

8 INFRASTRUCTURE

The following section provides a summary of the major infrastructure necessary to implement the Specific Plan.

A. Water

As Figure 8-1 illustrates, new water service in the Plan Area will be provided by Cal Water through a series of new wells and new water mains. Well locations are intended for illustrative purposes only. Final well location will be determined by Cal Water at the time of development. According to Cal Water, it is likely that up to seven new wells will be required to provide service to development called for under the Specific Plan.

In addition, new water mains will need to be constructed to bring water service to future uses in the Plan Area. Figure 8-1 also shows a conceptual layout of the new water mains that will be necessary in the Plan Area. Generally, the distribution of land uses within the Plan Area will play a role in the location and size of infrastructure required to provide water service in the area. Larger water mains may be required in areas with more intensive land use designations. For example, commercial land uses require higher fire flows and therefore require larger water mains. On the other hand, low-density residential land uses with lower fire flow requirements may be served by smaller mains. Multiple cross connections will offer potential for smaller pipe sizes as well.

B. Sanitary Sewer

The development of the Plan Area will need new sewer mains, a temporary lift station, and increased capacity of the Northwest Chico Lift Station.

Build-out of the Plan Area will require an 18-inch sewer trunk to be constructed from the recently constructed 18-inch stub at the northern boundary of the Willoughby Glen Subdivision, northward, with a slight jog, to Nord

Highway. From this point in Nord Highway, the trunk will continue eastward, eventually crossing under Highway 99 to provide service to the eastern portion of the Plan Area. This conceptual alignment is shown in Figure 8-2. Some lots along Powerline Drive and Nord Highway may need smaller parallel collection systems as well.

Given elevations in the Plan Area, it may not be possible to service all of the Plan Area with the 18-inch gravity main. A temporary lift station and a main will most likely need to be constructed in order to serve the Epick Homes and Creekside Landing areas, as shown in Figure 8-3.

The capacity of the Northwest Chico Lift Station will need to be increased to Phase 4 in order to accommodate sewage flows at buildout of the Plan Area. Alternatively, City Public Works staff have stated that the future Northwest Trunk can accommodate complete build-out of the Plan Area.

Extension of the sewer mains, future upgrades to the existing Northwest Chico lift station and implementation of the Northwest Trunk may require property owners moving forward with development in the Plan Area in the short-term to assume the costs of implementation and be reimbursed by future developers.

C. Storm Drainage

Storm drainage in the Plan Area will be accommodated by a series of drainage facilities that serve multiple properties within the Plan Area. These facilities will typically be dual-use, serving as a neighborhood park, wetland area or attractively landscaped visual amenity.

As discussed in Chapter Four, there are two alternative drainage systems proposed as part of the Specific Plan for the study area west of Highway 99. One alternative will eventually be chosen, but both are proposed in this Specific Plan as options. The drainage for the Plan Area east of Highway 99 functions

independently of the drainage west of Highway 99. Therefore the proposed drainage east of Highway 99 is the same in both alternatives. The sections below provide more detail about the storm drain layout including pipe locations and overland flow paths.

1. Preferred Drainage Scenario (Alternative 1)

The preferred drainage scenario (Alternative 1) is shown in Figure 8-4. It has two detention facilities, V and M, west of Highway 99.

Facility V is an off-site parcel, adjacent to the southwest corner of the Plan Area and Mud Creek. Facility V will hold a minimum capacity of 40.4 acre-feet of water, and will also function as a wetland area. Implementing the preferred alternative will require acquisition of the adjacent parcel.

Facility M, located at the intersection of Powerline Drive and Center Street, will hold a minimum of 18 acre-feet of water storage. It will also serve as a 4.5 acre neighborhood park. The modeled design is a 425 foot by 425 foot bottom with 5:1 side slopes and 4 foot depth. The design of the drainage facility, including an underdrain system, will ensure that its use as a park is maximized and that it dries as efficiently as possible.

The outflow pipe from Facility M will be connected to the improved storm drain system along the Mud Creek levee which will drain via underground pipes into Facility V. At the point where the pipes empty into Facility V there will be a grassy swale approximately 50 feet wide to convey flow from the pipes into the drainage/wetland area.

