



# Devil's Gate Reservoir Sediment Removal and Management Project

Public Scoping Meeting  
October 15, 2011

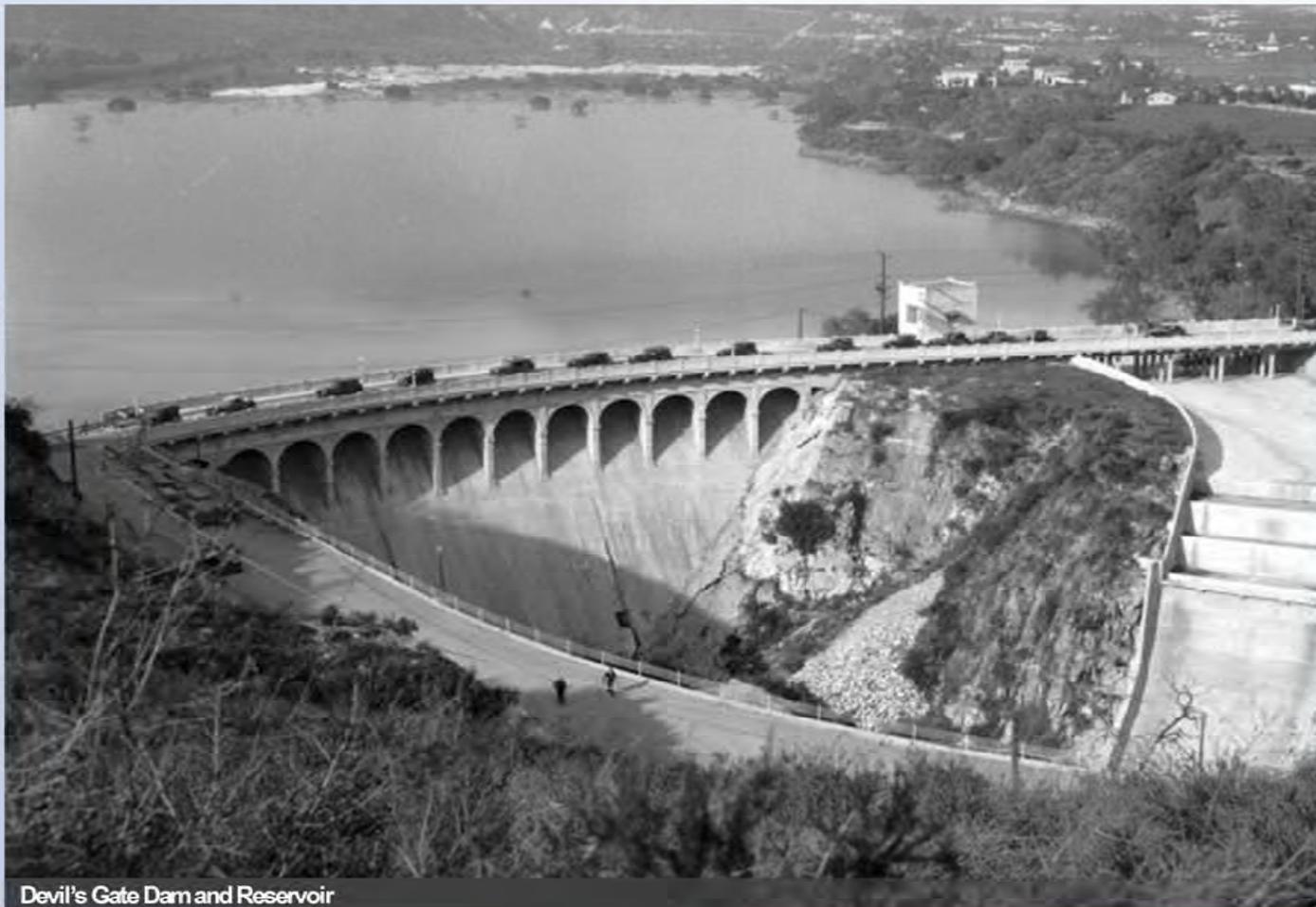


Presentation By: Keith Lilley, P.E.

Devil's Gate Reservoir Sediment Removal and Management Project

Good evening/morning. My name is Keith Lilley and I am a civil engineer in the Los Angeles County Department of Public Works' Water Resources Division where I oversee a group of engineers developing sediment removal projects for the reservoirs affected by the Station Fire, one of which is Devil's Gate Dam. I will be providing an overview of the history of dam, how the dam functions, and why we are proposing a sediment removal project at the dam.

# Devil's Gate Dam & Reservoir



Devil's Gate Dam and Reservoir

Devil's Gate Reservoir Sediment Removal and Management Project

Devil's Gate Dam was built in 1920 for flood control and water conservation and was the first dam built by the Flood Control District which was formed in 1915 after a series of floods that caused loss of life and extensive property damage in the LA basin.

# Downstream Construction



Rose Bowl Construction – completed in 1922



Arroyo Seco Channel Construction – completed in 1935



Arroyo Seco Pwy Construction – completed in 1940

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Construction of the dam provided flood protection and allowed for development downstream including the Rose Bowl and the Arroyo Seco Channel. With the dam and channel in place development could safely proceed along the Arroyo Seco in the Cities of Pasadena, South Pasadena and Los Angeles. The last photo show the construction of the Arroyo Seco Parkway (110 Freeway) which was the first freeway constructed in the United States.



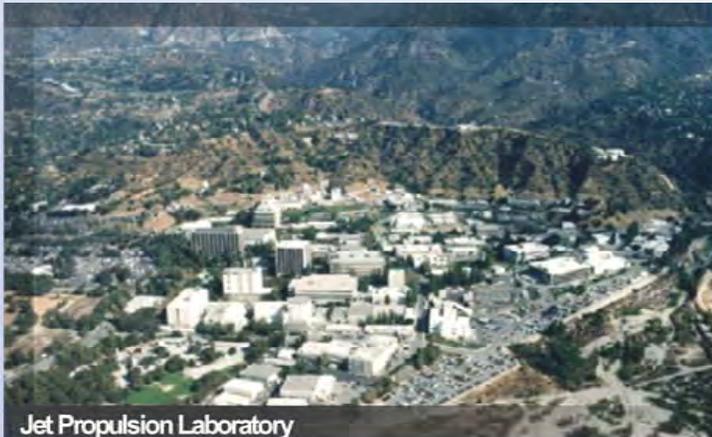
1935 Aerial View



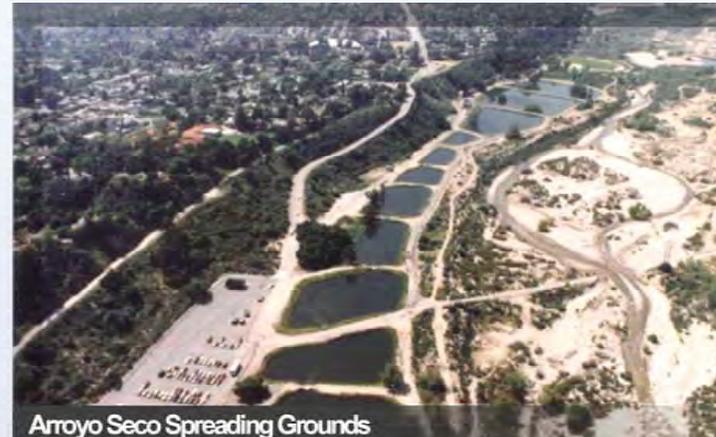
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There have also been changes upstream since the dam's construction. This photo from 1935 shows very little vegetation in the reservoir area; however the oaks of what is now Oak Grove Park can be seen.

# Nearby Facilities



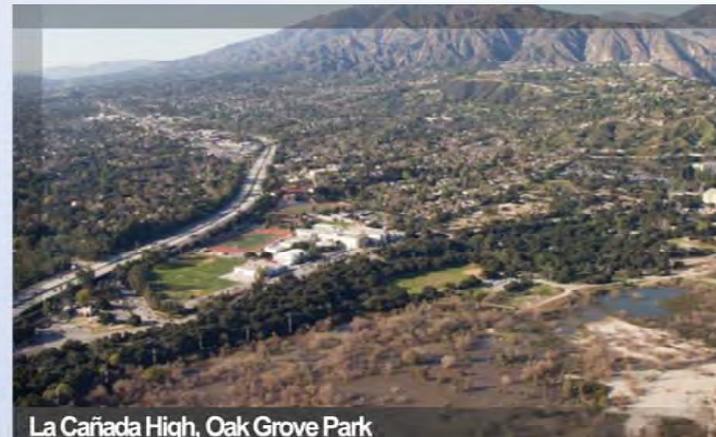
Jet Propulsion Laboratory



Arroyo Seco Spreading Grounds



Mining Operation



La Cañada High, Oak Grove Park

Devil's Gate Reservoir Sediment Removal and Management Project

Currently, within and adjacent to the reservoir are JPL, various homes in Altadena along the eastern rim, water conservation facilities (Spreading Grounds), and on the western side, the City of La Cañada, La Cañada High School, a Methodist Church, and Oak Grove Park. Additionally, commercial mining for sand and aggregate took place in the reservoir in the 1980's.

# Recreational Opportunities



Frisbee Golf



Athletics



Equestrian



Picnic



Education

Source: Arroyo Seco Foundation

Devil's Gate Reservoir Sediment Removal and Management Project

There are numerous recreational uses within Oak Grove Park.

