Appendix K

LAX NORTHSIDE PLAN UPDATE

Hydrology Technical Memorandum

May 2014

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TECHNICAL MEMORANDUM August 2, 2012

HYDROLOGY ANALYSIS

LAX NORTHSIDE PLAN UPDATE

DESCRIPTION

The LAX Northside Plan Update (the proposed Project) will establish new regulations for future development occurring within the LAX Northside sub-area (the Project site) of the LAX Specific Plan area. The Project site is comprised of approximately 340 acres within the City of Los Angeles. The Project site is generally bounded by Sepulveda Westway and Sepulveda Boulevard to the east, LAX to the south, South Pershing Drive to the west, and generally 91st Street, Manchester Avenue, and 88th Street to the north.

PURPOSE

This memorandum is intended to evaluate hydrology for several scenarios, including existing conditions as well as conditions associated with the proposed Project, and to provide an opinion as to whether the existing storm drain system is capable of supporting the proposed future development using its existing topography and watersheds. This study will review existing hydrology conditions and help develop future conditions for the proposed Project. Comparisons are made to the LAX Conceptual Drainage Plan[1] prepared in accordance with LAX Master Plan Commitment HWQ-1 and the conditions that existed prior to acquisition of the property by Los Angeles World Airports (LAWA).

BACKGROUND

The existing drainage system is capable of receiving stormwater discharge from future development at the proposed Project site. Based on current configurations, the drainage system will be designed to adequately respond to drainage demand without significantly altering the existing drainage flow pattern. The capacity of the existing drainage system will need to be verified based on the final size of future development impervious area and current standards and regulations. This study analyzes the land uses of the proposed Project as shown in Exhibit 1 – URS Land Use Map.

HYDROLOGY ANALYSIS METHODOLOGY

URS analyzed the following four conditions to determine if the proposed development will impact the existing storm drain system: 1) Pre-LAWA acquisition; 2) existing conditions; 3) the proposed Project; and 4) the 2005 LAX Conceptual Drainage Plan (CDP).

The Pre-LAWA acquisition scenario is necessary to understand this analysis because the existing storm drainage lines were installed and constructed as part of the original Northside Development. It can be assumed that the storm drainage lines were designed and sized based on the land use and topography during that developed condition. This Pre-LAWA acquisition

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[1] Prepared by Psomas in April 2005.

condition primarily consisted of single-family residential housing. This determined the basis for the existing sizes of storm drain pipes.

After the areas were acquired by LAWA, houses were demolished and removed; only the minor roads that connected these neighborhoods remain. The present-day condition analysis reflects these changes.

The proposed Project would allow airport support, commercial, office, retail, research and development, civic and community, and open space and recreation as permitted uses on the subject site. Hydrology calculations may change as development occurs altering the topography and increasing the impervious areas.

Finally, the 2005 Psomas LAX Conceptual Drainage Plan study provided the data that included watershed delineation and flow rate capacities. Watershed boundary delineation defines which watershed water will flow into if falling onto a given piece of land. Watershed delineation was necessary in order to determine the conceptual runoff plan for the LAX Master Plan, including the LAX Northside. The LAX Northside is located in the Santa Monica Bay watershed, in the Argo sub-area. Flow rate represents the speed and volume with which water moves over an area and is represented in cubic feet per second (cfs). Flow rate capacity refers to the amount of water that can flow through a drainage outfall (such as a pipeline or drainage ditch). Flow rate capacity was defined in order to determine whether existing drainage outfalls could accommodate flows from the proposed Project. The CDP fulfills the requirement of LAX Master Plan HWQ-1, which applies to the proposed Project. HWQ-1 requires that sufficient facilities be provided to adequately convey stormwater runoff, meet water quality regulations, and ensure no net increase in pollutant loading to receiving water bodies.