The preliminary storm drain layout and overland flow paths for the preferred drainage alternative are also shown in Figure 8-4. Pipe sizes designed to carry the flow from a 10-year event will range from 30 inches to 66 inches. The detention facilities and their outlet structures for controlling peak flow rates will accommodate a 10-year storm event, and auxiliary outlets would allow overflow in larger storms.

When the project moves to the design phase, street sections will be designed to convey the 100-year frequency floods through surface flows on streets. Streets shall be one foot below pad grades. Overland flow will accumulate at the downstream end of the development and be discharged at Points 1, and 2 as shown in Figure 8-4. Point 1 discharges into Facility V and then to the SUDAD Channel, whereas Points 2 and 3 will discharge through swales directly into the SUDAD channel. A conceptual design of the swale that will convey this overland flow to the SUDAD channel is shown in Figure 8-6.

2. Alternative Drainage Scenario (Alternative 2)

As shown in Figure 8-5, the alternative drainage scenario (Alternative 2) will have three detention facilities on the west side of Highway 99. As in the preferred alternative, Facility M in the proposed neighborhood park would provide 18 acre-feet maximum of storage. In this alternative, there would be no off-site Facility V. Instead, Facility K, to be built in a park area along Mud Creek, would provide 2.5 acre-feet of storage and Facility O, just south of Eaton Drive, would provide approximately 9 acre-feet.

Pond K is modeled as a 175 ft by 175 ft square bottom area with 3 foot depth and 1:5 side slopes for a surface area of 2.2 acres.¹ Pond O is modeled as a 3.3 acre triangle area with a 4 foot depth and 1:5 side slope for approximately 9 acre-feet of water storage.

The storm drain layout and overland flows for the alternative drainage scenario are shown in Figure 8-5. A new storm drain parallel to Mud Creek will carry outflows from Facility K and Facility M as well as runoff generated from most development west of Powerline Drive. A smaller separate area will drain into Facility O. Both storm drain systems will consist of pipes of

¹ Due to shallow depth in Detention Pond “K”, the storm drain pipes (L-Line) discharging in to the pond would be designed to go underneath the pond. The invert of the 42 inch pipe is set at 159.00 ft. and the pond bottom elevation is at 163.00 ft. The size of the outlet pipe is 30 inch in diameter which would be installed with a flap gate at its upstream side. The flap gates can be designed to withstand the design head.

varying sizes, from 30 to 66 inches, and drain by gravity. The detention facilities and their outlet structures for controlling peak flow rates will accommodate a 10-year storm event, and auxiliary outlets would will allow overflow in larger storms.

When the project moves to the design phase, street sections will be designed to convey the 100-year frequency floods through surface flows on streets. Streets shall be one foot below pad grades. Overland flow will discharge to the SUDAD channel at points 2 and 3, as also shown in Figure 8-5. The area west of Powerline Drive will be re-graded to drain from west to east toward Powerline Drive in order to provide a positive grade along the overland flow path. A conceptual design of the swale that will convey this overland flow to the SUDAD channel is shown in Figure 8-6.

3. Drainage East of Highway 99

There will be two detention basins on the east side of Highway 99, as seen in both Figures 8-4 and 8-5. Facility A, located along Highway 99 and Sycamore Creek, is modeled with a 295 ft by 295 ft bottom, 4 foot depth and 1:5 side slopes for a surface area of 2.6 acres. It will be designed as an extended detention pond in order to address water quality. Pond B, located along Highway 99 across from DeGarmo Park, is modeled with a 275 ft by 275 ft bottom, 4 foot depth and 1:5 side slopes for a surface area of 2.3 acres. Alternative designs may be considered that provide adequate capacity and meet design guidance provided in Chapter 7.

A small channel or swale will be constructed parallel to Sycamore Creek, which will flow into Facility A. Facility A will drain into an existing channel parallel to Highway 99 and then into Facility B. A channel will then convey flow from Facility B along and under Highway 99 and into the existing SUDAD channel. The existing channel will be re-graded and widened upstream of the highway cross culvert in order to provide necessary capacity and sloping. This drainage system will feed into the two drainage systems discussed.

