1960s)

This planning study documents the planning and sizing of the Tremont 3 Drain and identifies its service area. The Tremont 3 Drain was constructed in the early 1960's.

It identifies the purpose of the Tremont 3 Drain as "This area was originally traversed by various shallow sloughs which carried off the surface drainage. Individual landowners have leveled their land, thus breaking up the natural drainage pattern. The rate of penetration into the soil is very slow so that it is necessary to provide for both winter drainage and drainage from summer irrigation."

The drain was planned to vary in size from bottom widths of 2 to 6 feet and depths of 2 to 4.5 feet. The length was planned as 12.5 miles (including laterals C and D). It was planned to drain into the RD 2068 Main Canal, Hass Slough, and then to the Sacramento River. The inlet and outlet structures to and from the RD 2068 main canal were identified as part of the project, however, no other improvements were identified for the RD 2068 main canal or channels further downstream. The tributary area was identified as 5,860 acres, and included no areas west of Pedrick Road and limited area west of the railroad tracks. The project was sized based on the Dixon hydrology using a runoff rate of 11 cfs per square mile.

The project was funded by a voluntary group consisting of property owners who signed the agreement for construction and maintenance and by a grant from the soil conservation service. The costs were prorated by the acres that benefit from the project. The County Transportation Department was a participant by constructing the culverts under the County Roads.

Curry Drain Hydrology and Peak Flow Calculation Sheets and Planning Study (1963)

In 1963, the Curry Drain was planned, but it was never constructed.

The Curry Drain was intended to convey a flow of 50 cfs from the railroad to the Tremont 3 Drain. The runoff was to be from the large watershed west of Interstate 80 and the Northeast Quadrant to the Tremont 3 Drain (4.53 square miles total). This project would have included improvements to the Tremont 3 Drain, including channel enlargement and culvert replacement.

The Curry Drain hydrology calculations were based on a 10-year storm producing a runoff of 125 cfs at the highway (35.4 cfs per square mile) and 157 cfs at the railroad (34.6 cfs per square mile). The Curry Drain was only planned for a capacity of 50 cfs from the railroad to the Tremont 3 Drain. Within the study, it was determined that the resulting duration of flooding at the highway would be about 30 hours and the duration of flooding at the railroad would be about 40 hours.

Thus in 1963, the problem of flooding at Interstate 80 and at the railroad was recognized, a solution was developed, but the solution was not implemented.

County Wide Flood Control Master Plan 1998

In 1998 the Solano County Water Agency sponsored a County-Wide flood control master plan in which flooding problems throughout the County were identified and prioritized. Flooding within the Dixon Watershed received a high priority, leading to the more detailed Dixon Watershed Management Plan.

Dixon Watershed Management Plan (August 24, 2001)

In this document five alternatives were evaluated to provide drainage for development of the Northeast Quadrant. These alternatives included:

- Detention within the Northeast Quadrant to existing discharge rates
- Pumping from the Northeast Quadrant to Putah Creek
- Drainage from the Northeast Quadrant to the Yolo Bypass in a new channel along Hackman Road
- Drainage from the Northeast Quadrant to Hass Slough by increasing the Capacity of the Treamont 3 Drain and Lateral 5, and construction of the New South Channel.
- Drainage from the Northeast Quadrant to Hass Slough by increasing the Capacity of the Laterals 2 and 3 and the Dixon Main Drain and construction of the New South Channel.

The fourth of these alternatives was selected because it provided flood reduction benefit to the largest area and at the lowest cost per acre of flood reduction. This report also identified the optimum detention storage volume (70 acre-feet at a cost of $0.8 million) and discharge rate (250 cfs at a cost for downstream conveyance improvements of $4.8 million) to minimize the overall project costs. It was decided that the developers within the Northeast Quadrant would fund, design, and construct the required detention basin within (or near) the Northeast Quadrant. The downstream conveyance project was named the Eastside Drain Project (EDP). Over the next two years, the Eastside Drain Project was further refined and cost estimates updated, leading to a final cost estimate of $6.8 million for the project including the New South Channel. The New South Channel is the most downstream segment of this project: and as such, it was identified as the project element that should be constructed first. At that time, the New South Channel was planned to provide a conveyance capacity of 375 cfs and cost $1.1 million.

New South Channel Conceptual Design (December 2002)

This document provided additional planning for just the New South Channel. It included the flood control channel and culverts; however, it also included wetlands and upland wildlife habitat creation in the project in an effort to seek grant funding for the project.

Update to the Storm Drainage Facilities Fee for the City of Dixon (June 10, 2003)

Based on fully funding the Eastside Drain Project (including the New South Channel), the City of Dixon revised its Storm Drainage Facilities Fees for the Northeast Quadrant to $15,686 per acre of development within the Northeast Quadrant. This fee is currently being collected by the City of Dixon from all development within the Northeast Quadrant. This fee is adjusted annually based on current inflation rates.

Letter to Mike Dean (June 16, 2004)

In this letter the original planning and design documents for the Tremont 3 Drain were reviewed and summarized. The Tremont 3 Drain indirectly receives runoff from the Northeast Quadrant. It was concluded that in the original planning of the Tremont 3 Drain, no capacity was allocated for runoff from lands west of Pedrick Road. Nevertheless, some runoff would have come off of those lands, and it was probably intended that the runoff would be limited by the 30-inch culvert under the railroad east of Pedrick Road. The intended flow rates through the culvert were estimated to be about 23.1 cfs in a 5-year storm, 27.2 cfs in a 10-year storm, and 37.2 cfs in a 100-year storm.

Letter to Mike Dean (July 23, 2004)

This letter was prepared while the Dixon Downs race track was under consideration by the City of Dixon. In this letter, the Eastside Drain Project was revised to a Recommended Project to utilize detention basin facilities initially proposed by Dixon Downs. This Recommended Project included a variable discharge rate under the railroad of 140 to 214 cfs. The Northeast Quadrant could always discharge at least 140 cfs under the railroad, and when downstream capacity was available, that discharge could be increased to 214 cfs. A storage volume of 478 ac-ft in or near the Northeast Quadrant was required to achieve this discharge rate under the railroad.

Joint Powers Agreement – Dixon Regional Watershed Joint Powers Authority (September 2004)

This document created the Dixon JPA and its signatories were the City of Dixon, the Dixon Resource Conservation District (DRCD), Reclamation District 2068 (RD 2068), and the Maine Prairie Water District (MPWD). The main goal of the JPA is to plan, design, construct, operate, and maintain drainage projects that reduce flooding in the Dixon Watershed. The JPA document and its attachments:

- Acknowledge properties west of Pedrick Road and most of the properties west of the railroad tracks did not participate in the Tremont 3 Drain project, and consequently have no entitlement to discharge runoff into the Tremont 3 Drain.
- Acknowledge that the 30-inch CMP culvert under the railroad was the only railroad culvert intentionally kept open capable of accepting flow from the Northeast Quadrant area. The estimated flow rates through this culvert, by action of the JPA agreement, are accomodated at ratesof 23.1 cfs in a 5-year storm, 27.2 cfs in a 10-year storm, and 37.2 cfs in a 100-year storm. Under the JPA agreement the City is permitted to discharge these flow rates from the Northeast Quadrant under the railroad even though there is no planned capacity in or direct connection to the Tremont 3 Drain for that flow.
- The JPA document further requires that the JPA member agencies pursue construction of increased downstream conveyance capacity for these discharge rates.
- Recognizes that to limit flows from the Northeast Quadrant to these 5-year, 10-year and 100-year rates would require construction of an 871 ac-ft detention basin.
- It further acknowledges that it may be preferable to construct greater downstream conveyance capacity and a smaller detention basin. It identifies a 478 ac-ft detention basin (sized based on a drainage rate of 140 cfs) and an increase of downstream conveyance capacity of 214 cfs as the JPA Recommended Project. The actual discharge rate under the railroad would vary between 140 cfs and 214 cfs depending upon the available capacity in the downstream channels.
- It also acknowledges that further modifications of the JPA Recommended Project may occur as planning of development projects and associated drainage facilities proceed.
- Identified the Eastside Drain Project (including the New South Channel) as one of the high priority projects and identified January 1, 2012 as the goal for having this project constructed.
- Identified the New South Channel as the first phase of the Eastside Drain Project, established the NSC project capacity to be 375 cfs and the cost to be $1.1 million. Established a contingency cost of $220,000 for the New South Channel. The City of Dixon agreed to contribute up to $1.32 million to construct the New South Channel.
- The signatories to the JPA agreed to use their best efforts to obtain funding for the East Side Drain through a variety of private, local, state and federal funding sources, with a goal of completing the Eastside Drain Project by January 1, 2012.

- The JPA also identifies anticipated operations and maintenance (O&M) costs for the JPA channels and facilities and identified the O&M cost sharing amongst the member agencies.

Letter to John Currey (January, 2006)

This letter is a study of providing conveyance at the south end of the Eastside Drain Project via the New South Channel or constructing improvements along the Dixon Main Drain and V-Drain. Although costs for the Dixon Main Drain and V-Drain were somewhat higher, the Dixon Main Drain V-Drain alignment was preferred by landowners in the area. Therefore, the Dixon Main Drain V-Drain alignment was selected as the preferred alignment for the south end of the Eastside Drain Project.

PROJECT COST ESTIMATE

A planning level cost estimate for the Eastside Drain project is shown in Table 1.

As Shown, the estimated construction cost is $4,284,000 and the estimated capital cost is $6,870,000.

Table 1. Preliminary Cost Estimate for the Eastside Drainage Project

Item	Unit	Unit Cost, dollars	Quantity	Cost, dollars
Dixon Main Drain Improvements				
Channel Excavation from Swan Road to V-Drain (dry excavation)	CY	4.00	36,000	144,000
BridgeTech Conspan 7' x 24' Bridge at Private Road (effective flow area is equal to six 60-inch culverts)	LF	1,300	32	41,600
Headwalls/Wingwalls	Each	19,000	2	38,000
Relocate Existing Private Pump	Each	5,000	1	5,000
Existing Facilities Conflicts	Lump Sum	80,000	1	80,000
Vegetative Erosion Control	acre	2,000	8.2	16,400
Contingency at 10 percent	Lump Sum	32,500	1	32,500
DMD Construction Cost				358,000
V-Drain Improvements				
Channel Excavation (Assumed 50% dry excavation)	CY	4.00	95,000	380,000
Channel Excavation (Assumed 50% wet excavation)	CY	6.00	95,000	570,000
Check Dam in V-Drain near Swan Road	Lump Sum	20,000	2	40,000
Modifications to RD2068 Intake Structures	Lump Sum	160,000.00	1	160,000
Reconstruct Irrigation Channel	CY	6	38,000	228,000
Vegetative Erosion Control	Acre	2,000	41.0	82,000
Contingency at 10 percent	Lump Sum	146,000	1	146,000
V-Drain Construction Cost				1,606,000
Construction Cost Total				1,964,000
Dixon Main Drain Right-of-Way/Easement	Acre	7,000	8.8	61,600
V-Drain Right-of-Way/Easement	Acre	7,000	45.0	315,000
Environmental Evaluation/Mitigation and Permitting @ 10 %				196,400
Engineering, Administration, Legal @ 20 %				392,800
Dixon Main Drain and V-Drain Total (rounded up)				**2,930,000**
Three Mile Extension				
BridgeTech Conspan 7' x 24' Bridge at Swan Road (effective flow area is equal to six 60-inch culverts)	LF	1,300	64	83,200
Headwalls/Wingwalls	Each	19,000	2	38,000
Twin 72-Inch Culverts	LF	456	128	58,337
Triple 72-Inch Culverts	LF	612	288	176,256
Headwalls for Twin Culverts	Each	14,000	4	56,000
Headwalls for Triple Culverts	Each	16,000	6	96,000
Channel Excavation	CY	4.00	61,300	245,200
Relocate Existing Irrigation Channel	CY	6.00	6,000	36,000
Field Drains	Each	1,000	8	8,000
Existing Facilities Conflicts	Lump Sum	40,000	1	40,000
Vegetative Erosion Control	Acre	2,000	36	72,000
Contingency at 10 percent	Lump Sum	90,899	1	90,899
Three Mile Extension Construction Cost				880,000
Three Mile Extention Right of Way/Easement	Acre	7,000	36	252,000
Environmental Evaluation/Mitigation and Permitting @ 10 %				88,000
Engineering, Administration, Legal @ 20 %				176,000
Three Mile Extension Total (rounded up)				**1,400,000**
Eastside Drain Connection				
60-inch Culverts	LF	230	180	41,400
66-inch Culverts	LF	260	582	151,320
72-inch Culverts	LF	290	214	62,060
Headwalls	Each	10,000	28	280,000
Check Dams / Orifice Structure	Each	10,000	1	10,000
Channel Excavation	CY	4.00	116,300	465,200
Existing Utility Conflicts	Lump Sum	116,000	1	116,000
Vegetative Erosion Control	Acre	2,000	75	150,000
Field Drains (every quarter mile)	Each	1,000	30	30,000
Contingency at 10 percent	Lump Sum	130,598	1	130,598
Eastside Drain Construction Cost				1,440,000
Eastside Drain Connection Right of Way/Easement	Acre	7,000	75	525,000
Environmental Evaluation/Mitigation and Permitting @ 20 %				288,000
Engineering, Administration, Legal @ 20 %				288,000
Eastside Drain Connection Total (rounded up)				**2,540,000**

WEST YOST ASSOCIATES
Consulting Engineers

May 10, 2012 Project No.: 298-00-07-02

Mr. John Currey
Dixon Regional Watershed Joint Powers Authority
Dixon Resource Conservation District
1170 N. Lincoln Street, Suite 110
Dixon CA 95620

SUBJECT: Main Drain and V-Drain—Hydraulics Study

Dear John:

West Yost Associates (West Yost) prepared this hydraulic study to confirm the Dixon Main Drain and V-Drain Project channel design. Information in this report on the existing average capacity and the proposed increase to that capacity was taken from the letter report titled, *Conceptual Design of the New South Channel, Enlarging the Dixon Main Drain and V-Drain, and the Three Mile Extension* dated January 3, 2006 prepared by West Yost. The January 3, 2006 report included a Mannings Equation analysis of the Main Drain and V-Drain channels and was used in planning the project. The following information from the January 3, 2006 report was used as the basis for the design of the improvement plans for the Dixon Main Drain and V-Drain Enlargement Project and is used in the analysis presented in this letter report:

- Existing average capacity Dixon Main Drain – 240 cfs
- Existing average capacity V-Drain – 1,132 cfs
- Target capacity for the enlarged Dixon Main Drain – 615 cfs (increase of 375 cfs)
- Target capacity for the enlarged V-Drain – 1,518 cfs (increase of 386 cfs)

The January 3, 2006 report presented some basic channel dimensions to provide the increased capacity. It also discussed the existing bridge over the channel and concluded that the existing channel section at the bridge provides adequate conveyance capacity for the increased flows and that the bridge does not need to be replaced.

In 2010 and 2011, West Yost prepared improvement plans for the Dixon Main Drain and V-Drain Enlargement Project. These construction documents show the final cross sectional configuration of the enlarged channels. As a part of the design, an XP-SWMM model was prepared to verify the adequacy of the final channel improvements for the design flows of 615 cfs in the V-Drain and 1,518 cfs in the V-Drain. The model was also used to compare the flow and resulting water surface elevations of the enlarged channel to the existing channel. This letter report presents the results of the XP-SWMM modeling.

MODEL INPUT

The existing condition model used a steady state flow of 240 cfs in the Dixon Main Drain and 1,132 cfs in the V-Drain. The existing condition channel was taken from surveyed cross sections. A tail water elevation in Hass Slough of 8.5 feet was assumed, which represents a very high tide, but not flooding of the Yolo Bypass. A Manning's n value of 0.035 was used.

The future conditions model used a steady state flow of 615 cfs in the Dixon Main Drain and 1,518 cfs in the V-Drain. The future condition channel was taken from the cross sections shown on the Dixon Main Drain and V-Drain Enlargement Project improvement plans. A tail water elevation in Hass Slough of 8.5 feet was assumed. A Manning's n value of 0.035 was used for the earth channel sections and a value of 0.05 was used for the sections near the bridge where the channel will be lined with rock rip rap.

The Manning's n value of 0.035 used in the XP-SWMM model differs from the value of 0.040 used in the conceptual design analysis done in the January 2006 report. The conceptual design analysis was preliminary and used assumed channel slope and channel cross sections with which the more conservative n value of 0.040 was appropriate. The enlarged channel XP-SWMM model cross sections and channel slope were as per the design. The Manning's n value of 0.035 reflects the roughness of the earth sections of the channel. Table 5-6 of Chow (attached in Appendix 1) shows a range of n values for earth channels from 0.016 for clean and recently completed channel to 0.12 for non-maintained channels with weeds and brush uncut and dense and as high as the flow depth. The 0.035 value selected reflects the level of expected vegetation in the Main Drain and V-Drain channel. Additionally the publication "Roughness Characteristics of Natural Channels", US Geological Survey Paper 1849 was consulted for a recommended n value. An excerpt from this text is shown in Appendix 2. This second reference depicts a calibrated stream that is quite similar in appearance to the Main Drain and V-Drain and confirms our selection of a 0.035 n value.

MODEL RESULTS

Figure 1 presents a profile of the channel showing the existing and proposed channel inverts along with the channel banks. It shows the water surface elevations for the existing channel flowing at its existing average capacity of 240 cfs in the Main Drain and 1,132 cfs in the V-Drain. It also shows the water surface elevation for the enlarged channel flowing at the target capacities of 615 cfs in the Main Drain and 1,518 cfs in the V-Drain. As shown in Figure 1, the future conditions water surface is lower at all locations along the channel than the existing conditions results. The bridge crossing at the V-Drain is also shown on Figure 1. Bridge elevations were taken from a topographic survey. The bridge deck is at elevation 16.0 feet and the bottom of the bridge is 23 inches below the deck. The water surface elevation of the enlarged channel at the target capacity is below the bottom of the bridge.

Figure 2 shows the existing and enlarged cross section of the V-Drain approximately 185 feet upstream of the bridge. The proposed channel cross sections north of the bridge have a 10-foot wide low flow channel with 2:1 side slopes. There is a 42-foot wide maintenance bench at elevation 9.0. This bench will be above the tidal elevation and will be dry during the summer so that it can be mowed. The side slope above the maintenance bench is 4:1. As shown on Figure 2 the maximum water surface with the enlarged channel at target flows is about 1.5 feet lower than the existing condition channel flowing at its existing average capacity.

Figure 3 shows the channel section at the bridge. The channel will not be widened at the bridge; it will only be deepened approximately two feet along the invert. Model results show the maximum water surface at the target flows after the project is constructed will be below the bottom of the bridge and about 1.9 feet lower than the existing condition channel flowing at its existing average capacity. The modeled channel velocity at the bridge section in the existing condition is approximately 4.4 feet per second. In the proposed conditions model it is approximately 6.8 feet per second. Because of this higher channel velocity at the bridge, the channel will be lined with rock rip-rap to prevent scour.

Figure 4 shows the existing and enlarged cross section of the V-Drain approximately 500 feet downstream of the bridge. The proposed channel cross sections south of the bridge have a 40-foot wide low flow channel with 2:1 side slopes on the east and 4:1 side slopes on the west. There is a 21-foot wide maintenance bench at elevation 9.0. The channel south of the bridge experiences more tidal inundation; however this bench will facilitate channel cleaning and maintenance. The side slope above the maintenance bench is 4:1 and the side slope of the adjacent high line canal is 2:1. As shown on Figure 4, the maximum water surface with the enlarged channel at target flows is about two feet lower than the existing condition channel flowing at its existing average capacity.

The modeling results presented in this letter report confirm that there should be lower overall water surface elevations in the channel and at the bridge with the Main Drain and V-Drain Enlargement Project than for current conditions. Please call or email me if you have questions or need additional information.

Sincerely,

WEST YOST ASSCOCIATES

Mary L. Young
Principal Engineer
R.C.E. #C39713

MLY:np

Figure 1. Profile Main Drain and V Drain

Figure 2. Section 185 Feet Upstream of Bridge

Figure 3. Section at Bridge

Figure 4. Section 500 Feet Downstream of Bridge

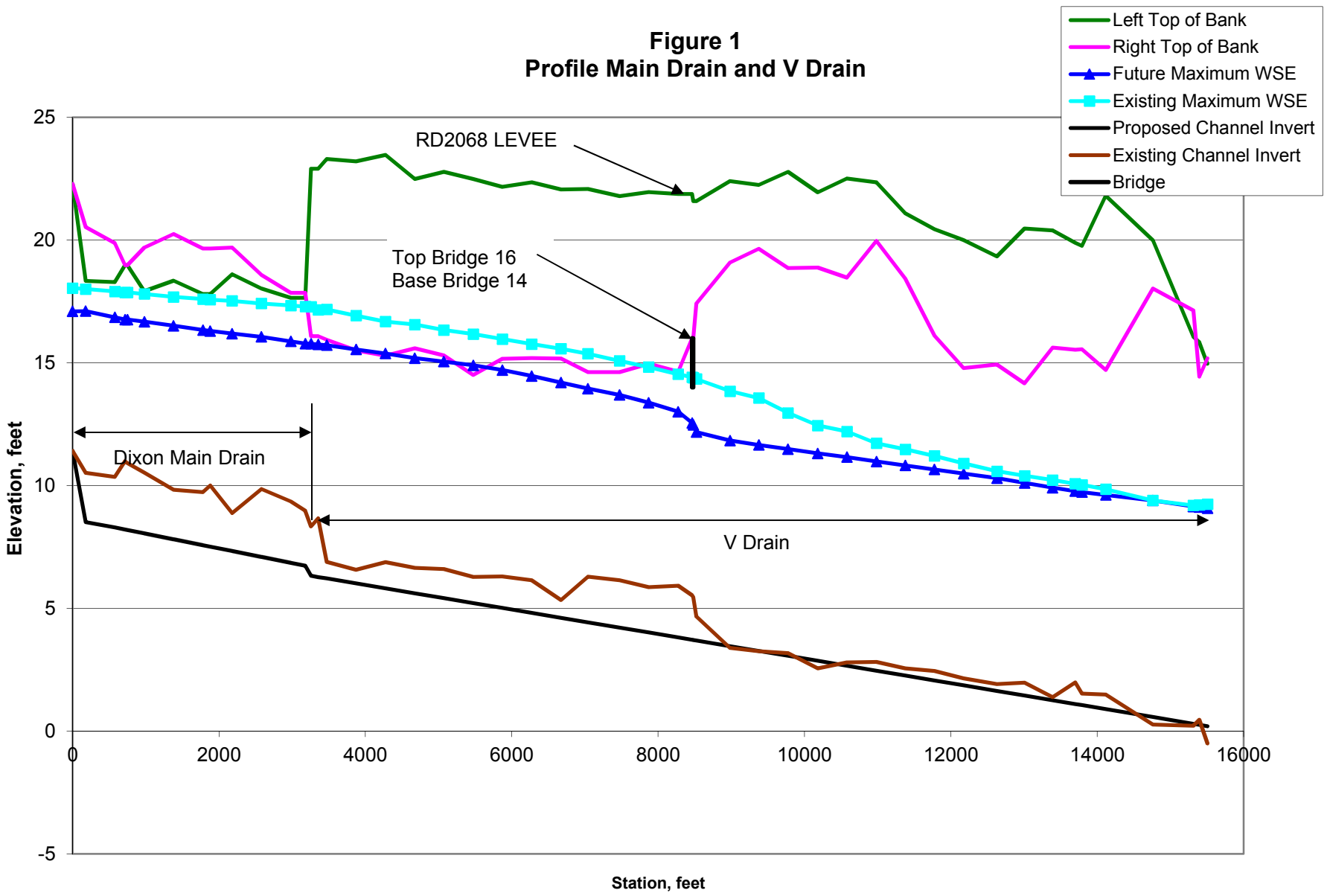


Figure 1
Profile Main Drain and V Drain
Left Top of Bank
Right Top of Bank
Future Maximum WSE
Existing Maximum WSE
Proposed Channel Invert
Existing Channel Invert
Bridge
RD2068 LEVEE
Top Bridge 16
Base Bridge 14
Dixon Main Drain
V Drain
Elevation, feet
Station, feet
25
20
15
10
5
0
-5
0
2000
4000
6000
8000
10000
12000
14000
16000

Figure 2
Section 185 Feet Upstream of Bridge

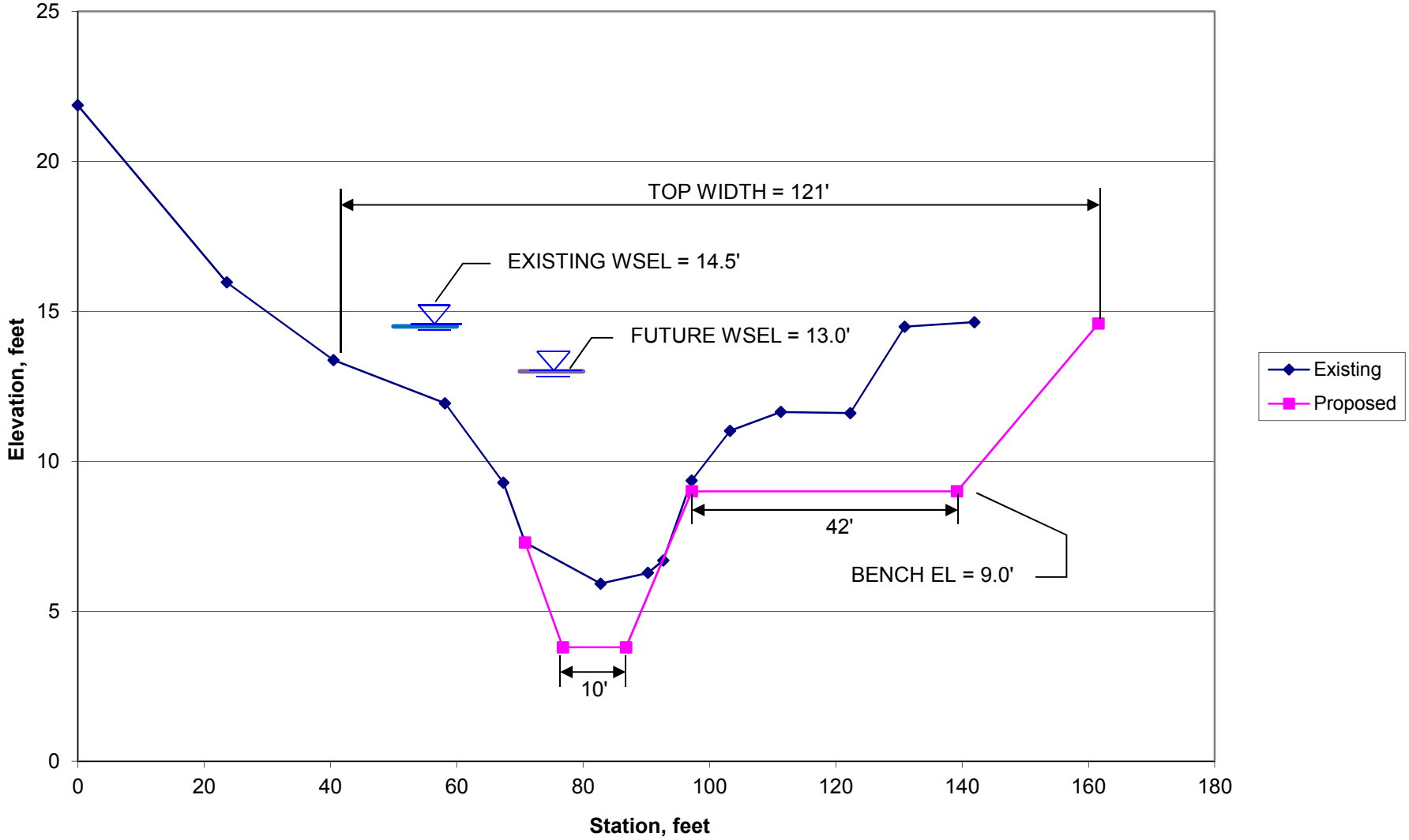


Figure 3
Section at Bridge

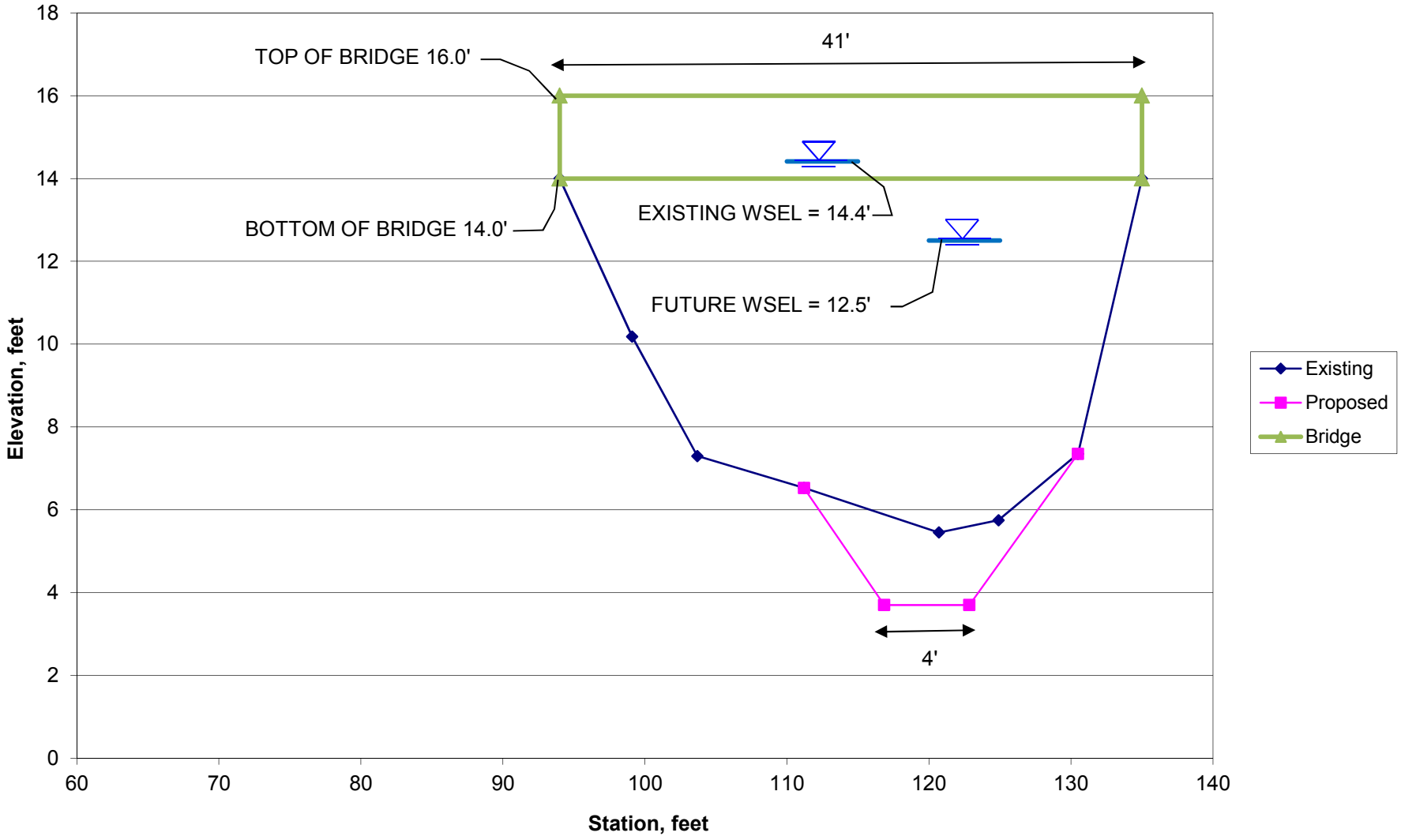
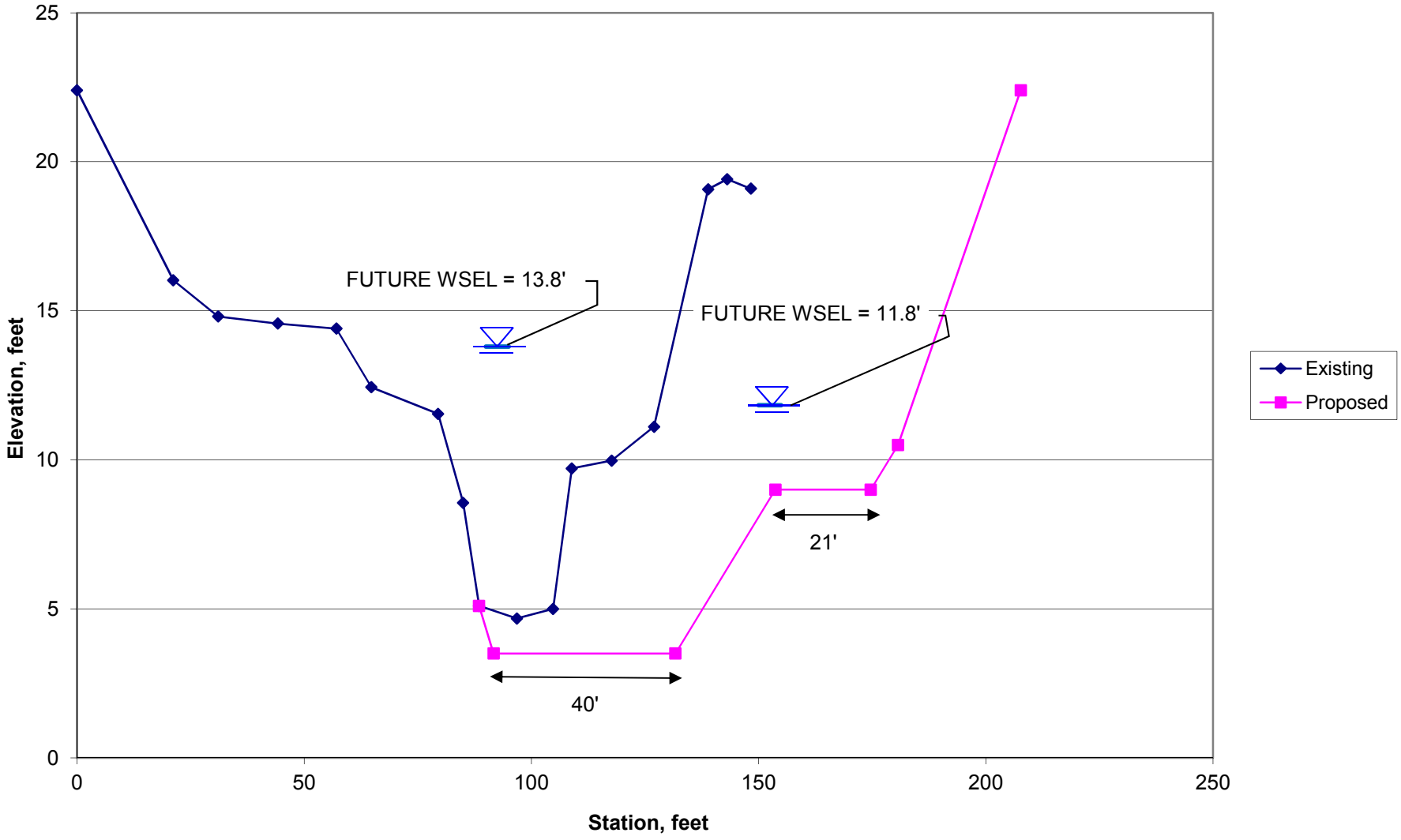


Figure 4
Section 500 Feet Downstream of Bridge



APPENDIX 1

TABLE 5-6. VALUES OF THE ROUGHNESS COEFFICIENT n (*continued*)

Type of channel and description	Minimum	Normal	Maximum
C. EXCAVATED OR DREDGED			
a. Earth, straight and uniform			
1. Clean, recently completed	0.016	0.018	0.020
2. Clean, after weathering	0.018	**0.022**	0.025
3. Gravel, uniform section, clean	0.022	0.025	0.030
4. With short grass, few weeds	0.022	0.027	0.033
b. Earth, winding and sluggish			
1. No vegetation	0.023	0.025	0.030
2. Grass, some weeds	0.025	0.030	0.033
3. Dense weeds or aquatic plants in deep channels	0.030	0.035	0.040
4. Earth bottom and rubble sides	0.028	0.030	0.035
5. Stony bottom and weedy banks	0.025	0.035	0.040
6. Cobble bottom and clean sides	0.030	0.040	0.050
c. Dragline-excavated or dredged			
1. No vegetation	0.025	0.028	0.033
2. Light brush on banks	0.035	0.050	0.060
d. Rock cuts			
1. Smooth and uniform	0.025	0.035	0.040
2. Jagged and irregular	0.035	0.040	0.050
e. Channels not maintained, weeds and brush uncut			
1. Dense weeds, high as flow depth	0.050	0.080	0.120
2. Clean bottom, brush on sides	0.040	0.050	0.080
3. Same, highest stage of flow	0.045	0.070	0.110
4. Dense brush, high stage	0.080	0.100	0.140
D. NATURAL STREAMS			
D-1. Minor streams (top width at flood stage <100 ft)			
a. Streams on plain			
1. Clean, straight, full stage, no rifts or deep pools	0.025	**0.030**	0.033
2. Same as above, but more stones and weeds	0.030	0.035	0.040
3. Clean, winding, some pools and shoals	0.033	0.040	0.045
4. Same as above, but some weeds and stones	0.035	0.045	0.050
5. Same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
6. Same as 4, but more stones	0.045	0.050	0.060
7. Sluggish reaches, weedy, deep pools	0.050	0.070	0.080
8. Very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150

TABLE 5-6. VALUES OF THE ROUGHNESS COEFFICIENT n (*continued*)

Type of channel and description	Minimum	Normal	Maximum
b. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
1. Bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
2. Bottom: cobbles with large boulders	0.040	0.050	0.070
D-2. Flood plains			
a. Pasture, no brush			
1. Short grass	0.025	0.030	0.035
2. High grass	0.030	0.035	0.050
b. Cultivated areas			
1. No crop	0.020	0.030	0.040
2. Mature row crops	0.025	0.035	0.045
3. Mature field crops	0.030	0.040	0.050
c. Brush			
1. Scattered brush, heavy weeds	0.035	0.050	0.070
2. Light brush and trees, in winter	0.035	0.050	0.060
3. Light brush and trees, in summer	0.040	0.060	0.080
4. Medium to dense brush, in winter	0.045	0.070	0.110
5. Medium to dense brush, in summer	0.070	0.100	0.160
d. Trees			
1. Dense willows, summer, straight	0.110	0.150	0.200
2. Cleared land with tree stumps, no sprouts	0.030	0.040	0.050
3. Same as above, but with heavy growth of sprouts	0.050	0.060	0.080
4. Heavy stand of timber, a few down trees, little undergrowth, flood stage below branches	0.080	0.100	0.120
5. Same as above, but with flood stage reaching branches	0.100	0.120	0.160
D-3. Major streams (top width at flood stage >100 ft). The n value is less than that for minor streams of similar description, because banks offer less effective resistance.			
a. Regular section with no boulders or brush	0.025	.....	0.060
b. Irregular and rough section	0.035	.....	0.100

APPENDIX 2

$n = 0.030$

No. 825 downstream from below section 2,
Salt Creek at Roca, Nebr.

Technical Report

Second Draft

Drainage Project Benefits
And
Agricultural Drainage Payment Capacity
For The
Dixon Watershed Drainage Plan Alternatives,

Solano County, California

Submitted To:
Solano County Water Agency
508 Elmira road
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Prepared by:
HAZARD MITIGATION ECONOMICS INC.
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June 9, 1999

EXECUTIVE SUMMARY

Adequate drainage has been a problem in the Dixon area for several years. In 1997, flooding caused by inadequate drainage occurred in 87 areas. The 1997 flood frequency was classified as a 10-year event or having a 10 percent probability of occurring in any given year. Two projects have been proposed to decrease the frequency of flooding: 1) East Project: a water collection system with the outfall to the east of the area and 2) South Project: a second collection system with the outfall to the south of the area. Each project affects the area differently. This study was commissioned to estimate benefits for both projects and estimate agricultural drainage payment capacity.

Drainage Project Benefits

The analysis indicates that both projects are potentially economically feasible. Total project benefits are approximately $10 million for each project and costs range from $6.5 million to $7.5 million. An hydrology and hydraulic analysis would have to be conducted to confirm this conclusion. Financial considerations of the projects were not identified.

Most of the project benefits are projected to occur in the areas around the City of Dixon and immediately north of the City. I-80 is located in this area and it is vulnerable to frequent flooding. In addition to I-80, the area also has a number of industrial and commercial structures at almost grade level that was damaged in the 1997 flood. Another beneficiary is a housing development on the southwest periphery of Dixon. The approximate 90 single-family dwellings are subject to frequent flooding and both projects will reduce expected damages. However, the South Project will be more effective in protecting these homes than the East Project. Total flood damages to the residential area are projected to be reduced by over $2 million if the South Project is selected and by over $500,000 under the East Project.

Agricultural Drainage Payment Capacity

Agricultural drainage payment capacity is the ability of agricultural operations to financially support a drainage project. It is the residual of gross returns minus all production costs except the drainage project costs. Payment capacity was estimated on an annual basis for agricultural operations located in each Section of the Dixon Watershed Drainage Plan (DWDP) area since agricultural productivity varies considerably from north to south.

The total annual payment capacity for the 64,356-acre DWDP area is $741,105, which averages $12.59 per acre. Section payment capacity however, varies substantially. Annual Section payment capacity ranges from $33,693 in the north to a negative $6,225 in the south. Fifty eight Sections have a positive payment capacity and 57 have a negative payment capacity. Annual average Section payment capacity is $6,444 per year.

Generally, Sections located in the northwest portion of the Project area had higher payment capacity and Sections located in the southeast portion had lower payment capacity. Annual payment capacity ranged from almost $60 per acre in the north because it produces orchard and high value annual crops to almost -$11 per acre in the south, which produces grains, hay and pasture.

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INTRODUCTION

The Solano County Water Agency has defined the drainage problems and related flooding centered around the City of Dixon and the Dixon Watershed Drainage Plan (DWDP) as a high priority area in the development of the countywide flood control master planning program. Structuring a comprehensive regional solution to the problem requires that alternative drainage plans be developed and analyzed with respect to economic and financial feasibility. This means that a reasonable effort needs to be made to estimate alternative project costs, effectiveness and benefits.

Financial feasibility is also important. A basis for payment of project costs needs to be established on an equitable basis. Financial analysis should include an estimate of payment capacity of project beneficiaries.

Historical Drainage Patterns

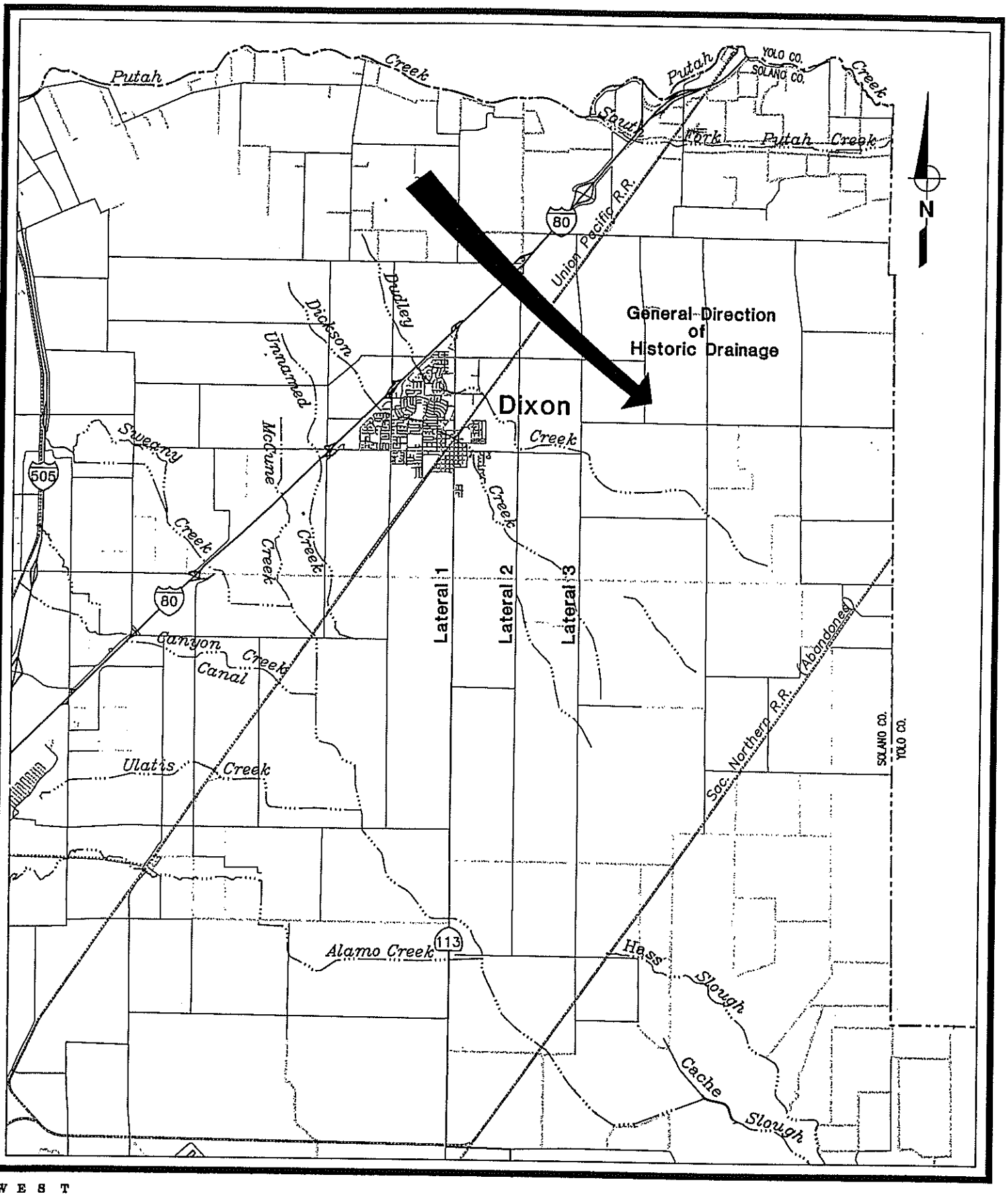
This description of the Area is taken from the report entitled "Dixon Area Local Watershed Management Planning, Draft, 11/18/98, Solano County Water Agency".

This area is located on the alluvial fan formed by Putah Creek (Figure 1). The historical drainage pattern was generally from the northwest to southeast with numerous minor swales and drainage ways that drained into several meandering creeks traversing the relatively flat farmlands. Southeast of Dixon, these creeks became sinks and swales as they extended beyond the City, and ultimately discharged to sloughs and marshes tributary to the Sacramento-San Joaquin Delta during wet years. Historically, rainfall runoff slowly drained from the fields, ponded in low areas, infiltrated, and in heavier storms, flowed to the Delta sloughs downstream of Hass and Ulatis Creeks.

Over the last 30 to 40 years, natural drainage patterns have been altered, creeks and small drainage ways have been filled, land has been leveled, and drainage facilities were constructed to reclaim poorly drained land and to reduce local flooding. An exception is the land in Reclamation District No. 2068 where drainage patterns have not changed since the 1920's. More recently, intensive agricultural practices such as laser leveling and preparing fields in the fall have significantly increased runoff rates and volumes. City urbanization has generated similar changes to the drainage patterns and prompted the construction of a variety of drainage facilities. The Union Pacific Railroad (UPRR) embankment and the construction of I-80 also modified drainage patterns, blocking the natural flow of surface runoff and concentrating it at culvert crossings.

There are numerous culverts under I-80 that provide drainage for agricultural lands northwest of I-80 discharging into either the City drainage system or those agricultural lands between 1-80 and UPRR. This drainage impacts both City and downstream drainage facilities.

In 1926, one of the earliest agricultural water supply and drainage systems was completed to serve the agricultural lands within the Reclamation District No. 2068 (RD 2068) service area. The drainage system was designed to collect and convey runoff mainly from the lands within RD 2068, and accommodated the existing natural drainage from the upstream area to the northwest. Subsequent upstream agricultural drainage improvements, primarily constructed within the



WEST YOST & ASSOCIATES

LEGEND:

NATURAL DRAINAGE

Figure 1

Dixon Storm Drainage Report

HISTORIC DRAINAGE CONDITIONS

The Floods of 1997

The storm of early January 1997 was an example of a 10-Year flood event. Several growers and District staff were able to depict specific examples of ponding in the area from pictures and memory. Figure 2 provides the specific location of all 87 floods that were identified. Data on location, area, flood depth and duration were collected on the 33 floods that would probably be affected by either of the two projects (Table 1). Hydrology and hydraulic studies have not been completed on the proposed projects but project engineers were able to provide rough estimates of how the two projects would effect the frequency of occurrence for each flood incidence (Table 1).

Objectives

The objective of this study is to estimate the agricultural drainage payment capacity and benefits for two drainage projects being proposed for the Dixon Watershed Drainage Plan. Proposed drainage project alternatives include: 1) a drainage outlet to the east and 2) a drainage outlet to the south.

ALTERNATIVE DRAINAGE PROJECTS

Five drainage alternatives were originally identified to achieve various levels of drainage effectiveness and costs. Since the beginning of this project that number has been reduced to two. The purpose of this project will be to estimate the benefits of each alternative and determine the beneficiaries' ability to share project costs. This information, along with related data, will be used to formulate a regional solution to the drainage problem.

The East Drainage Outfall System.

This project improves the drainage system for the DWDP. The City will be able to discharge 225 cfs instead of 77.5 cfs currently allowed. Drainage will be discharged to the Yolo Bypass. Preliminary cost estimates range between $5.5 to $7.5 million (Figure 3).

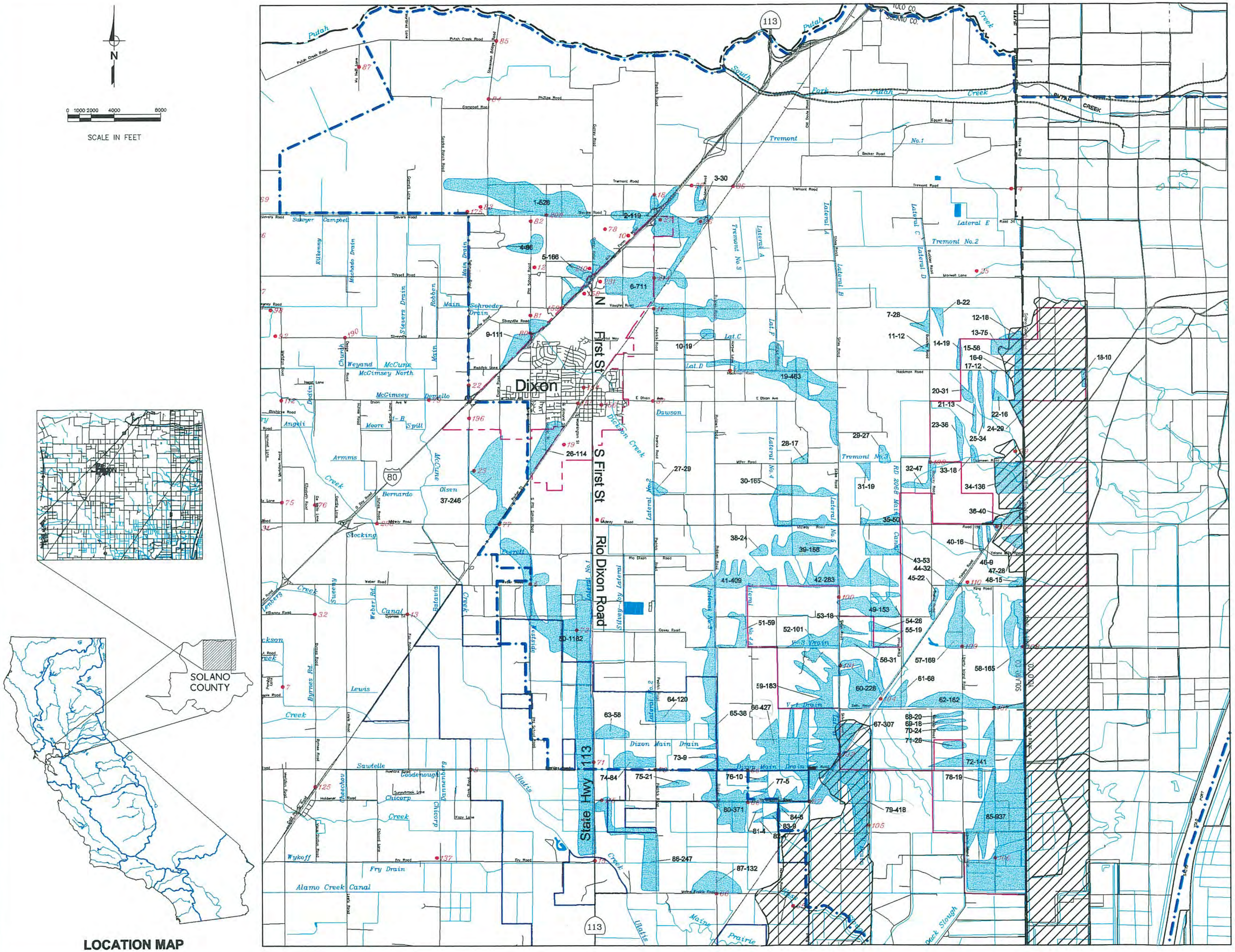
The South Drainage Outfall System.

This project improves the drainage system for the DWDP. The City will be able to discharge 225 cfs instead of the 77.5 cfs currently allowed. Drainage will be discharged to the Hass Slough. Preliminary cost estimates range between $5 to $6.5 million (Figure 4).

Figure 2

DIXON LOCAL WATERSHED MANAGEMENT PLAN

AREAS OF LOCALIZED FLOODING



NOTES:

1. THE HYDROLOGIC INFORMATION SHOWN HEREON IS BASED ON DIGITIZED 1:100,000 SCALE USGS MAPS AS SUPPLIED BY A MAP VENDOR.
2. CONTOURS IN THE RELATIVELY FLAT AREAS WERE SCANNED FROM USGS 7.5 MINUTE QUADRANGLES. IN STEEP AREAS, THE CONTOURS WERE GENERATED WITH A DIGITAL ELEVATION MODEL BASED ON A 30 METER ELEVATION POINT GRID.

LEGEND:

- DIXON CITY LIMITS
- DRCD BOUNDARY
- RD 2068 BOUNDARY
- MPWD BOUNDARY
- LEVEE
- 1-26 AREAS OF LOCALIZED FLOODING (AREA NO.–ACREAGE)
- YOLO BYPASS FLOODING

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Table 1. Flood Problem Areas

Flood Site				10-Year Flood		10- Year Project Effectiveness	
						East	South
Number	Location	Acreage	Elevation	Depth (ft)	Duration (days)	(Year Protection)	
1	Sievers-Currey	528	70	1.5	5	2	2
2	Seivers I-80	119	60	2	1	2	2
3	Robben-Tremont	30	60	1.5	3	5	5
4	Pitt School-Seivers	66	75	1	3	5	5
5	Pedrick-Seivers	166	65	2	3	2	2
6	Pitt School I-80	711	60	3	5	5	5
9	Pitt School I-80	111	70	1	2	10	10
19	Hackman-Runge	463	45	1.5	4	5	2
26	Porter-Pitt School	114	60	2.5	6	5	2
27	Pedrick-Miller	29	45	1.5	3	5	5
28	Miller-Sikes	17	43	1.5	3	5	0
29	Miller-Etzel	27	35	1.5	3	5	0
30	Midway-Sikes	165	35	1.5	3	5	0
31	Miller-Sikes	19	35	1.5	2	5	0
35	Midway-Etzel	47	35	2	4	5	0
37	Batavia	246	65	2.5	5	5	2
38	Robben-Midway	24	35	1	2	0	0
41	Lateral #3	409	32	2	5	5	5
42	Lateral #5	283	25	2	5	0	0
50	Hwy 113	1,182	43	2	6	2	5
51	Lateral #4A	59	30	2	5	5	5
63	Hwy 113-Dixon Main Drain	58	35	2	6	2	5
64	Pedrick-Dixon Main Drain	120	35	2	6	2	5
65	Lateral 3-Dixon Main Drain	38	29	2	5	5	5
66	Dixon Main Drain-Robben	427	20	2	7	2	5
67	Sikes-Delhi	307	20	3.5	4	2	5
73	Robben-Dixon Main Drain	9	25	2	7	2	5
74	Hawkins-Pedrick	84	30	2	7	2	5
76	Swan-Robben	10	20	1.5	1	2	5
77	Binghamton-Robben	5	20	1.5	1	2	5
80	Binghamton-Robben	371	23	1	4	2	5
86	Pedrick-Maine Prairie	247	30	2	5	2	5
87	Maine Prairie	132	20	2	5	2	5
Total		6,623					

Source: Area residents and DWDP staff.

Figure 3

ALTERNATIVE 4

DIXON LOCAL WATERSHED MANAGEMENT PLAN

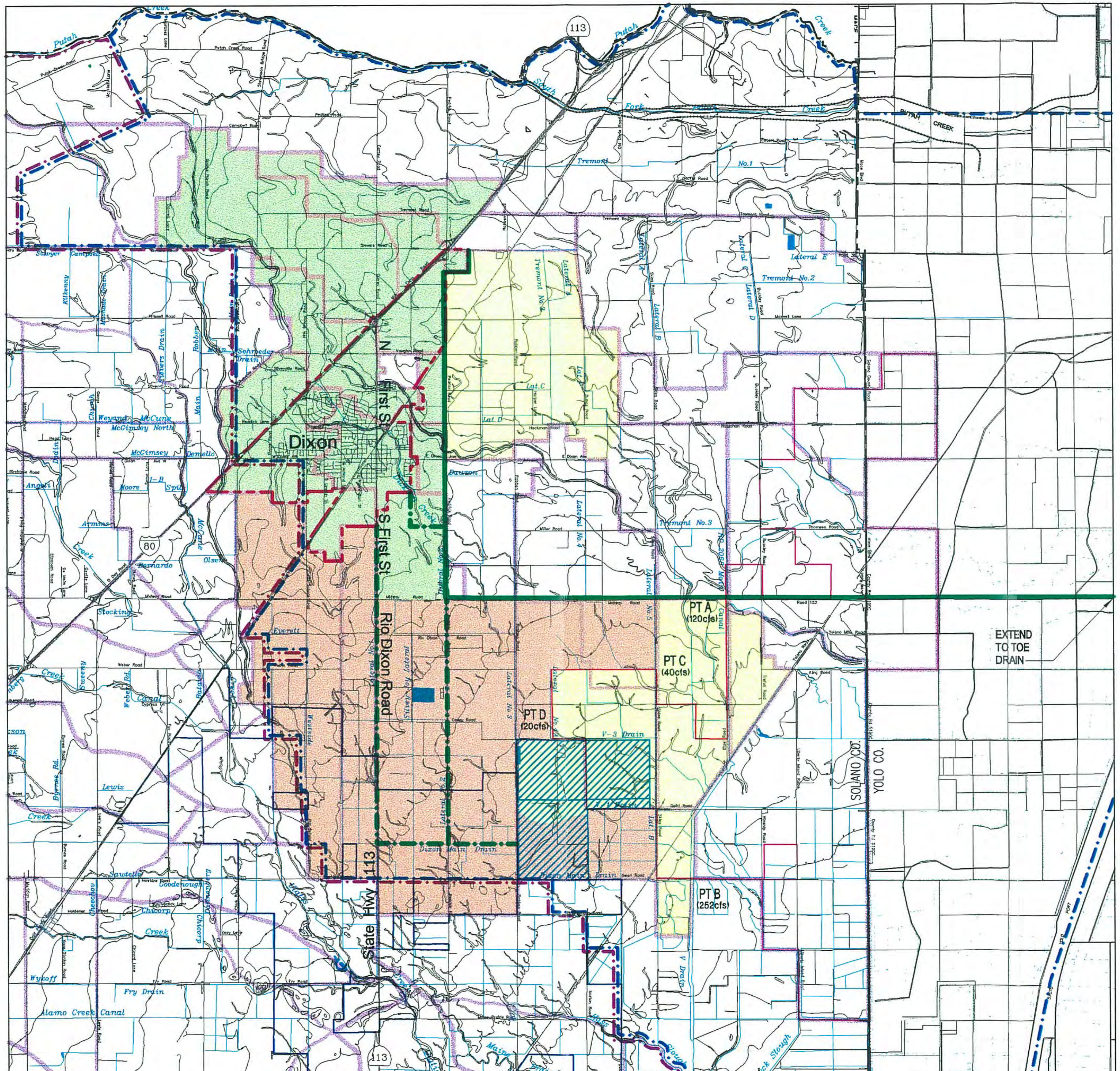
EAST MAIN STEM OPTION
NOVEMBER 1998

N

0 1000 2000 4000 8000

SCALE IN FEET

BENEFIT AREA	ACREAGE
PRIMARY	10,876 ACRES
SECONDARY	13,826 ACRES
TERTIARY	9,529 ACRES
TOTAL	34,231 ACRES



COUNTY LOCATION

NOTES:

1. THE HYDROLOGIC INFORMATION SHOWN HERON IS BASED ON DIGITIZED 1:100,000 SCALE USGS MAPS AS SUPPLIED BY A MAP VENDOR.
2. CONTOURS IN THE RELATIVELY FLAT AREAS WERE SCANNED FROM USGS 7.5 MINUTE QUADRANGLES. IN STEEP AREAS, THE CONTOURS WERE GENERATED WITH A DIGITAL ELEVATION MODEL BASED ON A 30 METER ELEVATION POINT GRID.
3. WATERSHED BOUNDARIES WERE DIGITIZED FROM EXISTING STUDIES WHERE POSSIBLE. WHERE INFORMATION DID NOT EXIST, THE BOUNDARIES WERE DETERMINED FROM 7.5 MINUTE USGS QUADRANGLES AND DIGITIZED.