Hydrology flow rates were determined by calculating the amount of runoff a watershed may discharge under certain conditions. These conditions provided the values needed in the Rational Method. Calculations in the CDP utilized the County of Los Angeles Department of Public Works Modified Rational Method, in compliance with the requirements of LAX Master Plan Commitment HWQ-1. This study utilizes the Rational Method, which is equivalent to the Modified Rational Method and usable for comparison to the CDP. The Rational equation is the simplest method to determine peak discharge from drainage basin runoff. It is the most common method used for sizing and analyzing storm drain systems and is shown by:

Rational Equation: $Q = ciA$

The Rational equation requires the following units:

Q = Peak discharge, cfs
c = Rational method runoff coefficient
i = Rainfall intensity, inch/hour
A = Drainage area, acre

RUN-OFF COEFFICIENT

The Rational Method runoff coefficient (c) is a function of the soil type, land use, and drainage basin slope.

The land uses within the watersheds are identified on the Land Use Map included as Exhibit 1. The Northside area is part of the Argo sub-drainage area that is tributary to the Santa Monica Bay watershed. The existing storm drainage system was constructed pursuant to the Westchester Parkway Construction Plans dated October 1990. The proposed Project should not dramatically change the topography of the Project site. Therefore, existing watershed areas were assumed to be maintained and used for the analysis. Values associated with the coefficient Rational Method and impervious runoff were determined based on the proposed land uses within the individual subareas and standard values contained in the Federal Aviation Regulation Aviation Circular 150/5320-5, Airport Drainage Design. The proposed land uses alter existing and future runoff flows. The runoff coefficient values for each condition, which include the pre-LAWA acquisition, existing, proposed Project, and CDP conditions, were determined for each Area within the Project site. Runoff coefficients were defined for each proposed land use category: Office, Research, and Development (0.75), Community and Civic Use (0.6), Mixed Use (0.7), Airport Support (0.7), and Recreation and Open Space (0.35) based on industry standards. Combined runoff coefficients for each Area within the Project site were calculated by multiplying the runoff coefficient for each land use type and the total acreage allocated for each land use type. The attached Flow Rate Tables-Table 1 details the combined runoff coefficients for each Area.

RAIN INTENSITY

The rainfall intensity (i) is typically found from Intensity/Duration/Frequency curves for rainfall events in the geographical region of interest. The duration is usually equivalent to the time of concentration of the drainage area. The storm frequency is typically stated by local authorities depending on the impact of the development. The storm frequency may be specified in a span of 10, 25, 50, or even 100 years. The 50-year 24 hours Isohyet was used to determine the amount of rain in inches/hour. To determine the 25-year and the 10-year 24-hour values, reduction factors of 0.878 and 0.714 were used respectively. Based on design criteria established by the Federal Aviation Administration (FAA), LACDPW, and the City of Los Angeles, as written in the CDP, it was determined that the appropriate study design criteria will have a minimum threshold equivalent to a 10-year capacity. In addition, the 50-year storm was evaluated in order to analyze the proposed Project under the City of Los Angeles California Environmental Quality Act (CEQA) Thresholds. The peak runoff associated with the proposed Project was based on applying all three frequency design storms to the subject site. The duration is usually equivalent to the time of concentration of the drainage area. Time of concentration (Tc) was assumed not to change for this analysis regardless of development scenario.

AREAS

The LAX Northside Plan Update “Initial Study and Checklist” dated April 4, 2012, was reviewed to understand the proposed development and permitted land uses. Using Table 1-1, Existing Uses by Area, data provided the area (acres) of the proposed development and Location IDs used for the analysis. Figure 1-4 Conceptual Land Use Plan, of the LAX Northside Plan Update Draft EIR, provided the proposed land uses. Finally, the existing drainage watershed areas developed in the 2005 CDP, Figure 3-2 was used for this analysis. This figure was modified to reflect the proposed land use areas (Exhibit 2). The proposed land use areas crossed over multiple watersheds and each proposed area was divided into sub-areas where it split across multiple watersheds. Flow rates were calculated for each land use sub-area.