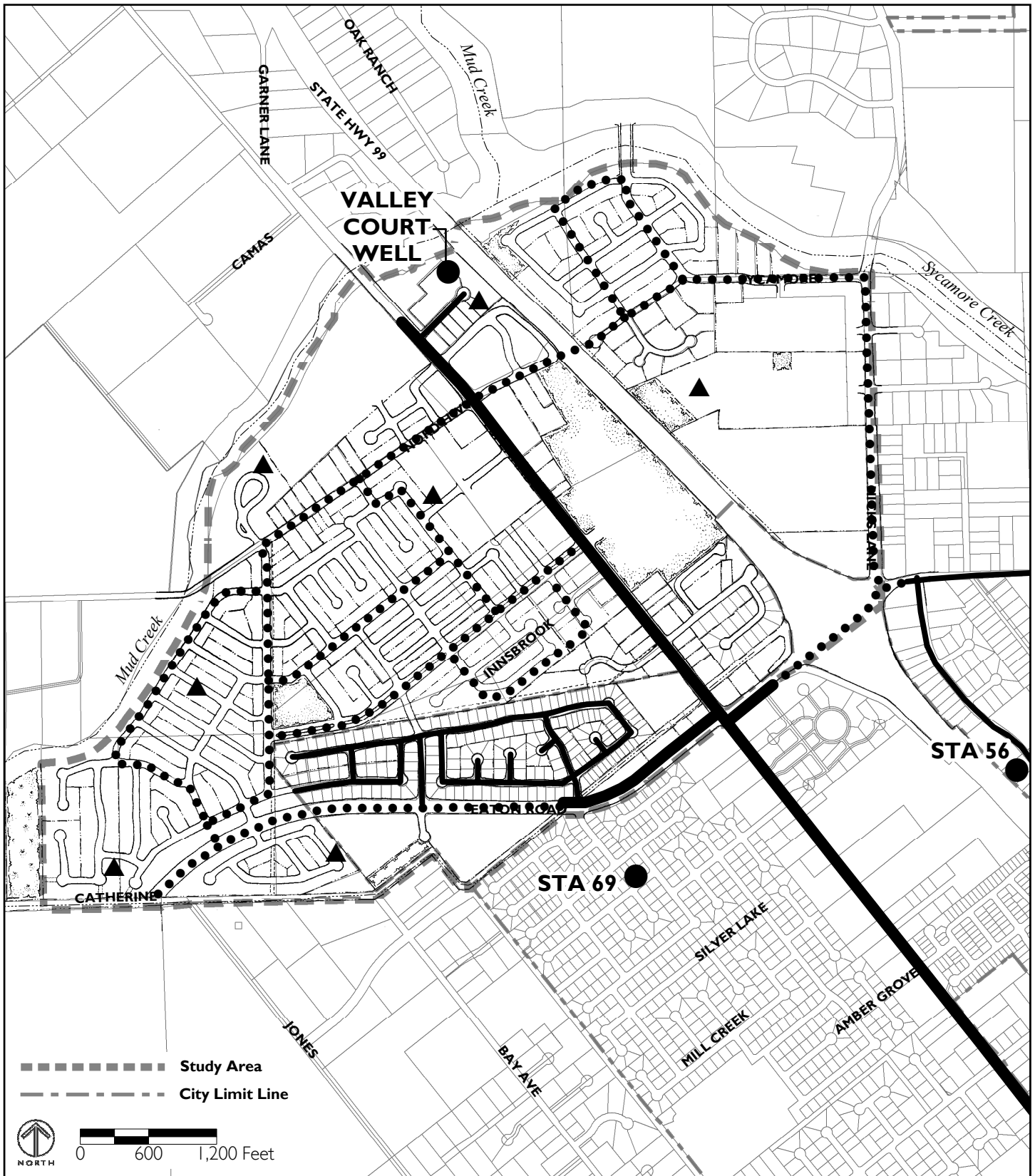
4. Water Quality Features

Facility V in the preferred drainage scenario, and Facilities K and O in the alternative drainage scenario, as well as Facility A to the east of Highway 99, are designed to be “extended dry detention ponds” for stormwater quality enhancement as well as peak flow attenuation. Extended dry detention ponds are an adaptive improvement of the traditional detention ponds used for flood control with the primary difference being in the outlet design. The extended ponds will have a smaller outlet that extends the emptying time to facilitate pollutant removal. The water quality benefits of these facilities can be increased by extending the detention time 24 hours or more, and this Plan proposes a holding time of 30 hours.²

In the preferred drainage scenario, Facility V will be designed as a wetland restoration project. The constructed wetland area will be designed to allow for maximum uptake of pollutants while also ensuring that there is no standing water that would create a vector control problem. Plant species will be selected for maximum phyto-remediation, or water-cleansing, properties. Facility V could also function as an “extended dry detention pond”. Such a design would include a low-flow trickle ditch to address water quality concerns.