LEGEND:

EAST MAIN STEM SYSTEM

- NEW CHANNEL
- CHECK AND REPLACE CULVERTS IF NECESSARY
- PRIMARY BENEFIT AREA
- SECONDARY BENEFIT AREA

GENERAL LEGEND ITEMS

- DIXON CITY LIMITS
- WATERSHED BOUNDARY
- WATERSHED SUB-BASIN BOUNDARY
- LEVEE
- ULATIS RESOURCE CONSERVATION DISTRICT BOUNDARY
- DIXON RESOURCE CONSERVATION DISTRICT BOUNDARY
- MAINE PRAIRIE WATER DISTRICT BOUNDARY
- RD2068 BOUNDARY
- MILITARY BOUNDARY

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Figure 4
ALTERNATIVE 3

DIXON LOCAL WATERSHED MANAGEMENT PLAN

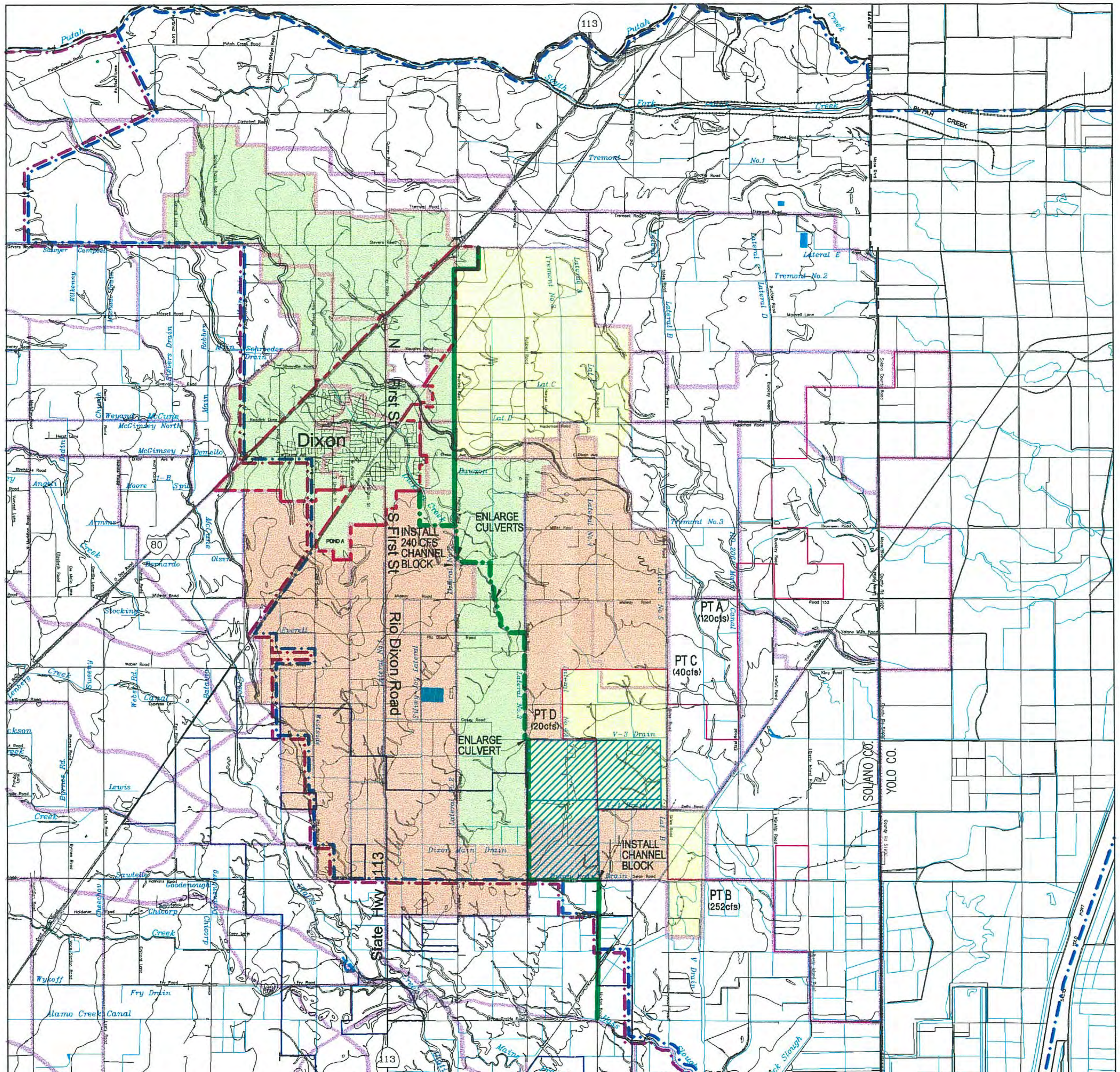
SOUTH MAIN STEM OPTION NOVEMBER 1998

N

0 1000 2000 4000 8000

SCALE IN FEET

BENEFIT AREA	ACREAGE
PRIMARY	12,576 ACRES
SECONDARY	14,780 ACRES
TERTIARY	7,008 ACRES
TOTAL	34,364 ACRES



COUNTY LOCATION

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3. WATERSHED BOUNDARIES WERE DIGITIZED FROM EXISTING STUDIES WHERE POSSIBLE. WHERE INFORMATION DID NOT EXIST, THE BOUNDARIES WERE DETERMINED FROM 7.5 MINUTE USGS QUADRANGLES AND DIGITIZED.

LEGEND:

SOUTH MAIN STEM SYSTEM

- NEW CHANNEL
- EXPAND CHANNEL, CHECK AND REPLACE CULVERTS IF NECESSARY
- CHECK AND REPLACE CULVERTS IF NECESSARY
- PRIMARY BENEFIT AREA
- SECONDARY BENEFIT AREA
- TERTIARY BENEFIT AREA

GENERAL LEGEND ITEMS

- DIXON CITY LIMITS
- WATERSHED BOUNDARY
- WATERSHED SUB-BASIN BOUNDARY
- LEVEE
- ULATIS RESOURCE CONSERVATION DISTRICT BOUNDARY
- DIXON RESOURCE CONSERVATION DISTRICT BOUNDARY
- MAINE PRAIRIE WATER DISTRICT BOUNDARY
- RD2068 BOUNDARY
- MILITARY BOUNDARY

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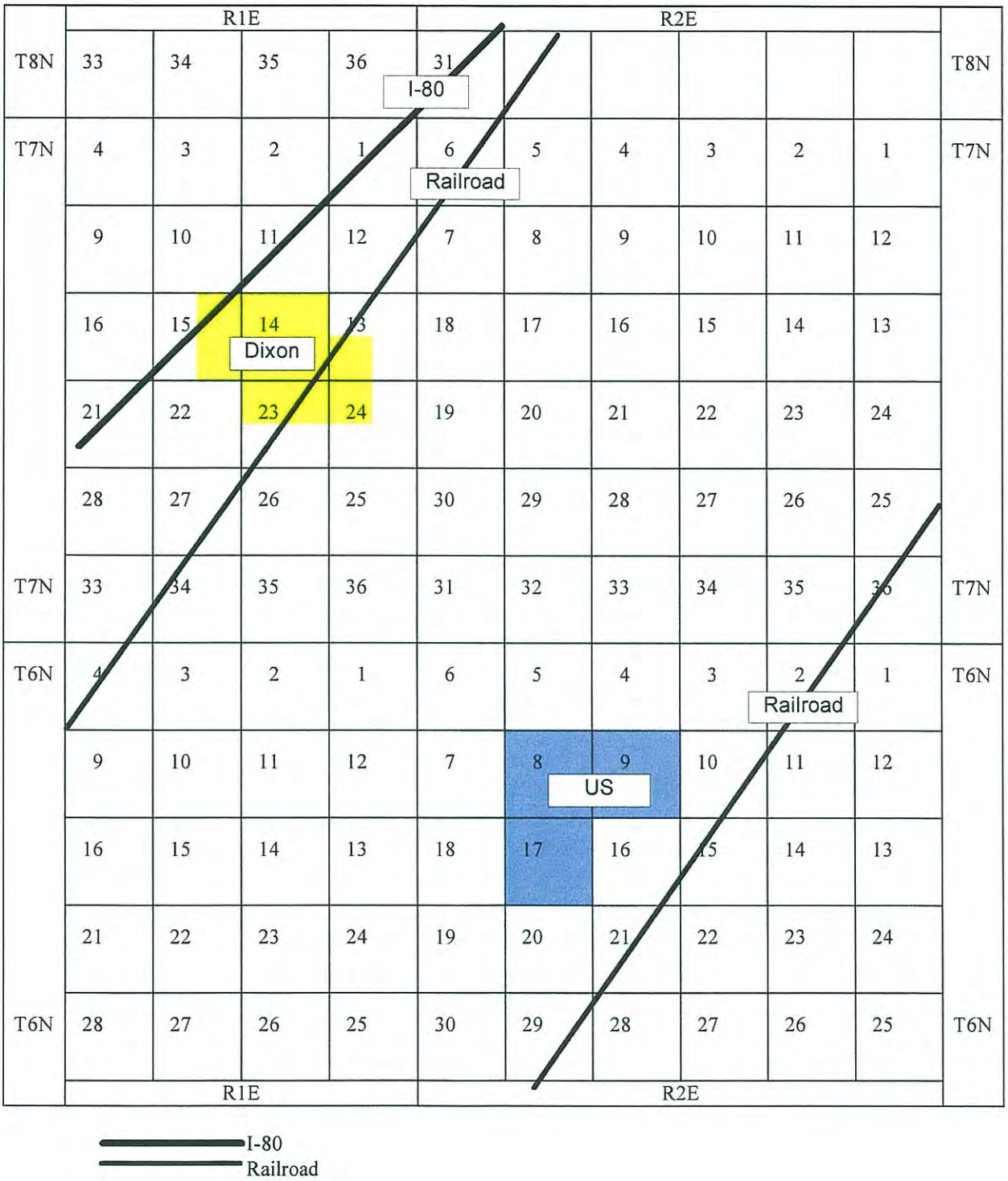
DELINEATION OF PROJECT PAYMENT AND BENEFIT AREAS

The definition of Project Payment and Benefit Areas, is important in estimating either payment capacity or project benefits. The areas need to be as autonomous as possible, and easily identified. The DWDP project area was defined at the Section level. Although not perfectly autonomous, soils and land use data are readily available and ownership is easily identified at the Section level. Sections usually have somewhat similar agricultural production activities and they will receive similar drainage and flood control benefits. Since roads and/or fields usually delineate Sections, they can be used to identify a regional drainage solution.

The study area contained 105 Sections, approximately 67,200 acres that could potentially benefit from the proposed projects and also share project costs. Sections judged to be potential beneficiaries are specified in Figure 5.

Figure 5. Dixon Watershed Drainage Plan Sections of Potential Benefit



PROJECT BENEFITS

Benefits were estimated for each proposed drainage alternative using a procedure currently being used by the Federal Emergency Management Agency (FEMA) and the US Army Corps of Engineers (USACE). The procedure estimates the physical damages and value of loss of function for the current situation and with each proposed drainage alternative. Project benefits are the difference between expected damage with the project and expected damages without the project.

The FEMA Riverine Benefit Cost Module (FEMA, 1996) was used to estimate the benefits of the proposed DWDP drainage alternatives. FEMA uses this model to evaluate flood mitigation projects submitted for funding under the Hazard Mitigation Grant Program (Section 404) and the Response and Recovery Program (Section 406) of the Stewart Act. The Corps of Engineers uses the same procedure to evaluate economic feasibility of levee repair projects.

The benefits of a flood control project are the expected net present value of avoided future damages and losses (i.e., the extent to which the project is effective in reducing expected future damages and losses). The term "expected" means that the probability of future losses was estimated. The net present value of benefits accounts for the time value of money, because benefits are expected to accrue in the future and dollars received in the future have a present value, which is less than dollars received immediately.

Methodology

The methodology section contains a description of the benefit cost methodology, the building, infrastructure and agricultural crop surveys, and estimates of Sectional project benefits. The methodology used in this project is the same approach used in the FEMA Riverine Benefit-Cost Module (FEMA, 1996) with the following exception: regression analysis is used to estimate flood risk instead of a linear interpolation of the estimated exceedance probability. The second procedure is much more difficult and cumbersome to use correctly.

Scenario Damages, Expected Annual Damages and Expected Annual Avoided Damages

The benefits of a drainage project are the reduction in damages and other economic losses that would otherwise occur. Expected annual benefits are defined as the sum of expected avoided damages and losses. There are three different types of damages that are considered in this analysis: scenario damages; expected annual damages; and expected annual avoided damages.

- Scenario damages are the expected damages per flood of a given flood depth at the building.
- Expected annual damages are the product of scenario damages and the expected annual number of floods of a given flood depth at the building or structure.
- Expected annual avoided damages are the product of expected annual damages and the effectiveness of the mitigation measure in reducing damages at the building. This is sometimes termed "With and Without Project".

A schematic example illustrating these damage terms is presented in the following table:

Flood Depth (ft)	Scenario Damages	Expected Annual Number of Floods	Expected Annual Damages	Effectiveness of Mitigation Measure	Expected Annual Avoided Damages
1	$20,000	.10	$2000	100%	$2,000
2	$25,000	.05	$1250	80%	$1,000
3	$35,000	.02	$700	50%	$350
4	$50,000	.01	$500	25%	$125
5	$85,000	.005	$425	15%	$64

In this example, the scenario damages indicate the expected damages each time a flood of a given depth occurs at the building, structure or crop site. Scenario damages do not depend on how frequently such floods are expected to occur. The annual flood probabilities indicate the degree of flood-related risk at the specific site under consideration. The expected annual damages are the product of scenario damages and annual flood probability. Expected annual damages are the best estimate of the average damages per year expected at this site; such estimates do not indicate that these damages will occur every year. Expected annual damages are those damages that are probabilistically predicted to occur without undertaking the mitigation measure. The effectiveness of the mitigation measure is an estimate of how much expected damages would be reduced by the mitigation measure under consideration. The expected annual avoided damages (i.e., the annual benefits) are the product of expected annual damages and the effectiveness of the mitigation measure. The expected annual avoided damages are thus the expected annual benefits of constructing the flood control project.

Discount Rate and Planning Horizon

Each year's expected net benefit is discounted to its present value, then all years' expected net benefits are summed together to yield the total expected net present value. The planning horizon, or useful lifetime, of the flood control project varies depending on the type of project, with 50 to 100 years being common for flood control projects. The discount rate correctly values benefits expected to be received in the future.

Salvage Value and Annual Project Costs

Two other factors can be included in the expected net present value calculation: the salvage value of the mitigation investment at the end of the planning horizon; and the annual costs to maintain the effectiveness of the flood control project. However, the present value of the salvage value of flood control projects is generally quite small, because of the long planning horizons appropriate for flood control projects, thus salvage value is not considered in this analysis. The annual maintenance costs of typical flood control projects are generally small, but may be significant, especially for levee or drainage projects. Therefore, for completeness, the annual maintenance costs are included in the FEMA benefit-cost program.

Land Use, Building Inventory and Infrastructure in Flood Prone Areas

Land use, structures and infrastructure were inventoried and evaluated in each area that experienced flooding. Appendix IV lists the 379 inventoried items with regard to code number (Site # in Figure 2), Section number, general location, ground elevation, type of land use, category (USACE, Appendix V), 1st floor elevation above ground elevation, reference elevation (ground elevation plus 1st floor elevation), and area (floor area for structures, acres for agricultural crops, miles for roads, bushels for grain storage). The Project Area inventory is classified into 28 USACE categories (Table 2). A total of 110 one-story residences totaling over 400,000 square feet of floor space were estimated to be located in areas that would be affected by the drainage projects. These residences are mostly located in southwest Dixon.

Appendix V contains the USACE structure codes, structure description, replacement cost per unit, contents value as a percent of replacement cost, relocation cost per month per unit, value of lost services per month per unit, and net income loss per month per unit.

Flood Damages and Economic Losses

Figure 2 delineates 87 areas of flooding that occurred during the 1997 flood. The 1997 flood was estimated to have a reoccurrence level of 10 years. Table 1 presents data on the 33 flood areas totaling 6,623 acres that could be improved by the proposed drainage project. Flood site elevation, flood depth and duration, and project effectiveness is used to estimate the benefits of the drainage projects. Scenario damages are the sum of structural and crop damages, content damages, displacement costs, lost business income, rental income losses, and the value of lost government services for floods of each flood depth.

Table 2. Dixon WDP Area Land Use, Structure and Infrastructure Inventory

Category	Description	Count of No.	Sum of Area	Units
1	Residence, 1 story w/o basement	110	138,800	square foot
3	Residence, 2 story w/o basement	7	13,200	square foot
7	Residence, Mobile Home	19	14,000	square foot
9	Residence, Apartment w/o basement	1	0	square foot
12	Livestock Barn	13	19,200	square foot
13	Industrial, Light	7	35,700	square foot
20	Storage	32	58,600	square foot
26	Farm Shop/Storage	11	23,500	square foot
31	Auto parts	1	5,000	square foot
42	Business (general)	1	1,000	square foot
57	Food processor	6	25,000	square foot
61	Garage	8	4,900	square foot
63	Grocery store	1	2,400	square foot
64	Grocery store (quick)	1	1,000	square foot
83	Office building	10	14,500	square foot
90	Restaurant	1	0	square foot
99	Warehouse	2	8,000	square foot
104	Wheat Storage	34	1,177,716	bushel
910	Interstate	7	3	mile
911	Primary Road	2	4	mile
912	Secondary Road	26	24	mile
913	Improved Road	4	5	mile
921	Trees	7	331	acre
922	Vines	1	15	acre
924	Hi Value Annuals	68	6,199	acre
925	Diesel/Gas Storage Tank	2	30,000	gallon
926	Truck, stored outside	1	100	truck
927	Trailer, stored outside	1	250	trailer

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Building, Infrastructure and Agricultural Crop Damages

Floods can cause structural building damage and/or clean up. Flood damages to buildings and contents were estimated by USACE using approximately 50 years of Flood Insurance Agency claims data. Results of this study are expressed as damage as a percent of replacement cost by flood depth. This is termed a "flood depth-damage" function. Actual damages are then estimated as the product of the depth-damage function (Appendix VI and VII), the floor area of the building and the replacement value of the building per square foot.

Floods can cause structural damage to infrastructure, create a need for clean up, directly reduce incomes of users, or cause inconvenience for the public. Flood structural damages are estimated as a percent of replacement cost of the structure. A flood removing the structure or causing irreparable damage would be considered a 100% loss while a minimum flood may require that only debris be removed.

Since highways and roads facilitate commerce, time delays can be crucial. Time delays are measured in days versus the flood depth. Income losses are estimated by the time of interrupted service to customers.

Flood damage to agricultural crops not only relates flood depth to damage but also serves as a proxy for damages due to water velocity, duration of flooding, and area flooded. Depth/damage functions for crop losses were estimated and used in the Welton Mohawk Irrigation and Drainage District flood control study conducted under a FEMA contract in 1996. This district is located in Arizona and is entirely irrigated. The same methodology was used in a Nebraska study in 1997. Crop production in the Nebraska study is primarily rain fed with supplemental irrigation but the damage function was judged to be adequate for both cases because of the types of crops grown in each area are equally susceptible to flood depth and duration of flooding. The Arizona damage functions relate directly to the study area. Multiplying the depth/damage function by the replacement cost, if it is a permanent crop or gross value for an annual crop (less harvest costs), yields the crop damages for each flood depth.

Flood Depth (ft)	Damage
1	15%
2	30%
3	55%
4	75%
5	100%

Contents Damages

Building contents damages (Appendix VII) are estimated as the product of the contents depth-damage function and the total building contents replacement value for each flood depth. The building depth/damage function was estimated for various building structures by the USACE.

Appendix V contains data on content value by building category expressed as a percent of building replacement costs.

Displacement Costs

Displacement expense is the product of displacement days necessary for a flood of a given depth, the total displacement costs per day, and the total area occupied by the owner agency, public or nonprofit agencies. If relocation or displacement is required, the number of days as a function of flood depth are as follows.

Flood Depth (ft.)	Days
1	118
2	174
3	214
4	254
5	294
6	347
7	365

Appendix V contains data on relocation costs by building category expressed in $ per square foot of floor area.

Lost Business Income

Lost business income is included if all or a portion of the building is rented to commercial businesses (Appendix V). Lost business income is the product of the net income of commercial businesses per day and the number of days of functional downtime. Functional downtime expressed in days as a function of flood depth is as follows.

Flood Depth (ft.)	Days
0	10
1	21
2	28
3	30

Data on lost income is presented in Appendix V expressed as $ per square foot of floor area.

Lost Public Services

For public/nonprofit sector buildings, the value of services lost when the building becomes unusable during a flood must be included (Appendix V). Public/nonprofit services are valued

using the quasi-willingness to pay (QWTP) model. QWTP is a simple methodology that assumes that public/nonprofit services are worth what we pay to provide the services.

Value of Lost Services is the product of the total value of lost services per day and the number of days of functional downtime. The period of lost services depends on the agency's ability to find alternative quarters and to establish normal functions. This period may vary depending on the structure, size and function of the agency and the availability of suitable quarters after the flood. Note that the period of loss of agency function may be much shorter than the period of displacement necessary due to flood damage, because agencies can resume their functions in temporary quarters.

Flood Risk

Flood risk is specified in terms of expected annual number of floods by flood depth expressed in one-foot increments. The annual number of floods are estimated using standard frequency (10-year, 50-year, 100-year and 500-year) flood elevations and discharges that are published from FEMA's Federal Insurance Study (FIS) and the Federal Rate Insurance Map (FIRM) for a flood area. In the case of the DWDP, no such study or maps exist since flooding does not result from a structured river or stream but is the result of rainfall. Rainfall records are usually not adequate to determine flood depths since rainfall intensity, the prime cause of runoff flooding, is reported in only few cases and then only recently. To estimate flood risk for the DWDP, the 10-year flood depth was observed in the 1997 flood. Flood depths from similar FIS can then be used for the remaining standard flood frequencies (50- 100-, 500-year) since the proposed projects only affect the 10-year flood frequency.

Figure 2 locates the 87 flood sites that were identified during the 1997 floods. Due to the location of the proposed projects, flood sites will be affected differently. The proposed projects are expected to reduce flooding in only 33 of the 87 flood sites observed in the 1997 floods (Table 3).

Effectiveness was assessed by project staff for each proposed project in terms of 100% protection for a specific flood frequency. Flood sites were assigned a 1-year, 2.5-year, or 5-year level of protection for each proposed project. Since the 1997 flood was estimated to be a 10-year event, a 5-year level of protection was assumed to reduce flood risk by 50% for the 10-year event. The projects were assumed to affect the 10-year flood only and not be effective in larger or less frequent floods. This may not be true but the extent of effectiveness could not be assessed without an in-depth hydrology and hydraulic study. Protection to the 2.5-year flood frequency is assumed to reduce flood risk by 25%, and protection to the 1-year frequency is assumed to be 10% effective in the 10-year flood. Standard frequency flood elevations are presented for the without project condition and the proposed projects 10-year flood frequency in Table 4. Flood elevations for the remaining flood frequencies for the proposed project are the same as the without project case.

Expected Annual Number of Floods without Project

Regression analysis is used to estimate exceedance probability for flood depth in one-foot flood depth increments using flood elevations for the standard frequencies. Exceedance probability is the probability that flood elevation will exceed a given level in any given year. Standard

hydrologic procedures assume exceedance probabilities and corresponding flood elevations are assumed to have relationship that approximates a "straight line log" curve. The general form of the equation for a curve of this type is

$$Y = \alpha X^{\beta}$$

Where Y = flood frequency,

X = flood elevation,

α and β are estimated parameters.

Taking the logarithm of both sides of this equation yields

$$\ln Y = \ln \alpha + \beta \ln X$$

By assigning Y′ and X′ to Y and X and α' to the constant log α the following equation is derived.

$$Y' = \alpha' + \beta X'$$

This is the general equation for a straight line. After transforming the observations for Y and X to logarithms, standard linear regression analysis can be used to estimate α and β.

For example site #1 has the following flood elevations.

Frequency	Flood Elevation
10	71.5
50	72.5
100	73.5
500	74.5

Converting the values to natural logarithms yields the following.

Frequency	Flood Elevation
2.3	4.270
3.9	4.284
4.6	4.297
6.2	4.311

Adding an additional observation for the one year frequency from the standard depth frequency curves to increase the number of observations. The full data set is as follows.

Frequency	Flood Elevation
0	4.212
2.3	4.270
3.9	4.284
4.6	4.297
6.2	4.311

Standard linear regression was used to estimate α and β.

$$Y' = .694 + -254.29X'$$

Table 5 contains predicted frequency, exceedance probabilities and expected annual number of floods by flood depth using this equation for flood site #1. Predicted frequency is calculated by the following equation.

$$Y = e^{(\alpha' + \beta \ln X)}$$

Exceedance probability is the inverse of predicted frequency and is the probability of a flood occurring that exceeds the specific flood depth in any given year. Expected annual number of floods for any given flood depth is the difference between the exceedance probability for that flood depth minus the exceedance probability for that flood depth minus one foot. Expected annual number of floods is an "interval probability" for a specific flood depth.

Expected Annual Number of Floods with Proposed Projects

The East and South projects are expected to affect Site #1 flooding equally or to be 100% effective to the one-year frequency. Flood elevations for the without and with projects are as follows.

Frequency (years)	Flood Elevation		
	Without Project	East Project	South Project
10	71.5	71.35	71.35
50	72.5	72.5	72.5
100	73.5	73.5	73.5
500	74.5	74.5	74.5

Table 6 contains the estimated expected annual number of floods without and with both projects for Site #1 with an elevation of 70 feet. Flood risk must also be estimated for each unique elevation of structures within the flood site. The decrease in flood risk as the elevation of the

structure rises is illustrated in Figure 6. A structure with an elevation of 60 feet at Flood Site #2 is subject to .0918 one foot floods per year and structures elevated one foot higher is subject to .0386 one foot floods per year, less than half the amount of risk.

Table 3. 10-Year Flood Conditions and Project Effectiveness

Site #	Elevation (ft.)	10-Year Depth (ft.)	10-Year Duration (days)	East Year Protection	South Year Protection
1	70	1.5	5	2	2
2	60	2	1	2	2
3	60	1.5	3	5	5
4	75	1	3	5	5
5	65	2	3	2	2
6	60	3	5	5	5
9	70	1	2	10	10
19	45	1.5	4	5	2
26	60	2.5	6	5	2
27	45	1.5	3	5	5
28	43	1.5	3	5	0
29	35	1.5	3	5	0
30	35	1.5	3	5	0
31	35	1.5	2	5	0
35	35	2	4	5	0
37	65	2.5	5	5	2
38	35	1	2	0	0
41	32	2	5	5	5
42	25	2	5	0	0
50	43	2	6	2	5
51	30	2	5	5	5
63	35	2	6	2	5
64	35	2	6	2	5
65	29	2	5	5	5
66	20	2	7	2	5
67	20	3.5	4	2	5
73	25	2	7	2	5
74	30	2	7	2	5
76	20	1.5	1	2	5
77	20	1.5	1	2	5
80	23	1	4	2	5
86	30	2	5	2	5
87	20	2	5	2	5

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Table 4. With and Without Project Flood Elevations by Flood Frequency

Site #	Elevation (ft.)	10-Year Flood Depth (ft.)	Without Project				East Project	South Project
			Flood Frequency Elevations (ft.)					
			10-year	50-year	100-year	500-year	10-year	10-year
1	70	1.5	71.50	72.50	73.50	74.50	71.35	71.35
2	60	2	62.00	63.00	64.00	65.00	61.80	61.80
3	60	1.5	61.50	62.50	63.50	64.50	61.13	61.13
4	75	1	76.00	77.00	78.00	79.00	75.75	75.75
5	65	2	67.00	68.00	69.00	70.00	66.80	66.80
6	60	3	63.00	64.00	65.00	66.00	62.25	62.25
9	70	1	71.00	72.00	73.00	74.00	70.50	70.50
19	45	1.5	46.50	47.50	48.50	49.50	46.13	46.35
26	60	2.5	62.50	63.50	64.50	65.50	61.88	62.25
27	45	1.5	46.50	47.50	48.50	49.50	46.13	46.13
28	43	1.5	44.50	45.50	46.50	47.50	44.13	44.50
29	35	1.5	36.50	37.50	38.50	39.50	36.13	36.50
30	35	1.5	36.50	37.50	38.50	39.50	36.13	36.50
31	35	1.5	36.50	37.50	38.50	39.50	36.13	36.50
35	35	2	37.00	38.00	39.00	40.00	36.50	37.00
37	65	2.5	67.50	68.50	69.50	70.50	66.88	67.25
38	35	1	36.00	37.00	38.00	39.00	36.00	36.00
41	32	2	34.00	35.00	36.00	37.00	33.50	33.50
42	25	2	27.00	28.00	29.00	30.00	27.00	27.00
50	43	2	45.00	46.00	47.00	48.00	44.80	44.50
51	30	2	32.00	33.00	34.00	35.00	31.50	31.50
63	35	2	37.00	38.00	39.00	40.00	36.80	36.50
64	35	2	37.00	38.00	39.00	40.00	36.80	36.50
65	29	2	31.00	32.00	33.00	34.00	30.50	30.50
✓66	20	2	22.00	23.00	24.00	25.00	21.80	21.50
✓67	20	3.5	23.50	24.50	25.50	26.50	23.15	22.63
73	25	2	27.00	28.00	29.00	30.00	26.80	26.50
74	30	2	32.00	33.00	34.00	35.00	31.80	31.50
76	20	1.5	21.50	22.50	23.50	24.50	21.35	21.13
77	20	1.5	21.50	22.50	23.50	24.50	21.35	21.13
80	23	1	24.00	25.00	26.00	27.00	23.90	23.75
86	30	2	32.00	33.00	34.00	35.00	31.80	31.50
87	20	2	22.00	23.00	24.00	25.00	21.80	21.50

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Table 5. Site #1 Expected Annual Number of Floods

Flood Depth	Elevation	ln(elevation)	Predicted Frequency	Exceedance Probability	Expected Annual Number of Floods
0.5	70.5	4.256	9.547	1.047E-01	1.431E-01
1.5	71.5	4.270	22.317	4.481E-02	5.993E-02
2.5	72.5	4.284	51.555	1.940E-02	2.541E-02
3.5	73.5	4.297	117.738	8.493E-03	1.090E-02
4.5	74.5	4.311	265.902	3.761E-03	4.733E-03
5.5	75.5	4.324	594.030	1.683E-03	2.077E-03
6.5	76.5	4.337	1313.110	7.616E-04	9.219E-04
7.5	77.5	4.350	2872.897	3.481E-04	4.135E-04
8.5	78.5	4.363	6222.709	1.607E-04	1.874E-04
9.5	79.5	4.376	13347.194	7.492E-05	8.578E-05
10.5	80.5	4.388	28356.831	3.526E-05	3.966E-05
11.5	81.5	4.401	59687.719	1.675E-05	1.851E-05
12.5	82.5	4.413	124500.294	8.032E-06	8.722E-06
13.5	83.5	4.425	257400.190	3.885E-06	4.147E-06
14.5	84.5	4.437	527584.519	1.895E-06	1.990E-06
15.5	85.5	4.449	1072280.174	9.326E-07	9.628E-07
16.5	86.5	4.460	2161438.307	4.627E-07	4.699E-07
17.5	87.5	4.472	4321933.563	2.314E-07	2.313E-07
18.5	88.5	4.483	8574198.554	1.166E-07	1.147E-07

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Table 6. Site #1 Expected Annual Number of Floods With and Without Projects

Flood Depth	Project		
	Without	East	South
1	5.993E-02	5.466E-02	5.466E-02
2	2.541E-02	2.363E-02	2.363E-02
3	1.090E-02	1.033E-02	1.033E-02
4	4.733E-03	4.571E-03	4.571E-03
5	2.077E-03	2.044E-03	2.044E-03
6	9.219E-04	9.238E-04	9.238E-04
7	4.135E-04	4.219E-04	4.219E-04
8	1.874E-04	1.947E-04	1.947E-04
9	8.578E-05	9.070E-05	9.070E-05
10	3.966E-05	4.267E-05	4.267E-05
11	1.851E-05	2.026E-05	2.026E-05
12	8.722E-06	9.711E-06	9.711E-06
13	4.147E-06	4.696E-06	4.696E-06
14	1.990E-06	2.290E-06	2.290E-06
15	9.628E-07	1.127E-06	1.127E-06
16	4.699E-07	5.589E-07	5.589E-07
17	2.313E-07	2.795E-07	2.795E-07
18	1.147E-07	1.409E-07	1.409E-07

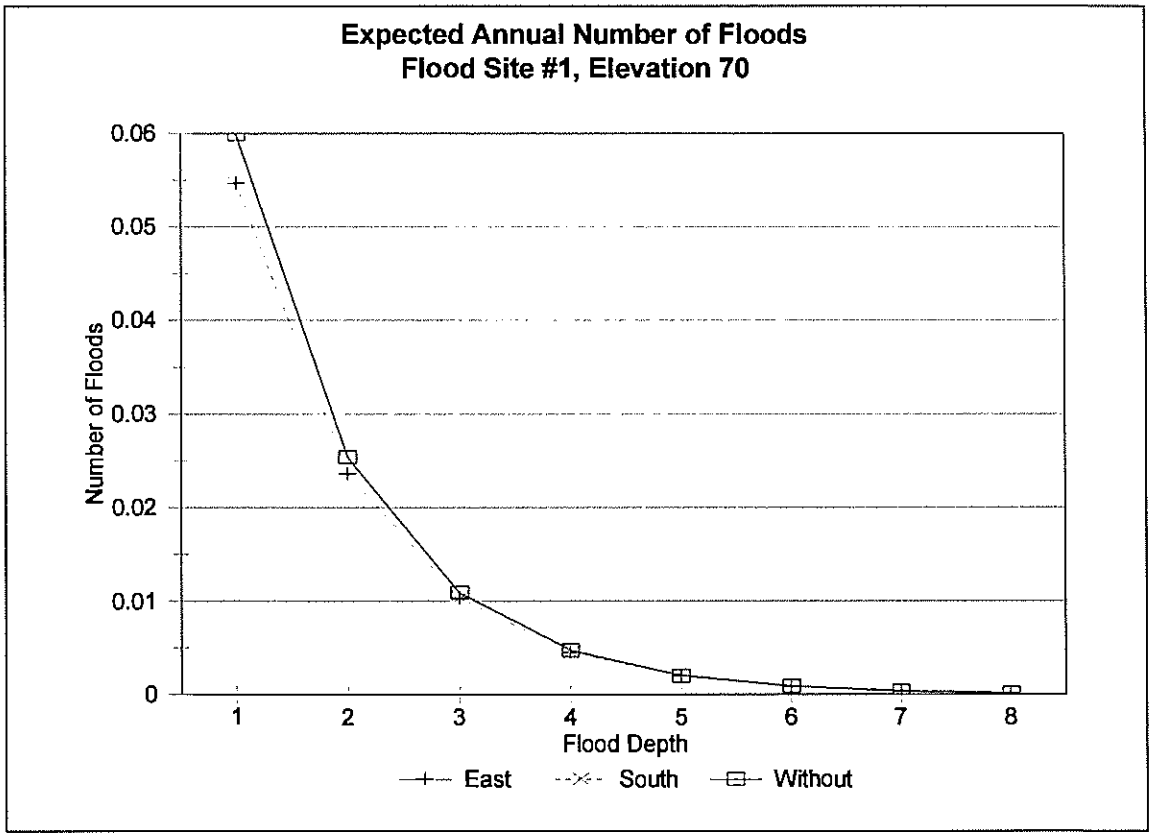

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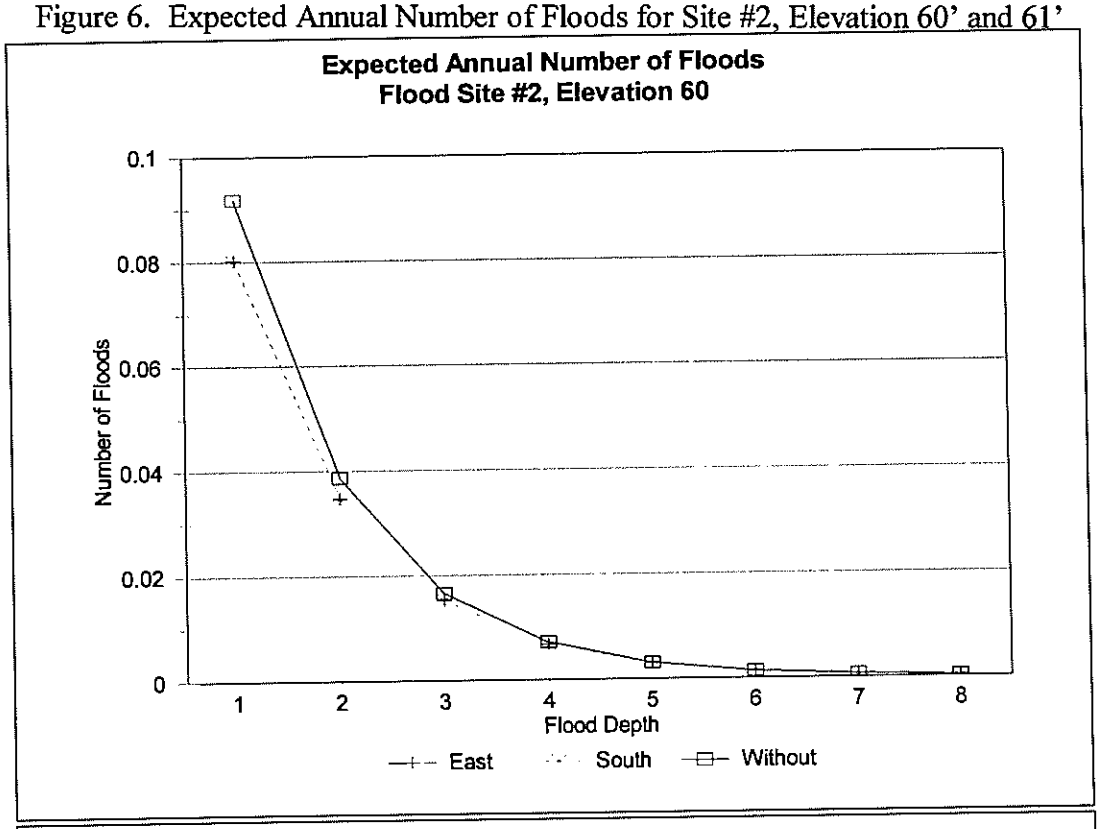
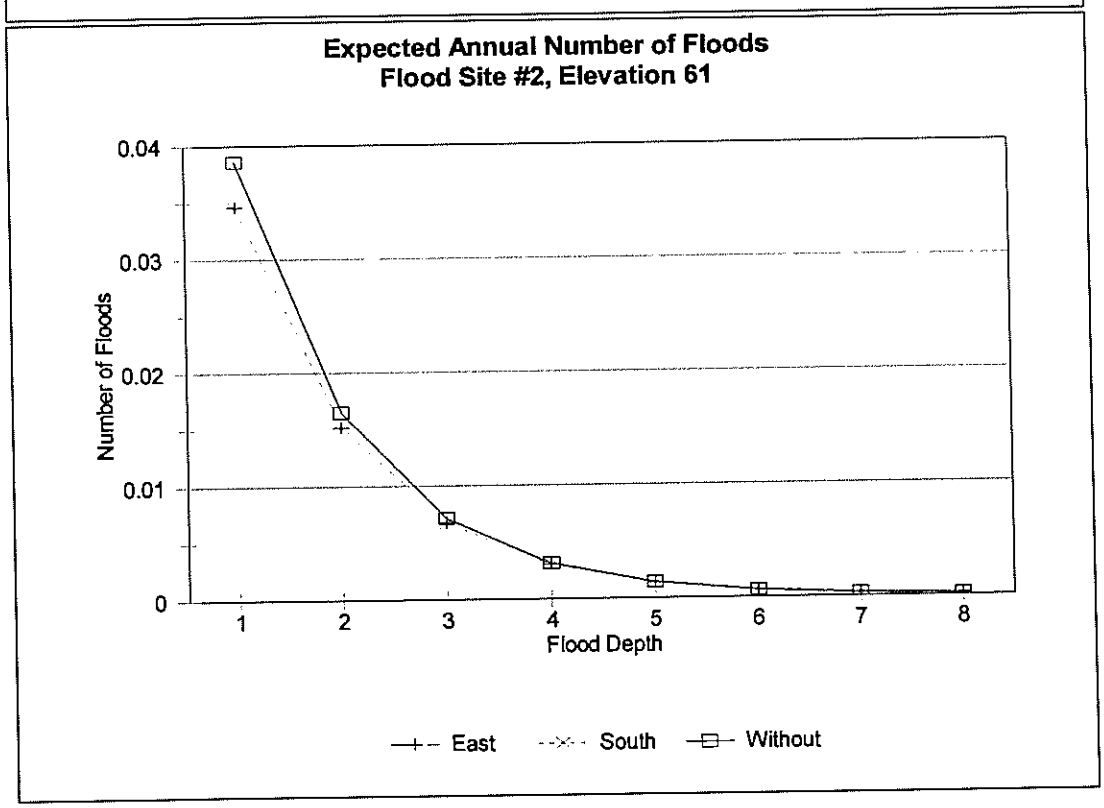
Figure 6. Expected Annual Number of Floods for Site #2, Elevation 60' and 61'





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Drainage Project Benefits

Project benefits are estimated by subtracting the expected annual damages and losses with the project from the expected annual damages and losses without the project.

Expected Annual Damages and Loss of Income and Services With and Without the Project

Total replacement value of buildings, contents, crops and infrastructure located in the designated flood prone areas is over $80 million and building contents totals over $11 million (Table 7). Total expected annual economic losses (damages and value of loss of function) without the project is $2,734,714. The two projects are very similar in terms of total expected annual damages and losses estimated at approximately $2 million. Over 60 percent of the total expected annual damages and value of loss of function is in building and structural damage with and without the proposed projects. Structural and contents damage is almost 90 percent of the total expected annual damage with the value of loss of function making up the remaining 10 percent.

Expected Annual Benefits and the Present Value of Project Benefits

Expected annual benefits range from $705,847 for the South project to $747,928 for the East project. If a discount rate of 7 percent is used, total benefits are approximately $10 million for both projects (Table 8). Prevented property damages represent over 80 percent of total benefits and reduced loss of function represents almost 20 percent. The 7 percent discount rate was selected because it is currently being used by FEMA to evaluate flood mitigation projects. The Water Resources Council mandated interest rate for federal water project is 6 7/8 percent. The use of a 7 percent discount rate assumes a nominal rate of inflation and all project costs and benefits are not inflated. This procedure yields a conservative benefit estimate. If inflation were removed from the discount rate, resulting in an approximate discount rate of 5 percent or costs and benefits were inflated, higher benefits would result.

Project Benefits and Project Costs

Two indicators of project economic feasibility are benefits minus costs and the benefit cost ratio. These indicators should only be made when a reasonably high degree of confidence can be attributed to the estimation of benefits and costs. At this time, the hydrology and hydrologic studies for the projects have not been commissioned and therefore these results are far from final but the comparison is difficult to avoid since only cursory estimates of project costs and effectiveness have been made. Project costs range from $5.5 to $7.5 million for the East Project and $5 to 6.5 million for the South Project. Subtracting the upper range of the cost estimates from estimated benefits, yields over $2.8 million in net benefits for the East Project and over $3.2 million for the South Project.

Estimated benefit cost ratios (B/C) for the two projects are also very favorable. The South Project yielded a B/C ratio of 1.45 and the East Project 1.37. Again given the uncertainty of project effectiveness and project costs, these estimates serve only as a indication probable economic feasibility.

Project	East	South
Project Benefits	$10,321,960	$9,741,212
Project Costs	$7,500,000	$6,500,000
Benefits-Costs	$2,821,960	$3,241,212
Benefits/Costs	1.37	1.45

Section Project Benefits

Section benefits are presented for the East and South Projects in Table 9 and 10 in descending order. Section 31 (T8N R2E) benefits of over $2.4 million are the same under both projects. This amount comprises almost 25 percent of total project benefits. Section 31 contains the intersection of I-80 and Pedrick Road that contains numerous commercial structures that are flood prone and both projects are equally effective in protecting the area to the 5-year flood frequency.

Section 23 (T7N R1E) contains numerous residential structures located in the southwest portion of Dixon and will realize benefits in excess of $2 million under the East Project but only $560,000 if the South Project is selected. The East Project will provide protection to Section 23 to the 5-year flood frequency. The South Project will provide a 2-year level of protection.

Table 11 indicates the difference in Sectional project benefits. As expected, Section 2, 14 and 26 (T6N R1E) located in the southern portion of the study area will receive substantially more benefits under the South Project. The East Project would benefit, in addition to the Section located in Dixon, Section 26 and 27, which are all adjacent.

Table 9. East Project Benefits by Section

Twnsp-Range	Section	Replacement Value of Structure/ Land	Replacement Value of Contents	Expected Annual Benefits: Structure	Expected Annual Benefits: Contents	Expected Annual Benefits: Lost Public Services	Expected Annual Benefits: Relocation	Expected Annual Benefits: Downtime	Expected Annual Benefits: Income	Total Annual Benefits	Present Value of Benefits	Percent
T6N R1E	2	$1,424,000	$407,500	$1,857	$1,730	$0	$72	$11	$2	$3,672	$50,676	0.5%
T6N R1E	3	$100,000	$0	$136	$0	$0	$0	$0	$0	$137	$1,884	0.0%
T6N R1E	11	$564,000	$107,000	$687	$1,070	$0	$17	$1	$1	$1,777	$24,517	0.2%
T6N R1E	12	$82,000	$24,850	$87	$98	$0	$19	$4	$0	$208	$2,872	0.0%
T6N R1E	13	$889,000	$12,200	$1,146	$19	$552	$10	$5	$0	$1,731	$23,887	0.2%
T6N R1E	14	$522,000	$182,100	$1,010	$2,237	$0	$69	$9	$2	$3,326	$45,898	0.4%
T6N R1E	23	$375,000	$0	$511	$0	$0	$0	$1	$0	$512	$7,066	0.1%
T6N R1E	24	$200,000	$0	$267	$0	$0	$0	$1	$0	$268	$3,697	0.0%
T6N R1E	25	$627,500	$0	$825	$0	$356	$0	$1	$0	$1,182	$16,318	0.2%
T6N R1E	26	$4,750,000	$0	$6,175	$0	$4,560	$0	$1	$0	$10,736	$148,162	1.4%
T6N R2E	5	$386,000	$166,800	$2,093	$8,118	$948	$329	$2	$13	$11,503	$158,752	1.5%
T6N R2E	6	$519,500	$159,600	$3,691	$2,604	$0	$313	$43	$8	$6,660	$91,906	0.9%
T6N R2E	7	$1,040,000	$0	$5,434	$0	$4,690	$0	$2	$0	$10,126	$139,748	1.4%
T6N R2E	15	$600,000	$0	$6,824	$0	$5,170	$0	$1	$0	$11,996	$165,549	1.6%
T6N R2E	16	$1,095,000	$0	$6,250	$0	$112	$0	$4	$0	$6,367	$87,867	0.9%
T6N R2E	17	$500,000	$0	$648	$0	$0	$0	$2	$0	$650	$8,971	0.1%
T6N R2E	18	$882,000	$295,600	$3,425	$12,016	$1,523	$589	$16	$22	$17,592	$242,783	2.4%
T6N R2E	19	$100,000	$0	$21	$0	$0	$0	$0	$0	$21	$285	0.0%
T6N R2E	20	$645,000	$0	$155	$0	$24	$0	$0	$0	$180	$2,481	0.0%
T6N R2E	21	$874,000	$27,600	$169	$138	$184	$6	$0	$0	$497	$6,857	0.1%
T6N R2E	29	$150,000	$0	$194	$0	$0	$0	$0	$0	$195	$2,689	0.0%
T6N R2E	30	$180,000	$0	$233	$0	$0	$0	$0	$0	$234	$3,227	0.0%
T7N R1E	1	$11,540,000	$304,450	$17,040	$2,391	$10,123	$165	$18	$2	$29,738	$410,412	4.0%
T7N R1E	2	$432,500	$240,000	$257	$3,879	$99	$229	$0	$4	$4,469	$61,669	0.6%
T7N R1E	3	$135,000	$0	$70	$0	$0	$0	$0	$0	$70	$966	0.0%
T7N R1E	10	$75,000	$0	$119	$0	$0	$0	$0	$0	$119	$1,643	0.0%
T7N R1E	11	$8,262,500	$0	$11,301	$0	$8,411	$0	$1	$0	$19,713	$272,053	2.6%
T7N R1E	12	$1,349,500	$498,100	$22,766	$48,824	$0	$1,914	$112	$60	$73,676	$1,016,778	9.9%
T7N R1E	15	$5,527,500	$80,250	$8,073	$532	$6,697	$51	$4	$2	$15,359	$211,971	2.1%
T7N R1E	22	$250,000	$0	$2,655	$0	$0	$0	$2	$0	$2,657	$36,668	0.4%
T7N R1E	23	$5,095,000	$1,795,300	$85,598	$53,151	$0	$6,019	$1,044	$60	$145,871	$2,013,133	19.5%
T7N R1E	25	$25,000	$0	$34	$0	$0	$0	$0	$0	$34	$464	0.0%
T7N R1E	26	$793,700	$87,900	$9,163	$7,316	$5,904	$464	$33	$3	$22,883	$315,805	3.1%
T7N R1E	27	$562,000	$160,950	$7,822	$9,349	$0	$528	$36	$7	$17,742	$244,859	2.4%
T7N R1E	34	$437,500	$0	$2,279	$0	$878	$0	$1	$0	$3,157	$43,572	0.4%
T7N R1E	35	$75,000	$0	$102	$0	$0	$0	$0	$0	$102	$1,413	0.0%
T7N R2E	6	$2,435,105	$3,842,092	$15,954	$12,312	$0	$184	$16	$4	$28,469	$392,897	3.8%
T7N R2E	7	$532,992	$734,658	$9,705	$60,739	$0	$3,411	$99	$20	$73,973	$1,020,888	9.9%
T7N R2E	8	$450,000	$0	$8,679	$0	$4,963	$0	$3	$0	$13,644	$188,302	1.8%
T7N R2E	16	$682,500	$116,500	$942	$568	$0	$71	$6	$2	$1,589	$21,930	0.2%
T7N R2E	17	$754,500	$547,350	$1,282	$7,369	$0	$248	$5	$9	$8,913	$123,010	1.2%
T7N R2E	18	$377,000	$364,100	$424	$4,620	$0	$147	$6	$5	$5,202	$71,787	0.7%
T7N R2E	21	$962,500	$0	$1,242	$0	$1,152	$0	$0	$0	$2,394	$33,038	0.3%
T7N R2E	22	$217,500	$0	$278	$0	$246	$0	$0	$0	$524	$7,231	0.1%
T7N R2E	27	$442,500	$0	$1,672	$0	$1,122	$0	$1	$0	$2,795	$38,571	0.4%
T7N R2E	28	$587,500	$0	$759	$0	$491	$0	$0	$0	$1,251	$17,262	0.2%
T7N R2E	29	$125,000	$0	$166	$0	$0	$0	$0	$0	$166	$2,294	0.0%
T7N R2E	30	$418,500	$247,500	$623	$924	$192	$52	$4	$2	$1,796	$24,789	0.2%
T7N R2E	31	$75,000	$0	$407	$0	$0	$0	$1	$0	$408	$5,628	0.1%
T7N R2E	32	$557,500	$0	$2,701	$0	$0	$0	$4	$0	$2,705	$37,330	0.4%
T7N R2E	33	$300,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	0.0%
T7N R2E	34	$407,500	$0	$0	$0	$0	$0	$0	$0	$0	$0	0.0%
T8N R1E	33	$150,000	$0	$88	$0	$0	$0	$0	$0	$88	$1,216	0.0%
T8N R1E	34	$625,000	$0	$367	$0	$0	$0	$1	$0	$367	$5,069	0.0%
T8N R1E	35	$1,445,000	$0	$817	$0	$630	$0	$1	$0	$1,448	$19,982	0.2%
T8N R1E	36	$396,000	$113,300	$740	$363	$0	$34	$3	$0	$1,140	$15,734	0.2%
T8N R2E	31	$17,253,000	$1,035,500	$108,417	$12,625	$54,480	$245	$3	$127	$175,896	$2,427,500	23.5%
Totals		$80,259,798	$11,551,200	$364,382	$252,991	$113,506	$15,185	$1,511	$354	$747,928	$10,321,960	100%

T6N R2E

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Table 10. South Project Benefits by Section

Twnsp-Range	Section	Replacement Value of Structure/ Land	Replacement Value of Contents	Expected Annual Benefits: Structure	Expected Annual Benefits: Contents	Expected Annual Benefits: Lost Public Services	Expected Annual Benefits: Relocation	Expected Annual Benefits: Downtime	Expected Annual Benefits: Income	Total Annual Benefits	Present Value of Benefits	Percent
T6N R1E	2	$1,424,000	$407,500	$7,543	$7,242	$0	$277	$44	$8	$15,113	$208,575	2.1%
T6N R1E	3	$100,000	$0	$549	$0	$0	$0	$1	$0	$550	$7,596	0.1%
T6N R1E	11	$564,000	$107,000	$2,772	$4,489	$0	$66	$5	$3	$7,336	$101,244	1.0%
T6N R1E	12	$82,000	$24,850	$354	$403	$0	$77	$16	$2	$852	$11,754	0.1%
T6N R1E	13	$889,000	$12,200	$4,633	$78	$2,058	$38	$20	$0	$6,827	$94,216	1.0%
T6N R1E	14	$522,000	$182,100	$4,133	$9,305	$0	$276	$36	$7	$13,758	$189,867	1.9%
T6N R1E	23	$375,000	$0	$2,060	$0	$0	$0	$4	$0	$2,064	$28,487	0.3%
T6N R1E	24	$200,000	$0	$1,082	$0	$0	$0	$2	$0	$1,085	$14,967	0.2%
T6N R1E	25	$627,500	$0	$3,340	$0	$1,327	$0	$4	$0	$4,671	$64,469	0.7%
T6N R1E	26	$4,750,000	$0	$24,872	$0	$17,105	$0	$2	$0	$41,980	$579,348	5.9%
T6N R2E	5	$386,000	$166,800	$2,093	$8,118	$948	$329	$2	$13	$11,503	$158,752	1.6%
T6N R2E	6	$519,500	$159,600	$3,691	$2,604	$0	$313	$43	$8	$6,660	$91,906	0.9%
T6N R2E	7	$1,040,000	$0	$5,434	$0	$4,690	$0	$2	$0	$10,126	$139,748	1.4%
T6N R2E	15	$600,000	$0	$19,896	$0	$11,866	$0	$4	$0	$31,767	$438,406	4.5%
T6N R2E	16	$1,095,000	$0	$19,039	$0	$412	$0	$15	$0	$19,466	$268,641	2.8%
T6N R2E	17	$500,000	$0	$2,643	$0	$0	$0	$7	$0	$2,650	$36,575	0.4%
T6N R2E	18	$882,000	$295,600	$4,799	$12,016	$2,034	$589	$18	$22	$19,478	$268,816	2.8%
T6N R2E	19	$100,000	$0	$49	$0	$0	$0	$0	$0	$49	$682	0.0%
T6N R2E	20	$645,000	$0	$369	$0	$53	$0	$1	$0	$423	$5,834	0.1%
T6N R2E	21	$874,000	$27,600	$404	$325	$424	$14	$1	$0	$1,167	$16,109	0.2%
T6N R2E	29	$150,000	$0	$793	$0	$0	$0	$2	$0	$794	$10,964	0.1%
T6N R2E	30	$180,000	$0	$951	$0	$0	$0	$2	$0	$953	$13,157	0.1%
T7N R1E	1	$11,540,000	$304,450	$17,040	$2,391	$10,123	$165	$18	$2	$29,738	$410,412	4.2%
T7N R1E	2	$432,500	$240,000	$257	$3,879	$99	$229	$0	$4	$4,469	$61,669	0.6%
T7N R1E	3	$135,000	$0	$70	$0	$0	$0	$0	$0	$70	$966	0.0%
T7N R1E	10	$75,000	$0	$119	$0	$0	$0	$0	$0	$119	$1,643	0.0%
T7N R1E	11	$8,262,500	$0	$11,301	$0	$8,411	$0	$1	$0	$19,713	$272,053	2.8%
T7N R1E	12	$1,349,500	$498,100	$22,766	$48,824	$0	$1,914	$112	$60	$73,676	$1,016,778	10.4%
T7N R1E	15	$5,527,500	$80,250	$8,073	$532	$6,697	$51	$4	$2	$15,359	$211,971	2.2%
T7N R1E	22	$250,000	$0	$751	$0	$0	$0	$1	$0	$751	$10,366	0.1%
T7N R1E	23	$5,095,000	$1,795,300	$23,846	$14,845	$0	$1,724	$296	$17	$40,728	$562,075	5.8%
T7N R1E	25	$25,000	$0	$34	$0	$0	$0	$0	$0	$34	$464	0.0%
T7N R1E	26	$793,700	$87,900	$2,569	$2,070	$1,879	$132	$9	$1	$6,659	$91,893	0.9%
T7N R1E	27	$562,000	$160,950	$2,210	$2,626	$0	$150	$10	$2	$4,997	$68,965	0.7%
T7N R1E	34	$437,500	$0	$1,919	$0	$279	$0	$3	$0	$2,201	$30,370	0.3%
T7N R1E	35	$75,000	$0	$412	$0	$0	$0	$1	$0	$413	$5,697	0.1%
T7N R2E	6	$2,435,105	$3,842,092	$15,954	$12,312	$0	$184	$16	$4	$28,469	$392,897	4.0%
T7N R2E	7	$532,992	$734,658	$9,705	$60,739	$0	$3,411	$99	$20	$73,973	$1,020,888	10.5%
T7N R2E	8	$450,000	$0	$8,679	$0	$4,963	$0	$3	$0	$13,644	$188,302	1.9%
T7N R2E	16	$682,500	$116,500	$405	$248	$0	$30	$3	$1	$687	$9,477	0.1%
T7N R2E	17	$754,500	$547,350	$553	$3,216	$0	$106	$2	$4	$3,882	$53,575	0.5%
T7N R2E	18	$377,000	$364,100	$183	$2,016	$0	$63	$3	$2	$2,267	$31,292	0.3%
T7N R2E	21	$962,500	$0	$442	$0	$434	$0	$0	$0	$876	$12,095	0.1%
T7N R2E	22	$217,500	$0	$0	$0	$0	$0	$0	$0	$0	$0	0.0%
T7N R2E	27	$442,500	$0	$0	$0	$0	$0	$0	$0	$0	$0	0.0%
T7N R2E	28	$587,500	$0	$0	$0	$0	$0	$0	$0	$0	$0	0.0%
T7N R2E	29	$125,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	0.0%
T7N R2E	30	$418,500	$247,500	$623	$924	$192	$52	$4	$2	$1,796	$24,789	0.3%
T7N R2E	31	$75,000	$0	$407	$0	$0	$0	$1	$0	$408	$5,628	0.1%
T7N R2E	32	$557,500	$0	$2,701	$0	$0	$0	$4	$0	$2,705	$37,330	0.4%
T7N R2E	33	$300,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	0.0%
T7N R2E	34	$407,500	$0	$0	$0	$0	$0	$0	$0	$0	$0	0.0%
T8N R1E	33	$150,000	$0	$88	$0	$0	$0	$0	$0	$88	$1,216	0.0%
T8N R1E	34	$625,000	$0	$367	$0	$0	$0	$1	$0	$367	$5,069	0.1%
T8N R1E	35	$1,445,000	$0	$817	$0	$630	$0	$1	$0	$1,448	$19,982	0.2%
T8N R1E	36	$396,000	$113,300	$740	$363	$0	$34	$3	$0	$1,140	$15,734	0.2%
T8N R2E	31	$17,253,000	$1,035,500	$108,417	$12,625	$54,480	$245	$3	$127	$175,896	$2,427,500	24.9%
Totals		$80,259,798	$11,551,200	$352,947	$212,190	$129,104	$10,468	$829	$309	$705,847	$9,741,212	100%

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Table 11. Difference in Section Project Benefits

Twnsp-Range	Section	East Total Benefits	South Total Benefits	Project Advantage	
				East	South
T6N R1E	2	$50,676	$208,575		$157,900
T6N R1E	3	$1,884	$7,596		$5,712
T6N R1E	11	$24,517	$101,244		$76,727
T6N R1E	12	$2,872	$11,754		$8,883
T6N R1E	13	$23,887	$94,216		$70,329
T6N R1E	14	$45,898	$189,867		$143,969
T6N R1E	23	$7,066	$28,487		$21,421
T6N R1E	24	$3,697	$14,967		$11,270
T6N R1E	25	$16,318	$64,469		$48,151
T6N R1E	26	$148,162	$579,348		$431,186
T6N R2E	5	$158,752	$158,752		
T6N R2E	6	$91,906	$91,906		$0
T6N R2E	7	$139,748	$139,748		
T6N R2E	15	$165,549	$438,406		$272,857
T6N R2E	16	$87,867	$268,641		$180,775
T6N R2E	17	$8,971	$36,575		$27,604
T6N R2E	18	$242,783	$268,816		$26,033
T6N R2E	19	$285	$682		$396
T6N R2E	20	$2,481	$5,834		$3,352
T6N R2E	21	$6,857	$16,109		$9,251
T6N R2E	29	$2,689	$10,964		$8,275
T6N R2E	30	$3,227	$13,157		$9,930
T7N R1E	1	$410,412	$410,412	$0	
T7N R1E	2	$61,669	$61,669		
T7N R1E	3	$966	$966		
T7N R1E	10	$1,643	$1,643		
T7N R1E	11	$272,053	$272,053		
T7N R1E	12	$1,016,778	$1,016,778		
T7N R1E	15	$211,971	$211,971		
T7N R1E	22	$36,668	$10,366	$26,302	
T7N R1E	23	$2,013,133	$562,075	$1,451,057	
T7N R1E	25	$464	$464		
T7N R1E	26	$315,805	$91,893	$223,912	
T7N R1E	27	$244,859	$68,965	$175,894	
T7N R1E	34	$43,572	$30,370	$13,202	
T7N R1E	35	$1,413	$5,697		$4,284
T7N R2E	6	$392,897	$392,897		
T7N R2E	7	$1,020,888	$1,020,888		
T7N R2E	8	$188,302	$188,302		
T7N R2E	16	$21,930	$9,477	$12,453	
T7N R2E	17	$123,010	$53,575	$69,435	
T7N R2E	18	$71,787	$31,292	$40,495	
T7N R2E	21	$33,038	$12,095	$20,943	
T7N R2E	22	$7,231	$0	$7,231	
T7N R2E	27	$38,571	$0	$38,571	
T7N R2E	28	$17,262	$0	$17,262	
T7N R2E	29	$2,294	$0	$2,294	
T7N R2E	30	$24,789	$24,789		
T7N R2E	31	$5,628	$5,628		
T7N R2E	32	$37,330	$37,330		
T7N R2E	33	$0	$0		
T7N R2E	34	$0	$0		
T8N R1E	33	$1,216	$1,216		
T8N R1E	34	$5,069	$5,069		
T8N R1E	35	$19,982	$19,982		
T8N R1E	36	$15,734	$15,734		$0
T8N R2E	31	$2,427,500	$2,427,500		

Figure 7. East Project Section Benefits

	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	Column 10
	R1E			R1E	R2E					R2E
T8N	Section 33 $1,216	Section 34 $5,069	Section 35 $19,982	Section 36 $15,734	Section 31 $2,427,500					
T8N										
T7N	Section 4 $0	Section 3 $966	Section 2 $61,669	Section 1 $410,412	Section 6 $392,897	Section 5 $0	Section 4 $0	Section 3 $0	Section 2 $0	Section 1 $0
	Section 9 $0	Section 10 $1,643	Section 11 $272,053	Section 12 $1,016,778	Section 7 $1,020,888	Section 8 $188,302	Section 9 $0	Section 10 $0	Section 11 $0	Section 12 $0
	Section 16 $0	Section 15 $211,971	Section 14 $0	Section 13 $0	Section 18 $71,787	Section 17 $123,010	Section 16 $21,930	Section 15 $0	Section 14 $0	Section 13 $0
	Section 21 $0	Section 22 $36,668	Section 23 $2,013,133	Section 24 $0	Section 19 $0	Section 20 $0	Section 21 $33,038	Section 22 $7,231	Section 23 $0	Section 24 $0
	Section 28 $0	Section 27 $244,859	Section 26 $315,805	Section 25 $464	Section 30 $24,789	Section 29 $2,294	Section 28 $17,262	Section 27 $38,571	Section 26 $0	Section 25 $0
	Section 33 $0	Section 34 $43,572	Section 35 $1,413	Section 36 $0	Section 31 $5,628	Section 32 $37,330	Section 33 $0	Section 34 $0	Section 35 $0	Section 36 $0
T7N										
T6N	Section 4 $0	Section 3 $1,884	Section 2 $50,676	Section 1 $0	Section 6 $91,906	Section 5 $158,752	Section 4 $0	Section 3 $0	Section 2 $0	Section 1 $0
	Section 9 $0	Section 10 $0	Section 11 $24,517	Section 12 $2,872	Section 7 $139,748	Section 8 $0	Section 9 $0	Section 10 $0	Section 11 $0	Section 12 $0
	Section16 $0	Section 15 $0	Section 14 $45,898	Section 13 $23,887	Section 18 $242,783	Section 17 $8,971	Section 16 $87,867	Section 15 $165,549	Section 14 $0	Section 13 $0
	Section 21 $0	Section 22 $0	Section 23 $7,066	Section 24 $3,697	Section 19 $285	Section 20 $2,481	Section 21 $6,857	Section 22 $0	Section 23 $0	Section 24 $0
	Section 28 $0	Section 27 $0	Section 26 $148,162	Section 25 $16,318	Section 30 $3,227	Section 29 $2,689	Section 28 $0	Section 27 $0	Section 26 $0	Section 25 $0
T6N										

Benefits per Section
$0
>$0-$10,000
>$10,000-$50,000
>$50,000-$100,000
>$100,000-$500,000
>$500,000-$1,000,000
>$1,000,000

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Figure 8. South Project Section Benefits

	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	Column 10
	R1E			R1E	R2E					R2E
T8N	Section 33 $1,216	Section 34 $5,069	Section 35 $19,982	Section 36 $15,734	Section 31 $2,427,500					
T8N										
T7N	Section 4 $0	Section 3 $966	Section 2 $61,669	Section 1 $410,412	Section 6 $392,897	Section 5 $0	Section 4 $0	Section 3 $0	Section 2 $0	Section 1 $0
	Section 9 $0	Section 10 $1,643	Section 11 $272,053	Section 12 $1,016,778	Section 7 $1,020,888	Section 8 $188,302	Section 9 $0	Section 10 $0	Section 11 $0	Section 12 $0
	Section 16 $0	Section 15 $211,971	Section 14 $0	Section 13 $0	Section 18 $31,292	Section 17 $53,575	Section 16 $9,477	Section 15 $0	Section 14 $0	Section 13 $0
	Section 21 $0	Section 22 $10,366	Section 23 $562,075	Section 24 $0	Section 19 $0	Section 20 $0	Section 21 $12,095	Section 22 $0	Section 23 $0	Section 24 $0
	Section 28 $0	Section 27 $68,965	Section 26 $91,893	Section 25 $464	Section 30 $24,789	Section 29 $0	Section 28 $0	Section 27 $0	Section 26 $0	Section 25 $0
	Section 33 $0	Section 34 $30,370	Section 35 $5,697	Section 36 $0	Section 31 $5,628	Section 32 $37,330	Section 33 $0	Section 34 $0	Section 35 $0	Section 36 $0
T7N										
T6N	Section 4 $0	Section 3 $7,596	Section 2 $208,575	Section 1 $0	Section 6 $91,906	Section 5 $158,752	Section 4 $0	Section 3 $0	Section 2 $0	Section 1 $0
	Section 9 $0	Section 10 $0	Section 11 $101,244	Section 12 $11,754	Section 7 $139,748	Section 8 $0	Section 9 $0	Section 10 $0	Section 11 $0	Section 12 $0
	Section16 $0	Section 15 $0	Section 14 $189,867	Section 13 $94,216	Section 18 $268,816	Section 17 $36,575	Section 16 $268,641	Section 15 $438,406	Section 14 $0	Section 13 $0
	Section 21 $0	Section 22 $0	Section 23 $28,487	Section 24 $14,967	Section 19 $682	Section 20 $5,834	Section 21 $16,109	Section 22 $0	Section 23 $0	Section 24 $0
	Section 28 $0	Section 27 $0	Section 26 $579,348	Section 25 $64,469	Section 30 $13,157	Section 29 $10,964	Section 28 $0	Section 27 $0	Section 26 $0	Section 25 $0
T6N										

Benefits per Section
$0
>$0-$10,000
>$10,000-$50,000
>$50,000-$100,000
>$100,000-$500,000
>$500,000-$1,000,000
>$1,000,000

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Figure 9. Project Difference in Section Benefits

	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	Column 10
	R1E			R1E	R2E					R2E
T8N	Section 33 $0	Section 34 $0	Section 35 $0	Section 36 $0	Section 31 $0					
T8N										
T7N	Section 4 $0	Section 3 $0	Section 2 $0	Section 1 $0	Section 6 $0	Section 5 $0	Section 4 $0	Section 3 $0	Section 2 $0	Section 1 $0
	Section 9 $0	Section 10 $0	Section 11 $0	Section 12 $0	Section 7 $0	Section 8 $0	Section 9 $0	Section 10 $0	Section 11 $0	Section 12 $0
	Section 16 $0	Section 15 $0	Section 14 $0	Section 13 $0	Section 18 $40,495	Section 17 $69,435	Section 16 $12,453	Section 15 $0	Section 14 $0	Section 13 $0
	Section 21 $0	Section 22 $26,302	Section 23 $1,451,057	Section 24 $0	Section 19 $0	Section 20 $0	Section 21 $20,943	Section 22 $7,231	Section 23 $0	Section 24 $0
	Section 28 $0	Section 27 $175,894	Section 26 $223,912	Section 25	Section 30 $0	Section 29 $2,294	Section 28 $17,262	Section 27 $38,571	Section 26 $0	Section 25 $0
	Section 33 $0	Section 34 $13,202	Section 35 $4,284	Section 36 $0	Section 31 $0	Section 32 $0	Section 33 $0	Section 34 $0	Section 35 $0	Section 36 $0
T7N										
T6N	Section 4 $0	Section 3 $5,712	Section 2 ...	Section 1 $0	Section 6 $0	Section 5 $0	Section 4 $0	Section 3 $0	Section 2 $0	Section 1 $0
	Section 9 $0	Section 10 $0	Section 11 $76,727	Section 12 $8,883	Section 7 $0	Section 8 $0	Section 9 $0	Section 10 $0	Section 11 $0	Section 12 $0
	Section16 $0	Section 15 $0	Section 14 $143,969	Section 13 $70,329	Section 18 $26,033	Section 17 $27,604	Section 16 $180,775	Section 15 $272,857	Section 14 $0	Section 13 $0
	Section 21 $0	Section 22 $0	Section 23 $21,421	Section 24 $11,270	Section 19 $396	Section 20 $3,352	Section 21 $9,251	Section 22 $0	Section 23 $0	Section 24 $0
	Section 28 $0	Section 27 $0	Section 26 $431,186	Section 25 $48,151	Section 30 $9,930	Section 29 $8,275	Section 28 $0	Section 27 $0	Section 26 $0	Section 25 $0
T6N										

East Advantage	South Advantage
>$0-$10,000	>$0-$10,000
>$10,000-$50,000	>$10,000-$50,000
>$50,000-$100,000	>$50,000-$100,000
>$100,000-$500,000	>$100,000-$500,000
>$500,000-$1,000,000	>$500,000-$1,000,000
>$1,000,000	>$1,000,000

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AGRICULTURAL DRAINAGE PAYMENT CAPACITY

The economic and financial ability to contribute to the costs of the drainage alternatives is important in defining acceptable regional solutions to the problem. One of the beneficiaries of the drainage proposals and certainly not the only beneficiaries are agricultural growers and the ability to pay for drainage can define potential project participation. The ability to pay will be calculated for agriculture using crop yield and price data from Agricultural Commissioners Reports, UC Cooperative Extension cost surveys and existing models used by the Federal Government.

