South Yuba Drainage Master Plan Yuba County Public Works Department



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Overview

Background

This revision to the South Yuba Drainage Master Plan (SYDMP) has been prepared to update previous studies, to assess the impacts of future development within the East Linda Specific Plan Area, and to delineate alternative drainage improvements within the study area. That study area is roughly bounded by Reclamation District 784 and the Southern Pacific Railroad on the west, the Yuba River levee on the north and by Reeds Creek on the south and east. This Master Plan Report is intended to be sufficiently detailed to provide a firm basis for planning, right-of-way acquisitions, grant applications, engineering design, support of future land development, and for a nexus study to update the drainage impact fees in the East Linda Specific Plan Area.

The 1981 South Yuba Drainage Master Plan (Ref. 10) includes an excellent history of drainage in southwest Yuba County. The history was updated in the Revised SYDMP of 1992 (Ref. 11). A discussion of that history through 1992 will not be repeated here, except to say that southwest Yuba County has had a very involved history of drainage challenges and infrastructure construction in response to those challenges. Since the 1992 SYDMP, there has been a marked rise of man-made changes, both in this study area and to the west in the Olivehurst/RD784/Plumas Lake areas. Some of the more important drainage infrastructure changes now in place were ones suggested in the 1992 SYDMP.

The community of Olivehurst has been affected greatly by at least four projects, all completed in the past ten (10) years, which also bear on this study. Historically, Linda Drain (also known as Horseman's Ditch) and Olivehurst Drain (also known as Clark Slough) flowed from the east into Olivehurst. Additionally, backwater from the Bear River and the Western Pacific Interceptor Canal (WPIC) could rise and affect the south portion of Olivehurst. The Olivehurst Interceptor project, which is inside the study area of this SYDMP, now prevents the inflow from the east to Olivehurst via the Linda and Olivehurst Drains. The improved levee on the WPIC and the Bear River Setback Levee Project have improved the situation at the north end of the WPIC and south Olivehurst. While perhaps less significant for this study, the South Olivehurst Detention Pond and Pumping Station has had a huge impact on the flood potential for Olivehurst. That facility maintains a lowered peak water surface in South Olivehurst even during high levels in the WPIC. The South Olivehurst LOMR of 2007 (Ref. 16) revised the FEMA flood maps to reflect the Olivehurst Interceptor and South Olivehurst Detention Pond projects.

Historically, the lack of adequate downstream facilities from North Beale Road, South to Reeds Creek, caused water to backup into the community of Linda. The problems in Olivehurst had been a result of the water from the Linda and Olivehurst Drains carrying the runoff from the East side of State Route 70 through the area in a system that has been challenged to even handle local runoff. The Olivehurst Interceptor project, completed with the help of FEMA grants, directs water around the community of Olivehurst into the Reeds Creek/Western Pacific Interceptor system, greatly improving conditions in both Linda and Olivehurst. The

2006 East Linda LOMR (Ref. 7) analyzed the drainage as affected by the Olivehurst Interceptor Project and developed effective FIRM Panels considering the project.

A huge amount of residential development along the south part of Linda has occurred since the Olivehurst Interceptor Project. This has included the Edgewater, Orchard and Montrose subdivisions. As part of that development, the Edgewater Pond, the Orchard Pond and the Orchard Pump Station were constructed. The effects of those developments and facilities are considered in the hydrologic and hydraulic models developed as part of this study. Runoff from those developments currently drains via three separate routes: some to Linda Drain (which then drains to the Olivehurst Interceptor), some directly to the Olivehurst Interceptor, and some to Olivehurst Drain (which then drains to the Olivehurst Interceptor).

A number of other smaller subdivisions within this study area have sprung up since the 1992 SYDMP. Most notable of those are Dantoni Ranch Estates, College View Estates and Sierra Vista. Each of those have a pond associated with the development. The most significant pond is the one at the Sierra Vista subdivision. While all the developments are accounted for in the hydrologic/hydraulic models with this SYDMP, the pond at Sierra Vista warrants special discussion within the alternatives presented later in this report.