The Grading and Erosion Best Practices found in the City of Chico Best Practices Manual will be followed.

² The water quality volume to be detained and the duration over which this volume is to be released vary in different storm water management policies. The City of Chico Storm Water Management Program does not state specific design criteria. For this study, Nolte calculated the required water quality volume by two methods and selected the greater volume. Detail design of detention ponds and vegetated channels would be performed at a later date when the project enters design phases.

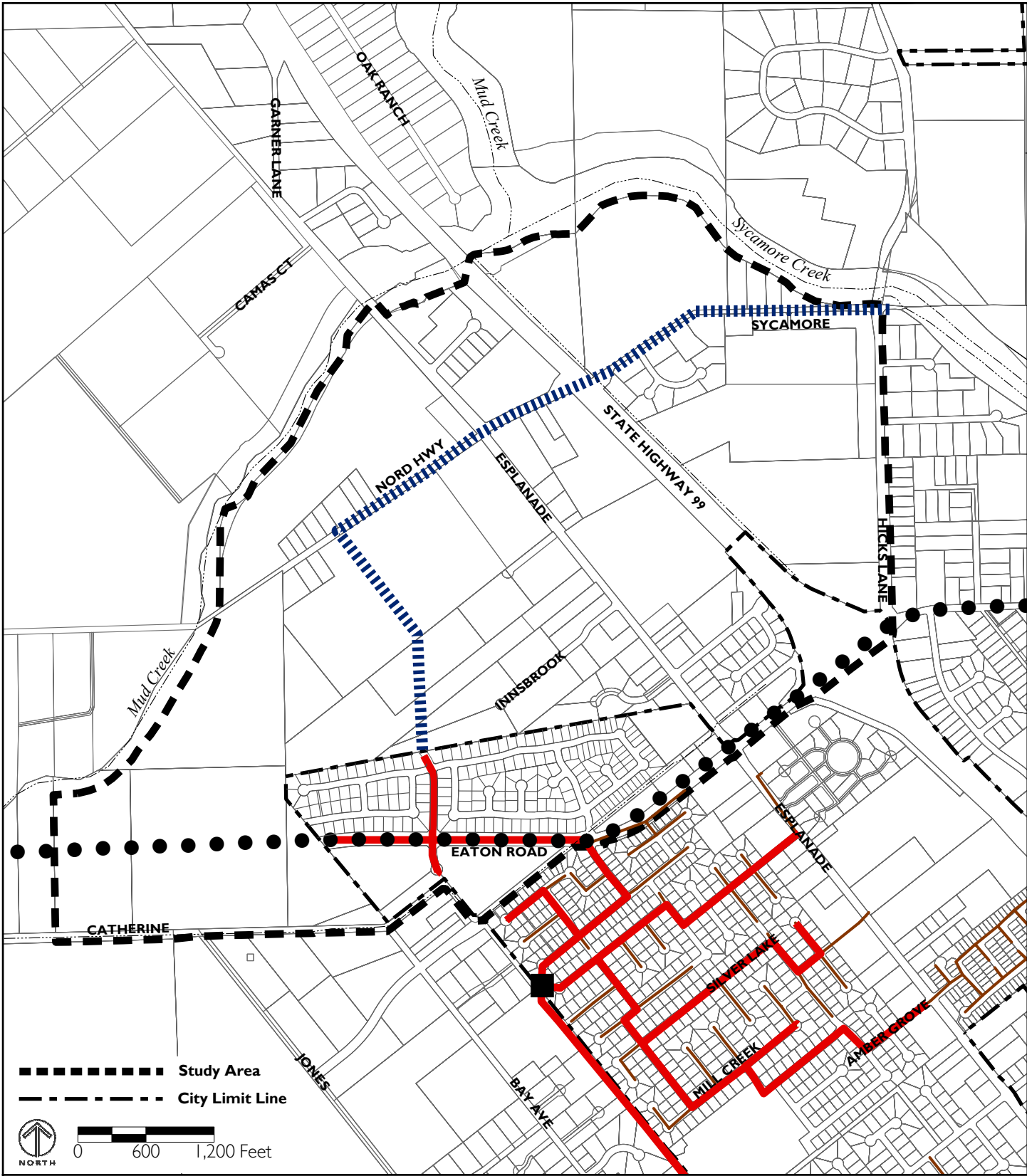


Source: Nolte Associates and Cal Water. Well locations are for illustrative purposes only. Final well locations will be determined by Cal Water at the time of development.

FIGURE 8-1

- Existing or Planned Well
- ▲ Approximate Location of New Well
- 8-inch Existing Pipe
- 12-inch Existing Pipe
- Proposed New Pipe

