CDM

Technical Memorandum Task 3.2B: Water Supply and Reuse, North Santa Monica Bay Watersheds Regional Watershed Implementation Plan and Malibu Creek Bacterial TMDL

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1.0 Introduction

1.1 Background and Statement of Problem

The North Santa Monica Bay Watersheds (NSMBW) are unique for the greater Los Angeles area because a majority of the watersheds contain a large amount of open space and several natural creeks. This region is primarily characterized by its rural environment, natural beauty, wildlife, and recreational opportunities. However, the NSMBW also support urban, residential, and business communities primarily in a strip along the Malibu Coastline and the upper reaches of Malibu Creek Watershed (MCW) in both Counties. Roads, highways, water utilities, sanitary sewer systems, on-site wastewater treatment systems, and coordinated trash disposal serve these diverse communities. Stormwater discharges from these communities can convey pollutants that impact the natural waterways and northern beaches of Santa Monica Bay. This presents a challenge to the stormwater dischargers to comply with three regulations of concern - the National Pollutant Discharge Elimination System (NPDES) permits; total maximum daily load (TMDL) allocations; and Assembly Bill 885 (AB 885), which will regulate on-site wastewater systems. To address these regulations, municipalities and agencies within the NSMBW are developing a Regional Watershed Implementation Plan (RWIP) to address watershed management principles through strategic implementation of best management practices (BMPs) to obtain optimal regional benefits and to meet the regulatory requirements in a cost efficient manner.

The Malibu Creek Watershed (MCW) is the largest watershed within the North Santa Monica Bay Watersheds and at 109 square miles, it is the second largest watershed, after Ballona Creek (128 square miles), that drains into Santa Monica Bay. MCW includes portions of unincorporated Los Angeles and Ventura Counties, as well as seven Cities in the two Counties. Much of the watershed is open space under the jurisdiction of the State and the Santa Monica Mountains Conservancy. The water in Malibu Creek, its five tributaries (Stokes Creek, Las Virgenes Creek, Palo Comado Creek, Medea Creek, and Lindero Creek) and Malibu Lagoon, which receives runoff from Malibu Creek exceeds the water quality objectives (WQOs) for indicator bacteria, including fecal coliform, total coliform, E. coli, and

Enterococcus. This continuing exceedence has resulted in the requirement under the Federal Clean Water Act and the California Porter-Cologne Act to prepare a TMDL for bacteria for the watershed. The TMDL has been approved by the State Water Resources Control Board (SWRCB) and is waiting United States Environmental Protection Agency (U.S. EPA) Region 9 approval which is expected in January 2006. Jointly responsible for meeting TMDL requirements are the two Counties; the Cities of Calabasas, Malibu, Westlake Village, Agoura Hills, Hidden Hills, Simi Valley and Thousand Oaks; the California Department of Parks and Recreation; the National Park Service, the Santa Monica Mountains Conservancy; and Caltrans. In order for MCW to comply with the Bacteria TMDL allocation the responsible agencies are developing a TMDL Implementation Plan (TMDLIP) that will present an integrated plan of BMPs to be implemented throughout the watershed to meet water quality objectives.

1.2 Purpose of this Technical Memorandum

An important aspect of an integrated approach to BMPs that considers watershed principals and optimizes regional benefits is consideration of beneficial reuse of stormwater in meeting water quality objectives. The Regional Water Implementation Plan and Malibu Creek TMDL Implementation Plan both need to include an examination of the region's current beneficial reuse opportunities, water supply, water use and reuse scenarios, and the impact of those practices on water quality. This memo summarizes the region's water supply and options for possible stormwater reuse in the NSMB watersheds (Figure 1).

The approach used in evaluating beneficial use options involved identifying potential locations at both local and regional levels and estimating the amount of runoff that can be managed by the beneficial use options. The potential for beneficial use was assumed to be related to land uses since certain land uses offer more potential for reuse, such as landscape irrigation for golf courses and parks.

Local reuse opportunities include on-site capture using cisterns. Regional reuse opportunities include groundwater recharge, reuse for recreation, regional capture and reuse for irrigation or other non-potable supply. In establishing reuse opportunities, a review of the practices of local water agencies was conducted. These agencies included: County of Los Angeles Water Works District 29, Las Virgenes Municipal Water District, West Basin Municipal Water District, and the City of Los Angeles.

2.0 Water Supply and Use

Water distribution is provided within the NSMB watersheds primarily by two water districts: County Waterworks District 29, distributing water to coastal watersheds; and Las Virgenes Municipal Water District (LVMWD) distributing water to upper Malibu Creek watershed.

