February 2013

REPORTING WATERSHED IMPROVEMENT

Based on Statistical Evidence of Watershed-wide Improvement (Option 2a)

Executive Summary

Three Los Angeles River Reach 3 watersheds demonstrate watershed-wide improvement in reducing ammonia contamination to surface waters. Ammonia reductions were achieved using a watershed approach that included both regulatory and non-regulatory mechanisms. These mechanisms were targeted to wastewater treatment plants, the primary sources of ammonia and nitrogen loads in the watershed. Three wastewater treatment plants in the watershed have installed nitrification and denitrification processes, which have resulted in significant ammonia reductions in the receiving water. The wastewater treatment plant discharges in Reach 3 are meeting their ammonia and nitrate/nitrite waste load allocations. Water quality improvement has been documented in the waters to which these wastewater treatment plants drain. Water quality in Reach 3 is meeting water quality objectives for ammonia.

Watershed Identification

a	Organization	California Regional Water Quality Control Board, Los Angeles Region (Los Angeles Regional Board)
b	Point of Contact	LB Nye, Senior Environmental Scientist 320 West 4th Street, 2nd Floor Los Angeles, Ca 90013 (213) 576-6785 lnye@waterboards.ca.gov
c	Project Title	Reducing ammonia contamination in Los Angeles River Reach 3 Watersheds, California
d	No.Watersheds Improved	The Los Angeles River Reach 3 runs through three HUC-12 watersheds: Tujunga Wash 180701050208, Scholl Canyon 180701050402, and Verdugo Wash 180701050207.

Description of 2002 Baseline Condition

e	Watershed(s)	180701050208 – Tujunga Wash 180701050402 – Scholl Canyon 180701050207 – Verdugo Wash
f	2002 Impairments	Reaches of the Los Angeles River and its tributaries were listed as impaired for nitrogen compounds (ammonia, nitrite, and nitrate) and related effects such as algae, pH, odor, and scum on the 2002 303(d) list. These reaches were listed because numeric and narrative water quality objectives for nitrogen compounds and related effects were exceeded, thereby impairing warm freshwater and wildlife habitats, and recreation beneficial uses. Specifically, Reach 3 is listed for ammonia, nutrients (algae), copper, lead, and trash.
g	Map (optional)	Map attached (Figure 1)

Evidence of Watershed Approach

h	Area of Effort	The Los Angeles River flows for 55 miles from the Santa Monica Mountains at the western end of the San Fernando Valley to the Pacific Ocean at San Pedro Bay. It drains a watershed of 834 square miles. Approximately 44% of the watershed area is forest or open space, which is primarily in the mountains and

		includes the headwaters of the River. Most of the lower portions of the watershed consist of urban land uses. The natural hydrology of the river and many of its tributaries have been altered for flood control purposes. Most of the main stem of the Los Angeles River is lined with concrete and most of the primary tributaries are lined with concrete for most or all of their lengths. Los Angeles River Reach 3, a 7.94-mile segment which drains three HUC-12s (180701050208, 180701050402 and 180701050207), is heavily urbanized and the River is a concrete channel with an unlined bottom in this section. The principal sources of nitrogen compounds to the Los Angeles River are discharges from the Donald C. Tillman Water Reclamation Plant (WRP), the Los Angeles-Glendale WRP, and the Burbank WRP. During dry-weather periods, these WRPs contribute 84% of the total dry-weather nitrogen load. Urban runoff, stormwater, and groundwater discharge may also contribute nitrate loads. The Tillman WRP discharges to Reach 4 and the Burbank WRP discharges to Burbank Western Channel; these reaches are upstream of Reach 3. The Glendale WRP discharges to Reach 3 (Figure 1).
i	Key Stake-holders Involved and Their Roles	Forty-three municipalities including the County of Los Angeles are located in the Los Angeles River watershed. The municipalities located in the Reach 3 subwatershed are the County of Los Angeles and the Cities of Los Angeles, Burbank, Glendale, La Cañada Flintridge, and Pasadena. The stormwater discharges from these municipalities are regulated by the Los Angeles County MS4 permit. The City of Los Angeles operates both the Tillman and Glendale WRPs (the City of Glendale co-owns the Glendale WRP). The City of Burbank operates the Burbank WRP. The NPDES permit provisions for the WRPs required that the WRPs achieve compliance with NPDES permit effluent limitations for ammonia based on the Los Angeles River Nutrients TMDL waste load allocations by September 23, 2007. In addition, the Cleaner Rivers through Effective Stakeholder-led TMDLs (CREST) stakeholder group, initiated by the City of Los Angeles for the purpose of developing TMDLs to restore water quality in the Los Angeles River and Ballona Creek, operates in the watershed. The Los Angeles Regional Board is a stakeholder as well.
j	Watershed Plan	The Los Angeles River Nutrients TMDL became effective on March 23, 2004. The TMDL established an implementation plan, primarily relying on the use of permits to regulate wastewater discharges. The TMDL requires monitoring for nitrogen compounds to be included in NPDES permits. The TMDL implementation schedule called for achieving ammonia and nitrate water quality standards in the river by September 23, 2007. The TMDL required major WRPs in the Los Angeles River watershed to reduce ammonia and oxidized nitrogen wasteloads. The TMDL also required reductions from minor point sources enrolled under NPDES and Report of Waste Discharge (WDR) permits, and reductions from the municipal separate storm sewer MS4 permittees. The TMDL established final ammonia and nitrate+nitrite requirements for the WRPs and for stormwater dischargers and interim requirements until the final requirements were met. The final requirements are now in effect. The principal implementation action identified to reduce ammonia and nitrate+nitrite levels in the River was installation of nitrification-denitrification (NdN) processes at the WRPs. By setting waste load allocations for ammonia as well as waste load allocations for nitrate and nitrite, the TMDL ensures that total nitrogen levels in the waterbody do not increase while ammonia levels decrease. **Future Activities** Reach 3 meets the existing objectives as expressed in the TMDL. The Los Angeles Regional Board updated the required ammonia objectives prior to the