Project payment capacity is defined as expected long term agricultural crop returns minus all expenses including cultural, land, and management costs. Payment Capacity is estimated by subtracting all cash and non-cash production costs from total crop revenue.

Crop Revenue

Total crop revenue was estimated by summing Section crop revenue. Multiplying Section cropping patterns by crop yields and prices derived Section crop revenue. Section cropping patterns was determined by the Section acreage of soil mapping units, the related crop capability and DWDP cropping patterns.

Soil series and soil phases define soil mapping units ("Soil Survey of Solano County, California", in Cooperation with University of California Agricultural Experiment Station, Issued May 1977). Soil series describes the soil profile and a soil phase describes features that affect management. The soil mapping unit name is comprised of the soil series and the soil phase.

Multiplying crop yields by Section cropping patterns and crop prices derived Section crop revenue.

Crop Yields

Crop yields have been estimated by soil mapping units. The following soil mapping units occur in the DWDP project area.

AoA	Antioch-San Ysidro complex (AoA)
BrA	Brentwood clay loam (BrA)
Ca	Capay clay (Cc)
Cc	Capay silty clay loam (Ca)
CeA	Clear Lake clay (CeA)
Pc	Pescadero clay loam (Pc)
Ra	Reiff fine sandy loam (Ra)
RoA	Rincon clay loam (RoA)
SeA	San Ysidro sandy loam, 0-2% slope (SeA)

SfA	San Ysidro sandy loam, thick surface (SfA)
Sr	Sycamore silty clay loam (Sr)
Ss	Sycamore silty clay loam, drained (Ss)
Yo	Yolo loam (Yo)
Yr	Yolo loam, clay substratum (Yr)
Ys	Yolo silty clay loam (Ys)

Estimated crop yields by soil mapping units for Solano County are presented in Table 12. These estimates were updated to current condition for the DWDP project area by using the Soil Survey soil mapping unit yield variation and current yield averages.

Two sources of current crop yields existed for Solano County, 1) the Solano County Commissioner's Agricultural Crop Report, and 2) recent University of California Cooperative Extension cost of production studies for Solano and surrounding counties.

The Agricultural Commissioner's Crop Report yield estimates for 1986 through 1997 are presented in Table 13.

Table 12. Predicted Soil Mapping Unit Crop Yields Under Optimum Management

	Irrigated Crop Yields											Dryland Crop Yields		
	Alfalfa	Almonds	Apricots	Corn	Sugar Beets	Tomatoes	Lima Beans	Grain Sorghum	Pears	Prunes	Pasture*	Barley	Wheat	Pasture*
Soil Series	ton	ton	ton	ton	ton	ton	ton	ton	ton	ton	aum	ton	ton	aum
Antioch-San Ysidro complex (AoA)														3.0
Brentwood clay loam (BrA)	8.2	1.1	8.0	5.0	26.0	30.0	1.5	3.3		1.8	20.0	1.8		
Capay silty clay loam (Ca)	7.5				26.0	27.0	1.4	3.0			18.0	1.5		
Capay clay (Cc)	7.5				26.0	27.0		3.0			18.0	1.5		
Clear Lake clay (CeA)	7.5				26.0	27.0		3.0			18.0	1.5		
Pescadero clay loam (Pc)														3.0
Reiff fine sandy loam (Ra)	8.3	1.1	8.0	5.0	27.0	27.0	1.5	3.3			18.0	1.5		
Rincon clay loam (RoA)	7.5	1.0	7.0		26.0	27.0	1.4	3.3			18.0	1.5		
San Ysidro sandy loam, 0-2% slope (SeA)														3.0
San Ysidro sandy loam, thick surface (SfA)								3.0				1.5		3.5
Sycamore silty clay loam (Sr)	8.0			4.8	26.0	30.0	1.5	3.3	11.0		20.0	1.5		
Sycamore silty clay loam, drained (Ss)	8.5	1.2	8.0	4.8	30.0	30.0	1.5	3.3	12.0	1.8	20.0	1.8		
Yolo loam (Yo)	8.5	1.2	8.0	5.0	28.0	27.0	1.5	3.3		1.8	20.0	1.8		
Yolo loam, clay substratum (Yr)	7.5	1.0	7.0	4.5	26.0	27.0	1.5	3.3		1.5	18.0	1.5		
Yolo silty clay loam (Ys)	8.5	1.2	8.0	5.0	30.0	30.0	1.5	3.3		1.8	20.0	1.8		
Soil Series Average	**8.0**	**1.1**	**7.7**	**4.9**	**27.0**	**28.1**	**1.5**	**3.2**	**11.5**	**1.7**	**18.9**	**1.6**		**3.1**

Source: Soil Survey of Solano County, California. USDA, Soil Conservation Service & UC Ag. Experiement Station. Page 56-63.

Table 13. Solano County Agricutlural Commissioners Crop Yields

	Crop										Forages			
Year	Corn, field	Alfalfa	Sugar Beets	Grain wheat	Tomatoes	Dry Beans	Almonds	Safflower	Walnuts	Vineyard	Pasture	Pasture, Dry	Hay, Grass	Hay, Grain
1986	4.50	6.00	24.30	2.00	30.50	1.10	0.15	1.30	0.94	4.50	10.00	1.00	2.10	2.50
1987	4.67	6.85	26.08	2.35	33.00	1.00	0.36	1.37	1.28	3.17	10.00	1.00	2.00	2.50
1988	4.80	6.85	23.50	2.75	36.00	1.25	0.32	1.08	1.28	3.52	10.00	1.00	2.00	2.00
1989	4.62	6.85	25.21	2.60	34.00	1.24	0.23	1.30	0.96	6.63	10.00	1.00	2.15	2.15
1990	4.47	6.21	24.88	2.45	31.50	1.25	0.38	1.03	0.99	6.24	10.00	1.00	1.50	2.15
1991	4.65	6.84	22.91	2.61	32.60	1.08	0.15	0.80	1.06	6.52	10.00	1.00	1.63	2.48
1992	5.06	6.46	29.39	2.54	32.54	0.95	0.30	1.15	0.87	4.82	10.00	1.00	1.00	2.89
1993	4.88	6.11	28.10	2.20	31.48	0.98	0.34	1.15	1.02	3.92	10.00	1.00	1.00	3.06
1994	5.21	6.78	27.47	2.75	33.74	0.96	0.40	1.50	0.83	5.36	10.00	1.00	1.00	2.86
1995	4.85	5.26	25.29	2.23	30.27	0.97	0.15	1.07	0.95	5.06	10.00	1.00	1.00	0.98
1996	4.44	6.62	27.53	2.10	32.32	0.89	0.30	1.24	0.81	6.36	10.00	1.00	1.00	1.99
Average	**4.74**	**6.44**	**25.88**	**2.42**	**32.54**	**1.06**	**0.28**	**1.18**	**1.00**	**5.10**	**10.00**	**1.00**	**1.49**	**2.32**

Source: Solano County Agricutlural Commissioner's Crop Report, 1986-1997.

UC Cooperative Extension used the following yields per acre in recent cost of production studies.

Alfalfa	7.0 tons
Corn	4.75 tons
Sugar Beets	24.5 tons
Tomatoes	32.0 tons
Lima Beans	0.9 tons
Almonds	1.0 tons
Safflower	22.5 cwt
Walnuts	2.0 tons
Vineyard	10.0 tons
Irrigated Pasture	16.0 aum
Dry Pasture	3.0 aum
Hay, Grass	3.0 tons
Hay, Grain	3.0 tons
Sudan	4.0 tons

Some Project area growers felt that the 12-year average yields from the Solano County Agricultural Commissioner was generally too low to represent average Project area yields. A project area grower provided the following yield estimates (Martinez).

Alfalfa	8.0 tons
Corn	5.8 tons
Sugar Beets	28.0 tons
Tomatoes	32.0 tons
Pink Beans	0.9 tons
Wheat	2.8 tons

The yields provided by the local grower along with the UCCE yields for the remaining crops were assumed to be average yields for the Project area. Applying the soil mapping unit yield variations presented in Table 12 and the average yields provides estimates of current or updated yields (Table 14).

Table 14. DWDP Area Crop Yields by Soil Mapping Unit

Soil Series	Corn, field	Alfalfa	Sugar Beets	Grain wheat	Tomatoes	Dry Beans	Almonds	Safflower	Walnuts	Vineyard	Nursery	Pasture	Pasture, Dry	Hay, Grass	Hay, Grain	Sudan
Proxy				sorghum				sorghum	almonds	prunes				sorghum	sorghum	
Antioch-San Ysidro complex (AoA)													2.88			
Brentwood clay loam (BrA)	5.97	8.25	26.96	2.87	34.17	0.91	1.00	1.15	2.01	10.34		16.92		3.08	3.08	
Capay silty clay loam (Ca)		7.54	26.96	2.65	30.76	0.85		1.07				15.23		2.84	2.84	
Capay clay (Cc)		7.54	26.96	2.65	30.76			1.07				15.23		2.84	2.84	
Clear Lake clay (CeA)		7.54	26.96	2.65	30.76			1.07				15.23		2.84	2.84	
Pescadero clay loam (Pc)													2.88			
Reiff fine sandy loam (Ra)	5.97	8.35	28.00	2.87	30.76	0.91	1.03	1.15	2.05			15.23		3.08	3.08	
Rincon clay loam (RoA)		7.54	26.96	2.87	30.76	0.85	0.91	1.15	1.82			15.23		3.08	3.08	
San Ysidro sandy loam, 0-2% slope (ScA)													2.88			
San Ysidro sandy loam, thick surface (SfA)				2.65				1.07					3.36	2.84	2.84	
Sycamore silty clay loam (Sr)	5.67	8.05	26.96	2.87	34.17	0.91		1.15				16.92		3.08	3.08	
Sycamore silty clay loam, drained (Ss)	5.67	8.55	31.11	2.87	34.17	0.91	1.05	1.15	2.10	10.34		16.92		3.08	3.08	
Yolo loam (Yo)	5.97	8.55	29.04	2.87	30.76	0.91	1.05	1.15	2.10	10.34		16.92		3.08	3.08	
Yolo loam, clay substratum (Yr)	5.37	7.54	26.96	2.87	30.76	0.91	0.91	1.15	1.82	8.62		15.23		3.08	3.08	
Yolo silty clay loam (Ys)	5.97	8.55	31.11	2.87	34.17	0.91	1.05	1.15	2.10	10.34		16.92		3.08	3.08	2.50
Average Yield*	**5.80**	**8.00**	**28.00**	**2.80**	**32.00**	**0.90**	**1.00**	**1.13**	**2.00**	**10.00**		**16.00**	**3.00**	**3.00**	**3.00**	**2.50**

*Average yield is best long range estimate. Soil yield variations based on Soil Survey crop yields.

Cropping Patterns

A two step process determined the Section cropping patterns. First, local growers and staff, using the County acreage as a guide, derived the DWDP area cropping patterns. Second, the Section crop acreage was based on DWDP area cropping patterns and on Section acreage of soil mapping units.

DWDP Area Cropping Patterns

Data on cropping patterns for the last 10 years was collected from Solano County Agricultural Commissioner's reports (Appendix II). Local growers and Project staff then estimated cropping patterns for the DWDP using the County data as a reference point (Table 15). Area crop acreage was estimated at 80,288 with corn (26%), alfalfa (12%), and sugar beets (11%) comprising almost half the total. Tomatoes a typical high value crop comprised 7.7 percent of the total acreage.

Section Cropping Patterns

No data exists on Section cropping patterns and if they did, crop acreage would vary annually. To estimate payment capacity, potential cropping patterns should reflect the soil type capabilities and past crop history. An area crop acreage composite adjusted for soil mapping unit crop production potential was used for this purpose.

Section soil mapping unit acreage was visually estimated for the DWDP using the aerial photographs contained in the Solano County Soil Survey. Results are presented in Appendix I and summarized in Table 16. Total DWDP agricultural Section acreage is estimated to be 65,107. This assumes that 90 percent of the gross agricultural acreage is planted to agricultural crops.

The largest soil mapping unit is Capay silty clay loam and comprises almost 40 percent of the DWDP area. Yolo silty clay loam and Capay clay comprises about 19 and 18 percent of the study area respectively.

Crop acreage ratios were determined by the Section crop capability (Table 14) and the DWDP crop acreage. Take Section 31, T8N R2E as an example. From the Soil Survey, it was determined that there are approximately 169 acres, of Brentwood clay loam (BrA), 345 acres of Capay silty clay loam (Ca), 42 acres of Capay clay (Cc), and 56 acres of Yolo silty clay loam (Ys) (Appendix I, page 4).

Table 15. Solano County Agricutlural Commissioners Crop Acreages

Year	Total Crop Acreage	Crop										Forages				
		Corn, field	Alfalfa	Sugar Beets	Grain wheat	Tomatoes	Dry Beans	Almonds	Safflower	Walnuts	Vineyard	Pasture	Pasture, Dry	Hay, Grass	Hay, Grain	Sudan
1986	91,890	34,841	5,700	8,736	7,875	5,850	4,725	1,222	216	428	16	10,000	7,280	2,000	3,000	0
1987	87,911	29,600	5,750	10,566	7,500	4,800	5,625	1,163	136	439	17	10,250	7,265	1,900	2,900	0
1988	84,672	25,600	6,803	10,190	7,500	5,606	6,750	1,097	330	439	16	10,250	7,190	1,900	1,000	0
1989	85,927	23,600	7,338	9,829	8,029	5,576	9,450	938	440	519	19	10,250	7,190	1,750	1,000	0
1990	81,765	22,195	8,000	8,690	6,076	5,864	8,775	843	577	536	19	10,250	7,190	1,750	1,000	0
1991	74,655	20,000	9,638	7,296	5,175	7,141	3,453	811	190	634	27	10,250	7,190	1,750	1,100	0
1992	66,808	10,845	10,377	7,445	6,525	5,581	3,750	818	765	637	27	10,250	7,185	1,750	854	0
1993	71,682	11,323	10,250	10,848	6,525	6,535	3,675	715	1,098	650	28	10,250	7,185	1,750	850	0
1994	78,187	14,137	11,409	10,378	6,600	7,024	6,162	715	1,050	649	28	10,250	7,185	1,750	850	0
1995	76,273	15,779	12,720	7,482	5,250	7,017	5,583	708	1,050	716	30	10,250	7,183	1,750	757	0
1996	83,399	22,466	14,498	3,293	7,867	7,030	6,118	669	608	716	31	10,250	7,183	1,750	421	500
Average	**80,288**	**20,944**	**9,317**	**8,614**	**6,811**	**6,184**	**5,824**	**882**	**587**	**578**	**23**	**10,227**	**7,202**	**1,800**	**1,248**	**45**

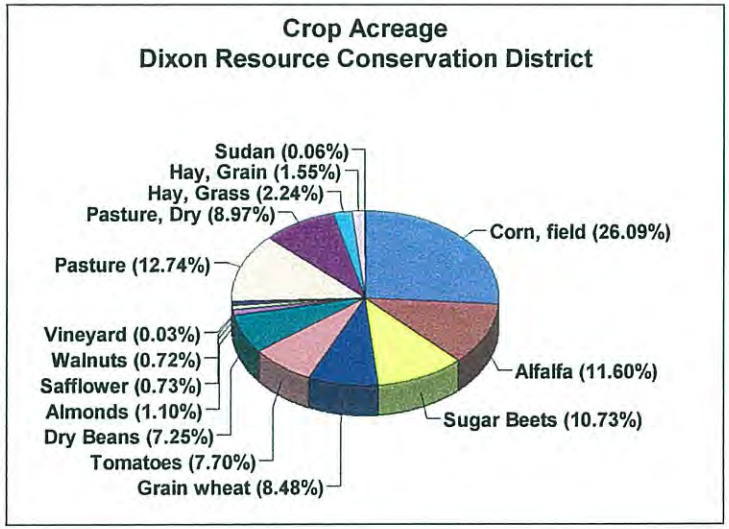

Table 16. Section Soil Mapping Unit Acreage (Page 1 of 2)

Map Column	Section #	Section Acreage	Soil Maping Unit														
			AoA	BrA	Ca	Cc	CeA	Pc	Ra	RoA	SeA	SfA	Sr	Ss	Yo	Yr	Ys
Column 1	Section 33	640	0	70	0	0	0	0	0	0	0	0	0	0	70	0	500
Column 2	Section 34	640	0	70	0	0	0	0	0	0	0	0	0	0	0	0	570
Column 3	Section 35	640	0	0	239	0	0	0	0	0	0	0	0	0	0	0	401
Column 4	Section 36	626	0	70	359	14	0	0	0	0	0	0	0	0	0	0	183
Column 5	Section 31	612	0	169	345	42	0	0	0	0	0	0	0	0	0	0	56
Column 1	Section 4	640	0	0	14	56	0	0	0	42	0	0	0	0	0	0	528
Column 2	Section 3	640	0	11	0	0	0	0	0	70	0	0	0	0	98	0	461
Column 3	Section 2	640	0	0	204	0	0	0	0	0	0	0	0	0	28	0	408
Column 4	Section 1	626	0	98	373	0	0	0	0	0	0	0	0	0	14	0	140
Column 5	Section 6	640	0	0	401	155	0	0	0	0	0	0	0	0	70	14	0
Column 6	Section 5	640	0	0	401	225	0	0	0	0	0	0	0	0	0	0	14
Column 7	Section 4	640	0	0	429	14	0	0	0	0	0	0	0	0	0	0	197
Column 8	Section 3	640	14	0	0	317	14	225	0	0	0	0	0	0	0	0	70
Column 9	Section 2	640	0	0	126	70	0	373	0	0	0	0	0	0	0	0	70
Column 10	Section 1	640	0	0	140	0	0	415	0	0	0	0	0	0	0	0	84
Column 1	Section 9	640	0	14	14	28	0	0	0	14	0	0	0	0	56	0	514
Column 2	Section 10	640	0	0	0	0	0	0	0	126	0	0	0	0	84	0	429
Column 3	Section 11	612	0	28	155	0	0	0	0	0	0	0	0	0	7	0	422
Column 4	Section 12	640	0	0	169	0	0	0	0	0	0	0	0	0	126	0	345
Column 5	Section 7	640	0	98	98	98	0	0	0	0	0	0	0	0	105	0	240
Column 6	Section 8	640	0	84	98	401	0	0	0	0	0	0	0	0	0	0	56
Column 7	Section 9	640	0	42	295	56	0	0	0	0	0	0	0	0	0	0	247
Column 8	Section 10	640	28	0	289	323	0	0	0	0	0	0	0	0	0	0	0
Column 9	Section 11	640	70	0	70	485	14	0	0	0	0	0	0	0	0	0	0
Column 10	Section 12	640	0	70	126	310	77	42	0	0	0	0	0	0	0	0	14
Column 1	Section 16	640	0	0	169	0	0	0	0	0	0	0	0	0	35	0	436
Column 2	Section 15	359	0	84	0	0	0	0	0	0	0	0	0	0	0	0	275
Column 3	Section 14	148	0	0	0	0	0	0	0	0	0	0	0	0	0	0	148
Column 4	Section 13	219	0	56	0	0	0	0	0	0	0	0	0	0	112	0	50
Column 5	Section 18	640	0	6	140	14	0	0	0	0	0	0	0	0	353	0	126
Column 6	Section 17	640	0	261	42	183	0	0	0	0	0	0	0	0	112	0	42
Column 7	Section 16	640	0	28	42	331	0	0	0	0	0	0	0	0	0	0	239
Column 8	Section 15	640	0	0	225	112	0	0	0	0	0	0	0	0	0	0	303
Column 9	Section 14	640	56	0	70	464	0	0	0	0	0	0	0	0	0	0	49
Column 10	Section 13	640	42	0	28	570	0	0	0	0	0	0	0	0	0	0	0
Column 1	Section 21	640	0	0	0	84	0	0	0	0	0	0	42	0	0	0	514
Column 2	Section 22	640	0	169	0	0	0	0	0	0	0	0	35	0	0	0	436
Column 3	Section 23	289	0	98	0	0	0	0	0	0	0	0	0	0	0	0	191
Column 4	Section 24	289	0	183	0	0	0	0	0	0	0	0	0	0	0	0	106
Column 5	Section 19	640	0	112	0	387	0	0	0	0	0	0	0	0	126	0	14
Column 6	Section 20	640	0	140	0	42	0	0	0	0	0	0	0	0	457	0	0
Column 7	Section 21	640	0	119	0	56	0	0	0	0	0	0	0	0	408	0	56
Column 8	Section 22	640	0	8	98	169	0	0	0	0	0	0	0	0	0	0	365
Column 9	Section 23	640	42	0	0	528	0	0	0	0	0	0	0	0	0	0	70
Column 10	Section 24	640	0	0	0	584	56	0	0	0	0	0	0	0	0	0	0
Column 1	Section 28	640	0	0	293	10	0	0	0	0	28	14	197	0	0	0	98
Column 2	Section 27	640	0	70	14	0	0	0	0	0	0	0	126	226	0	0	204
Column 3	Section 26	640	0	126	14	0	0	0	0	0	0	0	0	63	0	0	436
Column 4	Section 25	612	0	281	42	0	0	0	0	0	0	0	0	0	42	0	247
Column 5	Section 30	640	0	457	56	84	0	0	0	0	0	0	0	0	0	0	42
Column 6	Section 29	640	0	70	0	570	0	0	0	0	0	0	0	0	0	0	0
Column 7	Section 28	640	0	98	0	401	0	0	0	0	0	0	0	0	70	0	70
Column 8	Section 27	640	0	70	0	126	0	0	0	0	0	0	0	0	0	0	443
Column 9	Section 26	640	0	56	0	464	0	0	0	0	0	0	0	0	119	0	0
Column 10	Section 25	640	0	0	0	598	42	0	0	0	0	0	0	0	0	0	0
Column 1	Section 33	640	0	0	0	289	28	0	70	0	70	0	112	0	0	42	28
Column 2	Section 34	640	0	0	345	0	0	0	0	0	0	0	183	28	0	0	84
Column 3	Section 35	640	0	0	70	0	0	0	0	0	0	0	0	98	359	0	112
Column 4	Section 36	640	0	21	366	183	0	0	0	0	0	0	0	0	14	0	56
Column 5	Section 31	640	0	0	28	612	0	0	0	0	0	0	0	0	0	0	0
Column 6	Section 32	640	0	0	0	591	49	0	0	0	0	0	0	0	0	0	0
Column 7	Section 33	640	0	0	0	500	140	0	0	0	0	0	0	0	0	0	0
Column 8	Section 34	640	0	42	0	352	49	0	0	0	0	0	0	0	0	0	197
Column 9	Section 35	640	0	42	0	331	0	0	0	0	0	0	0	0	0	0	267
Column 10	Section 36	640	0	0	7	422	0	0	0	0	0	0	0	0	0	0	211
Column 1	Section 4	640	0	0	408	0	42	0	35	0	155	0	0	0	0	0	0
Column 2	Section 3	640	0	0	436	0	0	0	0	0	0	0	49	0	0	0	155
Column 3	Section 2	612	0	0	331	126	0	0	0	0	0	0	0	0	0	0	155
Column 4	Section 1	584	0	0	169	359	0	0	0	0	0	0	0	0	0	0	56
Column 5	Section 6	640	0	0	14	605	21	0	0	0	0	0	0	0	0	0	0
Column 6	Section 5	640	0	0	0	584	56	0	0	0	0	0	0	0	0	0	0
Column 7	Section 4	640	0	0	0	542	98	0	0	0	0	0	0	0	0	0	0
Column 8	Section 3	640	0	7	14	478	112	0	0	0	0	0	0	0	0	0	28

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Table 16. Section Soil Mapping Unit Acreage (Page 2 of 2)

Map Column	Section #	Section Acreage	Soil Maping Unit														
			AoA	BrA	Ca	Cc	CeA	Pc	Ra	RoA	SeA	SfA	Sr	Ss	Yo	Yr	Ys
Column 9	Section 2	640	0	0	21	584	0	0	0	0	28	0	0	0	0	0	7
Column 10	Section 1	640	0	0	0	580	56	0	0	0	4	0	0	0	0	0	0
Column 1	Section 9	640	0	0	0	126	0	0	0	0	443	70	0	0	0	0	0
Column 2	Section 10	640	0	0	464	56	0	0	0	0	0	42	0	0	0	0	77
Column 3	Section 11	640	0	0	439	197	0	0	0	0	0	0	0	0	0	0	4
Column 4	Section 12	640	0	0	225	410	0	0	0	0	0	0	0	0	0	0	6
Column 5	Section 7	640	0	0	63	577	0	0	0	0	0	0	0	0	0	0	0
Column 6	Section 8	640	84	0	0	485	70	0	0	0	0	0	0	0	0	0	0
Column 7	Section 9	640	98	0	4	425	112	0	0	0	0	0	0	0	0	0	0
Column 8	Section 10	640	0	0	0	500	140	0	0	0	0	0	0	0	0	0	0
Column 9	Section 11	640	0	0	0	584	28	0	0	0	0	0	0	0	0	0	28
Column 10	Section 12	640	0	0	0	570	28	0	0	0	42	0	0	0	0	0	0
Column 1	Section16	640	0	0	211	289	0	0	0	0	112	28	0	0	0	0	0
Column 2	Section 15	640	0	0	490	70	0	0	0	0	0	70	0	0	0	0	10
Column 3	Section 14	640	0	0	359	211	0	0	0	0	35	0	0	0	0	0	35
Column 4	Section 13	640	0	0	253	387	0	0	0	0	0	0	0	0	0	0	0
Column 5	Section 18	640	70	0	183	387	0	0	0	0	0	0	0	0	0	0	0
Column 6	Section 17	640	70	0	70	457	42	0	0	0	0	0	0	0	0	0	0
Column 7	Section 16	640	126	0	0	169	345	0	0	0	0	0	0	0	0	0	0
Column 8	Section 15	640	14	0	0	140	485	0	0	0	0	0	0	0	0	0	0
Column 9	Section 14	640	0	0	0	485	155	0	0	0	0	0	0	0	0	0	0
Column 10	Section 13	640	0	0	0	556	84	0	0	0	0	0	0	0	0	0	0
Column 1	Section 21	640	0	0	183	162	0	0	0	0	169	0	0	0	14	112	0
Column 2	Section 22	640	0	0	225	380	0	0	0	0	35	0	0	0	0	0	0
Column 3	Section 23	640	0	0	309	331	0	0	0	0	0	0	0	0	0	0	0
Column 4	Section 24	640	0	0	169	373	0	0	0	0	0	98	0	0	0	0	0
Column 5	Section 19	640	0	0	211	373	0	0	0	0	0	56	0	0	0	0	0
Column 6	Section 20	640	112	0	126	387	0	0	0	0	14	0	0	0	0	0	0
Column 7	Section 21	640	126	0	0	500	14	0	0	0	0	0	0	0	0	0	0
Column 8	Section 22	640	0	0	0	253	247	0	0	0	140	0	0	0	0	0	0
Column 9	Section 23	640	0	0	0	155	464	0	0	0	21	0	0	0	0	0	0
Column 10	Section 24	640	0	0	0	337	303	0	0	0	0	0	0	0	0	0	0
Totals		65,107	955	3,433	11,773	25,842	3,376	1,055	105	253	1,297	379	744	415	2,884	169	12,426

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Crop possibilities for soil mapping units was determined by the Solano County Soil Survey as follows. Crop yields for the four soil mapping units that occur in Section 31 are as follows:

Crop	BrA	Ca	Cc	Ys
Corn	X			X
Alfalfa	X	X	X	X
Sugar beets	X	X	X	X
Wheat	X	X	X	X
Tomatoes	X	X	X	X
Dry beans	X	X		X
Almonds	X			X
Safflower	X	X	X	X
Walnuts	X			X
Vineyard	X			X
Pasture	X	X	X	X
Hay, Grass	X	X	X	X
Hay, Grain	X	X	X	X
Sudan				X

By substituting the DWDP crop acreage (Table 15) for the "Xs" in the previous table, the following table is derived. Column sums are for the purposes of deriving proportions of crop type by soil mapping unit and are not significant for any other purpose.

Crop	BrA	Ca	Cc	Ys
Corn	20,944			20,944
Alfalfa	9,317	9,317	9,317	9,317
Sugar beets	8,614	8,614	8,614	8,614
Wheat	6,811	6,811	6,811	6,811
Tomatoes	6,184	6,184	6,184	6,184
Dry beans	5,824	5,824		5,824
Almonds	882			882
Safflower	587	587	587	587

Walnuts	578			578
Vineyard	23			23
Pasture	10,227	10,227	10,227	10,227
Hay, Grass	1,800	1,800	1,800	1,800
Hay, Grain	1,248	1,248	1,248	1,248
Sudan				45
Total	73,040	50,613	44,788	73,086

The percentage of crop acreage by soil mapping units for Section 31 is determined by dividing each crop acreage for each soil type by the column sum.

Crop	BrA	Ca	Cc	Ys
Corn	29			29
Alfalfa	13	18	21	13
Sugar beets	12	17	19	12
Wheat	9	13	15	9
Tomatoes	8	12	14	8
Dry beans	8	12		8
Almonds	1			1
Safflower	1	1	1	1
Walnuts	1			1
Vineyard	0			0
Pasture	14	20	23	14
Hay, Grass	2	4	4	2
Hay, Grain	2	2	3	2
Sudan				0

This table states the percentage of each crop for each soil mapping unit in Section 31.

Finally, crop acreage by soil mapping unit for Section 31 is determined by multiplying section soil mapping unit acreage (BrA 169 acres, Ca 345 acres, Cc 42 acres, Ys 56 acres) by the percentage of crop acreage by soil mapping units.

Crop	BrA	Ca	Cc	Ys
Corn	48.3			7.2
Alfalfa	21.5	63.5	8.8	6.6
Sugar beets	19.9	58.7	8.1	5.2
Wheat	15.7	46.4	6.4	4.8
Tomatoes	14.3	42.2	5.8	4.5
Dry beans	13.4	39.7		.7
Almonds	2.0			.5
Safflower	1.4	4.0	.6	.4
Walnuts	1.3			
Vineyard	.1			
Pasture	23.6	69.7	9.6	7.9
Hay, Grass	4.2	12.3	1.7	1.4
Hay, Grain	2.9	8.5	1.2	1.0
Sudan				0.0
Total	168.6	345.0	42.1	56.2

Section crop acreage is reported in Appendix III and summarized in Table 17.

Crop Prices

Average crop prices were used to determine payment capacity (Table 18). Averages were estimated using 1986 through 1996 prices as reported by the Solano County Commissioner.

Crop Production Costs

Crop production costs are basically from UC Cooperative Extension Service's agricultural cost of production surveys conducted for Solano and surrounding counties and adjusted by local growers for local area conditions (Table 19).

Section Payment Capacity

Section or Project Benefit Area payment capacity is equal to Section crop acreage times yield times price minus all production costs (Figure 10). Payment capacity is an annual value. The

total annual payment capacity for the 64,356-acre DWDP area is $741,105, which averages $11.52 per acre (Table 10). However, Section payment capacity varies substantially. Annual Section payment capacity ranges from $33,963 annually for Section 34, T8N R1E, to negative $6,225 for Section 9, T6N R1E. Fifty eight Sections have a positive payment capacity and 57 have a negative payment capacity. Annual average Section payment capacity is $6,444 per year. Generally, Sections located in the northwest portion of the Project area had higher payment capacity and Sections located in the southeast portion has lower payment capacity.

Section payment capacity cannot be compared because some Sections have non-agricultural land use activities for which payment capacity was not estimated. Therefore, payment capacity expressed on a per acre basis is needed to compare payment capacity among Sections (Figure 11). Table 20 presents payment capacity estimates and rank by Section and on a per acre basis. Sections 13, 14, 15, 23 and 24 (T7N R1E) have significant urban development and I-80 is located in several other Sections. Section 14 ranks first in per acre payment capacity but 40 in Section payment capacity due to the location of the City of Dixon. Average annual payment capacity for the Project area is $12.59 per acre.

Table 17. Total Section Crop Acreage by Soil Mapping Units

	Corn, field	Alfalfa	Sugar Beets	Grain wheat	Tomatoes	Dry Beans	Almonds	Safflower	Walnuts	Vineyard	Nursery	Pasture	Pasture, Dry	Hay, Grass	Hay, Grain	Sudan	Total
AoA	0	0	0	0	0	0	0	0	0	0	0	0	936	0	0	0	936
BrA	886	394	364	288	262	246	37	25	24	1	0	433	0	76	53	0	3,089
Ca	0	2,268	2,097	1,658	1,505	1,418	0	143	0	0	0	2,489	0	438	304	0	12,318
Cc	0	5,433	5,023	3,972	3,606	0	0	342	0	0	0	5,964	0	1,050	728	0	26,119
CeA	0	711	657	520	472	0	0	45	0	0	0	780	0	137	95	0	3,417
Pc	0	0	0	0	0	0	0	0	0	0	0	0	950	0	0	0	950
Ra	27	12	11	9	8	8	1	1	1	0	0	13	0	2	2	0	95
RoA	0	41	38	30	27	25	4	3	3	0	0	45	0	8	5	0	228
SeA	0	0	0	0	0	0	0	0	0	0	0	0	1,572	0	0	0	1,572
SfA	0	0	0	195	0	0	0	17	0	0	0	0	206	52	36	0	506
Sr	196	87	81	64	58	55	0	5	0	0	0	96	0	17	12	0	670
Ss	107	48	44	35	32	30	5	3	3	0	0	52	0	9	6	0	374
Yo	770	342	317	250	227	214	32	22	21	1	0	376	0	66	46	0	2,685
Yr	62	27	25	20	18	17	3	2	2	0	0	30	0	5	4	0	215
Ys	3,205	1,426	1,318	1,042	946	891	135	90	89	4	0	1,565	0	275	191	7	11,183
Total	5,253	10,789	9,975	8,083	7,161	2,904	217	697	142	6	0	11,843	3,664	2,136	1,481	7	64,356

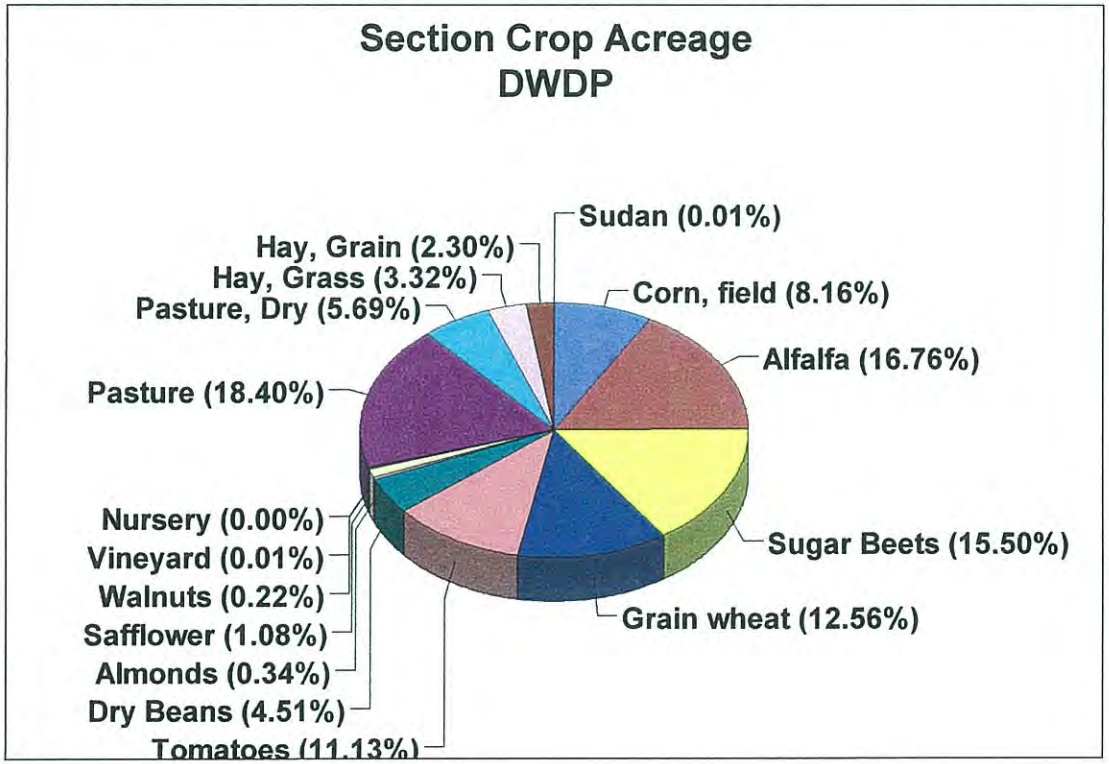

Table 18. Solano County Agricutlural Commissioners Crop Prices

	Crop										Forages			
Year	Corn, field	Alfalfa	Sugar Beets	Grain wheat	Tomatoes	Dry Beans	Almonds	Safflower	Walnuts	Vineyard	Pasture	Pasture, Dry	Hay, Grass	Hay, Grain
1986	$70.00	$75.00	$33.75	$80.00	$47.80	$425.01	$4,014.99	$219.99	$1,159.98	$248.84	$9.00	$10.00	$35.00	$45.00
1987	$82.00	$73.02	$35.25	$90.00	$46.40	$375.00	$2,125.03	$200.00	$1,040.01	$341.23	$7.00	$10.00	$35.00	$55.00
1988	$110.00	$86.00	$36.00	$110.00	$47.50	$500.00	$2,031.25	$245.01	$960.01	$517.19	$7.00	$10.00	$35.00	$60.00
1989	$110.00	$95.00	$40.71	$125.00	$55.00	$606.94	$2,027.40	$305.00	$1,122.01	$625.98	$7.50	$15.00	$50.01	$60.00
1990	$101.08	$98.52	$48.04	$178.53	$52.40	$514.00	$1,542.06	$295.47	$1,078.00	$552.57	$7.50	$15.00	$40.00	$83.79
1991	$107.00	$110.00	$38.06	$119.00	$54.00	$519.99	$2,333.47	$250.03	$1,259.99	$584.39	$7.50	$15.00	$47.99	$72.00
1992	$95.00	$85.00	$38.15	$111.00	$45.57	$511.01	$2,037.48	$300.00	$1,300.00	$633.28	$8.40	$15.00	$44.86	$60.01
1993	$106.00	$90.00	$36.00	$107.00	$46.32	$577.01	$3,382.97	$320.00	$1,317.99	$590.84	$9.00	$15.00	$50.00	$57.00
1994	$99.00	$99.00	$34.00	$112.00	$49.43	$551.00	$2,362.55	$302.00	$1,162.00	$626.24	$9.00	$15.00	$44.86	$59.01
1995	$120.00	$99.00	$35.35	$135.00	$52.08	$561.00	$3,433.04	$300.00	$1,406.99	$746.40	$9.00	$15.00	$75.00	$237.42
1996	$123.00	$96.00	$34.35	$147.00	$51.46	$658.98	$3,565.29	$351.00	$1,527.01	$1,205.80	$9.00	$15.00	$50.00	$69.00
Average	**$102.10**	**$91.50**	**$37.24**	**$119.50**	**$49.81**	**$527.27**	**$2,623.23**	**$280.77**	**$1,212.18**	**$606.61**	**$8.17**	**$13.64**	**$46.16**	**$78.02**

Table 19. Dixon WDP Area Cost of Crop Production.

	Crop															
	Corn	Alfalfa	Sugar Beets	Wheat	Tomatoes	Beans Pink	Almonds*	Safflower	Walnuts	Vineyard**	Nursery	Pasture	Dry Pasture	Hay Grass	Hay, Grain	Sudan
Year====>	1998	1998	1994	1995	1997		1997	1996	1998	1997						
Operating Costs																
Cultural Costs																
Water	$55.50	$77.00	$55.50	$9.00	$88.00	$45.00	$176.00	$14.00	$176.00	$169.00		$100.00		$12.00	$12.00	$12.00
Other	$266.88	$271.00	$715.64	$90.00	$849.00	$200.00	$519.00	$97.00	$593.00	$513.00				$110.00	$110.00	$110.00
Total Cultural Costs	$322.38	$348.00	$771.14	$99.00	$937.00	$245.00	$695.00	$111.00	$769.00	$682.00		$100.00	$0.00	$122.00	$122.00	$122.00
Harvest Cost																
Yield (Martinez 2/18)	116.0	8.0	28.0	2.8	32.0	18.0										
Yield							2,000.0	22.5	4,000.0	10.0		16.0	3.0	3.0	3.0	4.0
Units	cwt.	ton	ton	ton	ton	cwt.	lb.	cwt.	lb.	ton		AUM	AUM	ton	ton	ton
Total Harvest Costs	$24.83	$217.00	$88.20	$18.00	$215.00	$75.00	$322.00	$17.00	$511.00	$325.00				$90.00	$90.00	$80.00
Total Harvest Costs/unit	$0.21	$27.13	$3.15	$6.43	$6.72	$4.17	$0.16	$0.76	$0.13	$32.50		$0.00	$0.00	$30.00	$30.00	$20.00
Assessment Costs					$12.00											
Postharvest Costs	$9.35		$26.34	$4.00				$18.00	$32.00							
Interest on Operating Capital																
Interest Rate	9.00%	10.46%	7.89%	11.61%	10.00%	10.46%	10.00%	11.61%	10.46%	10.00%				10.00%	10.00%	10.00%
Interest Cost	$14.34	$24.62	$31.49	$7.00	$48.00	$10.00	$33.00	$9.00	$36.00	$34.00				$10.00	$10.00	$10.00
Total Operating Costs	$370.90	$589.62	$917.17	$128.00	$1,212.00	$330.00	$1,050.00	$155.00	$1,348.00	$1,041.00		$100.00	$0.00	$222.00	$222.00	$212.00
Cash Overhead Costs																
Land (Martinez 2/18)	$102.00	$150.00	$220.00	$90.00	$241.50	$87.00										
							$347.00	$84.38	$350.00	$387.00		$40.00	$20.00	$50.00	$50.00	$50.00
Management	$10.44	$16.00	$22.40	$16.00	$32.00	$9.72	$75.00	$16.00	$75.00	$65.00		$3.20	$0.60	$6.00	$6.00	$6.00
Office	$30.00	$30.00	$30.00	$30.00	$30.00	$10.00	$40.00	$30.00	$109.00	$39.00						
Property Taxes	$2.31	$2.00	$4.08	$3.00	$8.00	$2.00	$64.00	$4.00	$99.00	$89.00		$3.00	$2.00	$3.00	$3.00	$3.00
Insurance	$1.46	$2.00	$3.21	$2.00	$36.00	$3.00	$48.00	$3.00	$79.00	$69.00		$1.00	$1.00	$1.00	$1.00	$1.00
Invest. Repairs	$0.89	$1.00	$1.30	$1.00	$4.00	$2.00	$11.00	$2.00	$39.00	$25.00						
Other	$0.52		$0.52	$1.00	$1.00		$10.00		$4.00							
Total Cash Overhead Costs	$147.62	$201.00	$281.51	$143.00	$352.50	$113.72	$595.00	$139.38	$755.00	$674.00		$47.20	$23.60	$60.00	$60.00	$60.00
Non-Cash Overhead																
Buildings	$1.70	$3.00	$1.70	$2.00	$3.00	$5.00	$41.00	$2.00	$72.00	$13.00		$5.00	$5.00	$5.00	$5.00	$5.00
Tools	$0.27	$1.00	$0.27		$1.00	$1.00	$13.00	$1.00	$24.00	$5.00		$1.00	$1.00	$1.00	$1.00	$1.00
Tanks & Pumps	$0.42	$1.00	$0.48	$1.00	$12.00	$1.00	$7.00	$1.00		$5.00		$1.00	$1.00	$1.00	$1.00	$1.00
Equipment	$41.87	$12.00	$76.92	$28.00	$176.00	$36.00	$74.00	$56.00	$179.00	$175.00		$5.00	$5.00	$5.00	$5.00	$5.00
Establishment		$97.00					$301.00		$521.00	$621.00		$10.00	$5.00			
Other				$3.00	$11.00			$1.00	$60.00							
Total Non-Cash Overhead Costs	$44.26	$114.00	$79.37	$32.00	$203.00	$43.00	$436.00	$61.00	$856.00	$819.00		$22.00	$17.00	$12.00	$12.00	$12.00
Total Cost Per Acre	$562.78	$904.62	$1,278.05	$303.00	$1,767.50	$486.72	$2,081.00	$355.38	$2,959.00	$2,534.00		$169.20	$40.60	$294.00	$294.00	$284.00
Total Cost Per Unit of Yield	$4.85	$113.08	$45.64	$108.21	$55.23	$27.04	$1.04	$15.78	$0.74	$253.40		$10.58	$13.53	$98.00	$98.00	$71.00
Total Cost Per Acre(Martinez 2/'	$510.00	$750.00	$1,100.00	$300.00	$1,610.00	$435.00										
Total Cost Per Unit of Yield	$4.40	$93.75	$39.29	$107.14	$50.31	$24.17										
Gross Returns																
Year	1998	1998	1994	1995	1997	0	1997	1996	1998	1997		0	0	0	0	0
Price (Martinez 2/18)	$4.50	$100.00	$40.00	$100.00	$53.00	$27.00										
Price							$1.30	$18.75	$0.65	$325.00		$10.00	$10.00	$100.00	$100.00	$75.00
Yield	116.0	8.0	28.0	2.8	32.0	18.0	2,000.0	22.5	4,000.0	10.0		16.0	3.0	3.0	3.0	4.0
Total Gross Returns	$522.00	$800.00	$1,120.00	$280.00	$1,696.00	$486.00	$2,600.00	$421.88	$2,600.00	$3,250.00		$160.00	$30.00	$300.00	$300.00	$300.00
Net Returns	$12.00	$50.00	$20.00	($20.00)	$86.00	$51.00	$519.00	$66.50	($359.00)	$716.00		($9.20)	($10.60)	$6.00	$6.00	$16.00

*UCCE, Southern San Joaquin Valley
**UCCE, San Joaquin Valley

Figure 10. Dixon RCD Total Section Payment Capacity

	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	Column 10
	R1E			R1E	R2E					R2E
T8N	Section 33 $32,282	Section 34 $33,693	Section 35 $21,828	Section 36 $12,085	Section 31 $8,418					
T8N										
T7N	Section 4 $28,802	Section 3 $29,244	Section 2 $23,220	Section 1 $11,277	Section 6 $1,405	Section 5 ($538)	Section 4 $10,382	Section 3 ($124)	Section 2 ($517)	Section 1 $101
T7N	Section 9 $30,528	Section 10 $26,785	Section 11 $24,265	Section 12 $23,203	Section 7 $19,696	Section 8 $4,154	Section 9 $14,505	Section 10 ($1,944)	Section 11 ($2,982)	Section 12 $948
T7N	Section 16 $25,035	Section 15 $17,884	Section 14 $8,144	Section 13 $8,591	Section 18 $19,257	Section 17 $14,364	Section 16 $12,596	Section 15 $15,952	Section 14 $19	Section 13 ($2,956)
T7N	Section 21 $28,300	Section 22 $30,564	Section 23 $18,841	Section 24 $12,114	Section 19 $7,348	Section 20 $20,567	Section 21 $21,154	Section 22 $19,493	Section 23 $1,106	Section 24 ($2,792)
T7N	Section 28 $9,175	Section 27 $27,423	Section 26 $31,346	Section 25 $24,640	Section 30 $17,638	Section 29 ($69)	Section 28 $7,933	Section 27 $26,202	Section 26 $4,062	Section 25 ($2,792)
T7N	Section 33 $3,716	Section 34 $9,929	Section 35 $23,362	Section 36 $3,202	Section 31 ($2,692)	Section 32 ($2,792)	Section 33 ($2,792)	Section 34 $10,495	Section 35 $14,656	Section 36 $9,718
T7N										
T6N	Section 4 ($1,253)	Section 3 $9,263	Section 2 $7,659	Section 1 $1,380	Section 6 ($2,742)	Section 5 ($2,792)	Section 4 ($2,792)	Section 3 ($805)	Section 2 ($2,477)	Section 1 ($2,818)
T6N	Section 9 ($6,225)	Section 10 $3,037	Section 11 ($986)	Section 12 ($1,662)	Section 7 ($2,568)	Section 8 ($3,319)	Section 9 ($3,392)	Section 10 ($2,792)	Section 11 ($1,127)	Section 12 ($3,055)
T6N	Section16 ($3,012)	Section 15 ($1,132)	Section 14 $342	Section 13 ($1,896)	Section 18 ($2,584)	Section 17 ($2,982)	Section 16 ($3,583)	Section 15 ($2,880)	Section 14 ($2,792)	Section 13 ($2,792)
T6N	Section 21 ($2,455)	Section 22 ($2,215)	Section 23 ($1,697)	Section 24 ($3,116)	Section 19 ($2,572)	Section 20 ($3,135)	Section 21 ($3,583)	Section 22 ($3,671)	Section 23 ($2,924)	Section 24 ($2,792)
T6N	Section 28 ($901)	Section 27 ($488)	Section 26 ($1,649)	Section 25 ($1,879)	Section 30 ($2,145)	Section 29 ($2,547)	Section 28 ($3,269)	Section 27 ($3,495)	Section 26 ($2,880)	Section 25 ($2,967)
T6N										

Style	Benefits per Section
-6	<-$5,000
-5	<-$4,000-$5,000
-4	<-$3,000-$4,000
-3	<-$2,000-$3,000
-2	<-$1,000-$2,000
-1	<$0-$1,000
0	$0
1	>$0+$10,000
2	>$10,000+$20,000
3	>$20,000+$30,000
4	>$30,000+$40,000
5	>$40,000+$50,000
6	>$50,000

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Figure 11. Dixon RCD Payment Capacity Per Acre

	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	Column 10
	R1E			R1E	R2E					R2E
T8N	Section 33 $56	Section 34 $58	Section 35 $38	Section 36 $21	Section 31 $15					
T8N										
T7N	Section 4 $50	Section 3 $51	Section 2 $40	Section 1 $20	Section 6 $2	Section 5 ($1)	Section 4 $18	Section 3 ($0)	Section 2 ($1)	Section 1 $0
	Section 9 $53	Section 10 $47	Section 11 $44	Section 12 $40	Section 7 $34	Section 8 $7	Section 9 $25	Section 10 ($3)	Section 11 ($5)	Section 12 $2
	Section 16 $43	Section 15 $56	Section 14 $61	Section 13 $44	Section 18 $33	Section 17 $25	Section 16 $22	Section 15 $28	Section 14 $0	Section 13 ($5)
	Section 21 $50	Section 22 $53	Section 23 $53	Section 24 $47	Section 19 $13	Section 20 $36	Section 21 $37	Section 22 $34	Section 23 $2	Section 24 ($5)
	Section 28 $16	Section 27 $43	Section 26 $54	Section 25 $45	Section 30 $31	Section 29 ($0)	Section 28 $14	Section 27 $45	Section 26 $7	Section 25 ($5)
	Section 33 $6	Section 34 $17	Section 35 $41	Section 36 $6	Section 31 ($5)	Section 32 ($5)	Section 33 ($5)	Section 34 $18	Section 35 $25	Section 36 $17
T7N										
T6N	Section 4 ($2)	Section 3 $16	Section 2 $14	Section 1 $3	Section 6 ($5)	Section 5 ($5)	Section 4 ($5)	Section 3 ($1)	Section 2 ($4)	Section 1 ($5)
	Section 9 ($11)	Section 10 $5	Section 11 ($2)	Section 12 ($3)	Section 7 ($4)	Section 8 ($6)	Section 9 ($6)	Section 10 ($5)	Section 11 ($2)	Section 12 ($5)
	Section16 ($5)	Section 15 ($2)	Section 14 $1	Section 13 ($3)	Section 18 ($4)	Section 17 ($5)	Section 16 ($6)	Section 15 ($5)	Section 14 ($5)	Section 13 ($5)
	Section 21 ($4)	Section 22 ($4)	Section 23 ($3)	Section 24 ($5)	Section 19 ($4)	Section 20 ($5)	Section 21 ($6)	Section 22 ($6)	Section 23 ($5)	Section 24 ($5)
	Section 28 ($2)	Section 27 ($1)	Section 26 ($3)	Section 25 ($3)	Section 30 ($4)	Section 29 ($4)	Section 28 ($6)	Section 27 ($6)	Section 26 ($5)	Section 25 ($5)
T6N										

Style	Benefits per Section
-6	<-$10
-5	<-$8-$10
-4	<-$6-$8
-3	<-$4-$6
-2	<-$2-$4
-1	<$0-$2
0	$0
1	>$0+$10
2	>$10+$20
3	>$20+$30
4	>$30+$40
5	>$40+$50
6	>$50

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Table 20. Dixon WDP Area Agricultural Drainage Payment Capacity (Page 1 of 2)