CONCEPTUAL WATER SERVICE PLAN

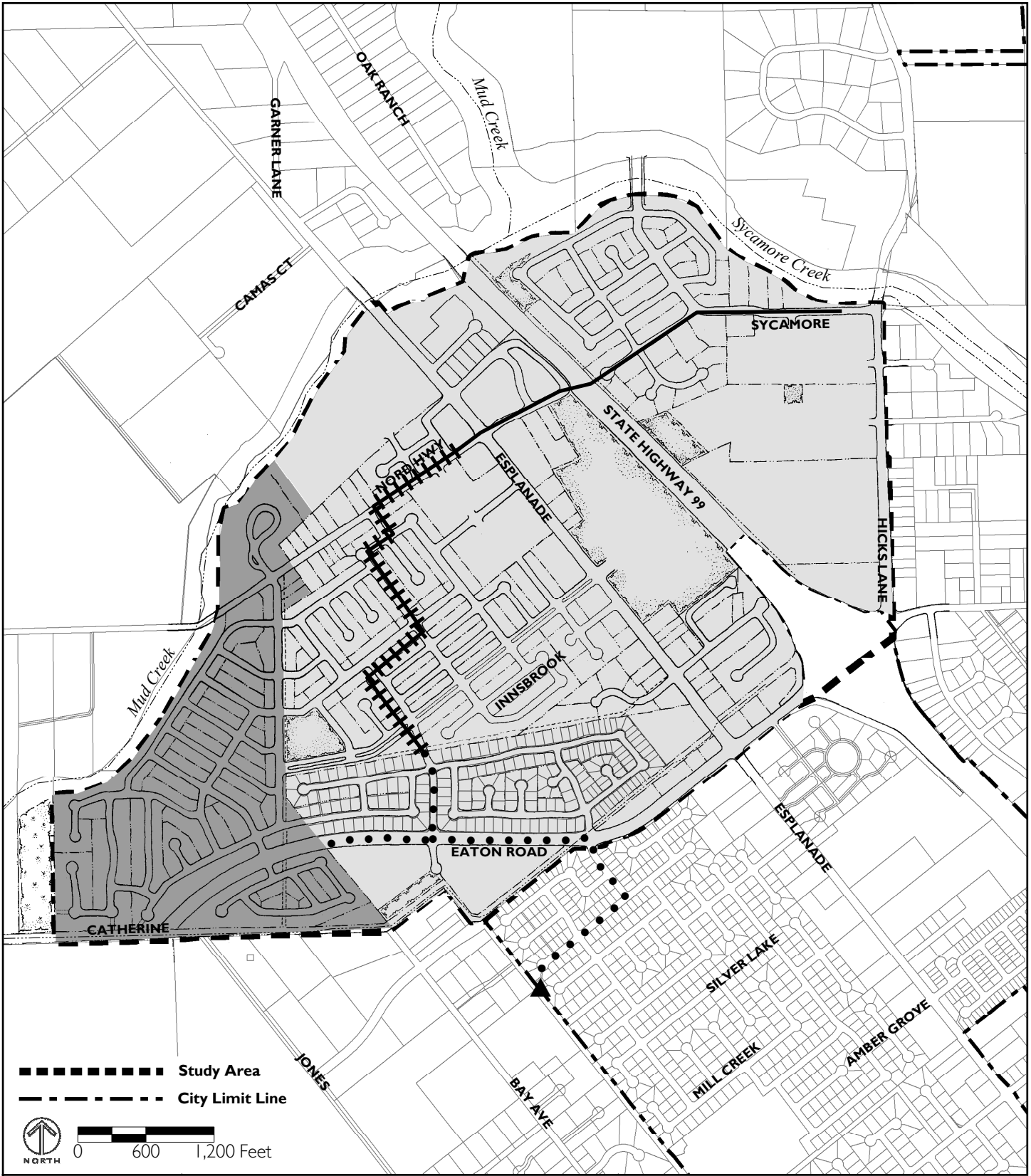


Source: Nolte Associates, October, 2003; City of Chico Sanitary Master Plan Update, May 2003; City of Chico Public Works Department.

FIGURE 8-2







- Existing Sewer System 2" - 6" Pipes
- Existing Sewer System 8" - 24" Pipes
- ● Future Northwest Trunk
- ▤▤▤▤▤ Proposed 18" Main
- Northwest Chico Lift Station

