



NORTH VENTURA COORDINATED AREA PLAN

UTILITIES AND INFRASTRUCTURE ANALYSIS

Overview

This analysis was prepared to provide an overview of the utility infrastructure that serves the North Ventura Coordinated Area Plan (NVCAP) area, identify existing infrastructure constraints, and provide recommendations as determined during review of the proposed NVCAP land-use plan.

As an existing, developed area, the NVCAP area is served by existing utilities. The future NVCAP development will increase water demand and sewer generation. This may require upgrades to aging infrastructure and/or new utilities to meet the needs of the increased development intensities. The existing conditions are described in detail in the Infrastructure Report prepared by BKF Engineers, dated December 10, 2018.

Development Program Summary

The existing program consists of multiple land-use types, including commercial, multi-family residential, research/office park, light industrial, single family residential, and neighborhood commercial. Specifically, the existing NVCAP area includes 142 residential units and approximately 855,000 sf of commercial area. The future development program consists of 672 residential units and approximately 469,000 sf of commercial area. This is an increase of 530 residential units and a decrease of approximately 286,000 sf of commercial area. Along with the residential and commercial work, 2 acres of park land is proposed for the development including the renaturalization of Matadero Creek.

Utility Infrastructure

A. Storm Drainage

Storm drainage facilities in and around NVCAP are owned and maintained by the City of Palo Alto's Department of Public Works (PWD). The Palo Alto models, provided as part of the City's Storm Drain Master Plan¹, split the storm drain system into three parts. The entirety of NVCAP is contained within the Matadero Creek Watershed, which consists of 55 linear miles of pipe (greater than 12-inches in diameter) and four pump stations. The Matadero Creek Watershed drains to the San Francisco Bay.

Per City of Palo Alto's records, the storm drain pipes around NVCAP were installed between the 1950's and the 1960's, with the exception of the pipes running through the site (between Ash Street and Park Boulevard), which were built in the 1990's. The City of Palo Alto Storm Drain Master Plan by Schaaf & Wheeler concluded the following about the drainage systems within the North Ventura Coordinated Area Plan:

The Matadero watershed analysis for a 10-year storm event shows flooding occurs at 693 of the 1,373 nodes. The model predicts less than 6 inches of flooding at 353 nodes; between 6 inches and 12 inches of flooding occur at 129 nodes; and more than 12 inches of flooding will occur at 212 nodes.

The Matadero watershed analysis above shows that flooding occurs at multiple locations within the NVCAP area during a 10-year storm event and that existing pipes on Page Mill Road and Portage Avenue lack the capacity for a 10-year storm event. The Storm Drain Master Plan identifies two capital improvement projects

¹ City of Palo Alto, Storm Drain Master Plan, Schaaf & Wheeler Consulting Civil Engineers, June 2015.



(CIP) be performed near the NVCAP area. Recommended CIP improvements include upgrades to the existing pipes on Portage Ave (Project ID 56) and Page Mill Road (Project ID 22). It is expected that developments will be required to implement these storm drain improvements if they are located along the frontage. As determined by PWD, these improvements should be implemented as the redevelopment buildings are developed. If additional storm drain improvements are needed, triggered by the development, individual developers within the NVCAP area may be required to upgrade storm drain infrastructure near their project to further improve performance of the storm drain system. Lastly, PWD may require other improvements including repair and replacement of any broken line within the vicinity.

Stormwater Treatment

Redevelopment within the NVCAP area is subject to the Municipal Regional Stormwater Permit (MRP). The third reissuance of the Municipal Regional Stormwater Permit, or MRP 3.0, has been adopted by the San Francisco Bay Regional Water Quality Control Board. MRP 3.0 includes significant changes and additional stormwater treatment requirements for Provision C.3.b. MRP 3.0 and its new requirements are effective July 1, 2023.

Under MRP 3.0, parcel-based development or redevelopment is considered a Regulated Project if it will create or replace 5,000 square feet (sf) or more of impervious area. This includes any impervious surface, sidewalk, or street frontage that is created or replaced in the public right of way as part of a project. The 5,000 sf threshold also applies to new roads, sidewalks, and bike lanes. For redevelopment projects, the "50% Rule" applies as noted in the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP). Projects that alter or replace less than 50 percent of existing impervious surface need to treat stormwater runoff only from the portion of the site that is redeveloped. Projects that alter or replace 50 percent or more of the existing impervious surface are required to treat runoff from the entire site.