					Agricultural			Rank	
ID #	Column	TWP	RNG	Section	Pay Cap	Acreage	Pay Cap/ac	Pay Cap	Pay Cap/ac
13	2	T8N	R1E	34	$33,693	576	$58.49	1	2
1	1	T8N	R1E	33	$32,282	576	$56.04	2	3
30	3	T7N	R1E	26	$31,346	576	$54.42	3	5
17	2	T7N	R1E	22	$30,564	576	$53.06	4	7
3	1	T7N	R1E	9	$30,528	576	$53.00	5	8
14	2	T7N	R1E	3	$29,244	576	$50.77	6	9
2	1	T7N	R1E	4	$28,802	576	$50.00	7	10
5	1	T7N	R1E	21	$28,800	576	$50.00	8	11
18	2	T7N	R1E	27	$27,423	576	$47.61	9	12
15	2	T7N	R1E	10	$26,785	576	$46.50	10	14
87	8	T7N	R2E	27	$26,202	576	$45.49	11	15
4	1	T7N	R1E	16	$25,035	576	$43.46	12	19
42	4	T7N	R1E	25	$24,640	551	$44.74	13	16
27	3	T7N	R1E	11	$24,265	551	$44.06	14	17
31	3	T7N	R1E	35	$23,362	576	$40.56	15	20
26	3	T7N	R1E	2	$23,220	576	$40.31	16	21
39	4	T7N	R1E	12	$23,201	576	$40.28	17	22
25	3	T8N	R1E	35	$21,828	576	$37.90	18	23
75	7	T7N	R2E	21	$21,154	576	$36.73	19	24
64	6	T7N	R2E	20	$20,567	576	$35.71	20	25
51	5	T7N	R2E	7	$19,696	576	$34.19	21	26
86	8	T7N	R2E	22	$19,493	576	$33.84	22	27
52	5	T7N	R2E	18	$19,257	576	$33.43	23	28
16	2	T7N	R1E	15	$17,984	323	$55.65	24	4
54	5	T7N	R2E	30	$17,638	576	$30.62	25	29
85	8	T7N	R2E	15	$15,952	576	$27.69	26	30
99	9	T7N	R2E	35	$14,656	576	$25.45	27	31
73	7	T7N	R2E	9	$14,505	576	$25.18	28	32
63	6	T7N	R2E	17	$14,364	576	$24.94	29	33
29	3	T7N	R1E	23	$13,841	260	$53.24	30	6
74	7	T7N	R2E	16	$12,596	576	$21.87	31	34
41	4	T7N	R1E	24	$12,114	260	$46.60	32	13
37	4	T8N	R1E	36	$12,085	563	$21.45	33	35
38	4	T7N	R1E	1	$11,277	563	$20.02	34	36
88	8	T7N	R2E	34	$10,495	576	$18.22	35	37
72	7	T7N	R2E	4	$10,382	576	$18.02	36	38
19	2	T7N	R1E	34	$9,929	576	$17.24	37	39
110	10	T7N	R2E	36	$9,718	576	$16.87	38	40
20	2	T6N	R1E	3	$9,263	576	$16.08	39	41
6	1	T7N	R1E	28	$9,175	576	$15.93	40	42
40	4	T7N	R1E	13	$8,591	197	$43.67	41	18
49	5	T8N	R2E	31	$8,418	551	$15.29	42	43
28	3	T7N	R1E	14	$8,144	134	$60.99	43	1
76	7	T7N	R2E	28	$7,933	576	$13.77	44	45
32	3	T6N	R1E	2	$7,659	551	$13.91	45	44
53	5	T7N	R2E	19	$7,348	576	$12.76	46	46
62	6	T7N	R2E	8	$4,154	576	$7.21	47	47
98	9	T7N	R2E	26	$4,062	576	$7.05	48	48
7	1	T7N	R1E	33	$3,716	576	$6.45	49	49
43	4	T7N	R1E	36	$3,202	576	$5.56	50	50
21	2	T6N	R1E	10	$3,037	576	$5.27	51	51
50	5	T7N	R2E	6	$1,405	576	$2.44	52	53
44	4	T6N	R1E	1	$1,380	525	$2.63	53	52
97	9	T7N	R2E	23	$1,106	576	$1.92	54	54
106	10	T7N	R2E	12	$948	576	$1.65	55	55
34	3	T6N	R1E	14	$342	576	$0.59	56	56
105	10	T7N	R2E	1	$101	576	$0.18	57	57
96	9	T7N	R2E	14	$19	576	$0.03	58	58
65	6	T7N	R2E	29	($69)	576	($0.12)	59	59
83	8	T7N	R2E	3	($124)	576	($0.22)	60	60
24	2	T6N	R1E	27	($488)	576	($0.85)	61	61

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Table 20. Dixon WDP Area Agricultural Drainage Payment Capacity (Page 2 of 2)

					Agricultural			Rank	
ID #	Column	TWP	RNG	Section	Pay Cap	Acreage	Pay Cap/ac	Pay Cap	Pay Cap/ac
94	9	T7N	R2E	2	($517)	576	($0.90)	62	62
61	6	T7N	R2E	5	($538)	576	($0.93)	63	63
89	8	T6N	R2E	3	($805)	576	($1.40)	64	64
12	1	T6N	R1E	28	($901)	576	($1.56)	65	65
33	3	T6N	R1E	11	($986)	576	($1.71)	66	66
101	9	T6N	R2E	11	($1,127)	576	($1.96)	67	67
22	2	T6N	R1E	15	($1,132)	576	($1.97)	68	68
8	1	T6N	R1E	4	($1,253)	576	($2.18)	69	69
36	3	T6N	R1E	26	($1,649)	576	($2.86)	70	70
45	4	T6N	R1E	12	($1,662)	576	($2.89)	71	71
35	3	T6N	R1E	23	($1,697)	576	($2.95)	72	72
48	4	T6N	R1E	25	($1,879)	576	($3.26)	73	73
46	4	T6N	R1E	13	($1,896)	576	($3.29)	74	74
84	8	T7N	R2E	10	($1,944)	576	($3.37)	75	75
60	5	T6N	R2E	30	($2,145)	576	($3.72)	76	76
23	2	T6N	R1E	22	($2,215)	576	($3.85)	77	77
11	1	T6N	R1E	21	($2,455)	576	($4.26)	78	78
100	9	T6N	R2E	2	($2,477)	576	($4.30)	79	79
71	6	T6N	R2E	29	($2,543)	576	($4.41)	80	80
57	5	T6N	R2E	7	($2,568)	576	($4.46)	81	81
59	5	T6N	R2E	19	($2,572)	576	($4.47)	82	82
58	5	T6N	R2E	18	($2,584)	576	($4.49)	83	83
55	5	T7N	R2E	31	($2,692)	576	($4.67)	84	84
56	5	T6N	R2E	6	($2,742)	576	($4.76)	85	85
90	8	T6N	R2E	10	($2,792)	576	($4.85)	86	86
77	7	T7N	R2E	33	($2,792)	576	($4.85)	87	87
114	10	T6N	R2E	24	($2,792)	576	($4.85)	88	88
102	9	T6N	R2E	14	($2,792)	576	($4.85)	89	89
113	10	T6N	R2E	13	($2,792)	576	($4.85)	90	93
108	10	T7N	R2E	24	($2,792)	576	($4.85)	91	91
109	10	T7N	R2E	25	($2,792)	576	($4.85)	92	92
67	6	T6N	R2E	5	($2,792)	576	($4.85)	93	90
78	7	T6N	R2E	4	($2,792)	576	($4.85)	94	94
66	6	T7N	R2E	32	($2,792)	576	($4.85)	95	95
111	10	T6N	R2E	1	($2,818)	576	($4.89)	96	96
104	9	T6N	R2E	26	($2,880)	576	($5.00)	97	97
91	8	T6N	R2E	15	($2,880)	576	($5.00)	98	98
103	9	T6N	R2E	23	($2,924)	576	($5.08)	99	99
107	10	T7N	R2E	13	($2,956)	576	($5.13)	100	100
115	10	T6N	R2E	25	($2,967)	576	($5.15)	101	101
69	6	T6N	R2E	17	($2,982)	576	($5.18)	102	102
95	9	T7N	R2E	11	($2,982)	576	($5.18)	103	103
10	1	T6N	R1E	16	($3,012)	576	($5.23)	104	104
112	10	T6N	R2E	12	($3,055)	576	($5.30)	105	105
47	4	T6N	R1E	24	($3,116)	576	($5.41)	106	106
70	6	T6N	R2E	20	($3,135)	576	($5.44)	107	107
82	7	T6N	R2E	28	($3,269)	576	($5.68)	108	108
68	6	T6N	R2E	8	($3,319)	576	($5.76)	109	109
79	7	T6N	R2E	9	($3,392)	576	($5.89)	110	110
93	8	T6N	R2E	27	($3,495)	576	($6.07)	111	111
80	7	T6N	R2E	16	($3,583)	576	($6.22)	112	112
81	7	T6N	R2E	21	($3,583)	576	($6.22)	113	113
92	8	T6N	R2E	22	($3,671)	576	($6.37)	114	114
9	1	T6N	R1E	9	($6,225)	576	($10.81)	115	115
Average					$6,444	560	$11.52		
Total					*********	64,356			

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APPENDIX I. SECTION SOIL MAPPING UNIT ACREAGE

Appendix I. Section Soil Mapping Unit Acreage (Page 1 of 6)

		Column 1	Total Section Ac	Total Percent	Column 2	Total Section Ac	Total Percent	Column 3	Total Section Ac	Total Percent	Column 4	Total Section Ac	Total Percent	Column 5	Total Section Ac	Total Percent	Column 6	Total Section Ac	Total Percent
		# of squares	Soil Series Ac	il Series Percent	# of squares	Soil Series Ac	il Series Percent	# of squares	Soil Series Ac	il Series Percent	# of squares	Soil Series Ac	il Series Percent	# of squares	Soil Series Ac	il Series Percent	# of squares	Soil Series Ac	il Series Percent
T8N	640	SEC 33	640	100.0%	Section 34	640	100.0%	Section 35	640	100.0%	Section 36	626	100.0%	Section 31	612	100.0%	N/A		
	AoA		0			0			0			0			0				
	BrA		0		5	70	11.0%		0		5	70	11.2%	12	169	27.5%			
	Ca		0			0		17	239	37.3%	25.5625	359	57.4%	24.5625	345	56.4%			
	Cc		0			0			0		1	14	2.2%	3	42	6.9%			
	CeA		0			0			0			0			0				
	Pc		0			0			0			0			0				
	Ra		0			0			0			0			0				
	RoA		0			0			0			0			0		RR		
	SeA		0			0			0			0			0				
	SfA		0			0			0			0			0				
	Sr		0			0			0			0			0				
	Ss		0			0			0			0			0				
	Yo	5	70	11.0%		0			0			0			0				
	Yr		0			0			0			0			0				
T8N	Ys	40.5625	570	89.0%	40.5625	570	89.0%	28.5625	401	62.7%	13	183	29.2%	4	56	9.2%			
T7N	Soil S	Section 4	640	100.0%	Section 3	640	100.0%	Section 2	640	100.0%	Section 1	626	100.0%	Section 6	640	100.0%	Section 5	640	100.0%
	AoA		0			0			0			0			0			0	
	BrA		0		0.75	11	1.6%		0		7	98	15.7%		0			0	
	Ca	1	14	2.2%		0		14.5	204	31.8%	26.5625	373	59.6%	28.5625	401	62.7%	28.5625	401	62.7%
	Cc	4	56	8.8%		0			0			0		11	155	24.1%	16	225	35.1%
	CeA		0			0			0			0			0			0	
	Pc		0			0			0			0			0			0	
	Ra		0			0			0			0			0			0	
	RoA	3	42	6.6%	5	70	11.0%		0			0			0			0	
	SeA		0			0			0			0			0			0	
	SfA		0			0			0			0			0			0	
	Sr		0			0			0			0			0			0	
	Ss		0			0			0			0			0			0	
	Yo		0		7	98	15.4%	2	28	4.4%	1	14	2.2%	5	70	11.0%		0	
	Yr		0			0			0			0			14	2.2%		0	
	Ys	37.5625	528	82.4%	32.8125	461	72.0%	29.0625	408	63.8%	10	140	22.4%		0		1	14	2.2%
T7N	Soil	Section 9	640	100.0%	Section 10	640	100.0%	Section 11	612	100.0%	Section 12	640	100.0%	Section 7	640	100.0%	Section 8	640	100.0%
	AoA		0			0			0			0			0			0	
	BrA	1	14	2.2%		0		2	28	4.6%		0		7	98	15.4%	6	84	13.2%
	Ca	1	14	2.2%		0		11	155	25.3%	12	169	26.3%	7	98	15.4%	7	98	15.4%
	Cc	2	28	4.4%		0			0			0		7	98	15.4%	28.5625	401	62.7%
	CeA		0			0			0			0			0			0	
	Pc		0			0			0		State	0			0			0	
	Ra		0			0			0		Hwy	0			0			0	
	RoA	1	14	2.2%	9	126	19.8%		0		113	0			0			0	
	SeA		0			0			0			0			0			0	
	SfA		0			0		I-80	0			0			0			0	
	Sr		0			0			0			0			0			0	
	Ss		0			0			0			0			0			0	
	Yo	4	56	8.8%	6	84	13.2%	0.5	7	1.1%	9	126	19.8%	7.5	105	16.5%		0	
	Yr		0			0			0			0			0			0	
	Ys	36.5625	514	80.2%	30.5625	429	67.1%	30.0625	422	69.0%	24.5625	345	53.9%	17.0625	240	37.4%	4	56	8.8%
T7N	Soil	Section 16	640	100.0%	Section 15	359	100.0%	Section 14	148	100.0%	Section 13	219	100.0%	Section 18	640	100.0%	Section 17	640	100.0%
	AoA		0			0			0			0			0			0	
	BrA		0		6	84	23.5%	0	0		4	56	25.7%	0.4	6	0.9%	18.5625	261	40.7%
	Ca	12	169	26.3%		0			0			0		10	140	21.9%	3	42	6.6%
	Cc		0			0			0			0		1	14	2.2%	13	183	28.5%
	CeA		0			0			0			0			0			0	
	Pc		0			0			0			0			0			0	
	Ra		0			0			0			0			0			0	
	RoA		0			0		City of	0			0			0			0	
	SeA		0			0		Dixon	0			0			0			0	
	SfA		0			0			0			0			0			0	
	Sr		0			0			0			0			0			0	
	Ss		0			0			0			0			0			0	
	Yo	2.5	35	5.5%		0		0	0		8	112	51.4%	25.1625	353	55.2%	8	112	17.6%
	Yr		0			0			0			0			0			0	
	Ys	31.0625	436	68.2%	19.5625	275	76.5%	10.5625	148	100.0%	3.5625	50	22.9%	9	126	19.8%	3	42	6.6%

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Appendix I. Section Soil Mapping Unit Acreage (Page 2 of 6)

		Column 1	Total Section Ac	Total Percent	Column 2	Total Section Ac	Total Percent	Column 3	Total Section Ac	Total Percent	Column 4	Total Section Ac	Total Percent	Column 5	Total Section Ac	Total Percent	Column 6	Total Section Ac	Total Percent
		# of squares	Soil Series Ac	il Series Percent	# of squares	Soil Series Ac	il Series Percent	# of squares	Soil Series Ac	il Series Percent	# of squares	Soil Series Ac	il Series Percent	# of squares	Soil Series Ac	il Series Percent	# of squares	Soil Series Ac	il Series Percent
T7N	Soil	Section 21	640	100.0%	Section 22	640	100.0%	Section 23	289	100.0%	Section 24	289	100.0%	Section 19	640	100.0%	Section 20	640	100.0%
	AoA		0			0			0			0			0			0	
	BrA		0		12	169	26.3%	7	98	34.0%	13	183	63.2%	8	112	17.6%	10	140	21.9%
	Ca		0			0			0			0			0			0	
	Cc	6	84	13.2%		0			0			0		27.5625	387	60.5%	3	42	6.6%
	CeA		0			0			0			0			0			0	
	Pc		0			0			0			0			0			0	
	Ra		0			0			0			0			0			0	
	RoA		0			0			0			0			0			0	
	SeA		0			0			0			0			0			0	
	SfA		0			0			0			0			0			0	
	Sr	3	42	6.6%	2.5	35	5.5%		0			0			0			0	
	Ss		0			0			0			0			0			0	
	Yo		0			0			0			0		9	126	19.8%	32.5625	457	71.5%
	Yr		0			0			0			0			0			0	
	Ys	36.5625	514	80.2%	31.0625	436	68.2%	13.5625	191	66.0%	7.5625	106	36.8%	1	14	2.2%		0	
T7N	Soil	Section 28	640	100.0%	Section 27	640	100.0%	Section 26	640	100.0%	Section 25	612	100.0%	Section 30	640	100.0%	Section 29	640	100.0%
	AoA		0			0			0			0			0			0	
	BrA		0		5	70	11.0%	9	126	19.8%	20	281	45.9%	32.5625	457	71.5%	5	70	11.0%
	Ca	20.8625	293	45.8%	1	14	2.2%	1	14	2.2%	3	42	6.9%	4	56	8.8%		0	
	Cc	0.7	10	1.5%		0			0			0		6	84	13.2%	40.5625	570	89.0%
	CeA		0			0			0			0			0			0	
	Pc		0			0			0			0			0			0	
	Ra		0			0			0			0			0			0	
	RoA		0			0			0			0			0			0	
	SeA	2	28	4.4%		0			0			0			0			0	
	SfA	1	14	2.2%		0			0			0			0			0	
	Sr	14	197	30.7%	9	126	19.8%		0			0			0			0	
	Ss		0		16.0625	226	35.3%	4.5	63	9.9%		0			0			0	
	Yo		0			0			0		3	42	6.9%		0			0	
	Yr		0			0			0			0			0			0	
	Ys	7	98	15.4%	14.5	204	31.8%	31.0625	436	68.2%	17.5625	247	40.3%	3	42	6.6%		0	
T7N	Soil	Section 33	640	100.0%	Section 34	640	100.0%	Section 35	640	100.0%	Section 36	640	100.0%	Section 31	640	100.0%	Section 32	640	100.0%
	AoA		0			0			0			0			0			0	
	BrA		0			0			0		1.5	21	3.3%		0			0	
	Ca		0		24.5625	345	53.9%	5	70	11.0%	26.0625	366	57.2%	2	28	4.4%		0	
	Cc	20.5625	289	45.1%		0			0		13	183	28.5%	43.5625	612	95.6%	42.0625	591	92.3%
	CeA	2	28	4.4%		0			0			0			0		3.5	49	7.7%
	Pc		0			0			0			0			0			0	
	Ra	5	70	11.0%		0			0			0			0			0	
	RoA		0			0			0			0			0			0	
	SeA	5	70	11.0%		0			0			0			0			0	
	SfA		0			0			0			0			0			0	
	Sr	8	112	17.6%	13	183	28.5%		0			0			0			0	
	Ss		0		2	28	4.4%	7	98	15.4%		0			0			0	
	Yo		0			0		25.5625	359	56.1%	1	14	2.2%		0			0	
	Yr	3	42	6.6%		0			0			0			0			0	
T7N	Ys	2	28	4.4%	6	84	13.2%	8	112	17.6%	4	56	8.8%		0			0	
T6N	Soil	Section 4	640	100.0%	Section 3	640	100.0%	Section 2	612	100.0%	Section 1	584	100.0%	Section 6	640	100.0%	Section 5	640	100.0%
	AoA		0			0			0			0			0			0	
	BrA		0			0			0			0			0			0	
	Ca	29.0625	408	63.8%	31.0625	436	68.2%	23.5625	331	54.1%	12	169	28.9%	1	14	2.2%		0	
	Cc		0			0		9	126	20.7%	25.5625	359	61.5%	43.0625	605	94.5%	41.5625	584	91.2%
	CeA	3	42	6.6%		0			0			0		1.5	21	3.3%	4	56	8.8%
	Pc		0			0			0			0			0			0	
	Ra	2.5	35	5.5%		0			0			0			0			0	
	RoA		0			0			0			0			0			0	
	SeA	11	155	24.1%		0			0			0			0			0	
	SfA		0			0			0			0			0			0	
	Sr		0		3.5	49	7.7%		0			0			0			0	
	Ss		0			0			0			0			0			0	
	Yo		0			0			0			0			0			0	
	Yr		0			0			0			0			0			0	
	Ys	RR	0		11	155	24.1%	11	155	25.3%	4	56	9.6%		0			0	

Appendix I. Section Soil Mapping Unit Acreage (Page 3 of 6)

		Column 1	Total Section Ac	Total Percent	Column 2	Total Section Ac	Total Percent	Column 3	Total Section Ac	Total Percent	Column 4	Total Section Ac	Total Percent	Column 5	Total Section Ac	Total Percent	Column 6	Total Section Ac	Total Percent
		# of squares	Soil Series Ac	il Series Percent	# of squares	Soil Series Ac	il Series Percent	# of squares	Soil Series Ac	il Series Percent	# of squares	Soil Series Ac	il Series Percent	# of squares	Soil Series Ac	il Series Percent	# of squares	Soil Series Ac	il Series Percent
T6N	Soil	Section 9	640	100.0%	Section 10	640	100.0%	Section 11	640	100.0%	Section 12	640	100.0%	Section 7	640	100.0%	Section 8	640	100.0%
	AoA		0			0			0			0			0		6	84	13.2%
	BrA		0			0			0			0			0			0	
	Ca		0		33.0625	464	72.6%	31.2625	439	68.6%	16	225	35.1%	4.5	63	9.9%		0	
	Cc	9	126	19.8%	4	56	8.8%	14	197	30.7%	29.1625	410	64.0%	41.0625	577	90.1%	34.5625	485	75.9%
	CeA		0			0			0			0			0		5	70	11.0%
	Pc		0			0			0			0			0			0	
	Ra		0			0			0			0			0			0	
	RoA		0			0			0			0			0			0	
	SeA	31.5625	443	69.3%		0			0			0			0			0	
	SfA	5	70	11.0%	3	42	6.6%		0			0			0			0	
	Sr		0			0			0			0			0			0	
	Ss		0			0			0			0			0			0	US
	Yo		0			0			0			0			0			0	
	Yr		0			0			0			0			0			0	
	Ys		0		5.5	77	12.1%	0.3	4	0.7%	0.4	6	0.9%		0			0	
T6N	Soil	Section16	640	100.0%	Section 15	640	100.0%	Section 14	640	100.0%	Section 13	640	100.0%	Section 18	640	100.0%	Section 17	640	100.0%
	AoA		0			0			0			0		5	70	11.0%	5	70	11.0%
	BrA		0			0			0			0			0			0	
	Ca	15	211	32.9%	34.8625	490	76.5%	25.5625	359	56.1%	18	253	39.5%	13	183	28.5%	5	70	11.0%
	Cc	20.5625	289	45.1%	5	70	11.0%	15	211	32.9%	27.5625	387	60.5%	27.5625	387	60.5%	32.5625	457	71.5%
	CeA		0			0			0			0			0		3	42	6.6%
	Pc		0			0			0			0			0			0	
	Ra		0			0			0			0			0			0	
	RoA		0			0			0			0			0			0	
	SeA	8	112	17.6%		0		2.5	35	5.5%		0			0			0	
	SfA	2	28	4.4%	5	70	11.0%		0			0			0			0	
	Sr		0			0			0			0			0			0	
	Ss		0			0			0			0			0			0	
	Yo		0			0			0			0			0			0	
	Yr		0			0			0			0			0			0	
	Ys		0		0.7	10	1.5%	2.5	35	5.5%		0			0			0	
T6N	Soil	Section 21	640	100.0%	Section 22	640	100.0%	Section 23	640	100.0%	Section 24	640	100.0%	Section 19	640	100.0%	Section 20	640	100.0%
	AoA		0			0			0			0			0		8	112	17.6%
	BrA		0			0			0			0			0			0	
	Ca	13	183	28.5%	16	225	35.1%	22	309	48.3%	12	169	26.3%	15	211	32.9%	9	126	19.8%
	Cc	11.5625	162	25.4%	27.0625	380	59.4%	23.5625	331	51.7%	26.5625	373	58.3%	26.5625	373	58.3%	27.5625	387	60.5%
	CeA		0			0			0			0			0			0	
	Pc		0			0			0			0			0			0	
	Ra		0			0			0			0			0			0	
	RoA		0			0			0			0			0			0	
	SeA	12	169	26.3%	2.5	35	5.5%		0			0			0		1	14	2.2%
	SfA		0			0			0		7	98	15.4%	4	56	8.8%		0	
	Sr		0			0			0			0			0			0	
	Ss		0			0			0			0			0			0	
	Yo	1	14	2.2%		0			0			0			0			0	
	Yr	8	112	17.6%		0			0			0			0			0	
	Ys		0			0			0			0			0			0	
T6N	Soil	Section 28	640	100.0%	Section 27	640	100.0%	Section 26	640	100.0%	Section 25	640	100.0%	Section 30	640	100.0%	Section 29	640	100.0%
	AoA		0			0			0			0			0			0	
	BrA		0			0			0			0			0			0	
	Ca	27.5625	387	60.5%	24.5625	345	53.9%	33.5625	471	73.7%	31.5625	443	69.3%	13	183	28.5%	5	70	11.0%
	Cc	4	56	8.8%		0		6	84	13.2%	9	126	19.8%	32.5625	457	71.5%	40.5625	570	89.0%
	CeA		0			0			0			0			0			0	
	Pc		0			0			0			0			0			0	
	Ra		0			0			0			0			0			0	
	RoA		0			0			0			0			0			0	
	SeA	5	70	11.0%	10	140	21.9%	6	84	13.2%		0			0			0	
	SfA	2	28	4.4%	6	84	13.2%		0		5	70	11.0%		0			0	
	Sr		0			0			0			0			0			0	
	Ss		0			0			0			0			0			0	
	Yo	2	28	4.4%	5	70	11.0%		0			0			0			0	
	Yr	5	70	11.0%		0			0			0			0			0	
	Ys		0			0			0			0			0			0	

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Appendix I. Section Soil Mapping Unit Acreage (Page 4 of 6)

		Column 7	Total Section Ac	Total Percent	Column 8	Total Section Ac	Total Percent	Column 9	Total Section Ac	Total Percent	Column 10	Total Section Ac	Total Percent	
		# of squares	Soil Series Ac	# Series Percent	# of squares	Soil Series Ac	# Series Percent	# of squares	Soil Series Ac	# Series Percent	# of squares	Soil Series Ac	# Series Percent	
T8N	640	N/A			N/A			N/A			N/A			T8N
	AoA													
	BrA													
	Ca													
	Cc													
	CeA													
	Pc													
	Ra													
	RoA													
	SeA													
	SfA													
	Sr													
	Sa													
	Yo													
	Yr													
T8N	Ya													T8N
T7N	Soil S	Section 4	640	100.0%	Section 3	640	100.0%	Section 2	640	100.0%	Section 1	640	100.0%	T7N
	AoA		0		1	14	2.2%		0			0		
	BrA		0			0			0			0		
	Ca	30.5625	429	67.1%		0		9	126	19.8%	10	140	21.9%	
	Cc	1	14	2.2%	22.5625	317	49.5%	5	70	11.0%		0		
	CeA		0		1	14	2.2%		0			0		
	Pc		0		16	225	35.1%	26.5625	373	58.3%	29.5625	415	64.9%	
	Ra		0			0			0			0		
	RoA		0			0			0			0		
	SeA		0			0			0			0		
	SfA		0			0			0			0		
	Sr		0			0			0			0		
	Sa		0			0			0			0		
	Yo		0			0			0			0		
	Yr		0			0			0			0		
	Ya	14	197	30.7%	5	70	11.0%	5	70	11.0%	6	84	13.2%	
T7N	Soil	Section 9	640	100.0%	Section 10	640	100.0%	Section 11	640	100.0%	Section 12	640	100.0%	T7N
	AoA		0		2	28	4.4%	5	70	11.0%		0		
	BrA	3	42	6.6%		0			0		5	70	11.0%	
	Ca	21	295	46.1%	20.5625	289	45.1%	5	70	11.0%	9	126	19.8%	
	Cc	4	56	8.8%	23	323	50.5%	34.5625	485	75.9%	22.0625	310	48.4%	
	CeA		0			0		1	14	2.2%	5.5	77	12.1%	
	Pc		0			0			0		3	42	6.6%	
	Ra		0			0			0			0		
	RoA		0			0			0			0		
	SeA		0			0			0			0		
	SfA		0			0			0			0		
	Sr		0			0			0			0		
	Sa		0			0			0			0		
	Yo		0			0			0			0		
	Yr		0			0			0			0		
	Ya	17.5625	247	38.5%		0			0		1	14	2.2%	
T7N	Soil	Section 16	640	100.0%	Section 15	640	100.0%	Section 14	640	100.0%	Section 13	640	100.0%	T7N
	AoA		0			0		4	56	8.8%	3	42	6.6%	
	BrA	2	28	4.4%		0			0			0		
	Ca	3	42	6.6%	16	225	35.1%	5	70	11.0%	2	28	4.4%	
	Cc	23.5625	331	51.7%	8	112	17.6%	33.0625	464	72.6%	40.5625	570	89.0%	
	CeA		0			0			0			0		
	Pc		0			0			0			0		
	Ra		0			0			0			0		
	RoA		0			0			0			0		
	SeA		0			0			0			0		
	SfA		0			0			0			0		
	Sr		0			0			0			0		
	Sa		0			0			0			0		
	Yo		0			0			0			0		
	Yr		0			0			0			0		
	Ya	17	239	37.3%	21.5625	303	47.3%	3.5	49	7.7%		0		

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Appendix I. Section Soil Mapping Unit Acreage (Page 5 of 6)

		Column 7	Total Section Ac	Total Percent	Column 8	Total Section Ac	Total Percent	Column 9	Total Section Ac	Total Percent	Column 10	Total Section Ac	Total Percent	
		# of squares	Soil Series Ac	# Series Percent	# of squares	Soil Series Ac	# Series Percent	# of squares	Soil Series Ac	# Series Percent	# of squares	Soil Series Ac	# Series Percent	
T7N	Soil	Section 21	640	100.0%	Section 22	640	100.0%	Section 23	640	100.0%	Section 24	640	100.0%	T7N
	AoA		0			0		3	42	6.6%		0		
	BrA	8.5	119	18.7%	0.6	8	1.3%		0			0		
	Ca		0		7	98	15.4%		0			0		
	Cc	4	56	8.8%	12	169	26.3%	37.5625	528	82.4%	41.5625	584	91.2%	
	CeA		0			0			0		4	56	8.8%	
	Pc		0			0			0			0		
	Ra		0			0			0			0		
	RoA		0			0			0			0		
	SeA		0			0			0			0		
	SfA		0			0			0			0		
	Sr		0			0			0			0		
	Sa		0			0			0			0		
	Yo	29.0625	408	63.8%		0			0			0		
	Yr		0			0			0			0		
	Ys	4	56	8.8%	25.9625	365	57.0%	5	70	11.0%		0		
T7N	Soil	Section 28	640	100.0%	Section 27	640	100.0%	Section 26	640	100.0%	Section 25	640	100.0%	T7N
	AoA		0			0			0			0		
	BrA	7	98	15.4%	5	70	11.0%	4	56	8.8%		0		
	Ca		0			0			0			0		
	Cc	28.5625	401	62.7%	9	126	19.8%	33.0625	464	72.6%	42.5625	598	93.4%	
	CeA		0			0			0		3	42	6.6%	
	Pc		0			0			0			0		
	Ra		0			0			0			0		
	RoA		0			0			0			0		
	SeA		0			0			0			0		
	SfA		0			0			0			0		
	Sr		0			0			0			0		
	Sa		0			0			0			0		
	Yo	5	70	11.0%		0		8.5	119	18.7%		0		
	Yr		0			0			0			0		
	Ys	5	70	11.0%	31.5625	443	69.3%		0			0		
T7N	Soil	Section 33	640	100.0%	Section 34	640	100.0%	Section 35	640	100.0%	Section 36	640	100.0%	T7N
	AoA		0			0			0			0		
	BrA		0		3	42	6.6%	3	42	6.6%		0		
	Ca		0			0			0		0.5	7	1.1%	
	Cc	35.5625	500	78.1%	25.0625	352	55.0%	23.5625	331	51.7%	30.0625	422	66.0%	
	CeA	10	140	21.9%	3.5	49	7.7%		0			0		
	Pc		0			0			0		RR	0		
	Ra		0			0			0			0		
	RoA		0			0			0			0		
	SeA		0			0			0			0		
	SfA		0			0			0			0		
	Sr		0			0			0			0		
	Sa		0			0			0			0		
	Yo		0			0			0			0		
	Yr		0			0			0			0		
T7N	Ys		0		14	197	30.7%	19	267	41.7%	15	211	32.9%	T7N
T6N	Soil	Section 4	640	100.0%	Section 3	640	100.0%	Section 2	640	100.0%	Section 1	640	100.0%	T6N
	AoA		0			0			0			0		
	BrA		0		0.5	7	1.1%		0			0		
	Ca		0		1	14	2.2%	1.5	21	3.3%		0		
	Cc	38.5625	542	84.6%	34.0625	478	74.8%	41.5625	584	91.2%	41.2625	580	90.6%	
	CeA	7	98	15.4%	8	112	17.6%		0		4	56	8.8%	
	Pc		0			0			0			0		
	Ra		0			0			0			0		
	RoA		0			0			0			0		
	SeA		0			0		2	28	4.4%	0.3	4	0.7%	
	SfA		0			0			0			0		
	Sr		0			0			0			0		
	Sa		0			0			0			0		
	Yo		0			0			0			0		
	Yr		0			0			0			0		
	Ys		0		2	28	4.4%	.5	7	1.1%		0		

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Appendix I. Section Soil Mapping Unit Acreage (Page 6 of 6)

		Column 7	Total Section Ac	Total Percent	Column 8	Total Section Ac	Total Percent	Column 9	Total Section Ac	Total Percent	Column 10	Total Section Ac	Total Percent	
		# of squares	Soil Series Ac	il Series Percent	# of squares	Soil Series Ac	il Series Percent	# of squares	Soil Series Ac	il Series Percent	# of squares	Soil Series Ac	il Series Percent	
T6N	Soil	Section 9	640	100.0%	Section 10	640	100.0%	Section 11	640	100.0%	Section 12	640	100.0%	T6N
	AoA	7	98	15.4%		0			0			0		
	BrA		0			0			0			0		
	Ca	0.3	4	0.7%		0			0			0		
	Cc	30.2625	425	66.4%	35.5625	500	78.1%	41.5625	584	91.2%	40.5625	570	89.0%	
	CeA	8	112	17.6%	10	140	21.9%	2	28	4.4%	2	28	4.4%	
	Pc		0			0			0			0		
	Ra		0			0			0			0		
	RoA		0			0			0			0		
	SeA		0			0			0		3	42	6.6%	
	StA		0			0			0			0		
	Sr		0			0			0			0		
	Ss		0			0			0			0		
	Yo		0			0			0			0		
	Yr		0			0			0			0		
	Ys		0			0		2	28	4.4%		0		
T6N	Soil	Section 16	640	100.0%	Section 15	640	100.0%	Section 14	640	100.0%	Section 13	640	100.0%	T6N
	AoA	9	126	19.8%	1	14	2.2%		0			0		
	BrA		0			0			0			0		
	Ca		0			0			0			0		
	Cc	12	169	26.3%	10	140	21.9%	34.5625	485	75.9%	39.5625	556	86.8%	
	CeA	24.5625	345	53.9%	34.5625	485	75.9%	11	155	24.1%	6	84	13.2%	
	Pc		0			0			0			0		
	Ra		0			0			0			0		
	RoA		0			0			0			0		
	SeA		0			0			0			0		
	StA		0			0			0			0		
	Sr		0			0			0			0		
	Ss		0			0			0			0		
	Yo		0			0			0			0		
	Yr		0			0			0			0		
	Ys		0			0			0			0		
T6N	Soil	Section 21	640	100.0%	Section 22	640	100.0%	Section 23	640	100.0%	Section 24	640	100.0%	T6N
	AoA	9	126	19.8%		0			0			0		
	BrA		0			0			0			0		
	Ca		0			0			0			0		
	Cc	35.5625	500	78.1%	18	253	39.5%	11	155	24.1%	24	337	52.7%	
	CeA	1	14	2.2%	17.5625	247	38.5%	33.0625	464	72.6%	21.5625	303	47.3%	
	Pc		0			0			0			0		
	Ra		0			0			0			0		
	RoA		0			0			0			0		
	SeA		0		10	140	21.9%	1.5	21	3.3%		0		
	StA		0			0			0			0		
	Sr	RE	0			0			0			0		
	Ss		0			0			0			0		
	Yo		0			0			0			0		
	Yr		0			0			0			0		
	Ys		0			0			0			0		T6N
T6N	Soil	Section 28	640	100.0%	Section 27	640	100.0%	Section 26	640	100.0%	Section 25	640	100.0%	T6N
	AoA	6	84	13.2%		0			0			0		
	BrA		0			0			0			0		
	Ca	1	14	2.2%		0			0			0		
	Cc	36.5625	514	80.2%	27.5625	387	60.5%	30.5625	429	67.1%	39.5625	556	86.8%	
	CeA	2	28	4.4%	10	140	21.9%	14	197	30.7%	4	56	8.8%	
	Pc		0			0			0			0		
	Ra		0			0			0			0		
	RoA		0			0			0			0		
	SeA		0		8	112	17.6%	1	14	2.2%	2	28	4.4%	
	StA		0			0			0			0		
	Sr		0			0			0			0		
	Ss		0			0			0			0		
	Yo		0			0			0			0		
	Yr		0			0			0			0		
	Ys		0			0			0			0		T6N

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APPENDIX II. SOLANO COUNTY AND DWDP CROPPING PATTERNS, 1986-1997

Appendix II. Solano County and DWDP Cropping Pattern, 1986-97 (Page 1 of 3)

	Production Acreage		Solano County				Dixon	
Year	Dixon	Solano County	Yield	Production	Price	Gross Rev	Production	Gross Rev.
Corn, field								
1986	34,841	43,551	4.50	195,980	$70.00	$13,718,600	156,784	$10,974,880
1987	29,600	37,000	4.67	172,790	$82.00	$14,168,800	138,232	$11,335,040
1988	25,600	32,000	4.80	153,600	$110.00	$16,896,000	122,880	$13,516,800
1989	23,600	29,500	4.62	136,290	$110.00	$14,991,900	109,032	$11,993,520
1990	22,195	27,744	4.47	124,016	$101.08	$12,535,500	99,213	$10,028,400
1991	20,000	25,000	4.65	116,250	$107.00	$12,438,800	93,000	$9,951,040
1992	10,845	13,556	5.06	68,593	$95.00	$6,516,300	54,874	$5,213,040
1993	11,323	14,154	4.88	69,072	$106.00	$7,321,600	55,258	$5,857,280
1994	14,137	17,671	5.21	92,066	$99.00	$9,114,500	73,653	$7,291,600
1995	15,779	19,724	4.85	95,661	$120.00	$11,479,300	76,529	$9,183,440
1996	22,466	28,083	4.44	124,689	$123.00	$15,336,700	99,751	$12,269,360
1997	18,828	23,535	4.84	113,909	$111.00	$12,643,900	91,127	$10,115,120
Alfalfa								
1986	5,700	11,400	6.00	68,400	$75.00	$5,130,000	34,200	$2,565,000
1987	5,750	11,500	6.85	78,755	$73.02	$5,750,600	39,378	$2,875,300
1988	6,803	13,606	6.85	93,201	$86.00	$8,015,300	46,601	$4,007,650
1989	7,338	14,676	6.85	100,531	$95.00	$9,550,400	50,266	$4,775,200
1990	8,000	16,000	6.21	99,360	$98.52	$9,788,900	49,680	$4,894,450
1991	9,638	19,276	6.84	131,847	$110.00	$14,503,200	65,924	$7,251,600
1992	10,377	20,753	6.46	134,155	$85.00	$11,403,200	67,078	$5,701,600
1993	10,250	20,500	6.11	125,255	$90.00	$11,273,000	62,628	$5,636,500
1994	11,409	22,818	6.78	154,706	$99.00	$15,315,900	77,353	$7,657,950
1995	12,720	25,439	5.26	133,809	$99.00	$13,247,100	66,905	$6,623,550
1996	14,498	28,995	6.62	191,947	$96.00	$18,426,900	95,974	$9,213,450
1997	12,287	24,574	6.58	161,697	$118.00	$19,080,200	80,849	$9,540,100
Sugar Beets								
1986	8,736	15,884	24.30	385,981	$33.75	$13,026,900	212,290	$7,164,795
1987	10,566	19,211	26.08	501,044	$35.25	$17,661,800	275,574	$9,713,990
1988	10,190	18,528	23.50	435,408	$36.00	$15,674,700	239,474	$8,621,085
1989	9,829	17,871	25.21	450,528	$40.71	$18,341,000	247,790	$10,087,550
1990	8,690	15,800	24.88	393,104	$48.04	$18,885,300	216,207	$10,386,915
1991	7,296	13,266	22.91	303,924	$38.06	$11,567,300	167,158	$6,362,015
1992	7,445	13,536	29.39	397,823	$38.15	$15,177,300	218,803	$8,347,515
1993	10,848	19,724	28.10	554,244	$36.00	$19,952,800	304,834	$10,974,040
1994	10,378	18,869	27.47	518,331	$34.00	$17,623,300	285,082	$9,692,815
1995	7,482	13,604	25.29	344,045	$35.35	$12,162,000	189,225	$6,689,100
1996	3,293	5,988	27.53	164,850	$34.35	$5,662,600	90,668	$3,114,430
1997	3,520	6,400	24.64	157,696	$38.00	$5,992,400	86,733	$3,295,820
Grain wheat								
1986	7,875	52,500	2.00	105,000	$80.00	$8,400,000	15,750	$1,260,000
1987	7,500	50,000	2.35	117,500	$90.00	$10,575,000	17,625	$1,586,250
1988	7,500	50,000	2.75	137,500	$110.00	$15,125,000	20,625	$2,268,750
1989	8,029	53,528	2.60	139,173	$125.00	$17,396,600	20,876	$2,609,490
1990	6,076	40,508	2.45	99,245	$178.53	$17,718,500	14,887	$2,657,775
1991	5,175	34,500	2.61	90,045	$119.00	$10,715,400	13,507	$1,607,310
1992	6,525	43,500	2.54	110,490	$111.00	$12,264,400	16,574	$1,839,660
1993	6,525	43,500	2.20	95,700	$107.00	$10,239,900	14,355	$1,535,985
1994	6,600	44,000	2.75	121,000	$112.00	$13,552,000	18,150	$2,032,800
1995	5,250	35,000	2.23	78,050	$135.00	$10,536,800	11,708	$1,580,520
1996	7,867	52,449	2.10	110,143	$147.00	$16,191,000	16,521	$2,428,650
1997	5,630	37,530	2.41	90,447	$135.00	$12,210,300	13,567	$1,831,545
Tomatoes								
1986	5,850	19,500	30.50	594,750	$47.80	$28,429,100	178,425	$8,528,730
1987	4,800	16,000	33.00	528,000	$46.40	$24,499,200	158,400	$7,349,760
1988	5,606	18,688	36.00	672,768	$47.50	$31,956,500	201,830	$9,586,950
1989	5,576	18,585	34.00	631,890	$55.00	$34,754,000	189,567	$10,426,200
1990	5,864	19,547	31.50	615,731	$52.40	$32,264,300	184,719	$9,679,290
1991	7,141	23,804	32.60	776,010	$54.00	$41,904,500	232,803	$12,571,350
1992	5,581	18,603	32.54	605,342	$45.57	$27,585,400	181,603	$8,275,620
1993	6,535	21,783	31.48	685,728	$46.32	$31,762,900	205,718	$9,528,870

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Appendix II. Solano County and DWDP Cropping Pattern, 1986-97 (Page 2 of 3)

	Production Acreage		Solano County				Dixon	
Year	Dixon	Solano County	Yield	Production	Price	Gross Rev	Production	Gross Rev.
1994	7,024	23,413	33.74	789,955	$49.43	$39,047,500	236,986	$11,714,250
1995	7,017	23,389	30.27	707,985	$52.08	$36,871,900	212,396	$11,061,570
1996	7,030	23,432	32.32	757,322	$51.46	$38,971,800	227,197	$11,691,540
1997	6,549	21,831	30.91	674,796	$50.00	$33,739,800	202,439	$10,121,940
Dry Beans								
1986	4,725	6,300	1.10	6,930	$425.01	$2,945,300	5,198	$2,208,975
1987	5,625	7,500	1.00	7,500	$375.00	$2,812,500	5,625	$2,109,375
1988	6,750	9,000	1.25	11,250	$500.00	$5,625,000	8,438	$4,218,750
1989	9,450	12,600	1.24	15,570	$606.94	$9,450,000	11,678	$7,087,500
1990	8,775	11,700	1.25	14,625	$514.00	$7,517,300	10,969	$5,637,975
1991	3,453	4,604	1.08	4,972	$519.99	$2,585,400	3,729	$1,939,050
1992	3,750	5,000	0.95	4,750	$511.01	$2,427,300	3,563	$1,820,475
1993	3,675	4,900	0.98	4,802	$577.01	$2,770,800	3,602	$2,078,100
1994	6,162	8,216	0.96	7,887	$551.00	$4,345,700	5,915	$3,259,275
1995	5,583	7,444	0.97	7,221	$561.00	$4,051,000	5,416	$3,038,250
1996	6,118	8,157	0.89	7,248	$658.98	$4,776,300	5,436	$3,582,225
1997	5,974	7,965	0.89	7,097	$576.00	$4,087,900	5,323	$3,065,925
Almonds								
1986	1,222	2,444	0.15	367	$4,014.99	$1,473,500	184	$736,750
1987	1,163	2,325	0.36	847	$2,125.03	$1,799,900	424	$899,950
1988	1,097	2,194	0.32	704	$2,031.25	$1,430,200	352	$715,100
1989	938	1,876	0.23	434	$2,027.40	$880,500	217	$440,250
1990	843	1,686	0.38	648	$1,542.06	$999,100	324	$499,550
1991	811	1,621	0.15	250	$2,333.47	$582,200	125	$291,100
1992	818	1,636	0.30	496	$2,037.48	$1,011,000	248	$505,500
1993	715	1,430	0.34	486	$3,382.97	$1,644,800	243	$822,400
1994	715	1,430	0.40	569	$2,362.55	$1,345,000	285	$672,500
1995	708	1,415	0.15	214	$3,433.04	$735,700	107	$367,850
1996	669	1,338	0.30	405	$3,565.29	$1,444,300	203	$722,150
1997	679	1,358	0.42	575	$3,083.71	$1,771,900	287	$885,950
Safflower								
1986	216	2,162	1.30	2,811	$219.99	$618,400	281	$61,840
1987	136	1,359	1.37	1,862	$200.00	$372,400	186	$37,240
1988	330	3,300	1.08	3,564	$245.01	$873,200	356	$87,320
1989	440	4,400	1.30	5,720	$305.00	$1,744,600	572	$174,460
1990	577	5,769	1.03	5,920	$295.47	$1,749,200	592	$174,920
1991	190	1,899	0.80	1,519	$250.03	$379,800	152	$37,980
1992	765	7,651	1.15	8,799	$300.00	$2,639,700	880	$263,970
1993	1,098	10,977	1.15	12,624	$320.00	$4,039,700	1,262	$403,970
1994	1,050	10,500	1.50	15,750	$302.00	$4,756,500	1,575	$475,650
1995	1,050	10,500	1.07	11,235	$300.00	$3,370,500	1,124	$337,050
1996	608	6,075	1.24	7,533	$351.00	$2,644,100	753	$264,410
1997	762	7,624	1.25	9,530	$308.00	$2,935,200	953	$293,520
Walnuts								
1986	428	2,520	0.94	2,364	$1,159.98	$2,742,200	402	$466,174
1987	439	2,583	1.28	3,299	$1,040.01	$3,431,000	561	$583,270
1988	439	2,583	1.28	3,306	$960.01	$3,173,800	562	$539,546
1989	519	3,050	0.96	2,931	$1,122.01	$3,288,600	498	$559,062
1990	536	3,155	0.99	3,132	$1,078.00	$3,376,300	532	$573,971
1991	634	3,730	1.06	3,944	$1,259.99	$4,969,400	670	$844,798
1992	637	3,745	0.87	3,250	$1,300.00	$4,225,000	553	$718,250
1993	650	3,821	1.02	3,885	$1,317.99	$5,120,400	660	$870,468
1994	649	3,817	0.83	3,153	$1,162.00	$3,663,800	536	$622,846
1995	716	4,211	0.95	4,007	$1,406.99	$5,637,800	681	$958,426
1996	716	4,211	0.81	3,410	$1,527.01	$5,207,100	580	$885,207
1997	747	4,392	1.12	4,903	$1,270.00	$6,226,800	834	$1,058,556
Vineyard								
1986	16	1,061	4.50	4,773	$248.84	$1,187,700	72	$17,816
1987	17	1,138	3.17	3,604	$341.23	$1,229,800	54	$18,447
1988	16	1,096	3.52	3,858	$517.19	$1,995,300	58	$29,929
1989	19	1,234	6.63	8,187	$625.98	$5,125,000	123	$76,875

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Appendix II. Solano County and DWDP Cropping Pattern, 1986-97 (Page 3 of 3)

	Production Acreage		Solano County				Dixon	
Year	Dixon	Solano County	Yield	Production	Price	Gross Rev	Production	Gross Rev.
1990	19	1,234	6.24	7,702	$552.57	$4,255,900	116	$63,838
1991	27	1,801	6.52	11,747	$584.39	$6,864,900	176	$102,974
1992	27	1,786	4.82	8,614	$633.28	$5,454,800	129	$81,822
1993	28	1,884	3.92	7,377	$590.84	$4,358,700	111	$65,381
1994	28	1,874	5.36	10,039	$626.24	$6,286,600	151	$94,299
1995	30	2,000	5.06	10,112	$746.40	$7,547,700	152	$113,216
1996	31	2,093	6.36	13,312	$1,205.80	$16,052,100	200	$240,782
1997	33	2,199	6.55	14,396	$1,115.05	$16,052,100	216	$240,782
Pasture								
1986	10,000	20,000	10.00	200,000	$9.00	$1,800,000	100,000	$900,000
1987	10,250	20,500	10.00	205,000	$7.00	$1,435,000	102,500	$717,500
1988	10,250	20,500	10.00	205,000	$7.00	$1,435,000	102,500	$717,500
1989	10,250	20,500	10.00	205,000	$7.50	$1,537,500	102,500	$768,750
1990	10,250	20,500	10.00	205,000	$7.50	$1,537,500	102,500	$768,750
1991	10,250	20,500	10.00	205,000	$7.50	$1,537,500	102,500	$768,750
1992	10,250	20,500	10.00	205,000	$8.40	$1,722,000	102,500	$861,000
1993	10,250	20,500	10.00	205,000	$9.00	$1,845,000	102,500	$922,500
1994	10,250	20,500	10.00	205,000	$9.00	$1,845,000	102,500	$922,500
1995	10,250	20,500	10.00	205,000	$9.00	$1,845,000	102,500	$922,500
1996	10,250	20,500	10.00	205,000	$9.00	$1,845,000	102,500	$922,500
1997	10,250	20,500	10.00	205,000	$9.00	$1,845,000	102,500	$922,500
Pasture, Dry								
1986	7,280	145,600	1.00	145,600	$10.00	$1,456,000	7,280	$72,800
1987	7,265	145,300	1.00	145,300	$10.00	$1,453,000	7,265	$72,650
1988	7,190	143,800	1.00	143,800	$10.00	$1,438,000	7,190	$71,900
1989	7,190	143,800	1.00	143,800	$15.00	$2,157,000	7,190	$107,850
1990	7,190	143,800	1.00	143,800	$15.00	$2,157,000	7,190	$107,850
1991	7,190	143,800	1.00	143,800	$15.00	$2,157,000	7,190	$107,850
1992	7,185	143,700	1.00	143,700	$15.00	$2,155,500	7,185	$107,775
1993	7,185	143,700	1.00	143,700	$15.00	$2,155,500	7,185	$107,775
1994	7,185	143,700	1.00	143,700	$15.00	$2,155,500	7,185	$107,775
1995	7,183	143,650	1.00	143,650	$15.00	$2,154,800	7,183	$107,740
1996	7,183	143,650	1.00	143,650	$15.00	$2,154,800	7,183	$107,740
1997	7,183	143,650	1.00	143,650	$15.00	$2,154,800	7,183	$107,740
Hay, Grass								
1986	2,000	4,000	2.10	8,400	$35.00	$294,000	4,200	$147,000
1987	1,900	3,800	2.00	7,600	$35.00	$266,000	3,800	$133,000
1988	1,900	3,800	2.00	7,600	$35.00	$266,000	3,800	$133,000
1989	1,750	3,500	2.15	7,525	$50.01	$376,300	3,763	$188,150
1990	1,750	3,500	1.50	5,250	$40.00	$210,000	2,625	$105,000
1991	1,750	3,500	1.63	5,705	$47.99	$273,800	2,853	$136,900
1992	1,750	3,500	1.00	3,500	$44.86	$157,000	1,750	$78,500
1993	1,750	3,500	1.00	3,500	$50.00	$175,000	1,750	$87,500
1994	1,750	3,500	1.00	3,500	$44.86	$157,000	1,750	$78,500
1995	1,750	3,500	1.00	3,500	$75.00	$262,500	1,750	$131,250
1996	1,750	3,500	1.00	3,500	$50.00	$175,000	1,750	$87,500
1997	1,750	3,500	1.00	3,500	$60.00	$210,000	1,750	$105,000
Hay, Grain								
1986	3,000	6,000	2.50	15,000	$45.00	$675,000	7,500	$337,500
1987	2,900	5,800	2.50	14,500	$55.00	$797,500	797,500	$398,750
1988	1,000	2,000	2.00	4,000	$60.00	$240,000	2,000	$120,000
1989	1,000	2,000	2.15	4,300	$60.00	$258,000	2,150	$129,000
1990	1,000	2,000	2.15	4,300	$83.79	$360,300	2,150	$180,150
1991	1,100	2,199	2.48	5,453	$72.00	$392,600	2,727	$196,300
1992	854	1,708	2.89	4,936	$60.01	$296,200	2,468	$148,100
1993	850	1,700	3.06	5,202	$57.00	$296,500	2,601	$148,250
1994	850	1,700	2.86	4,862	$59.01	$286,900	2,431	$143,450
1995	757	1,514	0.98	1,478	$237.42	$350,900	739	$175,450
1996	421	841	1.99	1,674	$69.00	$115,500	837	$57,750
1997	397	793	2.64	2,094	$86.01	$180,100	1,047	$90,050

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Appendix III. Section Crop Acreage by Soil Mapping Unit

Appendix III. Section Crop Acreage by Soil Mapping Unit (Page 1 of 20)

Net Crop 90%	Corn, field	Alfalfa	Sugar Beets	Grain wheat	Tomatoes	Dry Beans	Almonds	Safflower	Walnuts	Vineyard	Nursery	Pasture	Pasture, Dry	Hay, Grass	Hay, Grain	Sudan	Total
Column 1																	
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	18.1	8.1	7.5	5.9	5.4	5.0	0.8	0.5	0.5	0.0	0.0	8.9	0.0	1.6	1.1	0.0	63.2
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	147.0	65.4	60.4	47.8	43.4	40.9	6.2	4.1	4.1	0.2	0.0	71.8	0.0	12.6	8.8	0.3	512.8
Section 33	165.1	73.4	67.9	53.7	48.7	45.9	6.9	4.6	4.6	0.2	0.0	80.6	0.0	14.2	9.8	0.3	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	2.3	2.2	1.7	1.5	1.5	0.0	0.1	0.0	0.0	0.0	2.6	0.0	0.4	0.3	0.0	12.6
Cc	0.0	10.5	9.7	7.7	7.0	0.0	0.0	0.7	0.0	0.0	0.0	11.5	0.0	2.0	1.4	0.0	50.6
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	6.8	6.3	5.0	4.5	4.2	0.6	0.4	0.4	0.0	0.0	7.4	0.0	1.3	0.9	0.0	37.9
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	136.1	60.5	56.0	44.3	40.2	37.8	5.7	3.8	3.8	0.2	0.0	66.5	0.0	11.7	8.1	0.3	474.9
Section 4	136.1	80.2	74.1	58.6	53.2	43.5	6.4	5.1	4.2	0.2	0.0	88.0	0.0	15.5	10.7	0.3	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	3.6	1.6	1.5	1.2	1.1	1.0	0.2	0.1	0.1	0.0	0.0	1.8	0.0	0.3	0.2	0.0	12.6
Ca	0.0	2.3	2.2	1.7	1.5	1.5	0.0	0.1	0.0	0.0	0.0	2.6	0.0	0.4	0.3	0.0	12.6
Cc	0.0	5.3	4.9	3.8	3.5	0.0	0.0	0.3	0.0	0.0	0.0	5.8	0.0	1.0	0.7	0.0	25.3
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	2.3	2.1	1.7	1.5	1.4	0.2	0.1	0.1	0.0	0.0	2.5	0.0	0.4	0.3	0.0	12.6
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	14.5	6.5	6.0	4.7	4.3	4.0	0.6	0.4	0.4	0.0	0.0	7.1	0.0	1.2	0.9	0.0	50.6
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	132.5	58.9	54.5	43.1	39.1	36.8	5.6	3.7	3.7	0.1	0.0	64.7	0.0	11.4	7.9	0.3	462.2
Section 9	150.6	76.8	71.0	56.2	51.0	44.7	6.6	4.8	4.3	0.2	0.0	84.3	0.0	14.8	10.3	0.3	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	27.9	25.8	20.4	18.5	17.5	0.0	1.8	0.0	0.0	0.0	30.7	0.0	5.4	3.7	0.0	151.7
Cc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	9.1	4.0	3.7	2.9	2.7	2.5	0.4	0.3	0.3	0.0	0.0	4.4	0.0	0.8	0.5	0.0	31.6
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	112.5	50.1	46.3	36.6	33.2	31.3	4.7	3.2	3.1	0.1	0.0	55.0	0.0	9.7	6.7	0.2	392.7
Section 16	121.6	82.0	75.8	60.0	54.4	51.3	5.1	5.2	3.4	0.1	0.0	90.0	0.0	15.8	11.0	0.2	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	15.8	14.6	11.5	10.5	0.0	0.0	1.0	0.0	0.0	0.0	17.3	0.0	3.0	2.1	0.0	75.9
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	11.1	4.9	4.6	3.6	3.3	3.1	0.0	0.3	0.0	0.0	0.0	5.4	0.0	1.0	0.7	0.0	37.9
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	132.5	58.9	54.5	43.1	39.1	36.8	5.6	3.7	3.7	0.1	0.0	64.7	0.0	11.4	7.9	0.3	462.2
Section 21	143.6	79.6	73.6	58.2	52.9	39.9	5.6	5.0	3.7	0.1	0.0	87.4	0.0	15.4	10.7	0.3	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	48.5	44.9	35.5	32.2	30.3	0.0	3.1	0.0	0.0	0.0	53.3	0.0	9.4	6.5	0.0	263.7
Cc	0.0	1.8	1.7	1.3	1.2	0.0	0.0	0.1	0.0	0.0	0.0	2.0	0.0	0.4	0.2	0.0	8.8
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.3	0.0	0.0	0.0	25.3
SfA	0.0	0.0	0.0	4.9	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	5.2	1.3	0.9	0.0	12.6
Sr	51.8	23.0	21.3	16.8	15.3	14.4	0.0	1.5	0.0	0.0	0.0	25.3	0.0	4.5	3.1	0.0	177.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	25.4	11.3	10.4	8.2	7.5	7.1	1.1	0.7	0.7	0.0	0.0	12.4	0.0	2.2	1.5	0.1	88.5
Section 28	77.2	84.7	78.3	66.8	56.2	51.8	1.1	5.8	0.7	0.0	0.0	93.0	30.4	17.7	12.2	0.1	**576.0**

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Appendix III. Section Crop Acreage by Soil Mapping Unit (Page 2 of 20)

AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	54.1	50.0	39.5	35.9	0.0	0.0	3.4	0.0	0.0	0.0	59.4	0.0	10.4	7.2	0.0	260.0
CcA	0.0	5.3	4.9	3.8	3.5	0.0	0.0	0.3	0.0	0.0	0.0	5.8	0.0	1.0	0.7	0.0	25.3
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	18.1	8.1	7.5	5.9	5.4	5.0	0.8	0.5	0.5	0.0	0.0	8.9	0.0	1.6	1.1	0.0	63.2
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	63.2	0.0	0.0	0.0	63.2
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	29.6	13.2	12.2	9.6	8.7	8.2	0.0	0.8	0.0	0.0	0.0	14.5	0.0	2.5	1.8	0.0	101.1
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	10.9	4.8	4.5	3.5	3.2	3.0	0.5	0.3	0.3	0.0	0.0	5.3	0.0	0.9	0.6	0.0	37.9
Ys	7.2	3.2	3.0	2.4	2.1	2.0	0.3	0.2	0.2	0.0	0.0	3.5	0.0	0.6	0.4	0.0	25.3
Section 33	65.9	88.6	81.9	64.8	58.8	18.3	1.5	5.6	1.0	0.0	0.0	97.3	63.2	17.1	11.9	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	67.6	62.5	49.4	44.9	42.3	0.0	4.3	0.0	0.0	0.0	74.2	0.0	13.1	9.1	0.0	367.4
Cc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CcA	0.0	7.9	7.3	5.8	5.2	0.0	0.0	0.5	0.0	0.0	0.0	8.7	0.0	1.5	1.1	0.0	37.9
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	9.1	4.0	3.7	2.9	2.7	2.5	0.4	0.3	0.3	0.0	0.0	4.4	0.0	0.8	0.5	0.0	31.6
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	139.1	0.0	0.0	0.0	139.1
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 4	9.1	79.6	73.6	58.2	52.8	44.8	0.4	5.0	0.3	0.0	0.0	87.3	139.1	15.4	10.7	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	23.7	21.9	17.3	15.7	0.0	0.0	1.5	0.0	0.0	0.0	26.0	0.0	4.6	3.2	0.0	113.8
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	399.0	0.0	0.0	0.0	399.0
SfA	0.0	0.0	0.0	24.4	0.0	0.0	0.0	2.1	0.0	0.0	0.0	0.0	25.8	6.4	4.5	0.0	63.2
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 9	0.0	23.7	21.9	41.7	15.7	0.0	0.0	3.6	0.0	0.0	0.0	26.0	424.8	11.0	7.6	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	34.9	32.3	25.5	23.2	21.8	0.0	2.2	0.0	0.0	0.0	38.3	0.0	6.7	4.7	0.0	189.6
Cc	0.0	54.1	50.0	39.5	35.9	0.0	0.0	3.4	0.0	0.0	0.0	59.4	0.0	10.4	7.2	0.0	260.0
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	101.1	0.0	0.0	0.0	101.1
SfA	0.0	0.0	0.0	9.8	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	10.3	2.6	1.8	0.0	25.3
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section16	0.0	89.0	82.3	74.8	59.1	21.8	0.0	6.4	0.0	0.0	0.0	97.7	111.5	19.8	13.7	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	30.3	28.0	22.1	20.1	18.9	0.0	1.9	0.0	0.0	0.0	33.2	0.0	5.8	4.1	0.0	164.3
Cc	0.0	30.4	28.1	22.2	20.2	0.0	0.0	1.9	0.0	0.0	0.0	33.4	0.0	5.9	4.1	0.0	146.2
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	151.7	0.0	0.0	0.0	151.7
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	3.6	1.6	1.5	1.2	1.1	1.0	0.2	0.1	0.1	0.0	0.0	1.8	0.0	0.3	0.2	0.0	12.6
Yr	29.0	12.9	11.9	9.4	8.6	8.1	1.2	0.8	0.8	0.0	0.0	14.2	0.0	2.5	1.7	0.0	101.1
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 21	32.6	75.2	69.5	55.0	49.9	28.0	1.4	4.7	0.9	0.0	0.0	82.5	151.7	14.5	10.1	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	64.1	59.3	46.9	42.6	40.1	0.0	4.0	0.0	0.0	0.0	70.4	0.0	12.4	8.6	0.0	348.4
Cc	0.0	10.5	9.7	7.7	7.0	0.0	0.0	0.7	0.0	0.0	0.0	11.5	0.0	2.0	1.4	0.0	50.6
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	63.2	0.0	0.0	0.0	63.2
SfA	0.0	0.0	0.0	9.8	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	10.3	2.6	1.8	0.0	25.3
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	7.3	3.2	3.0	2.4	2.1	2.0	0.3	0.2	0.2	0.0	0.0	3.5	0.0	0.6	0.4	0.0	25.3
Yr	18.1	8.1	7.5	5.9	5.4	5.0	0.8	0.5	0.5	0.0	0.0	8.9	0.0	1.6	1.1	0.0	63.2
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 28	25.4	85.9	79.5	72.6	57.0	47.2	1.1	6.3	0.7	0.0	0.0	94.3	73.5	19.2	13.3	0.0	**576.0**

