Appendix C

West Yost & Associates Drainage/Flood Control EIR Evaluation

WEST YOST & ASSOCIATES
Consulting Engineers

March 10, 2005

Mr. Marshall Drack
Director of Economic Development
600 East A Street
Dixon CA 95620

Project No.: 066-00-03-09

SUBJECT: Dixon Downs Drainage/Flood Control EIR Evaluation

Dear Mr. Drack:

West Yost & Associates (WYA) is pleased to present our technical findings for the drainage/flood control and runoff water quality sections of the Dixon Downs Draft EIR.

ENVIRONMENTAL SETTING

The environmental setting is described below, including:

- Physical Setting - The Physical Setting describes the hydrological and water quality conditions, as they exist currently.
- Historical Setting – The Historical Setting describes the likely drainage history of the area that has led to the current physical setting.
- Regulatory Setting – The Regulatory Setting summarizes the applicable drainage and water quality regulations and permitting requirements.

Physical Setting

The Physical Setting describes the hydrological and water quality conditions, as they exist currently.

Hydrologic Conditions

The regional drainage patterns are shown on Figure 1 (all figures and tables are attached at the end of the letter report). Figure 1 is a map of the Dixon Region showing the major drainage channels serving the City of Dixon (City) and the upstream and downstream agricultural areas. Also shown on this map is the Northeast Quadrant (NEQ) boundary. The Dixon Downs Project site is within the City Watershed D, which drains into the Dixon Resource Conservation District's Tremont 3 Drain. The Tremont 3 Drain discharges into the Reclamation District (RD) 2068 Main Canal, which in turn drains into RD 2068's V-Drain. The V-Drain discharges into the Hass Slough. Hass Slough drains into the Sacramento River.

The Dixon Watershed D – Tremont 3 – Main Canal - V-Drain watershed is shown with yellow hatching on Figure 1, downstream to the point where the V-Drain enters Hass Slough. The discharge to Hass Slough represents the downstream limit for evaluation of potential impacts from the Dixon Downs Project. Limiting the evaluation to this point is reasonable because at Hass Slough, the water level is controlled by tidal fluctuations and by flooding within the Yolo Bypass. At this point Hass Slough is a very large channel and its water level would be virtually unchanged by any level of development within the NEQ.

Central NEQ Drainage

The general flow pattern in the Dixon Region is from the northwest to the southeast. In particular, runoff from about 2,700 acres of agricultural lands north of Interstate-80 (I-80) flows through several culverts under I-80 (and over the highway in a 100-year storm) and into the central part of the NEQ. I-80 was constructed above the surrounding ground by a few feet, and it impedes the flow of floodwater to the southeast (See Figures 1 and 2). Consequently, routine flooding occurs to the northwest of I-80 (see Figure 1). The flow through the I-80 culverts (or over the highway) enters a series of drainage channels and pipes through the center of the NEQ. The drainage channels in this area are privately owned and maintained. The channels/pipes convey flow across the NEQ and across the Dixon Downs site to a single 36-inch wide by 22-inch high oval culvert under Pedrick Road. This culvert lacks adequate capacity for even small (2-year to 3-year) storm events, and flood flows routinely overtop Pedrick Road and continue to the east.

North NEQ Drainage

Runoff from about 780 acres (Watersheds G and H) north of I-80 crosses I-80 in a series of culverts and then flows through an open channel around the north end of the NEQ. At Pedrick Road, there is a 22-inch wide by 18-inch high arch CMP that is filled with sediment. At this point most flow overtops Pedrick Road and flows east as sheet flow over the fields between Pedrick Road and Union Pacific Railroad.

Union Pacific Railroad

Like I-80, the Union Pacific Railroad was constructed above the surrounding ground, and it impedes the flow of floodwater to the southeast. Consequently, routine flooding occurs to the west of the railroad (the railroad would not be overtopped even in a 100-year storm). Along the east side of the railroad is a borrow pit (for the railroad construction), and the flow from the Central NEQ drainage and the North NEQ drainage are hydraulically connected by this borrow pit. There are 3 culverts under the railroad that are open to convey flow under the railroad, including a 48-inch CMP, a 30-inch CMP, and a 36-inch RCP. Flow through the 48-inch CMP directly enters the upstream end of the Tremont 3 Drain. Flow through the 30-inch CMP enters a privately owned channel and continues east to the Tremont 3 Drain. Flow through the 36-inch RCP enters a ditch that has been partly filled, resulting in flooding flow across the fields east of the railroad and then into the Tremont 3 Drain system.

There is also a plugged 36-inch RCP culvert just north of the Pedrick Road-Railroad crossing. However, since this culvert has been plugged, it was not included in this environmental analysis.

South NEQ Drainage

The southeast corner of the NEQ drains to a 36-inch wide by 22-inch high oval CMP under Vaughn Road. From this culvert runoff enters a drainage ditch that flows to the southwest along the railroad for about 800 feet. At this location it enters a 36-inch CMP culvert under the railroad. However, the railroad culvert is almost completely plugged with sediment and can convey very little flow. Also, the ditch downstream of the railroad culvert has been filled, so any flow passing through the railroad culvert would sheet flow across the fields east of the railroad and then enter the Tremont 3 Drain system.

HISTORICAL SETTING

The history of the planning, design, construction and operation of the Tremont 3 Drain is presented below. Several documents related to the planning, design, construction and operation of the Tremont 3 Drain were obtained from DRCD and reviewed for this evaluation. The relevant aspects of these documents are summarized below (roughly in chronological order).

1937 and 1963 and 2000 Aerial Photographs of the NEQ Area

Presented in Figures 3, 4, and 5 are aerial photographs of the NEQ area from the years 1937, 1964, and about 2000. Line work has been added to these photographs to show the NEQ boundary, culvert locations, and the locations of roads (even if they didn’t exist in 1937 or 1964).

As shown in Figure 3, there were several small drainage swales and creeks crossing the NEQ in 1937. The largest of these entered the NEQ area at the location of the future intersection of North First Street and I-80). It collected runoff from the southern area of the NEQ, and left the NEQ area at the intersection of Pedrick Road and the railroad. From this point it flowed southeast and intersected the future alignment of Lateral C. The central area of the NEQ was drained through a culvert under the railroad at the location of the current 36-inch RCP culvert under the railroad. The northern area of the NEQ apparently drained through a culvert at the location of the existing 30-inch CMP under the railroad.

As shown in Figure 4, Interstate-80 had been constructed and several culverts under the freeway had been added. The natural creeks and swales had been rerouted into channels that followed property line or field boundaries by 1964. The swale that drained the southern area of the NEQ appears to have been filled and was probably routed into roadside ditches and then along the west side of the railroad to the southwest. The large watershed upstream of the NEQ and the central area of the NEQ were rerouted to their current alignment, through the culvert under Pedrick Road, and east to the railroad. The creek downstream of the current 36-inch railroad culvert appears to have been filled. It is likely that runoff was intended to flow northeast along the north side of the railroad (in the borrow pit for the railroad construction) to the 30-inch CMP culvert. The swale downstream of the current 30-inch CMP culvert also appears to have been filled and a new ditch dug along the south side of the railroad and then across to Robben Road and to the Tremont 3 Drain (the current alignment).

Shown on Figure 5 are the current drainage patterns for the NEQ and nearby areas. As shown, the Campbell's Soup railroad spur was constructed after 1964, and it included a 24-inch CMP culvert to allow water to continue to flow along the railroad.

Tremont 3 Drain Hydrology and Channel Sizing Calculation Sheets

These calculation sheets provide the design flow rates for Tremont 3 Drain channel sections. The design flows were based on a modified rational method for a 5-year storm, as shown below:

Q5 = C * i * A * (D.M.) = 11 cfs per square mile

Where

C = 0.2 (the runoff factor)
i = 0.21 in/hr (the rainfall intensity)
A = 640 acres (the tributary area)

(D.M.) = 0.4. This factor of 0.4 reduces the actual 5-year peak runoff from 26.9 cfs per square mile to 11 cfs per square mile. Although it is uncertain why this factor was applied, it may be to account for ponding/flooding of fields that increases the lag time and reduces the peak runoff rate.

This calculation was performed once to develop a per square mile unit runoff rate of 11 cfs per square mile. This unit runoff rate was then simply multiplied by the tributary area at several points moving downstream along the drain. No adjustments were made to account for a lowered rainfall intensity due to a longer time of concentration for larger tributary areas.

The channel capacities were evaluated based on Manning's equation for a trapezoidal channel with varying bottom widths, varying depths, varying invert slopes, side slopes of 1 Horizontal to 1Vertical (1H:1V), and an "n" value of 0.030. The channel sizes are generally consistent with the Tremont 3 Drain "as-built" drawings (see below), however some minor discrepancies exist.

Tremont 3 Drain Preliminary and Reconnaissance Report

This planning study identifies the purpose of the Tremont 3 Drain as "This area was originally traversed by various shallow slough 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. 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.

Tremont 3 Drain Plan and Profile Drawings

These drawings were provided by DRCD. They were called "as-built" drawings. They are generally consistent with the planning study, but the project alignment changed slightly for a few segments of the drain. These drawings also included Laterals C and D. The channels ranged in size as follows:

<u>Tremont 3 Drain at the Upstream End</u> – The northern most segment of Tremont 3 Drain extends from just west of the railroad for 2,500 feet to the east. The channel has a bottom width of 3 feet, a depth of 2.5 feet, side slopes of 1H:1V, and a slope of 0.00034. The capacity of this channel segment is 17.4 cfs (using a Manning's n value of 0.030 as in the design calculations). It is clear that this channel was intended to convey flow from upstream of the railroad, since the minimum channel size used in the project had a bottom width of 2 feet, a depth of 2 feet and side slopes of 1H:1V and this channel is significantly larger. Had the smallest channel section been used here, the capacity would have been 8.5 cfs. The Tremont 3 Drain service area included about 22 acres west of the railroad at this point, which would have had a design runoff of about 0.4 cfs. Thus, it is clear from the channel capacity that a tributary area of about 1.6 square miles was anticipated in the design of the project even though the tributary area was not included in the service area. This tributary area was located primarily north of the NEQ.

<u>Lateral C</u> – Lateral C collects runoff from the southeast corner of the NEQ, the area south of Vaughn Road and east of the Railroad and conveys it to the Tremont 3 Drain. The channel has a bottom width of 2 feet, a depth of 2 feet, side slopes of 1H:1V, and a slope of 0.000854. The capacity of this channel segment is 10.2 cfs (using a Manning's n valued of 0.030 as in the design calculations). Tributary to the upstream end of Lateral C was about 160 acres within the designated service area. Also tributary to the upstream end was about 300 acres that was not within the designated service area. Thus, the design flow at the upstream end of lateral C was an area of about 460 acres, which would have had a design runoff of about 7.9 cfs.

About half a mile downstream of the start of Lateral C another creek discharged into Lateral C from the Central NEQ Area. This was the main creek that conveyed runoff from the large watershed north of the highway (about 3.5 square miles upstream of the highway and about 0.95 square miles between the highway and the railroad were delineated in the Curry Drain Study in 1963, see below). This area would have had a design runoff of about 49.8 cfs at the railroad.

Thus, it appears that Lateral C was intended to collect the runoff from the designated service area and possibly an additional 300 acres. It was not intended to collect runoff from the large Central NEQ watershed.

At the point that Lateral C connects to the Tremont 3 Drain, the Tremont 3 Drain's capacity increases from 36.2 to 73.8 cfs. At this point, the tributary area was about 7.5 square miles (including the area upstream of the upper segment of Tremont 3 Drain), which would have had a design runoff rate of about 82.5 cfs. Thus, it is unlikely that the Tremont 3 Drain was intended to collect and convey runoff from the large watershed upstream of the Central NEQ or runoff from the Central NEQ.

<u>Lower Tremont 3 Drain</u>

The downstream segment of the Tremont 3 Drain had a bottom width of 6 feet, a depth of 4.5 feet, side slopes of 1H:1V, and a channel slope of 0.00072. The capacity of this channel segment is 116.7 cfs (using a Manning's n valued of 0.030 as in the design calculations). The tributary service area was designated as 5,860 acres (or about 9.1 square miles). The areas tributary to the upper reach of Tremont 3 Drain and Lateral C (but not in the service area) were about 2.1 square miles. Thus the design flow for the lowest reaches of the Tremont 3 Drain would have been based on an area of about 11.2 square miles. This area would have had a design flow rate of about 123 cfs. Thus, it is unlikely that the lower segments of the Tremont 3 Drain were intended to collect and convey runoff from the 2,700 acre watershed upstream of the Central NEQ or runoff from the NEQ.

Curry Drain Hydrology and Peak Flow Calculation Sheets and Planning Study

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 from the large watershed upstream of the Central NEQ and the NEQ to the Tremont 3 Drain (4.53 square miles total). A design flow rate of 50 cfs from 4.53 square miles is equal to 11.0 cfs per square mile. 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.

Also in this study, it was determined that the original Manning's n value of 0.030 was to low, and that a value of 0.035 was more appropriate. The existing channel capacities were down-rated accordingly, resulting in a capacity at the downstream end of 112 cfs versus 132 cfs. It was also determined that in the original Tremont 3 Drain design calculations, head loss through culverts had not been taken into account.

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

Conclusion Based on the Review of Historical Documents

The following conclusions are based on the review of old aerial photographs and old documents presented above. These conclusions are intended as reasonably likely conclusions based on the review presented above. However, they are not presented as well established facts.

1. Based on the Tremont 3 Drain planning and design documents, the Tremont 3 Drain was planned, designed and constructed without including any capacity for runoff from the

2,700 acre watershed upstream of the Central NEQ or from the NEQ. These areas were excluded from the Tremont 3 Drain service area, presumably because these property owners chose not to contribute to the cost of construction of the Tremont 3 Drain. It is likely that the three southern 36-inch railroad culverts were plugged intentionally to preclude water from crossing the railroad at these points (because the upstream property owners chose not to participate in the Tremont 3 Drain project). The 30-inch CMP was probably left open to serve an area of about 276 acres that was within the Tremont 3 Drain service area between Pedrick Road and the railroad.

2. Based on the aerial photographs, runoff from the large watershed upstream of the NEQ and the central area of the NEQ was rerouted to the borrow ditch along the west side of the railroad near the location of the existing 36-inch railroad culvert. This would have caused significant flooding in the area between the railroad and Pedrick Road and the area just west of Pedrick Road (as is known to occur today).
3. The Curry Drain improvements were planned to provide a 50 cfs drain from the railroad to the Tremont 3 Drain and capacity in the Tremont 3 Drain for the large watershed upstream of the NEQ and the NEQ. However, the Curry Drain improvements were not constructed. Thus, it appears that currently there is no intended capacity in the Tremont 3 Drain for runoff from the large watershed upstream of the Central NEQ or the NEQ.
4. The 30-inch culvert under the railroad is currently open and does convey runoff under the railroad. Since a 24-inch culvert was constructed under the Campbell’s Soup railroad spur, it appears likely that it was intended that the area upstream of the railroad would drain through the single 30-inch railroad culvert. Under existing conditions, this culvert passes a flow rate of about 21 cfs in a 2-year storm, 24 cfs in a 10-year storm, and about 35 cfs in a 100-year storm. Although it is likely that no runoff was intended to flow through the 36-inch RCP culvert, it still actually passes about 12 cfs in a 2-year storm, 33 cfs in a 10-year storm, and about 60 cfs in a 100-year storm.

REGULATORY SETTING

The regulatory setting under which the proposed development project would be subject to is described below.

Federal Emergency Management Agency Flood Insurance Rate Maps

The Federal Emergency Management Agency’s Flood Insurance Rate Maps indicate that none of the NEQ is within a flood zone.

City of Dixon Engineering Design Standards and Construction Specifications

The *City of Dixon Engineering Design Standards and Construction Specifications*[1] (dated April 2003), provide minimum drainage design standards. The proposed development project and drainage system must comply with the City’s engineering standards. The most significant of these standards are listed below, however, all of the standards must be complied with by the Dixon Downs Development project.

- Storm Drains must be sized for the 10-year storm with the hydraulic grade line at least 1 foot below the drain inlet (DI) grates.
- The 100-year hydraulic grade line may exceed the DI grate elevation, resulting in floodwater in the streets, parking lots, or other area where flooding does not damage houses or buildings. The 100-year hydraulic grade line must be at least 1 foot below the building pads.
- Open channels are not allowed except in special circumstances and require the written approval of the City Engineer. Open channels shall be designed to convey the 100-year storm. The minimum freeboard is 1 foot if the design water level is below the surrounding ground and 3 feet if the design water level is above the adjacent ground (using levees). The maximum velocity is 3 feet per second unless additional erosion protection is provided. The side slopes shall be no steeper than 4 horizontal to 1 vertical.
- Detention ponds must be sized for the 100-year 4-day storm. The minimum freeboard is 1 foot if the design water level is below the surrounding ground and 3 feet if the water level is above the adjacent ground (using levees). The side slopes shall be no steeper than 4 horizontal to 1 vertical, and side slopes within public access areas (e.g. parks or green belts) must be no steeper than 6 horizontal to 1 vertical. The discharge rate from the detention basin will be determined on a case-by-case basis and must be authorized by the City Engineer.

City of Dixon Stormwater Management Plan

The City of Dixon has a *Stormwater Management Plan*[2], and some of the requirements apply to the Dixon Downs Development Project. This plan includes 6 programs as summarized below:

- Public Education and Outreach Program
- Public Involvement and Participation Program – One element of this program is labeling storm drains to warn citizens not to dump pollutants into the storm drain. This program element will be required for the Dixon Downs storm drain system.
- Illicit Discharge Detection and Elimination Program
- Construction Site Stormwater Runoff Control Program – During construction of the Dixon Downs facilities, the construction site will be expected to comply with the appropriate requirements form this program.
- Post Construction Stormwater Management in New and Redevelopment Program – This program covers use of structural and nonstructural BMPs to prevent pollutants form entering the stormwater, manage the runoff volumes and rates, and treat the runoff if appropriate. The Dixon Downs Development Project will need to propose a water quality plan and have it approved by the City of Dixon to comply with the requirements of this program.
- Pollution Prevention and Good Housekeeping for Municipal Operations.

As noted above, three of the six programs are applicable to the Dixon Downs Development Project.

Dixon Resource Conservation District (DRCD)

The DRCD owns, maintains, and operates the Tremont 3 Drain. In order to add or modify culverts or pipes draining into the Tremont 3 Drain, an encroachment permit is required from

DRCD. The primary requirements for obtaining the encroachment permit are that the new or modified drain not result in an increase of the flow in the Tremont 3 Drain and that the new or modified drain pipe serve areas that are within the Tremont 3 service area.

Joint Powers Agreement – Dixon Regional Watershed Joint Powers Authority

The City of Dixon, DRCD, RD 2068, and the Maine Prairie Water District (MPWD) recently formed a Joint Powers Authority (JPA) to cooperatively manage storm water issues and related flooding from the Dixon Regional Watersheds, which include the Dixon Downs area. The JPA document and its attachments acknowledge that NEQ properties did not participate in the Tremont 3 Drain project, and consequently have no entitlement to discharge runoff into the Tremont 3 Drain. This JPA document and its attachments acknowledge that the 30-inch CMP culvert under the railroad was the only railroad culvert intentionally kept open to accept flow from the NEQ area. The estimated flow rates through this culvert are acknowledged to be 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 even though there is no capacity in the Tremont 3 Drain for that flow. The JPA document further acknowledges that the JPA member agencies pursue construction of increased downstream conveyance capacity for these discharge rates. To limit flows from the NEQ to these rates would require construction of an 871 ac-ft wet pond 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 water level in the downstream channels. It also acknowledges that slight modifications of the JPA Recommended Project may occur as planning of development projects and associated drainage facilities proceed.

IMPACTS AND MITIGATION MEASURES

Criteria for Determining Significance

The criteria for determining significance are identified below.

- An increase of the runoff rate which causes or increases the depth of flooding on-site or off-site is significant.
- An increase of the runoff rate or volume which causes or increases the duration of flooding on-site or off-site may be significant. If the increase of duration may contribute to increased crop damage from the flood then it would be significant. If the existing condition flooding is more than 4 or 5 days, then an increase of flooding of half a day would not be considered significant. If the existing conditions flooding is 2 or 3 days, then a half-day increase of flood duration would be significant, but an increase in duration of a couple hours may not be significant.
- An exposure of people or structures to a risk of loss, injury, or death from flooding is significant.
- A violation of the City of Dixon drainage design criteria is significant.
- A decrease of the water quality of the runoff or the receiving water is significant.

- A change the summertime irrigation water flow pattern is significant.
- A violation of regulatory or permitting requirements is significant.

Methodology

This environmental evaluation of the hydrological and water quality impacts resulting from the Dixon Downs Project is based on:

- *Conceptual Drainage Report, Dixon Downs (Part of NQSP) Dixon California*[3], dated September 8, 2004 and updated January 26, 2004 prepared by Morton & Pitalo, Inc. (hereafter referred to as the CDR). As stated in the CDR, the purpose of the CDR is to identify the drainage impacts from the Dixon Downs Development and recommend mitigation measures. Essentially, the CDR addresses drainage flow rates from off site land onto the Dixon Downs parcel, the required detention storage volume within the Dixon Downs project site, and the discharge rate from the project site. The CDR and the drainage model were not intended to address the layout and sizing of the storm drain collection systems within the Dixon Downs project area.
- Computer models of the proposed major drainage facilities that were developed in support of the CDR. Computer models were prepared for existing conditions, the Dixon Downs project with stand alone drainage facilities, and with a drainage plan for the entire NEQ that is consistent with the drainage requirements in the Northeast Quadrant Specific Plan.
- Discussions with Morton & Pitalo staff subsequent to the submission of the CDR and computer models resulting in minor modifications of the models and the project.

The drainage computer models were prepared using the XP-SWMM software. XP-SWMM is a drainage computer model that simulates:

- The rainfall to runoff process based on the input rainfall data and the characteristics of the ground surface, such as the areas of soil versus pavement, the ground roughness, the ground slope, and other variables.
- The flow rate of the runoff in storm drains, open channels, pump stations, and other conveyance facilities.
- The storage of water in detention basins.
- The water surface elevations resulting from the flow in the storm drains, channels, pump stations, and detention basins.

The CDR evaluated three different conditions, including:

- Existing Conditions (EC) Evaluation – This condition was evaluated to establish the current flow rates and water surface elevations in the Northeast Quadrant and in the downstream agricultural drain system. It included the existing AKT retention pond with a storage volume of about 50 ac-ft. Exhibit A of the CDR shows the major drainage facilities included in the existing conditions evaluation (attached). A model of existing conditions was developed for this environmental evaluation.

- Dixon Downs Stand Alone Project (DDSAP) – This condition included full development of both Phases 1 and 2 of the Dixon Downs project, but no additional, other development within the Northeast Quadrant. It was evaluated to demonstrate that development of Dixon Downs with the proposed drainage improvements (including a 100 ac-ft detention basin in the interior of the race track) does not cause any increases in flooding either upstream or downstream of the Dixon Downs site. Exhibit B of the CDR shows the major drainage facilities included in the DDSAP (attached). Provided below is a summary of the major elements of the proposed drainage plan:
    - The current land use of this area is agricultural, and the impervious percentage is 3 percent. After full development of the Dixon Downs project site, the average impervious percentage was modeled at 72 percent. Thus, the process of development was reasonably represented in the drainage model of the project site.
    - Runoff from the areas west of the project site will be conveyed through the project site with (starting at the west parcel boundary and moving eastward to Pedrick Road):
        - Twin 60-inch RCP culverts to an on site open channel. The twin 60-inch culverts will be restricted to the equivalent of a single 42-inch culvert. Above this culvert, a structure will be constructed that allows floodwater from west of the Dixon Downs to flow over the ground surface and into the open channel segment at the same elevation as occurs under existing conditions. The twin 60-inch culverts are needed for future development within the Northeast Quadrant, and the 42-inch restriction is needed to eliminate downstream impacts under the DDSAP condition.
        - A segment of open channel, which will collect floodwater from west if the Dixon Downs site.
        - A segment of trunk storm drain (twin 60-inch RCP drains),
        - Parallel 48-inch and 27-inch RCP drains under Pedrick Road. These drains are smaller than the twin 60-inch drains so that the water level upstream of Pedrick road is high enough to force water to be detained in the detention basin within the interior of the racetrack. Pedrick Road will be raised by about 3.5 feet. Thus it will also be necessary to improve/raise driveways that are affected by this raising of Pedrick Road.
    - A storm water detention basin located within the interior of the racetrack. This basin provides a detention volume of about 100 acre-feet of storage, including the freeboard. The detention basin will receive all of the runoff from the Dixon Downs areas north of the twin 60-inch pipes. It will also received flow from the 60-inch pipes through a 48-inch pipe, which will have a flap gate that allows flow into the basin and prevents flow out of the basin. The detention basin is drained by an 18-inch RCP storm drain from the detention basin to the twin 60-inch drains just west of Pedrick Road.
    - At the south parcel boundary, the project would include a berm that prevents flood floodwater from flowing off of the Dixon Downs site and onto the property south of Dixon Downs. At this location there will also be a storm drain with a flap gate that

allows water to flow from the area south of Dixon Downs to the twin 60-inch drains and prevents flow from the 60-inch drains to the area south of Dixon Downs.

  - A storm drain in Pedrick Road from the intersection of Professional Drive and Pedrick Road to the downstream end of the twin 60-inch pipes. This drain would collect the runoff from north section of Professional Drive and part of Pedrick Road. It would also collect the flood flow from the parcels north of Dixon Downs that currently flows to the south onto the Dixon Downs property.
  - Storm drain collection systems that convey storm water from the northern project areas (181 acres) to the detention basin. Each of these storm drains would include a smaller collection system, but the smaller collection systems have not been included in the CDR or the model.
  - Storm drain collection systems that convey storm water from the southern project area (94 acres) to the open channel or the trunk drain system (twin 60-icnh drains). Each of these storm drains would include a smaller collection system, but the smaller collection systems have not been included in the CDR or the model.
  - Runoff from the entire project site would be provided water quality treatment through grassy swales. Runoff from the stable area would receive a higher level of water quality treatment. Runoff from the horse wash pads will drain into the sanitary sewers. Runoff from the first flush (defined as the runoff from of 0.1 inch of rain) will be directed into a storage tank and then into the sanitary sewer. Runoff from rainfall greater than 0.1 inch will be treated with a grassy swale and then enter the storm drain system.