It is likely that all horizontal and vertical development projects within the NVCAP area will meet the Regulated Project criteria and be required to comply with MRP Provision C.3. requirements. Projects will need to implement stormwater treatment measures that collect and treat stormwater runoff from all onsite impervious areas prior to discharge into the City storm drain system. If a Regulated Project creates or replaces less than 50% of the impervious surface within an existing road or public right of way, stormwater runoff from that portion of the road must be included in the treatment system design. If runoff from that portion of the road cannot be separated from runoff from the rest of the road, the runoff from the entire surface draining onto the reconstructed portion must be treated. If a project disturbs 50% or more of the existing roadway, the entire road surface must be included in the treatment system design. Treatment measures may include bioretention facilities, flow-through planters, or cistern and re-use facilities.

With the incorporation of C.3. treatment measures on a project by project basis, dedication of 2 acres of park space, and proposed renaturalization of Matadero Creek, the future NVCAP development is expected to reduce the impervious surface total at the site. This will result in a net decrease of stormwater flow to the City storm drainage system and creeks. Implementation of green infrastructure measures, such as bio-retention areas, pervious pavement, vegetated swales, and street trees, within the public streets in the North Ventura area will also slow and reduce runoff to the existing storm drain systems.



B. Wastewater Treatment

The City of Palo Alto owns and operates the existing sanitary sewer mains within and surrounding the North Ventura Coordinated Area Plan². The project’s wastewater will be treated at the Regional Water Quality Control Plant that is operated by the City of Palo Alto in partnership with the City of Mountain View, City of Los Altos, East Palo Alto Sanitary Sewer District, Town of Los Altos Hills and Stanford University.

The North Ventura Coordinated Area Plan currently consists of sanitary sewer mains within each public road and between the dead end of Portage Avenue and Park Boulevard. These existing sewer mains vary in size from 6” to 15”. There are also two parallel sewer mains in Olive Avenue, one 15-inch and one 8-inch, which connect to two parallel sewer mains in Park Avenue (one 12-inch and one 15-inch). The City of Palo Alto’s Wastewater Map shows that there will be upgrades to existing sanitary sewer mains along the NVCAP perimeter, in El Camino Real, Page Mill Road and Lambert Avenue. According to the City of Palo Alto Wastewater Capital Improvements Plan 2016-2020, improvements to the existing wastewater infrastructure around the site were implemented in 2018.

BKF prepared wastewater generation projections based on the proposed NVCAP land-use and densities. The City of Palo Alto Water Gas & Wastewater Utility Standards state that the proposed wastewater demand shall be based off of the Peak Base Wastewater Flow (PBWF). PBWF is the Average Base Wastewater Flow (ABWF) multiplied by a peaking factor between one and four. ABWF is the average dry weather wastewater flow contributed from residential, commercial and industrial users for the proposed development. The ABWF is calculated using unit flow rates shown in Table 1-1 in The City of Palo Alto Water Gas & Wastewater Utility Standards Section 2730 Wastewater Design and Construction Standards and also shown below.

Table 1-1 Unit Flow Rates for ABWF, GWI, and RDI*

Average Base Wastewater Flow (ABWF)			
Land Use Category	Land Use Designation**	Unit	Unit Flow Rate (gpd/unit)
Residential			
Single Family	SF	Dwelling Unit	220
Multi-Family	MF	Dwelling Unit	160
Transit-Oriented	CC	Dwelling Unit	160
Commercial	CS, CN, CH	Building Sq. Ft.	0.15
Research/Office Park	RO	Building Sq. Ft.	0.10
Light Industrial	LI	Building Sq. Ft.	0.10
Major Institutional	MISP	Building Sq. Ft.	0.15
School	S	Student	15

Groundwater Infiltration (GWI) = 500 gpd/acre
 Rainfall-Dependent Inflow (RDI) = 1,900 gpd/acre

* All rates are based on the 2004 Wastewater Collection System Master Plan.
 ** Land Use Designations based on Palo Alto’s Planning Land Use Designations.