Much of the current study area is in agricultural use much like it was in the earlier SYDMP studies. As discussed later in this report, the runoff from those areas tends to be very low, particularly when the land is in use for growing rice. Since the future developments considered in this study do not affect the majority of the agricultural lands within the overall study area watershed, the majority of the agricultural lands generate no increase in runoff between models effective currently and models intended to simulate future scenarios. Some agricultural areas within the East Linda Specific Plan are slated for development and those, of course, are treated appropriately in the modeling done for this study.

Three tools are generally used to measure and visualize flooding effects: Peak water surface elevations at various locations; runoff flow rates at various locations; and maps of inundation areas. One or more of these have been used in most of the past drainage studies in southwest Yuba County. All three tools will be used and presented in this SYDMP.

Goals of this Study

The basic purpose of this report is to update the South Yuba Drainage Master Plan from 1992. More specifically are the following multiple goals:

- (1) To integrate past studies which utilized separate hydrologic/hydraulic models for East Linda, Upper Linda Drain, and Upper Olivehurst Drain into a single model for current conditions;
- (2) To develop future conditions hydrologic/hydraulic models representing the effects of potential development within the East Linda Specific Plan;
- (3) To identify alternative drainage projects which, when completed, will provide adequate storm drainage for existing as well as future development within the East Linda Specific Plan;

- (4) To identify alternative drainage projects which, when completed, will minimize the County maintenance and operating costs associated with pump stations, ditches and distributed small detention facilities;
- (5) To serve as the basis for nexus study for an update of impact fees;
- (6) To provide a guide for right-of-way acquisition; and
- (7) To provide the analysis to facilitate the design and construction of future drainage infrastructure.

Previous Studies

The study area considered has been investigated by numerous agencies over the past forty years. The most recent and pertinent to this study in dealing with current or near-current conditions are the 2011 PAL Area East Linda Extension LOMR (Ref. 1) and the 2006 East Linda Area - South Olivehurst Interceptor LOMR (Ref. 7). Those studies were done by MHM, Incorporated. Also completed by MHM were the South Yuba Drainage Master Plan studies of 1981 (Ref. 10) and 1992 (Ref. 11). Construction of the Olivehurst Interceptor was one of the main recommendations in the 1981 and 1992 SYDMP. A Basis of Design Study (Ref.13) for the Interceptor was prepared by MHM, Inc. in 1998. The County constructed the project in numerous phases with completion in 2002.

Still, the older studies continue to be of importance and help provide historical perspective. Most notable of those are the 1972 Army Corps of Engineers Bear River Feasibility Report (Ref. 26), the 1973 Lampman Study of Olivehurst (Ref. 27), the 1974 East Linda Drainage Study (Ref. 28), the 1980 Army Corps of Engineers Hydrology Review of Linda and Olivehurst Drains (Ref. 12), and of course, the FEMA Flood Insurance Study of 1981 (Ref. 9).

The references cited at the end of this report contain a more complete list of previous studies in the southwest portion of Yuba County.

Descriptive Introduction – The Drainage Study Area

The drainage region in this study corresponds to the area covered in the 2006 "East Linda" LOMR (Case 06-09B119P). All drainage covered here eventually conveys by gravity to Reeds Creek and from there by gravity to the Western Pacific Interceptor Canal (WPIC) which conveys to the Bear River at the southern boundary of Yuba County. This Master Plan drainage study area covers thirteen reaches total. The main drainage channels analyzed are Linda Drain (also known historically as Horseman's Ditch), Olivehurst Drain (also known historically as Clark Slough), and the Olivehurst Interceptor.

An overall map and aerial of the study area is shown in Figure 1. The region covered is mixed use with the majority of the eastern and southern areas currently in agricultural uses. The western portion of the study area is mostly unchanged since the 2006 LOMR, including the residential areas of the community of Linda. However, the East Linda Specific Plan Area designated in Figure 1 is slated for considerable new development in the future. Figure 1 shows the major existing facilities and the main drainage basins and

channels considered in this study. The north and central portion of Figure 1 represents the Linda Drain watershed. The east-central portion of Figure 1 represents the Olivehurst Drain watershed. Both the Linda Drain and the Olivehurst Drain now empty into the Olivehurst Interceptor system and drain to Reeds Creek. The total hydrologic area represented is 7430 acres. The area contains one pump station and four designated detention storage basins.