- Full Development of the NEQ (FD) - This condition was included in the CDR to evaluate the cumulative impacts of the full development of the NEQ. It included full development of all the land in the NEQ. It also included the 100 ac-ft detention basin in the interior of the racetrack (and all other Dixon Downs facilities), an enlarged AKT pond with 92 ac-ft of detention storage, a linear detention basin located along I-80 (40 ac-ft), and a 44 ac-ft detention basin located at the northeast corner of the NEQ (Flying J). The proposed outfall pipe for this condition was a 66-inch storm drain in Vaughn Road from the NEQ to the Tremont 3 Drain. This condition would result in an increase of the flow rate under the railroad from 95 cfs to about 167 cfs in a 100-year storm. In the CDR, it was acknowledged that the discharge rate from the NEQ increased significantly, that downstream impacts would occur, and that additional mitigation measures would be required. Exhibit C of the CDR shows the major drainage facilities included in the FD (attached). This condition would be inconsistent with the requirements for drainage identified in the Northeast Quadrant Specific Plan (NQSP, see below). Because the FD condition was not consistent with the NQSP, a model of this condition was not included in this environmental evaluation.
- The Northeast Quadrant Specific Plan (Hearing Draft, dated April 3, 1995) identifies the use of multiple on-site detention basins that can retain 100 percent of the on-site runoff unless another drainage system is available. Since the FD condition was acknowledged to cause impacts to the downstream areas and was not consistent with the NQSP, an additional condition was evaluate for this EIR, which included multiple on-site detention basins as

needed to eliminate the impacts of the full development of the NEQ (called Full Development Full Detention, FDFD). At this time, the exact location of the multiple detention basins is unknown, but a total of up to 450 ac-ft of additional detention storage would be needed to reduce the discharge rate after full development back to the existing conditions discharge rate (95 cfs). A model of FDFD condition was developed for this environmental evaluation.

The EC, DDSAP, and FDFD conditions have been modeled with the drainage model of the Dixon Region for the 100-year, 4-day storm; the 10-year, 24-hour storm; and the 5-year, 24-hour storm. These evaluations are presented below.

Evaluation of the 100-Year, 4-Day Storm

The model results of the 100-year, 4-day storm are presented in Appendix A and discussed below. The location represented on each of the Appendix A figures is shown on Figure 6.

- Figure A1 - This figure shows the water surface elevation (WSEL) versus time at the point that flow from the western part of the NEQ (including the flow from north of I-80) enters the Dixon Downs site. On Figure A1, the thin black line represents the WSEL from the EC evaluation. The thick green line represents the WSEL for the DDSAP condition, and the thin dark blue line represents the WSEL for the FDFD (this color scheme is used on all of the charts in appendices A, B, and C). As shown, the maximum WSEL is the same in the DDSAP as in the EC at this location, and for the FDFD, the maximum WSEL is lowered somewhat. The duration of flooding of the adjacent fields is decreased for the DDSAP slightly, but for the FDFD it is lowered significantly as compared to existing conditions. Consequently, there are no impacts at this location from the proposed development with the proposed drainage improvements.
- Figure A2 – This figure shows the water surface elevation versus time for the drainage ditch at the upstream side of the 36-inch RCP culvert under the railroad just south of the Campbell’s Soup Facility.

  As shown, the maximum WSEL for the DDSAP, and FDFD are essentially the same as the EC conditions; consequently there is no impact due to an increase in the WSEL at this point for the DDSAP condition. Under existing conditions the WSEL is above the low point in the field south of the Campbell’s Soup facility for over 5 days. In the DDSAP this duration of flooding increases by about 10 hours. This increase in the duration of flooding is considered to be less than significant.

  In the FDFD, most of the flow from the NEQ is redirected from this location into the 66-inch drain in Vaughn Road. Thus, in the FDFD, the maximum water level at this location actually decreases, so there is no impact. In the FDFD the duration of flooding increases slightly, but this increase in the duration of flooding is considered to be less than significant.

- Figure A3 – This figure shows the flow rate under the railroad that eventually enters the Tremont 3 Drain. This flow rate includes the flow in the 36-inch RCP, the 30-inch CMP, and the proposed 66-inch Vaughn Road storm drain (in only FDFD). In the EC the peak flow rate is about 95 cfs. In the DDSAP, adequate detention basin capacity was included to prevent an increase in the flow rate under the railroad, and thus the DDSAP does not cause an impact based on flow under the railroad. In the FDFD, adequate detention basin capacity was included to prevent an increase in the flow rate under the railroad, and thus the FDFD does not cause an impact based on flow under the railroad.

- Figure A4 - This figure shows the water surface elevation versus time for Tremont 3 Drain at the upstream side of the Vaughn Road culvert. In the DDSAP, the maximum WSEL is essentially unchanged from the EC, and the length of flooding of the Vaughn Road and the adjacent farm fields increases by an insignificant duration. Thus, there are no significant impacts from the DDSAP at this location. In the FDFD the maximum water level is increased 0.1 foot, but the duration of flooding is decreased by about 18 hours.
- Figure A5 - This figure shows the water surface elevation versus time for Tremont 3 Drain at the upstream side of the Hackman Road culverts. In the DDSAP, the maximum WSEL is essentially unchanged from the EC at this location. Also, the duration of flooding is essentially unchanged at this location. Thus, there are no significant impacts from the DDSAP conditions. In the FDFD condition the maximum WSEL increase by about 0.1 foot, but the duration of flooding decreases slightly.
- Figure A6 - This figure shows the water surface elevation versus time for Tremont 3 Drain at the upstream side of the Sikes Road culverts. In the DDSAP, the maximum WSEL is essentially unchanged from the EC at this location. Also, the duration of flooding is increased by about 6 hours out of about 11 days, which is less than significant. For the FDFD, the maximum WSEL increases by about 0.1 foot and the duration of flooding increases by about 1 day.
- Figure A7 - This figure shows the flow in Tremont 3 Drain through the Sikes Road culverts. In the DDSAP, the maximum flow rate is unchanged from the EC at this location. In the FDFD the maximum flow rte increases by about 5 cfs.
- Figure A8 - This figure shows the flooding flow that overtops the Tremont 3 Drain channel and flows south to Lateral 5. In the DDSAP, the maximum flow rate is essentially unchanged from the EC at this location.
- Figure A9 – This figure shows the flow rate from DRCD’s Tremont 3 drain into the RD 2068 Main Canal. DRCD and RD 2068 have a drainage agreement that limits flows from DRCD’s Tremont 3 Drain to RD 2068’s main canal to 120 cfs. The discharge limit of 120 cfs is not exceeded in any of these conditions. Thus, there are no flow based significant impacts from the development of the NEQ at this location.
- Figure A10 - This figure shows the WSEL in the RD 2068 V-Drain at Delhi Road. In the DDSAP and the FDFD, the maximum water levels are essentially unchanged from the EC at this location.
- Figure A11 - This figure shows the water surface elevation versus time for Hass Slough near the end of the V-Drain. The water surface elevation at this location is primarily controlled by the tidal fluctuations of the water level in the Sacramento River Delta (from about 4 to 7 feet NAVD) or by flooding of the Yolo Bypass (15 to 17 feet NAVD in 1997 and 1998 floods). Because Hass Slough represents the downstream end of the channel system that was modeled, it was necessary to use an assumed tailwater elevation in Hass Slough. For this evaluation a tailwater elevation of about 8.6 feet was assumed. This tail

water elevation represents an elevation that is higher than a typical high tide, representing the water level during a large storm event. However, it is not as high as when the Yolo Bypass is flooded (at which time the flow from the V-drain is insignificant compared to the flow in the bypass and Sacramento River). Even using this reasonably conservative tailwater elevation in analyzing the DDSAP and the FDFD, the maximum WSELs are essentially unchanged from the EC at this location. Thus, there are no impacts at this location from development of the NEQ.

Evaluation of the 10-year, 24-Hour Storm

The model results of the 10-year, 24-hour storm are presented Appendix B and discussed below. The location represented on each of the Appendix B figures is shown on Figure 6.

- Figure B1 - This figure shows the water surface elevation versus time at the point that flow from the western part of the NEQ (including the flow from north of I-80) enters the Dixon Downs site. As shown, the WSEL is lowered at this point and the duration of flooding of the adjacent fields is decreased for the DDSAP and the FDFD as compared to existing conditions. Consequently, there are no impacts at this location from the proposed development with the proposed drainage improvements.
- Figure B2 – This figure shows the water surface elevation versus time for the drainage ditch at the upstream side of the 36-inch RCP culvert under the railroad just south of the Campbell’s Soup Facility. There are no impacts due to an increase in the WSEL or flooding duration at this point for the DDSAP. In the FDFD, the flooding at this location is eliminated.
- Figure B3 – This figure shows the flow rate under the railroad that eventually enters the Tremont 3 Drain. This flow rate includes the flow in the 36-inch RCP, the 30-inch CMP, and the proposed 66-inch Vaughn Road storm drain (in only the FDFD). In the EC, the peak flow rate is about 59 cfs. In the DDSAP, the maximum flow rate is reduced to about 57 cfs. In the FDFD, adequate detention basin capacity was included to prevent an increase in the flow rate under the railroad, and thus the FDFD does not cause an impact based on flow under the railroad.
- Figure B4 - This figure shows the water surface elevation versus time for Tremont 3 Drain at the upstream side of the Vaughn Road culvert. In the DDSAP, the maximum WSEL is essentially unchanged from the EC, and the increase of the length of flooding of the adjacent farm fields is less than significant. In the FDFD, the duration of field flooding is decreased.
- Figure B5 - This figure shows the water surface elevation versus time for Tremont 3 Drain at the upstream side of the Hackman Road culverts. In the DDSAP, the maximum WSEL is essentially unchanged from the EC, and the duration of flooding decreases slightly. In the FDFD condition the maximum WSEL increases by about 0.1 foot, but the duration of flooding decreases by about a day.
- Figure B6 - This figure shows the water surface elevation versus time for Tremont 3 Drain at the upstream side of the Sikes Road culverts. In the DDSAP, the maximum WSEL is essentially unchanged from the EC at this location. Also, the increase in duration of flooding of the adjacent field is less than significant at this location. In the FDFD, the flooding decreases slightly.

- Figure B7 - This figure shows the flow in Tremont 3 Drain through the Sikes Road culverts. In the DDSAP the maximum flow rates is unchanged from the EC at this location. In the FDFD, the maximum flow rate is decreased slightly.
- Figure B8 - This figure shows the flooding flow that overtops the Tremont 3 Drain channel and flows south to Lateral 5. In the DDSAP, the maximum flow rate decreases slightly from the EC at this location. In the FDFD condition, the maximum flood flow rate is almost eliminated.
- Figure B9 - This figure shows the flow rate from DRCD's Tremont 3 drain into the RD 2068 Main Canal. DRCD and RD 2068 have a drainage agreement that limits flows from DRCD's Tremont 3 Drain to RD 2068's main canal to 120 cfs. The discharge limit of 120 cfs is not exceeded in any of these conditions. Thus, there are no flow based significant impacts from the development of the NEQ at this location.
- Figure B10 - This figure shows the WSEL in the RD 2068 V-Drain at Delhi Road. In the DDSAP and the FDFD, the maximum water levels are essentially unchanged from the EC at this location.
- Figure B11 - This figure shows the water surface elevation versus time for Hass Slough near the end of the V-Drain. There are no impacts at this location from development of the NEQ.

Evaluation of the 5-year, 24-Hour Storm

The model results of the 5-year, 24-hour storm are presented Appendix C and discussed below. The location that each of the Appendix C figures represents is shown on Figure 6.

- Figure C1 - This figure shows the water surface elevation versus time at the point that flow from the western part of the NEQ (including the flow from north of I-80) enters the Dixon Downs site. As shown, the WSEL is lowered at this point and the duration of flooding of the adjacent fields is decreased for the DDSAP and the FDFD as compared to existing conditions. Consequently, there are no impacts at this location from the proposed development with the proposed drainage improvements.
- Figure C2 – This figure shows the water surface elevation versus time for the drainage ditch at the upstream side of the 36-inch RCP culvert under the railroad just south of the Campbell's Soup Facility. There are no significant impacts due to an increase in the WSEL or from an increase in the duration of flooding at this point for the DDSAP. In the FDFD, the flooding at this location is eliminated.
- Figure C3 – This figure shows the flow rate under the railroad that eventually enters the Tremont 3 Drain. This flow rate includes the flow in the 36-inch RCP, the 30-inch CMP, and the proposed 66-inch Vaughn Road storm drain (in the FDFD). In the EC the peak flow rate is about 51 cfs. In the DDSAP the maximum flow rate is reduced to about 48 cfs. In the FDFD, the maximum flow rate under the railroad decreases significantly.
- Figure C4 - This figure shows the water surface elevation versus time for Tremont 3 Drain at the upstream side of the Vaughn Road culvert. In the DDSAP, the maximum WSEL is essentially unchanged from the EC, and the duration of flooding of the adjacent farm fields is decreases slightly. In the FDFD, the maximum water level is decreased slightly and the duration of flooding is decreased by about 1 day.

- Figure C5 - This figure shows the water surface elevation versus time for Tremont 3 Drain at the upstream side of the Hackman Road culverts. In the DDSAP, the maximum WSEL is essentially unchanged from the EC, and the duration of flooding decreases slightly. In the FDFD the maximum water level is unchanged from EC, but he duration of flooding decreases significantly.
- Figure C6 - This figure shows the water surface elevation versus time for Tremont 3 Drain at the upstream end of the Sikes Road culverts. In the DDSAP, the maximum WSEL is essentially unchanged from the EC at this location. The increase in duration of flooding of the adjacent field is less than significant at this location. In the FDFD, the depth and duration of flooding over the adjacent field decreases slightly.
- Figure C7 - This figure shows the flow in Tremont 3 Drain through the Sikes Road culverts. In the DDSAP the maximum flow rate is unchanged from the EC at this location. In the FDFD, the maximum flow rate decreases slightly.
- Figure C8 - This figure shows that in the 5-year storm, no flooding flow overtops the Tremont 3 Drain channel and flows south to Lateral 5 for any of the conditions modeled.
- Figure C9 - This figure shows the flow rate from DRCD’s Tremont 3 drain into the RD 2068 Main Canal. DRCD and RD 2068 have a drainage agreement that limits flows from DRCD’s Tremont 3 Drain to RD 2068’s main canal to 120 cfs. The discharge limit of 120 cfs is not exceeded in any of these conditions. Thus, there are no flow based significant impacts from the development of the NEQ at this location.
- Figure C10 - This figure shows the WSEL in the RD 2068 V-Drain at Delhi Road. In the DDSAP and the FDFD, the maximum water levels are essentially unchanged from the EC at this location.
- Figure C11 - This figure shows the water surface elevation versus time for Hass Slough near the end of the V-Drain. There are no impacts at this location from development of the NEQ.

Water Quality

The current land use of the project site is row crops. When land is converted from agricultural practices to urban development, the water quality of the runoff from the land may also change. After development of Dixon Downs, the runoff will flow through storm drain pipe systems and either into a detention basin or into the drainage ditch east of Pedrick Road. Typical pollutants in agricultural runoff include fertilizers, herbicides, pesticides, sediment and pathogens. Many of these pollutants are also commonly found in residential runoff. Anticipated pollutants in residential runoff include pathogens, fertilizers, herbicides, pesticides, sediment, trash and debris, oxygen demanding substances, and oil/grease[4]. Thus, additional pollutants in the runoff will probably occur as a result of the development. All proposed development must comply with the requirements of the City’s Stormwater Management Plan to minimize impacts to water quality.

The project’s water quality management plan (WQMP) was provided as an appendix of the CDR. This plan describes the proposed water quality treatment facilities and operation of those facilities. The analysis presented below is based on this water quality management plan and discussions with the Dixon Downs engineers. The main features of the water quality management plan are:

1. All of the runoff from the Dixon Down site is intended to receive water quality treatment through grassy swales. The grassy swales will be sized and designed using the criteria from the California Stormwater Quality Association, Stormwater Best Management Practice Handbook, New Development and Redevelopment[4] (BMP Handbook). However, sizing calculations for the grassy swales have not provided.
2. The WQMP states that if grassy swales are not suitable for a given site, then other BMPs (from the BMP Handbook) may be used. However some types of BMPs are less effective than grassy swales. Thus substitution of other BMPS for grassy swales should only be implemented with approval of the City Engineer.
3. Runoff from the stable area will receive a higher level of treatment because the stable are is considered a Confined Animal Feeding Operation (CAFO) under federal and state regulations. As such, the water quality treatment plan for this area must be approved by the Regional Water Quality Control Board. As currently proposed, the runoff from the first 0.1 inch of rainfall (for each storm throughout the year) from the stable area will be directed to the sanitary sewer system (or first to a storage tank consisting of buried 60-inch diameter pipes and then to the sanitary sewer). Runoff from the horse wash pads will be directed to the sanitary sewer, and the wash pads will be covered to minimize the rainfall onto the wash pads. Runoff from rain greater than 0.1 inches will be treated through a grassy swale and then will drain into the storm drain system.
4. The WQMP states that the grassy swales will be operated and maintained according to the requirements in the BMP Manual.

Although not intended as part of the water quality treatment system, the development project includes a storm water detention basin. The primary purpose of this basin is a drainage/flood control basin, but it would also provide water quality benefits. The proposed basin would function much like an extended detention basin, and extended detention basins provide a medium level of pollutant removal[4].

There are also several source control Best Management Practices (BMPs) that could be implemented to reduce pollution from entering the storm water system. Storm drain signage (SD-13)[4] is a source control BMP that would be appropriate for this development project. This BMP essentially includes painting or attaching signs to the curb or sidewalk at each storm drain inlet that advise people not to put contaminants (motor oil, paint, car washing soaps, etc) down the storm drain system because these contaminants will pollute the ponds, creek, and rivers.

IMPACTS FROM DIXON DOWNS DEVELOPMENT AND PROPOSED MITIGATION MEASURES

Presented below are impacts and mitigation measures occurring as a result of the development of the Dixon Downs Development project along with construction of the proposed Dixon Downs drainage improvements.

Impact: As described above, the Dixon Downs project (DDSAP) causes increased durations of flooding (by a few hours out of several days of flooding) at a few locations downstream of the project. However, the minor increase of flooding duration is less than significant.

Discussion: At a few locations (for example see Figures A2, A5, A6, B6, C6) the duration of flooding increases by a few hours. However, the original duration of flooding ranged from 5 to 9 days. This increase of flooding duration would not contribute to increased crop damage (after 5 to 9 days of flooding) and is considered less than significant.

Mitigation Measure: No mitigation measures are required.

Impact: The CDR has not demonstrated that all of the City's storm drainage design criteria will be complied with by the Dixon Downs project.

Discussion: The CDR focused on identifying the required detention storage volume for the Dixon Downs project (by itself) to prevent either upstream or downstream flood related impacts. The CDR did not provide adequate detail to demonstrate that all of the City's design criteria will be complied with. For instance, minimum drain inlet grate elevations were not established to ensure that the 10-year design water levels were 1 foot below the grate elevations. Minimum building pad elevations were not established to ensure that buildings would be at least 1 foot above the 100-year water elevation. Detention basin discharge rates must be established on a case-by-case basis, subject to review and approval by the City Engineer, but no discharge rate has been approved by the City Engineer.

Mitigation Measure: Before improvement plans are approved by the City, revise the CDR (or prepare an addendum to the CDR) that demonstrates that all City storm drainage design criteria will be complied with, or states that they will be complied with and explains how the criteria will be complied with. Work with the City Engineer to determine an appropriate discharge rate. Presumably this discharge rate would be consistent with this the DDSAP drainage plan, unless a project has been implemented to increase the conveyance capacity of the downstream channels.

Impact: Development of the NEQ may result in increased pollutants in the runoff from the project site, which may contribute to decrease water quality of the downstream channels.

Discussion: The current land use of the project site is row crops. When land is converted from agricultural practices to urban development, the water quality of the runoff from the land may also change. Typical pollutants in agricultural runoff include fertilizers, herbicides, pesticides, sediment and pathogens. Many of these pollutants are also commonly found in urban runoff. Anticipated pollutants in urban runoff include pathogens, fertilizers, herbicides, pesticides, sediment, trash and debris, oxygen demanding substances, and oil/grease[3]. Thus, additional pollutants in the runoff will probably occur as a result of the development.

The development project includes use of grassy swales for water quality treatment. The grassy swales are to be sized, designed and operated based on the BMP Manual[4]. For the stable area a higher level of treatment will also be provided. The project also includes a storm water detention basin, and the primary purpose of this basin is a drainage/flood control basin. The proposed basin would function much like an extended detention basin, and extended detention basins provide a medium level of pollutant removal[3].

There are also several source control Best Management Practices (BMPs) that could be implemented to reduce pollution from entering the storm water system. Storm drain signage

(SD-13)[3] is a source control BMP that would be appropriate for this development project. This BMP essentially includes painting or attaching signs to the curb or sidewalk at each storm drain inlet that advise people not to put contaminants (motor oil, paint, car washing soaps, etc) down the storm drain system because these contaminants will pollute the ponds, creek, and rivers.

Mitigation Measures: The following mitigation measures will reduce this impact to a less than significant level.

1. Revise the water quality management plan to provide sizing calculation for the proposed storm water BMPs and to describe how the BMPs will be operated and maintained.
2. Provide storm drain signage to advise people not to put contaminants (motor oil, paint, animal wastes, car washing soaps, etc) down the storm drain system because these contaminants will pollute the ponds, creek, and rivers.

IMPACTS AND MITIGATION MEASURES FROM THE CUMULATIVE DEVELOPMENT OF THE NEQ

Presented below are impacts and mitigation measures occurring as a result of the cumulative development of the Dixon Downs project along with construction of the proposed Dixon Downs drainage improvements and the full development of the remainder of the NEQ.

In addition to the impacts caused be development of the Dixon Downs project, the following additional impacts would occur from the full development of the NEQ. These impacts are based on the model results presented in Appendices A, B, and C.

Impact: Full Development of the NEQ could lead to increased flooding downstream of the NEQ.

Discussion: The Northeast Quadrant Specific Plan (Hearing Draft, dated April 3, 1995) identifies the use of multiple on-site detention basins that can retain 100 percent of the on-site runoff unless another drainage system is available. The Full Development with Full Detention model run (see Appendices A, B, and C for model results) was developed to be consistent with the detention requirements from the Northeast Quadrant Specific Plan. The development and drainage plans for Northeast Quadrant lands outside of Dixon Downs are not know at this time, and consequently specific drainage improvements could not be modeled in the FDFD model run. Nevertheless, the FDFD model run demonstrates that (with minor changes) the use of on-site detention basins could reduce all drainage/flood control impacts to a less than significant level. The Northeast Quadrant Specific Plan also allows for increasing the downstream channel conveyance capacity to accept increased runoff from the NEQ. Implementation of the JPA Recommended Project (or some modification of the JPA Recommended Project) would allow for an increased discharge under the railroad and would reduce the volume of detention storage needed in or near the NEQ.

Mitigation Measure: The following mitigation measure would reduce these impacts to a less than significant level.

> Participate in the development of a regional drainage plan and pay the Storm Drainage Facilities Impact Fee which will be used for funding the regional drainage facilities. The Dixon Downs racetrack detention basin and other Dixon Downs drainage facilities could be

integrated into the regional drainage plan. An example of a regional drainage plan is the JPA Recommended Project, including both detention storage and increasing downstream conveyance capacity.

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1. *Dixon California Engineering Design Standards & Construction Specifications*, April 2003, City of Dixon Engineering Department
2. *Stormwater Management Plan*, Fiscal Years 2003-2004 through 2007-2008, Cities of Vacaville and Dixon, March 2003
1. *Conceptual Drainage Report, Dixon Downs (Part of NQSP) Dixon California*, September 8, 2004, Morton & Pitalo, Inc.
2. California Stormwater Quality Association, Stormwater Best Management Practice Handbook, New Development and Redevelopment, January 2003.

Please call if you have any questions or comments.

