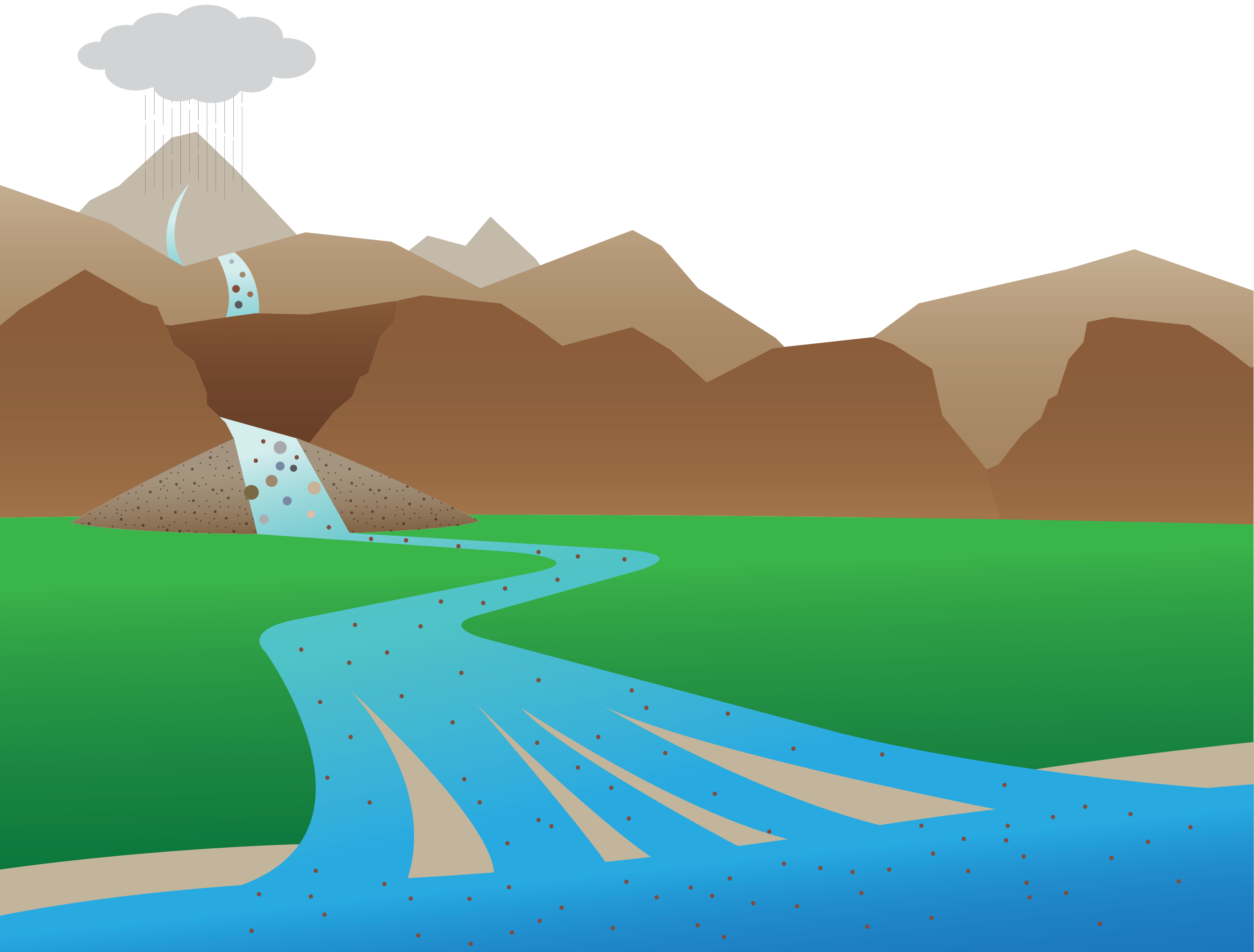
WELCOME!

We are here to SHARE, EDUCATE, and LISTEN.



For more information, visit our website: www.LASedimentManagement.com

Managing Flood Risk and Sediment

What is erosion?

Vegetation

Trees, plants, and shrubs all have roots that hold rocks and soil in place. But this vegetation is also a source of fuel for wildfires.