Not included in the watershed analysis area of this study is the region south of Reeds Creek and East Olivehurst. Those areas drain to the WPIC and, while the WPIC has been studied by MBK Engineers (see Ref. 4), no hydraulic studies have been completed between the south end of the Olivehurst Interceptor and the north end of the WPIC. Any flood mapping in those areas referenced in this report will necessarily utilize the existing FIRM Panels. The analyzed flood map area covered in this study corresponds roughly to the region contained by the Yuba River South Levee on the north, RD784 and the Southern Pacific Railroad on the west, and the Reeds Creek watershed on the east and south. The entire area in this study drains by gravity to Reeds Creek. While there is one internal pump station (at Orchard Pond) within this study area, there are no pump stations delivering runoff across a levee protecting the interior area of this study.

An additional area that was studied in the previous South Yuba Drainage Mater Plans is the community of Olivehurst. When the previous master plans were written, runoff from Linda Drain and Olivehurst Drain passed under the Southern Pacific Railroad and State Route 70/65 to enter Olivehurst, causing serious flooding in much of Olivehurst. In addition, backwater from the Plumas Lake area inundated the south portion of Olivehurst. These problems have been alleviated by several major projects in the area. Those include the Hazard Mitigation Grant Program (HMGP) FEMA-1044-DR-CA and FEMA-1046-DR-CA. The Olivehurst Interceptor Project now prevents flows from the east side of the Southern Pacific Railroad from reaching Olivehurst. The South Olivehurst Detention Basin, along with its pumps and ring levee prevent inundation from the south. These projects have been analyzed in a number of studies such as the 1998 Basis of Design Study, the 2006 East Linda Area - South Olivehurst Interceptor LOMR (Case #06-09-B119P), the 2007 LOMR for South Olivehurst area (Case #07-09-1090P), and the Interior Drainage Study RD784/TRLIA Levee and Flood Control System, FEMA Accreditation Project (County-Wide Study #08-09-0895S). The studies indicate that the 100-year flood is now contained in the drainage channels and detention facilities on the Community of Olivehurst. The current effective flood maps for the area reflect this also. Thus, there is no need for the Community of Olivehurst to be included in this SYDMP for two reasons: (1) the traditional SYDMP drainage routes represented by Linda Drain and Olivehurst Drain no longer pass through Olivehurst, and (2) past flooding problems in Olivehurst have been addressed in numerous other studies and mitigated by the recent HMGP projects.

The hydraulic analysis presented here covers thirteen reaches of various ditches, beginning in the north at Linda Drain near the intersection of Dantoni and Hammonton-Smartsville Roads (seen in Figure 1 at the far northeast), and ending in the south at the confluence of Olivehurst Interceptor (Perini Ditch) with Reeds Creek. Stationing begins at the confluence of the Olivehurst Interceptor with Reeds Creek downstream from Bernice Avenue. This study ends upstream on upper Linda Drain near Brophy Road at station 455+27. This study ends on Olivehurst Drain upstream near Wood Ln. at station 206+02. Near Erle Road, the Olivehurst Drain now disappears for almost a mile as it is piped into and out of a large detention pond referred to in this study as Orchard Pond.

In this study, the hydraulic model of Linda Drain has an upstream limit near Brophy Road. That location is shown in Photograph 1. The ditch at that point collects runoff from over a thousand acres, most of it agricultural. From there, the Linda Drain flows generally west along Hammonton-Smartsville Road continuing to collect further runoff from agricultural areas from both sides of the road.



Photograph 1 – Linda Drain at Brophy Road. Upstream limit of the hydraulic study for this report. Looking west.



Photograph 2 – Sierra Vista subdivision detention pond, looking eastward, toward the subdivision.