Sincerely,

WEST YOST & ASSOCIATES

Douglas T. Moore
Principal Engineer

DTM:mta

cc: Brian Boxer (incl. elec files)
Ken Giberson
Greg Bardini
Cleve Livingston
John O’Farrell

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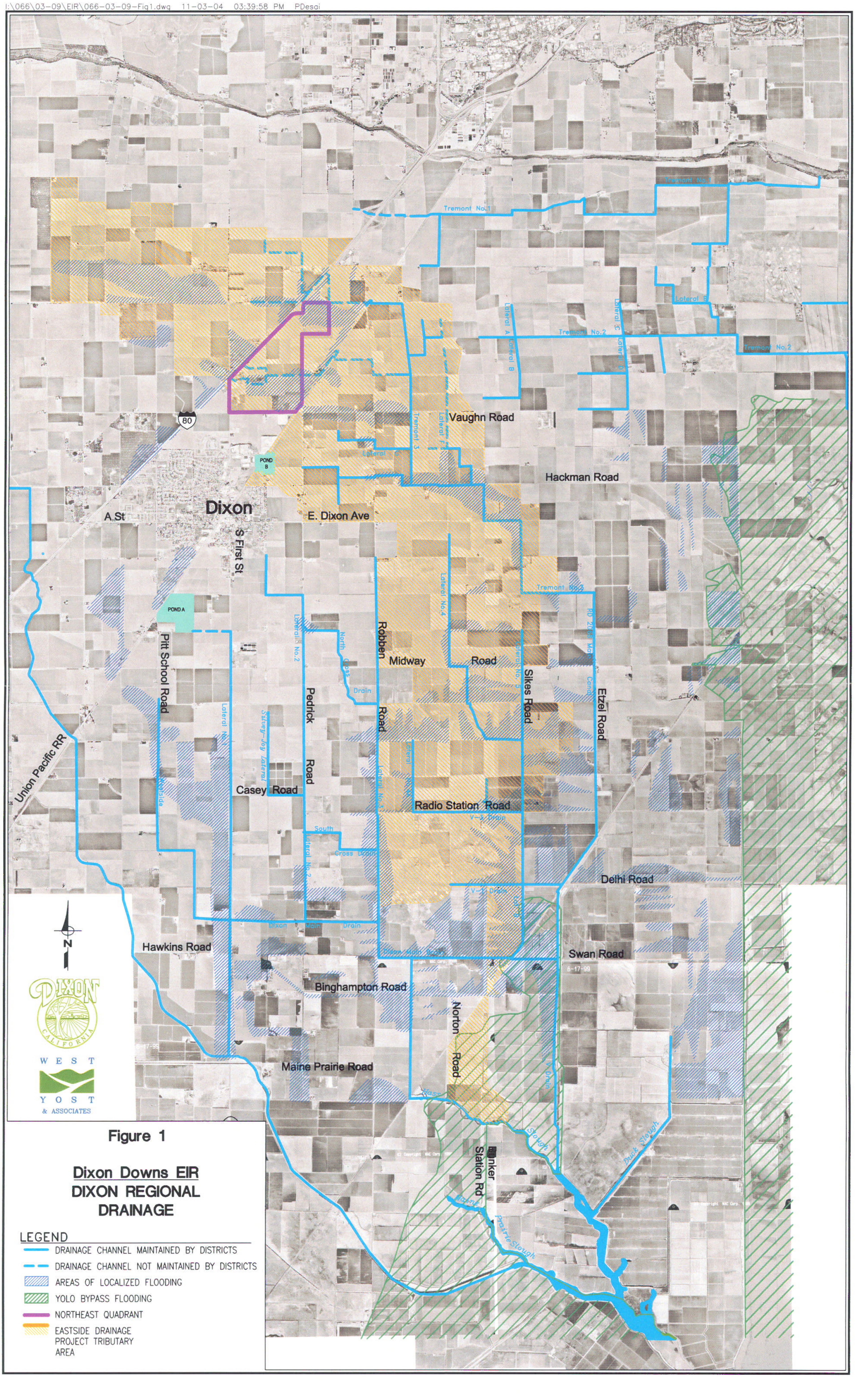

Figure 1

Dixon Downs EIR
DIXON REGIONAL DRAINAGE

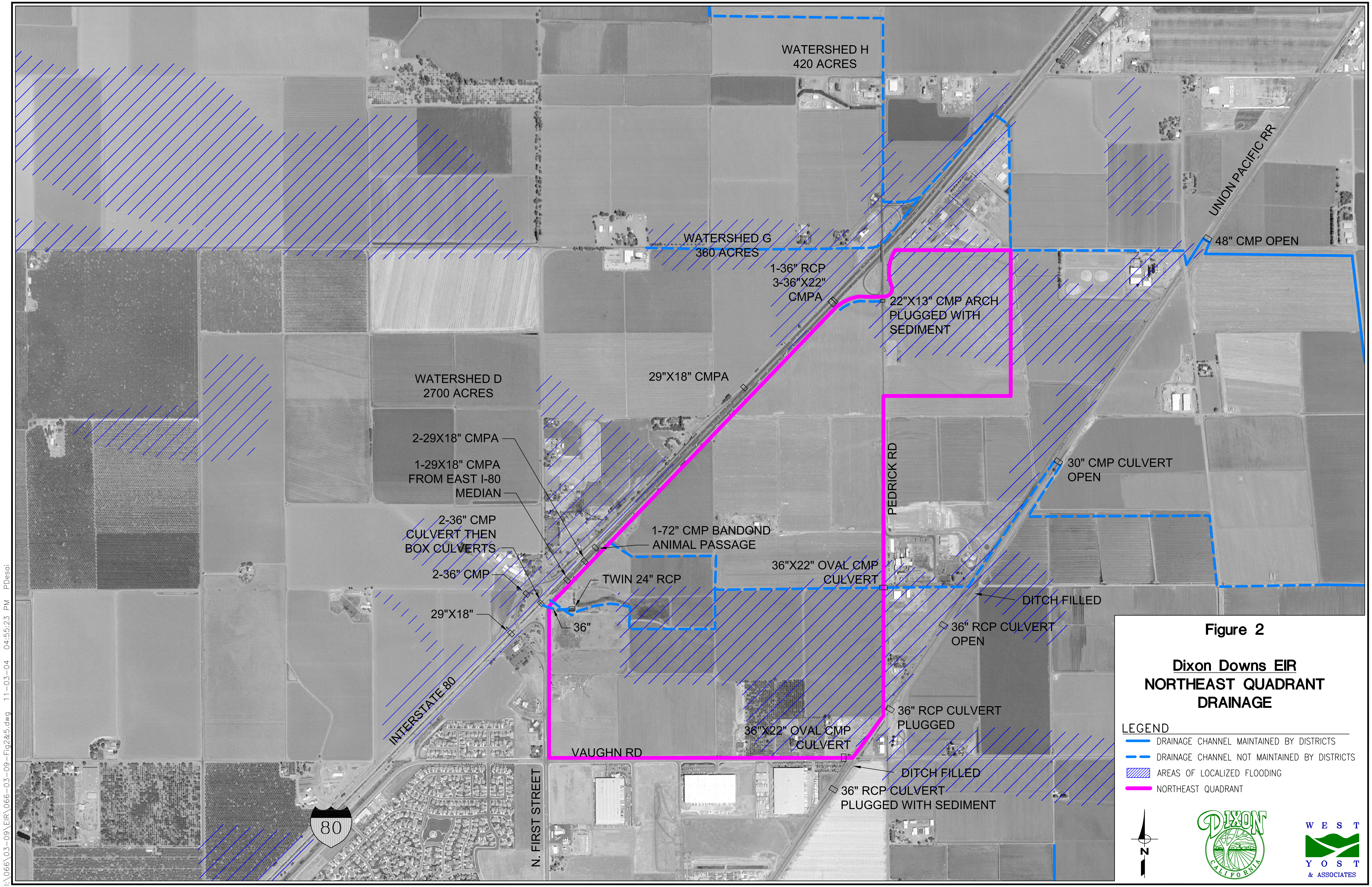

Figure 2

Dixon Downs EIR
NORTHEAST QUADRANT
DRAINAGE

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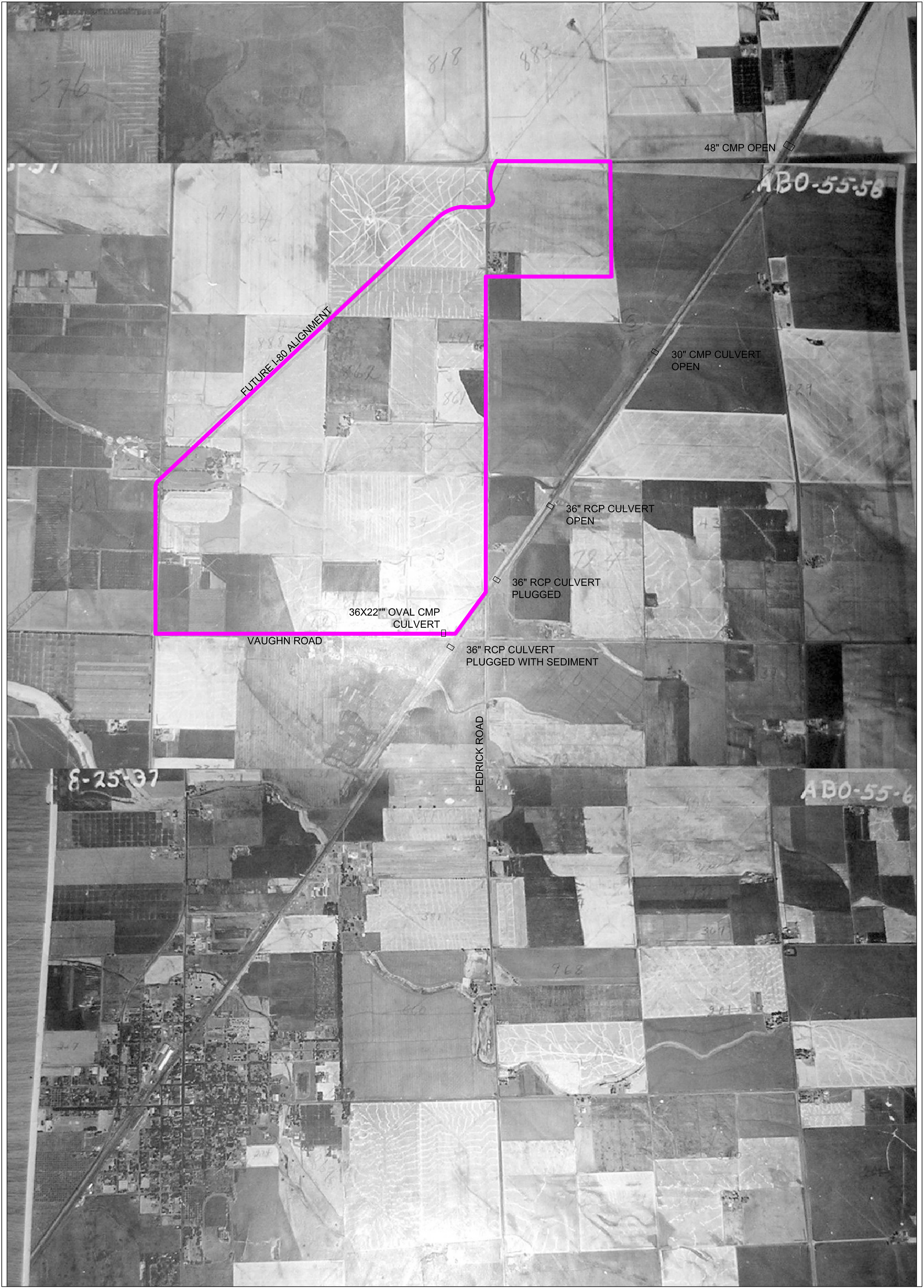

LEGEND

LEGEND TEXT

N

0 250 500
SCALE IN FEET

DIXON
CALIFORNIA

Figure 3

Dixon Downs EIR
1937 AERIAL PHOTOGRAPH
OF DIXON

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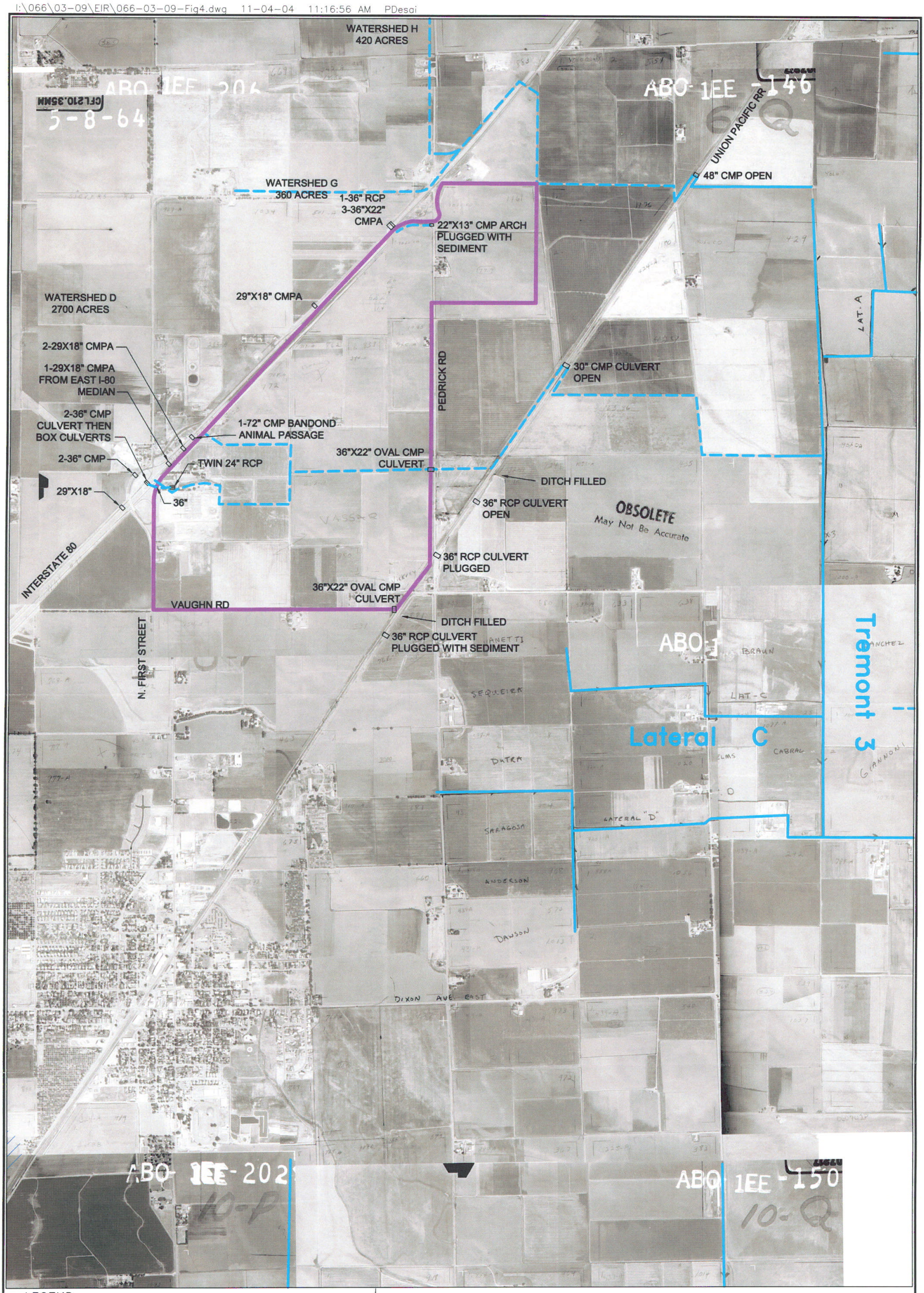

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DIXON
CALIFORNIA

Figure 4

Dixon Downs EIR
1964 AERIAL PHOTOGRAPH
OF DIXON

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& ASSOCIATES

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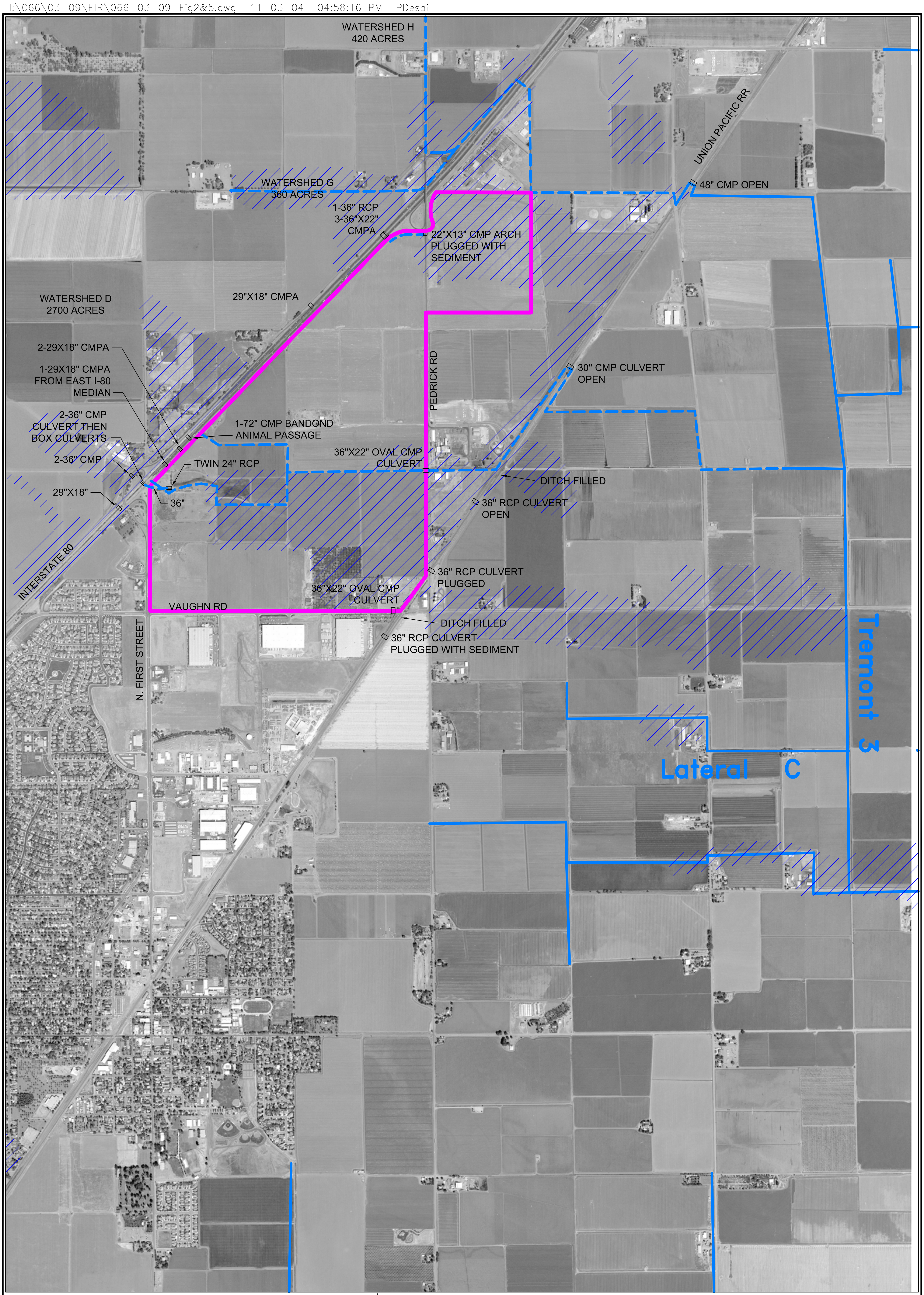

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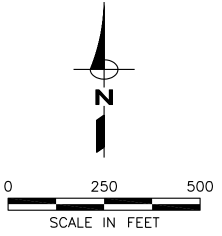

DIXON
CALIFORNIA

Figure 5

Dixon Downs EIR
2000 AERIAL PHOTOGRAPH
OF DIXON

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& ASSOCIATES

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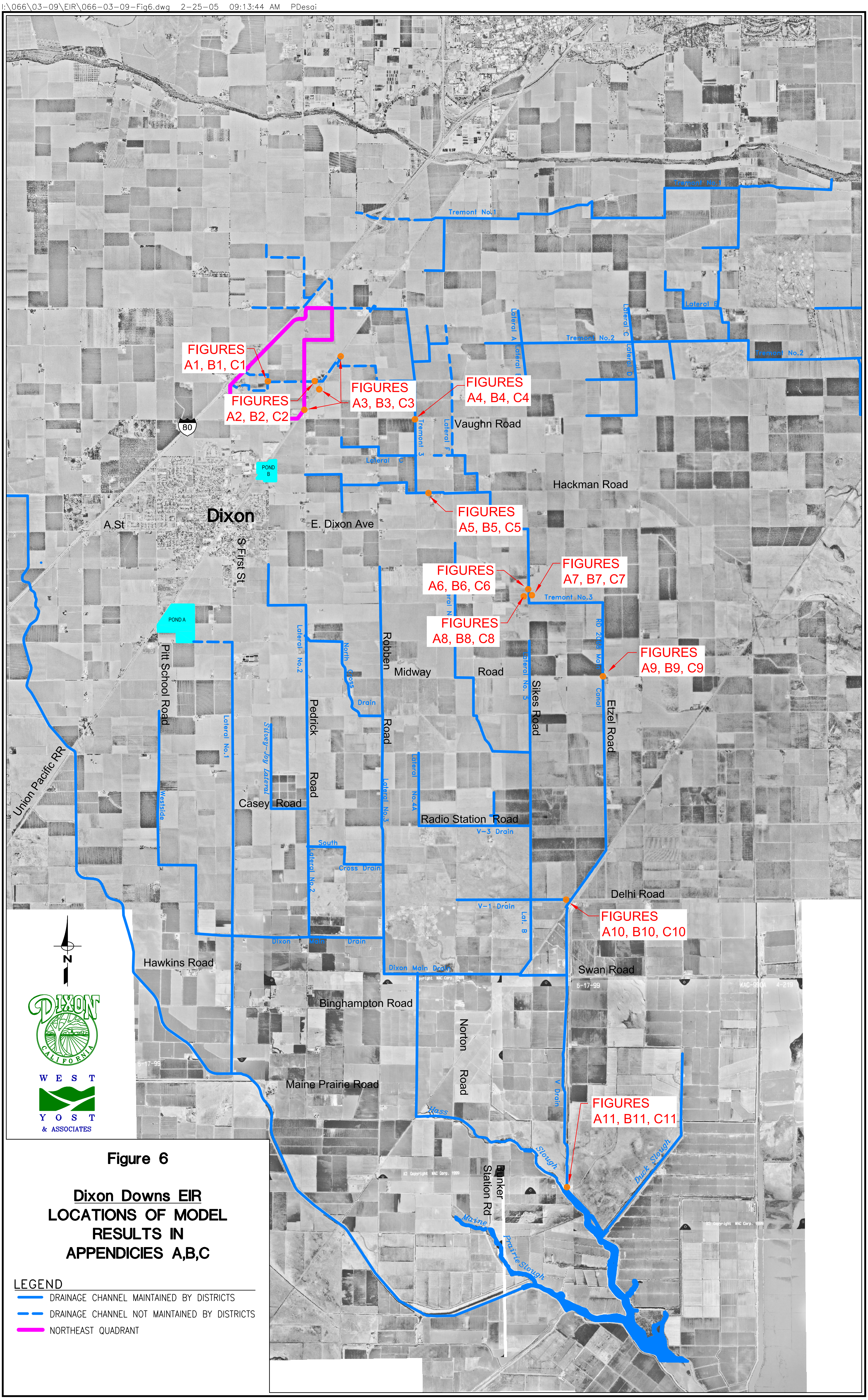


Figure 6

Dixon Downs EIR
LOCATIONS OF MODEL RESULTS IN APPENDICIES A,B,C

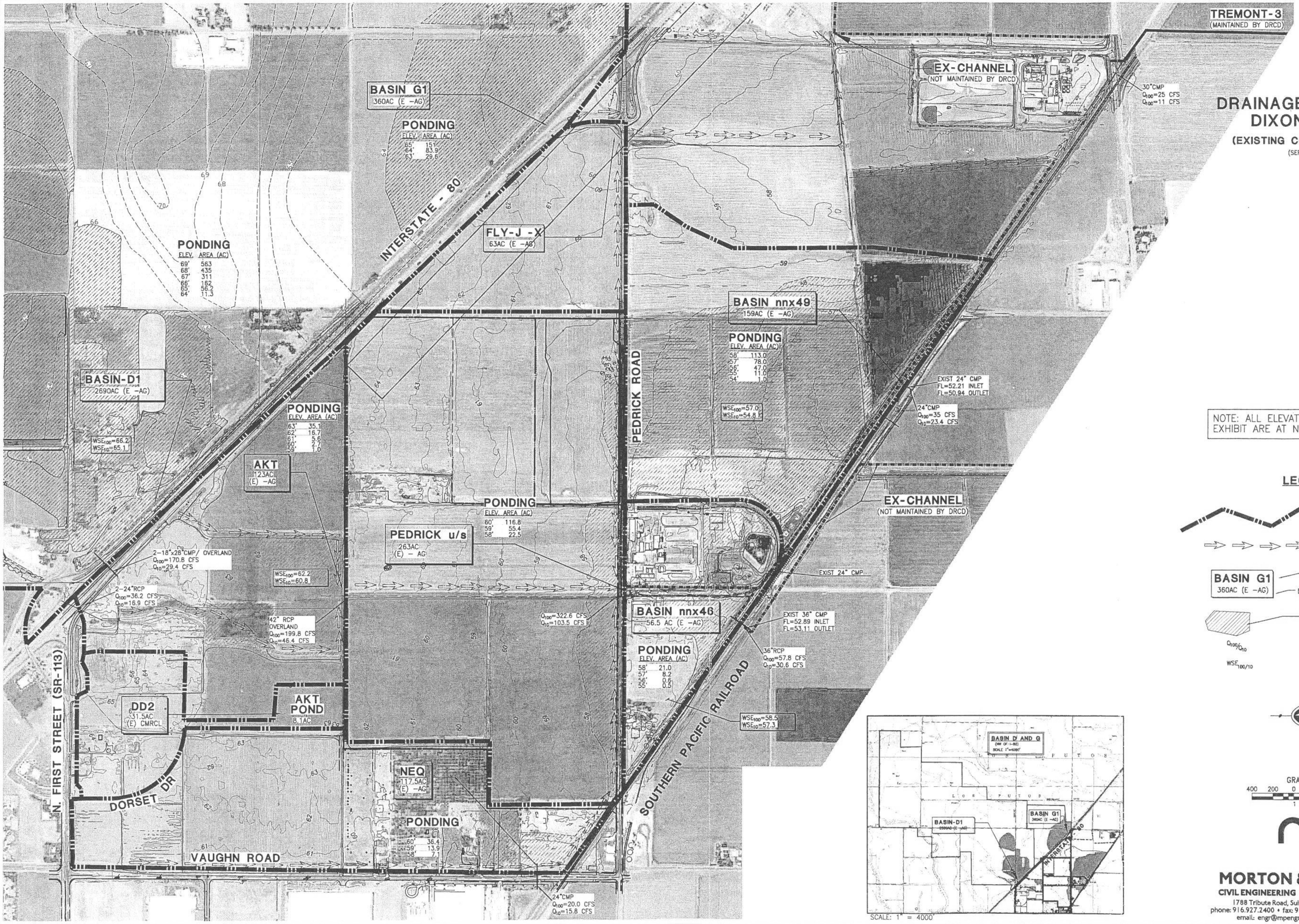
LEGEND

▬	DRAINAGE CHANNEL MAINTAINED BY DISTRICTS
- - -	DRAINAGE CHANNEL NOT MAINTAINED BY DISTRICTS
▬	NORTHEAST QUADRANT

DRAINAGE EXHIBIT -A
DIXON DOWNS

(EXISTING CONDITION - NQSP)

(SEPTEMBER 2004)



NOTE: ALL ELEVATIONS ON THIS EXHIBIT ARE AT NGVD-1929 DATUM.