		development of the TMDL (effective July 15, 2003). This update incorporated U.S. EPA's "1999 Update of Ambient Water Quality Criteria for Ammonia" into the Basin Plan. In addition, the ammonia objectives were updated after the establishment of the TMDLs with implementation provisions for early life stages of aquatic life (effective April 5, 2007) and with site specific objectives (SSOs) for the Los Angeles River including Reach 3 (effective April 23, 2009). The SSOs were incorporated into the TMDL in December 2012. The State Water Resources Control Board approved the revised TMDL in March 2013. As of May 2013, the TMDL revisions must still be approved by the Office of Administrative Law before they are effective. Based on the ammonia SSOs, the TMDL's thirty-day average numeric targets were changed from the numbers currently presented in the TMDL to equations based on pH and temperature. The revised WLAs are greater than the existing WLAs. However, the Burbank and Glendale WRPs are currently meeting the existing WLA without the adjustment of the WLAs by the SSOs; the SSOs were incorporated into the TMDL because the Tillman WRP occasionally exceeds its limits.
k	Restoration Work	The Burbank WRP retrofitted treatment units with NdN treatment in 2003. Following the NdN upgrade, there was an improvement in water quality. Both the Tillman and Glendale WRPs built NdN treatment facilities and brought them online in 2007, which resulted in additional improvements in water quality in Reach 3. The TMDL Source Assessment indicated that nitrogen loads from nonpoint sources are negligible compared to loading from point sources and their contribution is adequately accounted for in the margin of safety. Consequently, the TMDL does not include load allocations for nonpoint sources.

Evidence of Watershed-wide Improvement

l	Impairments Removed (if applicable)	
m	Statistical Results	Data collected at the Glendale WRP receiving water monitoring stations were used to demonstrate water quality improvement in HUC-12 watershed 180701050208 because this is the most downstream WRP in Los Angeles River Reach 3. Receiving Water Station R-4 is in Los Angeles River Reach 3, upstream of the Glendale WRP discharge point. Receiving Water Station R-7 is in Los Angeles River Reach 3, downstream of the Glendale WRP discharge point. Reach 3 meets the existing objectives as expressed in the TMDL (Figure 2). Monthly ammonia data were analyzed from August 2003 to May 2010 (Figure 2). The Glendale WRP built NdN treatment facilities and brought them online in June 2007, which resulted in much lower effluent concentrations. Data collected before the upgrade (August 2003 to May 2007) were compared to data collected after the upgrade (June 2007 to May 2010) to determine if there was a statistically significant change over time in the difference between upstream and downstream ammonia concentrations. Using a before-after-control-impact design and a t-test, it was demonstrated that there was a statistically significant difference in ammonia concentrations before implementation of NdN and after implementation of NdN ($p < 0.05$). Monthly total nitrogen data were also analyzed to demonstrate that other forms of nitrogen did not increase with decreasing ammonia (Figure 3). Using a before-after-control-impact design and a t-test, it was demonstrated that there