Table 1-1 in The City of Palo Alto Water Gas & Wastewater Utility Standards Section 2730 Wastewater Design and Construction Standards

Wastewater generation estimates for the existing and proposed developments are calculated based on the City’s design standards. Wastewater generation estimates are summarized below and account for the entire

² City of Palo Alto, Sanitary Sewer Management Plan, City of Palo Alto Wastewater Ops, 2016.



NVCAP area. Wastewater generation rates for both the existing and future conditions were compared in order to understand the impact the development will have on the existing wastewater infrastructure. The results are summarized in Table 1-2 below:

EXISTING WASTEWATER GENERATION				
Use	Total SF	gpd/1000 sq. ft.	ABWF (GPD)	Peak Flow (GPM)
Residential (Multi-Family)	142 D/U	160	22,720	63
Office (Commercial)	744,000	0.15	111,600	307
Retail (Commercial)	111,200	0.15	16,680	46
Total	-	-	151,000	416

FUTURE WASTEWATER GENERATION				
Use	Total SF	gpd/unit	ABWF (GPD)	Peak Flow (GPM)
Residential (Multi-Family)	672 D/U	160	107,520	297
Office (Commercial)	466,000	0.15	69,900	194
Retail (Commercial)	103,700	0.15	15,555	43
Total	-	-	192,975	534

Table 1-2 – Existing and future wastewater generation for the NVCAP site

The future NVCAP development will have an average base wastewater flow (ABWF) of approximately 192,975 gallons per day (GPD), a net decrease of 41,975 GPD compared to existing conditions. Peak wastewater flow will increase from 416 GPM to 534 GPM, a net increase of 118 GPM.

The future NVCAP redevelopment will increase sewer flows compared to existing conditions. According to the City of Palo Alto Wastewater Capital Improvements Plan 2016-2020, improvements to the existing wastewater infrastructure around the site were implemented in 2018. For future projects within the NVCAP area, developers will need to conduct an analysis to determine if the local City infrastructure can accommodate project flows, or if additional improvements to sewer infrastructure are required. Applicants are required to perform at his/her expense, flow monitoring studies of the immediate surrounding sewer mains that are 12-inch or less to determine the remaining capacity. The City Utility Engineering Department is to identify all sewer mains that are larger than 12-inch that the applicant is required to perform flow monitoring studies based on the proposed sewer flows. The applicant may be required to upsize sewer mains as part of public improvements for their projects, which could extend beyond their immediate project frontage.

C. Potable Water and Fire Water

The City of Palo Alto’s water comes from the City and County of San Francisco’s Regional Water Supply System (RWS), operated by the San Francisco Public Utilities Commission (SFPUC). This water supply consists almost entirely of Sierra Nevada snowmelt delivered through the Hetch Hetchy aqueducts, but also includes treated water produced by the SFPUC from its local watersheds and facilities in Alameda and San Mateo Counties.

The water demand for the developed site was calculated by using the assumption that wastewater generation is 95% of water demand for the site. The proposed water demand for the site is summarized in Table 1-3 below:



FUTURE WATER DEMAND				
Use	Total SF	gpd/unit	Average Day (GPD)	Peak Flow (GPM)
Residential (Multi-Family)	672 D/U	168	113,179	314
Office (Commercial)	466,000	0.16	73,579	204
Retail (Commercial)	103,700	0.16	16,374	45
Park (2 acres)	87,120		6,249	17
Total	-	-	209,381	582

Peak Hour Demand Peaking Factor = 4
Preliminary Assumption, WW Generation is 95% of Water Demand
For Landscape Irrigation, assuming 3.5 CF/YR per SF

Table 1-3 – Future water demand for the NVCAP site

Using the same assumption that existing wastewater generation is 95% of existing water demand, the existing peak water demand for the site is 438 GPM. The future development will result in a peak flow demand increase of 144 GPM, from 438 GPM to 582 GPM. The SFPUC has adequate supplies to meet its contractual obligation to the wholesale customers (City of Palo Alto) of 184 MGD, through the year 2030. The City has an ISG of 17.07 MGD (or 19,118 SFY). The water distribution system is operated by the City of Palo Alto Utilities Department.

The NVCAP area consists of existing water mains within the public streets (and between the dead end of Acacia Avenue and Park Boulevard), varying in size from 6” to 12”. The network of piping within NVCAP will need to be evaluated for adequacy on a project by project basis. It is likely that the existing 6-inch water mains are not able to provide sufficient flow and pressure to meet required fire demands for new construction. Depending on the actual building heights, locations, densities, and construction types, water mains may need to be replaced and upsized to meet fire flow requirements. The applicant may be required to perform capacity studies and upsize water mains as part of public improvements for their projects, which could extend beyond their immediate project frontage.