LEGEND:

SHED BOUNDARY

⇨ ⇨ ⇨ ⇨ OVERLAND FLOW PATH

BASIN G1 — DRAINAGE BASIN

360AC (E -AG) — DRAINAGE AREA / LAND USE

▨ PONDING AREA

Q_{100}/Q_{10} PEAK FLOWS (CFS)

$WSE_{100/10}$ 100/10 YEAR PONDING WATER SURFACE ELEVATION

N

GRAPHIC SCALE

400 200 0 400 800

1 in = 400 ft

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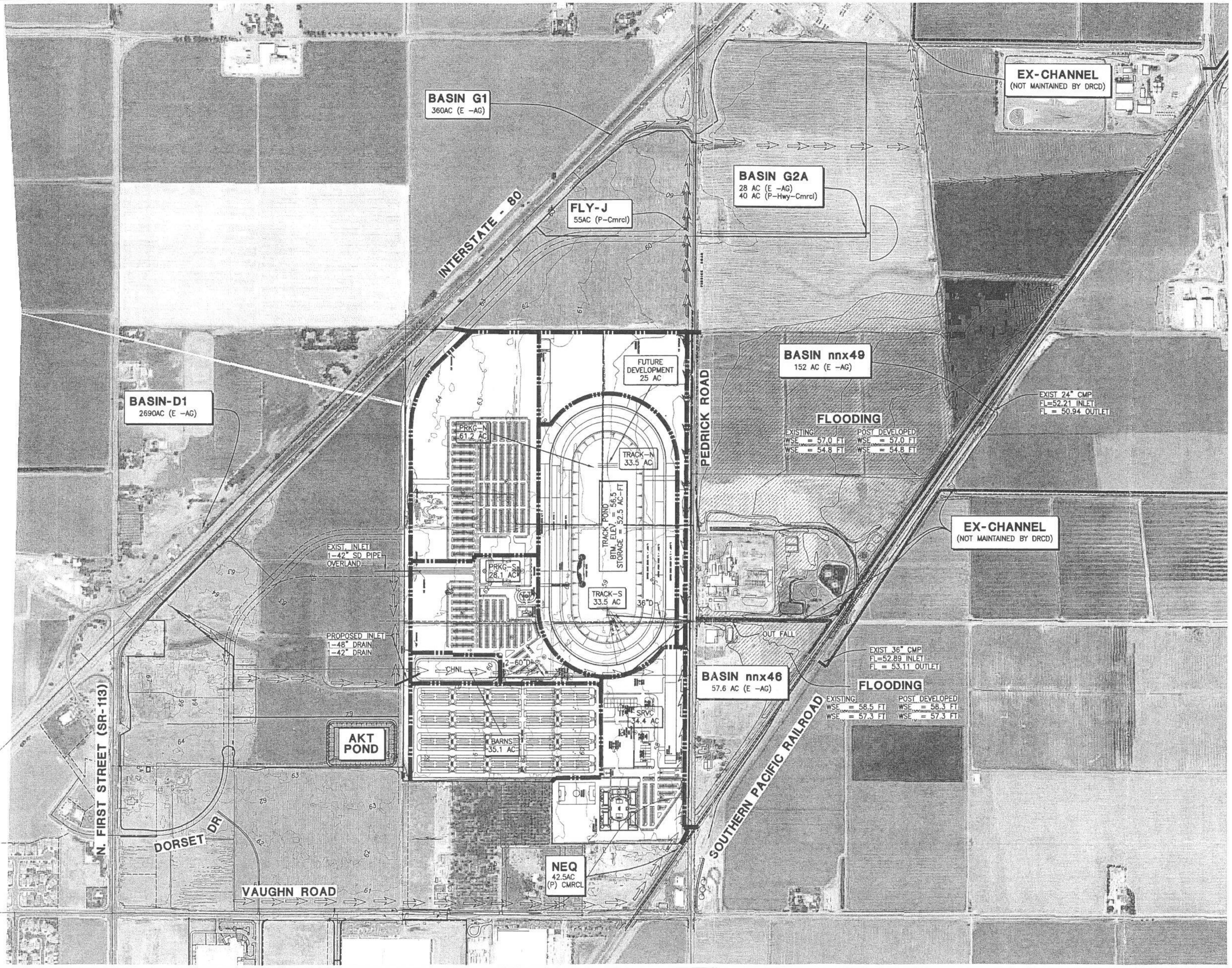
phone: 916.927.2400 • fax: 916.567.0120 • survey fax: 916.927.1185
email: engr@mpengr.com • web: www.mpengr.com



DRAINAGE EXHIBIT- B
DIXON DOWNS

(DEVELOPED CONDITION - PROJECT)

(SEPT 2004)

NOTE: ALL ELEVATIONS ON THIS EXHIBIT ARE AT NGVD-1929 DATUM.

LEGEND:

▬ ▪ ▪ ▬	SHED BOUNDARY
⇨ ⇨ ⇨ ⇨	OVERLAND FLOW PATH
BASIN G1	DRAINAGE BASIN
360AC (E -AG)	DRAINAGE AREA / LAND USE
▨	PONDING AREA
Q_{100}/Q_{10}	PEAK FLOWS (CFS)
$WSE_{100/10}$	100/10 YEAR PONDING WATER SURFACE ELEVATION

GRAPHIC SCALE
200 100 0 200 400
1 in = 200 ft

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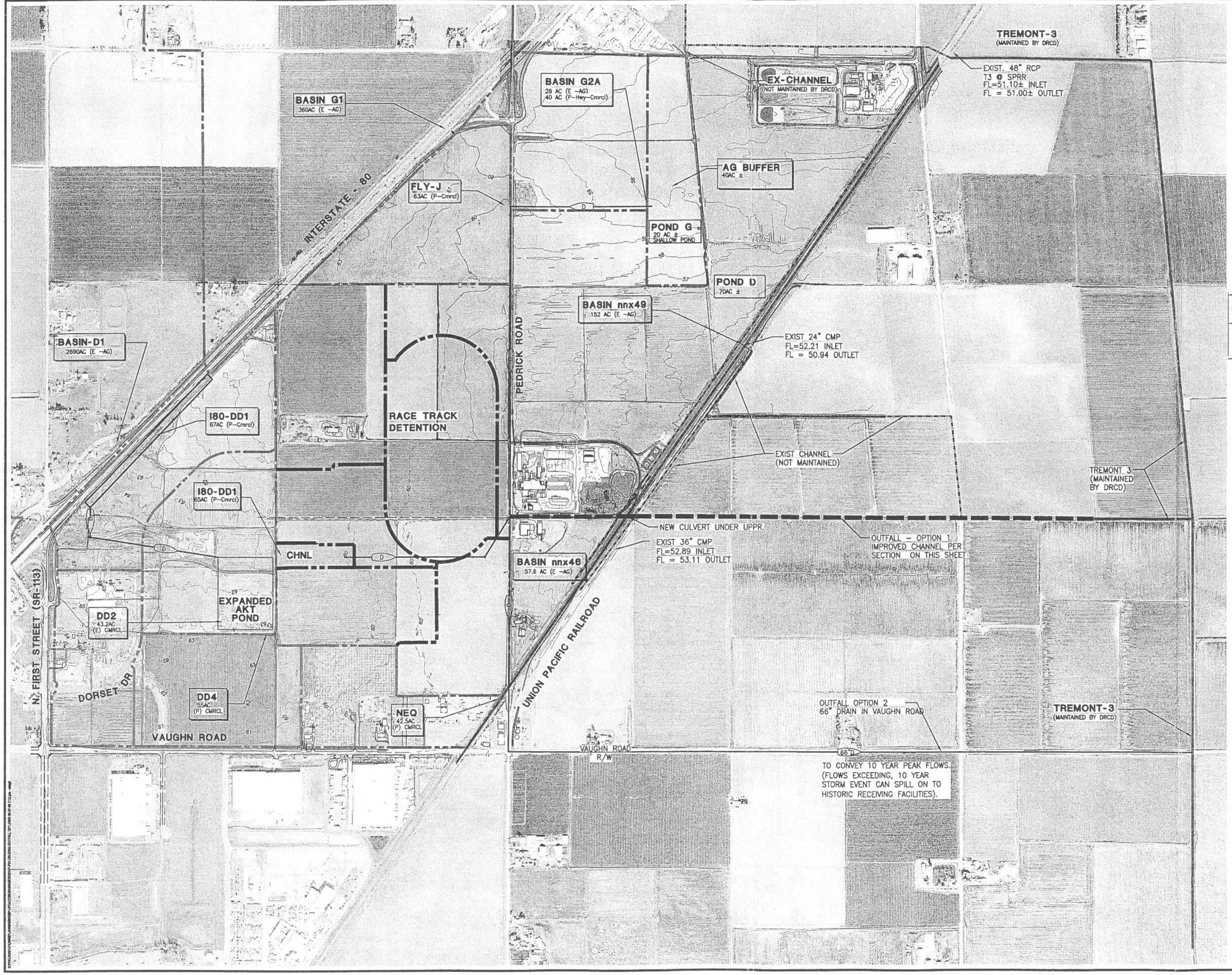
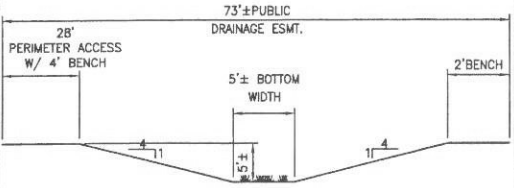
DIXON DOWNS
DRAINAGE EXHIBIT - C
NEQSP OVER ALL DRAINAGE SYSTEM AND OUT FALL OPTIONS
(SEPTEMBER 2004)





TYP. OFFSITE CONVEYANCE CHANNEL

LEGEND:

— - — SHED BOUNDARY

BASIN G2B — DRAINAGE BASIN
30AC (E -AG) — DRAINAGE AREA / LAND USE

GRAPHIC SCALE
500 250 0 500 1000
1 in = 500 ft

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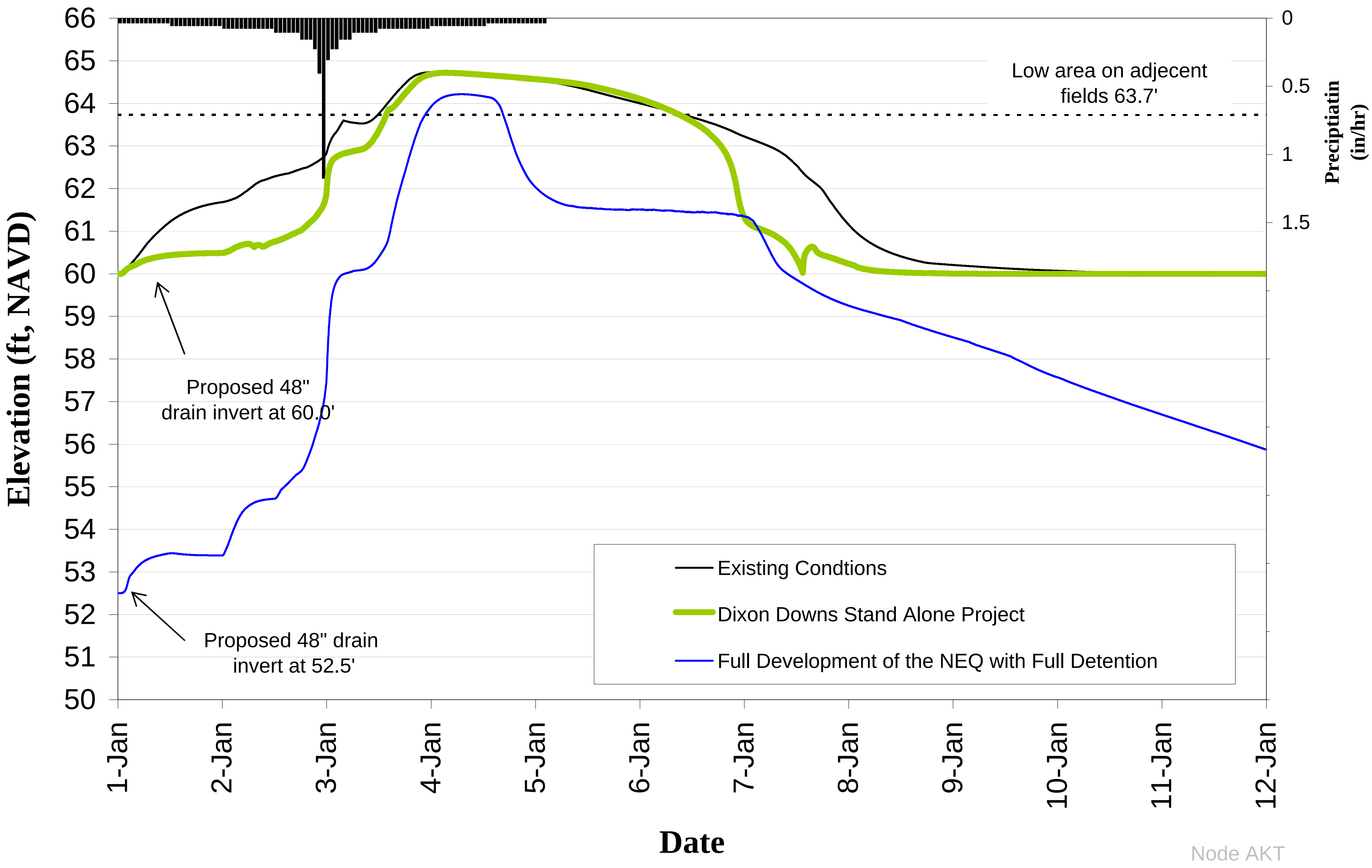
APPENDIX A

100-Year, 4- Day Storm Model Results

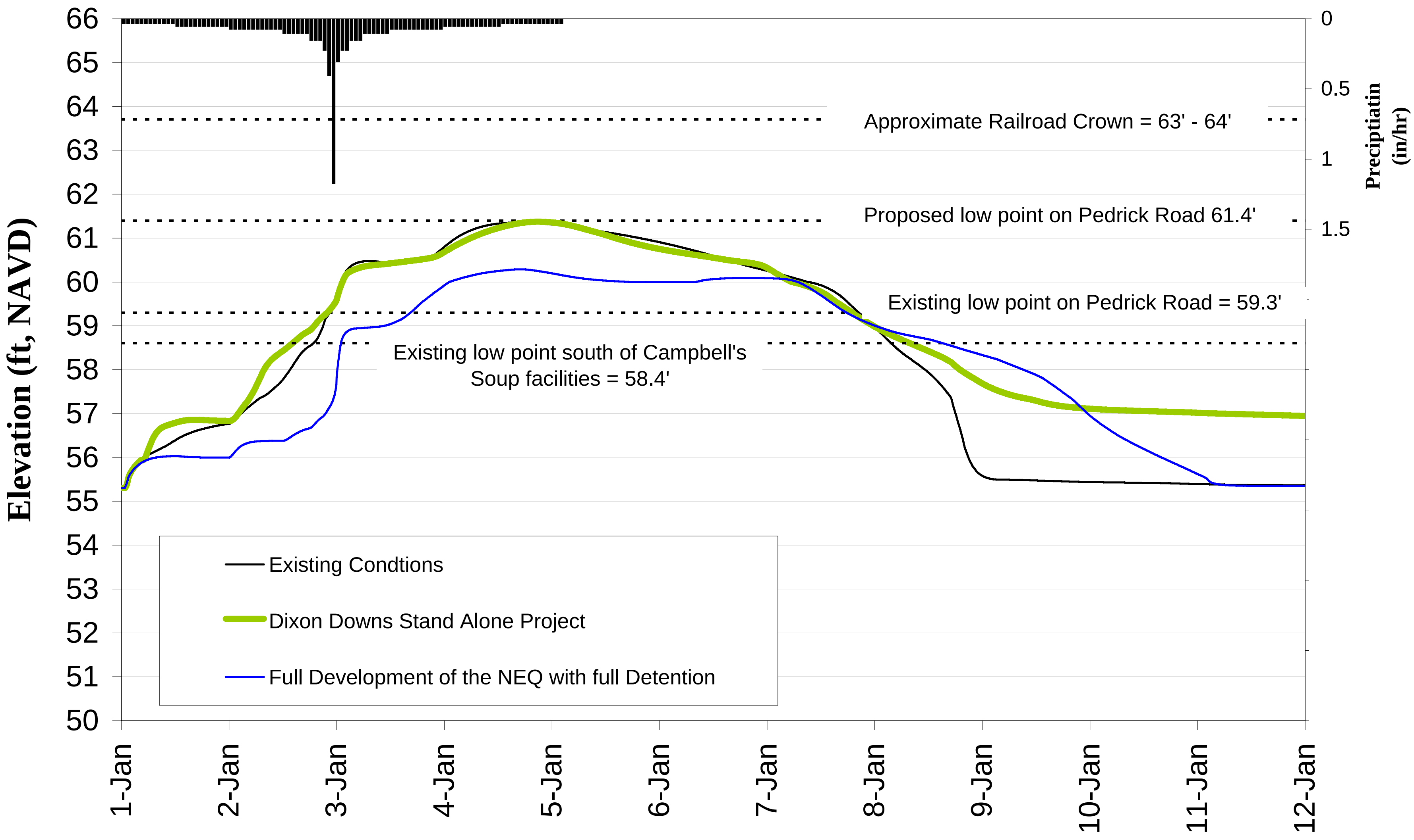
Figure A1. 100-Year Water Surface Elevation at the West Side of the Dixon Downs Project Site



WYA—03/01/05
066\00-03-09

City of Dixon
Dixon Downs EIR

Figure A2. 100-Year Water Surface Elevation at the Railroad South of the Campbell's Soup Facility

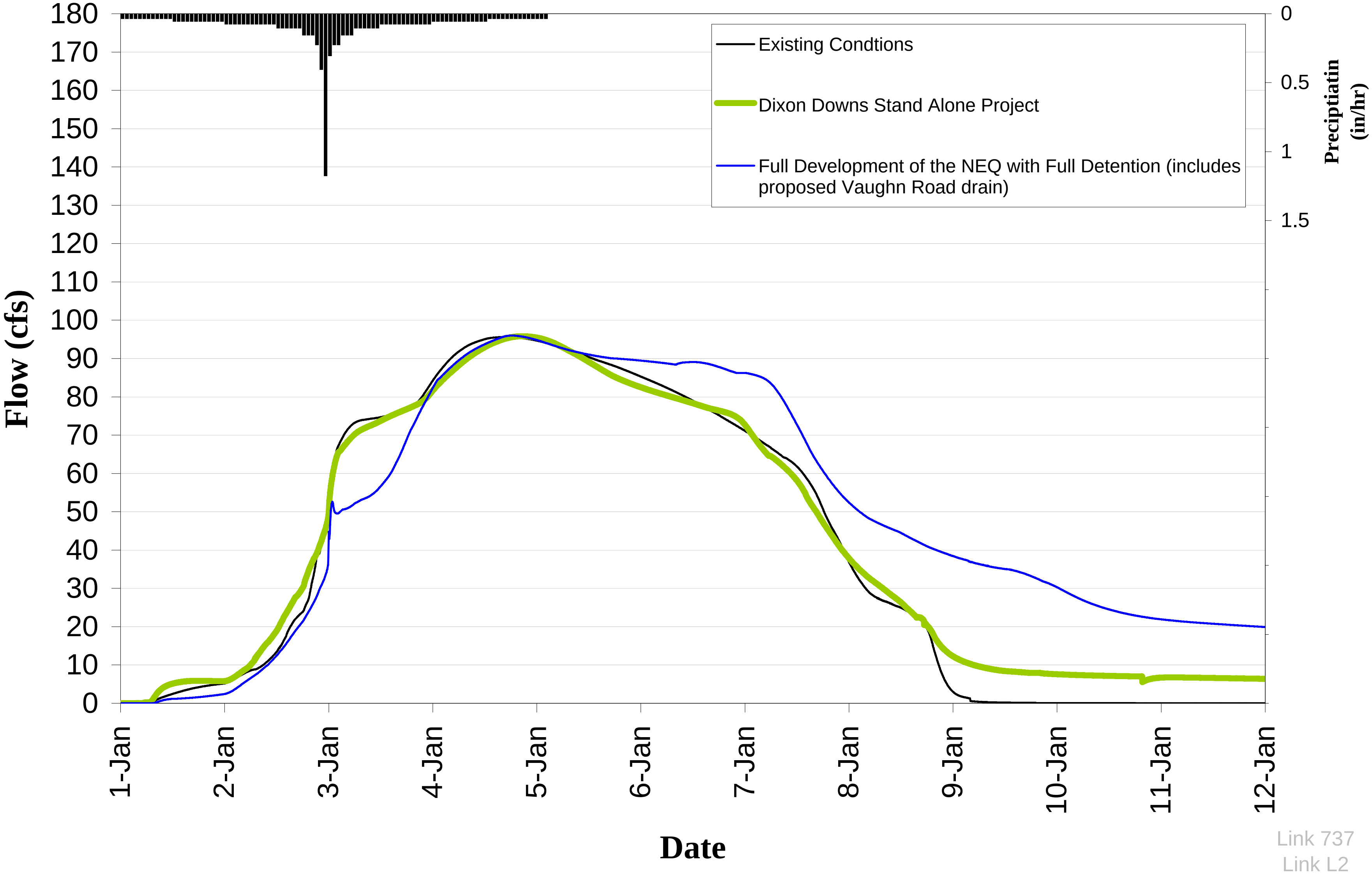


Node nnx46

WYA—03/01/05
066\00-03-09

City of Dixon
Dixon Downs EIR

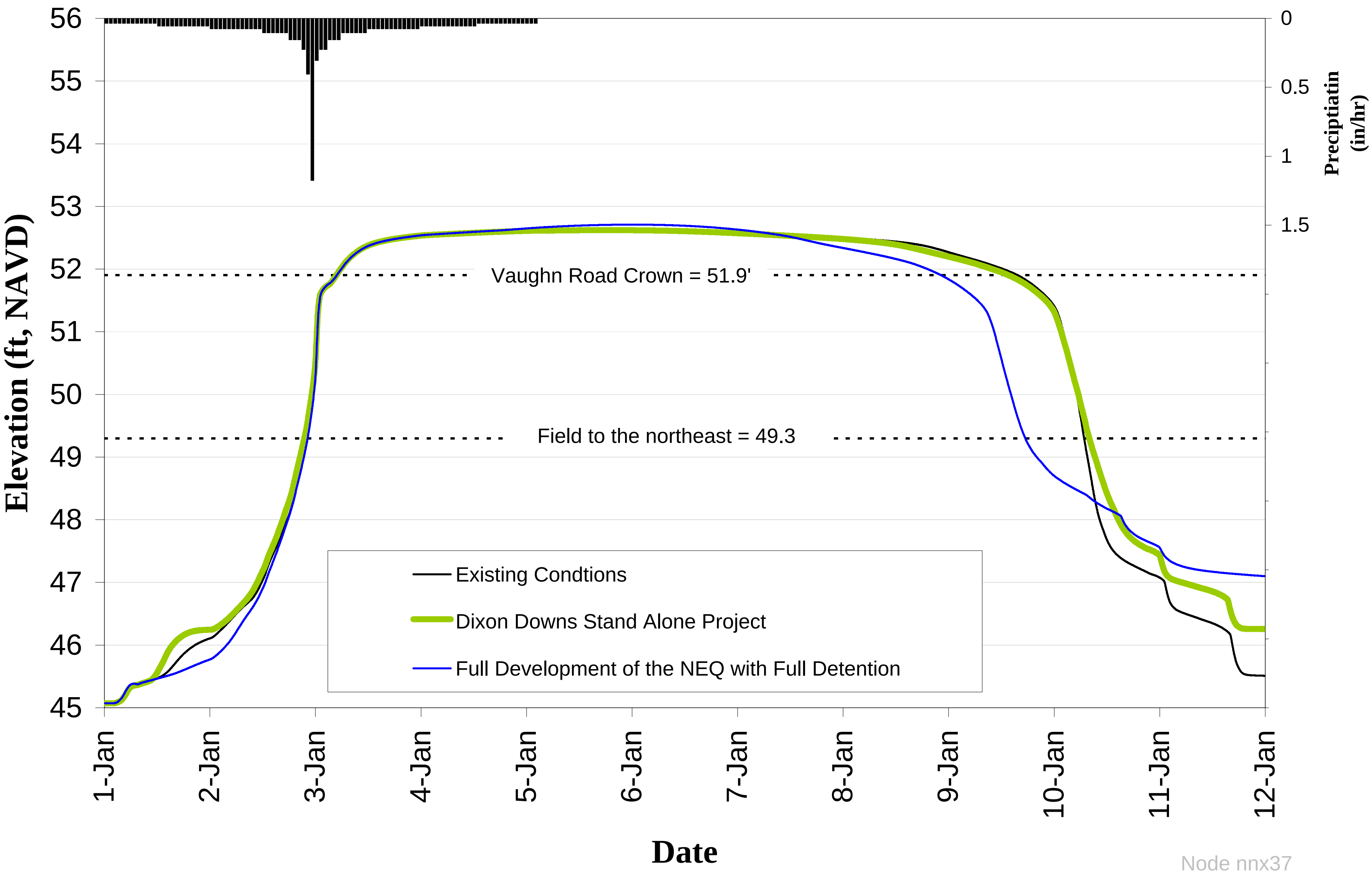
Figure A3. 100-Year Flow Under the Union Pacific Railroad (Combined Flow in the 30" CMP and 36" RCP Culverts)



WYA—03/01/05
066\00-03-09

City of Dixon
Dixon Downs EIR

Figure A4. 100-Year Water Surface Elevation of the Tremont 3 Drain at Vaughn Road



WYA—03/01/05
066\00-03-09

City of Dixon
Dixon Downs EIR

Figure A5. 100-Year Water Surface Elevation of the Tremont 3 Drain at Hackman Road

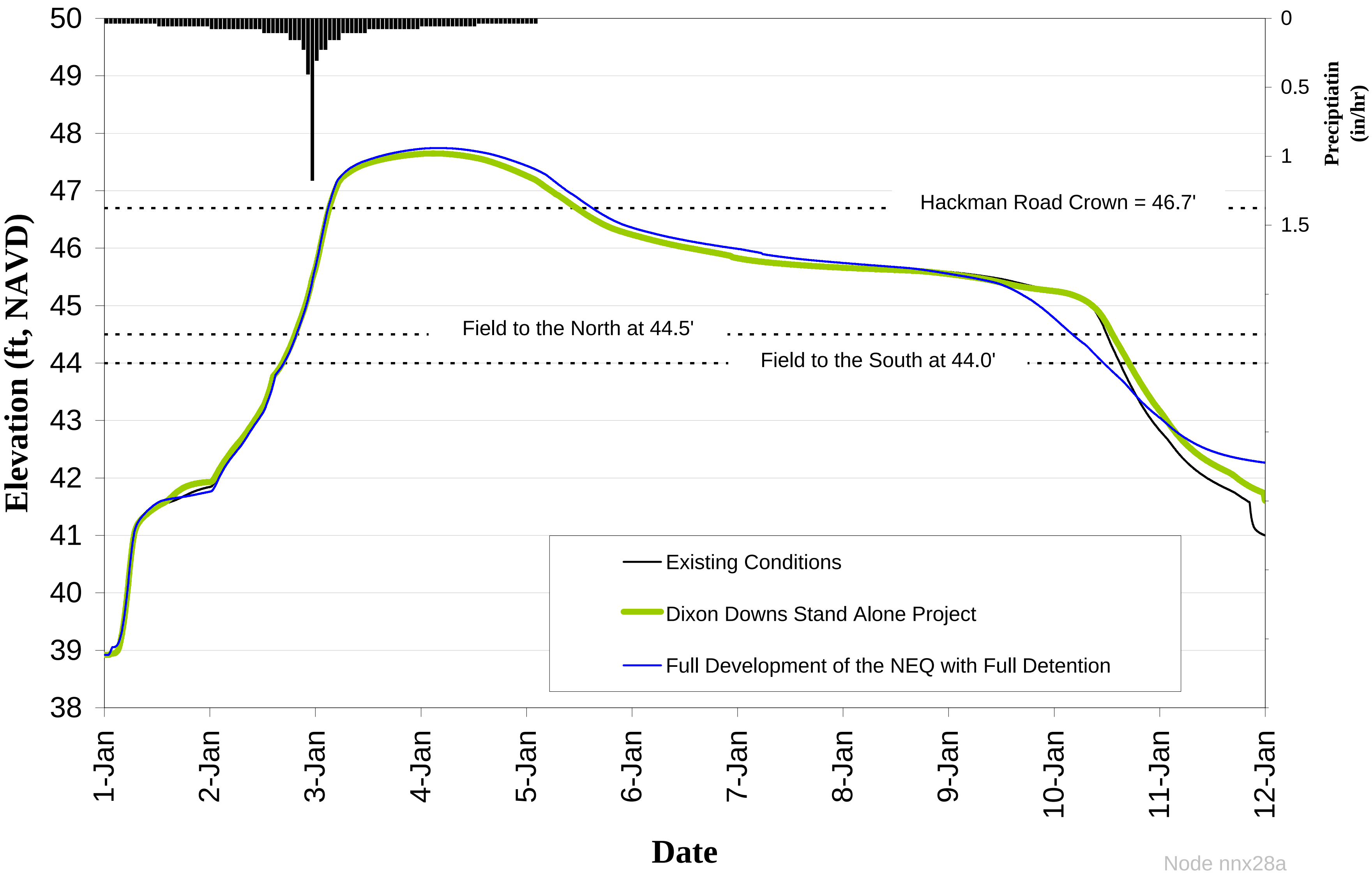


Figure A6. 100-Year Water Surface Elevation of the Tremont 3 Drain at the Sikes Road Culverts