About two (2) miles west of Brophy Road is the Sierra Vista subdivision. It includes a runoff detention facility at the corner of Hammonton-Smartsville Road and Griffith Avenue shown in Photograph 2. While

the pond is connected to Linda Drain, it serves just the subdivision since the outfall has a flap gate and will not allow water to back into the pond. One of the goals of this study is to devise facilities which will eliminate the need for local detention facilities.

Just west of Alberta Avenue, Linda Drain heads somewhat south into a large grassy field north of Yuba College. The area has generally been referred to as the "Butler Property" and will be discussed frequently in this study because it has been problematic in regard to flooding. The property is shown in Photograph 3.



Photograph 3 – Linda Drain west of Alberta Avenue in the "Butler Property".

Linda Drain continues south passing by Yuba College. Historically, including at the time of the 1992 SYDMP, Linda Drain turned to the west at the south edge of the college, but it now joins the Olivehurst Interceptor and continues south through the Edgewater development. Photograph 4 shows a typical section of the Interceptor in the Edgewater Development, looking south. The photo on the cover of this report is of the same section of the Olivehurst Interceptor, but looking to the north. Much of East Linda, Yuba College, and the Edgewater Development drain to the Olivehurst Interceptor. The Olivehurst Interceptor is the main flood control facility of the study area. It was designed to convey runoff from much of the study area to the south to Reeds Creek.

A detention facility is located in the west end of the Edgewater subdivision. The pond, known as Edgewater Pond, is shown in Photograph 5. It serves the western part of Edgewater subdivision and connects to the historic Linda Drain. The old Linda Drain ditch in this area is now designated Edgewater Ditch. It is actually piped under the subdivision and also receives runoff from a significant region of East Linda north of the Edgewater subdivision. Edgewater Pond, like Sierra Vista Pond, has no pumps. The Edgewater Pond is included in all the models in this study.



Photograph 4 – Olivehurst Interceptor as it passes through the Edgewater Development, looking south toward Erle Road.



Photograph 5 – Edgewater Detention Pond. Looking southwest from the Edgewater subdivision.

South of Edgewater subdivision both the Olivehurst Interceptor and the Edgewater Ditch pass under Erle Road and continue south. Both receive some additional runoff from agricultural areas south of Erle Road.

About one-half (1/2) mile south of Erle Road, the Olivehurst Interceptor turns right and heads west. About one-half (1/2) mile later, Edgewater Ditch (historic Linda Drain/Horseman's Ditch) enters the Interceptor from the north. Photograph 6 is a view at the confluence of Edgewater Ditch with the Olivehurst Interceptor.



Photograph 6 – Olivehurst Interceptor at the confluence with Edgewater Ditch (old Linda Drain), looking west with Edgewater Ditch coming in from the right.



Photograph 7 – Olivehurst Drain (at the left) enters the Olivehurst Interceptor.

From that point, the Olivehurst Interceptor turns and heads southeast parallel to the Southern Pacific Railroad. About one-half (1/2) mile southeast of Photograph 6, the Olivehurst Drain enters from the east as shown in Photograph 7. That is also the location of the Olivehurst Interceptor Pond, a 40 acre-foot detention basin built as part of the FEMA/County Olivehurst Interceptor project. This was all modeled in the 2006 LOMR and continued in this study. One of the changes to be considered is an expansion of the Olivehurst Interceptor Pond.

From the Olivehurst Interceptor Pond, the Olivehurst Interceptor continues to flow to the southeast and around the NorCal Lumber site. A large area of rice fields to the east drains to the interceptor in this area. Photograph 8 is a view from Bernice Road looking north with the lumber company on the left and the rice farms on the right. Just south of the lumber company, the interceptor passes under Bernice Road and then follows the railroad borrow between Bernice Road and the Southern Pacific Railroad. This part of the Olivehurst Interceptor was historically known as the Perini Ditch. The conveyance continues to the southeast another three-quarters (3/4) of a mile paralleling the railroad. Just below McGowan Parkway, the Olivehurst Interceptor discharges into Reeds Creek. This is the south (downstream) end of the hydraulic study from the 2006 East Linda LOMR and the south end of this current Drainage Study area. This point is shown in Photograph 9, looking south from McGowan Parkway. In the photo, Reeds Creek is in the heavy blackberry area past the concrete pipe stacked on the bank. The metal culverts in the foreground are in the Olivehurst Interceptor channel at the McGowan crossing. The backwater at this location used in the 2006 LOMR was 60 feet elevation (NGVD 1929) based on the 1981 FIS for Yuba County. That value is being used conservatively for the purpose of this Drainage Study. Further discussion of this tailwater value is included later in this report.