SANITARY SEWER

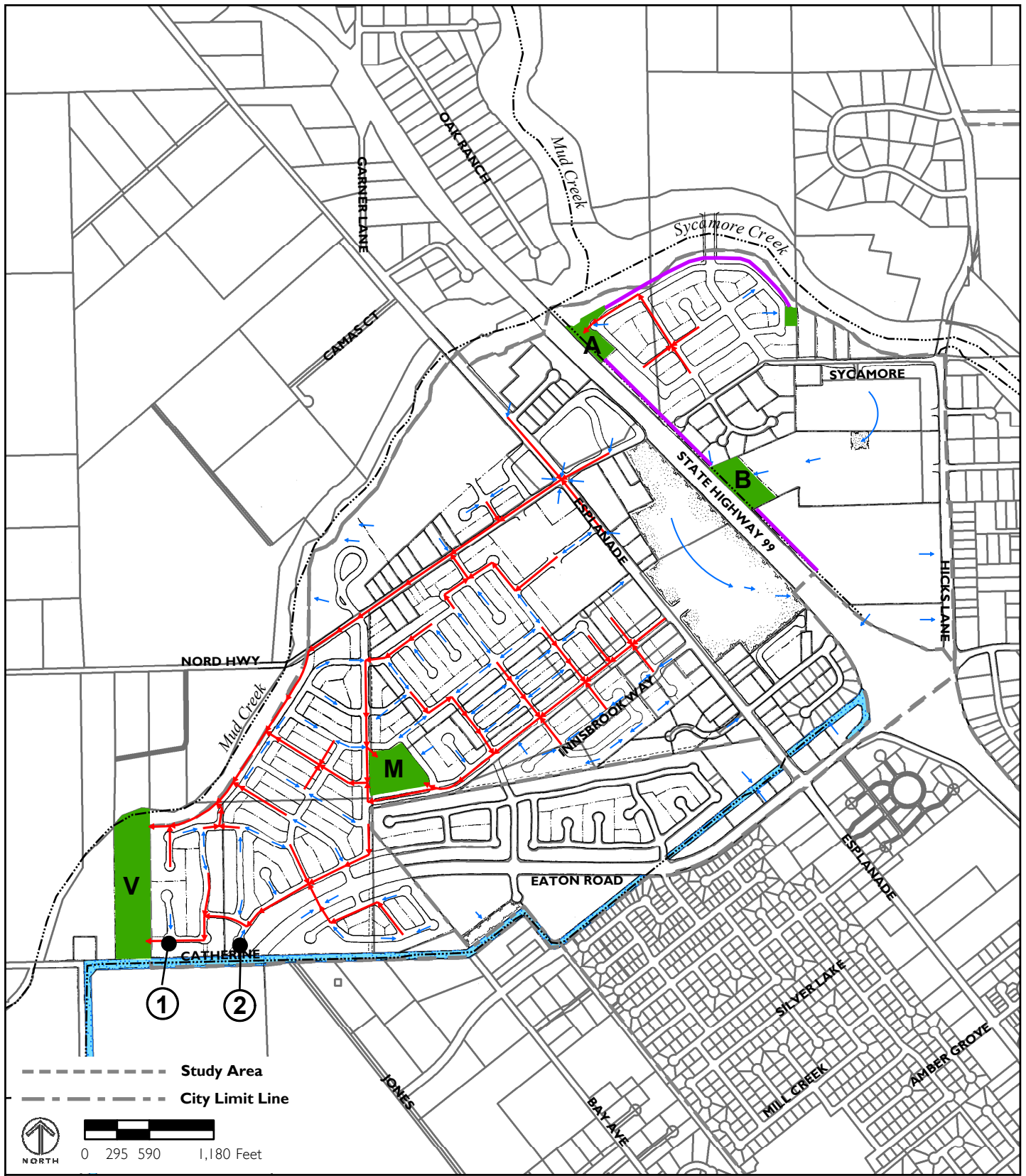


Source: Nolte Associates, October, 2003; City of Chico Sanitary Master Plan Update, May 2003; City of Chico Public Works Department.

FIGURE 8-3

-  Approximate Area Serviceable by New 18-inch Main
-  Approximate Area That May Require Separate Connection
-  Proposed Pipe
-  Existing Pipe
-  Northwest Chico Lift Station
-  Possible Front-on Lots to Large Diameter Main That May Require Small, Parallel Collection Systems

SEWER SERVICE AREAS



Source: Nolte Associates.