Flow Rates for all conditions were calculated and compared with the CDP run-off flow rate values as shown in Table 1. Graphs 1 and 2 provide the 10-year 24 hour storm events for a specific area at each condition to visually see proposed effects and changes.

CONCLUSION

Review of the LACDPW records indicate the existing storm drain systems are designed for a 10-year frequency runoff. Based on a compilation of available data and our initial evaluation, it appears that the existing storm drainage system is adequate to support the potential future development. In order to accommodate the 25-year or 50-year storm event in the watersheds, upgrading to the existing storm drain system would be recommended.

REFERENCES:

North Side Development Plans, March 1986, Engineering Technology Incorporated

Phase 1 Construction Plans, Westchester Parkway, October 4, 1990, Engineering Technology Incorporated

Draft Conceptual Drainage Plan, April 2005 - Psomas

LAX Northside Plan Update EIR Appendix A, Initial Study and Checklists

Psomas LAX Conceptual Drainage Plan 2005

ATTACHMENTS:

URS Land Use Map – Exhibit 1

Modified Psomas Figure 3-2 – Exhibit 2

Flow Rate Tables – Table 1

Land Use Flow Rate Graphs Areas 1 - 5 – Graph 1

Land Use Flow Rate Graphs Areas 6 - 13 – Graph 2

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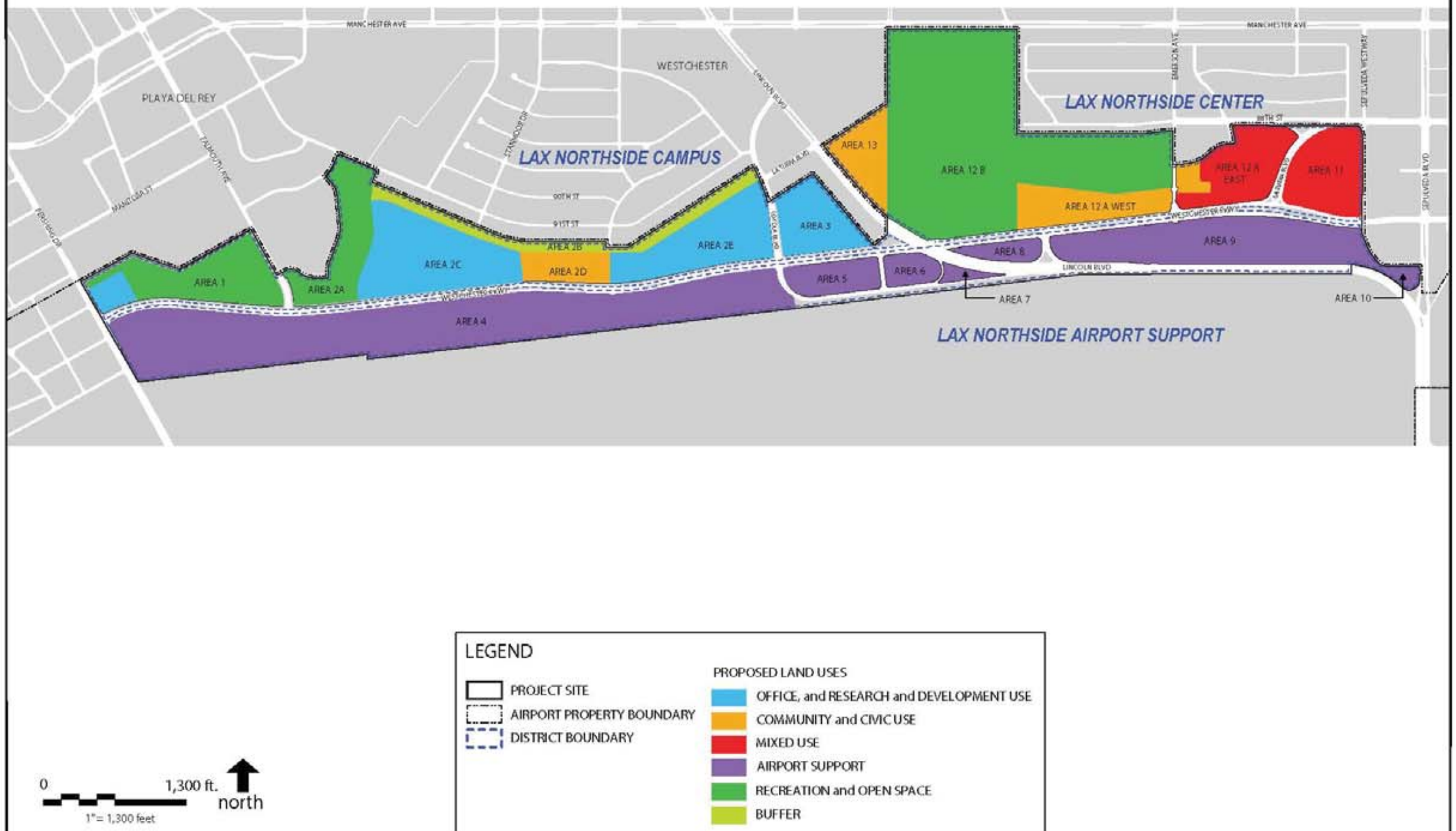
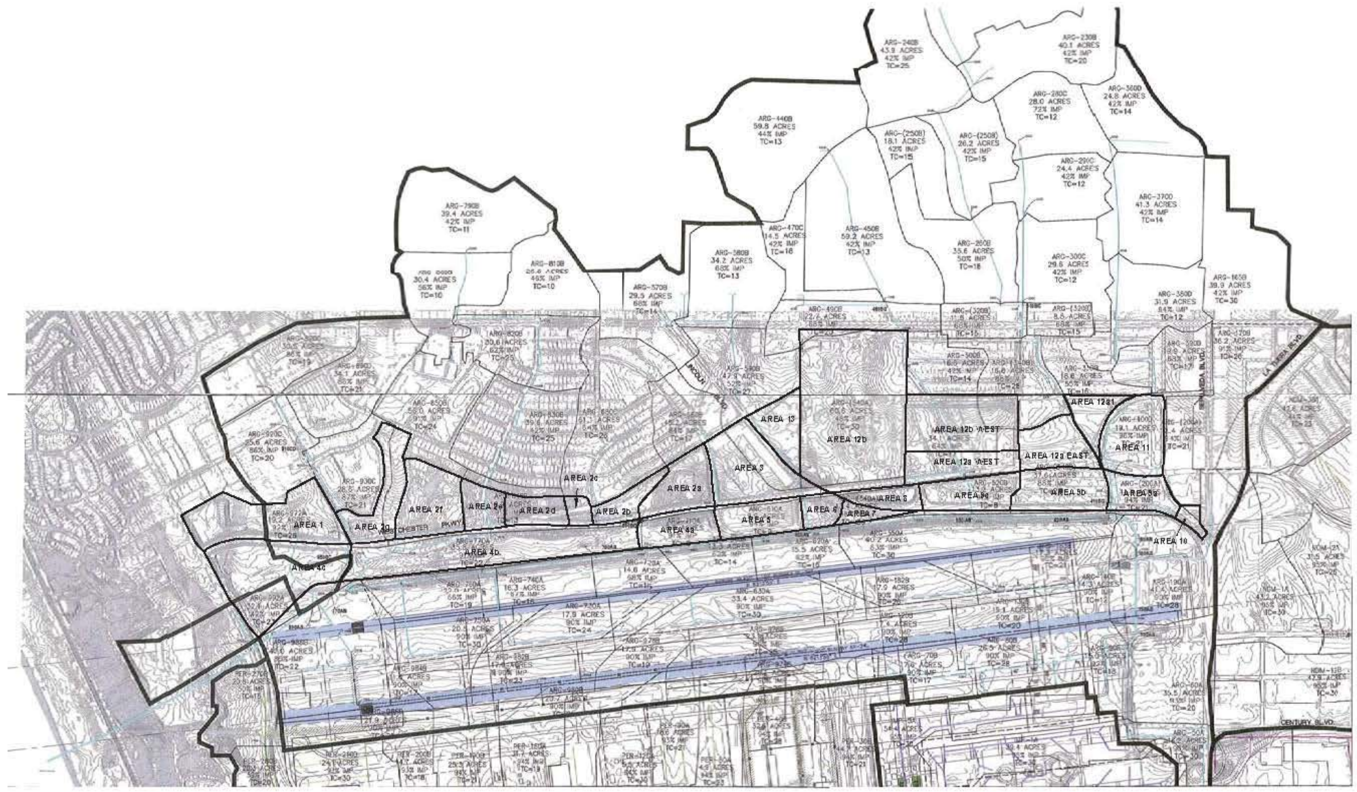