2.1 Water Districts

The City of Los Angeles Department Waterworks District 29 (District 29), Las Virgenes Municipal Water District (LVMWD), and a portion of Calleguas Municipal Water District provide water to users within NSMB watersheds and are thus responsible for coordinating potable and recycled water supplies to their customers. Water supply provided by these districts is imported to the area. According to the City of Malibu General Plan, there are some residences with private groundwater wells within the City, although the amount of water supplied by these wells is considered insignificant. Groundwater supply is used locally for irrigation purposes or to augment recycled water supply during peak usage (MBC, 2002; LVMWD, 2005). Presently there are no local, dependable surface water supplies and limited groundwater supplies. LVMWD service area is entirely within the Malibu Creek Watershed. A majority of Waterworks District No. 29 service area is within the NSMB watersheds. Only a portion of the Calleguas Municipal Water District (MWD) service area is within the uppermost Malibu Creek Watershed.

The Los Angeles County Waterworks District No. 29

District 29 currently supplies approximately 10,000 acre-feet per year (AFY) of potable water supply to the City of Malibu, Pepperdine University, and unincorporated portions of the County including Topanga Canyon and portions of Marina Del Rey. District 29 has a water supply that is completely imported and acquires its water from the West Basin Municipal Water District (WBMWD – which in turn obtains water from either its underlying groundwater basin (West Basin) or from Metropolitan Water District). The District maintains emergency connections to the Department of Water and Power of the City of Los Angeles (LADWP) and Las Virgenes Municipal Water District (District 29, 2005). Production and use of recycled water is limited in District 29 because the community served is predominately on individual septic systems. District 29 is within the service area of WBMWD's Recycle Program. Under this program, West Basin MWD produces recycled water for 13 southern California cities in its service area. The program does not service District 29 with recycled water because of its remote location (District 29, 2005). A portion of the wastewater generated in District 29 is collected and treated by small private and publicly owned package wastewater treatment plants serving individual developments. The Los Angeles County Department of Public Works operates and maintains the collection and treatment systems of three publicly-owned treatment plants (Malibu Mesa Water Reclamation Plant, Malibu Wastewater Treatment Plant and Trancas Wastewater Treatment Plant) serving the area. The total treatment capacity of the publicly owned facilities is approximately 312,500 gallons per day (gpd). Of these plants, only the Malibu Mesa Plant generates recycled water for irrigation use (District 29, 2005).

Figure I

WATERSHED FEATURES

North Santa Monica Bay Regional Watershed Implementation Plan

CALLEGUAS MUNICIPAL WATER DISTRICT

HIDDEN VALLEY MUNICIPAL WATER DISTRICT

MALIBU CREEK WATERSHED

LAS VIRGENES MUNICIPAL WATER DISTRICT

COASTAL WATERSHEDS

WEST BASIN MUNICIPAL WATER DISTRICT

CITY OF LA WATER DISTRICT

TOPANGA CREEK WATERSHED

VENTURA COUNTY

LOS ANGELES COUNTY

Lindero Canyon

Russell Valley

La Virgenes Canyon

Triunfo Canyon

Sherwood

Arroyo Senuit

Los Alisos Canyon

Nicholas Canyon

Encinal Canyon

Trancas Canyon

Zuma Canyon

Escondido Canyon

Latigo Canyon

Solstice Canyon

Corral Canyon

Ramera Canyon

Carbon Canyon

Las Flores Canyon

Monte Nido

Topanga Canyon

Tuna Canyon

Piedra Gorda Canyon

Pena Canyon

LEGEND

Interstates and Highways

- Interstate
- Highway

Hydrologic Features

- Streams
- 303d Listed Streams
- Lake, reservoir, or pond
- NSMB Watershed Boundary
- Hydrologic Area Boundary
- Hydrologic Sub-Area Boundary
- Water District Boundary

0 1 2

Miles

Map prepared by:

IWR Integrated Water Resources, Inc.

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The Malibu Mesa Plant serves an estimated population of 3,360 persons at Pepperdine University, and the Malibu Country Estates, a residential subdivision in the City of Malibu. The wastewater is recycled to Title 22 standards, and is then used by Pepperdine University for landscape irrigation. The plant has a design capacity of 200,000 gallons per day and provides approximately 140 AFY of recycled water for landscape irrigation to Pepperdine University (District 29, 2005). The volume of wastewater and the treatment plant capacity limit recycled water use.