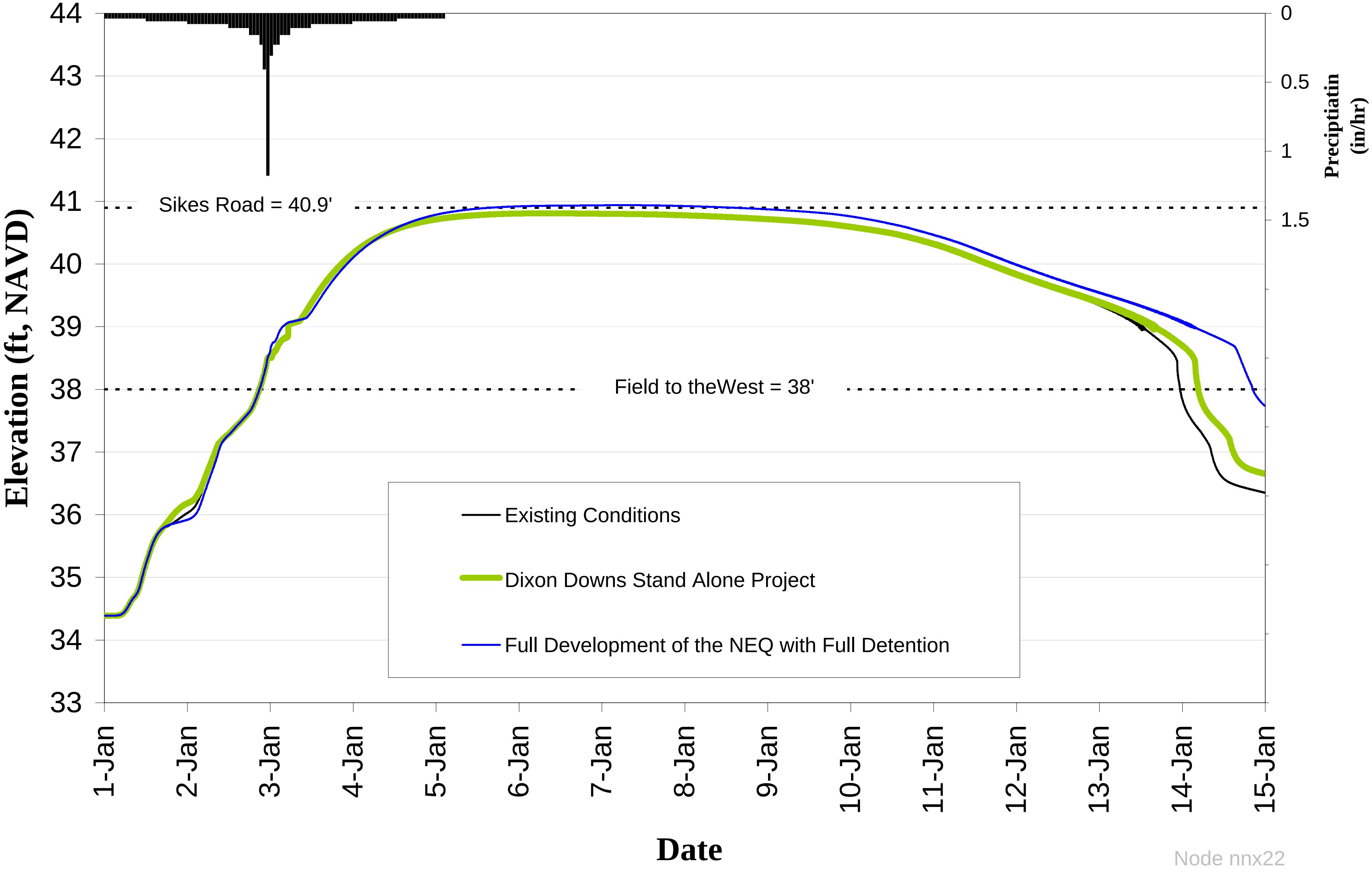


Figure A7. 100-Year Flow Through the Sikes Road Culverts

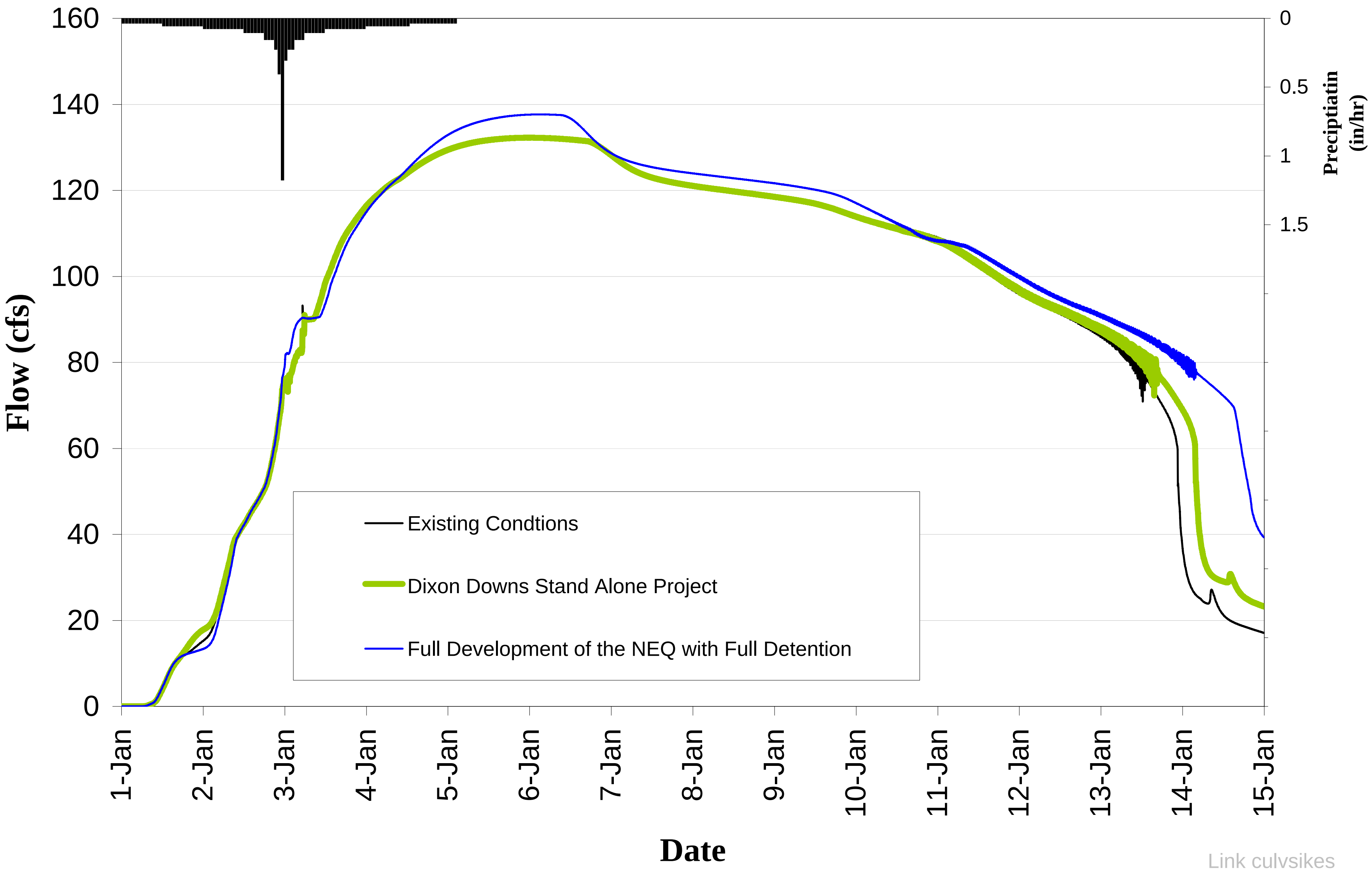
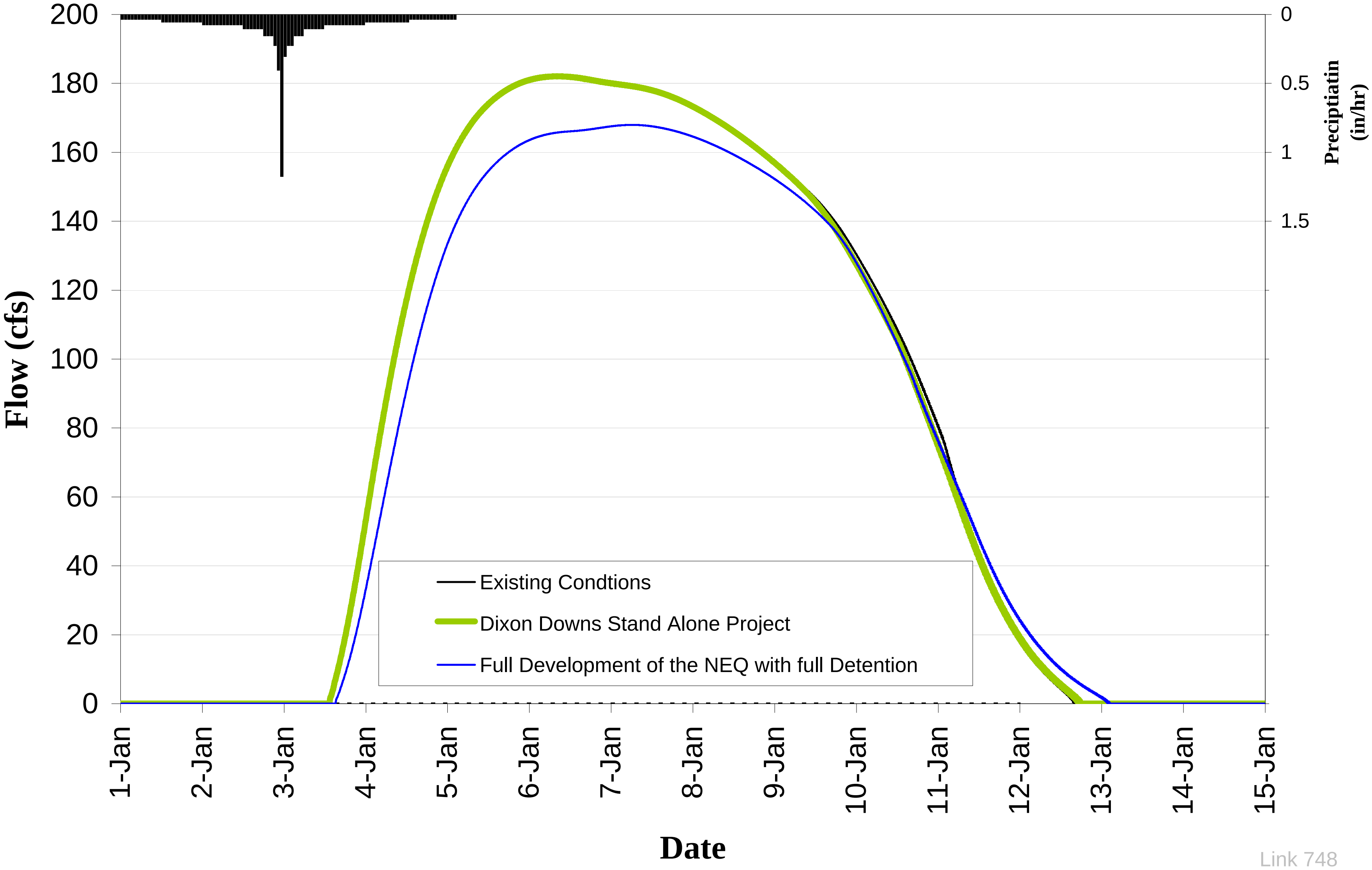


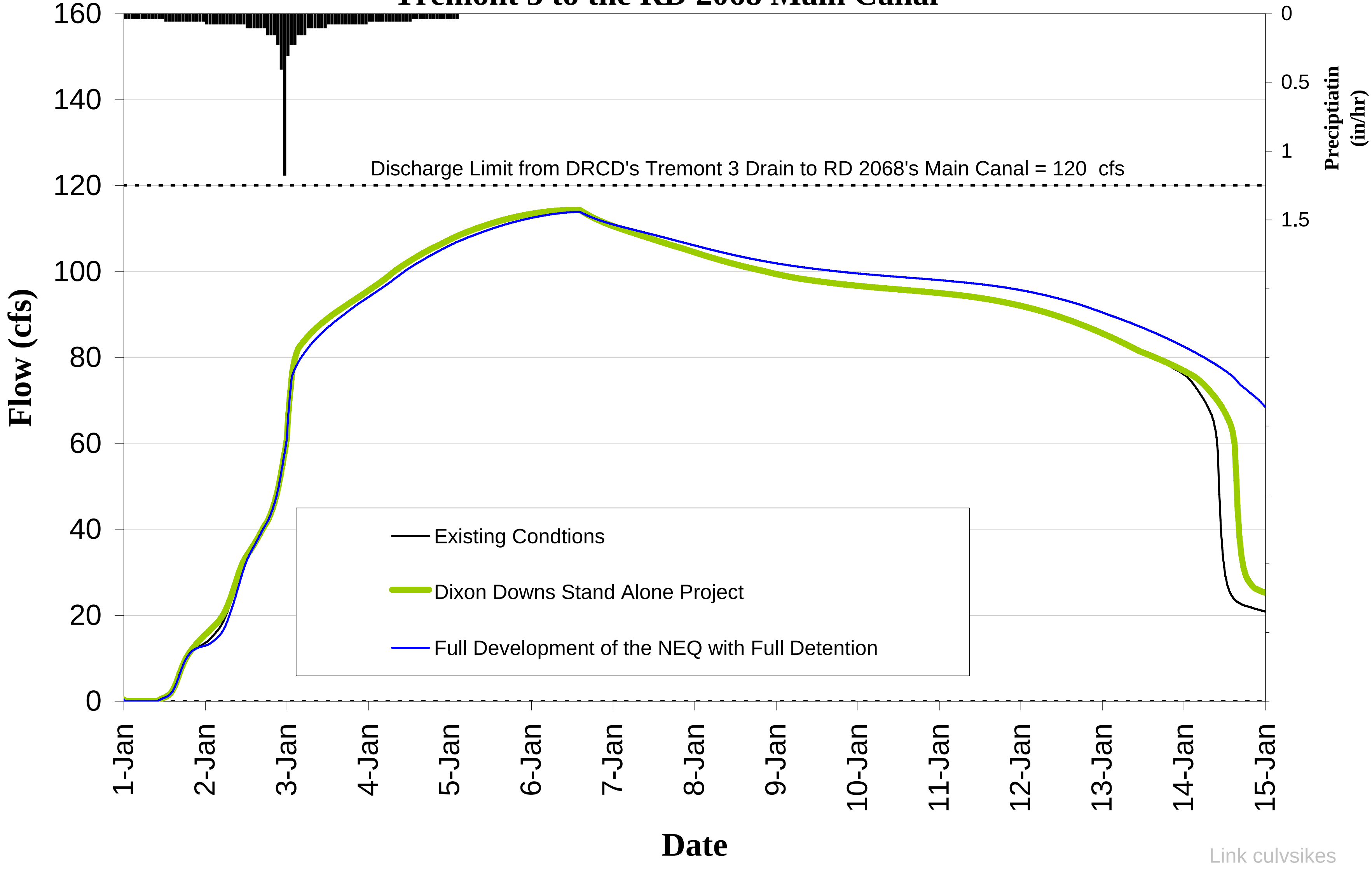
Figure A8. 100-Year Flow Continuing South from the Sikes Road Culverts



WYA—03/01/05
066\00-03-09

City of Dixon
Dixon Downs EIR

Figure A9. 100-Year Flow From Tremont 3 to the RD 2068 Main Canal



WYA—03/01/05
066\00-03-09

City of Dixon
Dixon Downs EIR

Figure A10. 100-Year Water Surface Elevation in the V-Drain at the Upstream Side of the Delhi Road Culverts

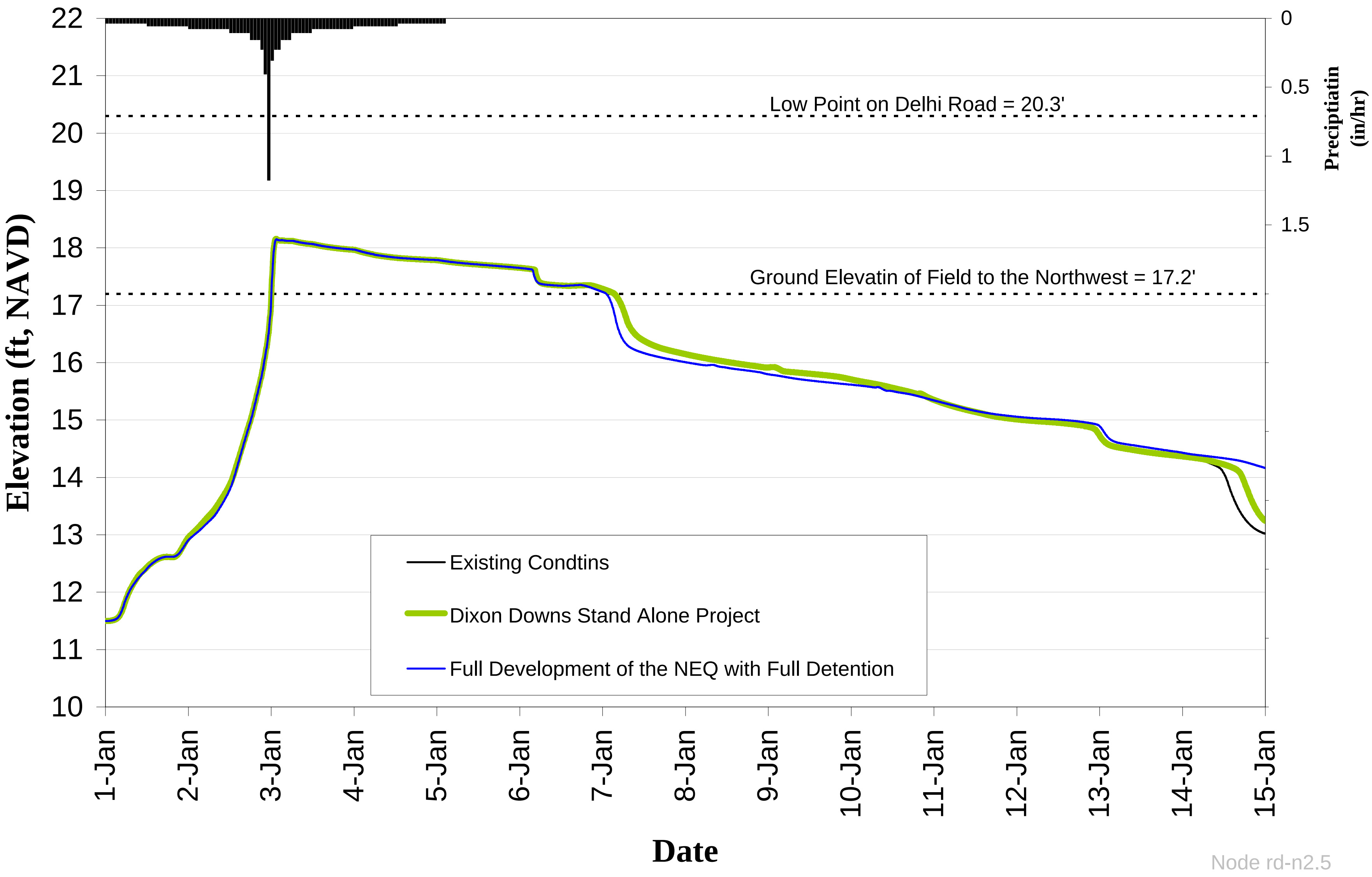
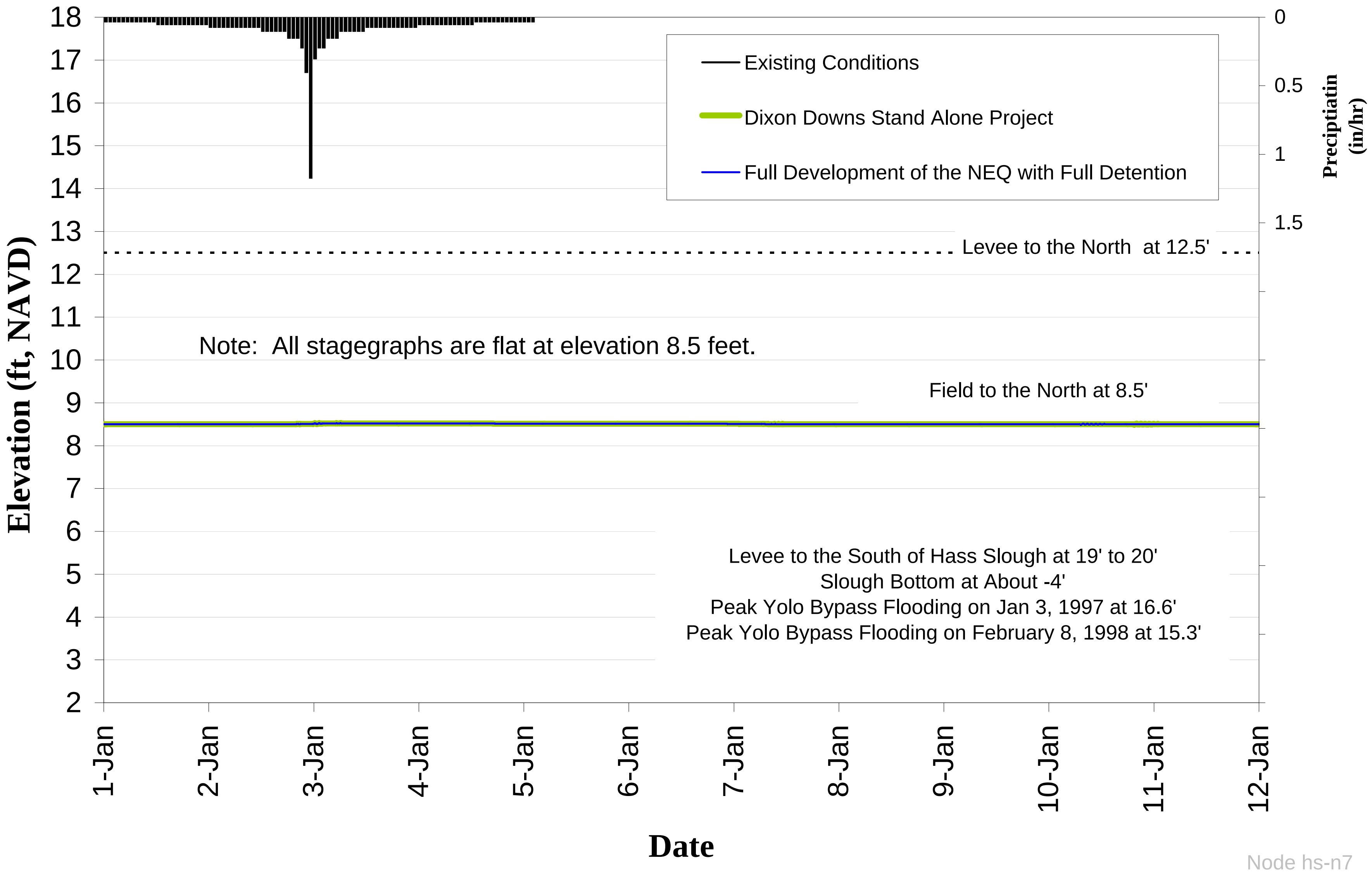


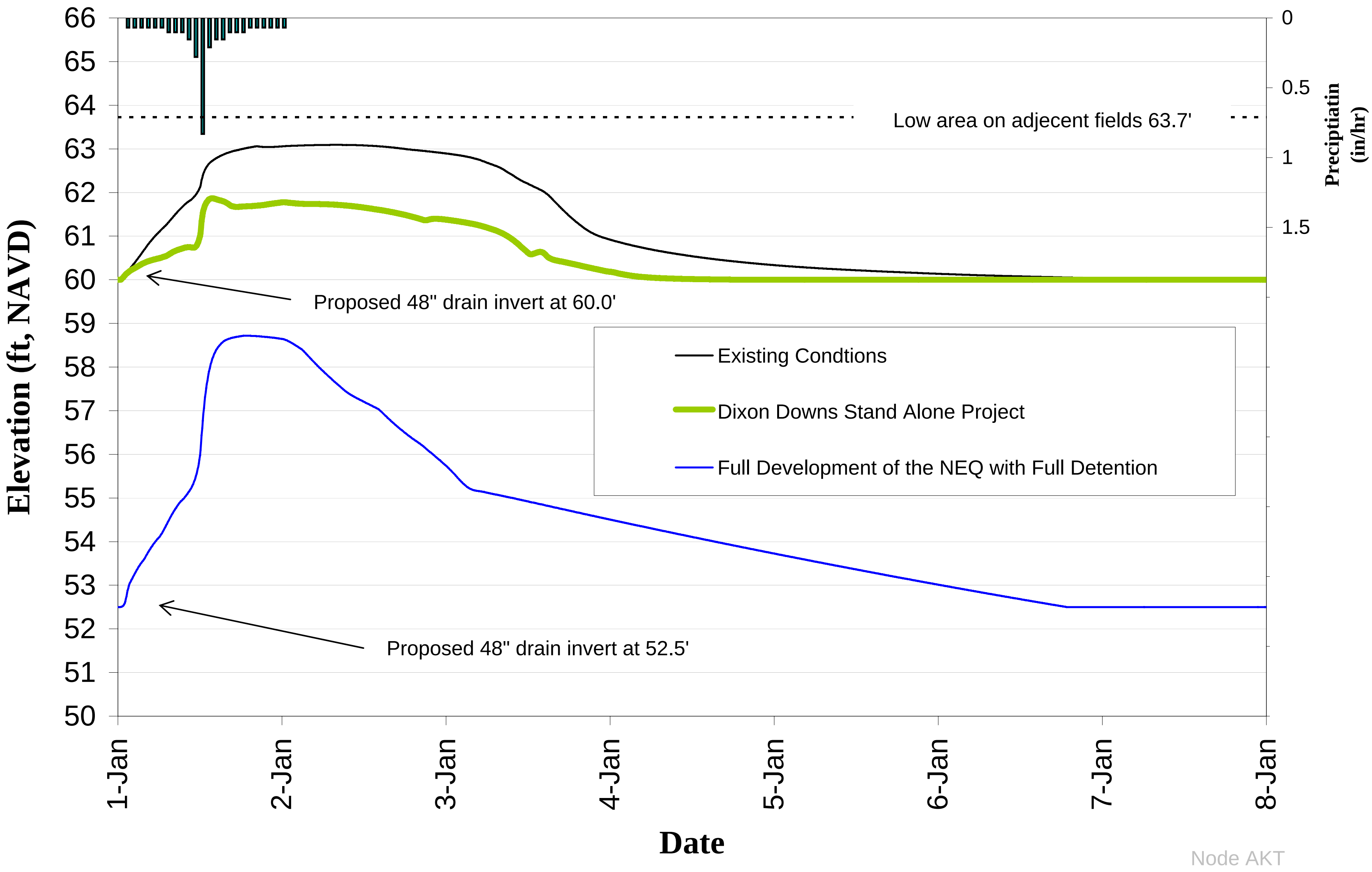
Figure A11. 100-Year Water Surface Elevation in Hass Slough