# Biological Resources



Devil's Gate Reservoir Habitat

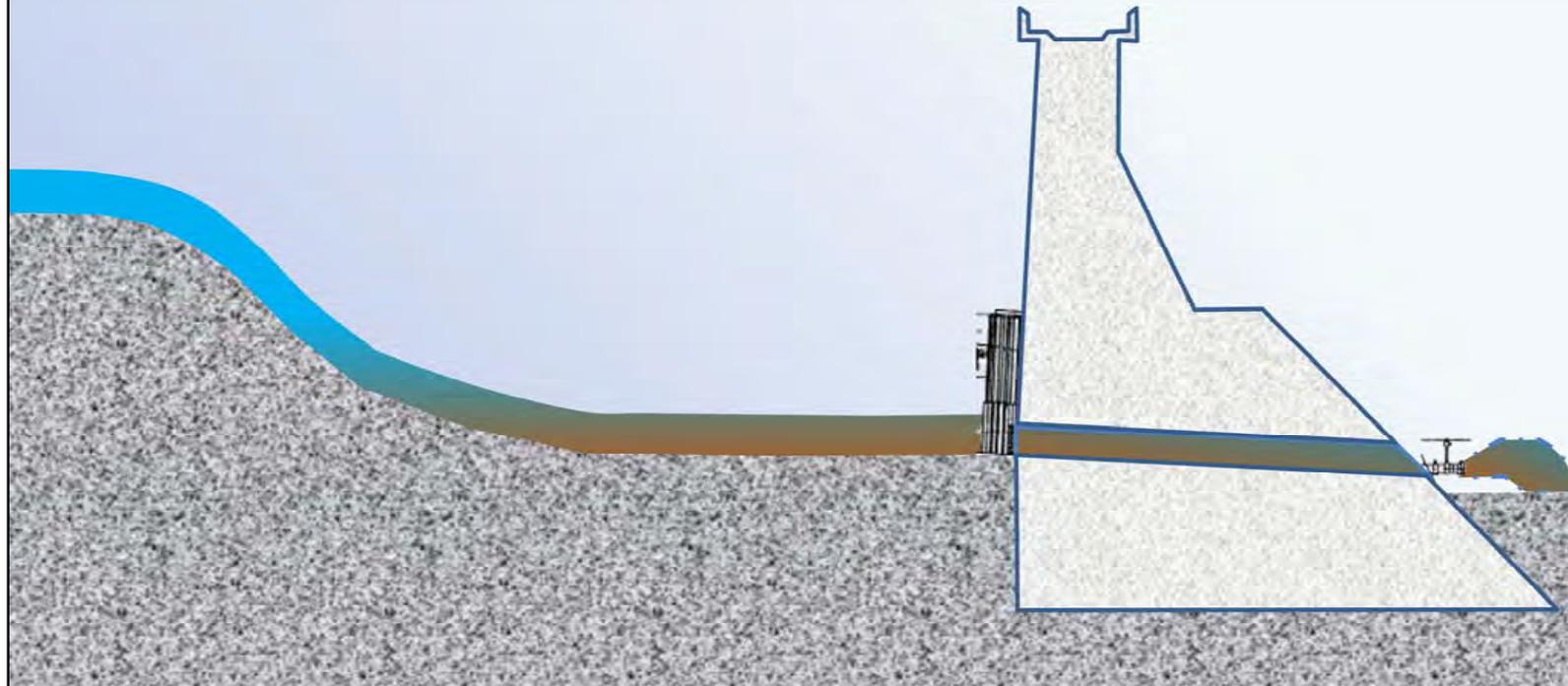
Devil's Gate Reservoir Sediment Removal and Management Project

Within the reservoir there is an abundance of vegetation, habitat that supports multiple species. As a result, Devil's Gate is a significant bird watching area in the County.



# Flood Control Operations

**Normal storm flows through the reservoir**



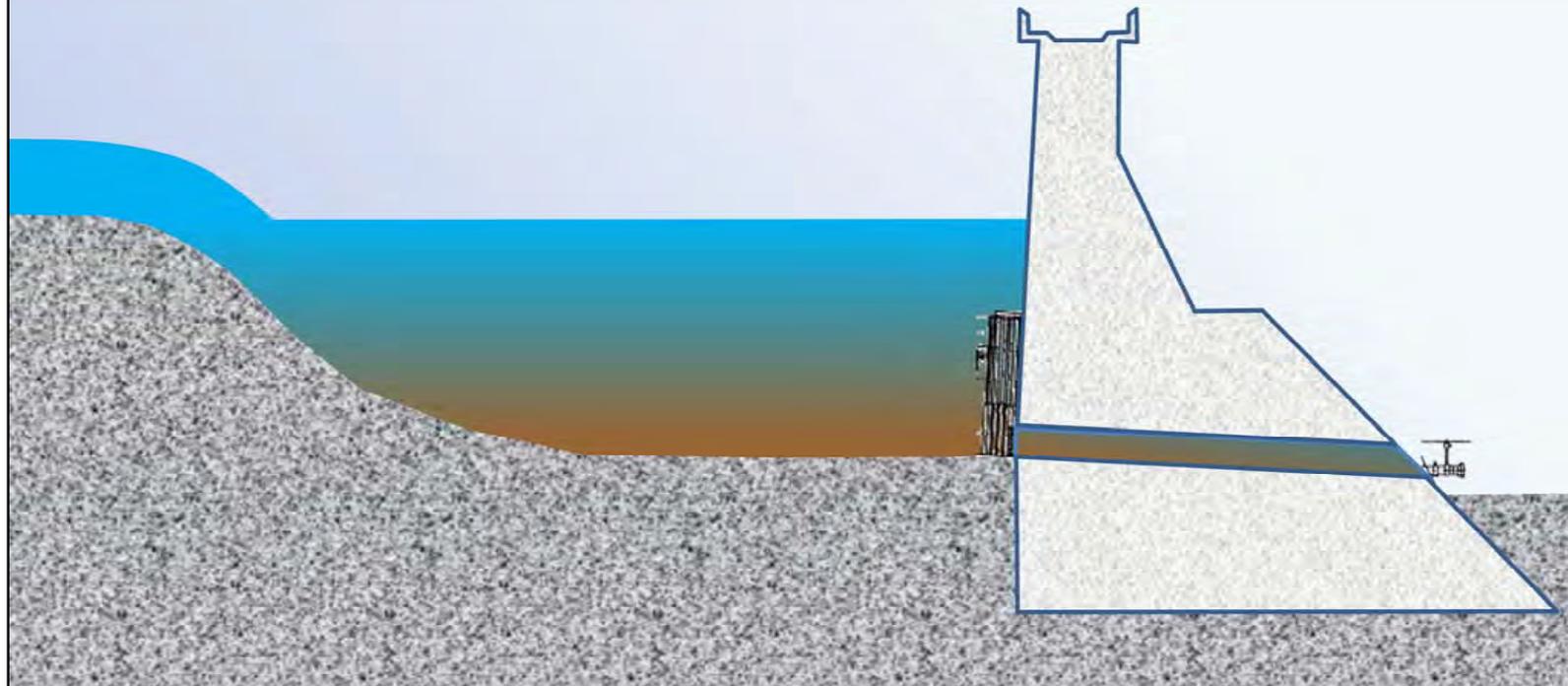
Devil's Gate Reservoir is primarily a flood control facility. These slides demonstrate how the reservoir is operated, how sediment accumulates, and how all of the vegetation and habitat has developed.

- Under normal operations the lowest gate is left open and storm flows along with their sediment pass through the dam. This helps to reduce sediment accumulation in the reservoir



# Flood Control Operations

**A buffer pool is built to accommodate for larger storm flows.**

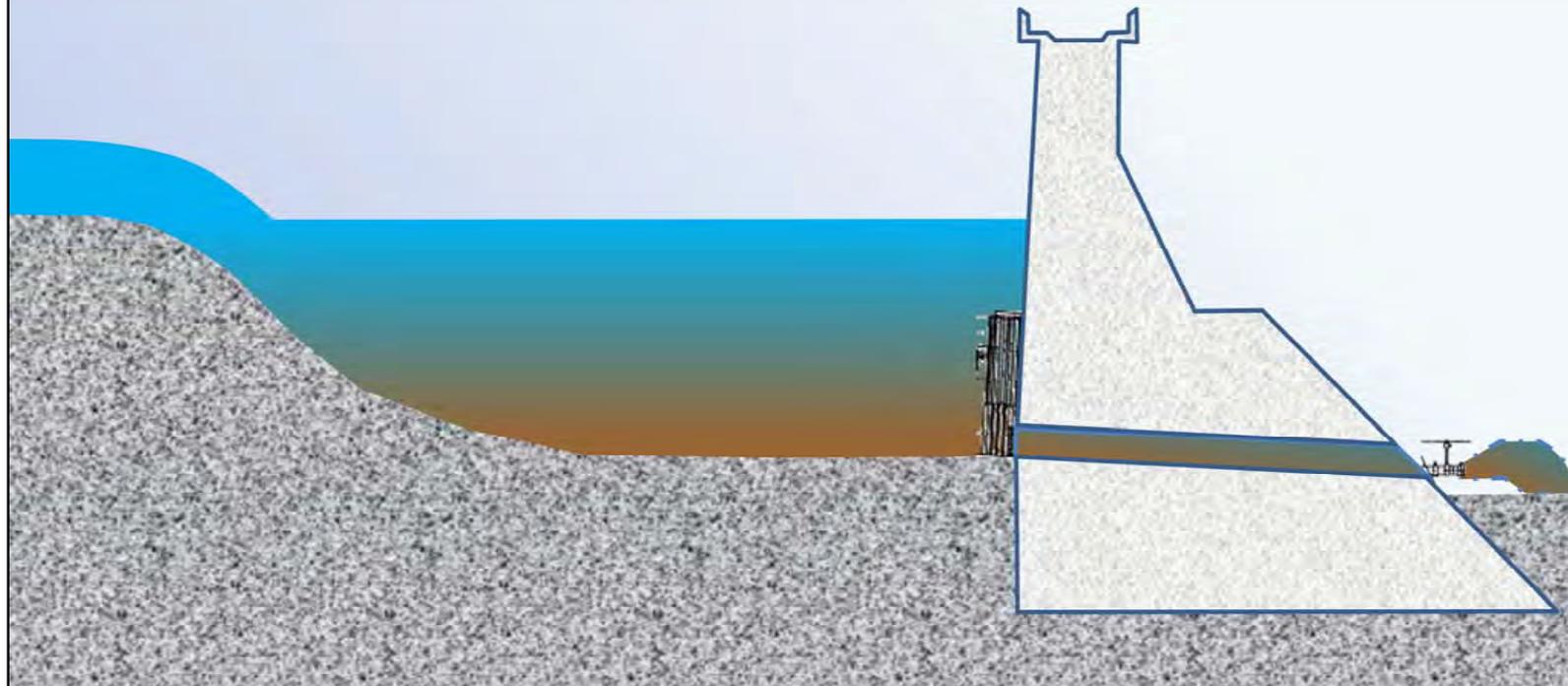


During larger storms that exceed the gates capacity or which could bring significant sediment and debris towards the gate and plug it, the gate is closed to allow a “buffer pool” to build. The other valves are then operated to control the reservoir level and the amount of flow entering the downstream channel.



