APPENDIX H
FLOODING AND DRAINAGE EVALUATION

NORTH SAN JOSE
AREA DEVELOPMENT POLICY UPDATE

FLOODING AND DRAINAGE EVALUATION

PREPARED FOR

David J. Powers & Associates

PREPARED BY

SCHAAF & WHEELER
CONSULTING CIVIL ENGINEERS

November 2004

NORTH SAN JOSE
AREA DEVELOPMENT POLICY UPDATE
FLOODING AND DRAINAGE EVALUATION

INTRODUCTION

The objective of this study is to describe the existing flood and drainage conditions in the proposed North San Jose Area Development Policy Update study area, the potential project constraints, and the potential impacts of the proposed project. One area of particular is the existing North San Jose Flood Plain Management Study and effects of flood protection projects for Coyote Creek and the Guadalupe River. The current evaluation is based on the general policy changes and does not consider particular projects or properties within the planning area.

The location of the proposed project is within the Rincon de los Esteros Redevelopment Area, which is located generally south of State Route 237 (SR 237), east of the Guadalupe River, north and northwest of Interstate 880 (I-880), and west of Coyote Creek.

PROJECT DESCRIPTION

The City of San José proposes to modify its relevant plans and policies in order to encourage a greater intensity of development within the existing Rincon de los Esteros Redevelopment Area. The project location is an established urban area characterized by one- and two-story industrial buildings and warehouses, two- to five-story campus industrial parks with extensive landscaping and large surface parking lots, multi-tenant industrial complexes, and three relatively new high and medium-high density residential projects. Also within the project boundary is a state residential facility for the developmentally disabled, a card club, two mobile home parks, and limited retail commercial/hotel/office development along North First and North Fourth Streets. Under existing policies, development in Rincon has been generally held to a floor area ratio (FAR) of 0.35, with 0.40 allowed on land within 2,000 feet of LRT stations. Greater intensities have been approved for developments in the area through the use of transferable floor area credits from properties once designated industrial and redesignated residential, and from the construction of dwelling units within the area. The City is proposing to develop a new North San José Area Development Policy that would incorporate updated versions of the various policy documents pertaining to North San José.

The proposed project would include developing approximately 24.9 million square feet of new industrial/office/R&D building space in the Rincon area in the future, including 17.2 million square feet that could be developed as a result of proposed changes in the City's plans and policies for this area. In addition, up to 38,400 new dwelling units would be allowed in Rincon, in densities of 55 to 90 dwelling units per acre (DU/AC). This would allow a population increase of approximately 88,000 persons.

Most of the new industrial/office/R&D development would be concentrated in an industrial Core Area located on both sides of North First Street, between Montague Expressway and US 101. This Core Area would ultimately have an overall average FAR of 1.2 with full implementation of the proposed policy changes, as described below. Development within the Core Area will be substantially denser than previous development in North San José. It is intended that this area will be characterized by high rise structures built close to the street, designed to facilitate pedestrian access to the LRT stations along North First Street, and with parking structures behind them to serve automobile traffic.

EVENT RETURN PERIODS

The terms 10-year and 100-year are used in this evaluation in reference to events such as storms and flows of water. The events are also called the 10-percent event and 1-percent event, respectively.

A 10-percent event (10-year event) is an event having a 10-percent chance (probability of 0.10) of occurring in any given year. Rather than being an event occurring regularly every 10-years, it is an event that would be equaled or exceeded about 100 times in 1000 years, or on average every 10-years.

Similarly, a 1-percent event (100-year event) is an event having a 1-percent chance (probability of 0.01) of occurring in any given year. It is an event that would be equaled or exceeded about 10 times in 1000 years.

The 10-year and 100-year events should be considered random events since each has its associated probability of occurring during any one year. There is a calculable probability of an event having a given probability of occurring in a given period of years. For example, the probability of the 100-year event (1-percent probability) occurring in a period of 100 consecutive years is 62 percent.

The 10-year event is generally considered significant because the City of San Jose design standard for storm drainage systems is the 10-year storm. That is all of the local runoff up to the 10-year storm should be contained in the drainage system. The City has used a lower design standard in the past and many older storm drain systems do not have 10-year capacity.

The 100-year event is generally considered significant because the Federal Emergency Management Agency (FEMA) uses the 100-year flood event flood plain for flood insurance and flood plain management purposes. Most private structures within the 100-year flood plain are required to purchase flood insurance. As part of the National Flood Insurance Program, the City flood plain management ordinance is based on regulating development within the 100-year flood plain.