APPENDIX B

10-Year, 24-Hour Storm Model Results

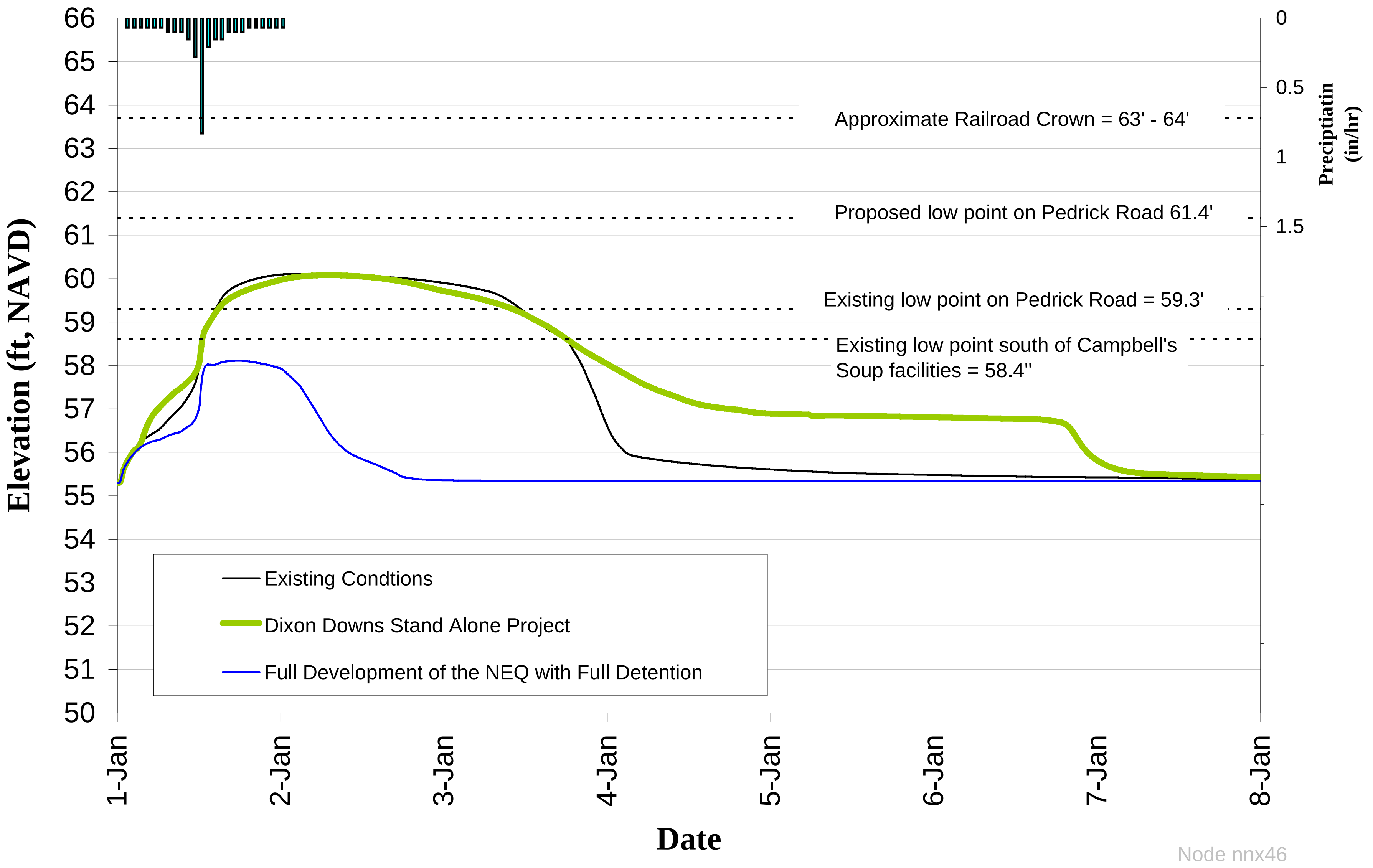
Figure B1. 10-Year Water Surface Elevation at the West Side of the Dixon Downs Project Site



WYA—03/01/05
066\00-03-09

City of Dixon
Dixon Downs EIR

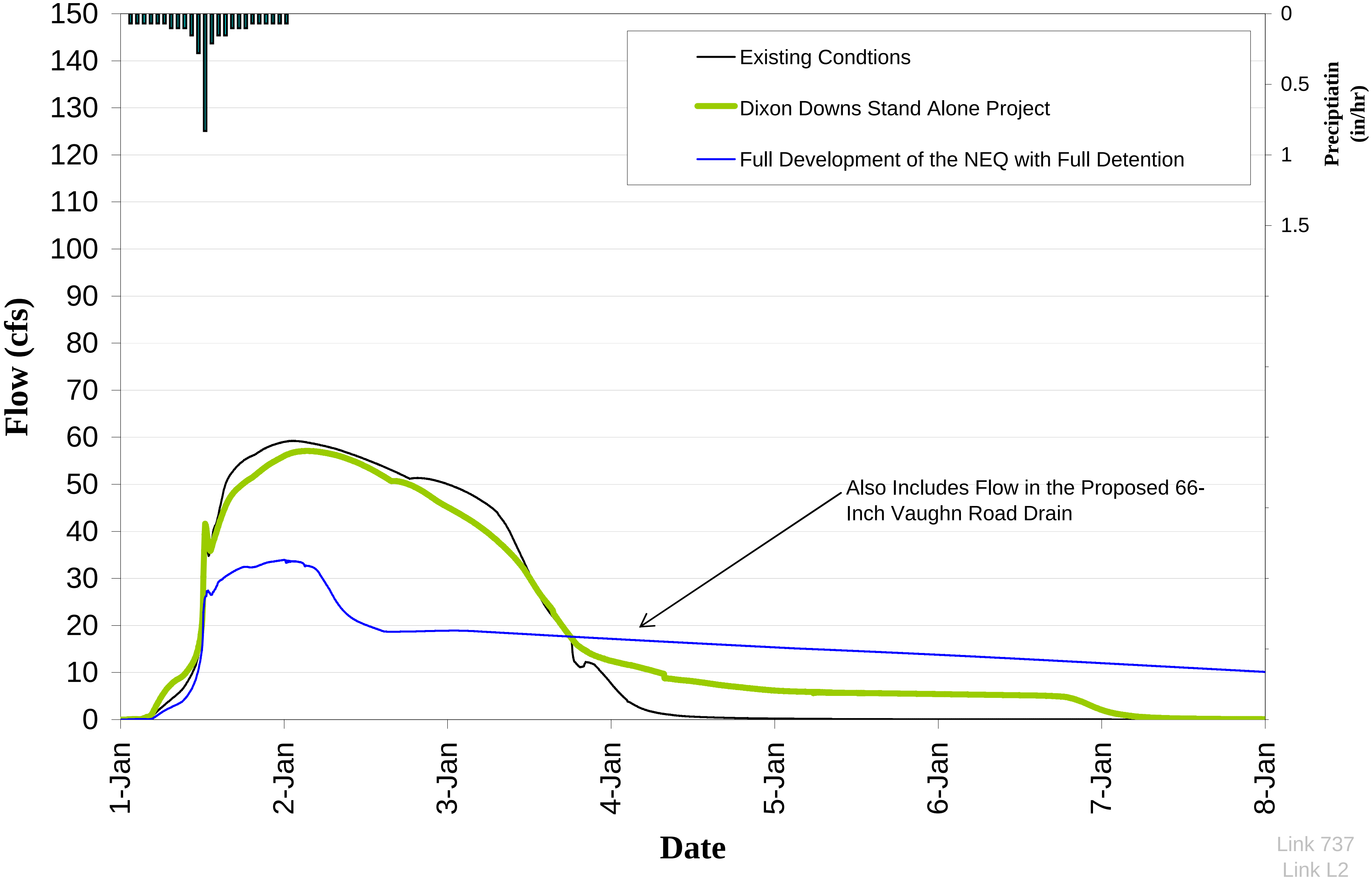
Figure B2. 10-Year Water Surface Elevation at the Railroad South of the Campbell's Soup Facility



City of Dixon
Dixon Downs EIR

WYA—03/01/05
066\00-03-09

Figure B3. 10-Year Flow Under the Union Pacific Railroad (combined flow in the 30" CMP and 36" RCP)



WYA—03/01/05
066\00-03-09

City of Dixon
Dixon Downs EIR

Figure B4. 10-Year Water Surface Elevation of the Tremont 3 Drain at Vaughn Road

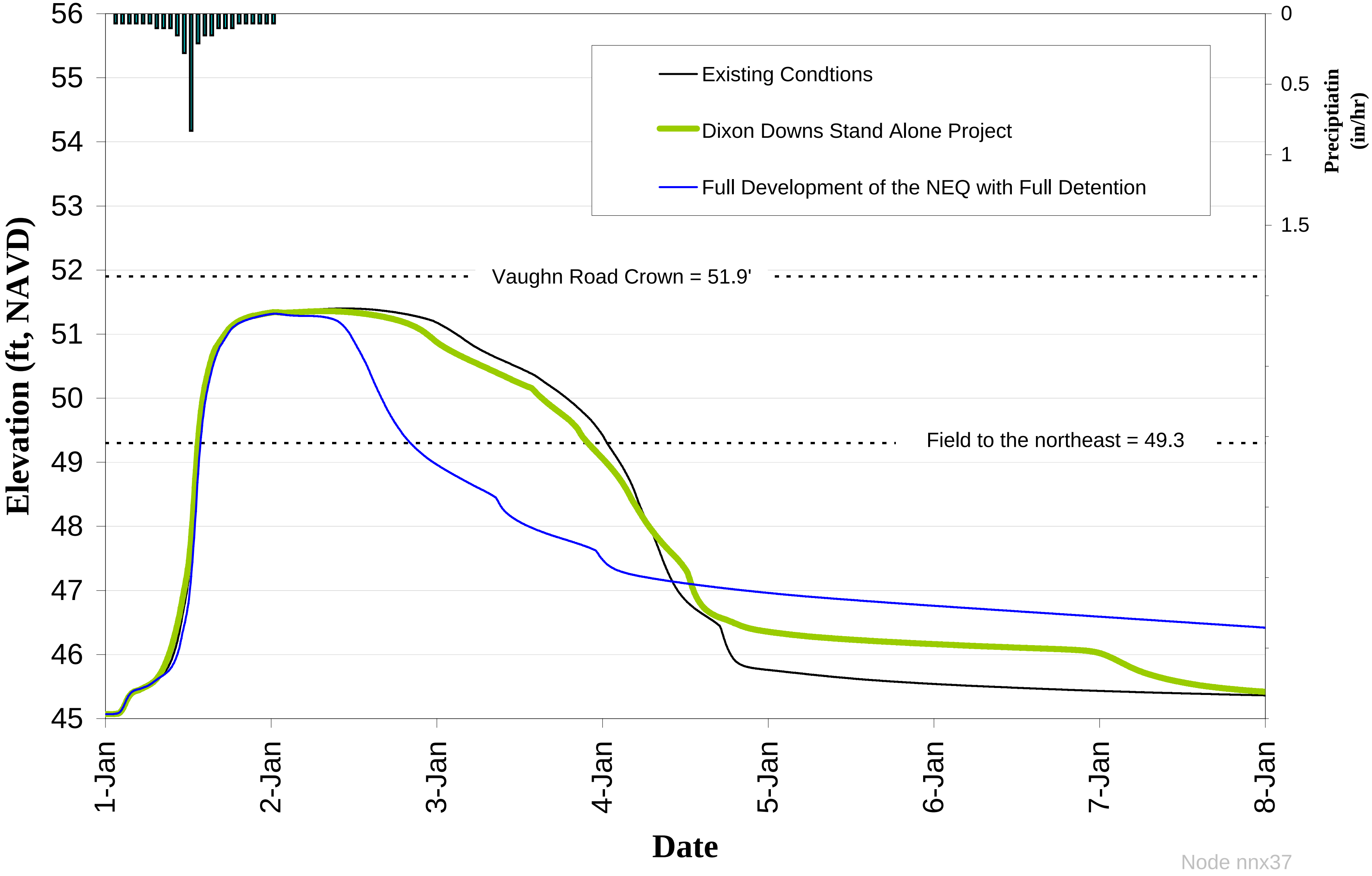
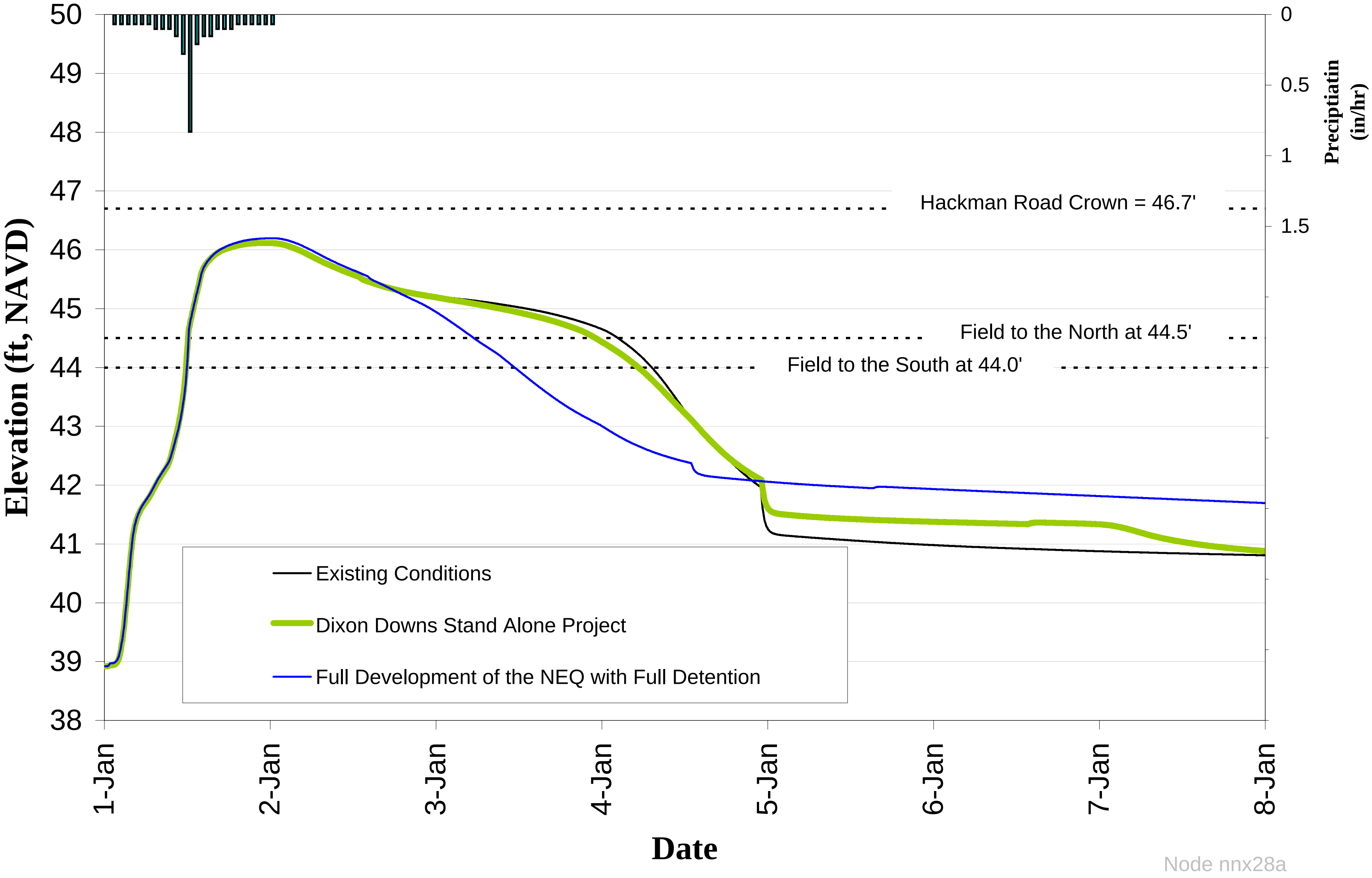


Figure B5. 10-Year Water Surface Elevation of the Tremont 3 Drain at Hackman Road



WYA—03/01/05
066\00-03-09

City of Dixon
Dixon Downs EIR

Figure B6. 10-Year Water Surface Elevation of the Tremont 3 Drain at the Sikes Road Culverts

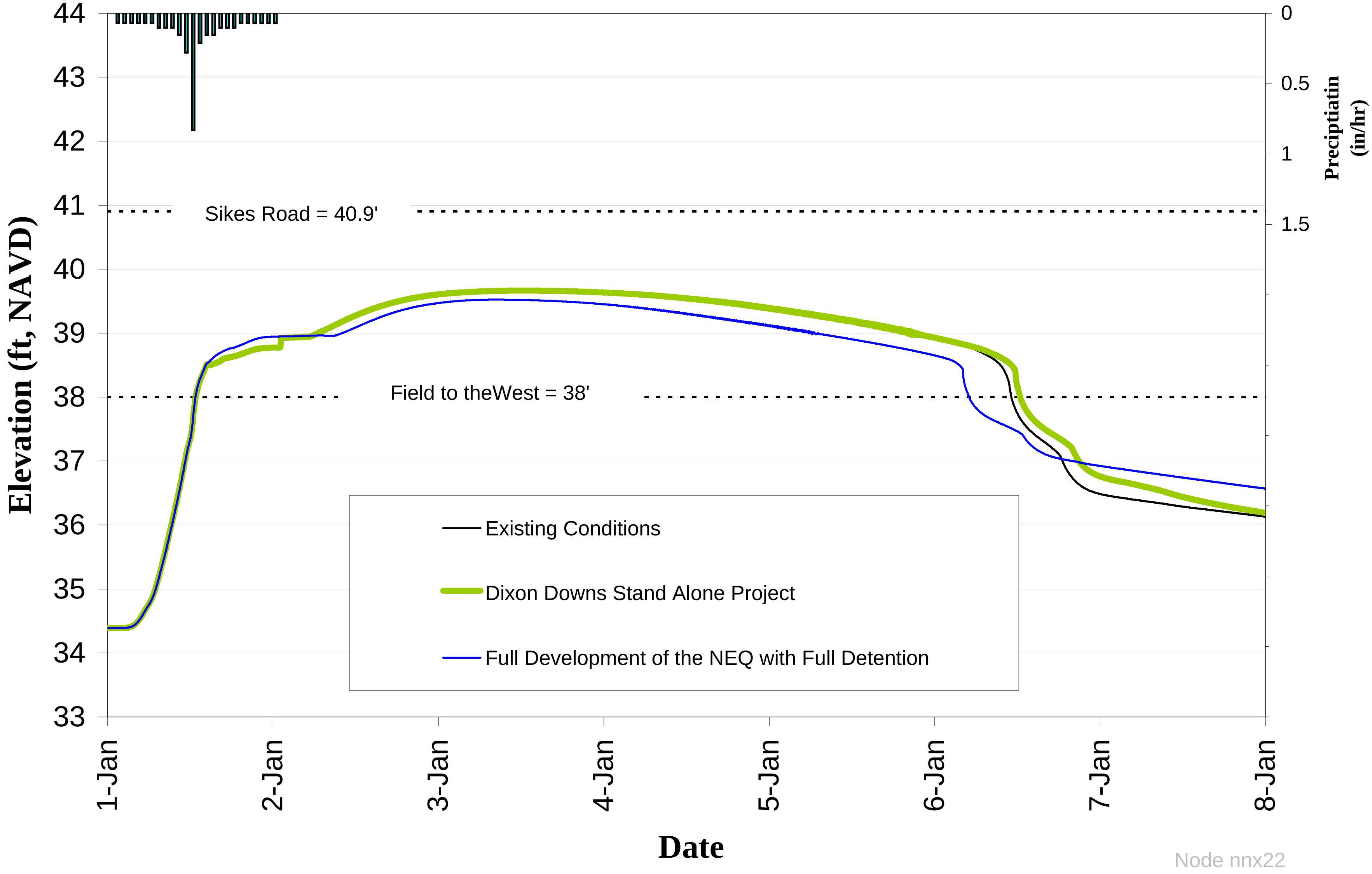
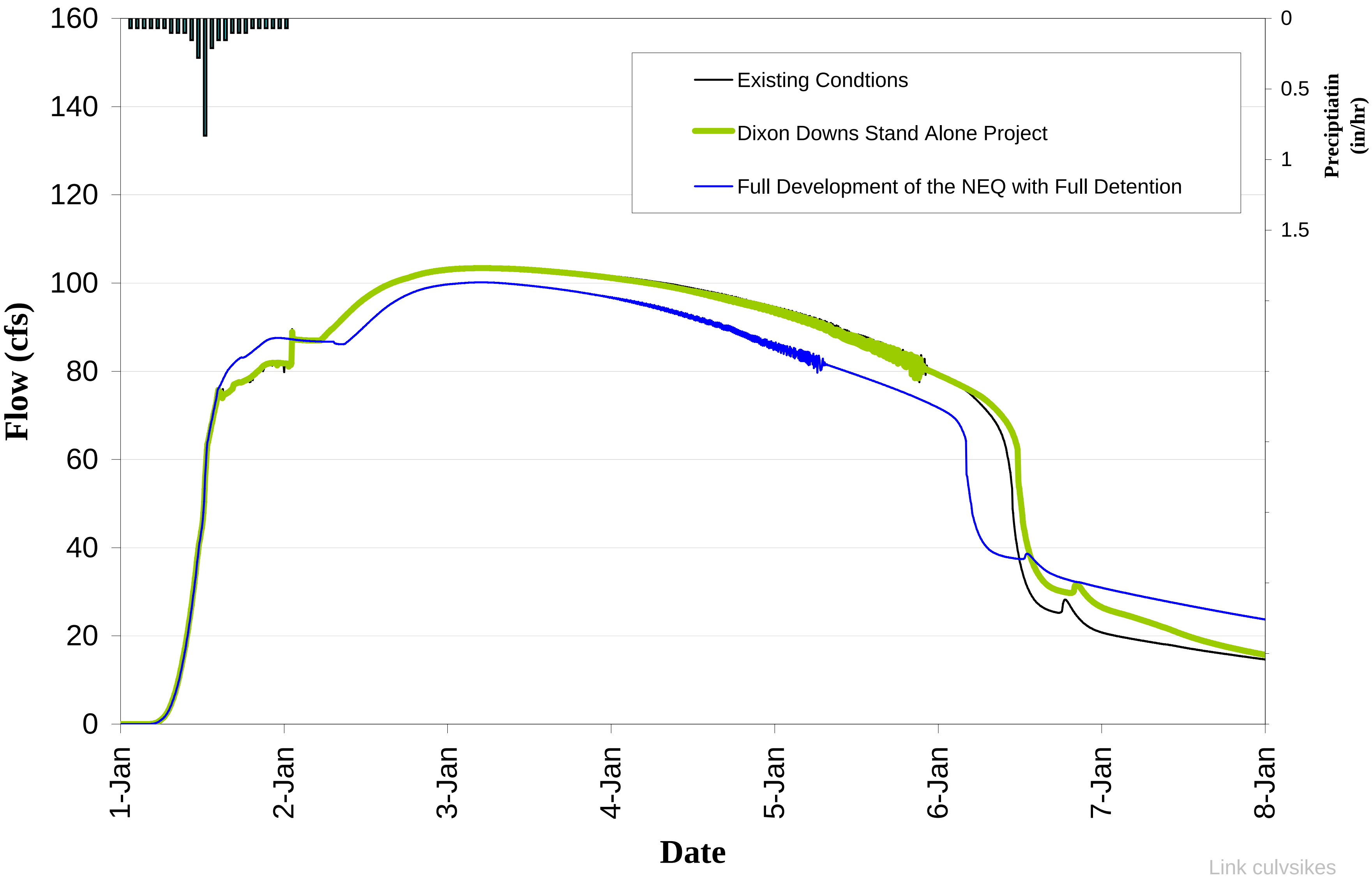