# Flood Control Operations

**Outlet flows can be controlled by the dam.**

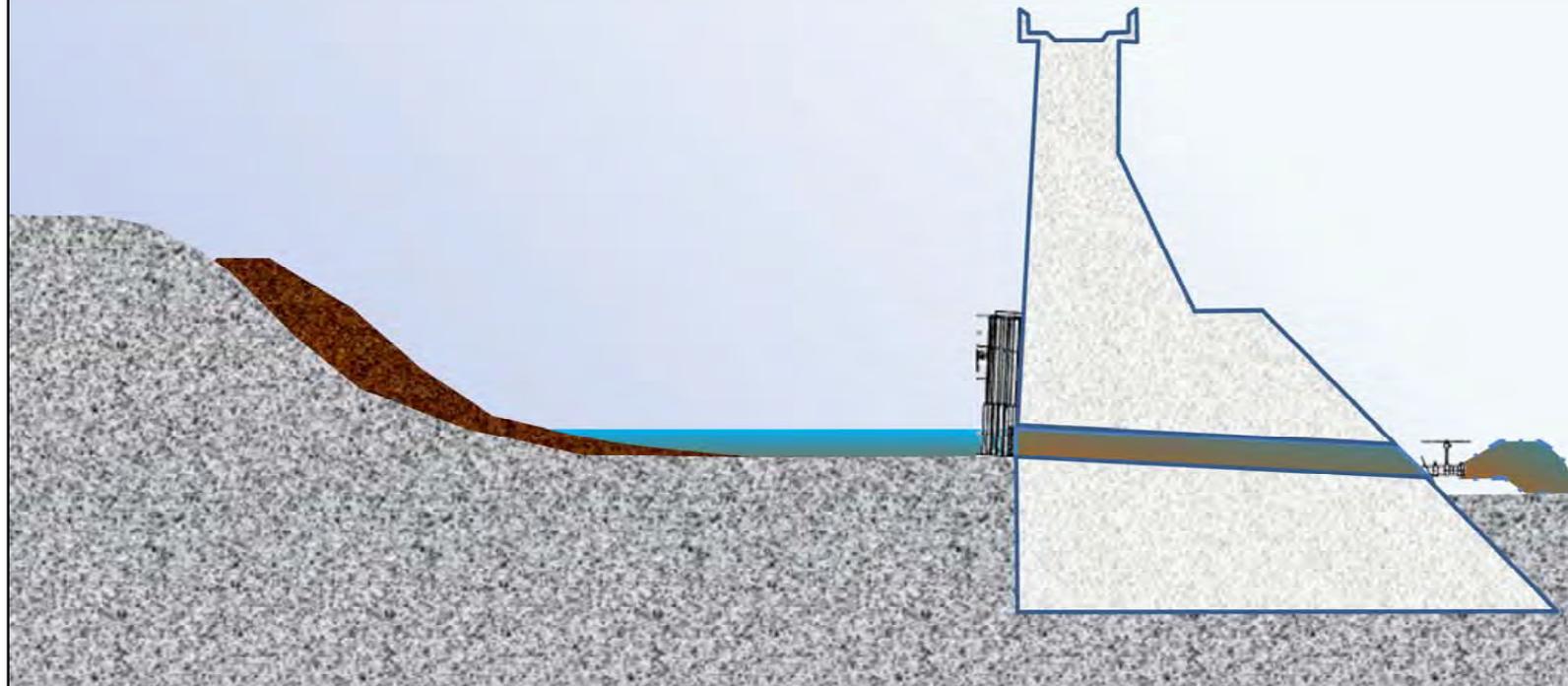


During larger storms that exceed the gates capacity or which could bring significant sediment and debris towards the gate and plug it, the gate is closed to allow a “buffer pool” to build. The other valves are then operated to control the reservoir level and the amount of flow entering the downstream channel.



# Flood Control Operations

**Sediment and debris is left behind once reservoir is drained**

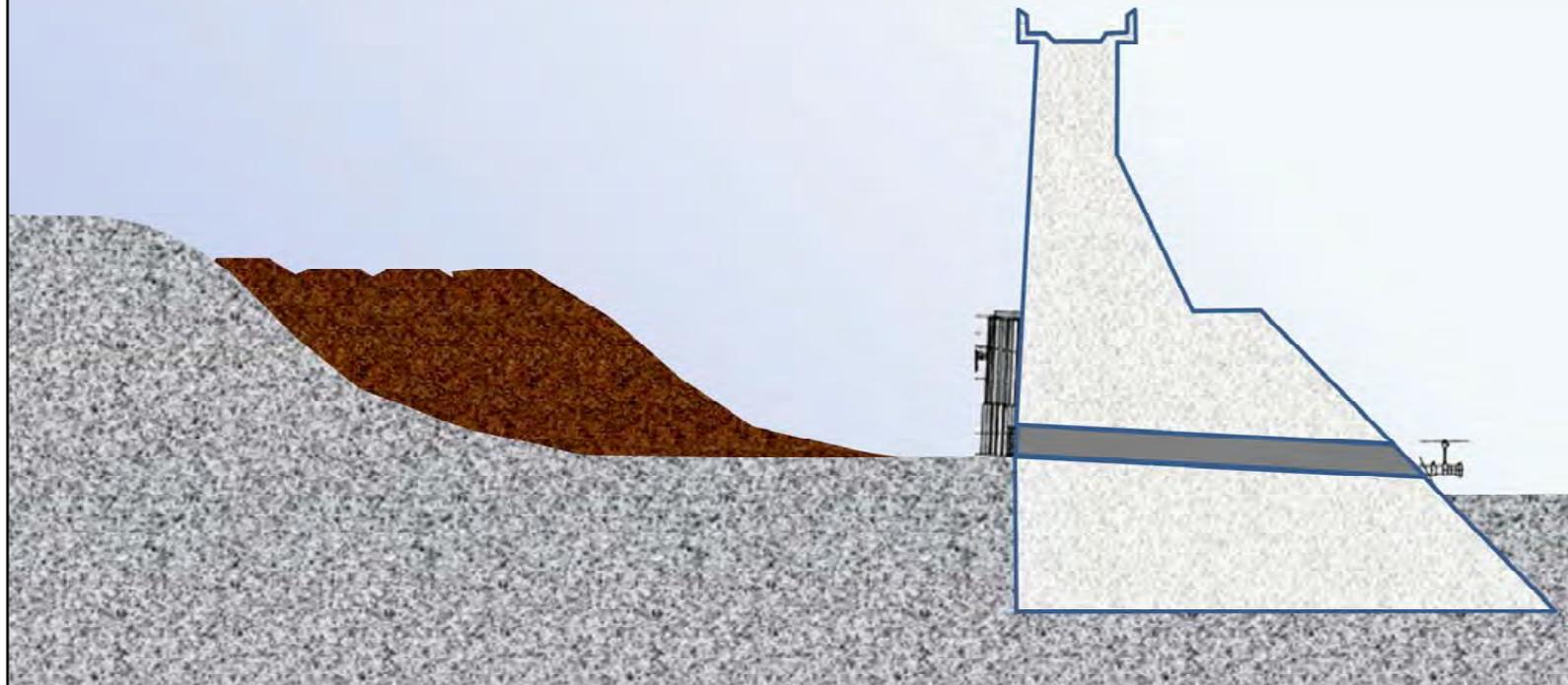


When the “buffer pool” is in place, flows entering the reservoir slow down and the sediment settles out in the upstream area of the reservoir, away from the dam face and valves.



# Flood Control Operations

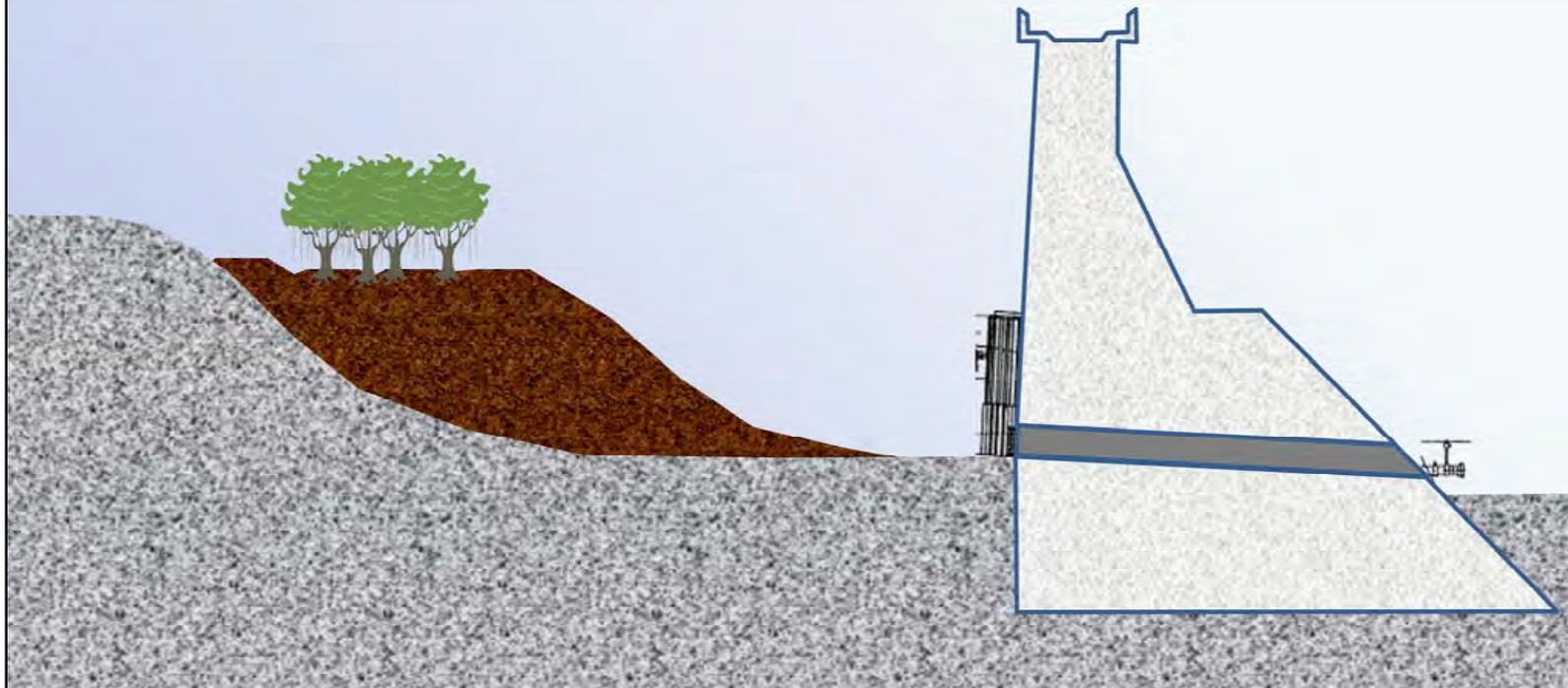
Sediment continues to build with each storm