Las Virgenes Municipal Water District (LVMWD)

LVMWD provides potable water, recycled water, and wastewater services to the cities of Agoura Hills, Calabasas, Hidden Hills, Westlake Village and neighboring unincorporated areas of Los Angeles County. The area served by LVMWD has no local source of drinking water supply, and its approximately 22,000 AFY of potable water is imported and provided by Metropolitan Water District. LVWMD, through its Tapia Water Reclamation Facility (TWRF), provides 4,500 acre-feet/year of recycled water within the service area (LVMWD, 2005). This is approximately 20 percent of total water supply, and represents 60 percent of TWRF production. Currently there is no recycled water supplied from the Tapia WRF to customers within the coastal watersheds (Jurisdictions 1 and 4). LVWMD has aggressively pursued the goal of complete beneficial use of recycled water. Through several extensive studies the district has attempted to identify projects that will fulfill this goal, but has been consistently hampered by the need for, and lack of, seasonal storage for use in summer high-demand months (LVWMD, 2005).

LVMWD operates the 9,600 AF Las Virgenes reservoir for storage of imported water supply. It does capture a small amount of surface water, particularly in wet years (LVMWD, 2005). In addition, LVMWD operates two groundwater wells in Russell Valley, near Westlake Village, to augment recycled water supply during peak summer usage (LVMWD, 2005). The poor quality of this groundwater precludes using it for drinking water supply. Total production from these wells is approximately 200-300 AFY, pumped generally between June and September.

3.0 Local (on-site) Reuse Opportunities

Local (on-site) reuse opportunities for the NSMB watersheds include:

- Irrigation use of roof runoff captured via cisterns
- On-site infiltration of runoff

3.1 Cisterns

On-site stormwater reuse options such as cisterns provide an important role in managing wet weather runoff. Rain barrels and cisterns are low-cost water conservation devices that can be used to reduce runoff volume and, for smaller storm events, delay and reduce the peak runoff flow rates. Cisterns divert and store runoff from impervious roof areas that can provide a source of chemically untreated 'soft water' for gardens and compost, free of most sediment and dissolved salts. Because residential irrigation can account for up to 40 percent of domestic water consumption, water conservation measures such as rain barrels also reduce the demand on the municipal water system.

Although the cistern option will not manage a sufficient quantity of runoff to eliminate the need for other runoff management options, it should be encouraged due to its positive effect from a water conservation standpoint, and its ability to eliminate low flow runoff from very small storm events.

Cisterns, while not capturing, storing and reusing large quantities of precipitation will, in combination with other local stormwater runoff control measures, minimize the impact of urban stormwater in the watersheds.

Analysis of land use, irrigation needs for different land uses, and precipitation records for the coastal watersheds (J1/4 area) indicates that efficient implementation of cisterns could result in the reuse of as much as 700 AFY of stormwater.

Malibu Creek Watershed has approximately 13% residential land use, or 9,100 acres. A similar analysis as that done for J1/4, with average precipitation of 16 inches per year, and assuming 90% capture of precipitation and 40% efficient storage, results in as much as 1,000 AFY reuse of stormwater. As part of a distributed watershed wide implementation of BMPs, cistern installation can assist in reducing total runoff of stormwater and associated urban pollution.

These figures for stormwater reuse for cisterns (700 AFY for J1/4 and 1,000 AFY MCW) assume variable efficiency of installation and water usage. The effectiveness of residential use of rain barrels can be assumed to be similar to the success of residential compost bin programs.

Infiltration associated with cistern use is not expected to interfere with onsite wastewater treatment systems for several reasons. First, the cisterns will be collecting stormwater that would have, in part, otherwise infiltrated, thereby reducing local infiltration for a given storm event; and second, cistern water usage is designed to replace potable water use for irrigation, and therefore the overall result will be a reduction in total amount of water infiltration at the local scale. Cistern use within the NSMB watersheds, including analysis of cost, siting and usage will be addressed in forthcoming Task Memos 6, 7, and 8.

3.2 On-site Infiltration

Opportunities exist for on-site infiltration, as explored in Technical Memo 3.2A in more detail, particularly in the neighborhoods of the upper watershed where local on-site infiltration BMPs could be effective for capturing runoff from small or low intensity intermediate sized storms. Most of these upper Malibu Creek Watershed tributaries contain moderate levels of development, making them optimal targets for BMP implementation. For example, as identified in Technical Memo 3.3, there are several parks in Upper Medea Creek and Upper Lindero Creek subwatersheds of the upper Malibu Creek Watershed, that could be investigated under Task 8 BMP siting. Based on geologic information presented in Technical Memo 3.2A, both of these subwatersheds have alluvial deposits that could accept local infiltration.

