

# ATTACHMENT 6

MONITORING, ASSESSMENT &  
PERFORMANCE MEASURES

## Attachment 6 Monitoring, Assessment and Performance

The primary purpose of Amethyst Basin is to provide improved flood control and protect human safety. The secondary purpose of Amethyst Basin is to provide opportunity for water recharge to the western Mojave desert in collaboration with the Mojave Water Agency's Oro Grande Project.

The following are performance measures that help facilitate the project performance verification process for the Amethyst Basin Stormwater Flood Reduction Project.

### A. Reduce Flood risk

The main metrics that will be used to assess the projects performance are improved flood control and reduction of the 100-year, 6 hours floodwater levels over the one and half mile of Oro Grande Wash. The floodwaters generated in the watershed will be conveyed



Figure 6-1

to Amethyst Basin where they will be detained and released slowly through a basin outlet. The reduction in peak volume will reduce the depth of water conveyed through the streets, culverts and natural drainage paths reducing the potential for flooding. Floods are classified according to their frequency and depth. A 100-year flood event has a large enough volume and depth to cause severe damage and destruction, and is a serious threat to human safety. The Amethyst Basin is located in a watershed producing 6,550 cubic feet per second and will serve to capture and detain approximately 20% or 1,323 cubic feet per second. Amethyst Basin is part of the Victorville Master Plan of Drainage geared toward reducing high volumes of floodwaters reaching residential and State Highway infrastructure in the City of Victorville. In order to quantify and track the performance of Amethyst Basin, the District will incorporate the threefold methodology currently used to track the 119 basins owned and operated by San Bernardino County Flood Control District:

1. Monitoring- To monitor progress after completion of the project monitoring and measuring will occur during and after each major storm event, defined by the National Weather Service as having intensities of more than 0.3 inches per hour or more than 2.0 inches per 24 hours by the use of an ALERT system (Automated Local Evaluation in Real Time) and standard metrics. On-site sensors, when installed, will monitor both rainfall and water levels in the basin and along the streambed. (See Figure 6-2)

The data is then received, assessed, and archived by two independent computer base stations where it can be used to assess project performance.



**Figure 6-2**

2. Inspection- Immediately after the storm season has passed, usually April, the inspectors begin Basin Inspections. Amethyst Basin Inspection will include structural assessment, security issues and overall basin status (i.e. erosion, excess vegetation, missing staff gage, graffiti, etc.) and a report folder will be kept on file. A sample Basin Inspection Report is shown on Figure 6-3.





## B. Water Recharge Opportunity

Population in the western Mojave Desert near Victorville, California, increased from 90,000 in 1980 to more than 300,000 in 1999 (R. Rector, oral communication, 1999). Growth was especially rapid between 2000 and 2005. During that time, the population of Victorville, the largest city in the area, increased by more than 40% ([http:// www.city-data.com/](http://www.city-data.com/) [accessed December 2, 2006]).

As a result of the increased population in the past decade ground water in this area which serves to provide the sole source of public water supply to the area has experienced a substantial demand in supply that is just not available. The Mojave Water Agency clearly understands this need and has determined artificial recharge projects are vital in aiding to mitigate for these increases. Currently the Mojave Water Agency has undergone the first Phase of the Oro Grande Recharge project to construct the conveyance pipeline to deliver water to Amethyst Basin. When complete, the project will recharge up to 3,600 acre-ft per year to support groundwater in the western part of the Alto Sub Area. Without the Amethyst



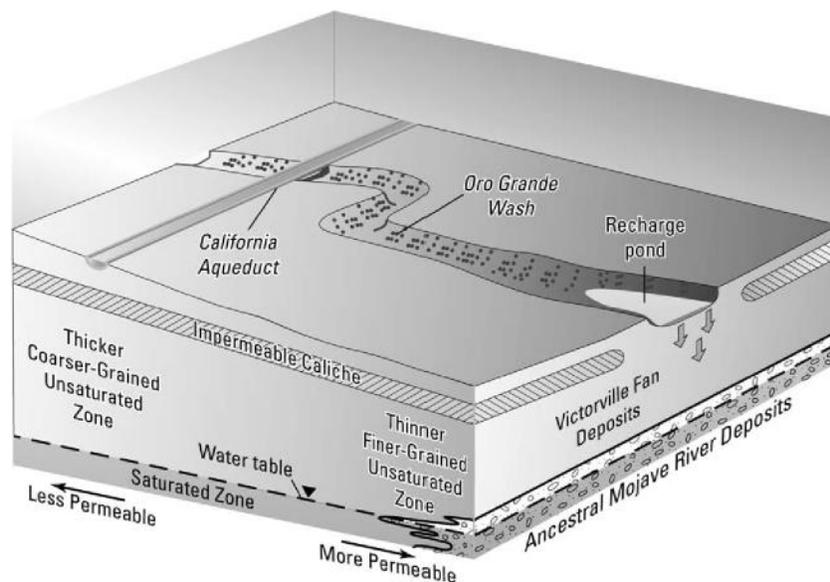
Figure 6-5

Basin, the existing MWA facility will only be capable of delivering less than 1,000 acre-feet per year. (See Figure 6-5)

In collaboration with the Mojave Water Agency, and in an effort to perform the main functions of flood control and preservation of watersheds and watercourses, the District is acquiring and setting aside the appropriate area required for water recharge within the basin floor approximately 30 acres (See Work Plan attachment 3) to help aid the mitigation effort.

The Amethyst Basin location has been tested extensively over the past few years and studies have shown the importance of groundwater recharge at this location due to its geotechnical characteristics. The Study by John A. Izbicki accompanied by Fig 6-6 states the following;

*" The recharge pond is located in the incised channel of Oro Grande Wash where thick, impermeable caliche layers that underlie much of the Victorville Fan are not present. The site overlies a pumping depression in the regional aquifer near several large-capacity public-supply wells. The site was selected to minimize the depth to water while avoiding fine-grained deposits associated with the toe of the fan farther downslope. Farther upslope, alluvial fan deposits overlying the water table thicken but are coarser grained and more permeable— potentially enhancing the downward movement of water."*



**Figure 6-6**

"Artificial Recharge through a thick, Heterogeneous Unsaturated Zone", by John A. Izbicki et al. Study 2008.

**Project Performance Measures Table**

	<b>Project goals</b>	<b>Desired outcomes</b>	<b>Output indicators</b>	<b>Outcome indicators</b>	<b>Measurement tools and methods</b>	<b>Targets</b>
<b>(a)</b>	<b>PRIMARY</b> Reduce Flood Risk	Reduce the percent chance of experiencing flood	Floodwaters stay within existing infrastructure	Reduced frequency of overtopping, road closures and maintenance	Monitoring, Annual Inspection and maintenance <i>(at min. annually)</i>	100% reduction in flood damages
<b>(b)</b>	<b>SECONDARY</b> Water Recharge Opportunity	Mitigate Water levels to meet increased demand	Water table increase	retard long term water level losses by 0.8 m per year	Water level depths(decrease) and improved groundwater quality	Recharge 3,500 acre-feet/year.
<b>(c)</b>						
<b>(d)</b>						