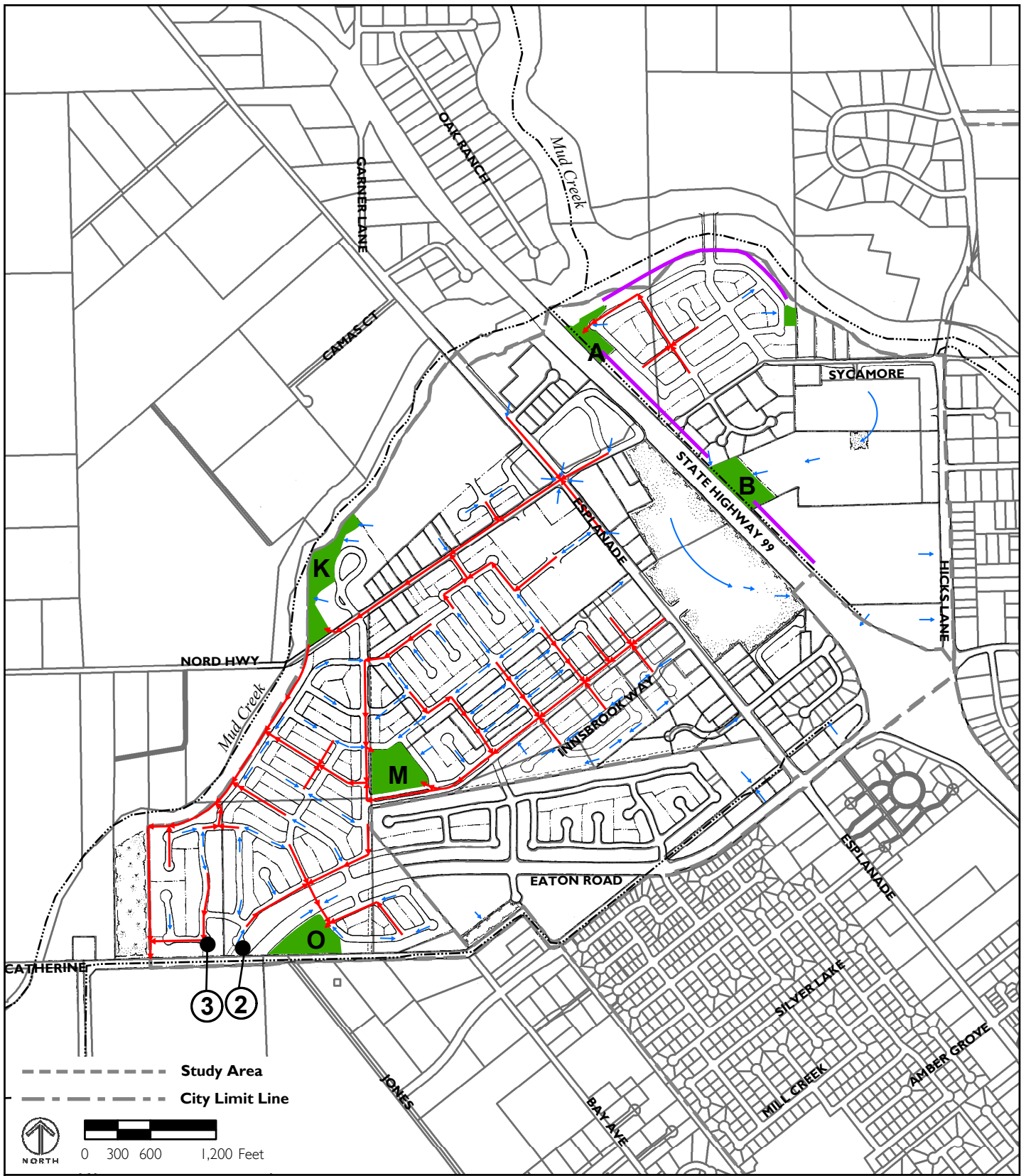
FIGURE 8-4

- Channel
- Overland Flow
- Storm Drainage Pipes
- Detention Facility
- Creeks
- # Overland Flow Discharge Areas

PREFERRED DRAINAGE PLAN

NORTHWEST CHICO SPECIFIC PLAN

FINAL



Source: Nolte Associates.

FIGURE 8-5