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Appendix III. Section Crop Acreage by Soil Mapping Unit (Page 3 of 20)

Net Crop 90%	Corn, field	Alfalfa	Sugar Beets	Grain wheat	Tomatoes	Dry Beans	Almonds	Safflower	Walnuts	Vineyard	Nursery	Pasture	Pasture, Dry	Hay, Grass	Hay, Grain	Sudan	Total
Column 2																	
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	18.1	8.1	7.5	5.9	5.4	5.0	0.8	0.5	0.5	0.0	0.0	8.9	0.0	1.6	1.1	0.0	63.2
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	147.0	65.4	60.4	47.8	43.4	40.9	6.2	4.1	4.1	0.2	0.0	71.8	0.0	12.6	8.8	0.3	512.8
Section 34	165.1	73.4	67.9	53.7	48.7	45.9	6.9	4.6	4.6	0.2	0.0	80.6	0.0	14.2	9.8	0.3	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	2.7	1.2	1.1	0.9	0.8	0.8	0.1	0.1	0.1	0.0	0.0	1.3	0.0	0.2	0.2	0.0	9.5
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	11.3	10.5	8.3	7.5	7.1	1.1	0.7	0.7	0.0	0.0	12.4	0.0	2.2	1.5	0.0	63.2
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	25.4	11.3	10.4	8.3	7.5	7.1	1.1	0.7	0.7	0.0	0.0	12.4	0.0	2.2	1.5	0.0	88.5
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	118.9	52.9	48.9	38.7	35.1	33.1	5.0	3.3	3.3	0.1	0.0	58.0	0.0	10.2	7.1	0.3	414.8
Section 3	147.0	76.7	70.9	56.1	50.9	47.9	7.3	4.8	4.8	0.2	0.0	84.2	0.0	14.8	10.3	0.3	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	20.4	18.8	14.9	13.5	12.7	1.9	1.3	1.3	0.0	0.0	22.3	0.0	3.9	2.7	0.0	113.8
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	21.8	9.7	8.9	7.1	6.4	6.0	0.9	0.6	0.6	0.0	0.0	10.6	0.0	1.9	1.3	0.0	75.9
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	110.7	49.3	45.5	36.0	32.7	30.8	4.7	3.1	3.1	0.1	0.0	54.1	0.0	9.5	6.6	0.2	386.4
Section 10	132.5	79.3	73.3	58.0	52.6	49.6	7.5	5.0	4.9	0.1	0.0	87.0	0.0	15.3	10.6	0.2	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	21.8	9.7	8.9	7.1	6.4	6.0	0.9	0.6	0.6	0.0	0.0	10.6	0.0	1.9	1.3	0.0	75.9
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	70.9	31.5	29.1	23.0	20.9	19.7	3.0	2.0	2.0	0.1	0.0	34.6	0.0	6.1	4.2	0.2	247.3
Section 15	92.6	41.2	38.1	30.1	27.3	25.8	3.9	2.6	2.6	0.1	0.0	45.2	0.0	8.0	5.5	0.2	**323.2**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	43.5	19.4	17.9	14.1	12.8	12.1	1.8	1.2	1.2	0.0	0.0	21.2	0.0	3.7	2.6	0.0	151.7
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	9.3	4.1	3.8	3.0	2.7	2.6	0.0	0.3	0.0	0.0	0.0	4.5	0.0	0.8	0.6	0.0	31.6
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	112.5	50.1	46.3	36.6	33.2	31.3	4.7	3.2	3.1	0.1	0.0	55.0	0.0	9.7	6.7	0.2	392.7
Section 22	165.3	73.5	68.0	53.8	48.8	46.0	6.6	4.6	4.3	0.2	0.0	80.7	0.0	14.2	9.9	0.2	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	18.1	8.1	7.5	5.9	5.4	5.0	0.8	0.5	0.5	0.0	0.0	8.9	0.0	1.6	1.1	0.0	63.2
Ca	0.0	2.3	2.2	1.7	1.5	1.5	0.0	0.1	0.0	0.0	0.0	2.6	0.0	0.4	0.3	0.0	12.6
Cc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	33.3	14.8	13.7	10.8	9.8	9.3	0.0	0.9	0.0	0.0	0.0	16.3	0.0	2.9	2.0	0.0	113.8
Ss	58.2	25.9	23.9	18.9	17.2	16.2	2.5	1.6	1.6	0.1	0.0	28.4	0.0	5.0	3.5	0.0	203.1
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	52.5	23.4	21.6	17.1	15.5	14.6	2.2	1.5	1.5	0.1	0.0	25.7	0.0	4.5	3.1	0.1	183.3

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Appendix III. Section Crop Acreage by Soil Mapping Unit (Page 4 of 20)

Section 27	162.2	74.5	68.9	54.4	49.4	46.6	5.4	4.7	3.6	0.1	0.0	81.8	0.0	14.4	10.0	0.1	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	57.2	52.8	41.8	37.9	35.7	0.0	3.6	0.0	0.0	0.0	62.7	0.0	11.0	7.7	0.0	310.5
Cc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CeA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SeA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	48.1	21.4	19.8	15.6	14.2	13.4	0.0	1.3	0.0	0.0	0.0	23.5	0.0	4.1	2.9	0.0	164.3
Ss	7.3	3.2	3.0	2.4	2.1	2.0	0.3	0.2	0.2	0.0	0.0	3.5	0.0	0.6	0.4	0.0	25.3
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	21.7	9.7	8.9	7.1	6.4	6.0	0.9	0.6	0.6	0.0	0.0	10.6	0.0	1.9	1.3	0.0	75.9
Section 34	77.1	91.5	84.6	66.9	60.7	57.2	1.2	5.8	0.8	0.0	0.0	100.4	0.0	17.7	12.3	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	72.3	66.8	52.8	48.0	45.2	0.0	4.6	0.0	0.0	0.0	79.4	0.0	14.0	9.7	0.0	392.7
Cc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CeA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SeA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	13.0	5.8	5.3	4.2	3.8	3.6	0.0	0.4	0.0	0.0	0.0	6.3	0.0	1.1	0.8	0.0	44.2
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	39.9	17.7	16.4	13.0	11.8	11.1	1.7	1.1	1.1	0.0	0.0	19.5	0.0	3.4	2.4	0.1	139.1
Section 3	52.8	95.8	88.6	70.0	63.6	59.9	1.7	6.0	1.1	0.0	0.0	105.1	0.0	18.5	12.8	0.1	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	76.9	71.1	56.2	51.1	48.1	0.0	4.8	0.0	0.0	0.0	84.5	0.0	14.9	10.3	0.0	418.0
Cc	0.0	10.5	9.7	7.7	7.0	0.0	0.0	0.7	0.0	0.0	0.0	11.5	0.0	2.0	1.4	0.0	50.6
CeA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SeA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	14.6	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	15.5	3.9	2.7	0.0	37.9
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	19.9	8.9	8.2	6.5	5.9	5.5	0.8	0.6	0.6	0.0	0.0	9.7	0.0	1.7	1.2	0.0	69.5
Section 10	19.9	96.3	89.1	85.1	63.9	53.6	0.8	7.3	0.6	0.0	0.0	105.7	15.5	22.5	15.6	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	81.1	75.0	59.3	53.8	50.7	0.0	5.1	0.0	0.0	0.0	89.1	0.0	15.7	10.9	0.0	440.7
Cc	0.0	13.1	12.2	9.6	8.7	0.0	0.0	0.8	0.0	0.0	0.0	14.4	0.0	2.5	1.8	0.0	63.2
CeA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SeA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	24.4	0.0	0.0	0.0	2.1	0.0	0.0	0.0	0.0	25.8	6.4	4.5	0.0	63.2
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	2.5	1.1	1.0	0.8	0.7	0.7	0.1	0.1	0.1	0.0	0.0	1.2	0.0	0.2	0.2	0.0	8.8
Section 15	2.5	95.4	88.2	94.1	63.3	51.4	0.1	8.1	0.1	0.0	0.0	104.7	25.8	24.9	17.3	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	37.2	34.4	27.2	24.7	23.3	0.0	2.3	0.0	0.0	0.0	40.9	0.0	7.2	5.0	0.0	202.3
Cc	0.0	71.2	65.8	52.0	47.2	0.0	0.0	4.5	0.0	0.0	0.0	78.1	0.0	13.7	9.5	0.0	342.1
CeA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SeA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	31.6	0.0	0.0	0.0	31.6
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 22	0.0	108.4	100.2	79.2	72.0	23.3	0.0	6.8	0.0	0.0	0.0	119.0	31.6	20.9	14.5	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	57.2	52.8	41.8	37.9	35.7	0.0	3.6	0.0	0.0	0.0	62.7	0.0	11.0	7.7	0.0	310.5
Cc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CeA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SeA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	126.4	0.0	0.0	0.0	126.4
SfA	0.0	0.0	0.0	29.3	0.0	0.0	0.0	2.5	0.0	0.0	0.0	0.0	31.0	7.7	5.4	0.0	75.9
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	18.1	8.1	7.5	5.9	5.4	5.0	0.8	0.5	0.5	0.0	0.0	8.9	0.0	1.6	1.1	0.0	63.2
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 27	18.1	65.2	60.3	77.0	43.3	40.8	0.8	6.6	0.5	0.0	0.0	71.6	157.4	20.3	14.1	0.0	**576.0**

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Appendix III. Section Crop Acreage by Soil Mapping Unit (Page 5 of 20)

Net Crop 90%	Corn, field	Alfalfa	Sugar Beets	Grain wheat	Tomatoes	Dry Beans	Almonds	Safflower	Walnuts	Vineyard	Nursery	Pasture	Pasture, Dry	Hay, Grass	Hay, Grain	Sudan	Total
Column 3																	
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	39.6	36.6	28.9	26.3	24.7	0.0	2.5	0.0	0.0	0.0	43.4	0.0	7.6	5.3	0.0	214.9
Cc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	103.5	46.0	42.6	33.7	30.6	28.8	4.4	2.9	2.9	0.1	0.0	50.5	0.0	8.9	6.2	0.2	361.1
Section 35	103.5	85.6	79.1	62.6	56.8	53.5	4.4	5.4	2.9	0.1	0.0	94.0	0.0	16.5	11.5	0.2	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	33.7	31.2	24.7	22.4	21.1	0.0	2.1	0.0	0.0	0.0	37.0	0.0	6.5	4.5	0.0	183.3
Cc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	7.3	3.2	3.0	2.4	2.1	2.0	0.3	0.2	0.2	0.0	0.0	3.5	0.0	0.6	0.4	0.0	25.3
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	105.3	46.8	43.3	34.2	31.1	29.3	4.4	3.0	2.9	0.1	0.0	51.4	0.0	9.0	6.3	0.2	367.4
Section 2	112.5	83.8	77.5	61.3	55.6	52.4	4.7	5.3	3.1	0.1	0.0	92.0	0.0	16.2	11.2	0.2	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	7.3	3.2	3.0	2.4	2.1	2.0	0.3	0.2	0.2	0.0	0.0	3.5	0.0	0.6	0.4	0.0	25.3
Ca	0.0	25.6	23.7	18.7	17.0	16.0	0.0	1.6	0.0	0.0	0.0	28.1	0.0	4.9	3.4	0.0	139.1
Cc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	1.8	0.8	0.7	0.6	0.5	0.5	0.1	0.1	0.1	0.0	0.0	0.9	0.0	0.2	0.1	0.0	6.3
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	108.9	48.4	44.8	35.4	32.2	30.3	4.6	3.1	3.0	0.1	0.0	53.2	0.0	9.4	6.5	0.2	380.0
Section 11	118.0	78.1	72.2	57.1	51.8	48.8	5.0	4.9	3.3	0.1	0.0	85.7	0.0	15.1	10.5	0.2	**550.7**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	38.3	17.0	15.7	12.4	11.3	10.6	1.6	1.1	1.1	0.0	0.0	18.7	0.0	3.3	2.3	0.1	133.5
Section 14	38.3	17.0	15.7	12.4	11.3	10.6	1.6	1.1	1.1	0.0	0.0	18.7	0.0	3.3	2.3	0.1	**133.5**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	25.4	11.3	10.4	8.3	7.5	7.1	1.1	0.7	0.7	0.0	0.0	12.4	0.0	2.2	1.5	0.0	88.5
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	49.1	21.9	20.2	16.0	14.5	13.7	2.1	1.4	1.4	0.1	0.0	24.0	0.0	4.2	2.9	0.1	171.5
Section 23	74.5	33.1	30.6	24.2	22.0	20.7	3.1	2.1	2.1	0.1	0.0	36.4	0.0	6.4	4.4	0.1	**260.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	32.6	14.5	13.4	10.6	9.6	9.1	1.4	0.9	0.9	0.0	0.0	15.9	0.0	2.8	1.9	0.0	113.8
Ca	0.0	2.3	2.2	1.7	1.5	1.5	0.0	0.1	0.0	0.0	0.0	2.6	0.0	0.4	0.3	0.0	12.6
Cc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	16.3	7.3	6.7	5.3	4.8	4.5	0.7	0.5	0.5	0.0	0.0	8.0	0.0	1.4	1.0	0.0	56.9
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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Appendix III. Section Crop Acreage by Soil Mapping Unit (Page 6 of 20)

Ys	112.5	50.1	46.3	36.6	33.2	31.3	4.7	3.2	3.1	0.1	0.0	55.0	0.0	9.7	6.7	0.2	392.7
Section 26	161.5	74.2	68.6	54.2	49.2	46.4	6.8	4.7	4.5	0.2	0.0	81.4	0.0	14.3	9.9	0.2	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	11.6	10.8	8.5	7.7	7.3	0.0	0.7	0.0	0.0	0.0	12.8	0.0	2.2	1.6	0.0	63.2
Cc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	25.4	11.3	10.4	8.3	7.5	7.1	1.1	0.7	0.7	0.0	0.0	12.4	0.0	2.2	1.5	0.0	88.5
Yo	92.7	41.2	38.1	30.1	27.4	25.8	3.9	2.6	2.6	0.1	0.0	45.2	0.0	8.0	5.5	0.0	323.2
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	29.0	12.9	11.9	9.4	8.6	8.1	1.2	0.8	0.8	0.0	0.0	14.2	0.0	2.5	1.7	0.1	101.1
Section 35	147.0	77.0	71.2	56.3	51.1	48.2	6.2	4.9	4.1	0.2	0.0	84.6	0.0	14.9	10.3	0.1	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	54.8	50.7	40.1	36.4	34.3	0.0	3.5	0.0	0.0	0.0	60.2	0.0	10.6	7.3	0.0	297.9
Cc	0.0	23.7	21.9	17.3	15.7	0.0	0.0	1.5	0.0	0.0	0.0	26.0	0.0	4.6	3.2	0.0	113.8
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	39.9	17.7	16.4	13.0	11.8	11.1	1.7	1.1	1.1	0.0	0.0	19.5	0.0	3.4	2.4	0.1	139.1
Section 2	39.9	96.2	89.0	70.3	63.9	45.4	1.7	6.1	1.1	0.0	0.0	105.6	0.0	18.6	12.9	0.1	**550.7**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	72.8	67.3	53.2	48.3	45.5	0.0	4.6	0.0	0.0	0.0	79.9	0.0	14.1	9.7	0.0	395.2
Cc	0.0	36.8	34.0	26.9	24.4	0.0	0.0	2.3	0.0	0.0	0.0	40.4	0.0	7.1	4.9	0.0	177.0
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	1.1	0.5	0.4	0.4	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.1	0.1	0.0	3.8
Section 11	1.1	110.0	101.8	80.5	73.0	45.8	0.0	6.9	0.0	0.0	0.0	120.8	0.0	21.3	14.7	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	59.5	55.0	43.5	39.5	37.2	0.0	3.7	0.0	0.0	0.0	65.3	0.0	11.5	8.0	0.0	323.2
Cc	0.0	39.4	36.5	28.8	26.2	0.0	0.0	2.5	0.0	0.0	0.0	43.3	0.0	7.6	5.3	0.0	189.6
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	31.6	0.0	0.0	0.0	31.6
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	9.1	4.0	3.7	2.9	2.7	2.5	0.4	0.3	0.3	0.0	0.0	4.4	0.0	0.8	0.5	0.0	31.6
Section 14	9.1	103.0	95.2	75.3	68.3	39.7	0.4	6.5	0.3	0.0	0.0	113.0	31.6	19.9	13.8	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	51.2	47.3	37.4	34.0	32.0	0.0	3.2	0.0	0.0	0.0	56.2	0.0	9.9	6.9	0.0	278.1
Cc	0.0	62.0	57.3	45.3	41.1	0.0	0.0	3.9	0.0	0.0	0.0	68.0	0.0	12.0	8.3	0.0	297.9
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 23	0.0	113.2	104.6	82.7	75.1	32.0	0.0	7.1	0.0	0.0	0.0	124.2	0.0	21.9	15.2	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	78.1	72.2	57.1	51.8	48.8	0.0	4.9	0.0	0.0	0.0	85.7	0.0	15.1	10.5	0.0	424.3
Cc	0.0	15.8	14.6	11.5	10.5	0.0	0.0	1.0	0.0	0.0	0.0	17.3	0.0	3.0	2.1	0.0	75.9
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	75.9	0.0	0.0	0.0	75.9
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 26	0.0	93.9	86.8	68.6	62.3	48.8	0.0	5.9	0.0	0.0	0.0	103.1	75.9	18.1	12.6	0.0	**576.0**

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Appendix III. Section Crop Acreage by Soil Mapping Unit (Page 7 of 20)

Net Crop 90%	Corn, field	Alfalfa	Sugar Beets	Grain wheat	Tomatoes	Dry Beans	Almonds	Safflower	Walnuts	Vineyard	Nursery	Pasture	Pasture, Dry	Hay, Grass	Hay, Grain	Sudan	Total
Column 4																	
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	18.1	8.1	7.5	5.9	5.4	5.0	0.8	0.5	0.5	0.0	0.0	8.9	0.0	1.6	1.1	0.0	63.2
Ca	0.0	59.5	55.0	43.5	39.5	37.2	0.0	3.7	0.0	0.0	0.0	65.3	0.0	11.5	8.0	0.0	323.2
Cc	0.0	2.6	2.4	1.9	1.7	0.0	0.0	0.2	0.0	0.0	0.0	2.9	0.0	0.5	0.4	0.0	12.6
CeA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	47.1	20.9	19.4	15.3	13.9	13.1	2.0	1.3	1.3	0.1	0.0	23.0	0.0	4.0	2.8	0.1	164.3
Section 36	65.2	91.1	84.3	66.6	60.5	55.3	2.7	5.7	1.8	0.1	0.0	100.0	0.0	17.6	12.2	0.1	563.4
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	25.4	11.3	10.4	8.3	7.5	7.1	1.1	0.7	0.7	0.0	0.0	12.4	0.0	2.2	1.5	0.0	88.5
Ca	0.0	61.8	57.2	45.2	41.0	38.6	0.0	3.9	0.0	0.0	0.0	67.9	0.0	11.9	8.3	0.0	335.8
Cc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CeA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	3.6	1.6	1.5	1.2	1.1	1.0	0.2	0.1	0.1	0.0	0.0	1.8	0.0	0.3	0.2	0.0	12.6
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	36.2	16.1	14.9	11.8	10.7	10.1	1.5	1.0	1.0	0.0	0.0	17.7	0.0	3.1	2.2	0.1	126.4
Section 1	65.2	90.8	84.0	66.4	60.3	56.8	2.7	5.7	1.8	0.1	0.0	99.7	0.0	17.5	12.2	0.1	563.4
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	27.9	25.8	20.4	18.5	17.5	0.0	1.8	0.0	0.0	0.0	30.7	0.0	5.4	3.7	0.0	151.7
Cc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CeA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	32.6	14.5	13.4	10.6	9.6	9.1	1.4	0.9	0.9	0.0	0.0	15.9	0.0	2.8	1.9	0.0	113.8
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	89.0	39.6	36.6	28.9	26.3	24.7	3.7	2.5	2.5	0.1	0.0	43.5	0.0	7.6	5.3	0.2	310.5
Section 12	121.6	82.0	75.8	60.0	54.4	51.3	5.1	5.2	3.4	0.1	0.0	90.0	0.0	15.8	11.0	0.2	576.0
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	14.5	6.5	6.0	4.7	4.3	4.0	0.6	0.4	0.4	0.0	0.0	7.1	0.0	1.2	0.9	0.0	50.6
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CeA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	29.0	12.9	11.9	9.4	8.6	8.1	1.2	0.8	0.8	0.0	0.0	14.2	0.0	2.5	1.7	0.0	101.1
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	12.9	5.7	5.3	4.2	3.8	3.6	0.5	0.4	0.4	0.0	0.0	6.3	0.0	1.1	0.8	0.0	45.0
Section 13	56.4	25.1	23.2	18.3	16.7	15.7	2.4	1.6	1.6	0.1	0.0	27.5	0.0	4.8	3.4	0.0	196.7
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	47.1	21.0	19.4	15.3	13.9	13.1	2.0	1.3	1.3	0.1	0.0	23.0	0.0	4.1	2.8	0.0	164.3
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CeA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	27.4	12.2	11.3	8.9	8.1	7.6	1.2	0.8	0.8	0.0	0.0	13.4	0.0	2.4	1.6	0.1	95.6
Section 24	74.5	33.1	30.7	24.2	22.0	20.7	3.1	2.1	2.1	0.1	0.0	36.4	0.0	6.4	4.4	0.1	260.0
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	72.5	32.3	29.8	23.6	21.4	20.2	3.1	2.0	2.0	0.1	0.0	35.4	0.0	6.2	4.3	0.0	252.8
Ca	0.0	7.0	6.5	5.1	4.6	4.4	0.0	0.4	0.0	0.0	0.0	7.7	0.0	1.3	0.9	0.0	37.9
Cc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CeA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	10.9	4.8	4.5	3.5	3.2	3.0	0.5	0.3	0.3	0.0	0.0	5.3	0.0	0.9	0.6	0.0	37.9
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	63.6	28.3	26.2	20.7	18.8	17.7	2.7	1.8	1.8	0.1	0.0	31.1	0.0	5.5	3.8	0.1	222.0

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Appendix III. Section Crop Acreage by Soil Mapping Unit (Page 8 of 20)

Section 25	147.0	72.4	66.9	52.9	48.0	45.2	6.2	4.6	4.1	0.2	0.0	79.4	0.0	14.0	9.7	0.1	**550.7**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	5.4	2.4	2.2	1.8	1.6	1.5	0.2	0.2	0.2	0.0	0.0	2.7	0.0	0.5	0.3	0.0	19.0
Ca	0.0	60.6	56.1	44.3	40.3	37.9	0.0	3.8	0.0	0.0	0.0	66.6	0.0	11.7	8.1	0.0	329.5
Cc	0.0	34.2	31.6	25.0	22.7	0.0	0.0	2.2	0.0	0.0	0.0	37.5	0.0	6.6	4.6	0.0	164.3
CeA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	3.6	1.6	1.5	1.2	1.1	1.0	0.2	0.1	0.1	0.0	0.0	1.8	0.0	0.3	0.2	0.0	12.6
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	14.5	6.4	6.0	4.7	4.3	4.0	0.6	0.4	0.4	0.0	0.0	7.1	0.0	1.2	0.9	0.0	50.6
Section 36	23.6	105.3	97.4	77.0	69.9	44.5	1.0	6.6	0.7	0.0	0.0	115.6	0.0	20.3	14.1	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	27.9	25.8	20.4	18.5	17.5	0.0	1.8	0.0	0.0	0.0	30.7	0.0	5.4	3.7	0.0	151.7
Cc	0.0	67.2	62.2	49.1	44.6	0.0	0.0	4.2	0.0	0.0	0.0	73.8	0.0	13.0	9.0	0.0	323.2
CeA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	14.5	6.4	6.0	4.7	4.3	4.0	0.6	0.4	0.4	0.0	0.0	7.1	0.0	1.2	0.9	0.0	50.6
Section 1	14.5	101.6	93.9	74.3	67.4	21.5	0.6	6.4	0.4	0.0	0.0	111.5	0.0	19.6	13.6	0.0	**525.4**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	37.2	34.4	27.2	24.7	23.3	0.0	2.3	0.0	0.0	0.0	40.9	0.0	7.2	5.0	0.0	202.3
Cc	0.0	76.7	70.9	56.1	50.9	0.0	0.0	4.8	0.0	0.0	0.0	84.2	0.0	14.8	10.3	0.0	368.7
CeA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	1.4	0.6	0.6	0.5	0.4	0.4	0.1	0.0	0.0	0.0	0.0	0.7	0.0	0.1	0.1	0.0	5.1
Section 12	1.4	114.6	105.9	83.8	76.0	23.7	0.1	7.2	0.0	0.0	0.0	125.8	0.0	22.1	15.4	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	41.9	38.7	30.6	27.8	26.2	0.0	2.6	0.0	0.0	0.0	46.0	0.0	8.1	5.6	0.0	227.6
Cc	0.0	72.5	67.0	53.0	48.1	0.0	0.0	4.6	0.0	0.0	0.0	79.6	0.0	14.0	9.7	0.0	348.4
CeA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 13	0.0	114.4	105.7	83.6	75.9	26.2	0.0	7.2	0.0	0.0	0.0	125.5	0.0	22.1	15.3	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	27.9	25.8	20.4	18.5	17.5	0.0	1.8	0.0	0.0	0.0	30.7	0.0	5.4	3.7	0.0	151.7
Cc	0.0	69.9	64.6	51.1	46.4	0.0	0.0	4.4	0.0	0.0	0.0	76.7	0.0	13.5	9.4	0.0	335.8
CeA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	34.2	0.0	0.0	0.0	2.9	0.0	0.0	0.0	0.0	36.1	9.0	6.3	0.0	88.5
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 24	0.0	97.8	90.4	105.6	64.9	17.5	0.0	9.1	0.0	0.0	0.0	107.3	36.1	27.9	19.4	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	73.4	67.9	53.7	48.8	45.9	0.0	4.6	0.0	0.0	0.0	80.6	0.0	14.2	9.8	0.0	399.0
Cc	0.0	23.7	21.9	17.3	15.7	0.0	0.0	1.5	0.0	0.0	0.0	26.0	0.0	4.6	3.2	0.0	113.8
CeA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	24.4	0.0	0.0	0.0	2.1	0.0	0.0	0.0	0.0	25.8	6.4	4.5	0.0	63.2
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 25	0.0	97.1	89.8	95.4	64.5	45.9	0.0	8.2	0.0	0.0	0.0	106.6	25.8	25.2	17.5	0.0	**576.0**

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Appendix III. Section Crop Acreage by Soil Mapping Unit (Page 9 of 20)

Net Crop 90%	Corn, field	Alfalfa	Sugar Beets	Grain wheat	Tomatoes	Dry Beans	Almonds	Safflower	Walnuts	Vineyard	Nursery	Pasture	Pasture, Dry	Hay, Grass	Hay, Grain	Sudan	Total
Column 5																	
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	43.5	19.4	17.9	14.1	12.8	12.1	1.8	1.2	1.2	0.0	0.0	21.2	0.0	3.7	2.6	0.0	151.7
Ca	0.0	57.2	52.8	41.8	37.9	35.7	0.0	3.6	0.0	0.0	0.0	62.7	0.0	11.0	7.7	0.0	310.5
Cc	0.0	7.9	7.3	5.8	5.2	0.0	0.0	0.5	0.0	0.0	0.0	8.7	0.0	1.5	1.1	0.0	37.9
CeA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	14.5	6.4	6.0	4.7	4.3	4.0	0.6	0.4	0.4	0.0	0.0	7.1	0.0	1.2	0.9	0.0	50.6
Section 31	58.0	90.8	84.0	66.4	60.3	51.9	2.4	5.7	1.6	0.1	0.0	99.7	0.0	17.6	12.2	0.0	**550.7**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	66.5	61.5	48.6	44.1	41.6	0.0	4.2	0.0	0.0	0.0	73.0	0.0	12.8	8.9	0.0	361.1
Cc	0.0	28.9	26.7	21.1	19.2	0.0	0.0	1.8	0.0	0.0	0.0	31.8	0.0	5.6	3.9	0.0	139.1
CeA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	18.1	8.1	7.5	5.9	5.4	5.0	0.8	0.5	0.5	0.0	0.0	8.9	0.0	1.6	1.1	0.0	63.2
Yr	3.6	1.6	1.5	1.2	1.1	1.0	0.2	0.1	0.1	0.0	0.0	1.8	0.0	0.3	0.2	0.0	12.6
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 6	21.8	105.1	97.1	76.8	69.7	47.6	0.9	6.6	0.6	0.0	0.0	115.3	0.0	20.3	14.1	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	25.4	11.3	10.4	8.3	7.5	7.1	1.1	0.7	0.7	0.0	0.0	12.4	0.0	2.2	1.5	0.0	88.5
Ca	0.0	16.3	15.1	11.9	10.8	10.2	0.0	1.0	0.0	0.0	0.0	17.9	0.0	3.1	2.2	0.0	88.5
Cc	0.0	18.4	17.0	13.5	12.2	0.0	0.0	1.2	0.0	0.0	0.0	20.2	0.0	3.6	2.5	0.0	88.5
CeA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	27.2	12.1	11.2	8.8	8.0	7.6	1.1	0.8	0.8	0.0	0.0	13.3	0.0	2.3	1.6	0.0	94.8
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	61.8	27.5	25.4	20.1	18.3	17.2	2.6	1.7	1.7	0.1	0.0	30.2	0.0	5.3	3.7	0.1	215.7
Section 7	114.4	85.6	79.1	62.6	56.8	42.0	4.8	5.4	3.2	0.1	0.0	93.9	0.0	16.5	11.5	0.1	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	1.5	0.6	0.6	0.5	0.4	0.4	0.1	0.0	0.0	0.0	0.0	0.7	0.0	0.1	0.1	0.0	5.1
Ca	0.0	23.3	21.5	17.0	15.4	14.5	0.0	1.5	0.0	0.0	0.0	25.5	0.0	4.5	3.1	0.0	126.4
Cc	0.0	2.6	2.4	1.9	1.7	0.0	0.0	0.2	0.0	0.0	0.0	2.9	0.0	0.5	0.4	0.0	12.6
CeA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	91.2	40.6	37.5	29.7	26.9	25.4	3.8	2.6	2.5	0.1	0.0	44.5	0.0	7.8	5.4	0.0	318.1
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	32.6	14.5	13.4	10.6	9.6	9.1	1.4	0.9	0.9	0.0	0.0	15.9	0.0	2.8	1.9	0.1	113.8
Section 18	125.3	81.6	75.5	59.7	54.2	49.4	5.3	5.1	3.5	0.1	0.0	89.6	0.0	15.8	10.9	0.1	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	29.0	12.9	11.9	9.4	8.6	8.1	1.2	0.8	0.8	0.0	0.0	14.2	0.0	2.5	1.7	0.0	101.1
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	72.5	67.0	53.0	48.1	0.0	0.0	4.6	0.0	0.0	0.0	79.6	0.0	14.0	9.7	0.0	348.4
CeA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	32.6	14.5	13.4	10.6	9.6	9.1	1.4	0.9	0.9	0.0	0.0	15.9	0.0	2.8	1.9	0.0	113.8
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	3.6	1.6	1.5	1.2	1.1	1.0	0.2	0.1	0.1	0.0	0.0	1.8	0.0	0.3	0.2	0.0	12.6
Section 19	65.2	101.5	93.9	74.2	67.4	18.1	2.7	6.4	1.8	0.1	0.0	111.4	0.0	19.6	13.6	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	118.0	52.5	48.5	38.4	34.9	32.8	5.0	3.3	3.3	0.1	0.0	57.6	0.0	10.1	7.0	0.0	411.7
Ca	0.0	9.3	8.6	6.8	6.2	5.8	0.0	0.6	0.0	0.0	0.0	10.2	0.0	1.8	1.2	0.0	50.6
Cc	0.0	15.8	14.6	11.5	10.5	0.0	0.0	1.0	0.0	0.0	0.0	17.3	0.0	3.0	2.1	0.0	75.9
CeA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	10.9	4.8	4.5	3.5	3.2	3.0	0.5	0.3	0.3	0.0	0.0	5.3	0.0	0.9	0.6	0.0	37.9

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Appendix III. Section Crop Acreage by Soil Mapping Unit (Page 10 of 20)

Section 30	128.9	82.4	76.2	60.3	54.7	41.7	5.4	5.2	3.6	0.1	0.0	90.5	0.0	15.9	11.0	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	4.7	4.3	3.4	3.1	2.9	0.0	0.3	0.0	0.0	0.0	5.1	0.0	0.9	0.6	0.0	25.3
Cc	0.0	114.6	105.9	83.7	76.0	0.0	0.0	7.2	0.0	0.0	0.0	125.8	0.0	22.1	15.3	0.0	550.7
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 31	0.0	119.2	110.2	87.2	79.1	2.9	0.0	7.5	0.0	0.0	0.0	130.9	0.0	23.0	16.0	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	2.3	2.2	1.7	1.5	1.5	0.0	0.1	0.0	0.0	0.0	2.6	0.0	0.4	0.3	0.0	12.6
Cc	0.0	113.2	104.7	82.8	75.2	0.0	0.0	7.1	0.0	0.0	0.0	124.3	0.0	21.9	15.2	0.0	544.4
CcA	0.0	3.9	3.6	2.9	2.6	0.0	0.0	0.2	0.0	0.0	0.0	4.3	0.0	0.8	0.5	0.0	19.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 6	0.0	119.5	110.5	87.4	79.3	1.5	0.0	7.5	0.0	0.0	0.0	131.2	0.0	23.1	16.0	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	10.5	9.7	7.7	7.0	6.5	0.0	0.7	0.0	0.0	0.0	11.5	0.0	2.0	1.4	0.0	56.9
Cc	0.0	108.0	99.8	78.9	71.7	0.0	0.0	6.8	0.0	0.0	0.0	118.5	0.0	20.9	14.5	0.0	519.1
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 7	0.0	118.5	109.5	86.6	78.6	6.5	0.0	7.5	0.0	0.0	0.0	130.0	0.0	22.9	15.9	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	63.2	0.0	0.0	0.0	63.2
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	30.3	28.0	22.1	20.1	18.9	0.0	1.9	0.0	0.0	0.0	33.2	0.0	5.8	4.1	0.0	164.3
Cc	0.0	72.5	67.0	53.0	48.1	0.0	0.0	4.6	0.0	0.0	0.0	79.6	0.0	14.0	9.7	0.0	348.4
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 18	0.0	102.7	95.0	75.1	68.2	18.9	0.0	6.5	0.0	0.0	0.0	112.8	63.2	19.8	13.8	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	34.9	32.3	25.5	23.2	21.8	0.0	2.2	0.0	0.0	0.0	38.3	0.0	6.7	4.7	0.0	189.6
Cc	0.0	69.9	64.6	51.1	46.4	0.0	0.0	4.4	0.0	0.0	0.0	76.7	0.0	13.5	9.4	0.0	335.8
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	19.5	0.0	0.0	0.0	1.7	0.0	0.0	0.0	0.0	20.6	5.2	3.6	0.0	50.6
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 19	0.0	104.8	96.9	96.1	69.5	21.8	0.0	8.3	0.0	0.0	0.0	115.0	20.6	25.4	17.6	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	30.3	28.0	22.1	20.1	18.9	0.0	1.9	0.0	0.0	0.0	33.2	0.0	5.8	4.1	0.0	164.3
Cc	0.0	85.6	79.2	62.6	56.8	0.0	0.0	5.4	0.0	0.0	0.0	94.0	0.0	16.5	11.5	0.0	411.7
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 30	0.0	115.9	107.1	84.7	76.9	18.9	0.0	7.3	0.0	0.0	0.0	127.2	0.0	22.4	15.5	0.0	**576.0**

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Appendix III. Section Crop Acreage by Soil Mapping Unit (Page 11 of 20)

Net Crop 90%	Corn, field	Alfalfa	Sugar Beets	Grain wheat	Tomatoes	Dry Beans	Almonds	Safflower	Walnuts	Vineyard	Nursery	Pasture	Pasture, Dry	Hay, Grass	Hay, Grain	Sudan	Total
Column 6																	
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N/A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	66.5	61.5	48.6	44.1	41.6	0.0	4.2	0.0	0.0	0.0	73.0	0.0	12.8	8.9	0.0	361.1
Cc	0.0	42.1	38.9	30.8	27.9	0.0	0.0	2.7	0.0	0.0	0.0	46.2	0.0	8.1	5.6	0.0	202.3
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	3.6	1.6	1.5	1.2	1.1	1.0	0.2	0.1	0.1	0.0	0.0	1.8	0.0	0.3	0.2	0.0	12.6
Section 5	3.6	110.2	101.8	80.5	73.1	42.6	0.2	6.9	0.1	0.0	0.0	120.9	0.0	21.3	14.8	0.0	576.0
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	21.8	9.7	8.9	7.1	6.4	6.0	0.9	0.6	0.6	0.0	0.0	10.6	0.0	1.9	1.3	0.0	75.9
Ca	0.0	16.3	15.1	11.9	10.8	10.2	0.0	1.0	0.0	0.0	0.0	17.9	0.0	3.1	2.2	0.0	88.5
Cc	0.0	75.1	69.4	54.9	49.9	0.0	0.0	4.7	0.0	0.0	0.0	82.5	0.0	14.5	10.1	0.0	361.1
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	14.5	6.4	6.0	4.7	4.3	4.0	0.6	0.4	0.4	0.0	0.0	7.1	0.0	1.2	0.9	0.0	50.6
Section 8	36.2	107.5	99.4	78.6	71.4	20.3	1.5	6.8	1.0	0.0	0.0	118.0	0.0	20.8	14.4	0.0	576.0
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	67.3	29.9	27.7	21.9	19.9	18.7	2.8	1.9	1.9	0.1	0.0	32.9	0.0	5.8	4.0	0.0	234.7
Ca	0.0	7.0	6.5	5.1	4.6	4.4	0.0	0.4	0.0	0.0	0.0	7.7	0.0	1.3	0.9	0.0	37.9
Cc	0.0	34.2	31.6	25.0	22.7	0.0	0.0	2.2	0.0	0.0	0.0	37.5	0.0	6.6	4.6	0.0	164.3
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	29.0	12.9	11.9	9.4	8.6	8.1	1.2	0.8	0.8	0.0	0.0	14.2	0.0	2.5	1.7	0.0	101.1
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	10.9	4.8	4.5	3.5	3.2	3.0	0.5	0.3	0.3	0.0	0.0	5.3	0.0	0.9	0.6	0.0	37.9
Section 17	107.2	88.8	82.1	64.9	59.0	34.2	4.5	5.6	3.0	0.1	0.0	97.5	0.0	17.2	11.9	0.0	576.0
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	36.3	16.1	14.9	11.8	10.7	10.1	1.5	1.0	1.0	0.0	0.0	17.7	0.0	3.1	2.2	0.0	126.4
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	7.9	7.3	5.8	5.2	0.0	0.0	0.5	0.0	0.0	0.0	8.7	0.0	1.5	1.1	0.0	37.9
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	118.0	52.5	48.5	38.4	34.9	32.8	5.0	3.3	3.3	0.1	0.0	57.6	0.0	10.1	7.0	0.0	411.7
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 20	154.3	76.5	70.8	55.9	50.8	42.9	6.5	4.8	4.3	0.2	0.0	84.0	0.0	14.8	10.3	0.0	576.0
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	18.1	8.1	7.5	5.9	5.4	5.0	0.8	0.5	0.5	0.0	0.0	8.9	0.0	1.6	1.1	0.0	63.2
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	106.7	98.6	78.0	70.8	0.0	0.0	6.7	0.0	0.0	0.0	117.1	0.0	20.6	14.3	0.0	512.8
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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Appendix III. Section Crop Acreage by Soil Mapping Unit (Page 12 of 20)

Section 29	18.1	114.7	106.1	83.9	76.2	5.0	0.8	7.2	0.5	0.0	0.0	125.9	0.0	22.2	15.4	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	110.6	102.3	80.9	73.4	0.0	0.0	7.0	0.0	0.0	0.0	121.4	0.0	21.4	14.8	0.0	531.8
CcA	0.0	9.2	8.5	6.7	6.1	0.0	0.0	0.6	0.0	0.0	0.0	10.1	0.0	1.8	1.2	0.0	44.2
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 32	0.0	119.8	110.8	87.6	79.5	0.0	0.0	7.6	0.0	0.0	0.0	131.5	0.0	23.1	16.1	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	109.3	101.1	79.9	72.5	0.0	0.0	6.9	0.0	0.0	0.0	120.0	0.0	21.1	14.6	0.0	525.4
CcA	0.0	10.5	9.7	7.7	7.0	0.0	0.0	0.7	0.0	0.0	0.0	11.5	0.0	2.0	1.4	0.0	50.6
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 5	0.0	119.8	110.8	87.6	79.5	0.0	0.0	7.6	0.0	0.0	0.0	131.5	0.0	23.1	16.1	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	75.9	0.0	0.0	0.0	75.9
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	90.9	84.0	66.4	60.3	0.0	0.0	5.7	0.0	0.0	0.0	99.8	0.0	17.6	12.2	0.0	436.9
CcA	0.0	13.1	12.2	9.6	8.7	0.0	0.0	0.8	0.0	0.0	0.0	14.4	0.0	2.5	1.8	0.0	63.2
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 8	0.0	104.0	96.2	76.1	69.1	0.0	0.0	6.6	0.0	0.0	0.0	114.2	75.9	20.1	13.9	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	63.2	0.0	0.0	0.0	63.2
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	11.6	10.8	8.5	7.7	7.3	0.0	0.7	0.0	0.0	0.0	12.8	0.0	2.2	1.6	0.0	63.2
Cc	0.0	85.6	79.2	62.6	56.8	0.0	0.0	5.4	0.0	0.0	0.0	94.0	0.0	16.5	11.5	0.0	411.7
CcA	0.0	7.9	7.3	5.8	5.2	0.0	0.0	0.5	0.0	0.0	0.0	8.7	0.0	1.5	1.1	0.0	37.9
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 17	0.0	105.2	97.2	76.9	69.8	7.3	0.0	6.6	0.0	0.0	0.0	115.4	63.2	20.3	14.1	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	101.1	0.0	0.0	0.0	101.1
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	20.9	19.4	15.3	13.9	13.1	0.0	1.3	0.0	0.0	0.0	23.0	0.0	4.0	2.8	0.0	113.8
Cc	0.0	72.5	67.0	53.0	48.1	0.0	0.0	4.6	0.0	0.0	0.0	79.6	0.0	14.0	9.7	0.0	348.4
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.6	0.0	0.0	0.0	12.6
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 20	0.0	93.4	86.4	68.3	62.0	13.1	0.0	5.9	0.0	0.0	0.0	102.6	113.8	18.1	12.5	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	11.6	10.8	8.5	7.7	7.3	0.0	0.7	0.0	0.0	0.0	12.8	0.0	2.2	1.6	0.0	63.2
Cc	0.0	106.7	98.6	78.0	70.8	0.0	0.0	6.7	0.0	0.0	0.0	117.1	0.0	20.6	14.3	0.0	512.8
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 29	0.0	118.3	109.4	86.5	78.5	7.3	0.0	7.5	0.0	0.0	0.0	129.9	0.0	22.9	15.9	0.0	**576.0**

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Appendix III. Section Crop Acreage by Soil Mapping Unit (Page 13 of 20)

Net Crop 90% Column 7	Corn, field	Alfalfa	Sugar Beets	Grain wheat	Tomatoes	Dry Beans	Almonds	Safflower	Walnuts	Vineyard	Nursery	Pasture	Pasture, Dry	Hay, Grass	Hay, Grain	Sudan	Total
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N/A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	71.1	65.8	52.0	47.2	44.5	0.0	4.5	0.0	0.0	0.0	78.1	0.0	13.7	9.5	0.0	386.4
Cc	0.0	2.6	2.4	1.9	1.7	0.0	0.0	0.2	0.0	0.0	0.0	2.9	0.0	0.5	0.4	0.0	12.6
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	50.7	22.6	20.9	16.5	15.0	14.1	2.1	1.4	1.4	0.1	0.0	24.8	0.0	4.4	3.0	0.1	177.0
Section 4	50.7	96.3	89.1	70.4	63.9	58.6	2.1	6.1	1.4	0.1	0.0	105.7	0.0	18.6	12.9	0.1	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	10.9	4.8	4.5	3.5	3.2	3.0	0.5	0.3	0.3	0.0	0.0	5.3	0.0	0.9	0.6	0.0	37.9
Ca	0.0	48.9	45.2	35.7	32.4	30.5	0.0	3.1	0.0	0.0	0.0	53.6	0.0	9.4	6.5	0.0	265.5
Cc	0.0	10.5	9.7	7.7	7.0	0.0	0.0	0.7	0.0	0.0	0.0	11.5	0.0	2.0	1.4	0.0	50.6
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	63.6	28.3	26.2	20.7	18.8	17.7	2.7	1.8	1.8	0.1	0.0	31.1	0.0	5.5	3.8	0.1	222.0
Section 9	74.5	92.5	85.6	67.6	61.4	51.3	3.1	5.8	2.1	0.1	0.0	101.6	0.0	17.9	12.4	0.1	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	7.3	3.2	3.0	2.4	2.1	2.0	0.3	0.2	0.2	0.0	0.0	3.5	0.0	0.6	0.4	0.0	25.3
Ca	0.0	7.0	6.5	5.1	4.6	4.4	0.0	0.4	0.0	0.0	0.0	7.7	0.0	1.3	0.9	0.0	37.9
Cc	0.0	62.0	57.3	45.3	41.1	0.0	0.0	3.9	0.0	0.0	0.0	68.0	0.0	12.0	8.3	0.0	297.9
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	61.6	27.4	25.3	20.0	18.2	17.1	2.6	1.7	1.7	0.1	0.0	30.1	0.0	5.3	3.7	0.1	214.9
Section 16	68.8	99.6	92.1	72.8	66.1	23.5	2.9	6.3	1.9	0.1	0.0	109.3	0.0	19.2	13.3	0.1	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	30.8	13.7	12.7	10.0	9.1	8.6	1.3	0.9	0.9	0.0	0.0	15.0	0.0	2.6	1.8	0.0	107.5
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	10.5	9.7	7.7	7.0	0.0	0.0	0.7	0.0	0.0	0.0	11.5	0.0	2.0	1.4	0.0	50.6
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	105.4	46.9	43.3	34.3	31.1	29.3	4.4	3.0	2.9	0.1	0.0	51.4	0.0	9.1	6.3	0.0	367.4
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	14.5	6.4	6.0	4.7	4.3	4.0	0.6	0.4	0.4	0.0	0.0	7.1	0.0	1.2	0.9	0.0	50.6
Section 21	150.7	77.5	71.7	56.7	51.5	41.9	6.3	4.9	4.2	0.2	0.0	85.1	0.0	15.0	10.4	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	25.4	11.3	10.4	8.3	7.5	7.1	1.1	0.7	0.7	0.0	0.0	12.4	0.0	2.2	1.5	0.0	88.5
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	75.1	69.4	54.9	49.9	0.0	0.0	4.7	0.0	0.0	0.0	82.5	0.0	14.5	10.1	0.0	361.1
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	18.1	8.1	7.5	5.9	5.4	5.0	0.8	0.5	0.5	0.0	0.0	8.9	0.0	1.6	1.1	0.0	63.2
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	18.1	8.1	7.5	5.9	5.3	5.0	0.8	0.5	0.5	0.0	0.0	8.8	0.0	1.6	1.1	0.0	63.2

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Appendix III. Section Crop Acreage by Soil Mapping Unit (Page 14 of 20)

Section 28	61.6	102.5	94.8	74.9	68.0	17.1	2.6	6.5	1.7	0.1	0.0	112.5	0.0	19.8	13.7	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	93.5	86.5	68.4	62.1	0.0	0.0	5.9	0.0	0.0	0.0	102.7	0.0	18.1	12.5	0.0	449.6
CcA	0.0	26.3	24.3	19.2	17.5	0.0	0.0	1.7	0.0	0.0	0.0	28.9	0.0	5.1	3.5	0.0	126.4
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 33	0.0	119.8	110.8	87.6	79.5	0.0	0.0	7.6	0.0	0.0	0.0	131.5	0.0	23.1	16.1	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	101.4	93.8	74.1	67.3	0.0	0.0	6.4	0.0	0.0	0.0	111.3	0.0	19.6	13.6	0.0	487.5
CcA	0.0	18.4	17.0	13.5	12.2	0.0	0.0	1.2	0.0	0.0	0.0	20.2	0.0	3.6	2.5	0.0	88.5
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 4	0.0	119.8	110.8	87.6	79.5	0.0	0.0	7.6	0.0	0.0	0.0	131.5	0.0	23.1	16.1	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	88.5	0.0	0.0	0.0	88.5
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	0.7	0.6	0.5	0.5	0.4	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.1	0.1	0.0	3.8
Cc	0.0	79.6	73.6	58.2	52.8	0.0	0.0	5.0	0.0	0.0	0.0	87.4	0.0	15.4	10.7	0.0	382.6
CcA	0.0	21.0	19.5	15.4	14.0	0.0	0.0	1.3	0.0	0.0	0.0	23.1	0.0	4.1	2.8	0.0	101.1
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 9	0.0	101.3	93.7	74.1	67.2	0.4	0.0	6.4	0.0	0.0	0.0	111.2	88.5	19.6	13.6	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	113.8	0.0	0.0	0.0	113.8
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	31.6	29.2	23.1	20.9	0.0	0.0	2.0	0.0	0.0	0.0	34.6	0.0	6.1	4.2	0.0	151.7
CcA	0.0	64.6	59.7	47.2	42.9	0.0	0.0	4.1	0.0	0.0	0.0	70.9	0.0	12.5	8.7	0.0	310.5
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 16	0.0	96.1	88.9	70.3	63.8	0.0	0.0	6.1	0.0	0.0	0.0	105.5	113.8	18.6	12.9	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	113.8	0.0	0.0	0.0	113.8
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	93.5	86.5	68.4	62.1	0.0	0.0	5.9	0.0	0.0	0.0	102.7	0.0	18.1	12.5	0.0	449.6
CcA	0.0	2.6	2.4	1.9	1.7	0.0	0.0	0.2	0.0	0.0	0.0	2.9	0.0	0.5	0.4	0.0	12.6
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 21	0.0	96.1	88.9	70.3	63.8	0.0	0.0	6.1	0.0	0.0	0.0	105.5	113.8	18.6	12.9	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	75.9	0.0	0.0	0.0	75.9
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	2.3	2.2	1.7	1.5	1.5	0.0	0.1	0.0	0.0	0.0	2.6	0.0	0.4	0.3	0.0	12.6
Cc	0.0	96.1	88.9	70.3	63.8	0.0	0.0	6.1	0.0	0.0	0.0	105.5	0.0	18.6	12.9	0.0	462.2
CcA	0.0	5.3	4.9	3.8	3.5	0.0	0.0	0.3	0.0	0.0	0.0	5.8	0.0	1.0	0.7	0.0	25.3
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 28	0.0	103.7	95.9	75.8	68.9	1.5	0.0	6.5	0.0	0.0	0.0	113.9	75.9	20.0	13.9	0.0	**576.0**

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Appendix III. Section Crop Acreage by Soil Mapping Unit (Page 15 of 20)

Net Crop 90%	Corn, field	Alfalfa	Sugar Beets	Grain wheat	Tomatoes	Dry Beans	Almonds	Safflower	Walnuts	Vineyard	Nursery	Pasture	Pasture, Dry	Hay, Grass	Hay, Grain	Sudan	Total
Column 8																	
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CeA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N/A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.6	0.0	0.0	0.0	12.6
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	59.3	54.9	43.4	39.4	0.0	0.0	3.7	0.0	0.0	0.0	65.1	0.0	11.5	7.9	0.0	285.2
CeA	0.0	2.6	2.4	1.9	1.7	0.0	0.0	0.2	0.0	0.0	0.0	2.9	0.0	0.5	0.4	0.0	12.6
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	202.3	0.0	0.0	0.0	202.3
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	18.1	8.1	7.5	5.9	5.3	5.0	0.8	0.5	0.5	0.0	0.0	8.8	0.0	1.6	1.1	0.0	63.2
Section 3	18.1	70.0	64.7	51.2	46.5	5.0	0.8	4.4	0.5	0.0	0.0	76.9	214.9	13.5	9.4	0.0	576.0
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.3	0.0	0.0	0.0	25.3
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	47.9	44.2	35.0	31.8	29.9	0.0	3.0	0.0	0.0	0.0	52.5	0.0	9.2	6.4	0.0	260.0
Cc	0.0	60.5	55.9	44.2	40.1	0.0	0.0	3.8	0.0	0.0	0.0	66.4	0.0	11.7	8.1	0.0	290.8
CeA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 10	0.0	108.3	100.2	79.2	71.9	29.9	0.0	6.8	0.0	0.0	0.0	118.9	25.3	20.9	14.5	0.0	576.0
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	37.2	34.4	27.2	24.7	23.3	0.0	2.3	0.0	0.0	0.0	40.9	0.0	7.2	5.0	0.0	202.3
Cc	0.0	21.0	19.5	15.4	14.0	0.0	0.0	1.3	0.0	0.0	0.0	23.1	0.0	4.1	2.8	0.0	101.1
CeA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	78.1	34.7	32.1	25.4	23.1	21.7	3.3	2.2	2.2	0.1	0.0	38.1	0.0	6.7	4.7	0.2	272.6
Section 15	78.1	93.0	86.0	68.0	61.7	45.0	3.3	5.9	2.2	0.1	0.0	102.1	0.0	18.0	12.5	0.2	576.0
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	2.2	1.0	0.9	0.7	0.6	0.6	0.1	0.1	0.1	0.0	0.0	1.1	0.0	0.2	0.1	0.0	7.6
Ca	0.0	16.3	15.1	11.9	10.8	10.2	0.0	1.0	0.0	0.0	0.0	17.9	0.0	3.1	2.2	0.0	88.5
Cc	0.0	31.6	29.2	23.1	20.9	0.0	0.0	2.0	0.0	0.0	0.0	34.6	0.0	6.1	4.2	0.0	151.7
CeA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	94.1	41.8	38.7	30.6	27.8	26.2	4.0	2.6	2.6	0.1	0.0	45.9	0.0	8.1	5.6	0.2	328.2
Section 22	96.2	90.7	83.8	66.3	60.2	36.9	4.1	5.7	2.7	0.1	0.0	99.5	0.0	17.5	12.1	0.2	576.0
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	18.1	8.1	7.5	5.9	5.4	5.0	0.8	0.5	0.5	0.0	0.0	8.9	0.0	1.6	1.1	0.0	63.2
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	23.7	21.9	17.3	15.7	0.0	0.0	1.5	0.0	0.0	0.0	26.0	0.0	4.6	3.2	0.0	113.8
CeA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	114.3	50.9	47.0	37.2	33.8	31.8	4.8	3.2	3.2	0.1	0.0	55.8	0.0	9.8	6.8	0.2	399.0

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Appendix III. Section Crop Acreage by Soil Mapping Unit (Page 16 of 20)

Section 27	132.5	82.6	76.4	60.4	54.8	36.8	5.6	5.2	3.7	0.1	0.0	90.7	0.0	16.0	11.1	0.2	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	10.9	4.8	4.5	3.5	3.2	3.0	0.5	0.3	0.3	0.0	0.0	5.3	0.0	0.9	0.6	0.0	37.9
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	65.9	60.9	48.2	43.7	0.0	0.0	4.2	0.0	0.0	0.0	72.3	0.0	12.7	8.8	0.0	316.8
CcA	0.0	9.2	8.5	6.7	6.1	0.0	0.0	0.6	0.0	0.0	0.0	10.1	0.0	1.8	1.2	0.0	44.2
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	50.7	22.6	20.9	16.5	15.0	14.1	2.1	1.4	1.4	0.1	0.0	24.8	0.0	4.4	3.0	0.1	177.0
Section 34	61.6	102.5	94.8	74.9	68.0	17.1	2.6	6.5	1.7	0.1	0.0	112.5	0.0	19.8	13.7	0.1	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	1.8	0.8	0.7	0.6	0.5	0.5	0.1	0.1	0.1	0.0	0.0	0.9	0.0	0.2	0.1	0.0	6.3
Ca	0.0	2.3	2.2	1.7	1.5	1.5	0.0	0.1	0.0	0.0	0.0	2.6	0.0	0.4	0.3	0.0	12.6
Cc	0.0	89.6	82.8	65.5	59.5	0.0	0.0	5.6	0.0	0.0	0.0	98.3	0.0	17.3	12.0	0.0	430.6
CcA	0.0	21.0	19.5	15.4	14.0	0.0	0.0	1.3	0.0	0.0	0.0	23.1	0.0	4.1	2.8	0.0	101.1
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	7.2	3.2	3.0	2.4	2.1	2.0	0.3	0.2	0.2	0.0	0.0	3.5	0.0	0.6	0.4	0.0	25.3
Section 3	9.1	117.0	108.1	85.5	77.6	4.0	0.4	7.4	0.3	0.0	0.0	128.4	0.0	22.6	15.7	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	93.5	86.5	68.4	62.1	0.0	0.0	5.9	0.0	0.0	0.0	102.7	0.0	18.1	12.5	0.0	449.6
CcA	0.0	26.3	24.3	19.2	17.5	0.0	0.0	1.7	0.0	0.0	0.0	28.9	0.0	5.1	3.5	0.0	126.4
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 10	0.0	119.8	110.8	87.6	79.5	0.0	0.0	7.6	0.0	0.0	0.0	131.5	0.0	23.1	16.1	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.6	0.0	0.0	0.0	12.6
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	26.3	24.3	19.2	17.5	0.0	0.0	1.7	0.0	0.0	0.0	28.9	0.0	5.1	3.5	0.0	126.4
CcA	0.0	90.9	84.0	66.4	60.3	0.0	0.0	5.7	0.0	0.0	0.0	99.8	0.0	17.6	12.2	0.0	436.9
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 15	0.0	117.2	108.3	85.7	77.8	0.0	0.0	7.4	0.0	0.0	0.0	128.6	12.6	22.6	15.7	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	47.3	43.8	34.6	31.4	0.0	0.0	3.0	0.0	0.0	0.0	52.0	0.0	9.1	6.3	0.0	227.6
CcA	0.0	46.2	42.7	33.8	30.7	0.0	0.0	2.9	0.0	0.0	0.0	50.7	0.0	8.9	6.2	0.0	222.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	126.4	0.0	0.0	0.0	126.4
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 22	0.0	93.5	86.5	68.4	62.1	0.0	0.0	5.9	0.0	0.0	0.0	102.7	126.4	18.1	12.5	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	72.5	67.0	53.0	48.1	0.0	0.0	4.6	0.0	0.0	0.0	79.6	0.0	14.0	9.7	0.0	348.4
CcA	0.0	26.3	24.3	19.2	17.5	0.0	0.0	1.7	0.0	0.0	0.0	28.9	0.0	5.1	3.5	0.0	126.4
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	101.1	0.0	0.0	0.0	101.1
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 27	0.0	98.8	91.3	72.2	65.6	0.0	0.0	6.2	0.0	0.0	0.0	108.4	101.1	19.1	13.2	0.0	**576.0**

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Appendix III. Section Crop Acreage by Soil Mapping Unit (Page 17 of 20)

Net Crop 90%	Corn, field	Alfalfa	Sugar Beets	Grain wheat	Tomatoes	Dry Beans	Almonds	Safflower	Walnuts	Vineyard	Nursery	Pasture	Pasture, Dry	Hay, Grass	Hay, Grain	Sudan	Total
Column 9																	
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N/A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	20.9	19.4	15.3	13.9	13.1	0.0	1.3	0.0	0.0	0.0	23.0	0.0	4.0	2.8	0.0	113.8
Cc	0.0	13.1	12.2	9.6	8.7	0.0	0.0	0.8	0.0	0.0	0.0	14.4	0.0	2.5	1.8	0.0	63.2
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	335.8	0.0	0.0	0.0	335.8
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	18.1	8.1	7.5	5.9	5.3	5.0	0.8	0.5	0.5	0.0	0.0	8.8	0.0	1.6	1.1	0.0	63.2
Section 2	18.1	42.1	39.0	30.8	28.0	18.1	0.8	2.7	0.5	0.0	0.0	46.3	335.8	8.1	5.6	0.0	576.0
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	63.2	0.0	0.0	0.0	63.2
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	11.6	10.8	8.5	7.7	7.3	0.0	0.7	0.0	0.0	0.0	12.8	0.0	2.2	1.6	0.0	63.2
Cc	0.0	90.9	84.0	66.4	60.3	0.0	0.0	5.7	0.0	0.0	0.0	99.8	0.0	17.6	12.2	0.0	436.9
CcA	0.0	2.6	2.4	1.9	1.7	0.0	0.0	0.2	0.0	0.0	0.0	2.9	0.0	0.5	0.4	0.0	12.6
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 11	0.0	105.2	97.2	76.9	69.8	7.3	0.0	6.6	0.0	0.0	0.0	115.4	63.2	20.3	14.1	0.0	576.0
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.6	0.0	0.0	0.0	50.6
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	11.6	10.8	8.5	7.7	7.3	0.0	0.7	0.0	0.0	0.0	12.8	0.0	2.2	1.6	0.0	63.2
Cc	0.0	86.9	80.4	63.6	57.7	0.0	0.0	5.5	0.0	0.0	0.0	95.4	0.0	16.8	11.6	0.0	418.0
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	12.7	5.6	5.2	4.1	3.7	3.5	0.5	0.4	0.4	0.0	0.0	6.2	0.0	1.1	0.8	0.0	44.2
Section 14	12.7	104.2	96.4	76.2	69.2	10.8	0.5	6.6	0.4	0.0	0.0	114.4	50.6	20.1	14.0	0.0	576.0
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	37.9	0.0	0.0	0.0	37.9
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	98.8	91.3	72.2	65.6	0.0	0.0	6.2	0.0	0.0	0.0	108.4	0.0	19.1	13.2	0.0	474.9
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	18.1	8.1	7.5	5.9	5.3	5.0	0.8	0.5	0.5	0.0	0.0	8.8	0.0	1.6	1.1	0.0	63.2
Section 23	18.1	106.8	98.8	78.1	70.9	5.0	0.8	6.7	0.5	0.0	0.0	117.3	37.9	20.6	14.3	0.0	576.0
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	14.5	6.5	6.0	4.7	4.3	4.0	0.6	0.4	0.4	0.0	0.0	7.1	0.0	1.2	0.9	0.0	50.6
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	86.9	80.4	63.6	57.7	0.0	0.0	5.5	0.0	0.0	0.0	95.4	0.0	16.8	11.6	0.0	418.0
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	30.8	13.7	12.7	10.0	9.1	8.6	1.3	0.9	0.9	0.0	0.0	15.0	0.0	2.6	1.8	0.0	107.5
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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Appendix III. Section Crop Acreage by Soil Mapping Unit (Page 18 of 20)