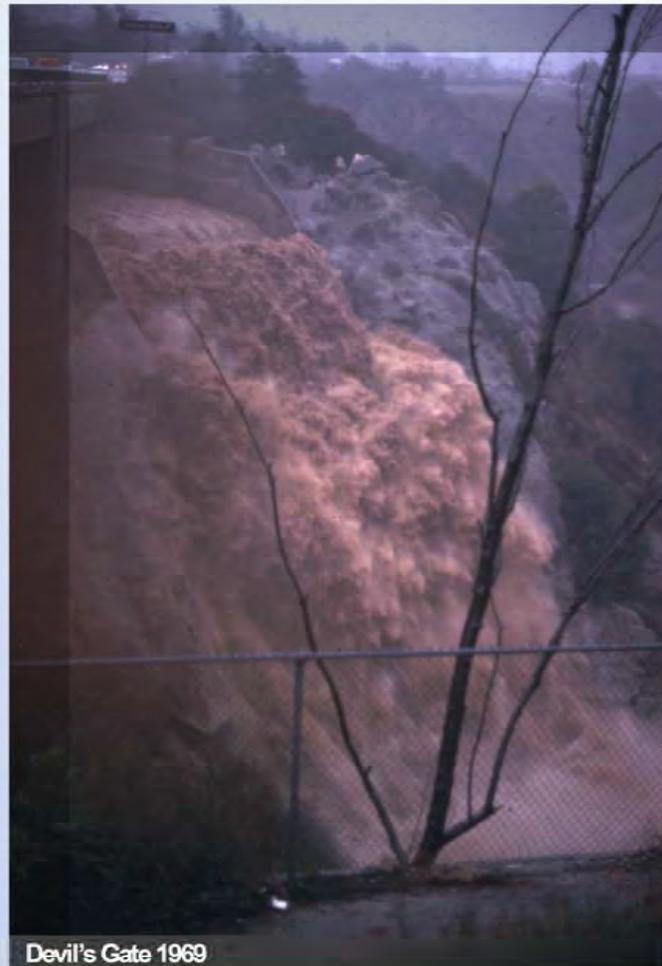
# Flood Control Operations

After time, vegetation begins to grow in the reservoir



After multiple storms over multiple years, the sediment accumulates and vegetation grows on the sediment.

# Devil's Gate at Spillway



Devil's Gate 1969

Devil's Gate Reservoir Sediment Removal and Management Project

Some storms exceed the capacity of the dam's valves and gates and flow goes over the spillway as shown here in 1969.

# Devil's Gate at Spillway



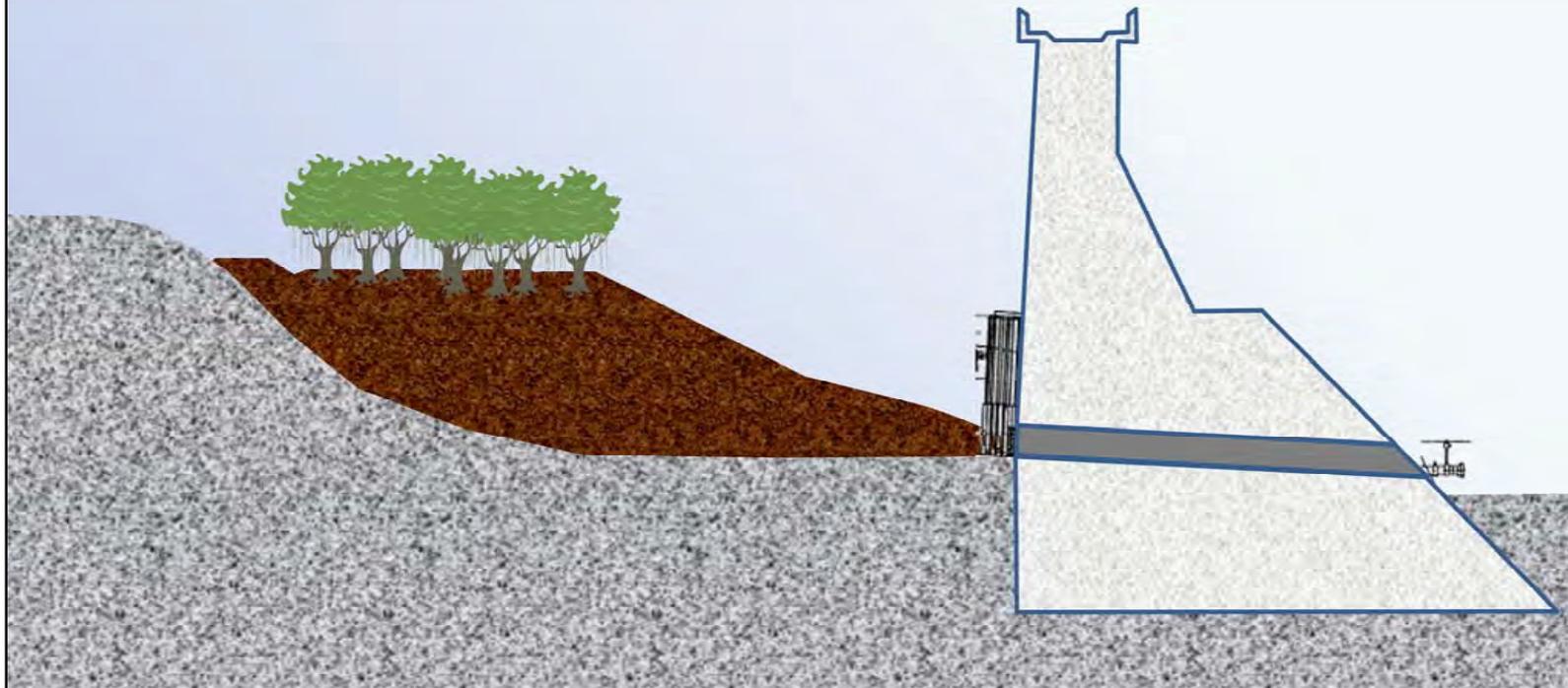
Devil's Gate 2005

Source: Arroyo Seco Foundation

Devil's Gate Reservoir Sediment Removal and Management Project

Again, here is spillway flow during a 2005 storm. As you can imagine, these are more powerful inflow events with higher flow rates and velocities. These storm flows can move the sediment closer to the dam face.

# Sediment Accumulation



After years of gradual sediment accumulation and large storm events such as the 2005 spillway flows, sediment removal projects are necessary. The last major sediment removal event was 1994 when 190,000 cubic yards (cy) were removed. In 2006, 14,000 cy were removed and in 2009, 3,800 cy were removed. All of these projects had limited sediment removal due to the presence of vegetation that limited the excavation footprints.



## A Regional Disaster: 2009 Station Fire

Largest fire in Los Angeles County Recorded History

- Burned over 160,000 acres in the San Gabriel Mountains
- Burned approximately 68% of the Devil's Gate watershed



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In addition to gradual sediment accumulation – sediment can also fill the reservoir during extreme debris inflow events as a result of the fire/flood sequence. As you are likely aware, the Station Fire of 2009 was the largest fire in LA County recorded history. It burnt approximately 100% of the undeveloped watershed above the dam (68% of the total watershed of 31.9 square miles).

# Major Debris Potential



Burned Watershed

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Following fires, severely burned areas do not have vegetation to hold sediment in place during storm events. Additionally, when the chaparral in the mountains burn, resins from the plants create a hydrophobic or waterproof layer a few inches below the soil. These conditions result in mudflows due to stormwater runoff washing the surface soil down the hillsides. Tributary streams then carry the water and sediment along with boulders and tree trunks into the reservoir. In order to design flood control and debris containment structures, engineers have developed methods to calculate the amount of debris estimated to be washed down during a single, major storm event. This is called the Design Debris Event. For the watershed tributary to Devil's Gate Dam, the Design Debris Event is approximately 2,000,000 cubic yards.

# Debris Inflow



Burned Watershed

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This photo shows some of the sediment, debris, and tree limbs and branches that washed into the reservoir in 2010 during one of the storms following the Station Fire.



Devil's Gate Reservoir Sediment Removal and Management Project

This aerial photo from 2010 shows the significant amounts of sediment washed into the reservoir. While a Design Debris Event did not occur, over 900,000 cubic yards of sediment accumulated during the 2009-10 storm season.

# Sediment at Face of Dam



## Same Trash Rack



### Devil's Gate Reservoir Sediment Removal and Management Project

- This is a comparison of the upstream face of the dam 2009 vs 2011
- During this past storm season **Valve 1** was inoperable and Sluice Gate was stuck.
- This shows how the sediment can affect the functioning of the outlet works and which, in turn, limits our ability to control storm flows to the downstream

# Green Waste



Organic Sludge



Dead Vegetation

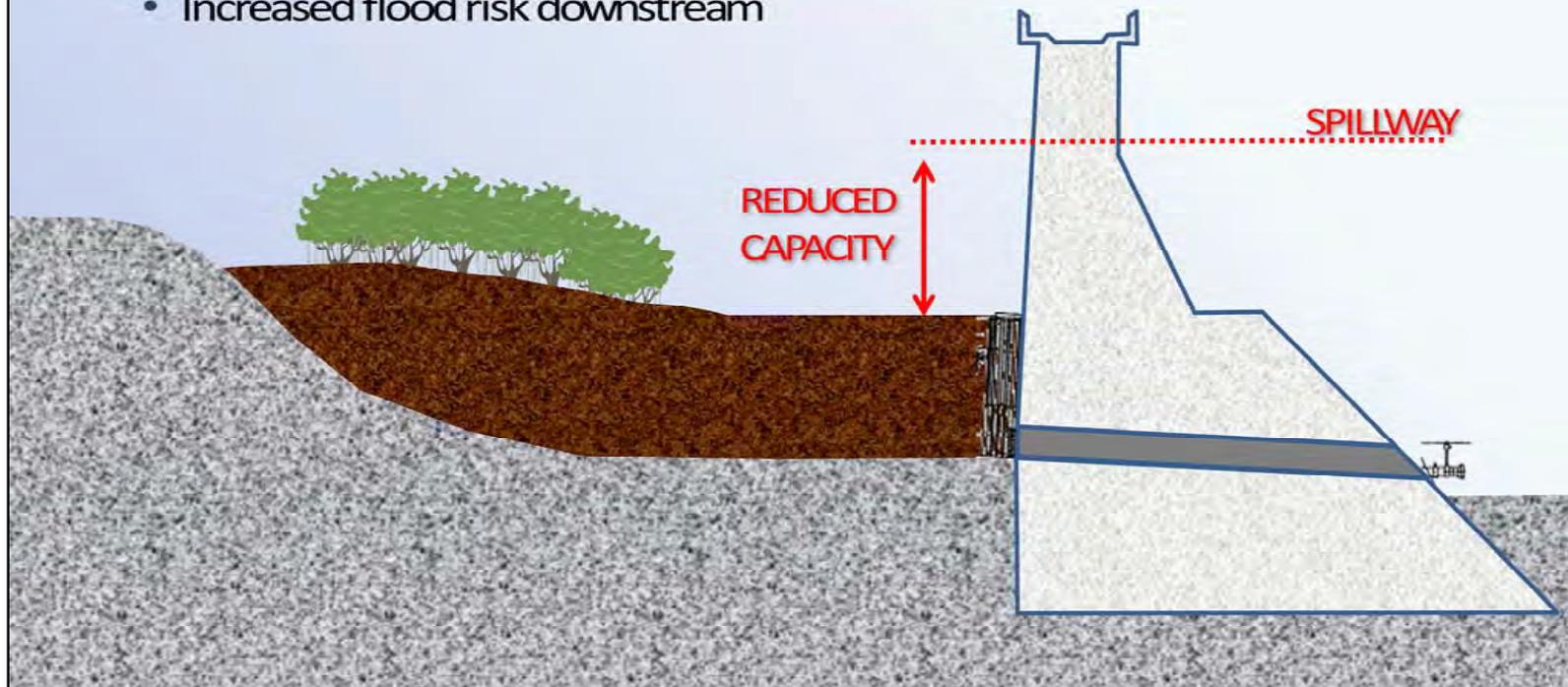
Devil's Gate Reservoir Sediment Removal and Management Project