D. Recycled Water

No recycled water is available in the study area. There is currently no intent to extend recycled water into the Plan area.

E. Electrical Utilities

Based on the Electrical and Fiber Optic Service Maps provided by the City of Palo Alto (Figures 16 and 17), there are existing electrical and fiber optic lines serving NVCAP. The existing electrical utilities consist of both overhead and underground lines. There are overhead electric lines serving existing buildings on each road within the NVCAP project boundaries. Based on the City of Palo Alto’s 2019-2023 Capital Improvement Program, the NVCAP project site is not within an area that the City plans on undergrounding between now and 2023. However, as part of individual development projects’ conditions of approval, the City may require projects to underground all overhead electric lines along their street frontage.

The majority of the existing electrical utilities, including a 60KV electric line and a fiber optic backbone line, run along Lambert Avenue and Park Boulevard to an existing substation, “Park Boulevard Substation” at the corner of Park Boulevard and Lambert Avenue. The Park Boulevard Substation is not within the North Ventura Coordinated Area Plan.



F. Gas

Based on the existing underground Map provided by the City of Palo Alto to BKF Engineers on October 29, 2018, there are multiple gas mains servicing the NVCAP project site. The existing gas mains vary in size from 2" to 4", and run within every public street in the North Ventura Coordinated Area Plan.

Matadero Creek Channel and Proposed Renaturalization

The Matadero Creek Channel is maintained by the Santa Clara Valley Water District (SCVWD). The portion of Matadero Creek running through the North Ventura Coordinated Area Plan is contained within a concrete trapezoidal channel, which was built in 1990 from El Camino Real to the Caltrain tracks.

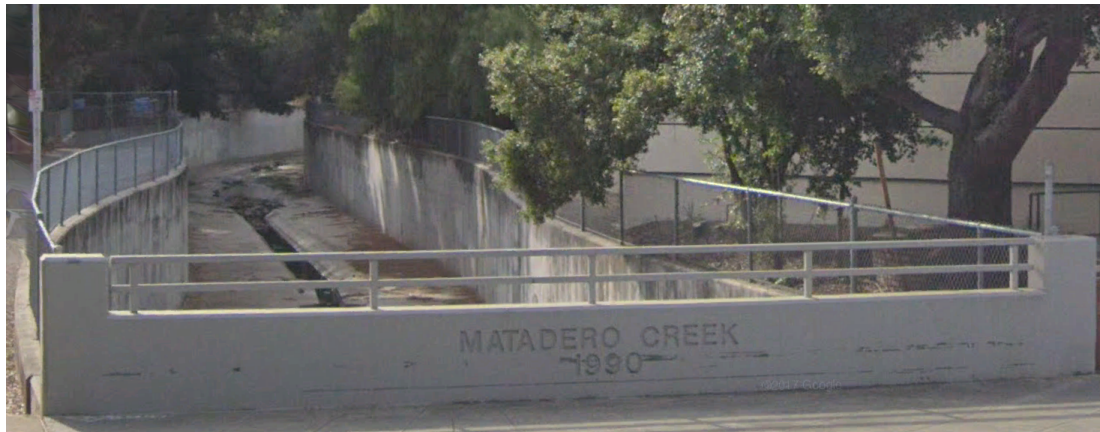


Figure 1-4 – Existing Matadero Creek Channel

NVCAP proposes in concept to renaturalize a section of Matadero Creek that is within the Plan area. There is an existing concrete flood control channel that flows south to north through the Plan area. This creek corridor is constrained by existing infrastructure and urban development. The proposed renaturalization would remove the existing U-shaped concrete channel and replace it with a widened, geomorphic bankfull channel. The goals of a renaturalization project are to provide community benefits, re-establish riparian ecosystem habitat, and avoid adverse impacts on hydraulic performance and flood risks.