Photograph 8 – Olivehurst Interceptor looking north from Bernice Road.



Photograph 9 – South end of the hydraulic analysis of this study. The Olivehurst Interceptor joins Reeds Creek here.

The Linda Drain watershed described in the previous pages has had almost no changes since the 2006 LOMR, but significant development has occurred since the 1992 SYDMP. The two most important developments on Linda Drain have been the Sierra Vista Subdivision in the north and the Edgewater Subdivision in the west. In addition, miscellaneous isolated small private improvements such as residences and outbuildings have been constructed scattered throughout the basin since 1992. Many agricultural areas have rotated from one crop to another, sometimes in conjunction with land leveling for irrigation. Of course many of the recommendations from the 1992 SYDMP have also been realized and have improved the situation in the Linda Drain. The Olivehurst Interceptor now picks up the historic Linda Drain at the southwest corner of Yuba College and continues some four miles to the south to Reeds Creek.

Olivehurst Drain, Photograph 10, is a view of the upstream limit of the hydraulic model used in this study. The photograph is looking downstream to the west from Wood Lane. Drainage from this point travels to the west and passes under North Beale Road, then heads to the south. Photograph 11 is from several thousand feet south and is typical of the drain in the rural region.



Photograph 10 – Upper Olivehurst Drain at Wood Ln. Upstream limit of the hydraulic study for this Report. View looking west.



Photograph 11 – Upper Olivehurst Drain at Lago Road looking south.

Flow from this upper reach of Olivehurst Drain is collected in the structure shown in Photograph 12 just to the east of Griffith Avenue and the Montrose Subdivision (located at the corner of Griffith and Erle Roads). The structure pipes the runoff to the Orchard Pond, which is shown in Photograph 13.



Photograph 12 – Collection structure for the upper portion of Olivehurst Drain. Runoff is piped from this point to Orchard Pond. View looking south from Griffith Avenue.



Photograph 13 – Orchard Pond in the south part of the Orchard and Montrose Subdivisions. Olivehurst Drain now passes through this pond.

The Orchard Pond and pump station were built in the spring of 2006 as part of the Orchard and Montrose Subdivisions in East Linda. The pump station is shown in Photograph 14. Under high runoff conditions, the pumps at Orchard Pond deliver flow to the main part of Olivehurst Drain approximately one-half (1/2) mile

to the west of the pond. This lower section of Olivehurst Drain has also been known historically as Clark Slough. Photograph 15 is taken at the outfall structure of the pumps from Orchard Pond looking south into the main reach of Olivehurst Drain.



Photograph 14 – Orchard Pump Station – East Linda Area



Photograph 15 – Outfall from the pump station at Orchard Pond, Near Erle Road looking south down the Olivehurst Drain.

From Erle Road, the Olivehurst Drain flows to the south through an area of rice fields. A typical section of Olivehurst Drain as it passes through the agricultural fields is shown in Photograph 16. The ditch continues to the south and then to the west, eventually meeting the Olivehurst Interceptor adjacent to the Olivehurst Interceptor Pond. The Olivehurst Drain enters the Olivehurst Interceptor from the two large culverts at the left of previous Photograph 7. The Olivehurst Interceptor is in the foreground and the Olivehurst Interceptor Pond is in the background, looking to the southeast.



Photograph 16 – Typical section of Olivehurst Drain as it passes through rice farms south of Erle Road. View looking south.

The Olivehurst Drain watershed area has essentially had no changes since the 2006 East Linda LOMR, but the significant changes associated with the Montrose and Orchard subdivisions have occurred since the 1992 SYDMP. As can be noted in Figure 1, the area is mostly in agricultural use, but there are some small pockets of residential areas scattered about the watershed, plus the large Montrose/Orchard development.