These photos show the organic sludge and dead vegetation that affects the dams outlet works. This valve from Devil's Gate Dam had to be removed for maintenance after it was plugged with debris. Workers are shown moving dead tree limbs and vegetation clumps away from the trash-rack to keep it functioning.



## Sediment Concerns

- Reduction in reservoir capacity
- Potential to block outlet works
- Increased flood risk downstream

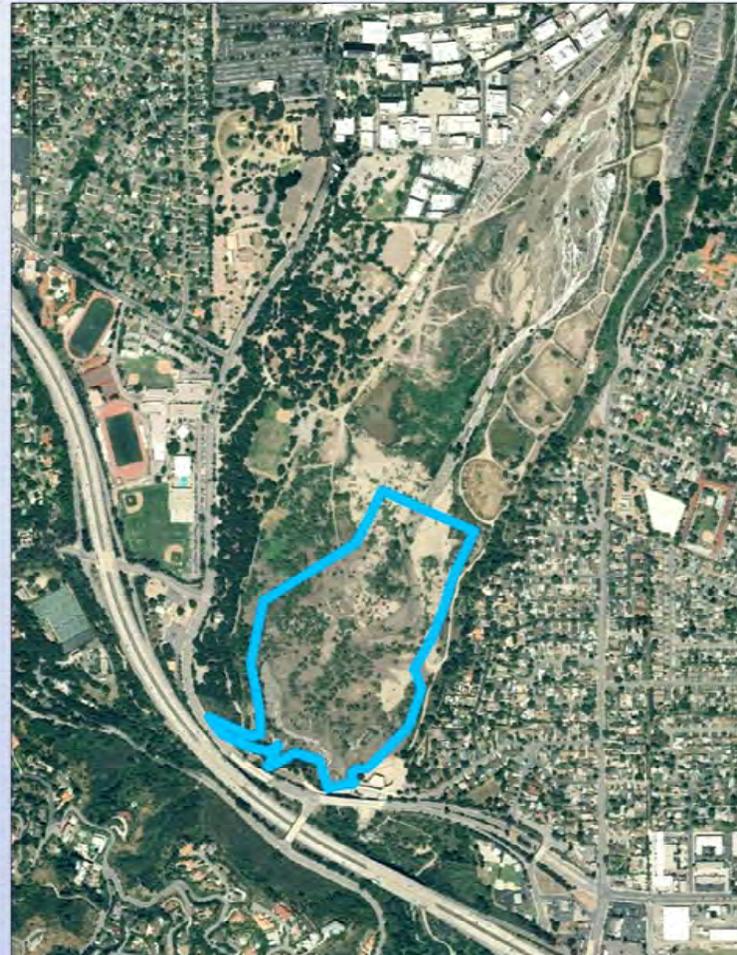


As a result of sediment accumulation, we have some concerns:

- There is inadequate capacity to capture future sediment inflows such as a Design Debris Event
- There is potential to plug or block the outlet works

These two concerns result in an increased flood risk downstream along the Arroyo Seco. During a major storm event, it is possible that the dam would not be able to capture all of the storm flows and sediment. Consequently, these sediment laden flows could be washed over the spillway to the downstream channel. The channel was designed for a major storm event based on the dam capturing all of the sediment and was not designed to carry the sediment.

# Emergency Excavation Boundary

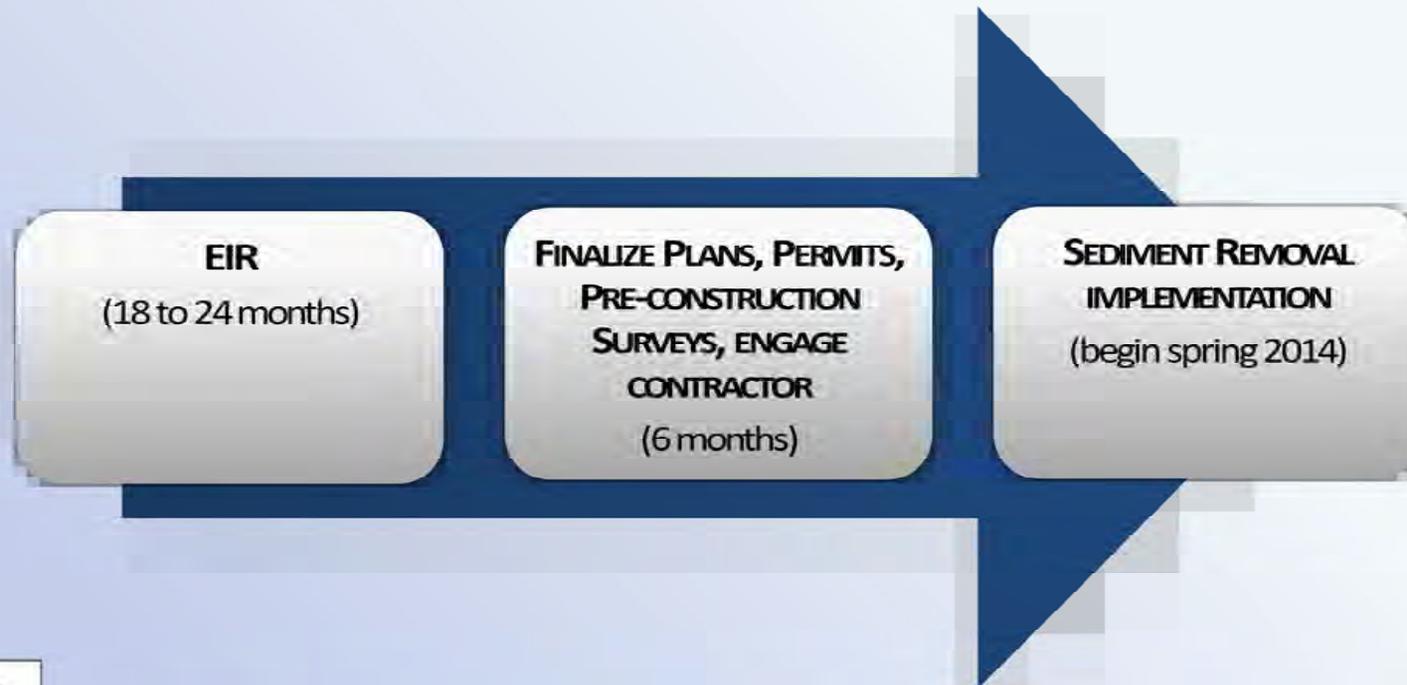


Devil's Gate Reservoir Sediment Removal and Management Project

In response to those concerns, we started planning a project to be implemented on an “emergency” basis. That project would have removed about 1.7 million cubic yards of sediment (resulting in about 4 million cubic yards of capacity below the existing spillway elevation) and have a foot print of approximately 50 acres as shown by the highlighted area. However, in recognizing strong stakeholder concern and potential significant impacts to vegetation and habitat, Mayor Antonovich and our Board of Supervisors decided an Environmental Impact Report should be prepared.



# Anticipated Project Schedule



Devil's Gate Reservoir Sediment Removal and Management Project

The Environmental Impact Report (EIR) has been initiated. Chambers Group is the environmental consulting firm hired to prepare the EIR will be prepared. As shown in the timeline, the EIR will take 18 to 24 months and is expected to be completed in the beginning 2013. After completing design plans, obtaining permits, and engaging a contractor, sediment removal work would not begin until after the storm season in the spring of 2014.