The NVCAP Preferred Plan supports a widened natural corridor with area available for riparian plantings, creative landscape architecture design, and increased recreation access. This concept is described in detail as *Concept 3* in the Matadero Creek Conceptual Alternative Analysis³ prepared by WRA Inc. This concept includes replacing the Lambert Avenue bridge with a longer span and widening the creek channel from approximately 30 feet wide to 100 feet wide. As described by WRA in Section 9.4 of the Matadero Creek Conceptual Alternative Analysis:

Hydraulic modeling indicates that Concept 3 would increase water surface elevations in some portions of the project reach by as much as one foot, but decrease water surface elevations upstream of El Camino Real by roughly 0.5 feet. Increases in water surface elevation between El Camino Real and Park Boulevard may be mitigated by floodwalls and no adverse effect would occur further upstream. Concept 3 appears to be feasible from a hydraulics perspective.

³ Matadero Creek Conceptual Alternative Analysis, WRA Inc., 2020.



Where the Matadero Creek channel runs through NVCAP, the existing site has several existing outfalls connected to the channel, with sizes varying from 12-inch storm drain inlet connections up to 60-inch storm drain mains. Local stormwater runoff is collected in a series of storm drain pipes and discharged at these outfall locations. Due to the widening of the creek channel, the existing outfalls will need to be relocated or otherwise accommodated in place. Hydraulic modeling by WRA indicates that water surface elevations in some portions of the project may increase by up to one foot. Further investigation will be required to assess if the increase in water surface elevation within the naturalized creek will adversely impact performance of the outfalls and connected, upstream storm drain infrastructure. The creek naturalization improvements will need to be submitted and reviewed by FEMA to ensure the creek modifications do not cause surrounding areas of the City to be mapped within a special flood hazard area. Additional study will also be needed to confirm that hydraulic performance at the Park Blvd culvert and Lambert Bridge is acceptable and not worse than the existing condition.

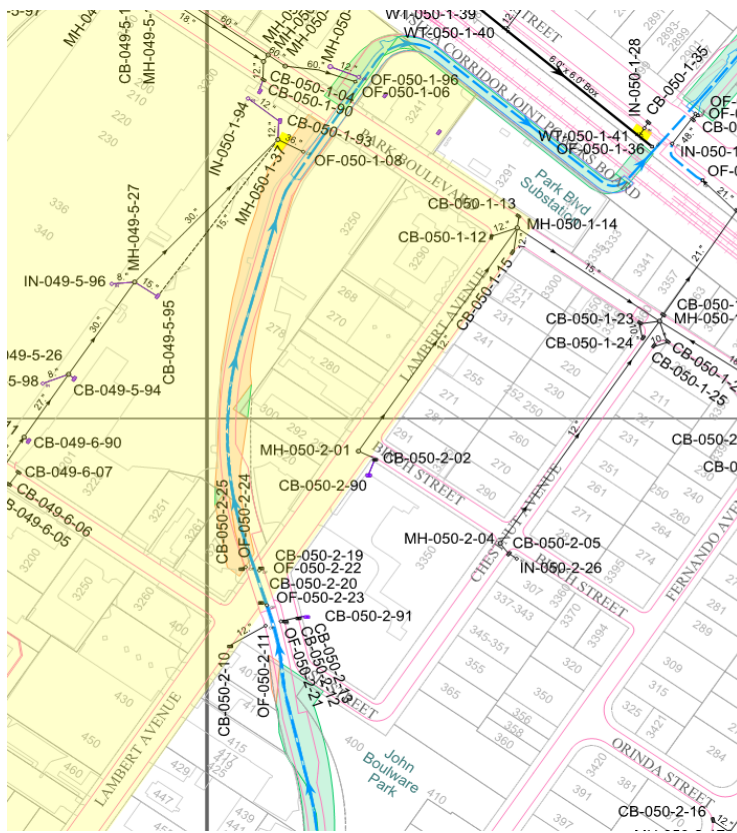


Figure 1-5 – Storm Drain Outfalls to Matadero Creek Channel

The creek widening will require replacement of the Lambert Avenue bridge with a longer span. Currently, a City water main is supported by the existing bridge and spans over the concrete channel. This utility will be impacted by the proposed bridge improvements and will need to be relocated onto the new bridge structure. Service to nearby properties will need to be identified to determine if these properties will be impacted. There are also overhead electrical lines that are supported by poles on either side of the channel.

Future development in this area will need to be coordinated with the SCVWD to ensure adequate measures are implemented to reduce impact to the existing channel, and to ensure the project meets SCVWD standards.