Section 26	45.3	107.1	99.0	78.3	71.1	12.6	1.9	6.8	1.3	0.1	0.0	117.6	0.0	20.7	14.3	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	10.9	4.8	4.5	3.5	3.2	3.0	0.5	0.3	0.3	0.0	0.0	5.3	0.0	0.9	0.6	0.0	37.9
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	62.0	57.3	45.3	41.1	0.0	0.0	3.9	0.0	0.0	0.0	68.0	0.0	12.0	8.3	0.0	297.9
CeA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	68.8	30.6	28.3	22.4	20.3	19.1	2.9	1.9	1.9	0.1	0.0	33.6	0.0	5.9	4.1	0.1	240.2
Section 35	79.7	97.4	90.1	71.2	64.7	22.2	3.4	6.1	2.2	0.1	0.0	106.9	0.0	18.8	13.1	0.1	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	3.5	3.2	2.6	2.3	2.2	0.0	0.2	0.0	0.0	0.0	3.8	0.0	0.7	0.5	0.0	19.0
Cc	0.0	109.3	101.1	79.9	72.5	0.0	0.0	6.9	0.0	0.0	0.0	120.0	0.0	21.1	14.6	0.0	525.4
CeA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.3	0.0	0.0	0.0	25.3
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	1.8	0.8	0.7	0.6	0.5	0.5	0.1	0.1	0.1	0.0	0.0	0.9	0.0	0.2	0.1	0.0	6.3
Section 2	1.8	113.6	105.0	83.0	75.4	2.7	0.1	7.2	0.1	0.0	0.0	124.7	25.3	21.9	15.2	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	109.3	101.1	79.9	72.5	0.0	0.0	6.9	0.0	0.0	0.0	120.0	0.0	21.1	14.6	0.0	525.4
CeA	0.0	5.3	4.9	3.8	3.5	0.0	0.0	0.3	0.0	0.0	0.0	5.8	0.0	1.0	0.7	0.0	25.3
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	7.2	3.2	3.0	2.4	2.1	2.0	0.3	0.2	0.2	0.0	0.0	3.5	0.0	0.6	0.4	0.0	25.3
Section 11	7.2	117.8	108.9	86.1	78.2	2.0	0.3	7.4	0.2	0.0	0.0	129.3	0.0	22.8	15.8	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	90.9	84.0	66.4	60.3	0.0	0.0	5.7	0.0	0.0	0.0	99.8	0.0	17.6	12.2	0.0	436.9
CeA	0.0	28.9	26.7	21.1	19.2	0.0	0.0	1.8	0.0	0.0	0.0	31.8	0.0	5.6	3.9	0.0	139.1
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 14	0.0	119.8	110.8	87.6	79.5	0.0	0.0	7.6	0.0	0.0	0.0	131.5	0.0	23.1	16.1	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	28.9	26.7	21.1	19.2	0.0	0.0	1.8	0.0	0.0	0.0	31.8	0.0	5.6	3.9	0.0	139.1
CeA	0.0	86.9	80.4	63.6	57.7	0.0	0.0	5.5	0.0	0.0	0.0	95.4	0.0	16.8	11.6	0.0	418.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.0	0.0	0.0	0.0	19.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 23	0.0	115.9	107.1	84.7	76.9	0.0	0.0	7.3	0.0	0.0	0.0	127.2	19.0	22.4	15.5	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	80.4	74.3	58.8	53.3	0.0	0.0	5.1	0.0	0.0	0.0	88.2	0.0	15.5	10.8	0.0	386.4
CeA	0.0	36.8	34.0	26.9	24.4	0.0	0.0	2.3	0.0	0.0	0.0	40.4	0.0	7.1	4.9	0.0	177.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.6	0.0	0.0	0.0	12.6
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 26	0.0	117.2	108.3	85.7	77.8	0.0	0.0	7.4	0.0	0.0	0.0	128.6	12.6	22.6	15.7	0.0	**576.0**

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Appendix III. Section Crop Acreage by Soil Mapping Unit (Page 19 of 20)

Net Crop 90%	Corn, field	Alfalfa	Sugar Beets	Grain wheat	Tomatoes	Dry Beans	Almonds	Safflower	Walnuts	Vineyard	Nursery	Pasture	Pasture, Dry	Hay, Grass	Hay, Grain	Sudan	Total
Column 10																	
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N/A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	23.3	21.5	17.0	15.4	14.5	0.0	1.5	0.0	0.0	0.0	25.5	0.0	4.5	3.1	0.0	126.4
Cc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	373.7	0.0	0.0	0.0	373.7
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	21.7	9.7	8.9	7.1	6.4	6.0	0.9	0.6	0.6	0.0	0.0	10.6	0.0	1.9	1.3	0.0	75.9
Section 1	21.7	32.9	30.5	24.1	21.9	20.6	0.9	2.1	0.6	0.0	0.0	36.2	373.7	6.4	4.4	0.0	576.0
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	18.1	8.1	7.5	5.9	5.4	5.0	0.8	0.5	0.5	0.0	0.0	8.9	0.0	1.6	1.1	0.0	63.2
Ca	0.0	20.9	19.4	15.3	13.9	13.1	0.0	1.3	0.0	0.0	0.0	23.0	0.0	4.0	2.8	0.0	113.8
Cc	0.0	58.0	53.6	42.4	38.5	0.0	0.0	3.7	0.0	0.0	0.0	63.7	0.0	11.2	7.8	0.0	278.9
CcA	0.0	14.5	13.4	10.6	9.6	0.0	0.0	0.9	0.0	0.0	0.0	15.9	0.0	2.8	1.9	0.0	69.5
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	37.9	0.0	0.0	0.0	37.9
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	3.6	1.6	1.5	1.2	1.1	1.0	0.2	0.1	0.1	0.0	0.0	1.8	0.0	0.3	0.2	0.0	12.6
Section 12	21.7	103.1	95.3	75.4	68.4	19.1	0.9	6.5	0.6	0.0	0.0	113.2	37.9	19.9	13.8	0.0	576.0
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	37.9	0.0	0.0	0.0	37.9
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	4.7	4.3	3.4	3.1	2.9	0.0	0.3	0.0	0.0	0.0	5.1	0.0	0.9	0.6	0.0	25.3
Cc	0.0	106.7	98.6	78.0	70.8	0.0	0.0	6.7	0.0	0.0	0.0	117.1	0.0	20.6	14.3	0.0	512.8
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 13	0.0	111.3	102.9	81.4	73.9	2.9	0.0	7.0	0.0	0.0	0.0	122.2	37.9	21.5	14.9	0.0	576.0
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	109.3	101.1	79.9	72.5	0.0	0.0	6.9	0.0	0.0	0.0	120.0	0.0	21.1	14.6	0.0	525.4
CcA	0.0	10.5	9.7	7.7	7.0	0.0	0.0	0.7	0.0	0.0	0.0	11.5	0.0	2.0	1.4	0.0	50.6
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 24	0.0	119.8	110.8	87.6	79.5	0.0	0.0	7.6	0.0	0.0	0.0	131.5	0.0	23.1	16.1	0.0	576.0
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	111.9	103.5	81.8	74.3	0.0	0.0	7.1	0.0	0.0	0.0	122.9	0.0	21.6	15.0	0.0	538.1
CcA	0.0	7.9	7.3	5.8	5.2	0.0	0.0	0.5	0.0	0.0	0.0	8.7	0.0	1.5	1.1	0.0	37.9
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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Appendix III. Section Crop Acreage by Soil Mapping Unit (Page 20 of 20)

Section 25	0.0	119.8	110.8	87.6	79.5	0.0	0.0	7.6	0.0	0.0	0.0	131.5	0.0	23.1	16.1	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	1.2	1.1	0.9	0.8	0.7	0.0	0.1	0.0	0.0	0.0	1.3	0.0	0.2	0.2	0.0	6.3
Cc	0.0	79.1	73.1	57.8	52.5	0.0	0.0	5.0	0.0	0.0	0.0	86.8	0.0	15.3	10.6	0.0	380.0
CcA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	54.3	24.2	22.4	17.7	16.0	15.1	2.3	1.5	1.5	0.1	0.0	26.5	0.0	4.7	3.2	0.1	189.6
Section 36	54.3	104.4	96.5	76.3	69.3	15.8	2.3	6.6	1.5	0.1	0.0	114.6	0.0	20.2	14.0	0.1	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	108.5	100.3	79.3	72.0	0.0	0.0	6.8	0.0	0.0	0.0	119.1	0.0	21.0	14.5	0.0	521.6
CcA	0.0	10.5	9.7	7.7	7.0	0.0	0.0	0.7	0.0	0.0	0.0	11.5	0.0	2.0	1.4	0.0	50.6
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	0.0	0.0	0.0	3.8
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 1	0.0	119.0	110.1	87.0	79.0	0.0	0.0	7.5	0.0	0.0	0.0	130.7	3.8	23.0	15.9	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	106.7	98.6	78.0	70.8	0.0	0.0	6.7	0.0	0.0	0.0	117.1	0.0	20.6	14.3	0.0	512.8
CcA	0.0	5.3	4.9	3.8	3.5	0.0	0.0	0.3	0.0	0.0	0.0	5.8	0.0	1.0	0.7	0.0	25.3
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	37.9	0.0	0.0	0.0	37.9
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 12	0.0	111.9	103.5	81.8	74.3	0.0	0.0	7.1	0.0	0.0	0.0	122.9	37.9	21.6	15.0	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	104.0	96.2	76.1	69.1	0.0	0.0	6.6	0.0	0.0	0.0	114.2	0.0	20.1	13.9	0.0	500.1
CcA	0.0	15.8	14.6	11.5	10.5	0.0	0.0	1.0	0.0	0.0	0.0	17.3	0.0	3.0	2.1	0.0	75.9
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 13	0.0	119.8	110.8	87.6	79.5	0.0	0.0	7.6	0.0	0.0	0.0	131.5	0.0	23.1	16.1	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	63.1	58.4	46.1	41.9	0.0	0.0	4.0	0.0	0.0	0.0	69.3	0.0	12.2	8.5	0.0	303.4
CcA	0.0	56.7	52.4	41.5	37.6	0.0	0.0	3.6	0.0	0.0	0.0	62.2	0.0	11.0	7.6	0.0	272.6
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 24	0.0	119.8	110.8	87.6	79.5	0.0	0.0	7.6	0.0	0.0	0.0	131.5	0.0	23.1	16.1	0.0	**576.0**
AoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BrA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ca	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cc	0.0	104.0	96.2	76.1	69.1	0.0	0.0	6.6	0.0	0.0	0.0	114.2	0.0	20.1	13.9	0.0	500.1
CcA	0.0	10.5	9.7	7.7	7.0	0.0	0.0	0.7	0.0	0.0	0.0	11.5	0.0	2.0	1.4	0.0	50.6
Pc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RoA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ScA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.3	0.0	0.0	0.0	25.3
SfA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ys	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Section 25	0.0	114.6	105.9	83.7	76.0	0.0	0.0	7.2	0.0	0.0	0.0	125.8	25.3	22.1	15.3	0.0	**576.0**

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APPENDIX IV. BUILDING/LAND/INFRASTRUCTURE INVENTORY

Appendix IV. Building/Land/Infrastructure Inventory (Page 1 of 8)

No.	Frequency	Twnsp-Range	Section	Location	Ele	Use	Category	1st Floor H	Reference Elevation	Area
1	1	T8N R1E	33	Sievers Rd	70	Irr Ag	924	0	70	60.0
2	1	T8N R1E	34	Sievers Rd	70	Irr Ag	924	0	70	250.0
3	1	T8N R1E	35	Sievers Rd	70	Irr Ag	924	0	70	218.0
4	1	T8N R1E	35	Sievers Rd	70	Co. Road	912	0	70	3.0
5	2	T7N R1E	1	Seivers I-80	60	Produce Market storage	99	2	62	3,000.0
6	2	T7N R1E	1	Seivers I-80	60	Produce Market	63	1	61	2,400.0
7	2	T7N R1E	1	Seivers I-80	60	I-80	910	0	60	0.5
8	2	T7N R1E	1	Seivers I-80	60	Co. Road	912	0	60	1.0
9	2	T7N R1E	1	Seivers I-80	60	Irr Ag	924	0	60	49.0
10	2	T8N R1E	36	Seivers I-80	60	Irr Ag	924	0	60	40.0
11	2	T8N R1E	36	Seivers I-80	60	single family	1	1	61	2,000.0
12	2	T8N R1E	36	Seivers I-80	60	single family	1	1	61	1,800.0
13	2	T8N R1E	36	Seivers I-80	60	single family	3	1	61	2,000.0
14	2	T8N R1E	36	Seivers I-80	60	76 Mini Mart	64	2	62	1,000.0
15	2	T8N R2E	31	Seivers I-80	60	Irr Ag	924	0	60	30.0
16	2	T8N R2E	31	Seivers I-80	60	CalTrans Main. Storage	20	0	60	400.0
17	2	T8N R2E	31	Seivers I-80	60	Trailers	927	0	60	250.0
18	2	T8N R2E	31	Seivers I-80	60	Pioneer Roofing Tile office	83	1	61	800.0
19	2	T8N R2E	31	Seivers I-80	60	CalTrans Main. Shop	13	0	60	2,400.0
20	2	T8N R2E	31	Seivers I-80	60	Valley Transport office	83	1	61	2,400.0
21	2	T8N R2E	31	Seivers I-80	60	Trucks	926	0	60	100.0
22	2	T8N R2E	31	Seivers I-80	60	Fuel tank office/shed	83	0	60	200.0
23	2	T8N R2E	31	Seivers I-80	60	Valley Transport fuel tanks	925	1	61	25,000.0
24	2	T8N R2E	31	Seivers I-80	60	I-80	910	0	60	0.5
25	2	T8N R2E	31	Seivers I-80	60	Valley Transport shop	13	1	61	8,000.0
26	2	T8N R2E	31	Seivers I-80	60	Fuel tanks	925	0	60	5,000.0
27	2	T8N R2E	31	Seivers I-80	60	CalTrans Main. Office	83	0	60	800.0
28	2	T8N R2E	31	Seivers I-80	60	Pioneer Roofing Tile plant	13	1	61	8,000.0
29	3	T8N R2E	31	Robben-Tremont	60	Co. Road	912	0	60	0.5
30	3	T8N R2E	31	Robben-Tremont	60	Irr Ag	924	0	60	30.0
31	4	T7N R1E	2	Pitt School-Seivers	75	Irr Ag	924	0	75	30.0
32	4	T7N R1E	2	Pitt School-Seivers	75	Co. Road	912	0	75	0.5
33	4	T7N R1E	3	Pitt School-Seivers	75	Irr Ag	924	0	75	18.0
34	4	T7N R1E	3	Pitt School-Seivers	75	Walnuts	921	0	75	18.0
35	5	T7N R1E	1	Curry I-80	65	Higby Country Feeds	42	0	65	1,000.0
36	5	T7N R1E	1	Curry I-80	65	Milk Farm Restaurant	90	0	65	0.0
37	5	T7N R1E	1	Curry I-80	65	Irr Ag	924	0	65	106.0
38	5	T7N R1E	1	Curry I-80	65	Co. Road	912	0	65	1.0
39	5	T7N R1E	1	Curry I-80	65	Higby Country Feeds storgage	20	0	65	1,000.0
40	5	T7N R1E	1	Curry I-80	65	I-80	910	0	65	0.5
41	5	T7N R1E	1	Curry I-80	65	single family	7	0	65	800.0
42	5	T7N R1E	1	Curry I-80	65	single family	7	0	65	800.0
43	5	T7N R1E	1	Curry I-80	65	single family	1	1	66	1,000.0
44	5	T7N R1E	1	Curry I-80	65	single family	1	0	65	1,000.0
45	5	T7N R1E	1	Curry I-80	65	single family	1	1	66	1,500.0
46	5	T7N R1E	1	Curry I-80	65	single family	1	1	66	2,000.0
47	5	T7N R1E	1	Curry I-80	65	barn	12	0	65	1,000.0
48	5	T7N R1E	1	Curry I-80	65	barn	12	0	65	1,000.0
49	5	T7N R1E	2	Curry I-80	65	barn	12	0	65	2500
50	5	T7N R1E	2	Curry I-80	65	apartment	9	0	65	0.0
51	5	T7N R1E	2	Curry I-80	65	barn	12	0	65	2500
52	5	T7N R1E	2	Curry I-80	65	Irr Ag	924	0	65	35.0
53	5	T7N R1E	2	Curry I-80	65	barn	12	0	65	2,500.0
54	5	T7N R1E	2	Curry I-80	65	storage	20	0	65	5,000.0
55	5	T7N R1E	11	Curry I-80	65	I-80	910	0	65	0.5
56	5	T7N R1E	11	Curry I-80	65	Irr Ag	924	0	65	25.0
57	6	T7N R1E	1	Pedrick-Seivers	60	Irr Ag	924	0	60	30.0
58	6	T7N R1E	12	Pedrick-Seivers	60	office	83	1	61	1,000.0
59	6	T7N R1E	12	Pedrick-Seivers	60	Almonds & Walnuts	921	0	60	170.0
60	6	T7N R1E	12	Pedrick-Seivers	60	warehouse	99	1	61	5,000.0
61	6	T7N R1E	12	Pedrick-Seivers	60	garage	61	0	60	500.0
62	6	T7N R1E	12	Pedrick-Seivers	60	Grigner HAC office	83	1	61	2,500.0
63	6	T7N R1E	12	Pedrick-Seivers	60	single family	1	1	61	2,000.0
64	6	T7N R1E	12	Pedrick-Seivers	60	Grigner HAC shop	13	1	61	4,500.0
65	6	T7N R1E	12	Pedrick-Seivers	60	single family	7	1	61	800.0
66	6	T7N R1E	12	Pedrick-Seivers	60	shop	26	0	60	1,000.0
67	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	3,534.4
68	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	18,850.2
69	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage	104	4	64	10,000.0
70	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	125,668.0
71	6	T7N R2E	6	Pedrick-Seivers	60	Irr Ag	924	0	60	321.0
72	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	125,668.0
73	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	18,850.2
74	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	3,534.4
75	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	3,534.4
76	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	125,668.0
77	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	3,534.4
78	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	3,534.4
79	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	125,668.0
80	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	18,850.2
81	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	3,534.4
82	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	3,534.4
83	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	18,850.2
84	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	3,534.4
85	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	3,534.4
86	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	3,534.4
87	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	3,534.4
88	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	18,850.2
89	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	3,534.4
90	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	3,534.4
91	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	125,668.0
92	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	18,850.2
93	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage	104	4	64	10,000.0
94	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	125,668.0
95	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	3,534.4
96	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	3,534.4
97	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	3,534.4
98	6	T7N R2E	6	Pedrick-Seivers	60	Cargill office	83	4	64	5,000.0
99	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain plant	13	4	64	10,000.0
100	6	T7N R2E	6	Pedrick-Seivers	60	Dixon Truck & tractor	31	4	64	5,000.0
101	6	T7N R2E	6	Pedrick-Seivers	60	Campbell Canning Co. plant	57	4	64	25,000.0
102	6	T7N R2E	7	Pedrick-Seivers	60	single family	1	1	61	1,000.0

Appendix IV. Building/Land/Infrastructure Inventory (Page 2 of 8)

No.	Frequency	Twnsp-Range	Section	Location	Ele	Use	Category	1st Floor H	Reference Elevation	Area
103	6	T7N R2E	7	Pedrick-Seivers	60	grain storage, steel	104	1	61	75400.8
104	6	T7N R2E	7	Pedrick-Seivers	60	Irr Ag	924	0	60	100.0
105	6	T7N R2E	7	Pedrick-Seivers	60	single family	3	1	61	1,200.0
106	6	T7N R2E	7	Pedrick-Seivers	60	storage	20	0	60	400.0
107	6	T7N R2E	7	Pedrick-Seivers	60	single family	7	2	62	800.0
108	6	T7N R2E	7	Pedrick-Seivers	60	single family	7	2	62	800.0
109	6	T7N R2E	7	Pedrick-Seivers	60	barn	12	0	60	1,000.0
110	6	T7N R2E	7	Pedrick-Seivers	60	barn	12	0	60	1,000.0
111	6	T7N R2E	7	Pedrick-Seivers	60	storage	20	1	61	2,000.0
112	6	T7N R2E	7	Pedrick-Seivers	60	single family	7	2	62	400.0
113	6	T7N R2E	7	Pedrick-Seivers	60	single family	1	1	61	500.0
114	6	T7N R2E	7	Pedrick-Seivers	60	storage	20	0	60	800.0
115	6	T7N R2E	7	Pedrick-Seivers	60	garage	61	0	60	800.0
116	6	T7N R2E	7	Pedrick-Seivers	60	grain storage, steel	104	1	61	75400.8
117	6	T7N R2E	7	Pedrick-Seivers	60	grain storage, steel	104	2	62	7,854.3
118	6	T7N R2E	7	Pedrick-Seivers	60	grain storage, steel	104	1	61	75400.8
119	6	T7N R2E	8	Pedrick-Seivers	60	Co. Road	912	0	60	1.0
120	6	T7N R2E	8	Pedrick-Seivers	60	Irr Ag	924	0	60	60.0
121	6	T8N R2E	31	Pedrick-Seivers	60	I-80	910	0	60	0.5
122	6	T8N R2E	31	Pedrick-Seivers	60	Irr Ag	924	0	60	30.0
123	9	T7N R1E	10	Pitt School I-80	70	Almonds	921	0	70	15.0
124	9	T7N R1E	11	Pitt School I-80	70	Walnuts	921	0	70	40.0
125	9	T7N R1E	11	Pitt School I-80	70	I-80	910	0	70	0.3
126	9	T7N R1E	15	Pitt School I-80	70	single family	1	1	71	1,500.0
127	9	T7N R1E	15	Pitt School I-80	70	I-80	910	0	70	0.5
128	9	T7N R1E	15	Pitt School I-80	70	storage	20	0	70	2,000.0
129	9	T7N R1E	15	Pitt School I-80	70	Co. Road	912	0	70	0.5
130	9	T7N R1E	15	Pitt School I-80	70	Almonds	921	0	70	56.0
131	19	T7N R2E	16	Hackman-Runge	45	storage	20	0	45	3,000.0
132	19	T7N R2E	16	Hackman-Runge	45	single family	1	1	46	1,500.0
133	19	T7N R2E	16	Hackman-Runge	45	garage	61	0	45	500.0
134	19	T7N R2E	16	Hackman-Runge	45	Irr Ag	924	0	45	223.0
135	19	T7N R2E	17	Hackman-Runge	45	Irr Ag	924	0	45	150.0
136	19	T7N R2E	17	Hackman-Runge	45	shop	26	0	45	2,000.0
137	19	T7N R2E	17	Hackman-Runge	45	shop	26	0	45	4,000.0
138	19	T7N R2E	17	Hackman-Runge	45	storage	20	0	45	5,000.0
139	19	T7N R2E	17	Hackman-Runge	45	storage	20	0	45	2,000.0
140	19	T7N R2E	17	Hackman-Runge	45	single family	7	2	47	800.0
141	19	T7N R2E	17	Hackman-Runge	45	single family	1	1	46	2,500.0
142	19	T7N R2E	18	Hackman-Runge	45	single family	1	4	49	2,000.0
143	19	T7N R2E	18	Hackman-Runge	45	storage	20	0	45	3,000.0
144	19	T7N R2E	18	Hackman-Runge	45	single family	7	2	47	800.0
145	19	T7N R2E	18	Hackman-Runge	45	single family	1	2	47	1,000.0
146	19	T7N R2E	18	Hackman-Runge	45	shop	26	0	45	4,000.0
147	19	T7N R2E	18	Hackman-Runge	45	garage	61	0	45	1,000.0
148	19	T7N R2E	18	Hackman-Runge	45	office	83	2	47	1,000.0
149	19	T7N R2E	18	Hackman-Runge	45	Irr Ag	924	0	45	10.0
150	19	T7N R2E	21	Hackman-Runge	45	Irr Ag	924	0	45	80.0
151	19	T7N R2E	21	Hackman-Runge	45	Co. Road	912	0	45	2.0
152	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
153	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,500.0
154	26	T7N R1E	23	Porter-Pitt School	60	single family	1	2	62	1,200.0
155	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
156	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
157	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
158	26	T7N R1E	23	Porter-Pitt School	60	single family	1	2	62	1,000.0
159	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
160	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,300.0
161	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
162	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
163	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
164	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
165	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
166	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
167	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
168	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,000.0
169	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
170	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
171	26	T7N R1E	23	Porter-Pitt School	60	single family	1	2	62	1,200.0
172	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
173	26	T7N R1E	23	Porter-Pitt School	60	single family	1	2	62	1,500.0
174	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
175	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
176	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
177	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,300.0
178	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
179	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
180	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
181	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
182	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
183	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
184	26	T7N R1E	23	Porter-Pitt School	60	Almonds	921	0	60	25.0
185	26	T7N R1E	23	Porter-Pitt School	60	Walser Bros storage	20	0	60	2,000.0
186	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
187	26	T7N R1E	23	Porter-Pitt School	60	storage	20	0	60	1,000.0
188	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,000.0
189	26	T7N R1E	23	Porter-Pitt School	60	storage	20	0	60	500.0
190	26	T7N R1E	23	Porter-Pitt School	60	storage	20	0	60	2,000.0
191	26	T7N R1E	23	Porter-Pitt School	60	storage	20	0	60	800.0
192	26	T7N R1E	23	Porter-Pitt School	60	Walser Bros shop	13	1	61	800.0
193	26	T7N R1E	23	Porter-Pitt School	60	barn	12	0	60	2,000.0
194	26	T7N R1E	23	Porter-Pitt School	60	single family	7	0	60	800.0
195	26	T7N R1E	23	Porter-Pitt School	60	single family	7	2	62	800.0
196	26	T7N R1E	23	Porter-Pitt School	60	single family	7	2	62	400.0
197	26	T7N R1E	23	Porter-Pitt School	60	single family	3	1	61	2,000.0
198	26	T7N R1E	23	Porter-Pitt School	60	single family	3	1	61	2,000.0
199	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
200	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
201	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
202	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
203	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
204	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0

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No.	Frequency	Twnsp-Range	Section	Location	Ele	Use	Category	1st Floor H	Reference Elevation	Area
205	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	500.0
206	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
207	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
208	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
209	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
210	26	T7N R1E	23	Porter-Pitt School	60	storage	20	0	60	1,500.0
211	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
212	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,000.0
213	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
214	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,500.0
215	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
216	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
217	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
218	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
219	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
220	26	T7N R1E	23	Porter-Pitt School	60	single family	1	2	62	1,200.0
221	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
222	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
223	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
224	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
225	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
226	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
227	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
228	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
229	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
230	26	T7N R1E	23	Porter-Pitt School	60	Walser Bros storage	20	0	60	2,000.0
231	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
232	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,500.0
233	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
234	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
235	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,500.0
236	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
237	26	T7N R1E	23	Porter-Pitt School	60	single family	1	2	62	1,200.0
238	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,500.0
239	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,500.0
240	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
241	26	T7N R1E	23	Porter-Pitt School	60	single family	1	2	62	1,500.0
242	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
243	26	T7N R1E	23	Porter-Pitt School	60	single family	1	2	62	1,200.0
244	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
245	26	T7N R1E	23	Porter-Pitt School	60	single family	1	2	62	1,200.0
246	26	T7N R1E	23	Porter-Pitt School	60	single family	1	2	62	1,500.0
247	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
248	26	T7N R1E	23	Porter-Pitt School	60	single family	1	3	63	1,000.0
249	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,000.0
250	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
251	26	T7N R1E	26	Porter-Pitt School	60	barn	12	0	60	500.0
252	26	T7N R1E	26	Porter-Pitt School	60	single family	1	1	61	1,500.0
253	26	T7N R1E	26	Porter-Pitt School	60	single family	1	1	61	1,500.0
254	26	T7N R1E	26	Porter-Pitt School	60	Almonds	921	0	60	7.0
255	26	T7N R1E	26	Porter-Pitt School	60	Co. Road	912	0	60	2.0
256	26	T7N R1E	26	Porter-Pitt School	60	storage	20	0	60	500.0
257	26	T7N R1E	26	Porter-Pitt School	60	barn	12	1	61	1,200.0
258	26	T7N R1E	26	Porter-Pitt School	60	barn	12	0	60	1,000.0
259	26	T7N R1E	27	Porter-Pitt School	60	Irr Ag	924	0	60	5.0
260	27	T7N R1E	25	Pedrick-Miller	45	Irr Ag	924	0	45	10.0
261	27	T7N R2E	30	Pedrick-Miller	45	single family	1	1	46	1,500.0
262	27	T7N R2E	30	Pedrick-Miller	45	single family	1	1	46	1,500.0
263	27	T7N R2E	30	Pedrick-Miller	45	storage	20	1	46	2,000.0
264	27	T7N R2E	30	Pedrick-Miller	45	storage	20	1	46	2,000.0
265	27	T7N R2E	30	Pedrick-Miller	45	storage	20	0	45	400.0
266	27	T7N R2E	30	Pedrick-Miller	45	Co. Road	912	0	45	0.4
267	27	T7N R2E	30	Pedrick-Miller	45	Grapes	922	0	45	15.0
268	27	T7N R2E	30	Pedrick-Miller	45	shop	26	1	46	1,500.0
269	28	T7N R2E	21	Miller-Sikes	43	Irr Ag	924	0	43	17.0
270	28	T7N R2E	21	Miller-Sikes	43	Co. Road	912	0	43	0.4
271	29	T7N R2E	22	Tremont #3	35	Irr Ag	924	0	35	27.0
272	29	T7N R2E	22	Tremont #3	35	Co. Road	912	0	35	0.5
273	30	T7N R2E	28	Midway-Sikes	35	Irr Ag	924	0	35	115.0
274	30	T7N R2E	28	Midway-Sikes	35	Co. Road	912	0	35	1.0
275	30	T7N R2E	29	Midway-Sikes	35	Irr Ag	924	0	35	50.0
276	31	T7N R2E	27	Tremont #3	35	Irr Ag	924	0	35	19.0
277	31	T7N R2E	27	Tremont #3	35	Co. Road	912	0	35	0.4
278	35	T7N R2E	27	Midway-Etzel	35	Co. Road	912	0	35	0.5
279	35	T7N R2E	27	Midway-Etzel	35	Irr Ag	924	0	35	50.0
280	37	T7N R1E	22	Batavia	65	Irr Ag	924	0	65	100.0
281	37	T7N R1E	27	Batavia	65	single family	1	0	65	1,000.0
282	37	T7N R1E	27	Batavia	65	single family	1	1	66	1,500.0
283	37	T7N R1E	27	Batavia	65	barn	12	0	65	1,000.0
284	37	T7N R1E	27	Batavia	65	Irr Ag	924	0	65	131.0
285	37	T7N R1E	27	Batavia	65	single family	1	3	68	1,200.0
286	37	T7N R1E	27	Batavia	65	storage	20	0	65	800.0
287	37	T7N R1E	27	Batavia	65	shop	26	1	66	1,500.0
288	37	T7N R1E	34	Batavia	65	Imp. Road	913	0	65	1.5
289	37	T7N R1E	34	Batavia	65	Irr Ag	924	0	65	15.0
290	38	T7N R2E	32	Robben-Midway	35	Irr Ag	924	0	35	24.0
291	41	T6N R2E	5	Lateral #3	32	shop	26	0	32	1,500.0
292	41	T6N R2E	5	Lateral #3	32	single family	7	2	34	400.0
293	41	T6N R2E	5	Lateral #3	32	storage	20	0	32	1,000.0
294	41	T6N R2E	5	Lateral #3	32	storage	20	0	32	2,000.0
295	41	T6N R2E	6	Lateral #3	32	storage	20	0	32	1,500.0
296	41	T6N R2E	6	Lateral #3	32	storage	20	0	32	1,000.0
297	41	T6N R2E	6	Lateral #3	32	single family	3	1	33	2,000.0
298	41	T6N R2E	6	Lateral #3	32	single family	7	2	34	800.0
299	41	T6N R2E	6	Lateral #3	32	single family	1	1	33	1,000.0
300	41	T6N R2E	6	Lateral #3	32	Irr Ag	924	0	32	80.0
301	41	T6N R2E	6	Lateral #3	32	single family	1	1	33	2,000.0
302	41	T6N R2E	6	Lateral #3	32	single family	1	1	33	1,000.0
303	41	T6N R2E	7	Lateral #3	32	Irr Ag	924	0	32	100.0
304	41	T6N R2E	7	Lateral #3	32	Imp. Road	913	0	32	1.0
305	41	T6N R2E	7	Lateral #3	32	Co. Road	912	0	32	2.3
306	41	T7N R2E	31	Lateral #3	32	Irr Ag	924	0	32	30.0

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No.	Frequency	Twnsp-Range	Section	Location	Ele	Use	Category	1st Floor H	Reference Elevation	Area
307	41	T7N R2E	32	Lateral #3	32	Irr Ag	924	0	32	199.0
308	42	T7N R2E	33	Lateral #5	25	Irr Ag	924	0	25	120.0
309	42	T7N R2E	34	Lateral #5	25	Irr Ag	924	0	25	163.0
310	50	T6N R1E	2	Hwy 113	43	single family	1	1	44	1,000.0
311	50	T6N R1E	2	Hwy 113	43	Irr Ag	924	0	43	432.0
312	50	T6N R1E	2	Hwy 113	43	office	83	2	45	400.0
313	50	T6N R1E	2	Hwy 113	43	single family	3	1	44	2,000.0
314	50	T6N R1E	2	Hwy 113	43	shop	26	1	44	2,000.0
315	50	T6N R1E	2	Hwy 113	43	garage	61	1	44	800.0
316	50	T6N R1E	2	Hwy 113	43	shop	26	1	44	2,000.0
317	50	T6N R1E	2	Hwy 113	43	storage	20	1	44	5,000.0
318	50	T6N R1E	3	Hwy 113	43	Irr Ag	924	0	43	40.0
319	50	T6N R1E	11	Hwy 113	43	Irr Ag	924	0	43	200.0
320	50	T6N R1E	11	Hwy 113	43	W.B. Joslin Aviation office	83	2	45	400.0
321	50	T6N R1E	11	Hwy 113	43	W.B. Joslin Aviation shop	13	1	44	2,000.0
322	50	T6N R1E	14	Hwy 113	43	single family	7	2	45	800.0
323	50	T6N R1E	14	Hwy 113	43	Irr Ag	924	0	43	150.0
324	50	T6N R1E	14	Hwy 113	43	garage	61	1	44	400.0
325	50	T6N R1E	14	Hwy 113	43	single family	1	0	43	1,000.0
326	50	T6N R1E	14	Hwy 113	43	shop	26	0	43	2,000.0
327	50	T6N R1E	14	Hwy 113	43	storage	20	1	44	2,000.0
328	50	T6N R1E	23	Hwy 113	43	Irr Ag	924	0	43	150.0
329	50	T6N R1E	26	Hwy 113	43	Imp. Road	913	0	43	2.5
330	50	T6N R1E	26	Hwy 113	43	Irr Ag	924	0	43	80.0
331	50	T6N R1E	26	Hwy 113	43	Co. Road	912	0	43	1.0
332	50	T6N R1E	26	Hwy 113	43	HW 113	911	0	43	4.0
333	50	T7N R1E	34	Hwy 113	43	Irr Ag	924	0	43	100.0
334	50	T7N R1E	35	Hwy 113	43	Irr Ag	924	0	43	30.0
335	51	T6N R2E	5	Lateral #4A	30	Irr Ag	924	0	30	59.0
336	51	T6N R2E	5	Lateral #4A	30	Co. Road	912	0	30	0.5
337	63	T6N R1E	13	Hwy 113-Dixon Main Drain	35	HW 113	911	0	35	0.3
338	63	T6N R1E	13	Hwy 113-Dixon Main Drain	35	Irr Ag	924	0	35	58.0
339	64	T6N R1E	12	Pedrick-Dixon Main Drain	35	Irr Ag	924	0	35	20.0
340	64	T6N R1E	12	Pedrick-Dixon Main Drain	35	single family	7	2	37	800.0
341	64	T6N R1E	12	Pedrick-Dixon Main Drain	35	garage	61	0	35	500.0
342	64	T6N R1E	12	Pedrick-Dixon Main Drain	35	storage	20	0	35	500.0
343	64	T6N R1E	13	Pedrick-Dixon Main Drain	35	single family	7	2	37	800.0
344	64	T6N R1E	13	Pedrick-Dixon Main Drain	35	single family	7	2	37	800.0
345	64	T6N R1E	13	Pedrick-Dixon Main Drain	35	garage	61	0	35	400.0
346	64	T6N R1E	13	Pedrick-Dixon Main Drain	35	Irr Ag	924	0	35	20.0
347	64	T6N R2E	18	Pedrick-Dixon Main Drain	35	Imp. Road	913	0	35	0.3
348	64	T6N R2E	18	Pedrick-Dixon Main Drain	35	Irr Ag	924	0	35	80.0
349	65	T6N R2E	18	Lateral 3-Dixon Main Drain	29	storage	20	0	29	1,500.0
350	65	T6N R2E	18	Lateral 3-Dixon Main Drain	29	Irr Ag	924	0	29	38.0
351	65	T6N R2E	18	Lateral 3-Dixon Main Drain	29	shop	26	0	29	2,000.0
352	65	T6N R2E	18	Lateral 3-Dixon Main Drain	29	storage	20	0	29	4,000.0
353	65	T6N R2E	18	Lateral 3-Dixon Main Drain	29	single family	3	1	30	2,000.0
354	65	T6N R2E	18	Lateral 3-Dixon Main Drain	29	Co. Road	912	0	29	0.7
355	65	T6N R2E	18	Lateral 3-Dixon Main Drain	29	single family	7	2	31	800.0
356	66	T6N R2E	16	Dixon Main Drain-Robben	20	Irr Ag	924	0	20	227.0
357	66	T6N R2E	16	Dixon Main Drain-Robben	20	Co. Road	912	0	20	0.2
358	66	T6N R2E	17	Dixon Main Drain-Robben	20	Irr Ag	924	0	20	200.0
359	67	T6N R2E	15	Sikes-Delhi	20	Co. Road	912	0	20	1.0
360	67	T6N R2E	15	Sikes-Delhi	20	Irr Ag	924	0	20	120.0
361	67	T6N R2E	16	Sikes-Delhi	20	Irr Ag	924	0	20	187.0
362	73	T6N R2E	18	Robben-Dixon Main Drain	25	Irr Ag	924	0	25	9.0
363	73	T6N R2E	18	Robben-Dixon Main Drain	25	Co. Road	912	0	25	0.3
364	74	T6N R1E	13	Hawkins-Pedrick	30	Irr Ag	924	0	30	84.0
365	74	T6N R1E	13	Hawkins-Pedrick	30	Co. Road	912	0	30	0.5
366	76	T6N R2E	20	Swan-Robben	20	Co. Road	912	0	20	0.1
367	76	T6N R2E	20	Swan-Robben	20	Irr Ag	924	0	20	10.0
368	77	T6N R2E	20	Binghamton-Robben	20	Irr Ag	924	0	20	5.0
369	80	T6N R2E	19	Binghamton-Robben	23	Irr Ag	924	0	23	40.0
370	80	T6N R2E	20	Binghamton-Robben	23	Irr Ag	924	0	23	231.0
371	80	T6N R2E	21	Binghamton-Robben	23	Irr Ag	924	0	23	100.0
372	80	T6N R2E	21	Binghamton-Robben	23	single family	7	2	25	800.0
373	80	T6N R2E	21	Binghamton-Robben	23	barn	12	0	23	2,000.0
374	80	T6N R2E	21	Binghamton-Robben	23	Co. Road	912	0	23	2.0
375	86	T6N R1E	24	Pedrick-Maine Prairie	30	Irr Ag	924	0	30	80.0
376	86	T6N R1E	25	Pedrick-Maine Prairie	30	Co. Road	912	0	30	0.7
377	86	T6N R1E	25	Pedrick-Maine Prairie	30	Irr Ag	924	0	30	167.0
378	87	T6N R2E	29	Maine Prairie	20	Irr Ag	924	0	20	60.0
379	87	T6N R2E	30	Maine Prairie	20	Irr Ag	924	0	20	72.0
380	1	T8N R1E	33	Sievers Rd	70	Irr Ag	924	0	70	60.0
381	1	T8N R1E	34	Sievers Rd	70	Irr Ag	924	0	70	250.0
382	1	T8N R1E	35	Sievers Rd	70	Co. Road	912	0	70	3.0
383	1	T8N R1E	35	Sievers Rd	70	Irr Ag	924	0	70	218.0
384	2	T7N R1E	1	Seivers I-80	60	I-80	910	0	60	0.5
385	2	T7N R1E	1	Seivers I-80	60	Irr Ag	924	0	60	49.0
386	2	T7N R1E	1	Seivers I-80	60	Produce Market	63	1	61	2,400.0
387	2	T7N R1E	1	Seivers I-80	60	Co. Road	912	0	60	1.0
388	2	T7N R1E	1	Seivers I-80	60	Produce Market storage	99	2	62	3,000.0
389	2	T8N R1E	36	Seivers I-80	60	single family	3	1	61	2,000.0
390	2	T8N R1E	36	Seivers I-80	60	single family	1	1	61	2,000.0
391	2	T8N R1E	36	Seivers I-80	60	76 Mini Mart	64	2	62	1,000.0
392	2	T8N R1E	36	Seivers I-80	60	single family	1	1	61	1,800.0
393	2	T8N R1E	36	Seivers I-80	60	Irr Ag	924	0	60	40.0
394	2	T8N R2E	31	Seivers I-80	60	Valley Transport fuel tanks	925	1	61	25,000.0
395	2	T8N R2E	31	Seivers I-80	60	Pioneer Roofing Tile plant	13	1	61	8,000.0
396	2	T8N R2E	31	Seivers I-80	60	Fuel tank office/shed	83	0	60	200.0
397	2	T8N R2E	31	Seivers I-80	60	Valley Transport shop	13	1	61	8,000.0
398	2	T8N R2E	31	Seivers I-80	60	I-80	910	0	60	0.5
399	2	T8N R2E	31	Seivers I-80	60	Valley Transport office	83	1	61	2,400.0
400	2	T8N R2E	31	Seivers I-80	60	Trucks	926	0	60	100.0
401	2	T8N R2E	31	Seivers I-80	60	CalTrans Main. Storage	20	0	60	400.0
402	2	T8N R2E	31	Seivers I-80	60	Fuel tanks	925	0	60	5,000.0
403	2	T8N R2E	31	Seivers I-80	60	CalTrans Main. Office	83	0	60	800.0
404	2	T8N R2E	31	Seivers I-80	60	Irr Ag	924	0	60	30.0
405	2	T8N R2E	31	Seivers I-80	60	CalTrans Main. Shop	13	0	60	2,400.0
406	2	T8N R2E	31	Seivers I-80	60	Trailers	927	0	60	250.0
407	2	T8N R2E	31	Seivers I-80	60	Pioneer Roofing Tile office	83	1	61	800.0
408	3	T8N R2E	31	Robben-Tremont	60	Irr Ag	924	0	60	30.0

T6N R2E

912 Road
924 high value annuals
7 mobil Home
12 Livestock Barn

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No.	Frequency	Twnsp-Range	Section	Location	Ele	Use	Category	1st Floor H	Reference Elevation	Area
409	3	T8N R2E	31	Robben-Tremont	60	Co. Road	912	0	60	0.5
410	4	T7N R1E	2	Pitt School-Seivers	75	Co. Road	912	0	75	0.5
411	4	T7N R1E	2	Pitt School-Seivers	75	Irr Ag	924	0	75	30.0
412	4	T7N R1E	3	Pitt School-Seivers	75	Walnuts	921	0	75	18.0
413	4	T7N R1E	3	Pitt School-Seivers	75	Irr Ag	924	0	75	18.0
414	5	T7N R1E	1	Curry I-80	65	barn	12	0	65	1,000.0
415	5	T7N R1E	1	Curry I-80	65	Higby Country Feeds	42	0	65	1,000.0
416	5	T7N R1E	1	Curry I-80	65	single family	1	1	66	2,000.0
417	5	T7N R1E	1	Curry I-80	65	single family	7	0	65	800.0
418	5	T7N R1E	1	Curry I-80	65	barn	12	0	65	1,000.0
419	5	T7N R1E	1	Curry I-80	65	single family	1	1	66	1,500.0
420	5	T7N R1E	1	Curry I-80	65	single family	7	0	65	800.0
421	5	T7N R1E	1	Curry I-80	65	Higby Country Feeds storgage	20	0	65	1,000.0
422	5	T7N R1E	1	Curry I-80	65	Co. Road	912	0	65	1.0
423	5	T7N R1E	1	Curry I-80	65	Milk Farm Restaurant	90	0	65	0.0
424	5	T7N R1E	1	Curry I-80	65	I-80	910	0	65	0.5
425	5	T7N R1E	1	Curry I-80	65	Irr Ag	924	0	65	106.0
426	5	T7N R1E	1	Curry I-80	65	single family	1	1	66	1,000.0
427	5	T7N R1E	1	Curry I-80	65	single family	1	0	65	1,000.0
428	5	T7N R1E	2	Curry I-80	65	storage	20	0	65	5,000.0
429	5	T7N R1E	2	Curry I-80	65	barn	12	0	65	2500
430	5	T7N R1E	2	Curry I-80	65	barn	12	0	65	2,500.0
431	5	T7N R1E	2	Curry I-80	65	barn	12	0	65	2500
432	5	T7N R1E	2	Curry I-80	65	Irr Ag	924	0	65	35.0
433	5	T7N R1E	2	Curry I-80	65	apartment	9	0	65	0.0
434	5	T7N R1E	11	Curry I-80	65	I-80	910	0	65	0.5
435	5	T7N R1E	11	Curry I-80	65	Irr Ag	924	0	65	25.0
436	6	T7N R1E	1	Pedrick-Seivers	60	Irr Ag	924	0	60	30.0
437	6	T7N R1E	12	Pedrick-Seivers	60	warehouse	99	1	61	5,000.0
438	6	T7N R1E	12	Pedrick-Seivers	60	Griener HAC office	83	1	61	2,500.0
439	6	T7N R1E	12	Pedrick-Seivers	60	garage	61	0	60	500.0
440	6	T7N R1E	12	Pedrick-Seivers	60	Griener HAC shop	13	1	61	4,500.0
441	6	T7N R1E	12	Pedrick-Seivers	60	office	83	1	61	1,000.0
442	6	T7N R1E	12	Pedrick-Seivers	60	shop	26	0	60	1,000.0
443	6	T7N R1E	12	Pedrick-Seivers	60	Almonds & Walnuts	921	0	60	170.0
444	6	T7N R1E	12	Pedrick-Seivers	60	single family	1	1	61	2,000.0
445	6	T7N R1E	12	Pedrick-Seivers	60	single family	7	1	61	800.0
446	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	125,668.0
447	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	3,534.4
448	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	18,850.2
449	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	3,534.4
450	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	3,534.4
451	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	3,534.4
452	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	3,534.4
453	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	18,850.2
454	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	3,534.4
455	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	125,668.0
456	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	125,668.0
457	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	3,534.4
458	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	3,534.4
459	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	3,534.4
460	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage	104	4	64	10,000.0
461	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	3,534.4
462	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	3,534.4
463	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	18,850.2
464	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	18,850.2
465	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain plant	13	4	64	10,000.0
466	6	T7N R2E	6	Pedrick-Seivers	60	Dixon Truck & tractor	31	4	64	5,000.0
467	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	18,850.2
468	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	18,850.2
469	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	3,534.4
470	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	125,668.0
471	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	125,668.0
472	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	3,534.4
473	6	T7N R2E	6	Pedrick-Seivers	60	Campbell Canning Co. plant	57	4	64	25,000.0
474	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	125,668.0
475	6	T7N R2E	6	Pedrick-Seivers	60	Irr Ag	924	0	60	321.0
476	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	3,534.4
477	6	T7N R2E	6	Pedrick-Seivers	60	Cargill office	83	4	64	5,000.0
478	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	3,534.4
479	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage steel	104	4	64	3,534.4
480	6	T7N R2E	6	Pedrick-Seivers	60	Cargill grain storage	104	4	64	10,000.0
481	6	T7N R2E	7	Pedrick-Seivers	60	single family	3	1	61	1,200.0
482	6	T7N R2E	7	Pedrick-Seivers	60	grain storage, steel	104	1	61	75400.8
483	6	T7N R2E	7	Pedrick-Seivers	60	single family	1	1	61	1,000.0
484	6	T7N R2E	7	Pedrick-Seivers	60	single family	7	2	62	400.0
485	6	T7N R2E	7	Pedrick-Seivers	60	single family	7	2	62	800.0
486	6	T7N R2E	7	Pedrick-Seivers	60	storage	20	0	60	800.0
487	6	T7N R2E	7	Pedrick-Seivers	60	Irr Ag	924	0	60	100.0
488	6	T7N R2E	7	Pedrick-Seivers	60	storage	20	1	61	2,000.0
489	6	T7N R2E	7	Pedrick-Seivers	60	storage	20	0	60	400.0
490	6	T7N R2E	7	Pedrick-Seivers	60	grain storage, steel	104	1	61	75400.8
491	6	T7N R2E	7	Pedrick-Seivers	60	grain storage, steel	104	2	62	7,854.3
492	6	T7N R2E	7	Pedrick-Seivers	60	single family	7	2	62	800.0
493	6	T7N R2E	7	Pedrick-Seivers	60	grain storage, steel	104	1	61	75400.8
494	6	T7N R2E	7	Pedrick-Seivers	60	garage	61	0	60	800.0
495	6	T7N R2E	7	Pedrick-Seivers	60	barn	12	0	60	1,000.0
496	6	T7N R2E	7	Pedrick-Seivers	60	barn	12	0	60	1,000.0
497	6	T7N R2E	7	Pedrick-Seivers	60	single family	1	1	61	500.0
498	6	T7N R2E	8	Pedrick-Seivers	60	Irr Ag	924	0	60	60.0
499	6	T7N R2E	8	Pedrick-Seivers	60	Co. Road	912	0	60	1.0
500	6	T8N R2E	31	Pedrick-Seivers	60	Irr Ag	924	0	60	30.0
501	6	T8N R2E	31	Pedrick-Seivers	60	I-80	910	0	60	0.5
502	9	T7N R1E	10	Pitt School I-80	70	Almonds	921	0	70	15.0
503	9	T7N R1E	11	Pitt School I-80	70	I-80	910	0	70	0.3
504	9	T7N R1E	11	Pitt School I-80	70	Walnuts	921	0	70	40.0
505	9	T7N R1E	15	Pitt School I-80	70	storage	20	0	70	2,000.0
506	9	T7N R1E	15	Pitt School I-80	70	I-80	910	0	70	0.5
507	9	T7N R1E	15	Pitt School I-80	70	Co. Road	912	0	70	0.5
508	9	T7N R1E	15	Pitt School I-80	70	Almonds	921	0	70	56.0
509	9	T7N R1E	15	Pitt School I-80	70	single family	1	1	71	1,500.0
510	19	T7N R2E	16	Hackman-Runge	45	Irr Ag	924	0	45	223.0

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No.	Frequency	Twnsp-Range	Section	Location	Ele	Use	Category	1st Floor H	Reference Elevation	Area
613	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
614	26	T7N R1E	23	Porter-Pitt School	60	Walser Bros storage	20	0	60	2,000.0
615	26	T7N R1E	23	Porter-Pitt School	60	single family	3	1	61	2,000.0
616	26	T7N R1E	23	Porter-Pitt School	60	single family	3	1	61	2,000.0
617	26	T7N R1E	23	Porter-Pitt School	60	single family	7	2	62	400.0
618	26	T7N R1E	23	Porter-Pitt School	60	single family	7	2	62	800.0
619	26	T7N R1E	23	Porter-Pitt School	60	single family	7	0	60	800.0
620	26	T7N R1E	23	Porter-Pitt School	60	barn	12	0	60	2,000.0
621	26	T7N R1E	23	Porter-Pitt School	60	Walser Bros shop	13	1	61	800.0
622	26	T7N R1E	23	Porter-Pitt School	60	storage	20	0	60	800.0
623	26	T7N R1E	23	Porter-Pitt School	60	storage	20	0	60	2,000.0
624	26	T7N R1E	23	Porter-Pitt School	60	storage	20	0	60	500.0
625	26	T7N R1E	23	Porter-Pitt School	60	storage	20	0	60	1,500.0
626	26	T7N R1E	23	Porter-Pitt School	60	storage	20	0	60	1,000.0
627	26	T7N R1E	23	Porter-Pitt School	60	Walser Bros storage	20	0	60	2,000.0
628	26	T7N R1E	23	Porter-Pitt School	60	Almonds	921	0	60	25.0
629	26	T7N R1E	23	Porter-Pitt School	60	single family	1	1	61	1,200.0
630	26	T7N R1E	26	Porter-Pitt School	60	single family	1	1	61	1,500.0
631	26	T7N R1E	26	Porter-Pitt School	60	barn	12	0	60	1,000.0
632	26	T7N R1E	26	Porter-Pitt School	60	barn	12	0	60	500.0
633	26	T7N R1E	26	Porter-Pitt School	60	single family	1	1	61	1,500.0
634	26	T7N R1E	26	Porter-Pitt School	60	Co. Road	912	0	60	2.0
635	26	T7N R1E	26	Porter-Pitt School	60	Almonds	921	0	60	7.0
636	26	T7N R1E	26	Porter-Pitt School	60	storage	20	0	60	500.0
637	26	T7N R1E	26	Porter-Pitt School	60	barn	12	1	61	1,200.0
638	26	T7N R1E	27	Porter-Pitt School	60	Irr Ag	924	0	60	5.0
639	27	T7N R1E	25	Pedrick-Miller	45	Irr Ag	924	0	45	10.0
640	27	T7N R2E	30	Pedrick-Miller	45	Co. Road	912	0	45	0.4
641	27	T7N R2E	30	Pedrick-Miller	45	storage	20	1	46	2,000.0
642	27	T7N R2E	30	Pedrick-Miller	45	single family	1	1	46	1,500.0
643	27	T7N R2E	30	Pedrick-Miller	45	Grapes	922	0	45	15.0
644	27	T7N R2E	30	Pedrick-Miller	45	single family	1	1	46	1,500.0
645	27	T7N R2E	30	Pedrick-Miller	45	storage	20	0	45	400.0
646	27	T7N R2E	30	Pedrick-Miller	45	storage	20	1	46	2,000.0
647	27	T7N R2E	30	Pedrick-Miller	45	shop	26	1	46	1,500.0
648	28	T7N R2E	21	Miller-Sikes	43	Irr Ag	924	0	43	17.0
649	28	T7N R2E	21	Miller-Sikes	43	Co. Road	912	0	43	0.4
650	29	T7N R2E	22	Tremont #3	35	Irr Ag	924	0	35	27.0
651	29	T7N R2E	22	Tremont #3	35	Co. Road	912	0	35	0.5
652	30	T7N R2E	28	Midway-Sikes	35	Irr Ag	924	0	35	115.0
653	30	T7N R2E	28	Midway-Sikes	35	Co. Road	912	0	35	1.0
654	30	T7N R2E	29	Midway-Sikes	35	Irr Ag	924	0	35	50.0
655	31	T7N R2E	27	Tremont #3	35	Co. Road	912	0	35	0.4
656	31	T7N R2E	27	Tremont #3	35	Irr Ag	924	0	35	19.0
657	35	T7N R2E	27	Midway-Etzel	35	Co. Road	912	0	35	0.5
658	35	T7N R2E	27	Midway-Etzel	35	Irr Ag	924	0	35	50.0
659	37	T7N R1E	22	Batavia	65	Irr Ag	924	0	65	100.0
660	37	T7N R1E	27	Batavia	65	barn	12	0	65	1,000.0
661	37	T7N R1E	27	Batavia	65	shop	26	1	66	1,500.0
662	37	T7N R1E	27	Batavia	65	Irr Ag	924	0	65	131.0
663	37	T7N R1E	27	Batavia	65	single family	1	0	65	1,000.0
664	37	T7N R1E	27	Batavia	65	single family	1	3	68	1,200.0
665	37	T7N R1E	27	Batavia	65	single family	1	1	66	1,500.0
666	37	T7N R1E	27	Batavia	65	storage	20	0	65	800.0
667	37	T7N R1E	34	Batavia	65	Imp. Road	913	0	65	1.5
668	37	T7N R1E	34	Batavia	65	Irr Ag	924	0	65	15.0
669	38	T7N R2E	32	Robben-Midway	35	Irr Ag	924	0	35	24.0
670	41	T6N R2E	5	Lateral #3	32	storage	20	0	32	1,000.0
671	41	T6N R2E	5	Lateral #3	32	single family	7	2	34	400.0
672	41	T6N R2E	5	Lateral #3	32	shop	26	0	32	1,500.0
673	41	T6N R2E	5	Lateral #3	32	storage	20	0	32	2,000.0
674	41	T6N R2E	6	Lateral #3	32	single family	7	2	34	800.0
675	41	T6N R2E	6	Lateral #3	32	single family	1	1	33	1,000.0
676	41	T6N R2E	6	Lateral #3	32	storage	20	0	32	1,000.0
677	41	T6N R2E	6	Lateral #3	32	storage	20	0	32	1,500.0
678	41	T6N R2E	6	Lateral #3	32	single family	3	1	33	2,000.0
679	41	T6N R2E	6	Lateral #3	32	single family	1	1	33	1,000.0
680	41	T6N R2E	6	Lateral #3	32	Irr Ag	924	0	32	80.0
681	41	T6N R2E	6	Lateral #3	32	single family	1	1	33	2,000.0
682	41	T6N R2E	7	Lateral #3	32	Irr Ag	924	0	32	100.0
683	41	T6N R2E	7	Lateral #3	32	Imp. Road	913	0	32	1.0
684	41	T6N R2E	7	Lateral #3	32	Co. Road	912	0	32	2.3
685	41	T7N R2E	31	Lateral #3	32	Irr Ag	924	0	32	30.0
686	41	T7N R2E	32	Lateral #3	32	Irr Ag	924	0	32	199.0
687	42	T7N R2E	33	Lateral #5	25	Irr Ag	924	0	25	120.0
688	42	T7N R2E	34	Lateral #5	25	Irr Ag	924	0	25	163.0
689	50	T6N R1E	2	Hwy 113	43	single family	1	1	44	1,000.0
690	50	T6N R1E	2	Hwy 113	43	office	83	2	45	400.0
691	50	T6N R1E	2	Hwy 113	43	Irr Ag	924	0	43	432.0
692	50	T6N R1E	2	Hwy 113	43	garage	61	1	44	800.0
693	50	T6N R1E	2	Hwy 113	43	shop	26	1	44	2,000.0
694	50	T6N R1E	2	Hwy 113	43	shop	26	1	44	2,000.0
695	50	T6N R1E	2	Hwy 113	43	storage	20	1	44	5,000.0
696	50	T6N R1E	2	Hwy 113	43	single family	3	1	44	2,000.0
697	50	T6N R1E	3	Hwy 113	43	Irr Ag	924	0	43	40.0
698	50	T6N R1E	11	Hwy 113	43	W.B. Joslin Aviation shop	13	1	44	2,000.0
699	50	T6N R1E	11	Hwy 113	43	W.B. Joslin Aviation office	83	2	45	400.0
700	50	T6N R1E	11	Hwy 113	43	Irr Ag	924	0	43	200.0
701	50	T6N R1E	14	Hwy 113	43	single family	1	0	43	1,000.0
702	50	T6N R1E	14	Hwy 113	43	shop	26	0	43	2,000.0
703	50	T6N R1E	14	Hwy 113	43	storage	20	1	44	2,000.0
704	50	T6N R1E	14	Hwy 113	43	garage	61	1	44	400.0
705	50	T6N R1E	14	Hwy 113	43	single family	7	2	45	800.0
706	50	T6N R1E	14	Hwy 113	43	Irr Ag	924	0	43	150.0
707	50	T6N R1E	23	Hwy 113	43	Irr Ag	924	0	43	150.0
708	50	T6N R1E	26	Hwy 113	43	Irr Ag	924	0	43	80.0
709	50	T6N R1E	26	Hwy 113	43	Imp. Road	913	0	43	2.5
710	50	T6N R1E	26	Hwy 113	43	Co. Road	912	0	43	1.0
711	50	T6N R1E	26	Hwy 113	43	HW 113	911	0	43	4.0
712	50	T7N R1E	34	Hwy 113	43	Irr Ag	924	0	43	100.0
713	50	T7N R1E	35	Hwy 113	43	Irr Ag	924	0	43	30.0
714	51	T6N R2E	5	Lateral #4A	30	Irr Ag	924	0	30	59.0

Appendix IV. Building/Land/Infrastructure Inventory (Page 8 of 8)