Source: LAX Northside Plan Update Design Plan and Development Guidelines; LAWA 2012; ESRI Maps and Data, 2014; Prepared by: URS Corporation, March 2014.

Proposed Land Use Plan	Hydrology Technical Memorandum LAX Northside Plan Update	EXHIBIT 1



Sources: LAWA, 2005; Prepared by: URS Corporation, March 2014.

Sub-Areas Used for Impacts Analysis	Hydrology Technical Memorandum LAX Northside Plan Update	EXHIBIT 2

URS

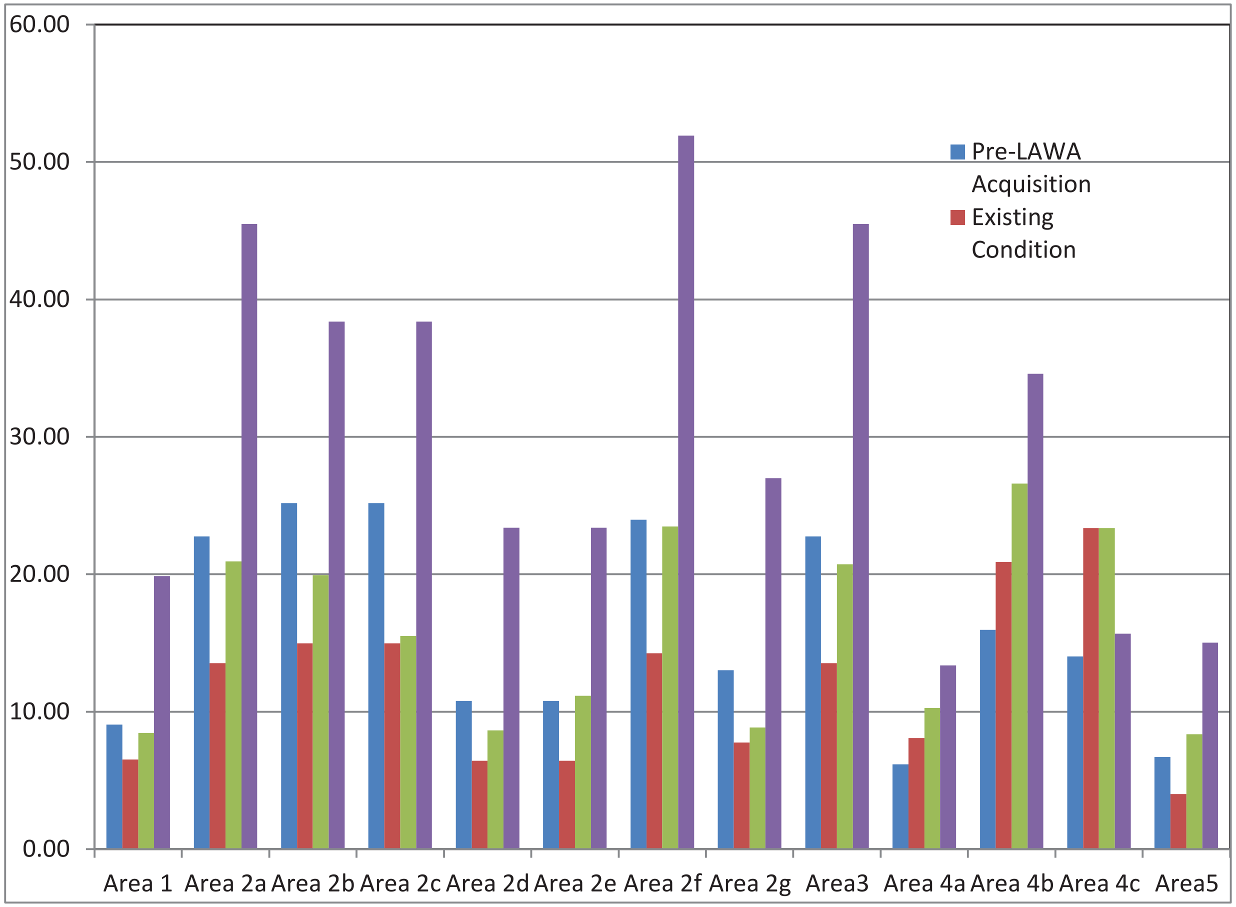
Table 1: Flow Rate Tables

LOCATION ID								Intensity			Flow Rate (cfs)		
URS Area 2f (Psomas Area 850B)	Undeveloped (Vacant Land)		Propose		Total Watershed Area	Combined	Tc = Time of concentration (min)	I10	I25	I50	Q10T	Q25T	Q50T
	Area	C	Area	C	Area	C							
Pre-LAWA acquisition					56	0.42	24	1.02	1.25	1.43	23.97	29.47	33.57
Existing Condition	56	0.25			56	0.25	24	1.02	1.25	1.43	14.27	17.54	19.98
URS Proposed	30.61	0.25	25.395	0.61	56.0	0.412	24	1.02	1.25	1.43	23.48	28.88	32.89
Psomas Study					56	0.91	24	1.02	1.25	1.43	51.93	63.86	72.73

LOCATION ID								Intensity			Flow Rate (cfs)		