- Channel
- Overland Flow
- Storm Drainage Pipes
- Detention Facility
- Study Area
- City Limit Line
- NORTH
- 0 300 600 1,200 Feet
- Overland Flow Discharge Areas

ALTERNATIVE DRAINAGE PLAN

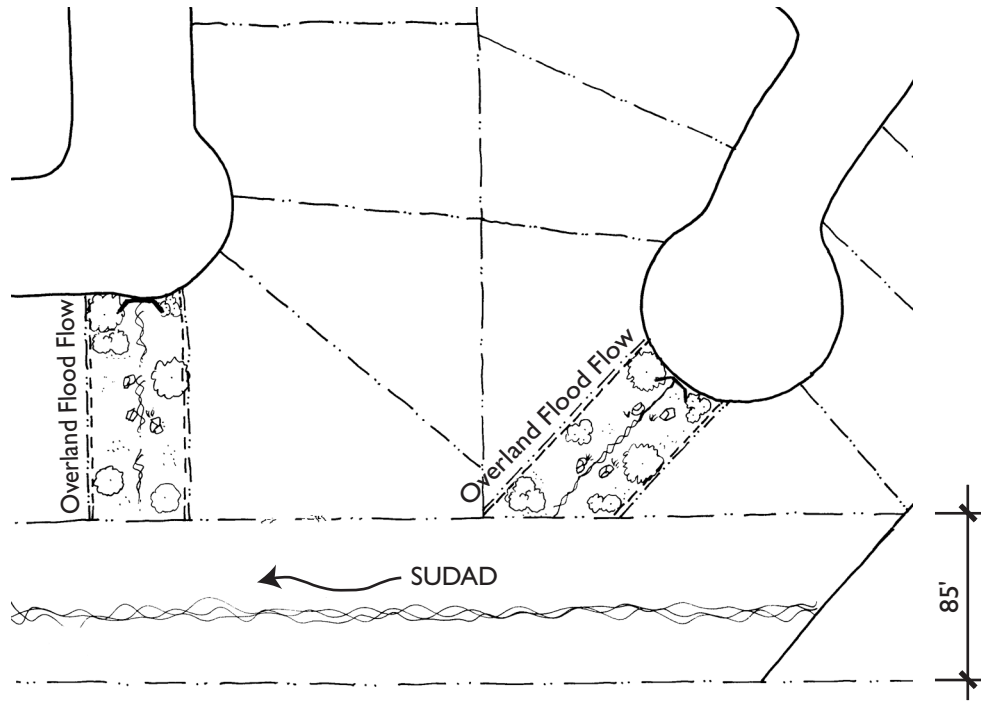


FIGURE 8-6

OVERLAND FLOW SWALES