No.	Frequency	Twnsp-Range	Section	Location	Ele	Use	Category	1st Floor H	Reference Elevation	Area
715	51	T6N R2E	5	Lateral #4A	30	Co. Road	912	0	30	0.5
716	63	T6N R1E	13	Hwy 113-Dixon Main Drain	35	Irr Ag	924	0	35	58.0
717	63	T6N R1E	13	Hwy 113-Dixon Main Drain	35	HW 113	911	0	35	0.3
718	64	T6N R1E	12	Pedrick-Dixon Main Drain	35	single family	7	2	37	800.0
719	64	T6N R1E	12	Pedrick-Dixon Main Drain	35	Irr Ag	924	0	35	20.0
720	64	T6N R1E	12	Pedrick-Dixon Main Drain	35	garage	61	0	35	500.0
721	64	T6N R1E	12	Pedrick-Dixon Main Drain	35	storage	20	0	35	500.0
722	64	T6N R1E	13	Pedrick-Dixon Main Drain	35	Irr Ag	924	0	35	20.0
723	64	T6N R1E	13	Pedrick-Dixon Main Drain	35	single family	7	2	37	800.0
724	64	T6N R1E	13	Pedrick-Dixon Main Drain	35	garage	61	0	35	400.0
725	64	T6N R1E	13	Pedrick-Dixon Main Drain	35	single family	7	2	37	800.0
726	64	T6N R2E	18	Pedrick-Dixon Main Drain	35	Irr Ag	924	0	35	80.0
727	64	T6N R2E	18	Pedrick-Dixon Main Drain	35	Imp. Road	913	0	35	0.3
728	65	T6N R2E	18	Lateral 3-Dixon Main Drain	29	storage	20	0	29	1,500.0
729	65	T6N R2E	18	Lateral 3-Dixon Main Drain	29	storage	20	0	29	4,000.0
730	65	T6N R2E	18	Lateral 3-Dixon Main Drain	29	single family	7	2	31	800.0
731	65	T6N R2E	18	Lateral 3-Dixon Main Drain	29	single family	3	1	30	2,000.0
732	65	T6N R2E	18	Lateral 3-Dixon Main Drain	29	Co. Road	912	0	29	0.7
733	65	T6N R2E	18	Lateral 3-Dixon Main Drain	29	shop	26	0	29	2,000.0
734	65	T6N R2E	18	Lateral 3-Dixon Main Drain	29	Irr Ag	924	0	29	38.0
735	66	T6N R2E	16	Dixon Main Drain-Robben	20	Co. Road	912	0	20	0.2
736	66	T6N R2E	16	Dixon Main Drain-Robben	20	Irr Ag	924	0	20	227.0
737	66	T6N R2E	17	Dixon Main Drain-Robben	20	Irr Ag	924	0	20	200.0
738	67	T6N R2E	15	Sikes-Delhi	20	Co. Road	912	0	20	1.0
739	67	T6N R2E	15	Sikes-Delhi	20	Irr Ag	924	0	20	120.0
740	67	T6N R2E	16	Sikes-Delhi	20	Irr Ag	924	0	20	187.0
741	73	T6N R2E	18	Robben-Dixon Main Drain	25	Co. Road	912	0	25	0.3
742	73	T6N R2E	18	Robben-Dixon Main Drain	25	Irr Ag	924	0	25	9.0
743	74	T6N R1E	13	Hawkins-Pedrick	30	Irr Ag	924	0	30	84.0
744	74	T6N R1E	13	Hawkins-Pedrick	30	Co. Road	912	0	30	0.5
745	76	T6N R2E	20	Swan-Robben	20	Co. Road	912	0	20	0.1
746	76	T6N R2E	20	Swan-Robben	20	Irr Ag	924	0	20	10.0
747	77	T6N R2E	20	Binghamton-Robben	20	Irr Ag	924	0	20	5.0
748	80	T6N R2E	19	Binghamton-Robben	23	Irr Ag	924	0	23	40.0
749	80	T6N R2E	20	Binghamton-Robben	23	Irr Ag	924	0	23	231.0
750	80	T6N R2E	21	Binghamton-Robben	23	barn	12	0	23	2,000.0
751	80	T6N R2E	21	Binghamton-Robben	23	single family	7	2	25	800.0
752	80	T6N R2E	21	Binghamton-Robben	23	Irr Ag	924	0	23	100.0
753	80	T6N R2E	21	Binghamton-Robben	23	Co. Road	912	0	23	2.0
754	86	T6N R1E	24	Pedrick-Maine Prairie	30	Irr Ag	924	0	30	80.0
755	86	T6N R1E	25	Pedrick-Maine Prairie	30	Co. Road	912	0	30	0.7
756	86	T6N R1E	25	Pedrick-Maine Prairie	30	Irr Ag	924	0	30	167.0
757	87	T6N R2E	29	Maine Prairie	20	Irr Ag	924	0	20	60.0
758	87	T6N R2E	30	Maine Prairie	20	Irr Ag	924	0	20	72.0

APPENDIX V. BUILDING/LAND/INFRASTRUCTURE CATEGORIES AND DATA

Appendix V. Building/Land/Infrastructure Categories and Data (Page 1 of 2)

Category	Description	Units	Replacement Cost(1)	Contents Value(2)	Relocation Cost(3)	Value of Lost Services(4)	Net Income(5)	Value of Functional Downtime (6)
1	Residence, 1 story w/o basement	square foot	$45.00	30.00%	$1.00			$0.10
2	Residence, 1 story w basement	square foot	$45.00	30.00%	$1.00			$0.10
3	Residence, 2 story w/o basement	square foot	$45.00	30.00%	$1.00			$0.10
4	Residence, 2 story w basement	square foot	$45.00	30.00%	$1.00			$0.10
5	Residence, Split level	square foot	$45.00	30.00%	$1.00			$0.10
6	Residence, Split foyer	square foot	$45.00	30.00%	$1.00			$0.10
7	Residence, Mobile Home	square foot	$15.00	30.00%	$1.00			$0.10
8	Residence, Apartment w/garden level units	square foot	$20.00	30.00%	$1.00			$0.10
9	Residence, Apartment w/o basement	square foot	$20.00	30.00%	$1.00			$0.10
10	Residence, Apartment w basement	square foot	$20.00	30.00%	$1.00			$0.10
11	Public Research Facility	square foot	$45.00	100.00%	$1.50	$10.00		
12	Livestock Barn	square foot	$6.00	200.00%	$1.00		$0.00	
13	Industrial, Light	square foot	$25.00	200.00%	$1.50		$0.25	
14	Industrial, Heavy	square foot	$30.00	200.00%	$1.50		$0.83	
15	Primary Sewage Treatment Plant	square foot	$46.00	0.00%	$0.00		$0.01	
16	Secondary Sewage Treatment Plant	square foot	$46.00	0.00%	$0.00		$0.01	
17	Well	well	$75,000.00	0.00%	$0.00		$276.07	
18	Pump House	square foot	$85,000.00	0.00%	$0.00		$276.07	
19	Mobile home RV Campground	space	$50.00	200.00%	$1.00		$0.15	
20	Storage	square foot	$15.00	200.00%	$1.00		$0.15	
21	Roads	mile	$100,000.00	0.00%	$0.00	$5,000.00	$0.00	
22	Streets	mile	$200,000.00	0.00%	$0.00	$15,000.00	$0.00	
23	Power Substation	plant	$320,000.00	10.00%	$5,000.00	$8,533.33	$2,133.33	
24								
25								
26	Farm Shop/Storage	square foot	$25.00	200%	$1.00		$0.12	
27	Antique shop	square foot	$45.00	100.00%	$1.00		$0.12	
28	Applicance shop	square foot	$25.00	100.00%	$1.00		$0.12	
29	Auto dealer	square foot	$15.00	100.00%	$1.00		$0.12	
30	Auto junkyard	square foot	$15.00	100.00%	$1.00		$0.12	
31	Auto parts	square foot	$25.00	100.00%	$1.00		$0.83	
32	Auto repair	square foot	$15.00	100.00%	$1.00		$0.60	
33	Auto transmission service	square foot	$25.00	100.00%	$1.00		$0.60	
34	Auto muffler service	square foot	$25.00	100.00%	$1.00		$0.60	
35	Bakery	square foot	$35.00	100.00%	$1.00		$0.17	
36	Bank	square foot	$45.00	100.00%	$1.00		$2.50	
37	Barber shop	square foot	$35.00	100.00%	$1.00		$1.50	
38	Beauty shop	square foot	$35.00	100.00%	$1.00		$1.50	
39	Boat sales	square foot	$25.00	100.00%	$1.00		$0.12	
40	Bowling Alley	square foot	$45.00	100.00%	$1.00		$3.13	
41	Book store	square foot	$35.00	100.00%	$1.00		$0.12	
42	Business (general)	square foot	$20.00	50.00%	$1.00		$0.12	
43	Church	square foot	$25.00	50.00%	$1.00	$7.00		
44	City hall	square foot	$25.00	50.00%	$1.00	$10.00		
45	Cleaners	square foot	$35.00	100.00%	$1.00		$1.50	
46	Clinic (medical)	square foot	$45.00	100.00%	$1.00		$20.83	
47	Construction company	square foot	$25.00	50.00%	$1.00		$6.25	
48	Country club	square foot	$45.00	50.00%	$1.00		$3.13	
49	Clothing	square foot	$35.00	100.00%	$1.00		$0.12	
50	Dentist Office	square foot	$45.00	100.00%	$1.00		$20.83	
51	Department store	square foot	$35.00	100.00%	$1.00		$0.12	
52	Doctors office	square foot	$45.00	100.00%	$1.00		$20.83	
53	Drug store	square foot	$45.00	100.00%	$1.00		$0.12	
54	Fire station	square foot	$25.00	30.00%	$1.00	$10.00		
55	Flooring & carpeting	square foot	$35.00	100.00%	$1.00		$0.12	
56	Florist	square foot	$35.00	100.00%	$1.00		$0.12	
57	Food processor	square foot	$35.00	100.00%	$1.00		$0.12	
58	Funeral home	square foot	$45.00	100.00%	$1.00		$0.12	
59	Furniture	square foot	$35.00	100.00%	$1.00		$0.12	
60	Gas Company	square foot	$25.00	50.00%	$1.00		$0.12	
61	Garage	square foot	$25.00	50.00%	$1.00			$0.10
62	Greenhouse	square foot	$35.00	100.00%	$1.00		$0.12	
63	Grocery store	square foot	$35.00	100.00%	$1.00		$0.12	
64	Grocery store (quick)	square foot	$35.00	100.00%	$1.00		$0.12	
65	Gift shop	square foot	$35.00	100.00%	$1.00		$0.12	
66	Golf course	square foot	$0.46	0.00%	$0.00		$0.01	
67	Gun shop	square foot	$35.00	100.00%	$1.00		$0.12	
68	Hall	square foot	$25.00	50.00%	$1.00		$0.12	
69	Hardware	square foot	$35.00	100.00%	$1.00		$0.12	
70	Hobby shop	square foot	$35.00	100.00%	$1.00		$0.12	
71	Hotel	square foot	$40.00	50.00%	$1.00		$0.12	
72	Jewelry	square foot	$35.00	100.00%	$1.00		$0.12	
73	Laundry	square foot	$25.00	100.00%	$1.00		$0.12	
74	Library	square foot	$35.00	100.00%	$1.00		$0.12	
75	Liquor store	square foot	$35.00	100.00%	$1.00		$0.12	
76	Lumber yard	square foot	$25.00	100.00%	$1.00		$0.12	
77	Meat market	square foot	$35.00	100.00%	$1.00		$0.12	
78	Motel	square foot	$40.00	50.00%	$1.00		$0.30	
79	Music store	square foot	$35.00	100.00%	$1.00		$0.12	
80	Newspapaer printing	square foot	$25.00	100.00%	$1.00		$0.12	

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Appendix V. Building/Land/Infrastructure Categories and Data (Page 2 of 2)

Category	Description	Units	Replacement Cost(1)	Contents Value(2)	Relocation Cost(3)	Value of Lost Services(4)	Net Income(5)	Value of Functional Downtime (6)
81	Nursing home	square foot	$45.00	100.00%	$1.00		$0.83	
82	Nursery (plant)	square foot	$25.00	100.00%	$1.00		$0.12	
83	Office building	square foot	$35.00	50.00%	$1.00		$0.12	
84	Plumbing supply	square foot	$25.00	100.00%	$1.00		$0.12	
85	Police station	square foot	$25.00	50.00%	$1.00	$10.00		
86	Post office	square foot	$25.00	50.00%	$1.00		$0.12	
87	Private club	square foot	$45.00	50.00%	$1.00		$0.12	
88	Real estate office	square foot	$35.00	50.00%	$1.00		$0.12	
89	Radio station	square foot	$35.00	50.00%	$1.00		$0.12	
90	Restaurant	square foot	$35.00	100.00%	$1.00		$0.12	
91	Restaurant drive-in	square foot	$35.00	100.00%	$1.00		$0.12	
92	School	square foot	$25.00	50.00%	$1.00	$10.00		
93	Tavern	square foot	$35.00	100.00%	$1.00		$0.12	
94	Theater	square foot	$35.00	50.00%	$1.00		$0.12	
95	Transport company	square foot	$25.00	50.00%	$1.00		$0.12	
96	Trailer sales	square foot	$35.00	100.00%	$1.00		$0.12	
97	TV repair	square foot	$35.00	100.00%	$1.00		$0.12	
98	Variety store	square foot	$35.00	100.00%	$1.00		$0.12	
99	Warehouse	square foot	$25.00	100.00%	$1.00		$0.12	
100	Welding supply	square foot	$35.00	100.00%	$1.00		$0.12	
101	Telephone Repair Shop	square foot	$15.00	100.00%	$1.00		$0.60	
102	Vegetable Packing Shed	square foot	$15.00	200.00%	$1.00		$0.60	
103	Rice Storage	bushel	$0.22	1466.00%	$0.10		$0.000000	
104	Wheat Storage	bushel	$0.22	1086.00%	$0.10		$0.000000	
105	Microwave Relay Station	plant	$100,000.00	0.00%	$1,000.00		$1,000.0000	
106	Natural Gas/Oil Well	well	$20,000.00	0.00%	$1,000.00		$1,000.0000	
201	Public Res, 1S w/o Bsmnt	square foot	$40.00	30.00%	$1.00	$0.50		
202	Public Res, 1S w Bsmnt	square foot	$40.00	30.00%	$1.00	$0.50		
203	Public Res, 2S w/o Bsmnt	square foot	$40.00	30.00%	$1.00	$0.50		
204	Public Res, 2S w Bsmnt	square foot	$40.00	30.00%	$1.00	$0.50		
205	Public Res, Split level	square foot	$40.00		$1.00	$0.50		
206	Public Res, Split foyer	square foot	$40.00	30.00%	$1.00	$0.50		
207	Public Res, Mobile Home	square foot	$40.00	30.00%	$1.00	$0.50		
208	Public Res, Apt ground level	square foot	$40.00	30.00%	$1.00	$0.50		
209	Public Res, Apt w/o Bsmnt	square foot	$40.00	30.00%	$1.00	$0.50		
210	Public Res, Apt w Bsmnt	square foot	$40.00	30.00%	$1.00	$0.50		
211	Public Administration	square foot	$35.00	50.00%	$1.00	$0.50		
212	Public Assembly Hall	square foot	$30.00	25.00%	$1.00	$0.10		
213	Public Clinic	square foot	$55.00	100.00%	$1.00	$1.00		
214	Public Dining Hall	square foot	$65.00	50.00%	$1.00	$1.00		
215	Public Dorm	square foot	$40.00	30.00%	$1.00	$0.50		
216	Public Heli Pad	square foot	$5.00	10.00%	$1.00	$1.00		
217	Public Laundry	square foot	$25.00	50.00%	$1.00	$0.50		
218	Public Office Bldg	square foot	$35.00	50.00%	$1.00	$0.50		
219	Public Repair Facility	square foot	$25.00	50.00%	$1.00	$0.50		
220	Public Retail Store	square foot	$55.00	100.00%	$1.00	$1.00		
221	Public Sewage Lagoon	lagoon	$250,000.00	0.00%	$0.00	$10,000.00		
222	Public Sewage Pumping Plant	plant	$350,000.00	0.00%	$0.00	$10,000.00		
223	Public Shooting Range	square foot	$5.00	30.00%	$1.00	$1.00		
224	Public Storage	square foot	$25.00	100.00%	$1.00	$1.00		
225	Public Warehouse	square foot	$25.00	100.00%	$1.00	$1.00		
226	Public Well House	plant	$75,000.00	0.00%	$0.00	$276.07		
227	Public Recycle Bldg	square foot	$15.00	100.00%	$1.00	$0.50		
228	Public Recycle Lot	square foot	$1.00	1000.00%	$1.00	$0.50		
229	Public Pumping Station	plant	$600,000.00	0.00%	$1,000.00	$1,000.00		
901	Non-ag Infrastructure	total	$4,003,000.00		**********			$0.10
902	Ag Infrastructure	total	$100,000.00					$0.10
903	Agriculture	total	$383,738.00					$0.10
904	Gravel Pit	total	$500,000.00		$50,000.00		$50,000.00	
910	Interstate	mile	**********			$100,000.00		
911	Primary Road	mile	$1,000,000.00			$10,000.00		
912	Secondary Road	mile	($300,000.00)			($5,000.00)		
913	Improved Road	mile	$100,000.00			$1,000.00		
914	Unimproved Road	mile	$50,000.00			$100.00		
921	Trees	acre	$5,000.00					$0.50
922	Vines	acre	$4,000.00					$0.50
923	Winter Grains	acre	$400.00					$0.50
924	Hi Value Annuals	acre	$2,500.00					$0.10
925	Diesel/Gas Storage Tank	gallon	$0.50	200.00%				$0.01
926	Truck, stored outside	truck	$50,000.00				$100.00	
927	Trailer, stored outside	trailer	$5,000.00				$50.00	

(1) Replacement cost per unit.
(2) Value of structure contents expressed as a percent of replacement cost.
(3) Relocation cost per unit per month.
(4) Value of lost public services per unit per month.
(5) Net income lost per unit per month.
(6) Value of functional downtime per unit per day

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APPENDIX VI. BUILDING/LAND/INFRASTRUCTURE DAMAGE FUNCTIONS

Appendix VI. Building/Land/Infrastructue Damage (Page 1 of 2)

	Flood Depth (feet)*																				
Category	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	0%	0%	10%	21%	28%	33%	38%	43%	50%	56%	63%	66%	69%	73%	77%	81%	85%	88%	92%	96%	100%
2	5%	11%	16%	26%	32%	36%	40%	45%	51%	56%	62%	65%	68%	72%	76%	80%	84%	88%	92%	96%	100%
3	0%	0%	7%	14%	21%	27%	31%	36%	40%	44%	48%	53%	57%	62%	68%	73%	78%	84%	89%	95%	100%
4	3%	9%	14%	20%	25%	29%	31%	34%	38%	41%	45%	50%	55%	61%	66%	72%	78%	83%	89%	94%	100%
5	0%	0%	15%	19%	22%	27%	32%	38%	43%	48%	53%	55%	57%	62%	68%	73%	78%	84%	89%	95%	100%
6	16%	26%	36%	40%	45%	49%	53%	58%	63%	67%	72%	74%	76%	79%	82%	85%	88%	91%	94%	97%	100%
7	0%	0%	10%	20%	31%	44%	60%	74%	81%	87%	94%	95%	96%	97%	97%	98%	98%	99%	99%	100%	100%
8	0%	0%	20%	31%	34%	36%	39%	41%	45%	49%	53%	56%	58%	63%	69%	74%	79%	84%	90%	95%	100%
9	0%	0%	5%	19%	25%	28%	30%	32%	34%	37%	39%	43%	46%	53%	60%	66%	73%	80%	87%	93%	100%
10	0%	5%	10%	14%	17%	19%	21%	22%	24%	27%	29%	32%	35%	43%	51%	59%	68%	76%	84%	92%	100%
11	0%	0%	0%	1%	2%	3%	5%	8%	11%	13%	16%	19%	21%	31%	41%	51%	61%	70%	80%	90%	100%
12	0%	0%	0%	1%	1%	1%	1%	1%	2%	4%	5%	6%	7%	19%	30%	42%	54%	65%	77%	88%	100%
13	0%	0%	0%	1%	1%	1%	1%	1%	2%	4%	5%	6%	7%	19%	30%	42%	54%	65%	77%	88%	100%
14	0%	0%	0%	1%	1%	1%	1%	1%	2%	4%	5%	6%	7%	19%	30%	42%	54%	65%	77%	88%	100%
15	0%	0%	0%	1%	4%	6%	8%	9%	12%	14%	17%	22%	26%	35%	45%	54%	63%	72%	82%	91%	100%
16	0%	0%	0%	1%	4%	6%	8%	9%	12%	14%	17%	22%	26%	35%	45%	54%	63%	72%	82%	91%	100%
17	0%	0%	0%	10%	20%	30%	40%	50%	50%	50%	50%	50%	50%	56%	63%	69%	75%	81%	88%	94%	100%
18	0%	0%	0%	10%	20%	30%	40%	50%	50%	50%	50%	50%	50%	56%	63%	69%	75%	81%	88%	94%	100%
19	0%	0%	0%	1%	2%	2%	2%	3%	5%	7%	9%	12%	15%	26%	36%	47%	58%	68%	79%	89%	100%
20	0%	0%	0%	1%	2%	2%	2%	3%	5%	7%	9%	12%	15%	26%	36%	47%	58%	68%	79%	89%	100%
21	0%	0%	0%	1%	1%	1%	1%	1%	2%	4%	5%	6%	7%	12%	18%	23%	29%	34%	39%	45%	50%
22	0%	0%	0%	1%	1%	1%	1%	1%	2%	4%	5%	6%	7%	12%	18%	23%	29%	34%	39%	45%	50%
23	0%	0%	0%	17%	17%	18%	19%	21%	23%	26%	28%	32%	35%	43%	51%	59%	68%	76%	84%	92%	100%
24																					
25																					
26	0%	0%	0%	17%	17%	18%	19%	21%	23%	26%	28%	32%	35%	43%	51%	59%	68%	76%	84%	92%	100%
27	0%	0%	0%	17%	17%	18%	19%	21%	23%	26%	28%	32%	35%	43%	51%	59%	68%	76%	84%	92%	100%
28	0%	0%	0%	17%	17%	18%	19%	21%	23%	26%	28%	32%	35%	43%	51%	59%	68%	76%	84%	92%	100%
29	0%	0%	0%	17%	17%	18%	19%	21%	23%	26%	28%	32%	35%	43%	51%	59%	68%	76%	84%	92%	100%
30	0%	0%	0%	2%	4%	5%	7%	8%	10%	11%	13%	14%	15%	26%	36%	47%	58%	68%	79%	89%	100%
31	0%	0%	0%	5%	5%	5%	5%	7%	11%	15%	19%	26%	32%	41%	49%	58%	66%	74%	83%	91%	100%
32	0%	0%	0%	3%	3%	3%	4%	5%	9%	13%	17%	24%	31%	40%	48%	57%	66%	74%	83%	91%	100%
33	0%	0%	0%	3%	3%	3%	4%	5%	9%	13%	17%	24%	31%	40%	48%	57%	66%	74%	83%	91%	100%
34	0%	0%	0%	3%	3%	3%	4%	5%	9%	13%	17%	24%	31%	40%	48%	57%	66%	74%	83%	91%	100%
35	0%	0%	12%	17%	21%	25%	28%	31%	33%	36%	38%	41%	43%	50%	57%	64%	72%	79%	86%	93%	100%
36	0%	0%	0%	11%	11%	12%	13%	15%	17%	20%	22%	25%	28%	37%	46%	55%	64%	73%	82%	91%	100%
37	0%	0%	0%	13%	17%	18%	24%	31%	36%	40%	45%	47%	49%	55%	62%	68%	74%	81%	87%	94%	100%
38	0%	0%	0%	10%	14%	17%	23%	28%	33%	38%	43%	47%	50%	56%	63%	69%	75%	81%	88%	94%	100%
39	0%	0%	14%	20%	32%	33%	34%	36%	41%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%	100%
40	0%	0%	0%	4%	7%	11%	15%	19%	23%	27%	31%	35%	39%	47%	54%	62%	70%	77%	85%	92%	100%
41	0%	0%	0%	2%	3%	5%	8%	10%	12%	15%	17%	20%	23%	33%	42%	52%	62%	71%	81%	90%	100%
42	0%	0%	0%	1%	2%	3%	5%	8%	11%	13%	16%	19%	21%	31%	41%	51%	61%	70%	80%	90%	100%
43	0%	0%	0%	10%	11%	11%	12%	12%	13%	13%	14%	16%	17%	27%	38%	48%	59%	69%	79%	90%	100%
44	0%	0%	0%	1%	1%	1%	2%	2%	3%	5%	6%	9%	12%	23%	34%	45%	56%	67%	78%	89%	100%
45	0%	0%	0%	4%	6%	6%	8%	10%	14%	18%	22%	28%	34%	42%	51%	59%	67%	75%	84%	92%	100%
46	0%	0%	0%	1%	2%	2%	2%	4%	6%	9%	11%	14%	17%	27%	38%	48%	59%	69%	79%	90%	100%
47	0%	0%	0%	13%	14%	15%	17%	19%	21%	23%	25%	25%	25%	34%	44%	53%	63%	72%	81%	91%	100%
48	0%	0%	0%	7%	8%	8%	9%	10%	11%	12%	13%	14%	15%	26%	36%	47%	58%	68%	79%	89%	100%
49	0%	0%	0%	8%	10%	11%	13%	15%	18%	21%	24%	28%	32%	41%	49%	58%	66%	74%	83%	91%	100%
50	0%	0%	7%	35%	35%	35%	35%	35%	36%	36%	37%	38%	39%	47%	54%	62%	70%	77%	85%	92%	100%
51	0%	0%	0%	3%	7%	7%	7%	9%	12%	14%	17%	20%	23%	33%	42%	52%	62%	71%	81%	90%	100%
52	0%	0%	0%	1%	3%	4%	6%	9%	12%	14%	17%	21%	24%	34%	43%	53%	62%	71%	81%	90%	100%
53	0%	0%	0%	1%	5%	5%	5%	7%	9%	12%	14%	18%	22%	32%	42%	51%	61%	71%	81%	90%	100%
54	0%	0%	0%	1%	5%	5%	5%	6%	8%	9%	11%	14%	17%	27%	38%	48%	59%	69%	79%	90%	100%
55	0%	0%	0%	70%	90%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
56	0%	0%	0%	7%	7%	8%	9%	11%	14%	16%	19%	23%	26%	35%	45%	54%	63%	72%	82%	91%	100%
57	0%	0%	0%	6%	6%	6%	6%	10%	13%	17%	20%	20%	20%	30%	40%	50%	60%	70%	80%	90%	100%
58	0%	0%	0%	1%	5%	5%	5%	6%	8%	9%	11%	14%	17%	27%	38%	48%	59%	69%	79%	90%	100%
59	0%	0%	0%	2%	4%	4%	5%	6%	8%	9%	11%	14%	17%	27%	38%	48%	59%	69%	79%	90%	100%
60	0%	0%	17%	17%	17%	17%	23%	32%	42%	51%	61%	65%	69%	73%	77%	81%	85%	88%	92%	96%	100%
61	0%	0%	0%	3%	5%	6%	7%	8%	11%	14%	17%	21%	25%	34%	44%	53%	63%	72%	81%	91%	100%
62	0%	0%	0%	5%	11%	16%	21%	26%	31%	37%	42%	47%	52%	58%	64%	70%	76%	82%	88%	94%	100%
63	0%	0%	0%	3%	4%	5%	6%	7%	11%	16%	20%	29%	37%	45%	53%	61%	69%	76%	84%	92%	100%
64	0%	0%	0%	3%	4%	5%	6%	7%	11%	16%	20%	29%	37%	45%	53%	61%	69%	76%	84%	92%	100%
65	0%	0%	0%	5%	8%	9%	9%	9%	12%	15%	18%	25%	31%	40%	48%	57%	66%	74%	83%	91%	100%
66	0%	0%	0%	1%	4%	6%	8%	9%	12%	14%	17%	22%	26%	35%	45%	54%	63%	72%	82%	91%	100%
67	0%	0%	0%	10%	10%	10%	11%	12%	13%	15%	16%	18%	20%	30%	40%	50%	60%	70%	80%	90%	100%
68	0%	0%	0%	1%	5%	5%	5%	5%	6%	8%	9%	12%	14%	25%	36%	46%	57%	68%	79%	89%	100%
69	0%	0%	0%	12%	12%	12%	12%	12%	13%	14%	15%	18%	21%	31%	41%	51%	61%	70%	80%	90%	100%
70	0%	0%	0%	18%	20%	20%	20%	20%	22%	25%	27%	33%	39%	47%	54%	62%	70%	77%	85%	92%	100%
71	0%	0%	0%	1%	2%	2%	2%	3%	5%	7%	9%	12%	15%	26%	36%	47%	58%	68%	79%	89%	100%
72	0%	0%	0%	1%	2%	2%	2%	3%	5%	6%	8%	10%	12%	23%	34%	45%	56%	67%	78%	89%	100%
73	0%	0%	0%	2%	5%	8%	12%	15%	18%	20%	23%	26%	28%	37%	46%	55%	64%	73%	82%	91%	100%
74	0%	0%	0%	1%	2%	2%	2%	3%	5%	6%	8%	10%	12%	23%	34%	45%	56%	67%	78%	89%	100%
75	0%	0%	0%	1%	1%	2%	2%	3%	5%	6%	8%	12%	16%	27%	37%	48%	58%	69%	79%	90%	100%
76	0%	0%	0%	1%	1%	1%	1%	1%	2%	4%	5%	6%	7%	19%	30%	42%	54%	65%	77%	88%	100%
77	0%	0%	0%	10%	10%	10%	11%	12%	16%	19%	23%	26%	28%	37%	46%	55%	64%	73%	82%	91%	100%
78	0%	0%	0%	4%	7%	10%	12%	15%	19%	22%	26%	32%	37%	45%	53%	61%	69%	76%	84%	92%	100%
79	0%	0%	5%	10%	13%	14%	15%	15%	16%	17%	18%	23%	27%	36%	45%	54%	64%	73%	82%	91%	100%
80	0%	0%	0%	2%	3%	4%	5%	6%	7%	7%	8%	10%	11%	22%	33%	44%	56%	67%	78%	89%	100%
81	0%	0%	0%	7%	10%	14%	15%	15%	17%	18%	20%	23%	26%	35%	45%	54%	63%	72%	82%	91%	100%
82	0%	0%	2%	2%	3%	6%	10%	15%	21%	26%	32%	37%	41%	48%	56%	63%	71%	78%	85%	93%	100%
83	0%	0%	0%	12%	14%	17%	19%	23%	27%	31%	35%	40%	45%	52%	59%	66%	73%	79%	86%	93%	100%
84	0%	0%	0%	20%	32%	40%	47%	53%	57%	60%	64%	67%	70%	74%	78%	81%	85%	89%	92%	96%	100%
85	0%	0%	0%	12%	14%	17%	19%	23%	27%	31%	35%	40%	45%	52%	59%	66%	73%	79%	86%	93%	100%
86	0%	0%	0%	8%	15%	24%	25%	28%	28%	30%	32%	36%	40%	48%	55%	63%	70%	78%	85%	92%	100%
87	0%	0%	0%	5%	8%	8%	9%	9%	10%	11%	12%	15%	17%	27%	38%	48%	59%	69%	79%	90%	100%

05/28/99, 10:36:55 AM, D:\Dixon\B-c\SDAM.WB1

Appendix VI. Building/Land/Infrastructue Damage (Page 2 of 2)

[illegible]

*[illegible]

05/28/99, 10:36:58 AM, D:\Dixon\B-c\SDAM.WB1

APPENDIX VII. BUILDING/STRUCTURE CONTENTS DAMAGE FUNCTIONS

Appendix VII. Building/Structure Contents Damage Functions (Page 1 of 2)

	Flood Depth (feet)*																				
Category	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Category	C-2	C-1	C-0	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18
1	0%	0%	0%	44%	75%	85%	86%	89%	90%	91%	92%	92%	92%	93%	94%	95%	96%	97%	98%	99%	100%
2	9%	10%	10%	46%	74%	82%	86%	88%	89%	90%	91%	92%	92%	93%	94%	95%	96%	97%	98%	99%	100%
3	0%	0%	0%	36%	47%	53%	57%	60%	62%	64%	66%	72%	78%	81%	84%	86%	89%	92%	94%	97%	100%
4	7%	8%	9%	36%	49%	53%	56%	58%	61%	63%	66%	72%	78%	81%	84%	86%	89%	92%	94%	97%	100%
5	13%	19%	24%	35%	44%	50%	56%	71%	76%	81%	86%	87%	88%	90%	91%	93%	94%	96%	97%	99%	100%
6	25%	32%	38%	64%	82%	87%	92%	94%	94%	95%	95%	95%	95%	96%	96%	97%	97%	98%	99%	99%	100%
7	0%	0%	0%	51%	76%	85%	89%	92%	93%	94%	95%	96%	96%	97%	97%	98%	98%	99%	99%	100%	100%
8	25%	32%	38%	64%	82%	89%	92%	94%	96%	98%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
9	0%	0%	0%	44%	75%	85%	88%	89%	93%	96%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
10	9%	10%	10%	46%	74%	82%	86%	88%	80%	73%	65%	71%	77%	80%	83%	86%	89%	91%	94%	97%	100%
11	0%	0%	0%	35%	75%	85%	95%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
12	0%	0%	50%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
13	0%	0%	50%	80%	95%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
14	0%	0%	50%	80%	95%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
15	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
16	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
17	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
18	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
19	0%	0%	8%	11%	22%	28%	33%	37%	40%	43%	46%	50%	54%	60%	66%	71%	77%	83%	89%	94%	100%
20	0%	0%	8%	11%	22%	28%	33%	37%	40%	43%	46%	50%	54%	60%	66%	71%	77%	83%	89%	94%	100%
21	0%	0%	8%	11%	22%	28%	33%	37%	40%	43%	46%	50%	54%	60%	66%	71%	77%	83%	89%	94%	100%
22	0%	0%	8%	11%	22%	28%	33%	37%	40%	43%	46%	50%	54%	60%	66%	71%	77%	83%	89%	94%	100%
23	0%	0%	20%	75%	78%	85%	90%	95%	97%	98%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
24																					
25																					
26	0%	0%	20%	75%	78%	85%	90%	95%	97%	98%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
27	0%	0%	20%	75%	78%	85%	90%	95%	97%	98%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
28	0%	0%	0%	83%	91%	94%	95%	97%	98%	99%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
29	0%	0%	20%	50%	90%	95%	98%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
30	0%	0%	0%	9%	13%	16%	17%	18%	18%	19%	19%	19%	19%	29%	39%	49%	60%	70%	80%	90%	100%
31	0%	0%	0%	18%	30%	59%	70%	90%	93%	97%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
32	0%	0%	50%	80%	95%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
33	0%	0%	40%	60%	85%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
34	0%	0%	0%	10%	20%	40%	60%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
35	0%	0%	55%	65%	90%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
36	0%	0%	0%	50%	87%	95%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
37	0%	0%	0%	15%	50%	75%	88%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
38	0%	0%	0%	18%	31%	50%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
39	0%	0%	13%	24%	43%	82%	95%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
40	0%	0%	0%	17%	22%	25%	27%	27%	29%	30%	32%	36%	39%	47%	54%	62%	70%	77%	85%	92%	100%
41	0%	0%	0%	7%	14%	21%	27%	35%	42%	50%	57%	65%	73%	76%	80%	83%	86%	90%	93%	97%	100%
42	0%	0%	0%	2%	6%	10%	15%	19%	24%	28%	33%	39%	44%	51%	58%	65%	72%	79%	86%	93%	100%
43	0%	0%	0%	35%	75%	85%	95%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
44	0%	0%	0%	35%	75%	85%	95%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
45	0%	0%	0%	10%	30%	50%	75%	95%	97%	98%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
46	0%	0%	0%	6%	30%	30%	30%	31%	33%	36%	38%	43%	47%	54%	60%	67%	74%	80%	87%	93%	100%
47	0%	0%	0%	50%	75%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
48	0%	0%	0%	12%	19%	27%	34%	42%	49%	55%	62%	68%	73%	76%	80%	83%	86%	90%	93%	97%	100%
49	0%	0%	6%	37%	50%	75%	88%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
50	0%	0%	0%	21%	40%	55%	70%	85%	90%	95%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
51	0%	0%	0%	18%	33%	65%	88%	95%	97%	98%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
52	0%	0%	0%	7%	12%	15%	16%	18%	23%	29%	34%	46%	57%	62%	68%	73%	78%	84%	89%	95%	100%
53	0%	0%	50%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
54	0%	0%	0%	10%	25%	50%	75%	91%	94%	97%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
55	0%	0%	0%	25%	42%	54%	65%	78%	85%	93%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
56	0%	0%	0%	50%	85%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
57	0%	0%	50%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
58	0%	0%	0%	10%	30%	60%	90%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
59	0%	0%	20%	78%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
60	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
61	0%	0%	0%	11%	17%	20%	23%	25%	31%	36%	42%	53%	63%	68%	72%	77%	82%	86%	91%	95%	100%
62	0%	0%	0%	66%	88%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
63	0%	0%	50%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
64	0%	0%	50%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
65	0%	0%	0%	54%	63%	75%	88%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
66	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
67	0%	0%	0%	22%	39%	58%	88%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
68	0%	0%	0%	5%	8%	10%	12%	14%	20%	26%	32%	46%	60%	65%	70%	75%	80%	85%	90%	95%	100%
69	0%	0%	8%	33%	52%	70%	75%	88%	92%	96%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
70	0%	0%	8%	25%	49%	64%	77%	88%	92%	96%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
71	0%	0%	8%	11%	22%	28%	33%	37%	40%	43%	46%	50%	54%	60%	66%	71%	77%	83%	89%	94%	100%
72	0%	0%	0%	7%	15%	24%	33%	39%	45%	50%	56%	56%	56%	62%	67%	72%	78%	83%	89%	94%	100%
73	0%	0%	0%	5%	10%	13%	16%	19%	24%	28%	33%	40%	47%	54%	60%	67%	74%	80%	87%	93%	100%
74	0%	0%	0%	35%	50%	75%	95%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
75	0%	0%	50%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
76	0%	0%	0%	20%	30%	45%	60%	75%	83%	92%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
77	0%	0%	50%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
78	0%	0%	0%	10%	16%	21%	25%	30%	37%	45%	52%	64%	76%	79%	82%	85%	88%	91%	94%	97%	100%
79	0%	0%	0%	66%	72%	75%	80%	88%	92%	96%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

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Source: US Army Corps of Engineers, HME Inc.

Appendix VII. Building/Structure Contents Damage Functions (Page 2 of 2)

	Flood Depth (feet)*																				
Category	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
80	0%	0%	0%	5%	8%	11%	13%	16%	21%	26%	31%	40%	48%	55%	61%	67%	74%	80%	87%	93%	100%
81	0%	0%	8%	35%	49%	53%	56%	56%	59%	62%	65%	71%	77%	80%	83%	86%	89%	91%	94%	97%	100%
82	0%	0%	0%	5%	20%	79%	88%	95%	97%	98%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
83	0%	0%	0%	16%	21%	24%	25%	26%	29%	33%	36%	43%	50%	56%	63%	69%	75%	81%	88%	94%	100%
84	0%	0%	0%	14%	25%	35%	44%	53%	61%	69%	77%	85%	93%	94%	95%	96%	97%	97%	98%	99%	100%
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93	0%	0%	50%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
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96	0%	0%	0%	18%	37%	60%	80%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
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99	0%	0%	0%	11%	16%	19%	21%	23%	31%	39%	47%	74%	100%	100%	100%	100%	100%	100%	100%	100%	100%
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102	0%	0%	20%	75%	78%	85%	90%	95%	97%	98%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
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202	9%	10%	10%	46%	74%	82%	86%	88%	89%	90%	91%	92%	92%	93%	94%	95%	96%	97%	98%	99%	100%
203	0%	0%	0%	36%	47%	53%	57%	60%	62%	64%	66%	72%	78%	81%	84%	86%	89%	92%	94%	97%	100%
204	0%	0%	9%	36%	49%	53%	56%	58%	61%	63%	66%	72%	78%	81%	84%	86%	89%	92%	94%	97%	100%
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207	0%	0%	0%	51%	76%	85%	89%	92%	93%	94%	95%	96%	96%	97%	97%	98%	98%	99%	99%	100%	100%
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211	0%	0%	0%	35%	75%	85%	95%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
212	0%	0%	0%	35%	75%	85%	95%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
213	0%	0%	0%	6%	30%	30%	30%	31%	33%	36%	38%	43%	47%	54%	60%	67%	74%	80%	87%	93%	100%
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215	0%	0%	0%	10%	16%	21%	25%	30%	37%	45%	52%	64%	76%	79%	82%	85%	88%	91%	94%	97%	100%
216	0%	0%	0%	10%	16%	21%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%
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220	0%	0%	50%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
221	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
222	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
223	0%	0%	0%	10%	16%	21%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%
224	0%	0%	8%	11%	22%	28%	33%	37%	40%	43%	46%	50%	54%	60%	66%	71%	77%	83%	89%	94%	100%
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227	0%	0%	8%	11%	22%	28%	33%	37%	40%	43%	46%	50%	54%	60%	66%	71%	77%	83%	89%	94%	100%
228	0%	0%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
229	0%	0%	0%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
901	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
902	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
903	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
904	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
910	0%	0%	8%	11%	22%	28%	33%	37%	40%	43%	46%	50%	54%	60%	66%	71%	77%	83%	89%	94%	100%
911	0%	0%	8%	11%	22%	28%	33%	37%	40%	43%	46%	50%	54%	60%	66%	71%	77%	83%	89%	94%	100%
912	0%	0%	8%	11%	22%	28%	33%	37%	40%	43%	46%	50%	54%	60%	66%	71%	77%	83%	89%	94%	100%
913	0%	0%	8%	11%	22%	28%	33%	37%	40%	43%	46%	50%	54%	60%	66%	71%	77%	83%	89%	94%	100%
914	0%	0%	8%	11%	22%	28%	33%	37%	40%	43%	46%	50%	54%	60%	66%	71%	77%	83%	89%	94%	100%
921	0%	0%	8%	11%	22%	28%	33%	37%	40%	43%	46%	50%	54%	60%	66%	71%	77%	83%	89%	94%	100%
922	0%	0%	8%	11%	22%	28%	33%	37%	40%	43%	46%	50%	54%	60%	66%	71%	77%	83%	89%	94%	100%
923	0%	0%	8%	11%	22%	28%	33%	37%	40%	43%	46%	50%	54%	60%	66%	71%	77%	83%	89%	94%	100%
924	0%	0%	8%	11%	22%	28%	33%	37%	40%	43%	46%	50%	54%	60%	66%	71%	77%	83%	89%	94%	100%
925																					
926																					
927																					

Source: US Army Corps of Engineers
*Damage as a percent of replacement value

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Source: US Army Corps of Engineers. HME Inc.

MITIGATION AND MONITORING PLAN

DIXON MAIN DRAIN AND
V-DRAIN ENLARGEMENT PROJECT
SOLANO COUNTY, CALIFORNIA

May 27, 2009

Application Submitted to:

U.S. Army Corps of Engineers
Sacramento District
California
Attention: Mr. William Guthrie

Applicant:

Dixon Regional Watershed Joint Powers Authority
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FIGURES
(Located under Tabs At Back of Report)

Figure 1. Project Site Regional Location Map.

Figure 2. Project Location Map.

Figure 3. Aerial Photograph of the Project Site.

Figure 4: Project Features.

Figure 5. Soils of the Project Site.

TABLES

Table A: Excavation in Waters of the United States/State.

Table B. Fill in Waters of the United States/State.

Table 1. Plant Species Observed on the Project Site.

Table 2. Wildlife Species Observed on the Project Site.

ATTACHMENTS
(Located under Tabs at Back of Report)

Attachment A. Project Site Photographs.

OVERSIZE SHEETS
(Located under Tabs at Back of Report)

Sheet 1-6. Existing and Proposed Channel Configurations: Cross-Sections.

UNDER SEPARATE COVER

Dixon Watershed Joint Powers Authority Plans For Dixon Main Drain and V-Drain Expansion (West Yost Associates, 2/26/09).

1. INTRODUCTION

On behalf of Dixon Regional Watershed Joint Powers Authority (herein referred to as the Applicant), Monk & Associates, Inc. (M&A) has prepared this Mitigation and Monitoring Plan (Mitigation Plan) that when implemented would compensate for impacts to 15,385 linear feet (8.46 acres) of Main Drain and V-Drain, 3,610 linear feet (3.2 acres) of jurisdictional ditches (primary and secondary channels), and 1.2 acres of Corps-jurisdictional adjacent wetlands. Implementation of the proposed project will impact these features. In addition, the proposed project will require the fill of 0.09-acre (615 square feet) of Corps jurisdictional area for other project improvements. These project improvements and the associated impacts are discussed in further detail below.

This Mitigation Plan provides a description of the existing conditions of the project site including the functions and values of the "other waters" and the adjacent seasonal wetlands that now occur on the project site. This Mitigation Plan also describes the functions and values of the approximately 18 to 19 acres of widened channels that will be created as part of the proposed project. Finally, this Mitigation Plan provides the goals and success criteria for the widened channels and adjacent floodplain areas, and details the proposed monitoring and reporting requirements. Once implemented, this Mitigation Plan will compensate for all impacts to waters of the United States and State that will occur from implementation of the proposed project.

2. PROPOSED PROJECT

The proposed project involves the enlargement of the Dixon Main Drain and V-Drain channels to provide an increase in flow capacity. The project consists of two primary elements, enlargement of the Dixon Main Drain along Swan Road, and the enlargement of the existing V-Drain between Swan Road and the RD 2068 Canal near to Haas Slough. During extreme storm events, high flows exceed the capacity of the channels, resulting in flooding along the floodplain, as evidenced by debris deposited approximately 20 feet above the baseflow elevation of the open water in the channel.

The goal of the proposed project is to reduce local flooding caused by regional drainage flows that exceed the existing capacity of these channels by increasing the capacity of these constructed drainage facilities. The Dixon Main Drain would be enlarged to have a capacity increase of 375 cfs (cubic feet per second) over the existing average capacity of 240 cfs. This would be achieved by excavating the channel to provide a bottom width of six to eight feet (approximately two feet wider than existing), increasing the channel depth about two feet, and creating a 4:1 slope along the southern bank. The V-Drain will be designed for a target capacity of 1,518 cfs, which includes the average existing capacity of 1,132 cfs, an increase of 375 cfs, and an additional 11 cfs to accommodate runoff from the local tributary areas. This increase in capacity would be achieved by providing a bottom width of 26 to 40 feet (approximately 13 to 18 feet wider than existing), increasing the channel depth in some locations by about 1.5 feet, and creating a 4:1 slope along the western bank. The RD 2068 Canal has a capacity that is at least 212 cfs greater than the target capacity of the V-Drain, so channel improvements are not required for the RD 2068 Intake Canal. The screens on the existing trash rack located immediately south of the existing pump station on the RD 2068 Intake Canal will be replaced as part of the routine maintenance of this structure.

In addition, the proposed project will require the fill of 0.09-acre (615 square feet) of Corps jurisdictional area for other project improvements. The proposed project will require the replacement of two 60-inch culverts along Swan Road with a new conspan bridge structure and associated rip-rap, replacement of two weir structures, relocation of an adjacent irrigation supply ditch (Primary Irrigation Ditch)(alternatively this supply ditch may be placed in a pipeline), and re-alignment of the V-Drain outlet into the RD 2068 Canal. Rip-rap will be placed on the eastern bank of the RD 2068 Canal to reduce erosion at this location. In addition, the existing railcar bridge crossing will remain. Consequently, the channel will transition from the widened channel up and downstream of the bridge. The applicant is proposing to protect the channel banks at the existing railcar bridge crossing with rip-rap. The proposed improvements to these drainage features are shown on Figure 4, Sheet 1, and the attached set of plans for the Dixon Main Drain and V-Drain Expansion project prepared by West Yost Associates (dated 2/26/09). The Applicant states that project site grading/excavation would commence in late summer of 2009, providing all applicable permits are obtained from permitting agencies. At that time, the applicant will concurrently implement the Mitigation Plan. The target completion date for this project is late Fall of 2009.

3. PROJECT IMPACTS TO WATERS OF THE U.S. AND STATE

The proposed project will require the excavation of 15,385 linear feet (8.46 acres) of Main Drain and V-Drain, 3,610 linear feet (3.2 acres) of jurisdictional ditches (primary and secondary channels), and 1.2 acres of Corps-jurisdictional adjacent wetlands. Areas of excavation within Corps jurisdiction are shown on the representative cross-sections provided on Sheets 1-6 (attached). Table A and B detail the various impacts to waters of the United States/State that would result from implementation of the proposed project.

Table A. Excavation in Waters of the United States/State

WATERS OF THE U.S. - Impact - Excavation	***Impacts***	
	acreage	**linear feet**
Wetlands		
Adjacent Seasonal Wetlands - excavate	1.20	--
Other Waters of the U.S.		
Main Drain and V-Drain- excavate jurisd. channel	8.46	15.385
Primary and Secondary Channels - excavate jurisd. channel	3.20	3,610
Total Waters of the U.S. - excavation	**12.86**	**18,995**

In addition, the proposed project will require the fill of 0.09-acre (615 square feet) of Corps jurisdictional area for other project improvements. The proposed project will require the replacement of two 60-inch culverts along Swan Road with a new conspan bridge structure and associated rip-rap, replacement of two weir structures, relocation of an adjacent irrigation supply ditch (Primary Irrigation Ditch)(alternatively this supply ditch may be placed in a pipeline), and re-alignment of the V-Drain outlet into the RD 2068 Canal. Rip-rap will be placed on the eastern bank of the RD 2068 Canal to reduce erosion at this location. In addition, the existing railcar bridge crossing will remain. Consequently, the channel will transition from the widened channel up and downstream of the bridge. The applicant is proposing to protect the channel banks at the existing railcar bridge crossing with rock rip-rap. The proposed improvements to these drainage features are shown on Figure 4, Sheet 1, and the attached set of plans for the Dixon Main Drain and V-Drain Expansion project prepared by West Yost Associates (dated 2/26/09).

Table B. Fill in Waters of the United States/State

WATERS OF THE U.S. - Impact - Fill	***Impacts***	
	acreage	**linear feet**
Other Waters of the U.S.		
Main Drain - replacement of two 60-inch culverts with a conspan bridge	0.13	20
Main Drain – replace weir structure	0.02	10
V-Drain - replace weir structure	0.02	10
V-Drain – rip-rap protection at existing railcar bridge crossing	0.65	400
RD 2068 Canal – rip-rap on eastern bank	0.08	175
Total Waters of the U.S. - fill	**0.09**	**615**

4. PROPERTY LOCATION AND SETTING

The proposed project covers approximately 56 acres and is located approximately 7 miles southeast of the City of Dixon, Solano County, California (Figures 1 and 2). The project site, that includes the adjacent stockpile areas, extends along the Dixon Main Drain, an irrigation drainage channel, for 0.6 mile along the south side of Swan Road and then continues south as the V-Drain, another irrigation drainage channel, for 2.5 miles paralleling the RD 2068 Irrigation Canal (Figure 3). The project site includes an area approximately 70 feet to the south of the Dixon Main Drain and 80 to 120 feet to the west of the V-Drain. The project site terminates at the confluence of the V-Drain and the RD 2068 Irrigation Canal. The RD 2068 Canal has connectivity to the Sacramento River and the greater Delta via the Haas Slough. The project site is surrounded for many miles by agricultural fields used for crops (alfalfa, corn, sunflower) and/or for grazing (sheep, cattle). Figure 3 provides an aerial photograph of the project site and the surrounding land uses.

5. DESCRIPTION OF THE PROJECT SITE

The primary habitats of interest in this analysis are the Dixon Main Drain and the V-Drain, both irrigation drainage channels that receives contributions from upstream watersheds, as well as runoff from the adjacent agricultural fields. Both the Dixon Main Drain and the V-Drain remove

stormwater sheet flows in the winter and collect irrigation tailwater runoff in the spring and summer. Most of the other areas within the project area are devoted to agriculture or livestock grazing, including open fields and irrigation ditches, which are highly disturbed and manipulated habitats. Ruderal (weedy) uplands and shallow seasonal wetlands also occur within the project area. These habitats provide some important functions and values, and following construction, the widened channels will provide an enhanced aquatic resource that will likely attract waterfowl and other wildlife. Project site photographs 1-8 (Attachment A) illustrate the project site features.

5.1 Hydrology and Topography

The Dixon Drain system is comprised of a 70-mile system of ditches designed to attenuate the flooding of agricultural lands. The Dixon Drain system receives upstream contributions from the historic Dickinson Creek and Dudley Creek watersheds, as well as runoff from the adjacent agricultural fields. The Dixon Drain removes stormwater sheet flows in the winter and collects irrigation tailwater runoff in the spring and summer.

The Main Drain and V-Drain drainage channels appear to be subject to extreme fluctuations in water level depending on stormwater runoff from upstream watersheds or the volume of tailwater flowing into this system. During extreme storm events, high flows exceed the capacity of these channels, resulting in flooding of the floodplain benches, as evidenced by rack lines and deposited debris along the floodplain benches.

5.1.1 Dixon Main Drain and V-Drain

Both the Dixon Main Drain and the V-Drain are large trapezoidal stormwater/irrigation drainage ditches characterized by an open water low-flow channel with steep banks on both sides. These linear man-made drainage channels total approximately 3 miles in length on the project site. The Dixon V-Drain was constructed in the late 1920's and enlarged in the 1940's, and the Dixon Main Drain was constructed in 1953. Project site photographs 1-8 (Attachment B) illustrate the project site features as they exist today. They have been routinely maintained since they were first created and thus there is not a riparian community associated with these drains. The Dixon Main Drain and the V-Drain receive contributions from upstream watersheds, as well as runoff from the adjacent agricultural lands east and south of the City of Dixon. The perennial features remove stormwater sheet flows in the winter and collect irrigation tailwater runoff in the spring and summer. These features ultimately are hydrologically connected to the navigable waters of the Sacramento River and the greater Delta via Haas Slough.

These drainage channels were excavated approximately 8 feet below the existing grade of the surrounding landscape. Routine maintenance of these drainage channels removes any buildup of sediments or silts and "problematic" vegetation (Photograph 2). The distance between ordinary high water marks (OHWM) in these drainage channels on the project site ranges between 20 and 50 feet.

5.1.2 Adjacent Agricultural Ditches

South of the Dixon Main Drain and west of the V-Drain are a series of smaller man-made ditches. The larger of these man-made irrigation channels range in width from 20 to 35 feet, and appear to be permanent features that are used to supply irrigation water to the surrounding agricultural fields (Photograph 5). Historically, these features were excavated in dry ground to

convey irrigation water and *do not otherwise constitute a straightened or channelized natural drainageway.* Other permanent, smaller man-made drainage features convey irrigation tail-waters away from the agricultural fields.

The shallow man-made ditches that are excavated on a year-to-year basis are designed to provide water to agricultural crops (supply ditches). These features range from approximately 1 to 2 feet in width (Photograph 6). These supply ditches are usually temporary features that are tailored to each year's crop species, and are routinely created and destroyed in conjunction with the agricultural activities occurring in the fields. These ditches are also subject to maintenance to ensure adequate flows are delivered to crops.

5.1.3 Adjacent Wetlands

Several topographic low areas occur within the floodplain benches alongside the V-Drain channel (Photographs 7 and 8). These topographic lows areas were originally created when the channel was created by imprecise grading of the flood control bench. These low areas can collect water when the water elevations in the ditches flood up to the elevation of the benches. After flows subside, the depressional topography holds water. To some extent these depressional features can also collect vertical precipitation. Evidence that they remain inundated for prolonged periods of time include the presence of oxidized rhizospheres, sediment deposits and drift deposits.

5.2 Soils

The Natural Resource Conservation Service (NRCS)(USDA 1972) mapped three soil units on the project site which are shown in Figure 5. The mapped soil units are San Ysidro Sandy Loam, which occurs on 0 to 2 percent slopes (SeA), Capay clay (Cc), and Clear Lake clay, which occurs on 0 to 2 percent slopes (CeA).

The San Ysidro series occurs between 25 to 100 feet above sea level and is characterized as a moderately well drained soil found on terraces. It was formed in alluvium derived from sedimentary rock. Permeability is very slow, available water capacity is moderate and runoff is slow. The surface layer for San Ysidro typically is light brownish-gray sandy loam and fine sandy loam about 14 inches thick. The sub-soil is dark yellowish-brown heavy clay loam and light yellowish-brown light clay loam that extends to a depth of more than 60 inches. San Ysidro sandy loam, 0 to 2 percent slopes is <u>not</u> classified as a hydric soil by the NRCS (1995).
Capay clay soil consists of moderately well drained soils on basin rims. These soils formed in alluvium derived from sedimentary rocks. Elevation ranges from 10-125 feet. Permeability in the soil is slow, available water capacity is moderate, and runoff is very slow. The surface layer for Capay clay is dark grayish-brown and grayish-brown clay loam 40 inches thick. The next layers are pale-brown and yellowish-brown clay loam that extends to a depth of more than 60 inches. Capay clay is <u>not</u> classified as a hydric soil by the NRCS.

The Clear Lake clay soil unit occurs at elevations between 10 and 100 feet. The soil unit consists of poorly drained soils in basins. These soils formed in mixed alluvium. Permeability is slow, available water capacity is moderate, and runoff is very slow. This soil was poorly drained, but drainage can be improved by leveling, using open drains, and general lowering of the water table. The surface layer for Clear Lake clay is dark-gray clay 45 inches thick. The substratum is

grayish-brown clay that extends to a depth of more than 60 inches. The Clear Lake clay, 0 to 2 percent slopes is classified as a hydric soil by the NRCS.

5.3 Vegetation

M&A biologists examined the habitats and characterized the vegetation present within the project area. Tables 1 and 2 (attached) provide a complete list of plant species observed in the project area and a complete list of animals observed in the project area, respectively. Habitats found within the project area are described below.

5.3.1 Drainage Channels

The Dixon V-Drain and Dixon Main Drain are large trapezoidal stormwater/irrigation drainage ditches characterized by an open water low-flow channel with steep banks on both sides. Emergent wetland vegetation grows along the edges of the channels and in intermittent patches within the channels. The dominant species growing along the bottom of the channels include broad-leaved cattail (*Typha latifolia*), hard-stem tule (*Schoenoplectus acutus* ssp. *occidentalis*), tall flatsedge (*Cyperus eragrostis*), curly dock (*Rumex crispus*), and giant bur-reed (*Sparganium eurycarpum eurycarpum*). The dominant species growing along the banks of the channels include broad-leaf peppergrass (*Lepidium latifolium*), common California aster (*Symphyotrichum chilensis*), California loosestrife (*Lythrum californicum*), perennial smartweed (*Persicaria punctata*), woolly sedge (*Carex lanuginosa*), sprangletop (*Leptochloa fascicularis, L. uninervia*), Dallis grass (*Paspalum dilatatum*) and Philadelphia fleabane (*Erigeron philadelphicus*). However, like all man-made ditches in the region, these channels are subjected to on-going maintenance activities to remove accumulated sediments and vegetation to accommodate more efficient flows.

Tree species that grow sporadically along the upper edge of the banks of the V-Drain channel include Northern California black walnut (*Juglans californica* var. *hindsii*), narrow-leaved willow (*Salix exigua*), Fremont cottonwood (*Populus fremontii fremontii*), and valley oak (*Quercus lobata*). While these tree species are typically referred to as “riparian” species if they grow in proximity to water/creeks, the sporadic occurrence of these species on the project site does not create a true riparian community.

5.3.2 Irrigation Ditches

There are a few large irrigation delivery channels and several smaller irrigation tailwater ditches to the west of the V-Drain drainage channel. The primary purpose of these irrigation ditches is to provide water to the agricultural fields and irrigated pastureland in the area and to remove excess irrigation water from the fields via tailwater ditches. The tailwater ditches are relatively permanent features that support plant species commonly found in wetlands. In the project area, the tailwater ditches support cattail, hard-stem tule, and willow (*Salix* sp.) saplings. The smaller irrigation ditches support hydrophytic (wetland) vegetation including tall flatsedge, broad-leaf peppergrass, annual beard grass (*Polypogon monspeliensis*), Bermuda grass (*Cynodon dactylon*), barnyard grass (*Echinochloa crus-galli*), and curly dock. Although this vegetation performs a valuable function in natural wetlands (for example, filtering the water, and providing wildlife with food and cover), it restricts the flow of water through agricultural ditches; hence, the growth of this vegetation is frequently controlled. That is, it is often cut back, physically removed, or

treated with herbicides. In addition, there are several smaller supply ditches that are usually temporary features that are excavated on a year-to-year basis and are tailored to crop species.

5.3.3 ADJACENT WETLANDS

The floodplain benches along the V-Drain channel support pockets of wetland vegetation, particularly in the topographic low areas. The wetland areas are dominated by cattails, tule, tall flatsedge, water plantain (*Alisma plantago-aquatica*), creeping spikerush (*Eleocharis macrostachya*), and water primrose (*Ludwigia* sp.). During high flows, water overflows the steep banks of the channel and wets the adjacent floodplain benches.

5.3.4 RUDERAL HABITAT

Ruderal habitat consists of plant species adapted to continuous disturbance (Holland and Keil 1995). Many of the plant species found within the project area are non-native species. Within the project area, this habitat occurs along the top-of-banks of the ditches, along the graded road to the east of the V-Drain, and in upland areas adjacent to fields. Common ruderal species in the project area include Queen Anne's lace (*Daucus carrota*), milk thistle (*Silybum marianum*), white-stem filaree (*Erodium moschatum*), horseweed (*Conyza canadensis*), black mustard (*Brassica nigra*), Italian ryegrass (*Lolium multiflorum*),bindweed (*Convolvulus arvensis*), wild oats (*Avena barbata, A. fatua*), ripgut grass, (*Bromus diandrus*), sweet fennel (*Foeniculum vulgare*), purple and yellow star thistle (*Centaurea calcitrapa* and *C. solstitialis*), smooth and rough cat's ear (*Hypochaeris glabra* and *H. radicata*), and bristly ox-tongue (*Helminthotheca echioides*).

5.3.5 AGRESTAL AND PASTORAL COMMUNITIES

The fields to the west of the project area support vegetation communities that are classified as agrestal (croplands) and pastoral (grazing land) (Holland & Keil 1995). These are highly disturbed communities that are the result of long-term ground manipulation and/or cultivation. These communities are dominated by plant species well-adapted to grazing of livestock or disturbance associated with cultivation. The main crop grown in the agricultural fields adjacent to the project is alfalfa (*Medicago sativa*), thus these fields require regular ground disturbance for both cultivation (disking activities) and harvesting practices. The remaining fields adjacent to the project site are used for cattle grazing.

6. MITIGATION CREATION

The attached set of plans for the Dixon Main Drain and V-Drain Expansion project prepared by West Yost Associates (dated 2/26/09) illustrate the proposed channel widening/enlargement project which when implemented would create approximately 18 to 19 acres of improved/widened channel within the project area where there is approximately 13 acres of channel now. It is important to note that while the Main Drain, V-Drain and other jurisdictional drainages within the project area will be either partially excavated to enlarge these features or completely removed and relocated, the total acreage of Corps-regulated area following implementation of the project will be approximately 1.5 times greater than the area that will be directly impacted. In addition, it is important to note that there will be no temporal loss of jurisdictional area. Hence, the impacts to Corps jurisdiction should be considered to be "self-mitigating."

The applicant is proposing to enlarge the Dixon Main Drain and V-Drain by excavating the channel to increase the channel depth and widen the channel width to provide increased capacity. The channel widening will greatly increase the area of open water along the Dixon Main Drain and V-Drain. To further increase channel capacity, the applicant proposes to lay-back the banks by creating a 4:1 slope along the southern bank of the Dixon Main Drain, and along the western bank of the V-Drain (see plans). In addition, the applicant is proposing to create an adjacent floodplain bench in certain locations (see plans), which will provide large level (flat) areas adjacent to the widened channel. The applicant proposes to seed the created floodplain benches with salt grass (*Distichlis spicata*) and creeping wild rye (*Leymus triticoides*) to control erosion.