Figure B7. 10-Year Flow Through the Sikes Road Culverts



WYA—03/01/05
066\00-03-09

City of Dixon
Dixon Downs EIR

Figure B8. 10-Year Flow Continuing South from the Sikes Road Culverts

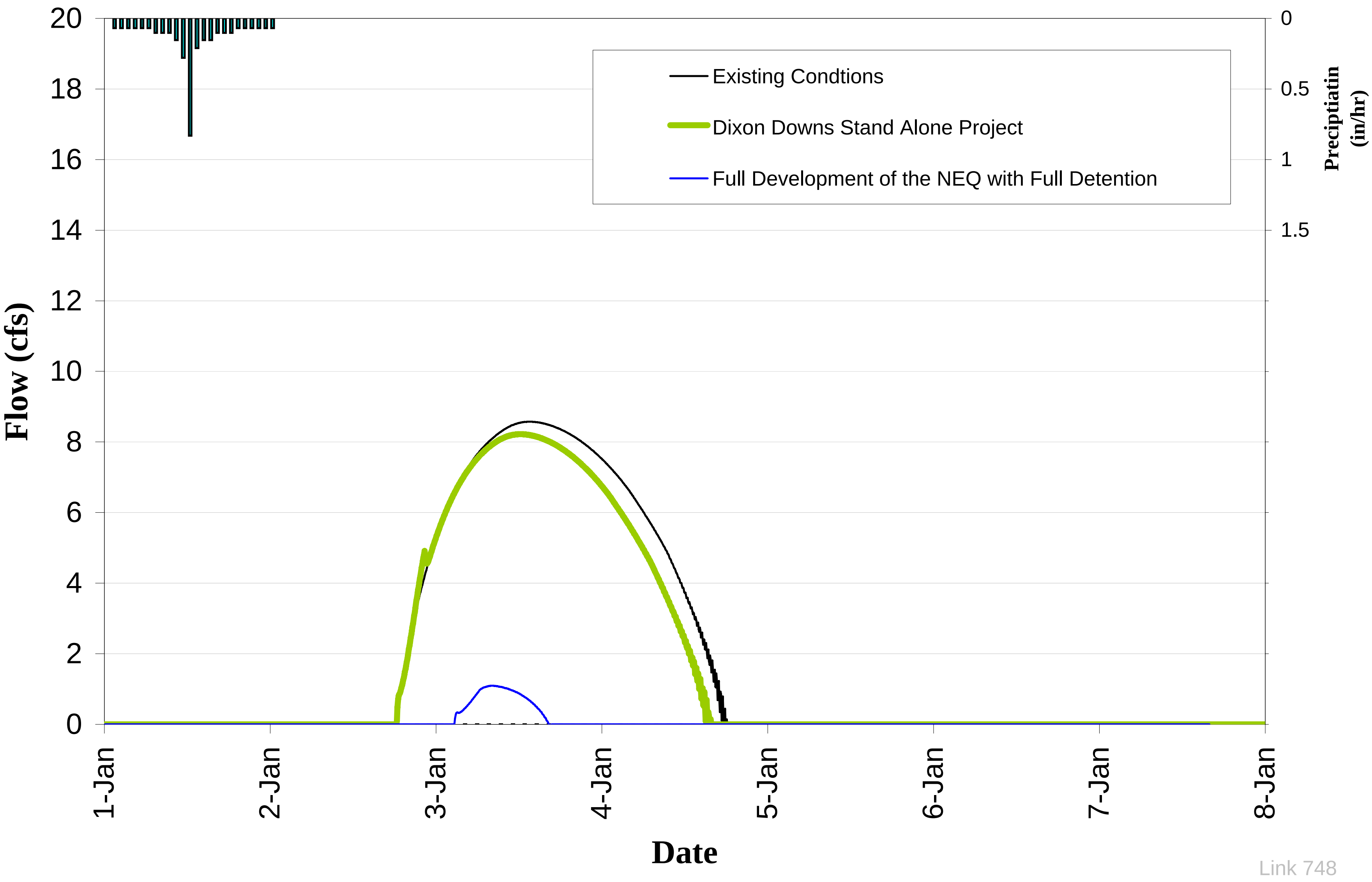


Figure B9. 10-Year Flow From Tremont 3 to the RD 2068 Main Canal

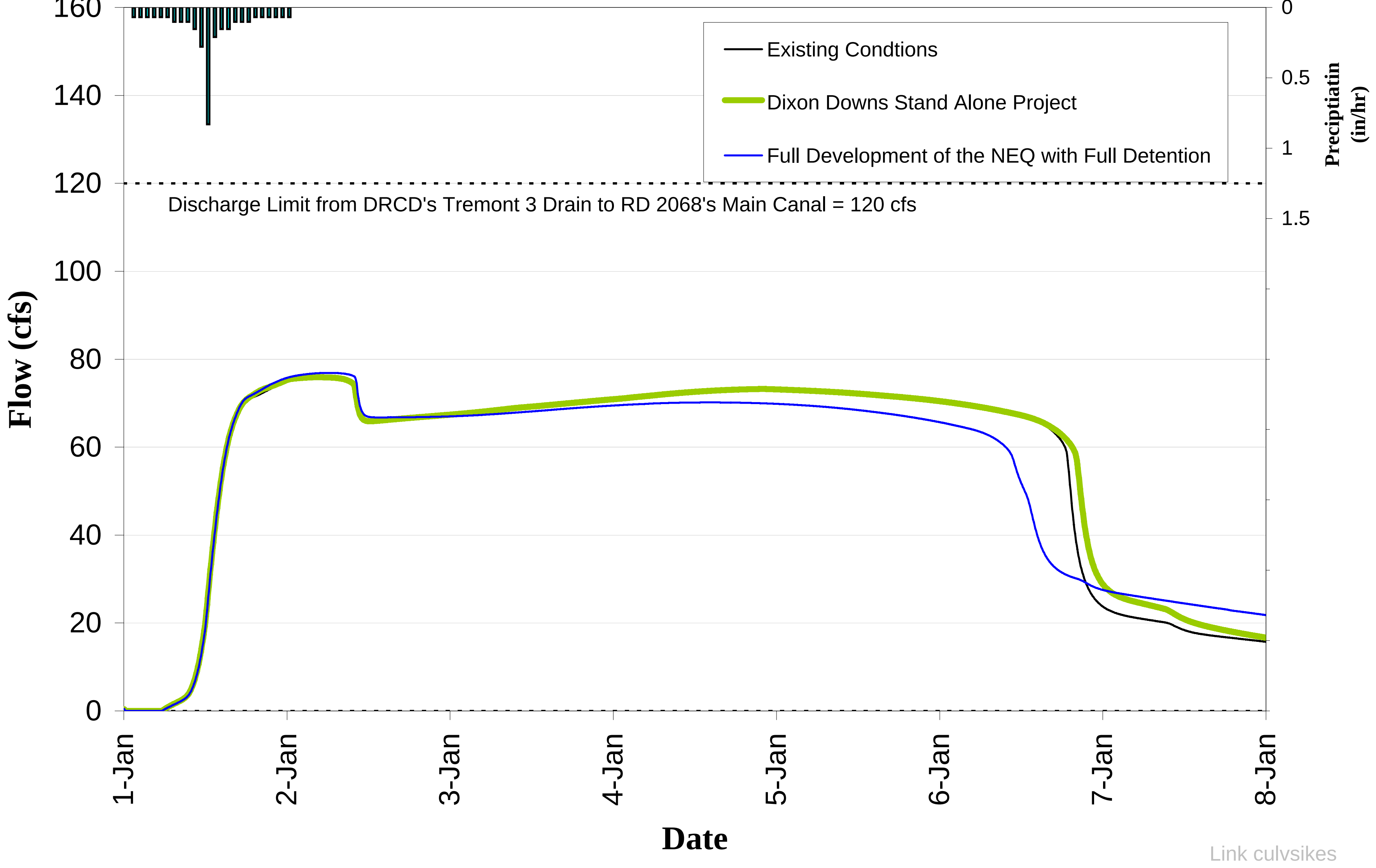
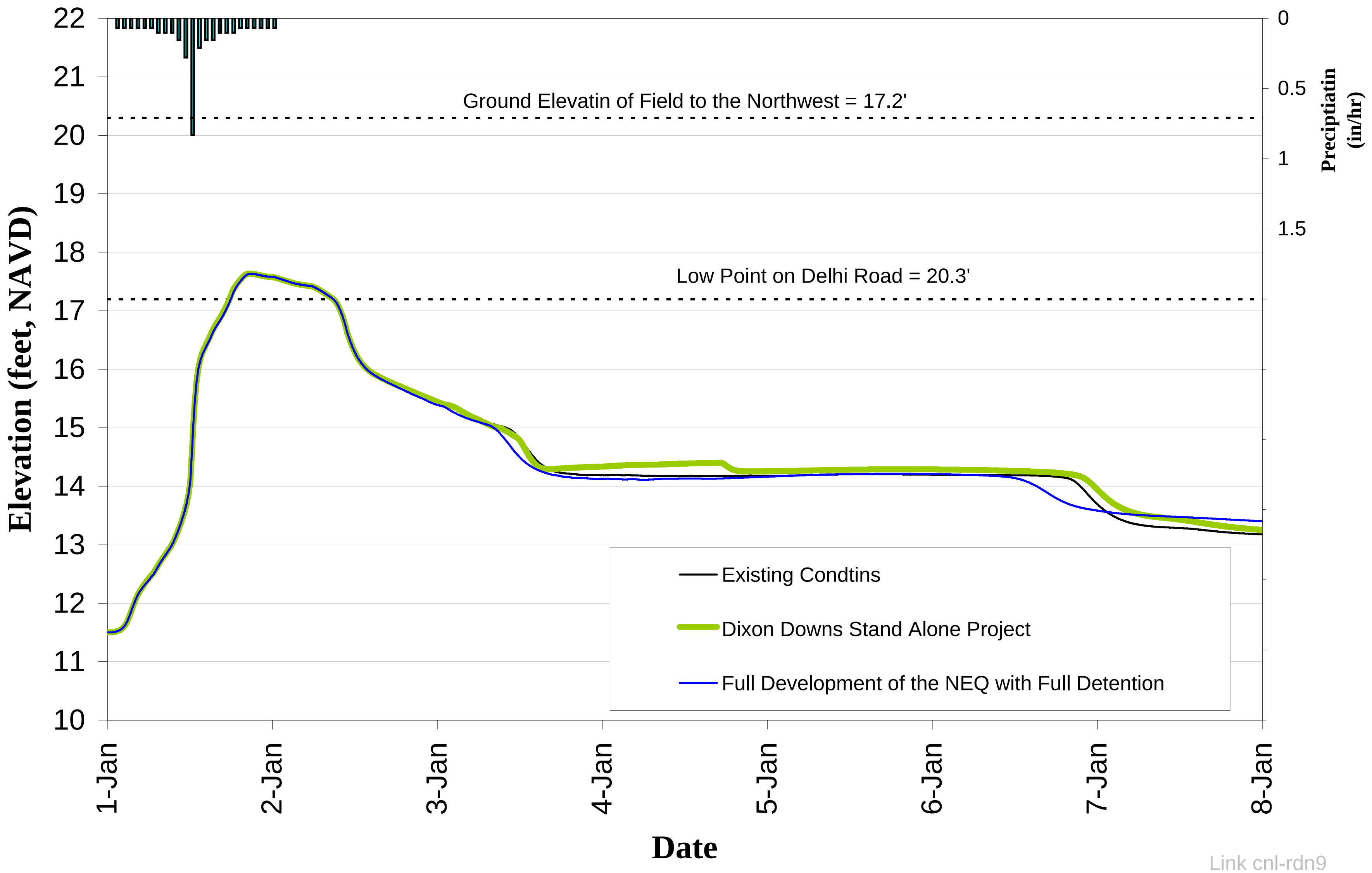
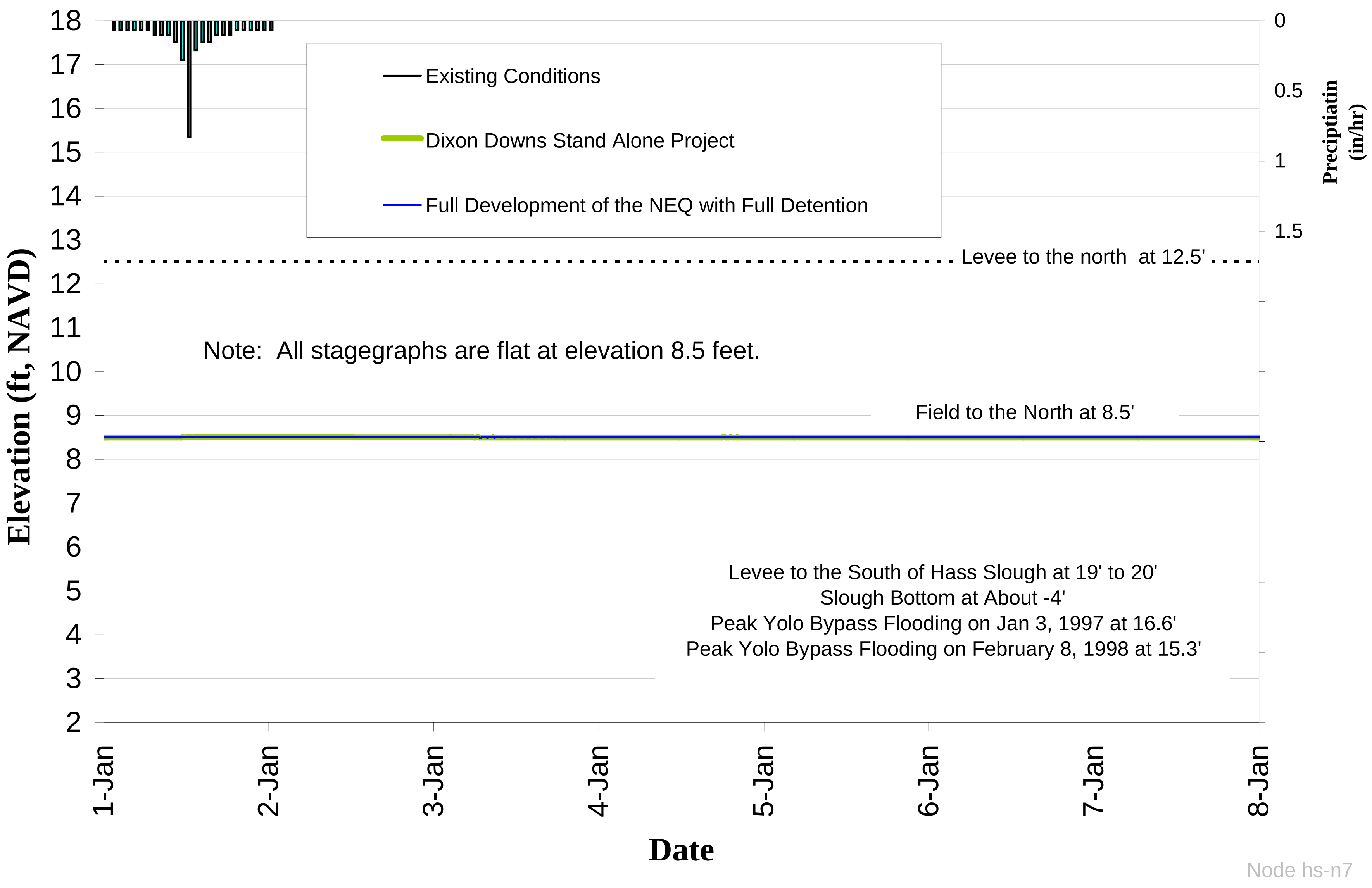


Figure B10. 10-Year Water Surface Elevation in the V-Drain at the Upstream Side of the Delhi Road Culverts



Link cnl-rdn9

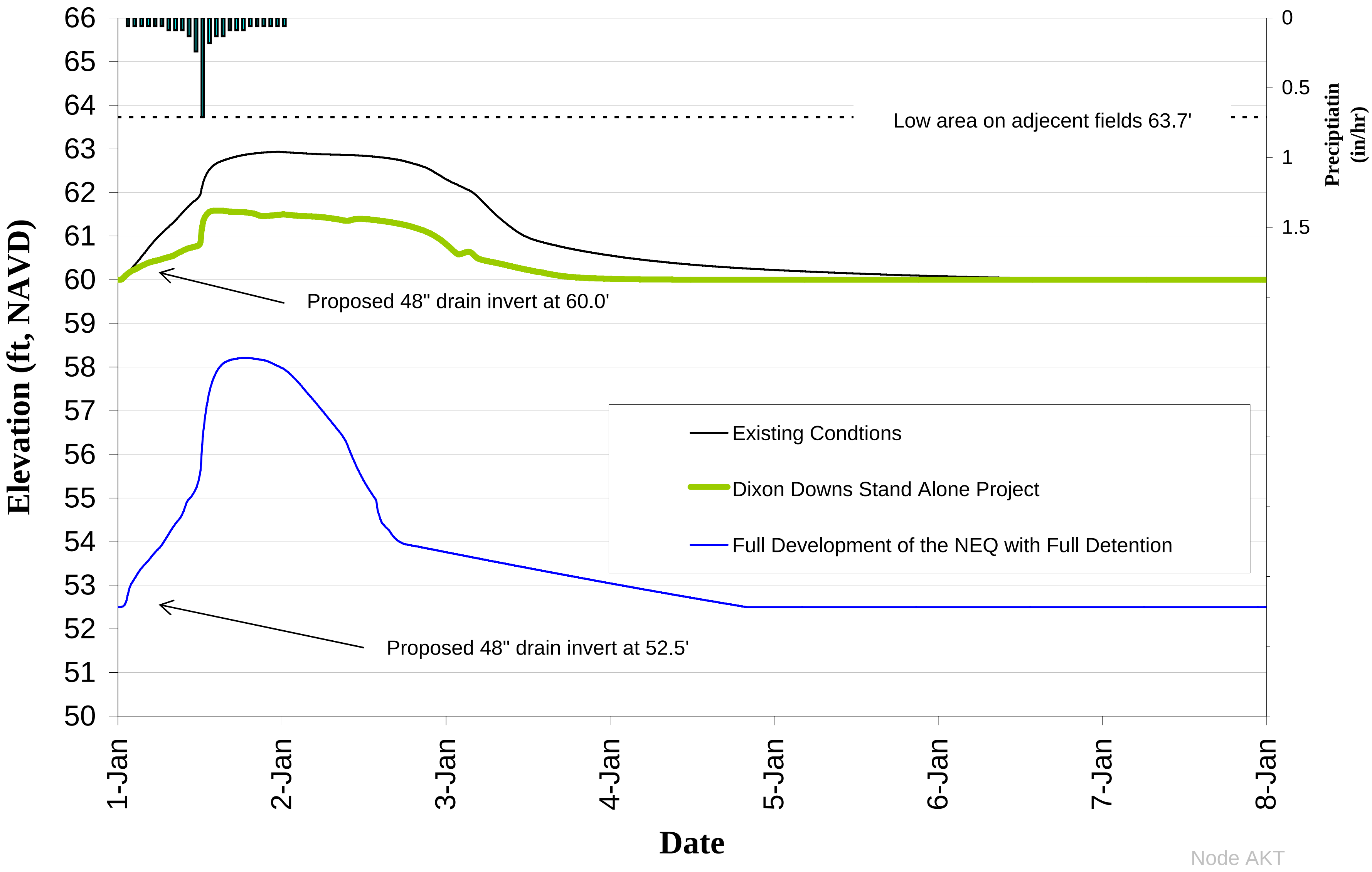
Figure B11. 10-Year Water Surface Elevation in Hass Slough



APPENDIX C

5-Year, 24-Hour Storm Model Results

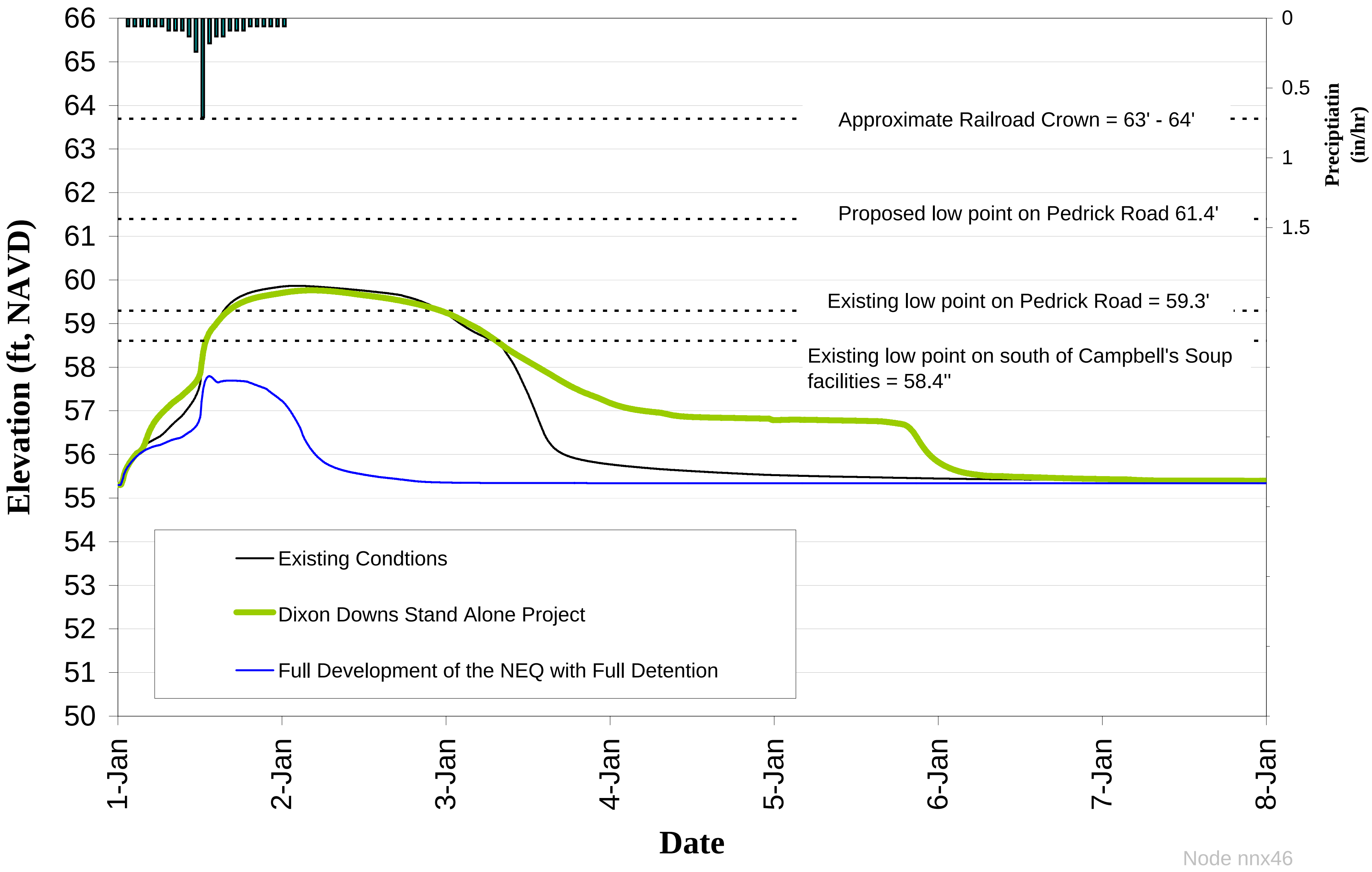
Figure C1. 5-Year Water Surface Elevation
at the West Side of the Dixon Downs Project Site



City of Dixon
Dixon Downs EIR

WYA—03/01/05
066\00-03-09

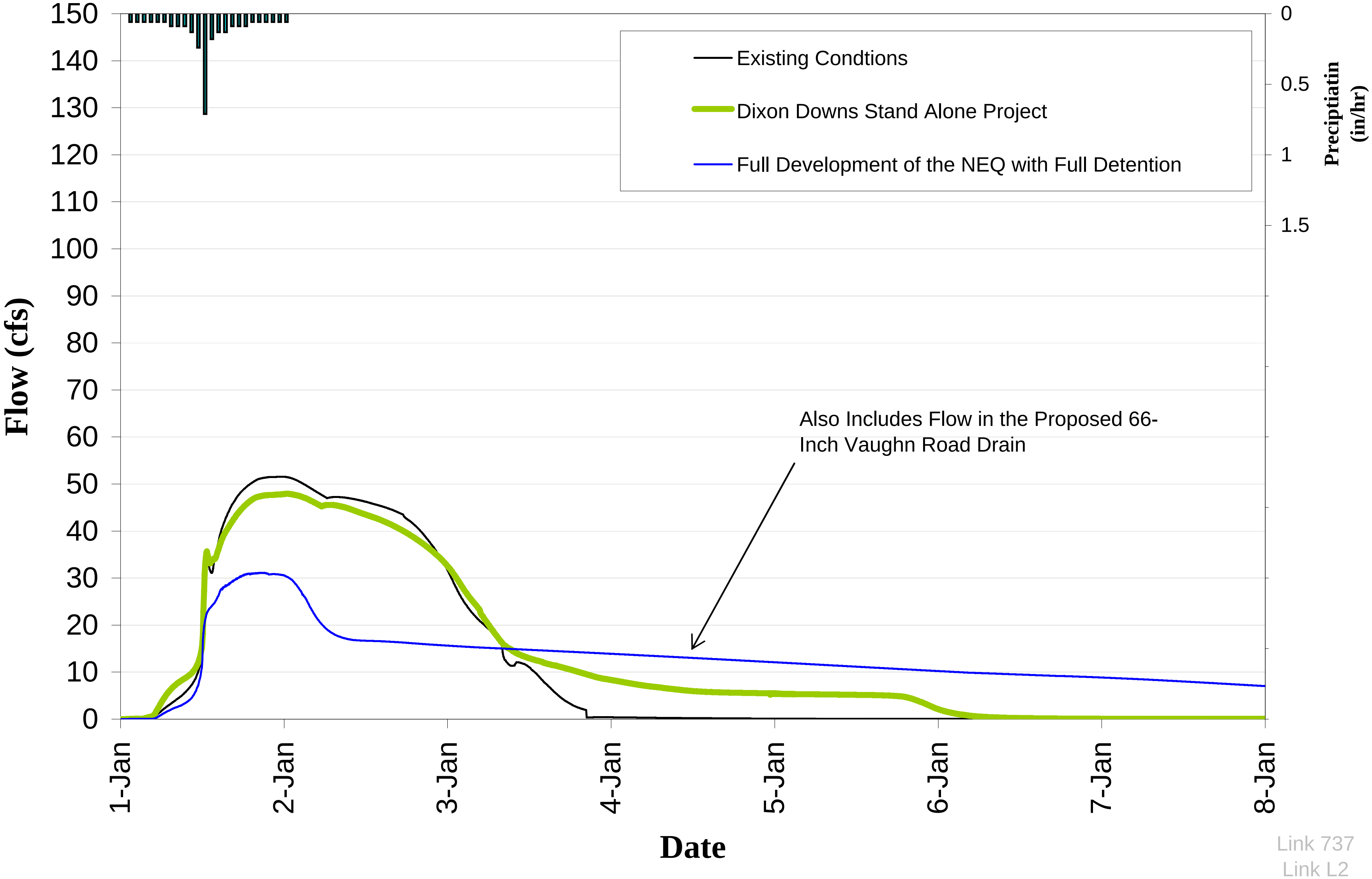
Figure C2. 5-Year Water Surface Elevation at the Railroad South of the Campbell's Soup Facility