EXISTING FLOOD CONDITIONS

The location of the proposed project is within the Rincon de los Esteros Redevelopment Area, which is located generally south of State Route 237 (SR 237), east of the Guadalupe River, north and northwest of Interstate 880 (I-880), and west of Coyote Creek. The project area is subject to potential tidal flooding from San Francisco Bay, and freshwater flooding from two separate watercourses: Coyote Creek and the Guadalupe River.

The existing 100-year base flood plains and zone designations are based on the National Flood Insurance Program Flood Insurance Rate Maps, prepared by the Federal Emergency Management Agency. The portions of the project area are designated as being within the 100-year base flood plain. There are no National Flood Insurance Program floodways designated in the project area.

Coyote Creek is an alluvial stream that drains from the mountains in the Diablo Range south of the project and flows approximately north toward the San Francisco Bay. The major tributaries of Coyote Creek are Fisher Creek, Silver Creek, Upper Penitencia Creek, and Lower Penitencia Creek. The stream channel has been improved in limited reaches through the urbanized areas of the valley floor. The channel has been improved by the Santa Clara Valley Water District (SCVWD) and the Corps of Engineers from Route 237 north to the San Francisco Bay.

Until 1995, the Coyote Creek channel from Montague Expressway north to Route 237 had not been improved to 100-year design standards. Spills from the channel south of Route 237 would flow northwesterly of the channel to Route 237. The estimated 100-year overflow from the channel between Montague Expressway and Route 237 was approximately 7700 cubic feet per second, which would cross Route 237 near North First Street.

Overflows from Coyote Creek occurred in 1982 and 1983, during flow events much less than the 100-year storm. In both events, significant flooding occurred in the Alviso area. In 1983 the maximum flood elevation reached elevation 6 feet (NGVD 1929), and the maximum flood depths in Alviso were over eight feet (NGVD 1929). The flood plain area was generally bounded by the Guadalupe River levees to the west, the salt pond levees north of the New Chicago Marsh on the north, the treatment plant and ponds to the northeast, and Coyote Creek to the east. Areas with higher existing ground elevations near Route 237 and Zanker Road were generally only affected by shallow flooding during the overflow from Coyote Creek. Lower areas were subject to flooding for longer period while floodwater was pumped out. The lowest areas in Alviso were flooded for over two weeks.

The SCVWD and the U.S. Army Corps of Engineers have completed a flood improvement project on Coyote Creek from Montague Expressway north to the San Francisco Bay. The project was designed to provide capacity for the 100-year design flow. The final phase of the project, from Route 237 south to Montague Expressway was completed in 1995. Completion of the Coyote Creek channel project would remove the North San Jose/Alviso area from the Coyote Creek 100-year flood plain. Flooding from Coyote Creek may still occur in events greater than the 100-year design flood.

The Guadalupe River is an alluvial stream that drains from the mountains of the Coast Range

south of San Jose and flows approximately north toward San Francisco Bay. The major tributaries of the Guadalupe River are Los Gatos Creek, Guadalupe Creek, Alamitos Creek, and Canoas Creek. The river channel has been improved in certain reaches through the urbanized areas of the valley floor. The channel from I-880 north to the bay has been improved to 100-year design standards by the SCVWD. Spills from the channel south of I-880 would flow north along the east side of the channel through the North San Jose area to Route 237.

The estimated 100-year flow rate for the Guadalupe River spill at Route 237 is approximately 2300 cubic feet per second. The flood water would cross Route 237 near North First Street and continue north into the Alviso area. Overflows from the Guadalupe River have not flooded the North San Jose area since the 1955 flood, prior to the construction of the channel from Highway 880 to the bay. The channel did overflow in downtown San Jose in 1995, but the flooding did not extend into North San Jose.

The Corps of Engineers, in conjunction with the SCVWD, is constructing a flood protection project for the Guadalupe River south of I-880 to I-280. The project would eliminate flooding between Guadalupe River and Coyote Creek due to spills from the Guadalupe River. The flood protection facilities are currently in construction. The reach from Highway 880 to Coleman Avenue has been completed. The project is scheduled to be completed in December 2004.

The SCVWD has proposed a project to improve the flood capacity of the Guadalupe River downstream of I-880 to Alviso. The project would increase the channel capacity to contain the 100-year design capacity of the upstream project, including potential increases from storm water pump stations in the lower reach. The lower Guadalupe River project is also scheduled to be completed in December 2004.