# Interim Measures Project (IMP)

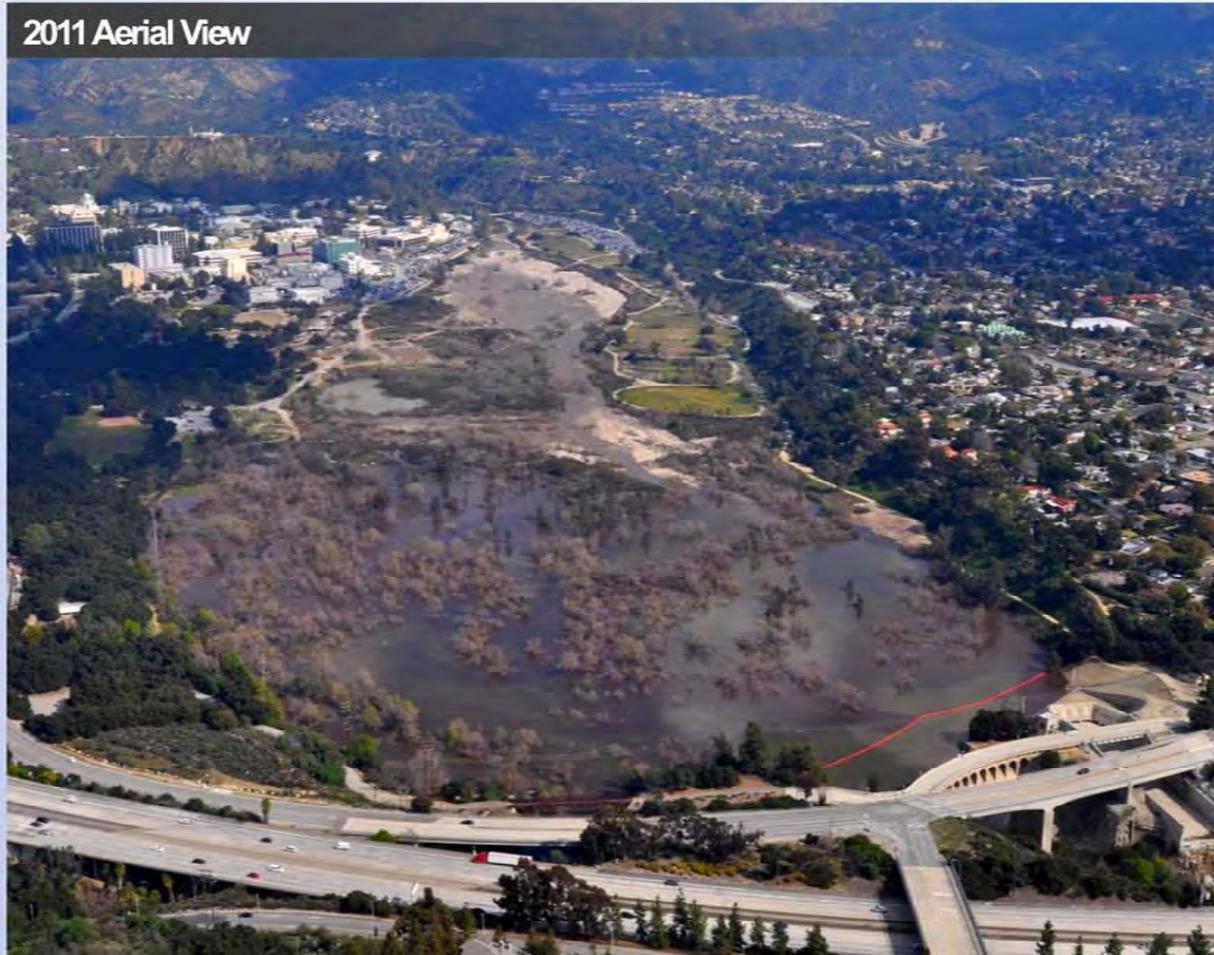


Devil's Gate Reservoir Sediment Removal and Management Project

In order to reduce flood risk until the sediment removal project is implemented, the Board of Supervisors also required we implement interim protective measures. The Interim Measures Project takes place within area near face of dam where there is no mature vegetation. The top right photo shows excavation of sediment from the face of the dam to create a buffer area. The project removed 13,000 cubic yards of sediment from the face of the dam. The lower photo shows installation of measures to prevent the outlet works from getting plugged with debris. The measures include closer bar spacing on the trash-rack and raising the trash-rack elevation. Boom logs to catch floating debris, access walkways, and stairways for maintenance personnel will also be added. The work is expected to be complete in a few weeks.



### 2011 Aerial View



Devil's Gate Reservoir Sediment Removal and Management Project

For the major sediment removal project, we have heard a number of stakeholder comments and agree that rather than just address the immediate needs and have to go through this again in a few years, this project affords an opportunity to take a longer term approach and develop a more comprehensive project with a more sustainable reservoir function.



# Devil's Gate Reservoir Sediment Removal & Management Project

## PROJECT OBJECTIVES

1. Reducing flood risk to the communities downstream of the reservoir adjacent to the Arroyo Seco by restoring reservoir capacity for flood control and future sediment inflow events.



Devil's Gate Reservoir Sediment Removal and Management Project

The project name reflects this approach, Devil's Gate Reservoir Sediment Removal and Management Project. By "management project" we refer to both sediment management and reservoir management. We have developed a number of project objectives as listed on this and the following slides.

# Project Excavation Boundary



Devil's Gate Reservoir Sediment Removal and Management Project

To meet the objective of restoring capacity in the reservoir, we would currently need to remove 2.6 million cubic yards of sediment to reach our design standard of capacity for 2 Design Debris Events (4 million cubic yards) below the spillway elevation. There is plenty of area with our flood control easement, the yellow boundary, to meet this objective and more. However, we recognize that excavation in that area could impact Oak Grove Park and the water conservation pool. Consequently, we have developed a smaller excavation boundary, shown in red, within which the excavation would occur. The entire area within the red boundary would not have to be excavated, but all excavation areas are expected to occur within the red boundary.



# Devil's Gate Reservoir Sediment Removal & Management Project

## PROJECT OBJECTIVES

2. Supporting sustainability by establishing a reservoir configuration more suitable for routine maintenance activities including sediment management.



Devil's Gate Reservoir Sediment Removal and Management Project

Objective number 2.



# Devil's Gate Reservoir Sediment Removal & Management Project

## Sustainable Reservoir configuration

- Opportunities to move sediment thru the reservoir
- Areas for routine periodic maintenance and sediment removal
- Permanent reservoir maintenance access road
- Areas for habitat preservation and restoration



Devil's Gate Reservoir Sediment Removal and Management Project

Moving sediment through the reservoir during storm events reduces the need for sediment removal projects. Additionally, we do not want to have impacts every time we perform a maintenance project.



# Devil's Gate Reservoir Sediment Removal & Management Project

## PROJECT OBJECTIVES

3. Removing sediment in front of the dam to facilitate an operational reservoir pool to reduce the possibility of plugging the outlet works with sediment or debris during subsequent storm events.



Devil's Gate Reservoir Sediment Removal and Management Project

We can't just make capacity in the reservoir but still have sediment at the face of the dam. A operation pool/ buffer pool must be located in front of the dam so that the valves and gates do not plug with debris and sediment.



# Devil's Gate Reservoir Sediment Removal & Management Project

## PROJECT OBJECTIVES

4. Removing sediment placed at Johnson Field during the Devil's Gate Reservoir Interim Measures Project.



Devil's Gate Reservoir Sediment Removal and Management Project

During the Interim Measures project, 13,000 cubic yard of sediment was moved from the face of the dam to Johnson Field, a basin within the reservoir that was previously used as a spreading grounds and as a ball field. In order to reduce traffic impacts, the sediment was moved here instead of trucking it along Windsor Avenue. In our permit with the City of Pasadena, we agreed to remove the sediment from Johnson Field during the larger sediment removal project.

# Johnson Field



IMP Sediment Placement Location

Devil's Gate Reservoir Sediment Removal and Management Project

This is a photo of the sediment placed in Johnson Field.



# Devil's Gate Reservoir Sediment Removal & Management Project

## PROJECT OBJECTIVES

5. Supporting dam safety by removing sediment accumulated in the reservoir in a timely manner to ensure the ability to empty the reservoir in the event of a dam safety concern.



Devil's Gate Reservoir Sediment Removal and Management Project

The dam was rehabilitated in 1995 to meet current seismic and spillway standards. It is under the jurisdiction of the State of California Division of Safety of Dams (DSOD) and there are no dam safety concerns. However, as a precautionary measure, DSOD requires all dams be able to be drained in the unlikely event of a dam safety emergency.



# Devil's Gate Reservoir Sediment Removal & Management Project

## PROJECT OBJECTIVES

6. Delivering the sediment to placement or reuse facilities that are already prepared and designated to accept material without native vegetation and habitat removal.



Devil's Gate Reservoir Sediment Removal and Management Project

We do not plan to move the sediment to a canyon above the dam in the forest, or to another location where native vegetation would have to be removed. We have capacity for the sediment in Manning Pit which is owned by the Department of Public Works and Waste Management's facility in Irwindale. However, we will also look at re-use alternatives for the material that may be suitable for the construction industry.

# Potential Excavation Area



Potential Excavation Area Near Dam

Devil's Gate Reservoir Sediment Removal and Management Project

Material near the face of the dam is finer in grain size and less suitable for construction industry reuse.

# Potential Excavation Area



Potential Excavation Area Near JPL

Devil's Gate Reservoir Sediment Removal and Management Project

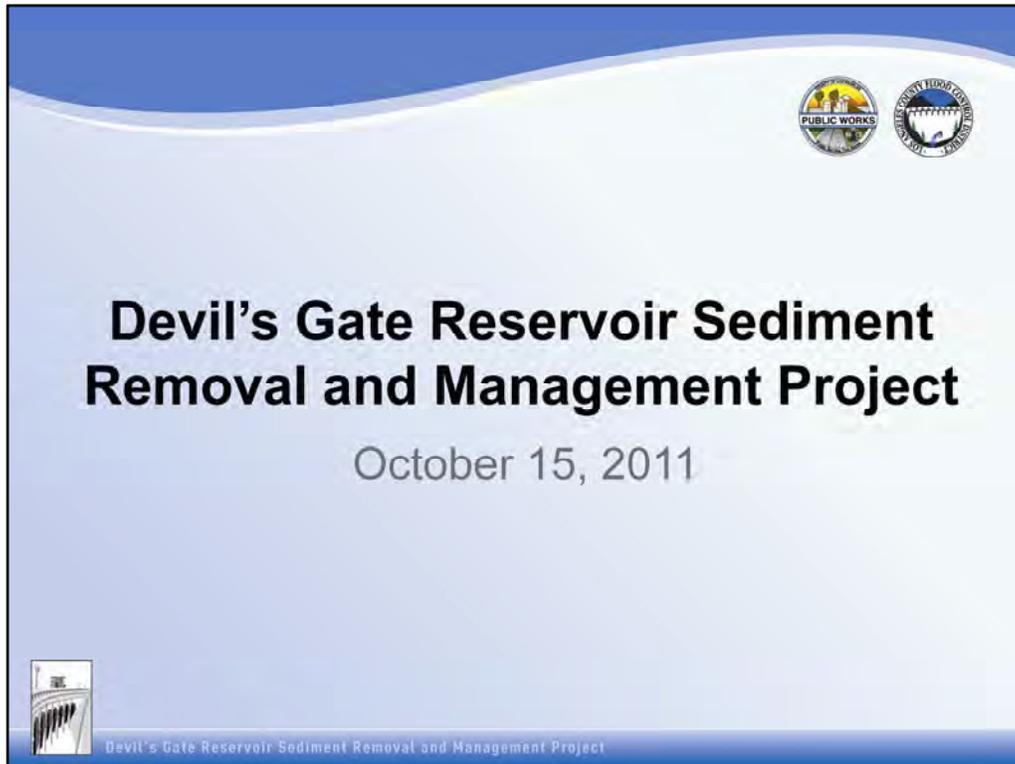
Material in the back of the reservoir is courser and would likely be suitable for construction use.