City of Dixon
Dixon Downs EIR

WYA—03/01/05
066\00-03-09

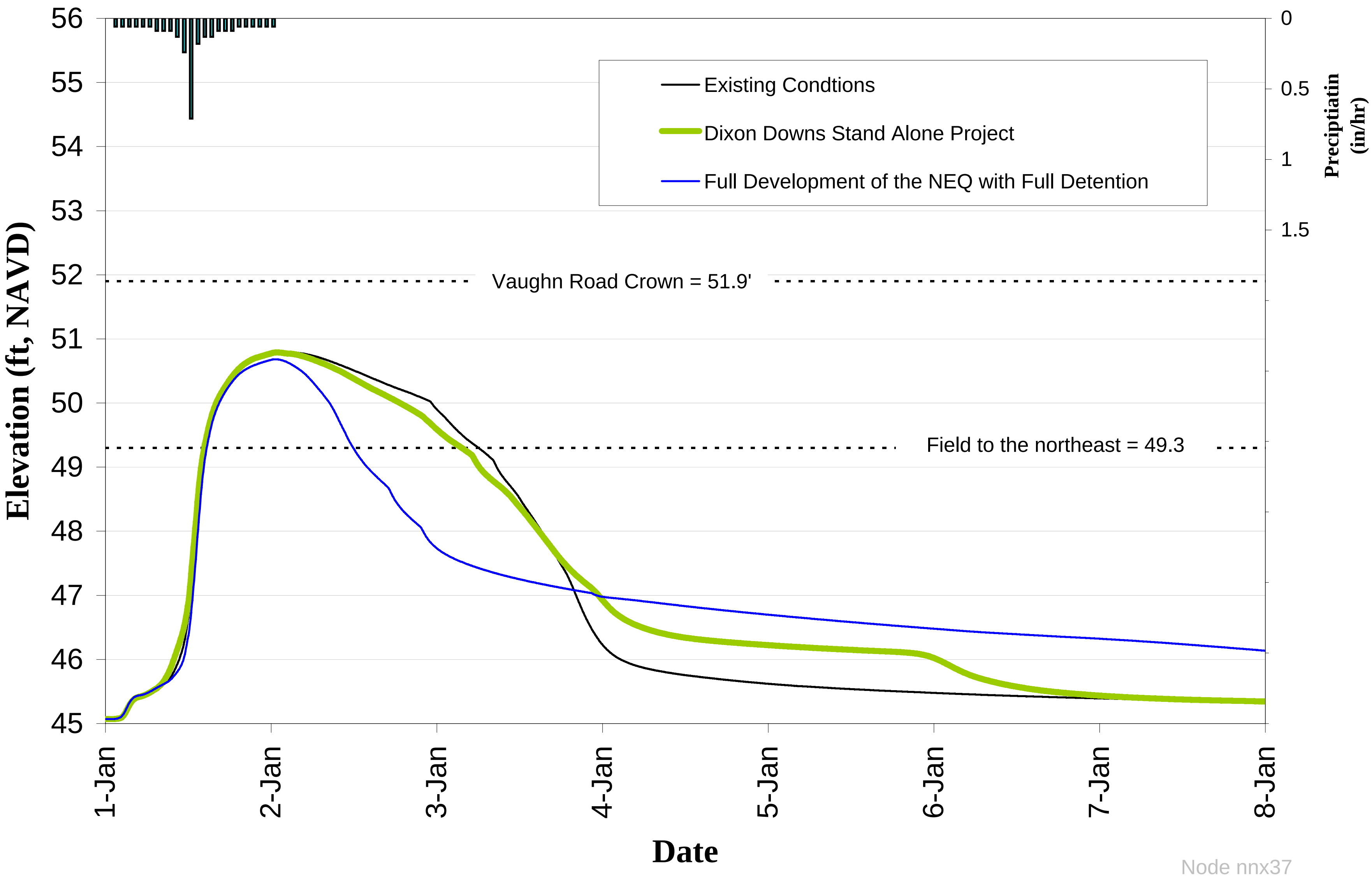
Figure C3. 5-Year Flow Under the Union Pacific Railroad (combined flow in the 30" CMP and 36" RCP)



WYA—03/01/05
066\00-03-09

City of Dixon
Dixon Downs EIR

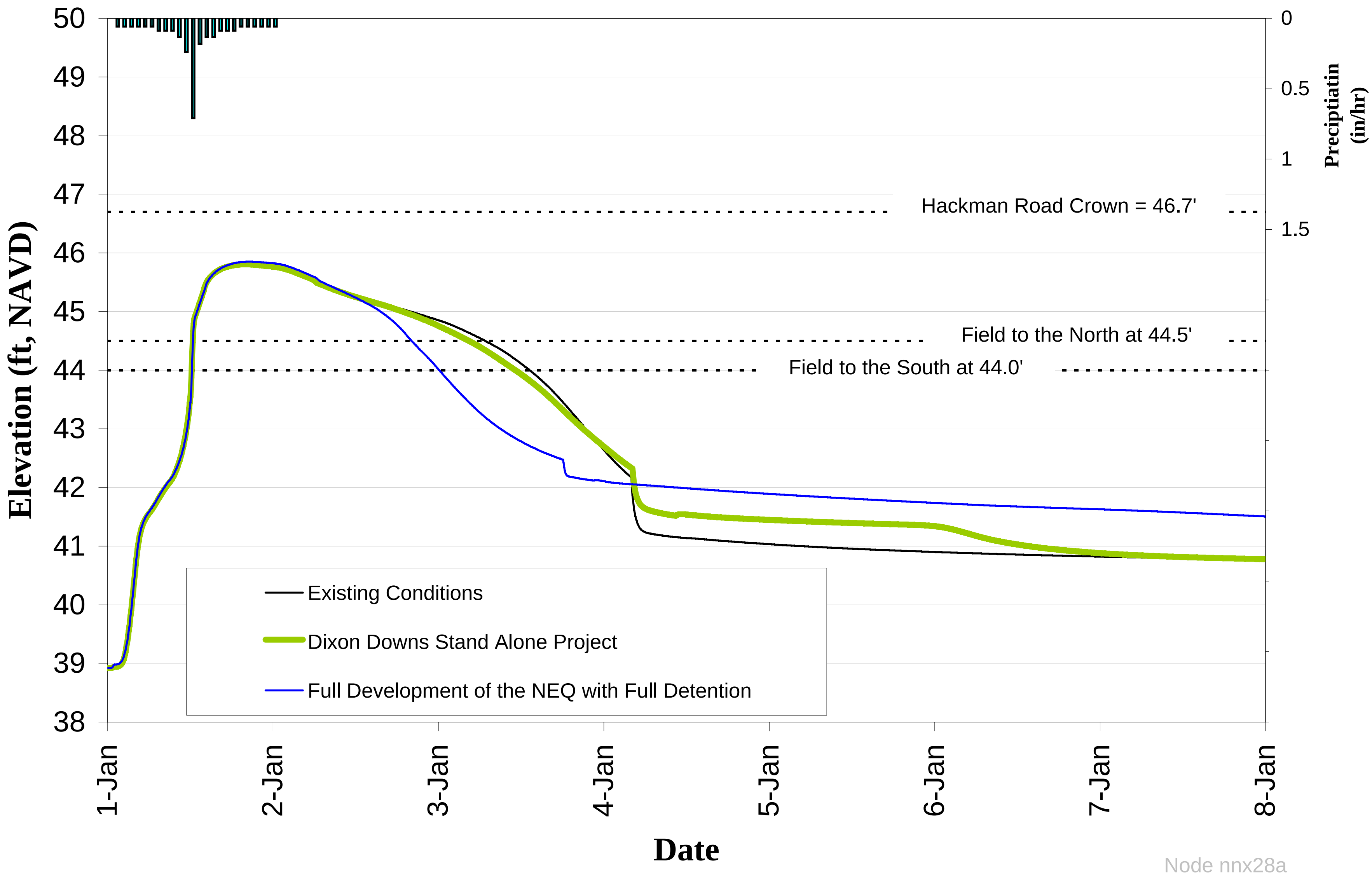
Figure C4. 5-Year Water Surface Elevation of the Tremont 3 Drain at Vaughn Road



WYA—03/01/05
066\00-03-09

City of Dixon
Dixon Downs EIR

Figure C5. 5-Year Water Surface Elevation of the Tremont 3 Drain at Hackman Road



WYA—03/01/05
066\00-03-09

City of Dixon
Dixon Downs EIR

Figure C6. 5-Year Water Surface Elevation of the Tremont 3 Drain at the Sikes Road Culverts

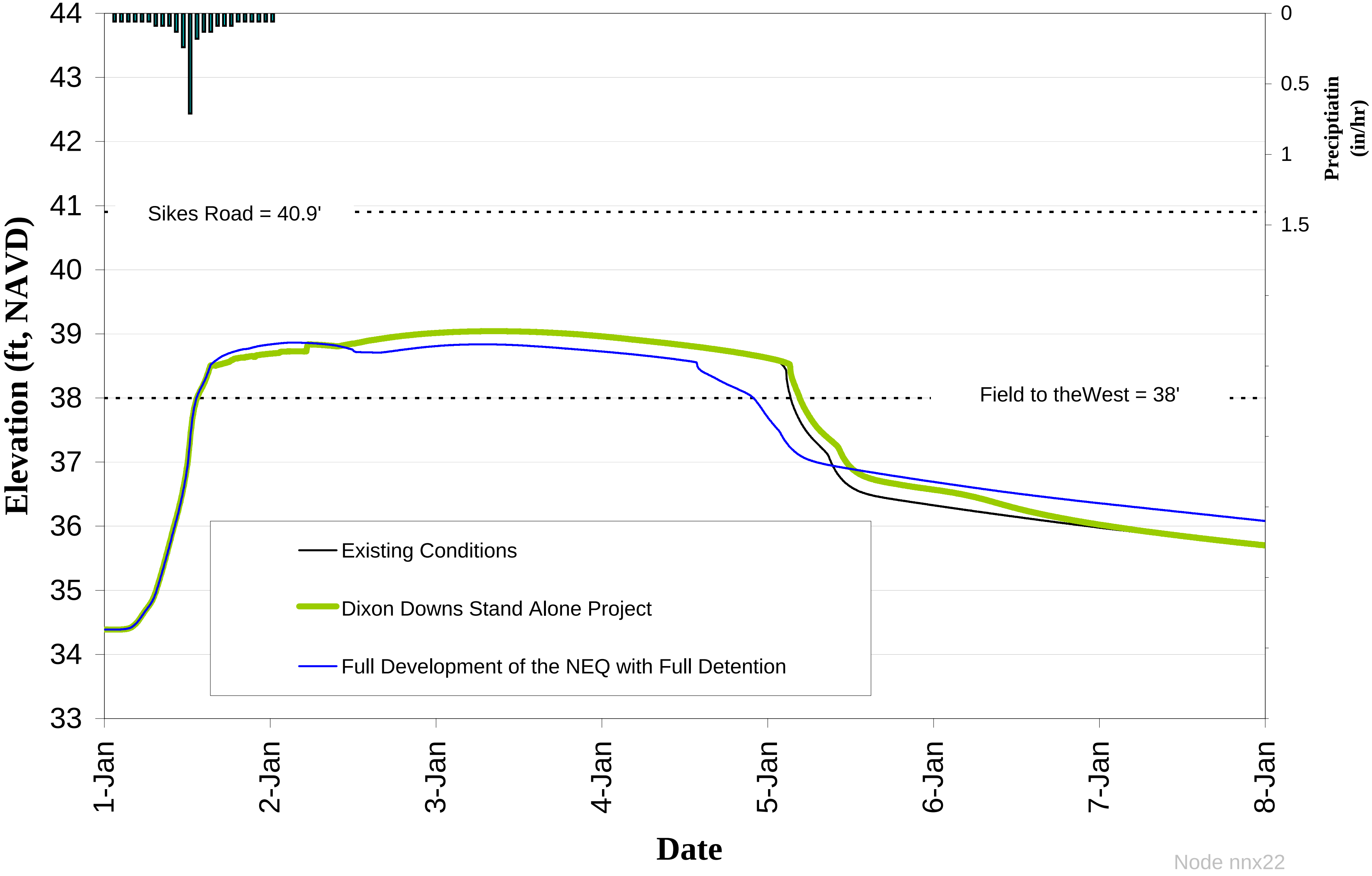
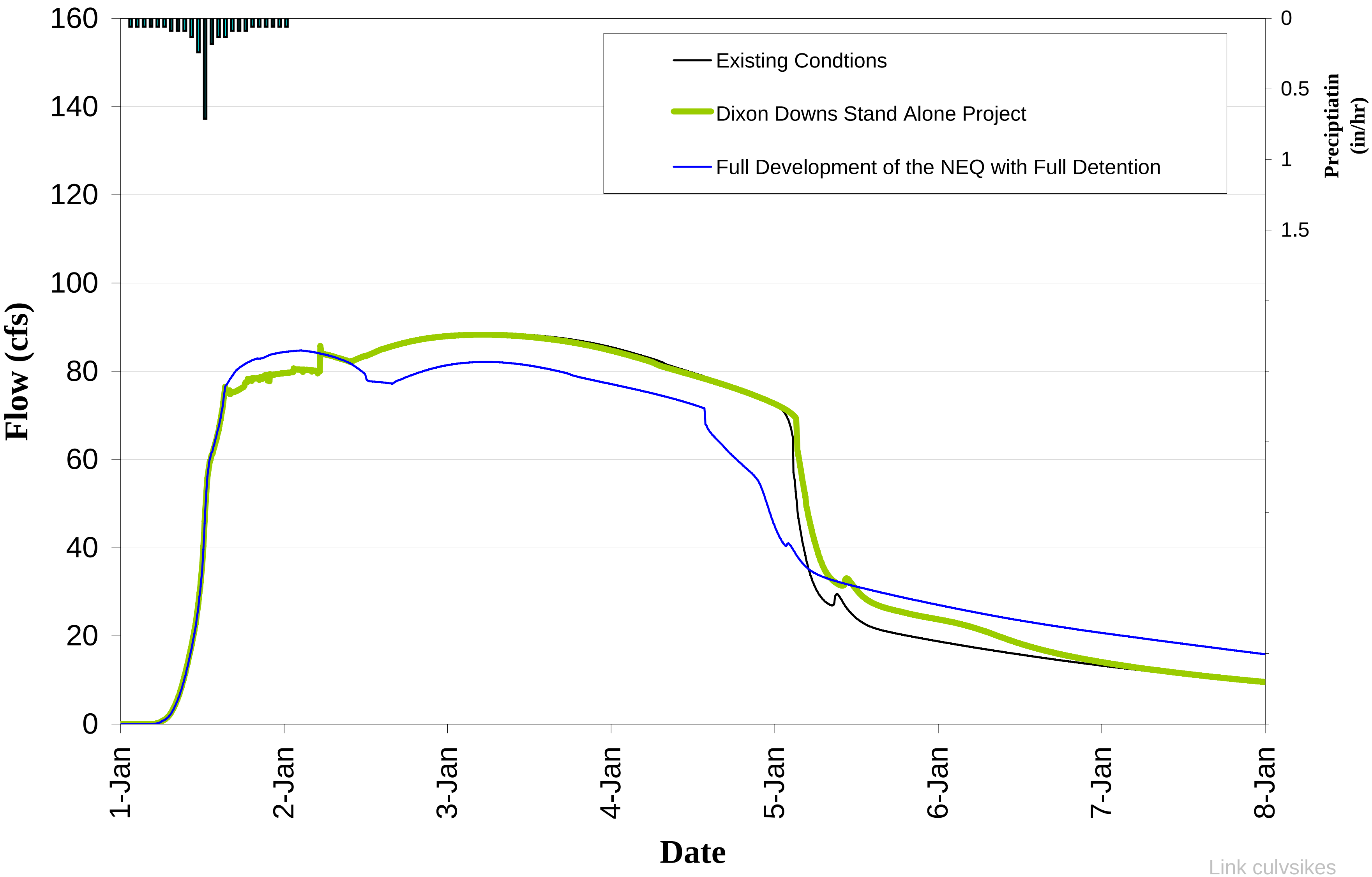


Figure C7. 5-Year Flow Through the Sikes Road Culverts



WYA—03/01/05
066\00-03-09

City of Dixon
Dixon Downs EIR

Figure C8. 5-Year Flow Continuing South from the Sikes Road Culverts

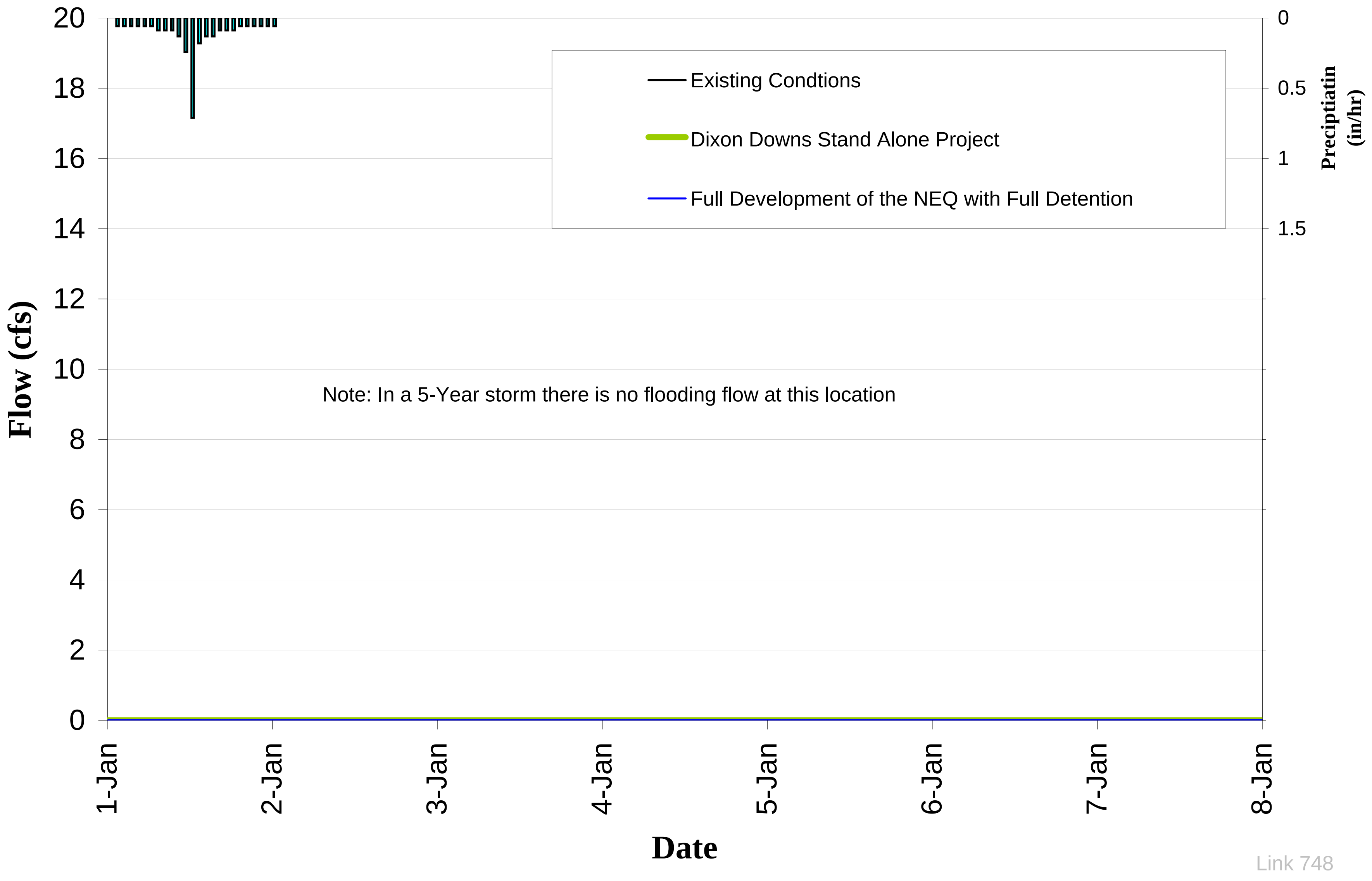


Figure C9. 5-Year Flow Through From Tremont 3 to the RD 2068 Main Canal

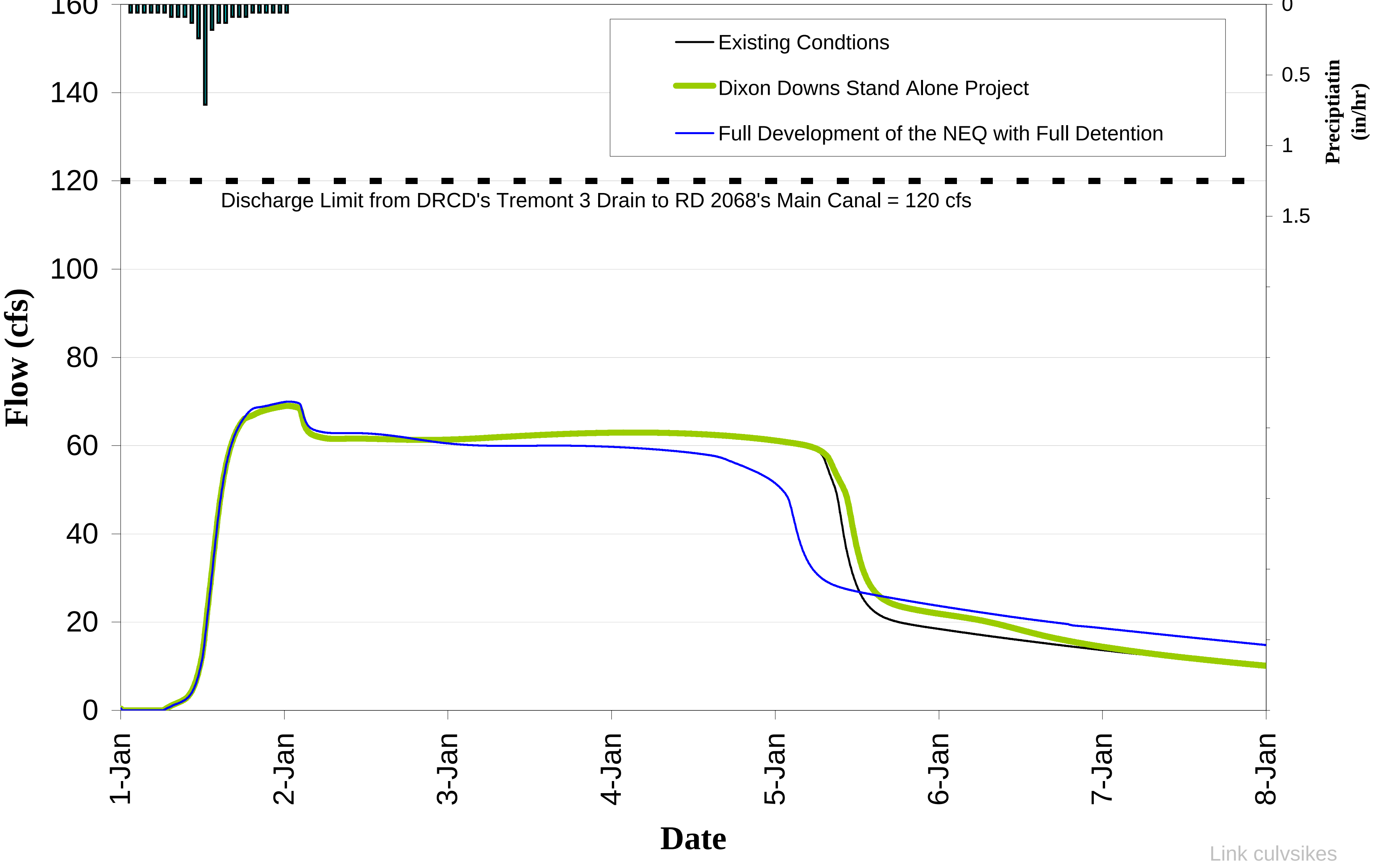
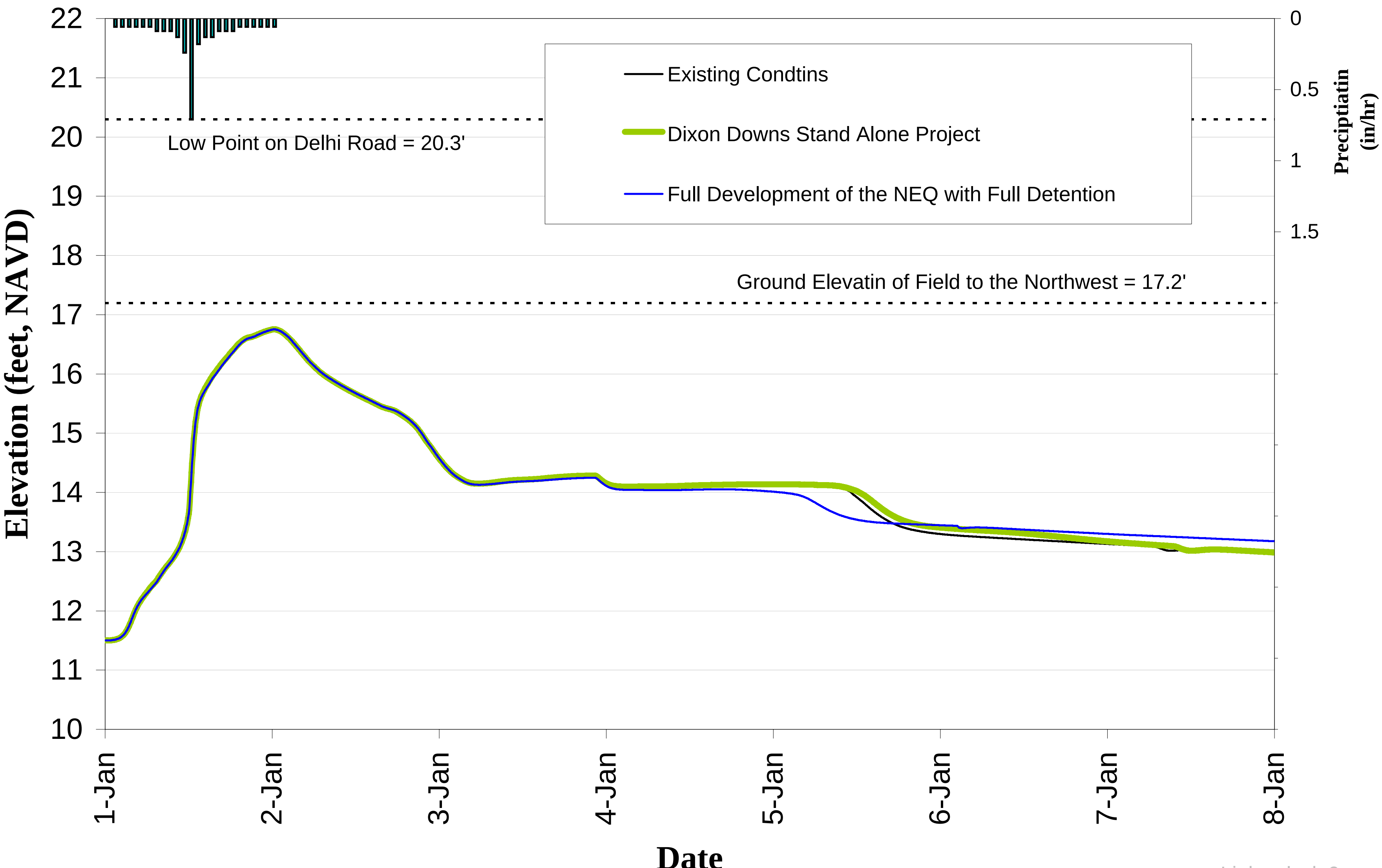


Figure C10. 5-Year Water Surface Elevation in the V-Drain at the Upstream Side of the Delhi Road Culverts



Link cnl-rdn9

WYA—03/01/05
066\00-03-09

City of Dixon
Dixon Downs EIR

Figure C11. 5-Year Water Surface Elevation in Hass Slough