The SCVWD and City of San Jose are in the process of amending the existing FEMA flood plain maps to include the effects of the Coyote Creek and Guadalupe River flood protection projects. The SCVWD is preparing a study to define the areas of residual 100-year flooding which may occur after completion of the flood protection project. This will include areas of local flooding and sheetflow due to local runoff in excess of the storm drainage system capacity. It is anticipated that the extent and depth of flooding will be significantly reduced in the project area by the flood protection improvements. The draft study results are scheduled for January 2005. The FEMA map amendment process is scheduled to be completed in 2005.

Part of the project area is subject to potential flooding from tidal inundation due to levee over topping or levee failure in the salt pond areas north of Alviso. The salt pond levees are not adequate to meet 100-year design standards as defined by the Federal Emergency Management Agency. In addition, localized areas of the levees near the railroad north of Alviso are below the 100-year tidal elevation and may be overtopped. The Flood Insurance Rate Maps are based on an estimated 100-year high tide elevation of 9 feet.

The Corps of Engineers has prepared a feasibility level study for the south bay shoreline area including the Alviso area. The study only considered overtopping of the existing levees, not

potential levee failure during an extreme high tide. Historically, levee failures during tidal events have been a rare occurrence. The levees were assumed to be maintained in their current condition. The study conclusion was that there would not be sufficient benefits from reduced flooding in the Alviso area to justify the cost of major levee improvements. The Corps is in the process of reevaluating flood protection for the Alviso levees in conjunction with the South Bay Salt Pond Restoration Project.

1987 NORTH SAN JOSE FLOOD PLAIN MANAGEMENT STUDY

Development in the North San Jose area must conform to the City's flood plain management ordinance. The ordinance is required for the City to participate in the National Flood Insurance Program. The flood plain ordinance requires all new construction or substantial improvement of existing structures to have lowest finished floor elevations above the existing 100-year flood elevation as shown on the Flood Insurance Rate Maps. In the tidal flood plain area, this would require first floor elevations of 9 feet (NGVD 1929). Based on the flood plain ordinance, certain types of commercial structures can be flood-proofed to allow finished floors below the 100-year flood elevation.

The City has a special flood plain management plan for the North San Jose area that considers the effects of new development on the freshwater overflows from Coyote Creek and Guadalupe River. The plan requires new construction to consider an additional constraint to allow shallow flooding to cross the property after development. This generally requires maintaining parking and open space areas for flood conveyance. To balance the impact of development on the water surface elevation, each site is restricted to allow buildings or fill on only 50 percent of the available property, as measured along a cross section perpendicular to the direction of the sheet flow across the site. Projects that exceed the 50 percent blockage criteria are required to provide engineering studies to document the potential impact of the project.

Due to the completed 1995 Coyote Creek improvements, new development projects are only required to analyze sheetflow conveyance based on overflows from the Guadalupe River. The design flood elevations from the 1987 Flood Plain Management Study are used to establish the flood elevations of existing buildings within the area. No building flooding would be expected for flood events below the design levels. New development projects include finish floor elevations at or above the existing design levels to maintain a consistent level of flood protection throughout the area. New development projects include low areas in parking lots and open space to convey sheet flow across the site.

City staff has proposed to update the Flood Plain Management Study to consider the revised effective flood plain conditions after the FEMA maps have been amended to include the Guadalupe River flood protection improvements. The revised FEMA maps would be used to identify the areas subject to flooding and the effective flood elevations or flood depths. The revised flood maps would include existing development in the area and therefore would incorporate the existing flood blockage which has occurred in the past. The revision to the Flood Plain Management Study would compare the revised flood elevations to the design elevations

established in the 1987 study to identify areas where increased blockage may be allowed. Because the new flood plain conditions are expected to reduce the flood flows in sheetflow areas, there may be a potential to allow increased blockage, without affecting the existing buildings which were designed to be consistent with the 1987 study.

EXISTING DRAINAGE CONDITIONS

The project area is served by eight main drainage systems which discharge to both Coyote Creek and the Guadalupe River. All of the drainage systems include underground storm drains to convey runoff to the stream channel. The majority of the systems include pump stations to pump the storm drain flows into the stream channel because the streams include levees. With the levees, the water level in the channel may be higher than the ground level outside the levee which would prevent flow into the stream channel without a pump system.