It is anticipated that the created floodplain bench areas would undergo wetting during high flows in the Dixon Main Drain and V-Drain, particularly during large winter storm events. It is likely that these created floodplain bench areas will remain saturated for a minimum of 15 days a year (likely many more days), and that each time the created floodplain bench areas are wetted that they will remain inundated/saturated for a number of days until subsequent storm events again wet the benches. Lastly, the applicant may re-create the Primary irrigation ditch that will be removed by the proposed V-Drain enlargement (alternatively this supply ditch may be placed in a pipeline). Consequently, the total acreage of Corps-regulated area following implementation of the project will be approximately 18 to 19 acres.

7. MITIGATION GOALS AND SUCCESS CRITERIA

7.1 Success Criteria Overview

The success of the mitigation plan will be based upon the functions and values provided by enlarged channels relative to the existing channels impacted by the project. To be judged successful, the enlarged channels must provide increased open water habitat, and some sections of the created adjacent floodplain benches must provide suitable conditions to support the establishment of a self-sustaining hydrophytic plant community that includes representative wetland taxa (*i.e.,* wetland plant genera and species).

7.2 Function and Value Goal for Mitigation Pools

The enlarged channels are designed to provide improved or superior functions and values over to the existing channels impacted by the project. The improved functions and values are likely to become evident the first winter following project implementation. Without doubt there will be increased channel capacity and improved functions and values at the end of a five-year annual monitoring program.

7.3 Target Jurisdictional Acreage to be Created

The proposed project will result in impacts to a total of 19,610 linear feet (12.95 acres) of Corps/RWQCB jurisdictional areas. The applicant will mitigate impacts to waters of the United States/State at approximately a 1.5:1 mitigation ratio (or greater) (created area to impacted area). The total acreage of Corps-regulated area following implementation of the project will be approximately 18 to 19 acres (or more).

7.4 General Success Criteria Goals

The parameters of measuring success that must be met before mitigation plan is determined to be successful are as follows:

7.4.1 VEGETATION COLONIZATION

The center of the Dixon Main Drain and V-Drain channels are designed to experience long-term inundation are not expected to vegetate. The intent is to create widened channels with open water habitat similar to the existing ditches that support a fringe of hydrophytic vegetation along the banks. Accounting for the expectation of vegetation suppression in areas with long-term inundation, the side slopes of the Dixon Main Drain and V-Drain channels will remain saturated or inundated long enough during each wet season to promote growth of hydrophytic vegetation. At a minimum, the side-slopes will be considered vegetated if there is at least 5 percent or more total cover, as measured in the summer (i.e., July). Hydrophytic vegetation shall exceed 50 percent of the dominant of the plant species growing on the side-slopes of pools. The vegetation cover must meet the criterion for dominance of hydrophytic vegetation as defined in the *Federal Manual for Identifying and Delineating Jurisdictional Wetlands* (Corps, 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (Corps, 2008).

Plant cover shall be measured as relative percent cover growing on the side-slopes of the Dixon Main Drain and V-Drain channels. In general, we believe it is important to use relative percent cover in mitigation wetlands since prolonged inundation and/or open water areas result in vegetation suppression and limited plant cover. Thus, if one were to use total cover, which includes bare ground and open water, hydrophytic vegetation might not be dominant (or over 50 percent of dominant of the plant species). In contrast, measuring the dominance of what plants are present (i.e., relative percent cover) is a better indication of the dominance of hydrophytic plant colonization. To qualify as dominant plant cover, the relative percent cover of hydrophytic plant species shall be greater than 50 percent of the dominant of the plant species growing on the side-slopes of pools.

In addition to the plant species that will be seeded on the created floodplain, such as salt grass (*Distichlis spicata*) and creeping wild rye (*Leymus triticoides*), targeted wetland plants for colonization of created floodplain benches adjacent to the channels would also include umbrella sedge (*Cyperus eragrostis*), creeping spikerush (*Eleocharis macrostachya*), broad-leaf water-plantain (*Alisma plantago-aquatica*), dotted smartweed (*Polygonum punctatum*). These species are hydrophytic species that are expected to become established if the hydrologic regime targeted for the created floodplain benches is achieved.

It is important to note that the Dixon Main Drain and V-Drain channels and possibly the created floodplain benches will be subjected to on-going maintenance activities to remove accumulated sediments and vegetation to accommodate more efficient water flows. Such maintenance occurs today and out of necessity must continue in the future to protect property from flooding.

7.4.2 HYDROLOGY

It is expected that the Dixon Main Drain and V-Drain channels will continue to support perennially flowing water. In order to be judged successful, the created floodplain benches adjacent to the channels must remain inundated or saturated for at least 2 months of the year, and the water table must be 12 inches or less below the ground/soil surface for 14 or more consecutive days (Corps 2008). Hydrology conditions will be considered successful if the above hydrology regime is met in each pool in at least 3 of the 5 years of the monitoring program.

7.4.3 HYDRIC SOILS

The soils of created floodplain benches adjacent to the channels will exhibit hydric properties at the end of the five year monitoring period.

7.5 Annual Mitigation Pool Performance Criteria

Following implementation of the project, a five-year monitoring program will be conducted to determine whether the enlarged channels and the created floodplain benches adjacent to the channels have achieved success criteria. The following criteria will be used to determine the success of the proposed project.

YEAR 1

- The Dixon Main Drain and V-Drain channels will support perennially flowing water.
- Low portions of the created floodplain benches adjacent to the channels pools will remain inundated or saturated for a minimum of 1 month.
- At least three hydrophytic plant species will colonize the side-slopes outside of open water habitats
- At least three hydrophytic plant species will colonize the created floodplain benches adjacent to the channels.

YEAR 3

- The Dixon Main Drain and V-Drain channels will support perennially flowing water.
- Low portions of the created floodplain benches adjacent to the channels pools will remain inundated or saturated for a minimum of 2 months each year.
- Relative percent cover of hydrophytic vegetation on the side-slopes of the channels will average at least 25 percent of the dominant species growing on the side-slopes, as measured in the summer (i.e., July).

YEAR 5

- The Dixon Main Drain and V-Drain channels will support perennially flowing water.
- Low portions of the created floodplain benches adjacent to the channels pools will remain inundated or saturated for a minimum of 2 months each year.
- Relative percent cover of hydrophytic vegetation on the side-slopes of the channels will average at least 51 percent of the dominant species growing on the side-slopes, as measured in the summer (i.e., July).
- Soils shall meet hydric soil properties set forth in the Corps' 1987 Wetland Delineation manual and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (Corps, 2008).
- At least 18 acres of the enlarged channels and portions of the adjacent floodplain benches must meet criteria to be considered "waters of the U.S." as set forth in the Corps' 1987 Wetland Delineation manual and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (Corps, 2008).

7.6 Determination of Success

The Corps will have final decision-making authority in determining whether the proposed project meets the mitigation goals and success criteria. The Corps shall use the Corps' 1987 Wetland Delineation Manual in addition to the 2008 *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* to determine if 18 acres of the enlarged channels and portions of the adjacent floodplain benches meet criteria to be considered waters of the U.S (and State). The RWQCB may provide comments to the Corps that may be used in the final decision; however, since the RWQCB defers to the Corps to define wetlands, the Corps ultimately should make the final determination whether the mitigation pools have successfully met the requirements set forth in the Corps' Manual.

8. MITIGATION IMPLEMENTATION DETAILS AND SCHEDULE

Implementation of the proposed project is scheduled to commence in mid-August of 2009, provided all applicable permits are obtained from permitting agencies. A biological monitor will be present while the channels are excavated to ensure that all mitigation plan components are implemented according to specifications presented herein. If this project does not commence in Fall of 2009, the Applicant proposes to begin construction/excavation in uplands in May of 2010, and in-channel work on August 1, 2010.

9. MITIGATION MONITORING PROGRAM

9.1 Monitoring Duration

Upon the completion of grading and excavation of the proposed project, mitigation monitoring will begin with the first wetting cycle (winter) and will continue for a total of five years thereafter.

9.2 Hydrology Monitoring Methods

Hydrologic monitoring will be conducted at least once a month during the months of December, February, April, June, and August (five monitoring visits per year). During each hydrologic monitoring visit, the percent of the enlarged channels and the adjacent floodplain benches that are dry, saturated, or inundated will be determined visually and as necessary supplemented by shovel testing. The total areas of the enlarged channels and the adjacent floodplain benches that are dry, saturated, and inundated will be expressed as a percent of the total created area, as reported in an As-built Report (discussed below).

9.3 Plant Community Monitoring Methods

Vegetation monitoring will occur once annually in July. Vegetation composition and frequency indices shall be developed for all plant species found growing on the side-slopes of the channels and on the created floodplain benches. For the vegetation composition analysis, a plant list will be made each year. Based upon this plant list, the habitat affinities of all plants growing on the side-slopes of the channels and on the created floodplain benches (*i.e.* obligate, facultative wetland, and facultative species) shall be determined from the "Revision of the National List of Plant Species That Occur in Wetlands" (Reed 1988).

Baseline transects will be established and monitored for five consecutive years. Systematic point-intercept sampling methods will be used to quantify relative wetland plant cover along these transects. Using this frequency index, a determination shall be made as to whether or not the side-slopes of the channels and on the created floodplain benches are meeting the hydrophytic plant species success criteria. Frequency indices can be used to detect changes in vegetation structure growing on the side-slopes of the channels and on the created floodplain benches over time.

10. REPORTING

10.1 As-Built Report

Following the completion of the grading and excavation of the proposed project, an As-Built Report will be prepared and submitted to the Corps, RWQCB and the California Department of Fish and Game. This report will document the construction effort. Channel widths and lengths will be mapped using GPS technology with sub-meter accuracy. Cross-sections of channels will be prepared by the project engineer. Photographs documenting the post-construction site conditions will be submitted in the As-Built report. The As-Built Report would be submitted to the agencies by the end of the first winter after the grading and excavation of the proposed project.

10.2 Annual Monitoring Reports

At the end of each monitoring year (years one through five), a detailed annual monitoring report will be prepared. At a minimum, each monitoring report shall contain:

A) Hydrology data;

B) Plant community sampling data and summaries;

C) Photographic documentation of channels and the created floodplains benches. During each wet season, photographs will be taken to document the extent of inundation/saturation in the channels and the created floodplains benches. Photographs will be taken from permanently established photo-stations. Photo-stations will be marked in the field via installation of t-posts. Taking pictures from the same location each year will allow a visual analysis of the year to year changes that occur in the channels and the created floodplains benches.

11. MITIGATION SITE MAINTENANCE AND OTHER REMEDIAL ACTIONS

During the monitoring efforts, plant establishment failure and/or damage to project site features (such as erosion) will be noted. Arrangements will be made for remedial action and/or repair as necessary to meet success criteria.

12. CONTINGENCY MEASURES

If annual or final success criteria are not met, the applicant will prepare an analysis of the cause(s) of failure and, if determined necessary by the Corps or the RWQCB, propose remedial actions for approval. The applicant or his legal assignee shall be responsible for reasonably funding the remedial procedures necessary for successful completion of the mitigation plan.

13. FISCAL RESPONSIBILITIES AND OTHER ADMINISTRATIVE COMPONENTS

The Dixon Regional Watershed Joint Powers Authority (Applicant), or a legal assignee, shall be solely liable for financing all work associated with mitigation plan implementation, monitoring, remedial actions, and contingency plans as specified in this mitigation plan. Fiscal responsibility for these tasks shall remain the sole obligation of the applicant or it legal assignee until mitigation is considered successful pursuant to success criteria as determined by the Corps. After the applicant meets the mitigation plan success criteria presented herein, and the Corps and RWQCB verify the success criteria are met, the applicant, or subsequent assignee, shall retain all financial obligations for perpetual management of the mitigation site.

14. REFERENCES

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0 2 4 8 12 16 20 Miles

Figure 1. Dixon Main Drain and V-Drain Enlargement Project Regional Location Map
Solano County, California

County: Solano
Map Preparation Date: January 31, 2007

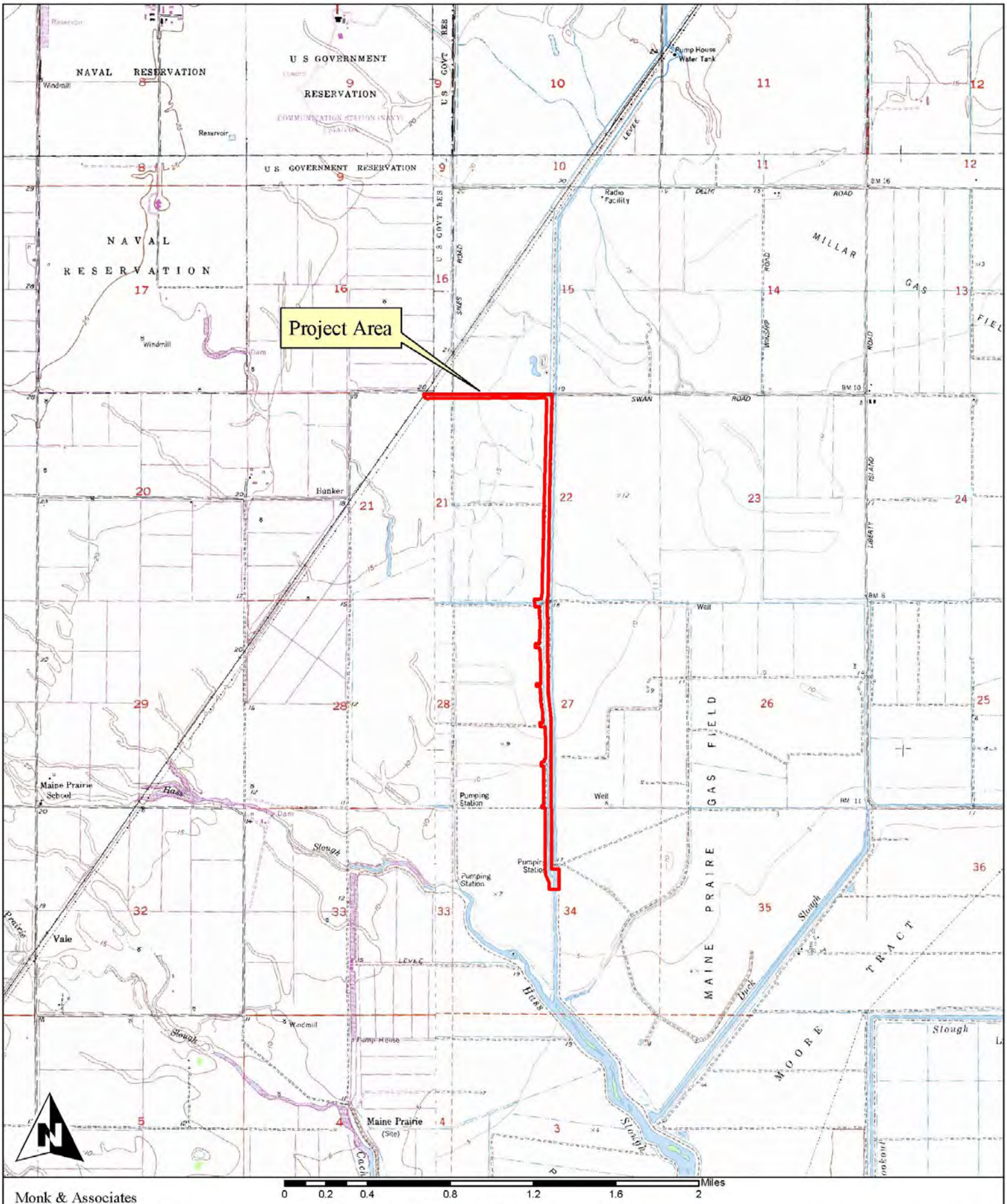

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Figure 2. Dixon Main Drain and V-Drain Enlargement Project Location Map
Solano County, California

7.5-Minute Dozier quadrangle
Map Preparation Date: January 31, 2007
Topography Source: http://gis.ca.gov

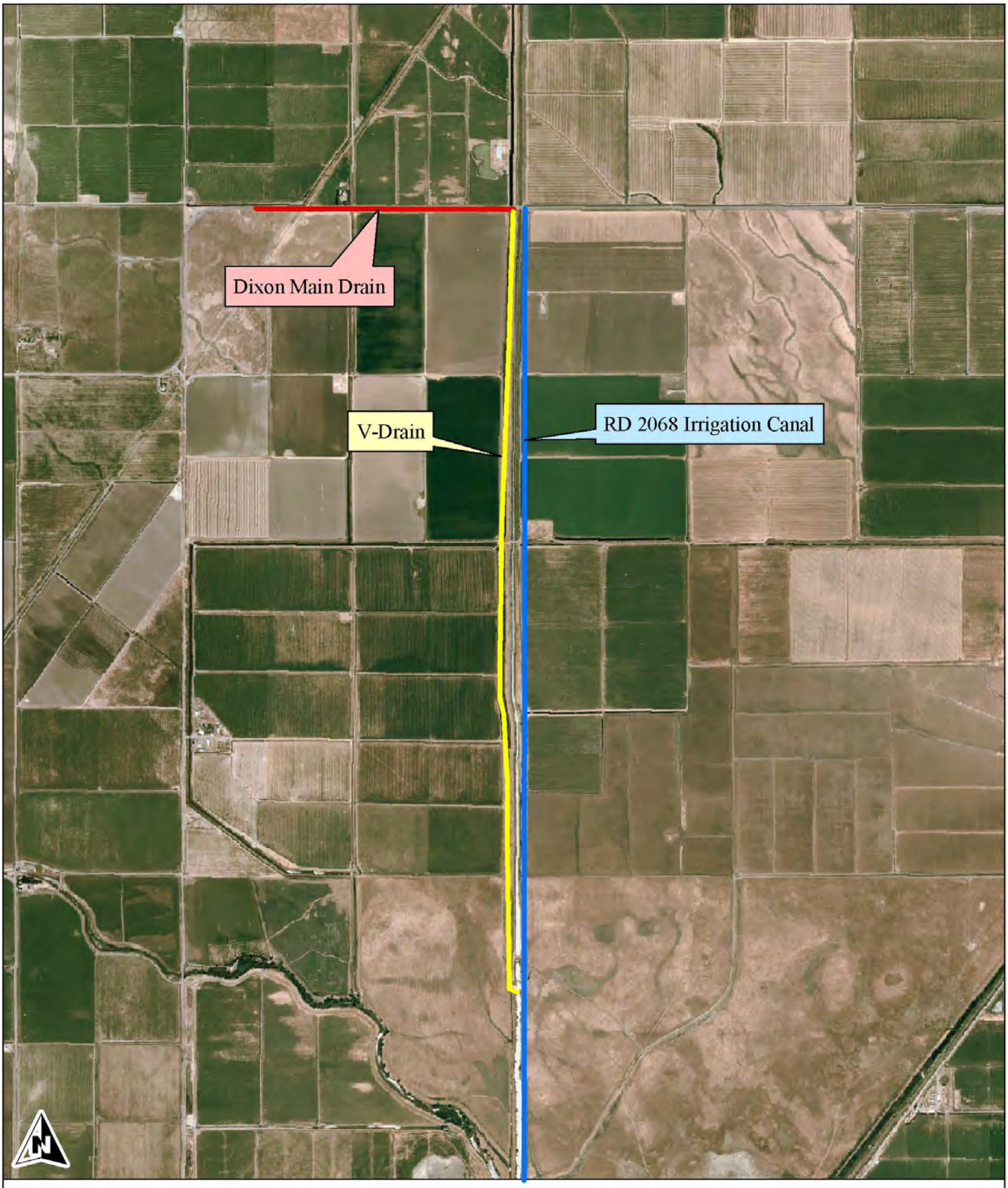

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Figure 3. Aerial Photograph of the
Dixon Main Drain and V-Drain Enlargement Project
Solano County, California

County: Solano
Map Preparation Date: January 31, 2007
Aerial Photograph Source: http://gdw.apfo.usda.gov

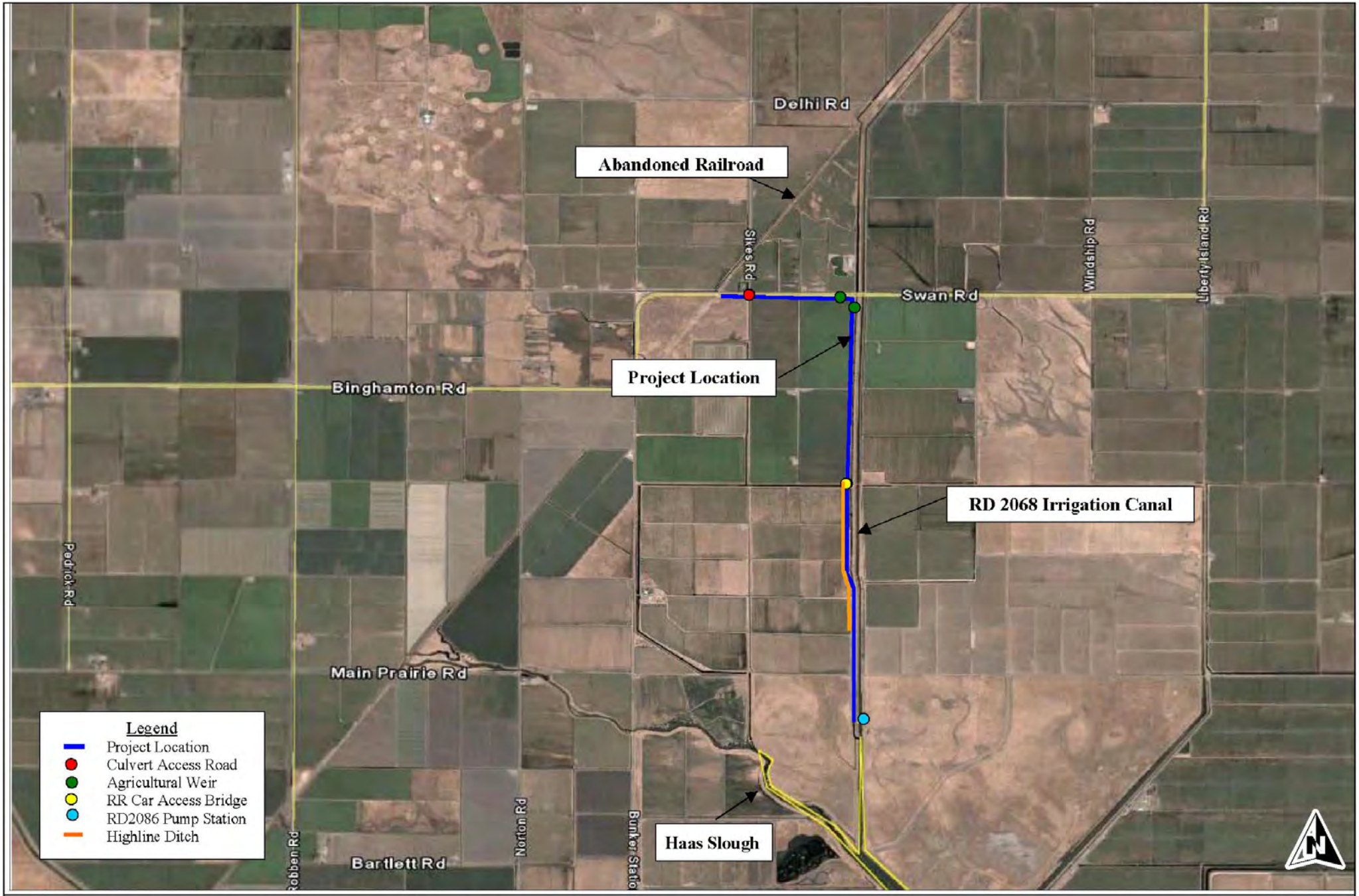

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Figure 4. Project Features
Dixon Main Drain and V-Drain Enlargement Project
Solano County, California

Map Preparation Date: March 5, 2009

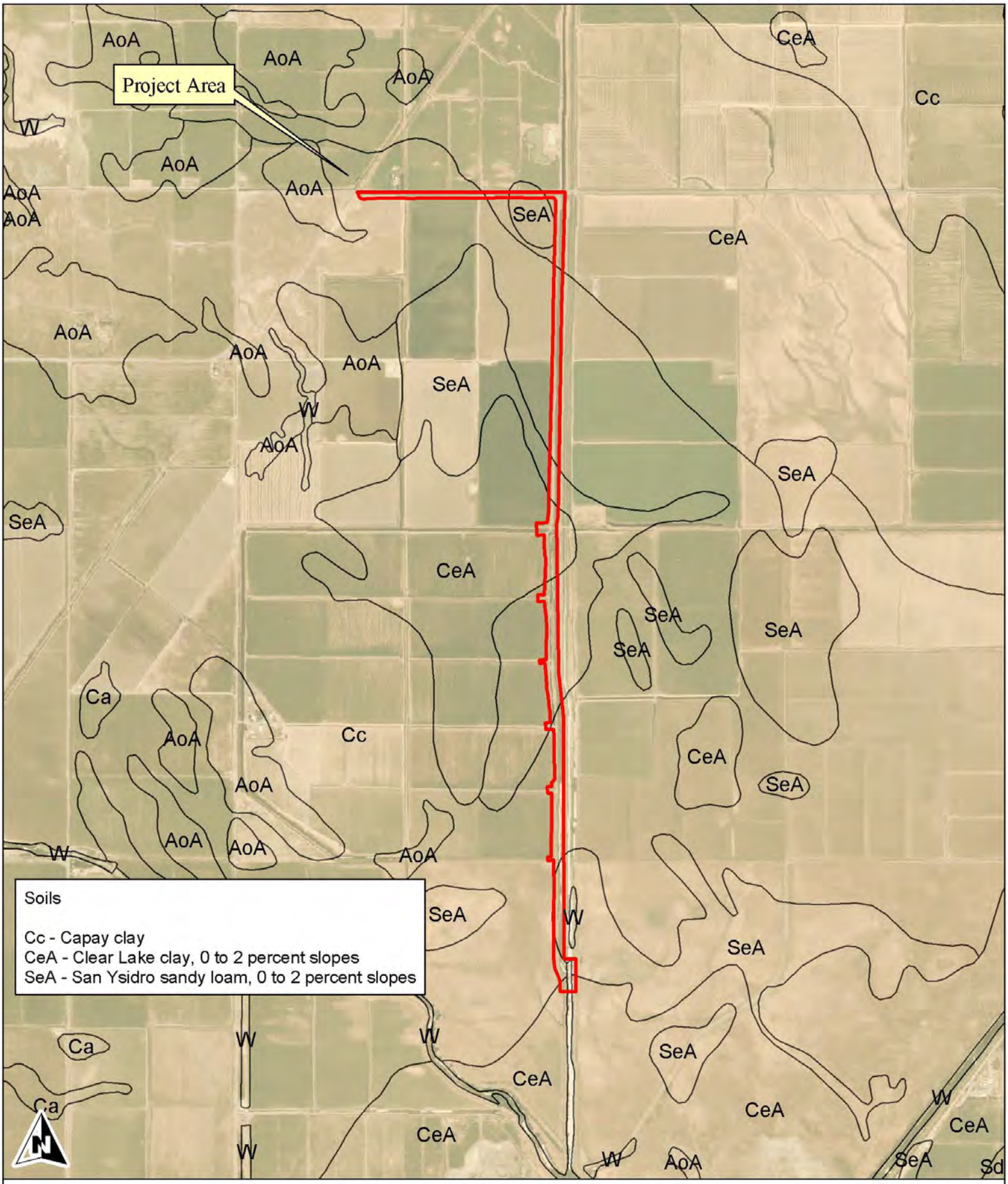

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Figure 5. Soils of the Dixon Main Drain and V-Drain Enlargement Project
Solano County, California

County: Solano
Map Preparation Date: January 31, 2007
Soils Data Source: http://soildatamart.nrcs.usda.gov

Table A. Excavation in Waters of the United States/State

WATERS OF THE U.S. - Impact - Excavation	***Impacts***	
	acres	**linear feet**
Wetlands		
Adjacent Seasonal Wetlands - excavate	1.20	--
Other Waters of the U.S.		
Main Drain and V-Drain- excavate jurisd. channel	8.46	15.385
Primary and Secondary Channels - excavate jurisd. channel	3.20	3,610
Total Waters of the U.S. - excavation	**12.86**	**18,995**

Table B. Fill in Waters of the United States/State

WATERS OF THE U.S. - Impact - Fill	***Impacts***	
	acreage	**linear feet**
Other Waters of the U.S.		
Main Drain - replacement of two 60-inch culverts with a conspan bridge	0.13	20
Main Drain – replace weir structure	0.02	10
V-Drain - replace weir structure	0.02	10
V-Drain – rip-rap protection at existing railcar bridge crossing	0.65	400
RD 2068 Canal – rip-rap on eastern bank	0.08	175
Total Waters of the U.S. - fill	**0.09**	**615**

Table 1

Plant Species Observed on the Dixon Drain Project Site

Angiosperms - Dicots	
Amaranthaceae	
**Amaranthus albus*	Tumble pigweed
Anacardiaceae	
Toxicodendron diversilobum	Western poison-oak
Apiaceae	
**Daucus carrota*	Queen Anne's lace
**Foeniculum vulgare*	sweet fennel
Hydrocotyle verticillata	Whorled penny-wort
Asclepiadaceae	
Asclepias fascicularis	narrow-leaf milkweed
Asteraceae	
**Carduus pycnocephalus*	Italian thistle
**Centaurea calcitrapa*	Purple star-thistle
**Centaurea solstitialis*	Yellow star-thistle
Centromadia fitchii	Fitch's spikeweed
**Cichorium intybus*	Chicory
**Cirsium vulgare*	bull thistle
Conyza canadensis	Horseweed
Eclipta prostrata	Yerba de tajo
Erigeron philadelphicus	Philadelphia fleabane
Euthamia occidentalis	Western goldenrod
Grindelia camporum camporum	Great Valley gumweed
Helenium puberulum	Sneezeweed
**Helminthotheca echioides*	bristly ox-tongue
Hemizonia congesta luzulifolia	White hayfield tarweed
**Hypochaeris glabra*	Smooth cat's-ear
**Hypochaeris radicata*	rough cat's-ear
**Lactuca saligna*	Willow lettuce
**Lactuca serriola*	prickly lettuce
Layia chrysanthemoides	Smooth tidy-tips
**Senecio vulgaris*	Common groundsel
**Silybum marianum*	Milk thistle
**Sonchus asper asper*	Prickly sow-thistle
**Sonchus oleraceus*	common sow-thistle
Symphyotrichum chilensis	Common California aster
Symphyotrichum subulatum ligulatum	Annual saltmarsh aster
**Taraxacum officinale*	Dandelion
**Tragopogon porrifolius*	Salsify
Xanthium spinosum	Spiny cocklebur
Xanthium strumarium	Cocklebur
Boraginaceae	
Amsinckia menziesii	Fiddleneck
Heliotropium curassavicum	Heliotrope
Brassicaceae	
**Brassica nigra*	Black mustard
**Lepidium latifolium*	Broad-leaf peppergrass

* Indicates a non-native species

Table 1

Plant Species Observed on the Dixon Drain Project Site

**Sinapis arvensis*	Charlock
Caryophyllaceae	
**Spergularia rubra*	Ruby sand-spurrey
Chenopodiaceae	
Atriplex triangularis	Spearscale
**Chenopodium sp.*	Goosefoot
**Salsola tragus*	Russian thistle
Convolvulaceae	
**Convolvulus arvensis*	Bindweed
Cressa truxillensis	Alkali weed
Fabaceae	
**Lotus corniculatus*	birdfoot trefoil
**Medicago polymorpha*	California burclover
**Medicago sativa*	Alfalfa
**Melilotus alba*	White sweetclover
**Melilotus indica*	Sour clover
**Trifolium dubium*	Little hop clover
**Trifolium fragiferum*	Strawberry clover
**Trifolium repens*	White clover
Trifolium variegatum	White-tip clover
**Vicia benghalensis*	Purple vetch
**Vicia sativa*	common vetch
Fagaceae	
Quercus lobata	Valley oak
Frankeniaceae	
Frankenia salina	Alkali heath
Gentianaceae	
Centaurium muehlenbergii	June centaury
Geraniaceae	
**Erodium botrys*	broad-leaf filaree
**Erodium cicutarium*	Red-stem filaree
**Erodium moschatum*	White-stem filaree
**Geranium dissectum*	cut-leaf geranium
**Geranium molle*	Crane's-bill geranium
Juglandaceae	
Juglans californica hindsii	Northern California black walnut
Lamiaceae	
Lycopus americanus	American bugleweed
Mentha arvensis	Field mint
**Mentha pulegium*	Pennyroyal
Prunella vulgaris lanceolata	Self-heal
Lythraceae	
Lythrum californicum	California loosestrife
**Lythrum hyssopifolium*	Hyssop loosestrife
Malvaceae	
Abutilon theophrasti	Velvet-leaf
**Malva parviflora*	Cheeseweed

* Indicates a non-native species

Table 1

Plant Species Observed on the Dixon Drain Project Site

Malvella leprosa	Alkali mallow
Sidalcea sp.	Checkerbloom
Onagraceae	
Epilobium brachycarpum	Summer cottonweed
Epilobium ciliatum ciliatum	Hairy willow-herb
Ludwigia sp.	Primrose
Plantaginaceae	
**Plantago lanceolata*	English plantain
**Plantago major*	Common plantain
Polygonaceae	
Persicaria lapathifolia	Willow weed
Persicaria punctata	Perennial smartweed
**Polygonum aviculare*	common knotweed
**Rumex crispus*	curly dock
Rosaceae	
**Rubus discolor*	Himalayan blackberry
Salicaceae	
Populus fremontii fremontii	Fremont cottonwood
Salix exigua	Narrow-leaved willow
Scrophulariaceae	
Triphysaria eriantha eriantha	Butter-and-eggs
Veronica americana	American brooklime
**Veronica anagallis-aquatica*	Water speedwell
Verbenaceae	
Phyla nodiflora nodiflora	Common frog-fruit
Zygophyllaceae	
**Tribulus terrestris*	Puncture vine
Angiosperms -Monocots	
Alismataceae	
Alisma plantago-aquatica	Water plantain
Cyperaceae	
Carex lanuginosa	Woolly sedge
Cyperus eragrostis	Tall flatsedge
Eleocharis macrostachya	creeping spikerush
Schoenoplectus acutus occidentalis	Hard-stem tule
Juncaceae	
Juncus balticus	Baltic rush
Juncus bufonius	toad rush
Juncus mexicanus	Mexican rush
Lemnaceae	
Lemna sp.	Duckweed
Liliaceae	
Triteleia laxa	Ithuriel's spear
Poaceae	
**Agrostis gigantea*	Black bentgrass

* Indicates a non-native species

Table 1

Plant Species Observed on the Dixon Drain Project Site

**Avena barbata*	slender wild oat
**Avena fatua*	Wild oat
**Avena sativa*	Cultivated oat
**Bromus diandrus*	ripgut grass
**Bromus hordeaceus*	soft chess
**Bromus stamineus*	Brome
**Cynodon dactylon*	Bermuda grass
Distichlis spicata	Saltgrass
**Echinochloa crus-galli*	Barnyard grass
Elymus multisetus	Big squirreltail
Eragrostis mexicana virescens	Mexican lovegrass
Hordeum brachyantherum	Meadow barley
**Hordeum marinum gussoneanum*	Mediterranean barley
**Hordeum murinum leporinum*	Foxtail barley
Leersia oryzoides	Rice cutgrass
Leptochloa fascicularis	Bearded spangletop
Leptochloa uninervia	Mexican spangletop
Leymus triticoides	Creeping wildrye
**Lolium multiflorum*	Italian ryegrass
**Lolium perenne*	Perennial ryegrass
Panicum capillare	Witchgrass
**Paspalum dilatatum*	Dallis grass
Paspalum distichum	Joint paspalum
**Phalaris aquatica*	Harding grass
**Phalaris minor*	Littleseed canary grass
**Phalaris paradoxa*	Paradox canary-grass
**Poa annua*	annual bluegrass
**Poa trivialis*	Rough bluegrass
**Polypogon interruptus*	Ditch beard grass
**Polypogon monspeliensis*	Annual beard grass
Setaria gracilis	Knotroot bristle grass
**Setaria pumila*	Yellow bristle grass
**Sorghum bicolor*	Sorghum
**Sorghum halepense*	Johnsongrass
**Taeniatherum caput-medusae*	Medusa-head
**Triticum aestivum*	Wheat
**Vulpia bromoides*	six-weeks brome grass
Typhaceae	
Sparganium eurycarpum eurycarpum	Giant bur-reed
Typha latifolia	broad-leaved cattail

* Indicates a non-native species

Table 2
Wildlife Species Observed on the Dixon Drain Project Site

Invertebrates	
Red swamp crayfish	*Procambarus clarkii*
Fish	
Common carp	*Cyprinus carpio*
Amphibians	
Pacific tree frog	*Hyla regilla*
Reptiles	
Pacific pond turtle (=western pond turtle)	*Actinemys marmorata (=Clemmys m.)*
Birds	
Great blue heron	*Ardea herodias*
Great egret	*Ardea alba*
Snowy egret	*Egretta thula*
Turkey vulture	*Cathartes aura*
Mallard	*Anas platyrhynchos*
White-tailed kite	*Elanus leucurus*
Northern harrier	*Circus cyaneus*
Red-tailed hawk	*Buteo jamaicensis*
Ring-necked pheasant	*Phasianus colchicus*
Killdeer	*Charadrius vociferus*
Long-eared owl	*Asio otus*
Black phoebe	*Sayornis nigricans*
American crow	*Corvus brachyrhynchos*
Marsh wren	*Cistothorus palustris*
Savannah sparrow	*Passerculus sandwichensis*
Song sparrow	*Melospiza melodia*
White-crowned sparrow	*Zonotrichia leucophrys*
Red-winged blackbird	*Agelaius phoeniceus*
Western meadowlark	*Sturnella neglecta*
Mammals	
Black-tailed hare	*Lepus californicus*
Botta's pocket gopher	*Thomomys bottae*
American beaver	*Castor canadensis*
Muskrat	*Ondatra zibethicus*
Coyote	*Canis latrans*
Raccoon	*Procyon lotor*
Southwestern river otter	*Lontra canadensis sonorae*
Striped skunk	*Mephitis mephitis*

Representative Photographs
Dixon Main Drain and V-Drain Wetland Delineation

Photograph 1: View of V-Drain from Swan Road looking south, showing open water low-flow channel with steep banks on both sides.

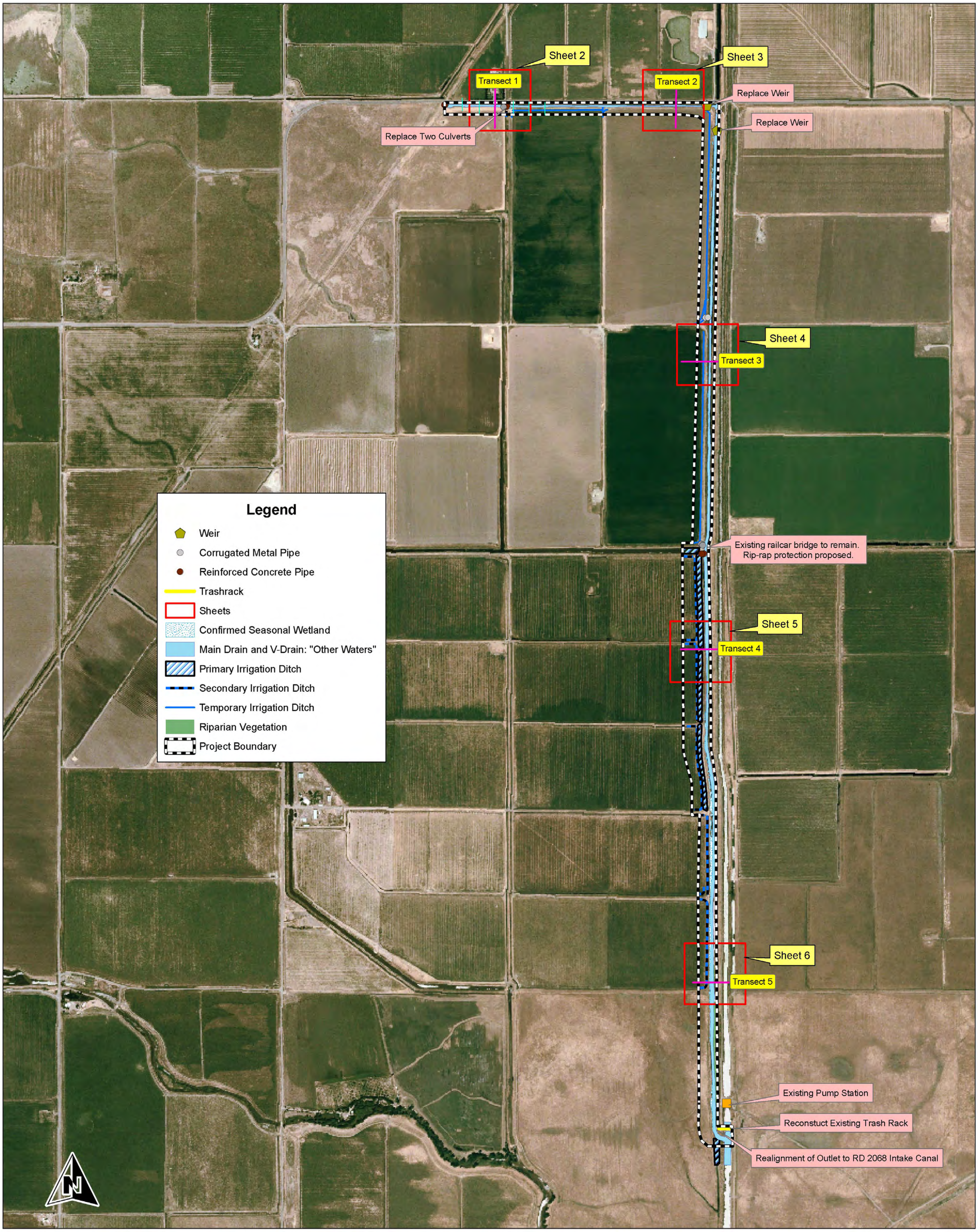
Photograph 2. View of V-Drain following routine maintenance removing any buildup of siltation and problematic vegetation.

Photograph 3: Primary Irrigation Ditch used as supply irrigation water.

Photograph 4: Temporary ditch used to convey tail-water away from the agricultural fields.

Photograph 5: Topographic low with seasonal wetland characteristics along the V-Drain canal flood plain

Photograph 6: Riparian vegetation along the banks of the V-Drain in the southern portion of project site. Note seasonal wetland on floodplain on opposite bank.



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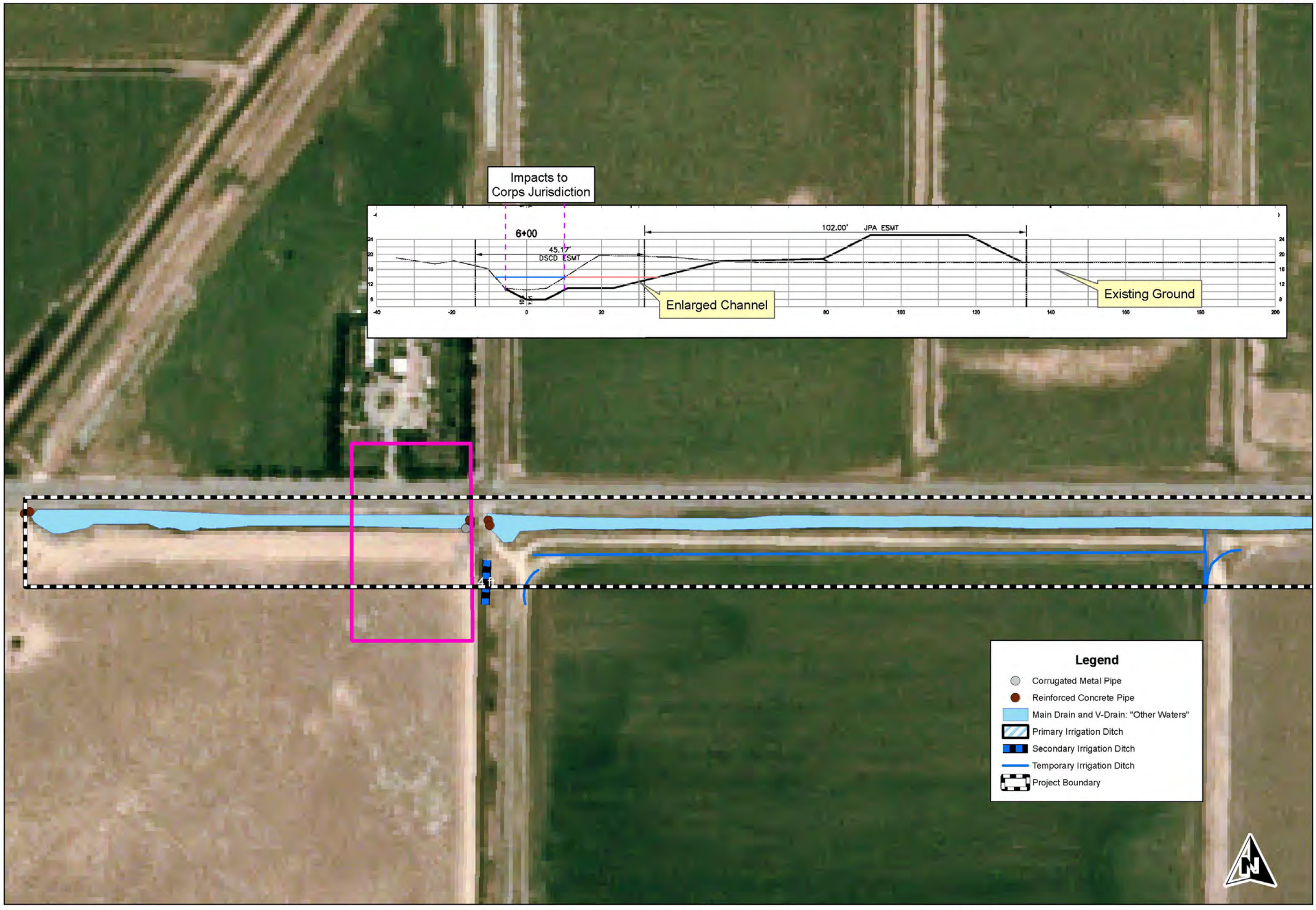
Sheet 1. Locations of Cross-Sections of Existing and Proposed Channel Configurations
Dixon Main Drain and V-Drain Enlargement Project
Dixon, California

Map Revision Date: March 9, 2009
Aerial Photograph Source: http://gdw.apfo.usda.gov



0 100 200 400 600 800 1,000 Feet

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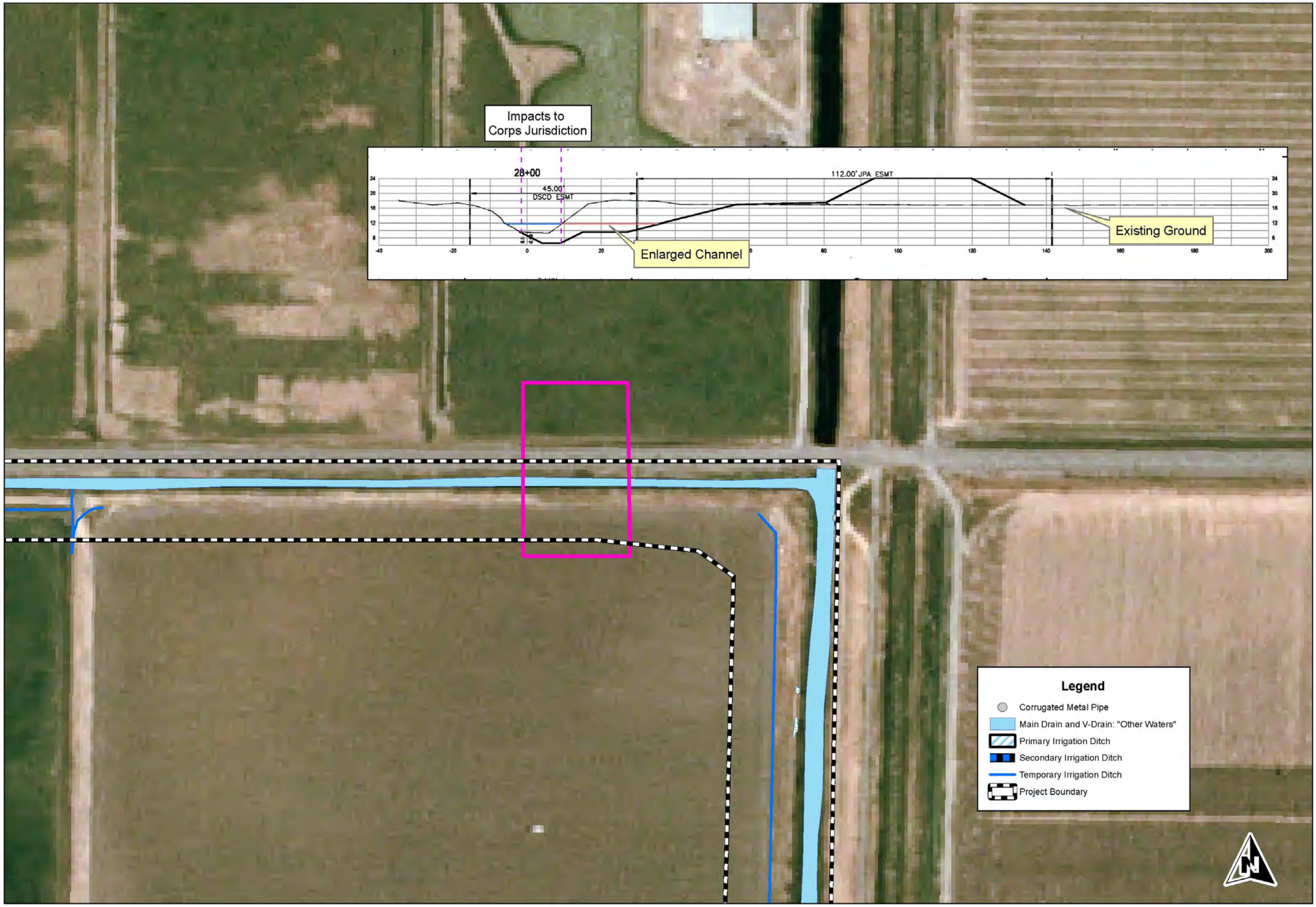
Sheet 2. Existing and Proposed Channel Configurations. Cross-Section 1
Dixon Main Drain and V-Drain Enlargement Project
Dixon, California

Map Revision Date: May 21, 2009
Aerial Photograph Source: http://gdw.apfo.usda.gov



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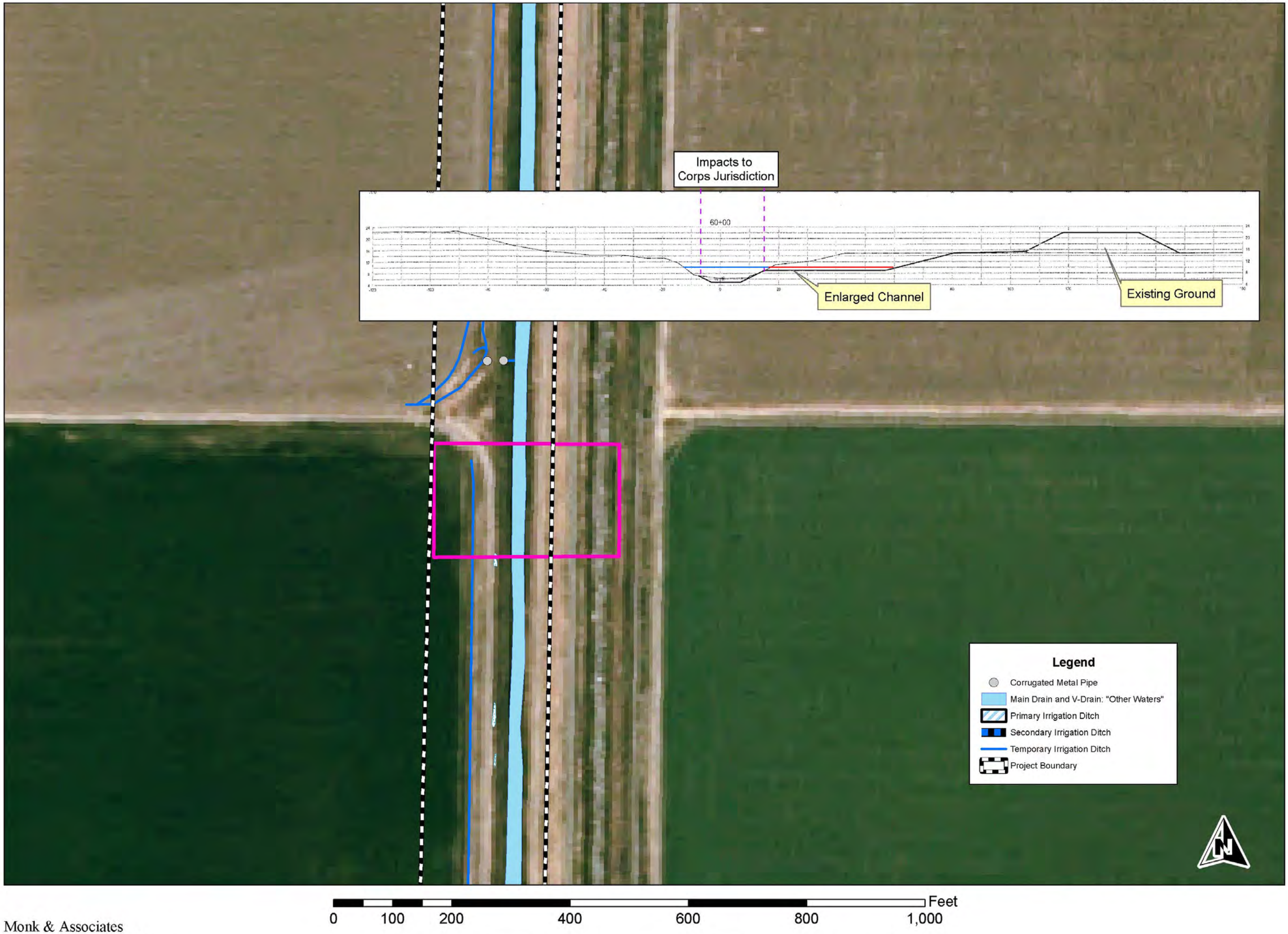
Sheet 3. Existing and Proposed Channel Configurations. Cross-Section 2
Dixon Main Drain and V-Drain Enlargement Project
Dixon, California

Map Revision Date: May 21, 2009
Aerial Photograph Source: http://gdw.apfo.usda.gov



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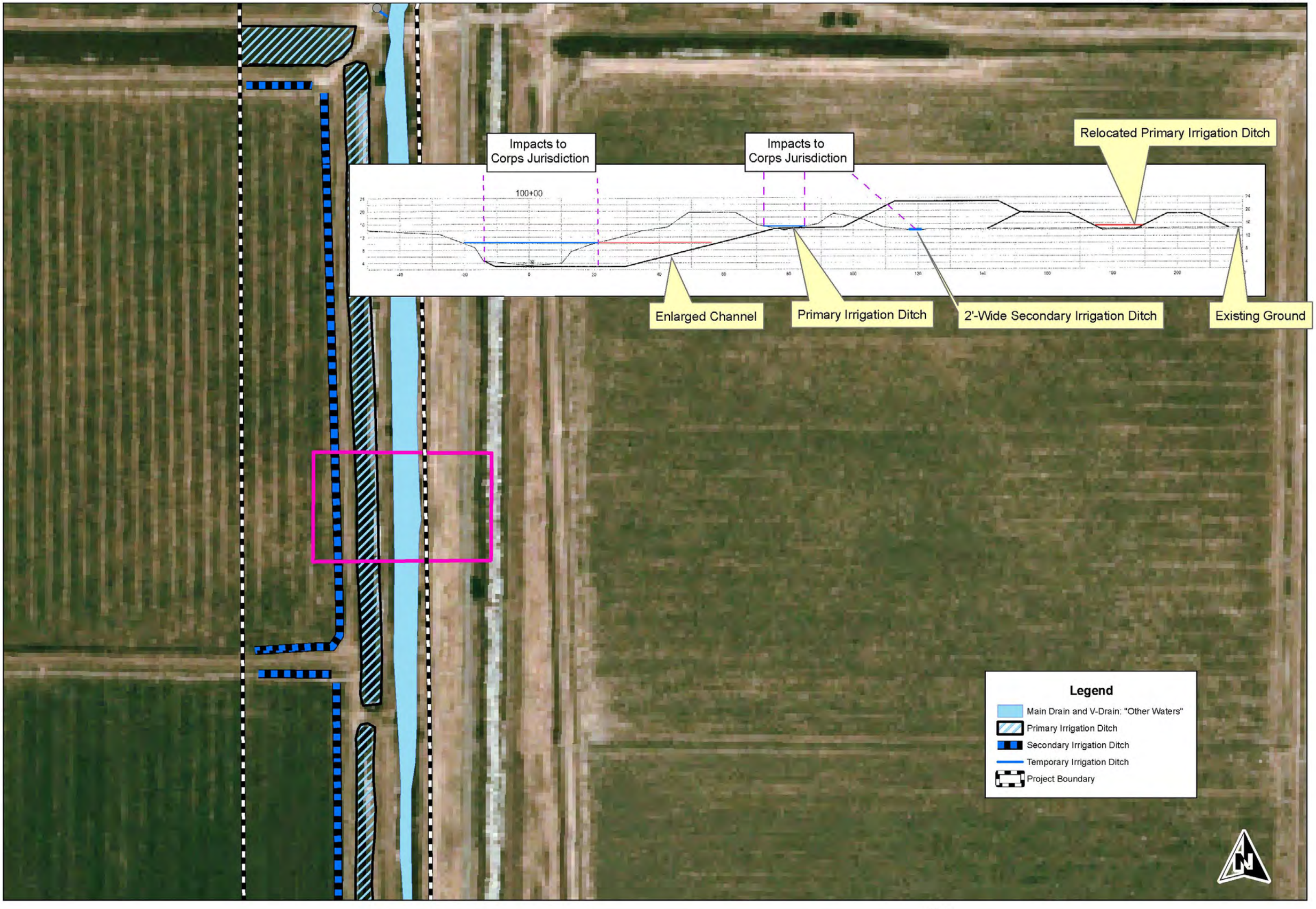
Sheet 4. Existing and Proposed Channel Configurations. Cross-Section 3
Dixon Main Drain and V-Drain Enlargement Project
Dixon, California

Map Revision Date: March 9, 2009
Aerial Photograph Source: http://gdw.apfo.usda.gov



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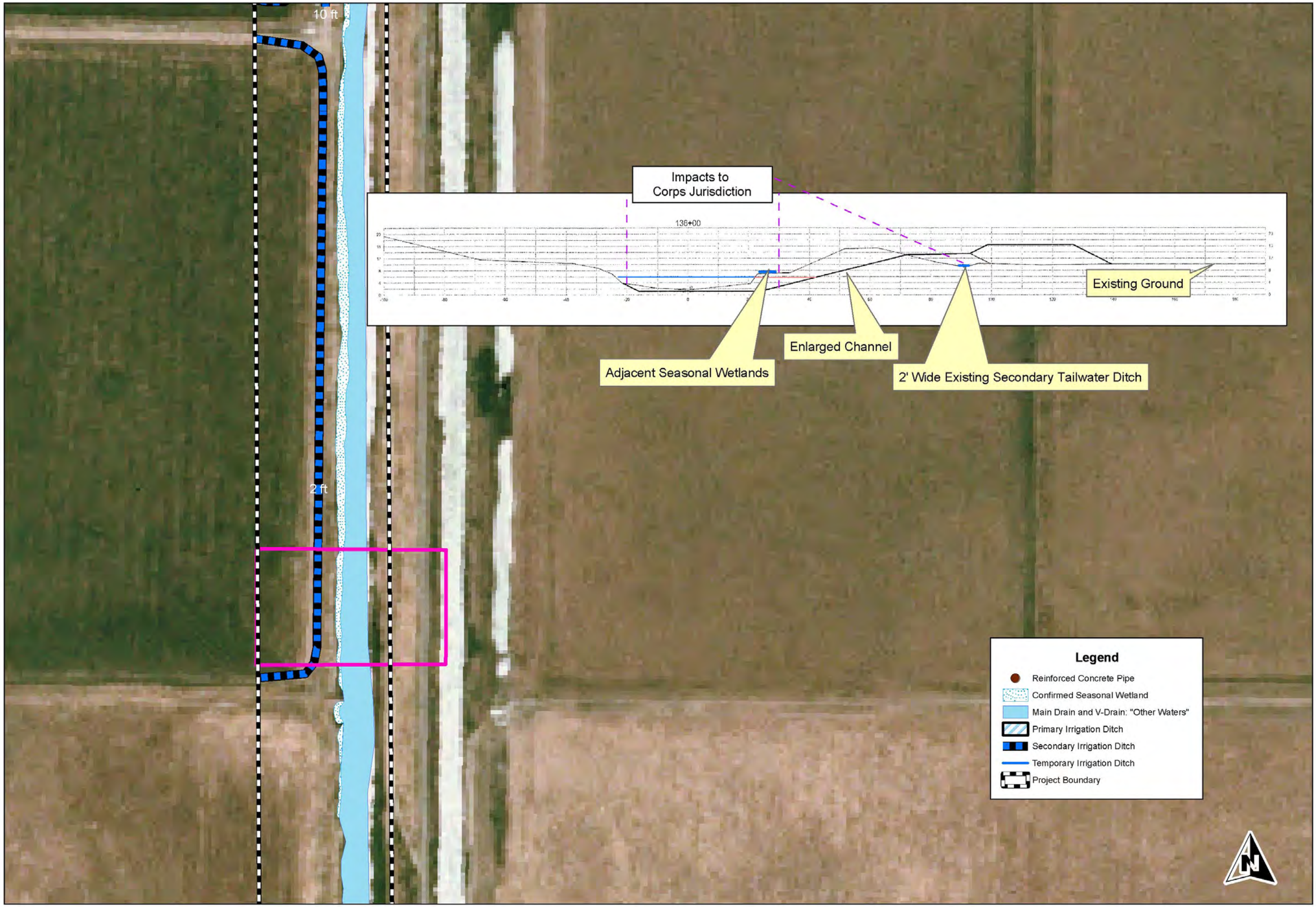
Sheet 5. Existing and Proposed Channel Configurations. Cross-Section 4
Dixon Main Drain and V-Drain Enlargement Project
Dixon, California

Map Revision Date: March 9, 2009
Aerial Photograph Source: http://gdw.apfo.usda.gov



0 100 200 400 600 800 1,000 Feet

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Sheet 6. Existing and Proposed Channel Configurations. Cross-Section 5
Dixon Main Drain and V-Drain Enlargement Project
Dixon, California

Map Revision Date: March 9, 2009
Aerial Photograph Source: http://gdw.apfo.usda.gov