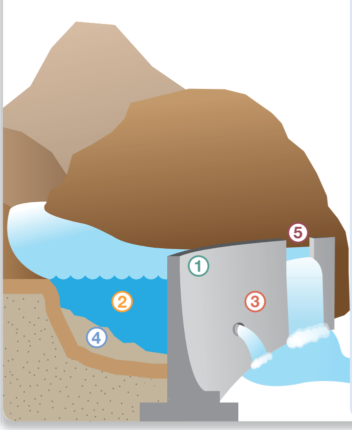
Wildfires

When wildfires occur, vegetation is burned away and rocks and soil are exposed to the elements, making them vulnerable and causing them to loosen from the mountain face.

Erosion

Erosion is the process by which soil and rock fall off, or are carried off, the face of mountains as sediment. The steeper the mountain, the more prone it is to erosion.

How does a dam work?



① Dam
A structure, built across a river or stream, that limits the amount of water and sediment moving downstream. The dam reduces the risk of flooding for downstream communities by releasing water in controlled amounts. Dams also store water for groundwater recharge.

② Reservoir
The area behind the dam where the water and sediment are captured and stored.

③ Outlet Valve
An outlet constructed through the face of a dam used to control the flow of water.

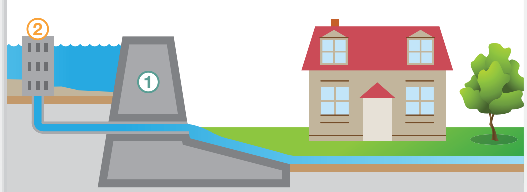
④ Sediment
Soil, sand, and rock is collected from the hillsides and transported and deposited by water. Large build-ups of sediment and debris within reservoirs have the potential to block outlet valves and reduce storage capacity for both flood risk management and water conservation, consequently preventing proper functioning of the flood control system.

⑤ Spillway
A passage that allows for overflow of flood waters if the reservoir behind the dam is filled to capacity.

How does a debris basin work?

① Debris Basins
On a much smaller scale than dams, debris basins also capture the sediment, gravel, boulders, and vegetation that are washed out of the canyons during storms. However, debris basins are not designed to retain water.

② Outlet Works
The outlet works consist of an outlet tower and pipe that drains the debris basin while preventing the sediment from entering the downstream flood control system. The outlet tower is a standing, perforated pipe drain that will drain the debris basin even as sediment accumulates in the basin.



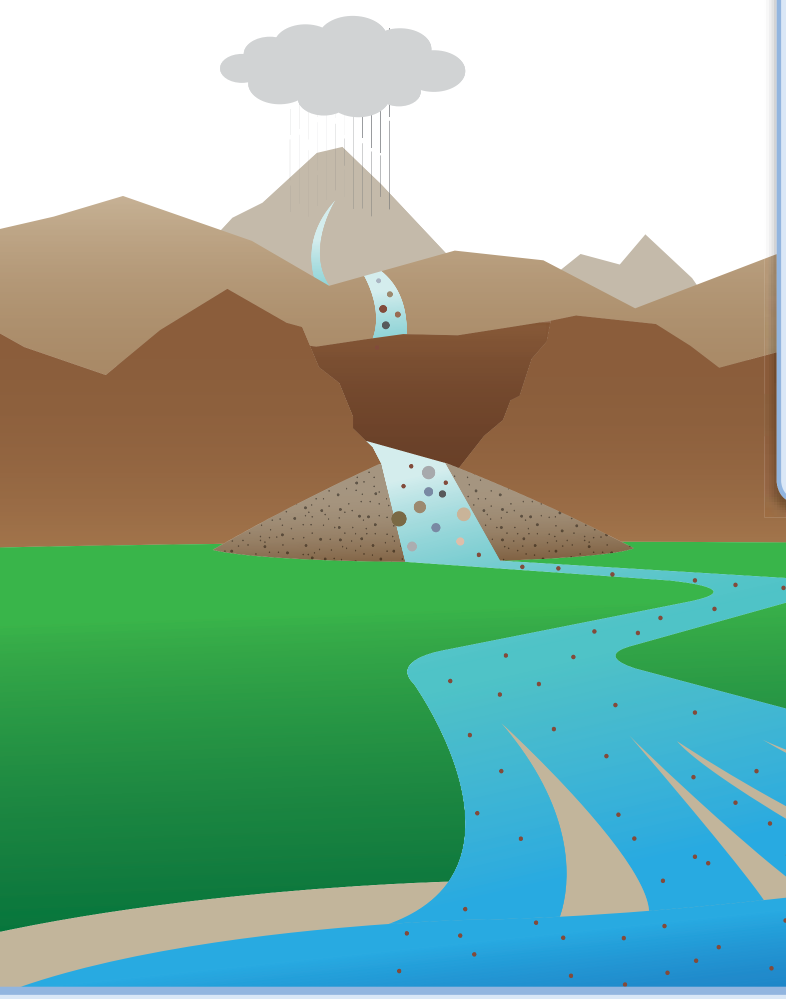
For more information, visit our website: www.LASedimentManagement.com

A Need for Sediment Management

For nearly 100 years, the Los Angeles County Flood Control District (District) has provided flood risk management and water conservation for much of Los Angeles County.