The Oakmead system serves the northwestern portion of the study area from Highway 237 south to Montague Expressway and from the Guadalupe River east to Coyote Creek. The existing pump station has a capacity of 735 cfs and serves an area of over 1200 acres. The pump station capacity exceeds the 10-year design flow. Portions of the storm drain system may not have 10-year capacity for existing or project conditions.

Three smaller drainage systems serve portions of the overall Oakmead system area. The Lamplighter mobile home park on the west side on North First Street near Highway 237 has a separate storm drain system and pump station. The Valley Transportation Agency bus yard on the east side of Zanker Road near Highway 237 also has a separate storm drain system which drains to Coyote Creek. Finally, the River Oaks system serves an area west of North First Street north of Montague Expressway. The River Oaks system has a pumping capacity of 67 cfs.

The area between Montague Expressway and Highway 101 is served by two drainage systems. The Montague system serves the majority of the area, 1339 acres and drains to two pump stations to the Guadalupe River at Montague Expressway and Trimble Road. The Rincon pump station at Montague Expressway was completed in 1998 and has a capacity of 360 cfs. The Trimble pump station was completed in 2004 and also has a capacity of 600 cfs. The combined pump capacity is based on the 10-year design flow. Based on the storm drain master plan for the area, the existing storm drain system does not provide 10-year capacity and additional storm drain improvements have been proposed.

The Charcot system serves approximately 430 acres and drains to Coyote Creek south of Charcot Avenue. The system serves an area generally bounded by Coyote Creek, Highway 101, East Brokaw Road (west of Zanker Road) and south of Charcot Avenue (east of Zanker Road). The system does not include a pump station, but doe include a flap gate to prevent high flow in Coyote Creek from backing up into the storm drain system. Portions of the drainage area are lower than the 10-year water surface elevation in the channel. The storm drain master plan has proposed a pump station and additional storm drain improvements for the system.

South of Highway 101 there are several smaller storm drain systems in the project area which drain the area between the Guadalupe River and Highway 101. These systems drain to the Guadalupe River and also include flapgates at the outlet to the river. The Gateway system near Highway 101 includes a pump station with a capacity of 7 cfs. These systems generally have less than 10-year capacity.

POTENTIAL PROJECT IMPACTS

The proposed area development policy update would increase the density of development in portions of the project area. This may have effects on both flooding and drainage conditions. The increased density of development may affect flooding by reducing the area available for flood flows to flow over land through the area as sheetflow. The increased density may also increase the impervious areas within the development area and therefore increase runoff and storm drain flows. These potential effects are described below.

Flooding

The evaluation of increased development density on flooding in the project area is complicated by the fact that the effective flood plain maps are in accurate due to the construction of the Coyote Creek and Guadalupe River flood protection projects. The draft amended flood plains are scheduled to be completed in January 2005. The amendment process is expected to be completed in 2005.

It is anticipated that the revised flood plain maps will reduce the area of 100-year flood plain in the project area. The major overflows from the stream channels would be controlled by the flood prevention projects and only local storm drain excess runoff would cause shallow sheetflow and local ponding. Similarly, due to the reduction in potential flood flows, the depth of flooding would be expected to be less than the existing flood conditions.

The tidal flood plain area below the 100-year tidal water surface elevation of 9 feet near Highway 237 would not be affected by the flood plain map revisions. The areas which are most likely to remain in the flood plain due to local runoff include the area along North First Street from the tidal flood plain near Highway 237 south to the Core Area north of Highway 101. The North First Street area is generally the lowest area between the Guadalupe River and Coyote Creek. Any storm drain excess would tend to flow toward that area, then north toward Highway 237 and Alviso.

As noted previously, the majority of the project area is within the area of the North San Jose Flood Plain Management Study. The City has implemented development controls in that area to allow development which is reasonably safe from flooding and controls potential increased flood depths due to development. This has included minimum finished floor elevation to keep new development above the estimated 100-year flood elevation. The development controls have also included limitations on building footprints and landscaping which may block sheetflow across the development property. This has been termed the 50 percent blockage criteria. Site

development should not block more than 50 percent of the flow area in the direction of the sheetflow across the site. The City staff has proposed a revision to the 1987 study to revise the existing criteria. The revision may reduce the area of development controls, required building finished floor elevations, and the blockage criteria.

In the worse case, there may be no change in the existing Flood Plain Management Study criteria. This could occur in areas where the local storm drain excess is concentrated in an area and creates flood conditions similar to the existing flood plain conditions. For most of the project area with industrial land uses, the development restrictions within the flood plain would include minimum building finished floor elevation, flood proofing of any below grade development, and at-grade parking lots or at grade parking structures. At-grade parking structures are multilevel parking structures with the lowest level at the existing ground level. The at-grade parking would be open to allow sheetflow through the ground level of the structure. The majority of the project area would include building densities similar to the existing development conditions in North San Jose.