	was a statistically significant reduction in total nitrogen concentrations before implementation of NdN and after implementation of NdN ($p < 0.05$). The map in Figure 1 shows the location of the Glendale WRP discharge point and the receiving water monitoring sites: R-4 (upstream) and R-7 (downstream). Before February 2007, the City of Los Angeles monitored ammonia and other forms of nitrogen on a quarterly basis at the two receiving monitoring sites. As of February 2007, ammonia and other forms of nitrogen are being monitored on a weekly basis.
n Environmental Significance	The statistical results demonstrate that focusing on the largest source of ammonia loading in the watershed resulted in statistically significant reductions in ammonia and total nitrogen concentrations in Los Angeles River Reach 3 in HUC-12 watershed 180701050208. The data show that ammonia targets are currently being met and water quality objectives are attained downstream of the Glendale WRP in Reach 3 (figure 2). The data also show that other forms of nitrogen have not increased as a result of reductions in ammonia (figure 3).
o Photos/Graphics (optional)	Figure 1 – Map of Los Angeles River Reach 3 and HUC-12 watershed delineations showing the WRPs and receiving water monitoring locations. Figure 2 – Total Nitrogen concentrations in Los Angeles River Reach 3 upstream and downstream of the Glendale WRP discharge. Figure 3 – Ammonia concentrations in Los Angeles River Reach 3 upstream and downstream of the Glendale WRP discharge.

Figure 1


San Fernando
Verdugo Wash
180701050207
La Crescenta-Montrose
Tujunga Wash
180701050208
TILLMAN
BURBANK
Glendale
Scholl Canyon
180701050402
R4
GLENDALE
R7
Los Angeles
Beverly Hills
N
0 1 2 4 Miles
Los Angeles River Reach 3 Watersheds
Water Reclamation Plants
Glendale Outlet
LA River Reach 3

Figure 2 Los Angeles River Reach 3
Ammonia Upstream and Downstream from Glendale WWTP

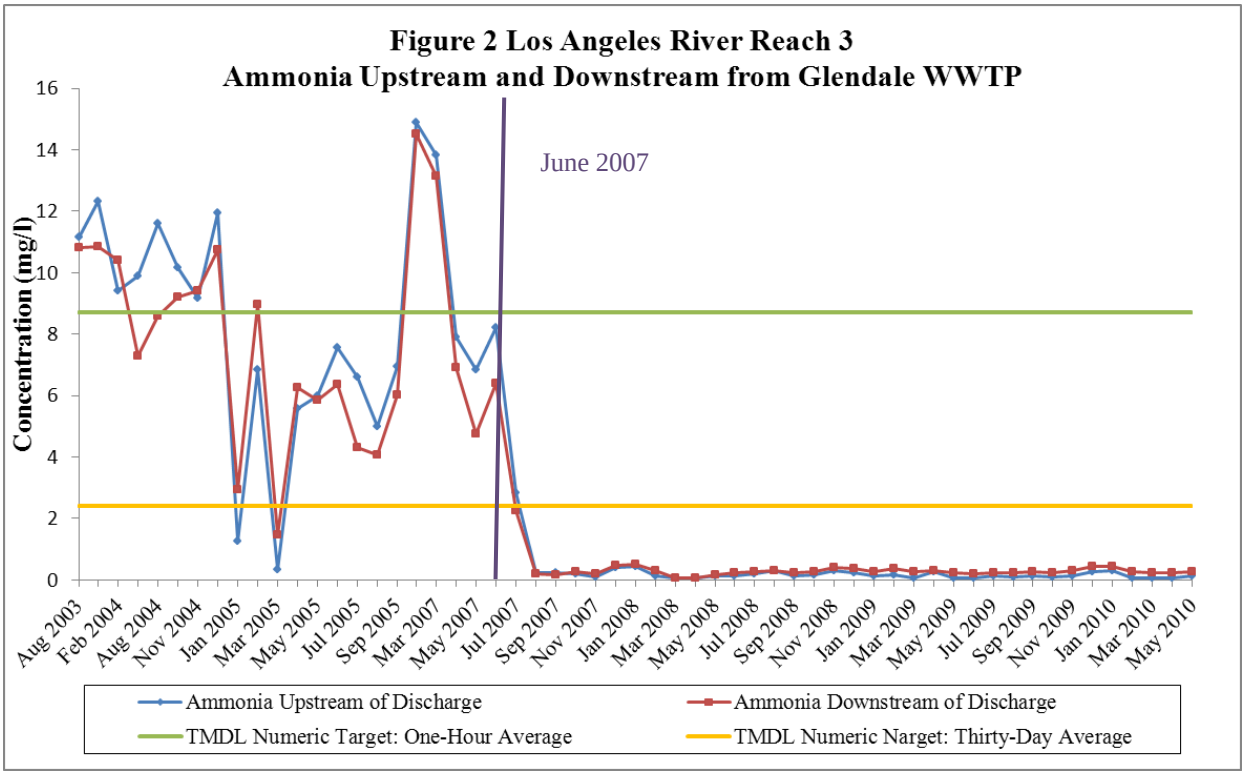

Figure 3 Los Angeles River Reach 3
Total Nitrogen Upstream and Downstream from Glendale WWTP