Rain does not occur very often in Los Angeles, but when it does, the rain can be intense. These intense storms cause erosion where rainwater collects and carries loose soil, rocks, and debris (called "sediment") downstream and could cause catastrophic property damage.

The District manages a flood control system of dams, debris basins, and other drainage infrastructure, which reduces risk of floods and debris flows for downstream communities. Effective sediment management requires the regular removal of sediment that deposits within District facilities.



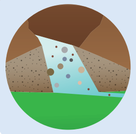
Challenges

The Los Angeles County Flood Control District must balance many factors as they address sediment management. Some of these factors include:


Rain


Wildfires


Erosion


Debris Flow


Flooding


Water Supply


Development

What is the Flood Control District?

Historic Overview

In 1915, the Los Angeles region experienced a disastrous flood that claimed lives and severely damaged property

To prevent such tragedy from happening again, the Los Angeles County Flood Control District was established to provide flood risk management, water conservation, recreation, and habitat restoration.

Role of the Flood Control District

The role of the Flood Control District is to reduce flood risk and conserve stormwater runoff while improving water quality, providing recreation opportunities, and enhancing open space where feasible.

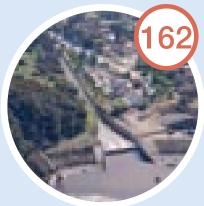
The Los Angeles County Flood Control District system includes the vast majority of drainage infrastructure within incorporated and unincorporated areas of Los Angeles County:

- 14 dams and reservoirs
- 162 debris basins
- 500 miles of open channel
- 2,800 miles of underground storm drains
- An estimated 120,000 catch basins
- 65 pump plants
- 36 sediment placement sites
- 3 seawater barrier projects
- 27 spreading facilities

What does the flood control system include?

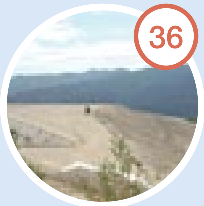
14 Dams and Reservoirs

Dams are built across a river and stream and limit the amount of water and sediment moving downstream. Dams reduce the risk of flooding by releasing water in controlled amounts. Reservoirs store water for groundwater recharge.



162 Debris Basins

Debris basins are similar to dams but operate on a much smaller scale and are not designed to retain water. They capture the soil, gravel, boulders, and debris (collectively known as "sediment") that are washed out of the canyons during storms and are designed to allow the stormwater to flow downstream into the storm drain system.



36 Sediment Placement Sites

Sediment that builds up in reservoirs and debris basins must be removed periodically to ensure proper functioning of the flood control system. Much of the sediment is transported to sediment placement sites located close to the debris basins and reservoirs. Sediment has also been taken to landfills or gravel pits when possible.

27 Spreading Facilities

Water held within reservoirs is often directed to spreading facilities, which allow the water to percolate into the ground and recharge groundwater supplies.

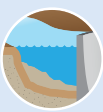
For more information, visit our website: www.LASedimentManagement.com

The Sediment Management Strategic Plan

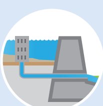
Why is sediment management important?

Too much sediment can impact the flood control system and water supply in the following ways:

Diminishing a dam's ability to manage water flow from severe storms, potentially affecting flood risk management for downstream communities.



Taking up space in the reservoir that would otherwise be used to store water for later use.



Reducing the capacity of debris basins to store sediment caused by future storms.

Purpose of the Sediment Management Strategic Plan

Address the sediment management needs in order to provide for flood risk management and water conservation from 2012 to 2032 taking social, environmental, and economic impacts into account.

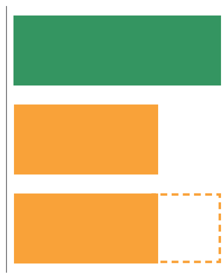
Why Do we need the Sediment Management Strategic Plan

There are 67.5 million cubic yards (MCY) of sediment anticipated to deposit behind the Los Angeles County Flood Control District's 14 dams and 162 debris basins over the next 20 years.