4.0 Regional Reuse Opportunities

Regional reuse opportunities considered include:

- Regional groundwater recharge to enhance water supply;
- Reuse of water for recreational uses; and
- Regional capture and reuse as irrigation or other non-potable supply.

Technical Memorandum Task 3.2A discusses groundwater recharge feasibility and opportunities. Technical Memorandum Task 3.3 discusses recreational opportunities. This section provides an evaluation of regional capture and reuse for irrigation or other non-potable supply.

Potential Reuse Projects

The largest single area for reuse of stormwater runoff is irrigation. Landscape irrigation includes golf courses, schools, parks and transportation or highway corridors. Reuse of stormwater for this purpose requires capture, storage, treatment and distribution.

As part of the TMDL Implementation Plan for J1/4 an analysis of potential irrigation demands was conducted. The results, based on analyzing land use, location and irrigation needs, indicated that golf courses, schools, parks, and commercial complexes could use approximately 1,000 AFY of reuse water. Of this 1,000 AFY, Pepperdine University already uses 140 AFY of reclaimed wastewater for landscape irrigation. Over 300 AFY of the remaining irrigation demand targeted Malibu County Golf Course.

Within the Malibu Creek Watershed LVMWD has a well developed recycled wastewater program that presently uses a 60% of TWRF effluent, with the goal of using 100%. LVMWD has identified Malibu County Golf Course as a major potential customer, and has designed,

and is presently seeking funding for, a distribution system to supply recycled water to the golf course (LVMWD, 2005). Wastewater reuse, and the simultaneous reduction of potable water imports into the watersheds, is a high priority consideration in any integrated watershed management plan.

LVMWD studies have identified numerous possible projects for use of recycled water (Kennedy/Jenks, 2005). Many of these projects incorporate transfer of water out of the watershed in one form or another, and therefore are not considered further here. Several other projects were concerned with expanding use of recycled water by identifying new customers. Other projects of interest include constructing new, or increasing existing, surface storage facilities. In conjunction with groundwater recharge or wetland infiltration, storage projects could result in the beneficial reuse of considerable quantities of stormwater. Several storage/recharge projects were associated with Ahmanson Ranch development, and are therefore no longer viable. The remaining surface storage projects are also unlikely to occur due to the high value of the real estate involved (Kennedy/Jenks, 2005).

Technical Memo 3.2A summarizes the hydrogeology and aquifer characteristics of the NSMB watersheds, and points out that only a couple small alluvial aquifers are available for recharge projects. In addition, the lack of existing significant groundwater extraction and poor water quality, result in a general lack of groundwater recharge opportunities for beneficial reuse of storm runoff.

5.0 Conclusions

Analysis of coastal watersheds, as part of the J1/4 implementation plan, concluded that local reuse of stormwater, in particular the use of cisterns, was the most suitable opportunity for beneficial use. Relatively high groundwater levels and lack of large alluvial aquifers suitable for recharge and storage (as summarized in Technical Memo 3.2A), precludes the development of any regional reuse opportunities within the coastal watersheds.

Malibu Creek Watershed, with its much larger area and inland reach, presents more opportunities for regional reuse of stormwater, but difficulties identified by LVMWD for expansion of their existing recycled water program suggest similar difficulties for a regional reuse system for stormwater. These difficulties include lack of surface storage capability, lack of significant additional customer base, and high treatment and distribution costs. Lack of large alluvial aquifers, with existing significant groundwater withdrawals, limits opportunities for groundwater recharge and subsequent beneficial reuse of significant quantities of stormwater.

These limitations on regional reuse scenarios emphasize the importance of distributed, watershed wide, local small-scale stormwater reuse and infiltration projects as the most suitable management tool for reducing storm runoff. On-site infiltration opportunities to be

considered as part of BMP and BMP siting in Tasks 6, 7 and 8 should target the middle and upper parts of tributaries in the upper portions of Malibu Creek Watershed. Local infiltration projects within the developed portions of these upper watershed tributaries (Upper Lindero and Upper Medea Creeks) could do much to reduce stormwater and associated urban pollutants in Malibu Creek.

6.0 References

District 29 Urban Water Plan, 2005. County of Los Angeles, Department of Public Works, Water Resources Unit, December 2005. Urban Water Management Plan for Waterworks District 29 and Marina Del Rey Water System.

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