# Reservoir Configuration



Devil's Gate Reservoir Sediment Removal and Management Project

In closing, I want to clarify that the Initial Study (IS) for this project includes a project excavation footprint that is broadly defined. We recognize that there are numerous opportunities, constraints, and potential impacts within that boundary. The IS considered trucking all of the sediment out of the reservoir, however we know there are other alternatives and we will develop and consider them. This is truly a starting point. The ultimate reservoir configuration and scope of work will be shaped during this EIR process and getting your comments is an important step. I'll turn this presentation over to Greg McCafferty of Chambers Group to discuss that process.



Hello, my name is Greg McCafferty with Chambers Group. The County has hired our firm to assist with preparing the Environmental Impact Report (EIR) for Devil's Gate. My role with this presentation is to explain the EIR process and share with you some of the preliminary findings of the Initial Study.

Before I get into my presentation, I would like to share some observations with you.

This is an inclusive, balanced process. The County wants to hear your thoughts and suggestions.

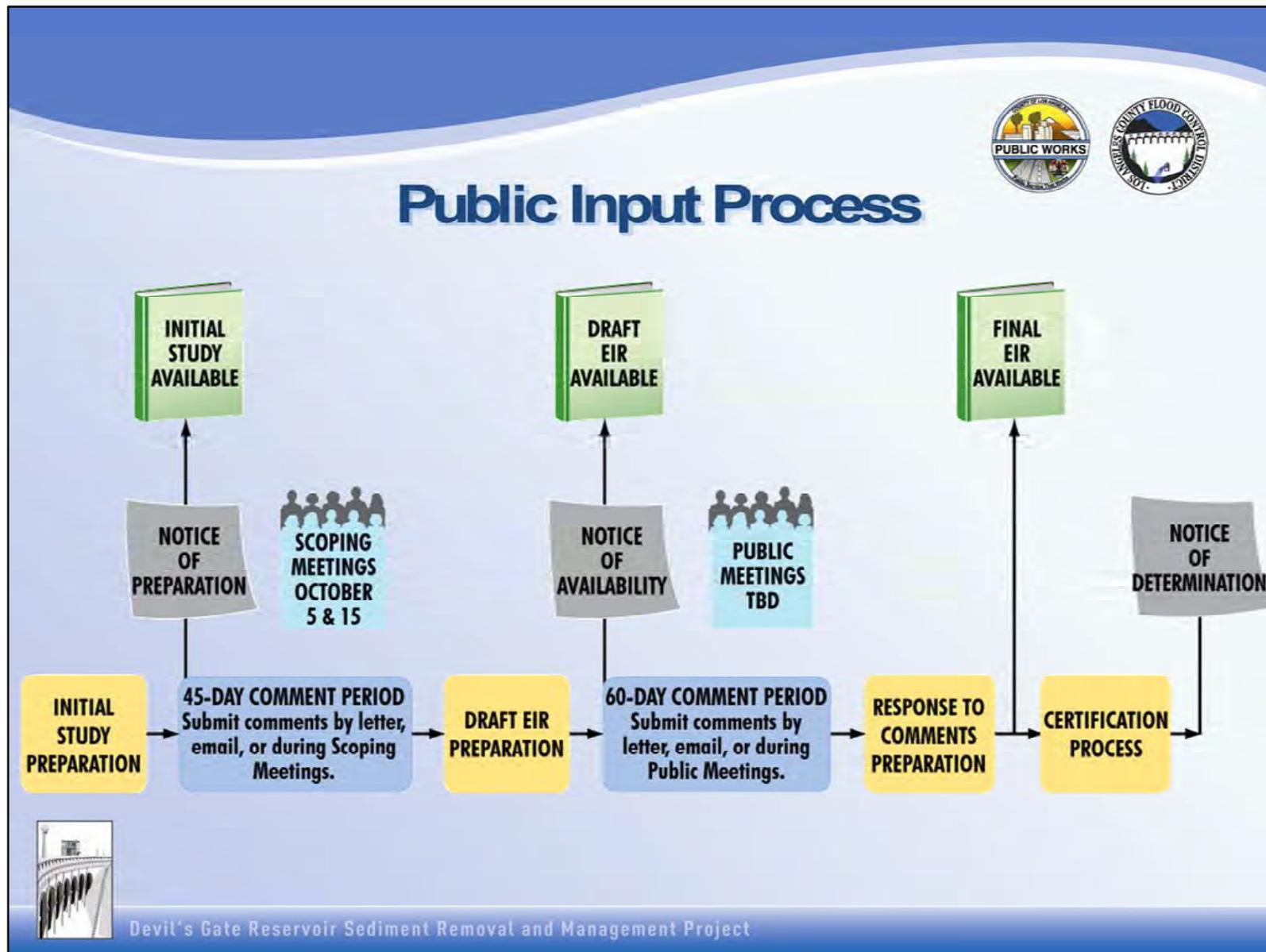
County staff and the Board of Supervisors are truly interested in listening to the concerns of the community. To that end, they have enlisted the help of a public outreach firm, KPA & Associates to assist with interviewing the various individuals and groups interested in the project.

The County has also extended the review and comment periods throughout the EIR process in order to encourage public involvement: 45 days for the Notice of Preparation (NOP) and 60 days for the Draft EIR).

The outreach process will help shape the project so that the approach is balanced and sustainable over the long term. This recognized the need to remove sediment to maintain flood protection while acknowledging the facility's importance as a resource for habitat, for recreational purposes, and for visual character.

The County is not locked in to a specific project and wants to hear your views and ideas. The Initial Study (IS)/NOP required a draft project description to be prepared, but it is not set in stone.

Now, with this background, I'm going to give a brief overview of the EIR process.

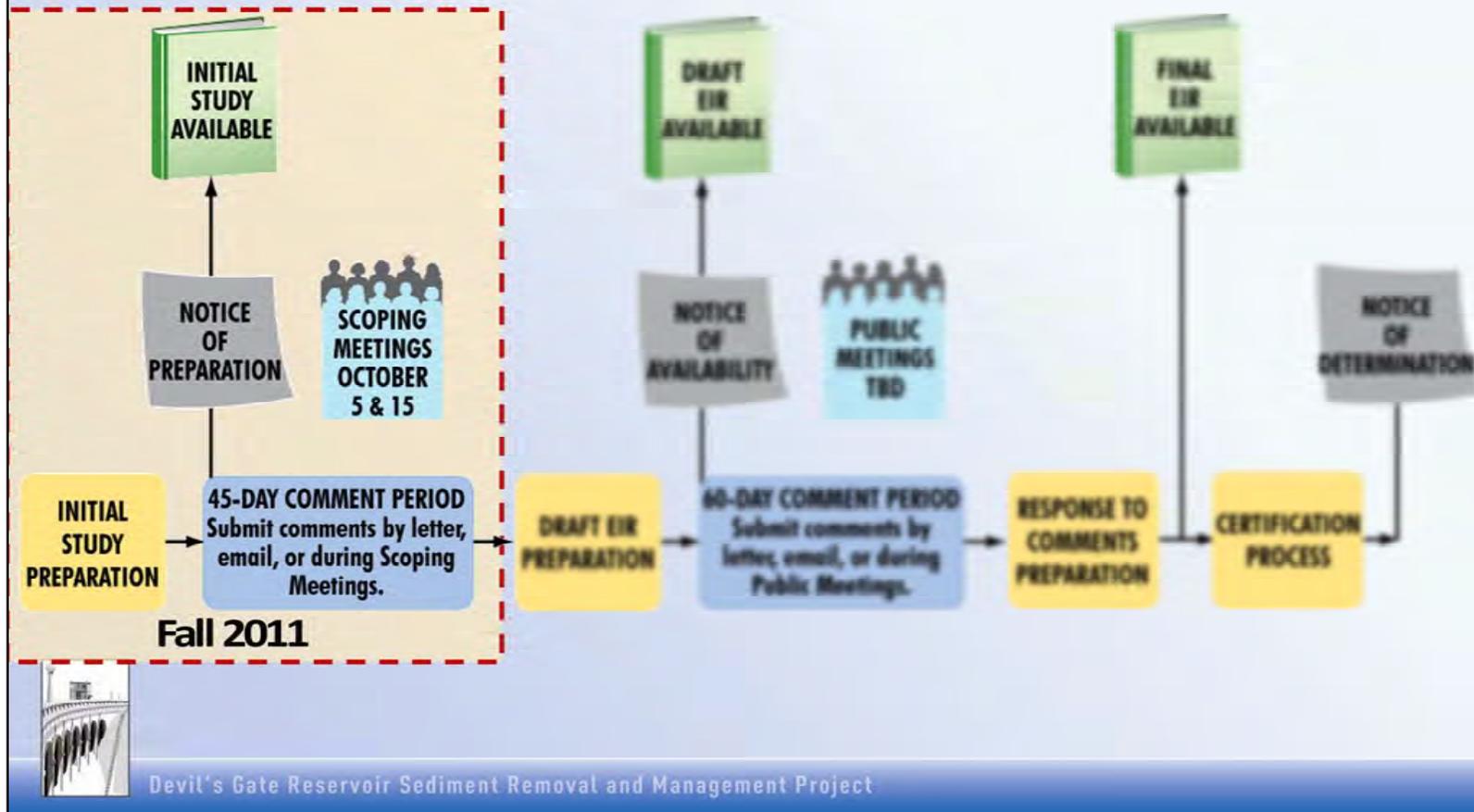


This graphic shows the entire EIR preparation process. My presentation will break it down into three (3) distinct components:

- Preliminary Review and Consultation
- Draft EIR Preparation and Environmental Review
- Final EIR Preparation (Response to Comments, Mitigation Monitoring and Reporting Program (MMRP), Findings) and Board of Supervisors Hearing.



## Initial Study Available



This part of the graphic shows the Initial Study and NOP process. The California Environmental Quality Act (CEQA) does not require that an Initial Study be prepared if the Lead Agency, in this case the County, knows that an EIR will be prepared. However, the County has chosen to prepare one so that there is full disclosure at the beginning of the process on what issues warrant further study in the EIR. This gives the public an opportunity to shape the project in the early stages of the process. In order to make sure this happens, the County has extended the Public Comment period on the NOP from 30 days to 45 days (9/28/11 to 11/11/11).

This is your opportunity to shape the project, so we are glad that you are with us today. The County wants to hear your views and is open to ways to enhance the project through design and/or mitigation.