Total sediment to be removed in the next 20 years:
67.5 Million Cubic Yards

Active Sediment Placement Site (SPS) remaining capacity:
48 Million Cubic Yards

Total sediment capacity needed:
19.5 Million Cubic Yards



Stakeholder and Community Involvement

- Stakeholder Task Force
- Sediment Management Advisory Working Group
- Internal Working Group
- Community Stakeholders

* Station 4 will provide a detailed description

The Sediment Management Strategic Plan

The goal of the Plan is to manage sediment in a cost-effective manner while benefitting people and the environment to the highest possible extent.

The Strategic Plan is guided by the following key objectives:

- Maintaining flood risk management and water conservation
- Identifying ways to use sediment as a resource
- Reducing social impacts related to sediment management
- Recognizing opportunities for increased environmental stewardship
- Ensuring the District is fiscally responsible in decision-making

Development Approach

It's not business as usual!

The Sediment Management Strategic Plan accomplishes the following:

1. Provides an overview of the management issues.
2. Identifies feasible implementation alternatives.
3. Recommends a course of action.

Los Angeles County Flood Control District

Stakeholder Task Force

The Stakeholder Task Force was created to gather input from external stakeholders during the development and review of potential sediment management alternatives to be incorporated into the Strategic Plan. Regulatory agencies, cities, landfill owners and operators, water agencies, sand and gravel companies, environmental groups, and others were invited to participate in the Stakeholder Task Force. All Stakeholder Task Force meetings were open to the public.

Advisory Working Group

Given the complexity, regional impacts, and broad interests in sediment management, Public Works realized the need for creating a small advisory group to provide additional input and a broad perspective based on the members' diverse experiences and key roles in the stakeholder community.

Community Stakeholders

Public Open Houses are being conducted to provide a forum for public input during the plan review period. Two open houses will be held in the general vicinity of major facilities to allow neighboring community members to provide feedback on the alternatives identified in the Strategic Plan.

Internal Working Group

The Internal Working Group was assembled to provide a range of background and expertise for formulating and reviewing sediment management alternatives and reviewing the Strategic Plan as it was developed. Each Public Works' division that is impacted by the sediment management operations or from whose assistance was needed to develop the Strategic Plan had a representative in the Internal Working Group.

We are looking for alternatives to traditional Sediment Placement Sites

- The District is actively looking for pits (inert landfills, engineered fill operations, retired quarries) for sediment placement.

We are considering all options

- The District is committed to considering and thoroughly examining all options.
- Determinations will be made taking social, environmental, and economic impacts into account.

We welcome partnerships

- Strategic partnerships will be a way to optimize environmentally and socially sound options.
- The District is committed to implement strategies to encourage the beneficial reuse of sediment when economically viable, and partnerships are available to facilitate preparing sediment for reuse.

We are looking at a Long Term Flood Control District Vision

- The Long Term Flood Control District Vision will look beyond the 20-year Strategic Plan to investigate the potential to implement more sustainable alternatives to the current flood control system as a whole.
- The Flood Control District and the Advisory Working Group are working together to develop a plan for the Long Term Flood Control District Vision.
- Public participation is a critical component of the Long Term Vision as it aims to reflect collaboration between the District, the Army Corps of Engineers, and the public.

Sediment Management Alternatives

The alternatives were separated by function:

1. Removal
2. Transportation
3. Placement

Each sediment management alternative was evaluated based on five main factors:

1. Environmental impacts
2. Social impacts
3. Implementability
4. Performance
5. Approximate 20-year cost

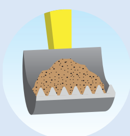
The alternatives that were determined infeasible are in grey.