In the Industrial Core Area, there would be increase building floor area ratios with increased building densities over existing conditions. In the core area, development would be characterized by high rise buildings close to the street with parking structures behind the buildings away from the street. If the revisions to the Flood Plain Management Study do reduce the extent of flood plain management criteria, there may be more flexibility in the design of the building footprints and blockage on individual properties.

There are also several areas identified for residential development with densities from 55 to 90 dwelling units per acre. If these areas are located within the revised flood plain and the revised Flood Plain Management Study continues to include blockage criteria, there may be limitations on the type and configuration of the residential development. FEMA does not allow below grade parking structures for residential development projects within the flood plain. The use of at-grade parking lots would limit the density of development with very tall high structures. The use of at-grade parking structures would increase the visible size of the parking structures over development plans with below grade parking.

DRAINAGE

The proposed project may affect existing runoff conditions by increasing the intensity of development and the amount of impervious area within the development. The majority of project area is zoned as industrial development and would continue to be industrial with the project. The level of development used in the existing storm drain planning and design would be very similar. There is a recognized need for storm drain improvements within the project area with or without the proposed project. The City has funded several storm drainage improvement projects, and would continue to improve the drainage system with capital improvement projects in the future.

In the areas with increased development densities, there may be an increase in runoff. Based on estimates from City staff, the runoff in the Industrial Core Area may increase by 10 percent or

more. This would primarily be due to a decrease in the pervious areas within the development areas such as lawns and landscaping. High density urban core development with high rise structures generally has very limited landscaping areas. The increase in site runoff may affect the level of service of the existing storm drainage systems. This may require additional storm drainage improvements above the currently master planned facilities. City staff has estimated that the additional drainage capacity may require an additional $10 million dollars for storm drain improvements (based on 1999 dollars).

The potential increase in storm drainage flows could be mitigated or partially mitigated by including development restrictions to reduce peak runoff flows to the storm drain system. This may include increased open space or pervious area within projects, and on-site detention. These types of development restrictions tend to complicate development planning, reduce development densities, and increase development costs.

CONCLUSIONS

1. The majority of the project area is located within the FEMA 100-year flood plain and is subject to development restrictions based on the City flood plain management ordinance, and the North San Jose Flood Plain Management Study.

2. The Coyote Creek and Guadalupe River flood protection projects have reduced the potential for 100-year flooding in the project area due to overflows from the stream channels. There will continue to be a potential for 100-year flooding in the project area due to local runoff in excess of the storm drain system capacity. The SCVWD is evaluating the area of residual flooding which would remain after completion of the stream flood protection projects.

3. The City will reevaluate the development requirements included in the 1987 North San Jose Flood Plain Management Study based on the extent of the residual flood plain. This may include changes to the areas for which the requirements may apply, the minimum finished floor elevations, and the limitations of building footprints which may affect sheetflow conditions.

4. The blockage requirements may affect the location and orientation of building footprints in the Industrial Core Area, and high density residential development areas if they remain in the flood plain.

5. The increase density of development in the Industrial Core Area may increase the peak runoff to the local storm drainage systems. This in turn may require additional storm drainage improvements and increase the cost of the City's proposed capital improvement program. City staff has estimated the potential increased cost to be approximately $10 million dollars (1999 dollars as used in the storm drainage master plan).

REFERENCES

A-N West, North San Jose Rincon de Los Esteros Storm Drain Master Plan, June 1999.

Federal Emergency Management Agency, Flood Insurance Study, City of San Jose, Santa Clara County, 1982

Nolte and Associates, North San Jose, 1987 Floodplain Management Study, 1987

Santa Clara Valley Water District, Coyote Creek Planning Study - San Francisco Bay to Montague Expressway, 1984

Santa Clara Valley Water District, Lower Guadalupe River Planning Study Engineers Report, 2001

US Army Corps of Engineers, Guadalupe River Project Downtown San Jose, California, Draft General Re-Evaluation and Environmental Report for Proposed Modifications, 2000

US Army Corps of Engineers, General Design Memorandum: Guadalupe River, California, 2000

U. S. Army, Corps of Engineers, San Francisco District, Southern Alameda and Santa Clara Counties, Interim San Francisco Bay Shoreline Study 1988