## Initial Study Checklist

The checklist identifies environmental factors that might be affected by the proposed project:

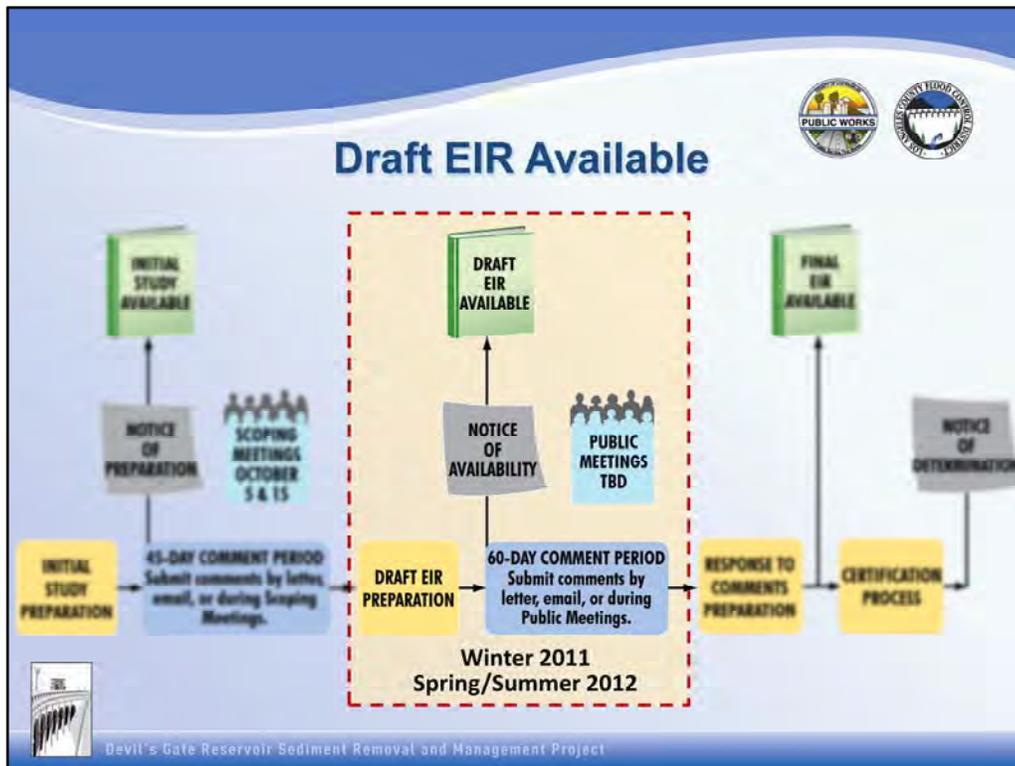
- Aesthetics
- Agriculture and Forest Resources
- Air Quality
- Cultural Resources
- Biological Resources
- Geology and Soils
- Greenhouse Gas Emissions
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use and Planning
- Mineral Resources
- Noise
- Population and Housing
- Public Services
- Recreation
- Transportation/Traffic
- Utilities and Service Systems



Devil's Gate Reservoir Sediment Removal and Management Project

This slide shows those environmental issues that will be studied in detail in the EIR. I will highlight a few that we already know the public is interested in.

- Aesthetics: Removal of sediment and vegetation will alter visual character of the site
- Air Quality: Emissions from trucks; dust from sediment removal activities
- Biological Resources: Impacts to riparian habitat; candidate, sensitive or special status species
- Noise: Homes, schools and other sensitive uses along haul routes
- Recreation: Impacts to hiking, biking, horseback riding, etc. from potential trail closures
- Transportation/Traffic: Truck trips associated with haul routes



The middle part of the process involves preparing the Draft EIR for Public Comment. During this stage, all of the potential areas of impact are analyzed with data obtained from the technical studies such as Traffic and Air Quality. The impact findings for each issue area are disclosed and design alternatives and/or measures to mitigate impacts are identified in the EIR.

Once the analysis is complete, the Draft EIR is ready for Public Review. In keeping with the County's desire to encourage maximum community involvement in the process, the County has extended the review period from 45 days to 60 days.

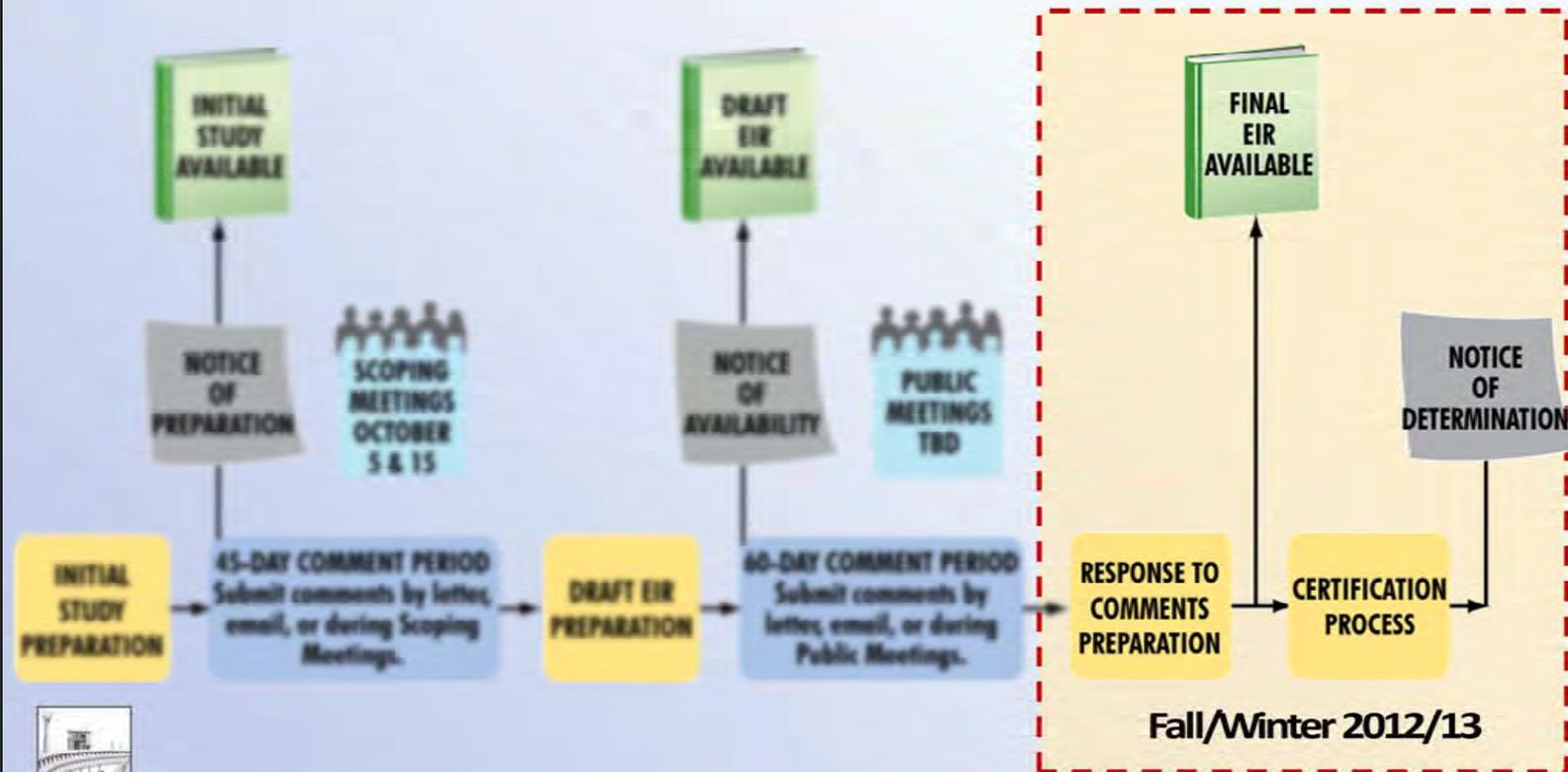
At the start of this review period, a Notice of Completion (NOC) is filed with the State Clearinghouse along with copies of the Draft EIR for distribution. A Notice of Availability (NOA) is also filed with the County Clerk notifying the public that the Draft EIR is available for Public Review. The document is also distributed to surrounding cities and public agencies.

During this period, the public can view the Draft EIR on the County's website ([www.lasedimentmanagement.com/devilsgate](http://www.lasedimentmanagement.com/devilsgate)), at the County offices in Alhambra (900 S. Fremont) and at designated libraries which I will display toward the end of my presentation.

Although CEQA does not require the Lead Agency to hold public meetings on the Draft EIR, the County has decided to hold public meetings to receive Public Comments on the findings contained in the Draft EIR.



# Final EIR Available



Devil's Gate Reservoir Sediment Removal and Management Project

The final part of the process involves responding to comments received on the Draft EIR. Chambers Group will carefully review all of the comments and work closely with the County on preparing comprehensive responses.

The responses, together with the MMRP and the findings, are packaged together into a Final EIR. The responses need to be made available 10 days prior to any decision to approve the project.



## Initial Study Repositories

- Linda Vista Library, 1281 Bryant Street, Pasadena
- San Rafael Branch Library, 1240 Nithsdale, Pasadena
- Pasadena Central Library, 285 East Walnut Street, Pasadena
- Altadena Library District, 600 East Mariposa Street, Altadena
- Bob Lucas Memorial Library, 2659 Lincoln Avenue, Altadena
- La Cañada Flintridge Library, 4545 N. Oakwood Avenue, La Cañada Flintridge
- Irwindale Public Library, 5050 Irwindale Avenue, Irwindale
- Los Angeles County Department of Public Works, 900 S. Fremont Avenue, Alhambra
- LACDPW/LACFCD Website ([www.lasedimentmanagement.com](http://www.lasedimentmanagement.com))





# Ways to Submit Your Comments

## SCOPING MEETINGS

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**Wednesday, October 5, 2011, 6:30 - 8:30 pm.**

Rose Bowl Stadium, Visitor's Locker Room, 1001 Rose Bowl Drive, Pasadena, CA 91103  
(Park in Lot F, enter at Gate A).

**Saturday, October 15, 2011, 9:00 - 11:00 am.**

La Cañada High School Cafeteria, 4463 Oak Grove, La Cañada Flintridge, CA 91011

## EMAIL

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[reservoircleanouts@dpw.lacounty.gov](mailto:reservoircleanouts@dpw.lacounty.gov)

***Include "Devil's Gate Reservoir Sediment Removal and Management Project" in the subject title.***

## WRITTEN

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Los Angeles County Department of Public Works  
Attn: Water Resources Division - Reservoir Cleanouts  
P.O. Box 1460, Alhambra, CA 91802-9974



Devil's Gate Reservoir Sediment Removal and Management Project



# PUBLIC COMMENTS



Devil's Gate Reservoir Sediment Removal and Management Project



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