URS Area 2g (Psomas Area 930C)	Undeveloped (Vacant Land)		Propose		Total Watershed Area	Combined	Tc = Time of concentration (min)	I10	I25	I50	Q10T	Q25T	Q50T
	Area	C	Area	C	Area	C							
Pre-LAWA acquisition					28.6	0.42	21	1.09	1.33	1.52	13.03	16.03	18.25
Existing Condition	28.6	0.25			28.6	0.25	21	1.09	1.33	1.52	7.76	9.54	10.87
URS Proposed	18.52	0.25	10.080	0.35	28.6	0.285	21	1.09	1.33	1.52	8.85	10.88	12.40
Psomas Study					28.6	0.87	21	1.09	1.33	1.52	27.00	33.20	37.81

LOCATION ID								Intensity			Flow Rate (cfs)		
URS Area 1 (Psomas Area 972A)	Undeveloped (Vacant Land)		Propose		Total Watershed Area	Combined	Tc = Time of concentration (min)	I10	I25	I50	Q10T	Q25T	Q50T
	Area	C	Area	C	Area	C							
Pre-LAWA acquisition					22	0.42	26	0.98	1.21	1.37	9.07	11.15	12.70
Existing Condition	22	0.30			22	0.30	26	0.98	1.21	1.37	6.53	8.03	9.14
URS Proposed	0.00	0.30	22.000	0.39	22.0	0.39	26	0.98	1.21	1.37	8.46	10.40	11.85
Psomas Study					22	0.92	26	0.98	1.21	1.37	19.86	24.43	27.82

Land Use Flow Rate Graphs Areas 1 - 5 – Graph 1



Land Use Flow Rate Graphs Areas 6 - 13 – Graph 2