All Alternatives Considered		Large Reservoirs	Small Reservoirs	Debris Basins
Removal Methods		**Removal Methods**	**Removal Methods**	**Removal Methods**
Dry Excavation		Dry Excavation	Dry Excavation	Dry Excavation
Dredging		Dredging	Dredging	Dredging
Sluicing		Sluicing	Sluicing	Sluicing
Transport Methods		**Transport Methods**	**Transport Methods**	**Transport Methods**
Sluicing		Sluicing	Sluicing	Sluicing
Trucking		Trucking	Trucking	Trucking
Conveyor Belts		Conveyor Belts	Conveyor Belts	Conveyor Belts
Slurry Pipeline		Slurry Pipeline	Slurry Pipeline	Slurry Pipeline
Trucking in Channels	Analysis	Trucking in Channels	Trucking in Channels	Trucking in Channels
Rail		Rail	Rail	Rail
Two-way Saltwater Pipeline		Two-way Saltwater Pipeline	Two-way Saltwater Pipeline	Two-way Saltwater Pipeline
Cable-Bucket Systems		Cable-Bucket Systems	Cable-Bucket Systems	Cable-Bucket Systems
Placement Locations		**Placement Locations**	**Placement Locations**	**Placement Locations**
Pits		Pits	Pits	Pits
Sediment Placement Sites		Sediment Placement Sites	Sediment Placement Sites	Sediment Placement Sites
Beach Nourishment		Beach Nourishment	Beach Nourishment	Beach Nourishment
Offshore Placement		Offshore Placement	Offshore Placement	Offshore Placement
Landfills		Landfills	Landfills	Landfills

Sediment Management Alternatives - Removal

What is Dry Excavation?

Dry Excavation



Dry excavation requires that the material be dry and involves the use of conventional excavation equipment such as excavators, backhoes, scrapers, bulldozers, and front-end loaders. Vehicular access to the site is required for dry excavation.

Environmental Impacts

- Habitat would need to be considered in order to avoid, minimize, or mitigate impacts to plant and wildlife species.
- Emissions from heavy equipment during excavation would affect air quality.

Social Impacts

- Excavation activities could have visual and noise impacts to those in close proximity.

Implementability

- The Flood Control District has conducted numerous dry excavation projects in the past.
- In order not to interfere with a reservoir's operational needs and functions, reservoirs need to be drained and excavated outside of the storm season.
- Environmental regulatory permits would be needed.

Performance

- The effectiveness of dry excavation is not a concern for future cleanouts.
- Dry excavation operations are versatile and are expected to match the efficiency of the transportation alternatives being considered.

Cost

- The cost to excavate sediment from a reservoir is approximately $3 per cubic yard.
- The cost to excavate sediment from debris basins is approximately $7.50 per cubic yard (Due to the smaller size of debris basins and different equipment requirements).

Conclusion

Dry excavation is a sediment removal method that could be feasible at reservoirs, both large and small, and at debris basins.

What is Dredging?

Dredging

Dredging is a type of underwater excavation that is used to remove sediment from inland as well as coastal water bodies. Generally dredges either scoop or suction sediment, along with water, from the bottom of a water body. Dredging could only be employed in reservoirs that have a pool of water.

Environmental Impacts

- The specifics of the habitat within a reservoir would need to be determined in order to ascertain the potential impacts.
- Dredging could impact water quality within a reservoir by increasing turbidity. Water quality concerns could be partially addressed with a silt curtain around the dredge.
- While some water losses are expected, there would be minimal impact to the quantity of water conserved.

Social Impacts

- Dredging activities could have visual and noise impacts to those in close proximity.

Implementability

- Dredging is a technique that has been used in other areas of the country for decades, but additional study will need to be completed to identify feasibility for specific reservoirs.
- Availability of temporary storage areas and the rate at which they can receive the water-sediment mixture will impact implementability.

Performance

- A 6-month dredging operation would remove approximately 400,000 CY of sediment from a reservoir.

Cost

- Dredging a reservoir would cost approximately $10.50 per cubic yard of sediment removed.

Conclusion

Dredging is a removal alternative that could be feasible at large reservoirs, which have a pool of water. However, it is not feasible at small reservoirs, which do not have a pool of water or at debris basins.

What is Sluicing?

Sluicing

Sluicing involves draining a reservoir to expose the accumulated sediment to incoming water flows so that the water can resuspend the sediment and carry it through the dam's sluice gate or valves. Typically, the sediment-laden water is impounded in a reservoir or other facility downstream that is more accessible for sediment removal operations than the reservoir from which sediment was sluiced. This section focuses on the impacts sluicing has on the reservoir.

Environmental Impacts

- Impacts from sluicing operations on biological resources would vary, depending on whether the reservoir typically has a pool year-round.
- Some water conservation losses would be expected over a couple of seasons after a sluicing event until sediment remaining in the stream course can be washed out by high flows.
- Dewatering a reservoir in order to sluice could affect water conservation if the water is released faster than spreading facilities downstream can handle. Some of the silt resuspended in the water during dewatering and sluicing would affect water conservation.

Social Impacts

- Sluicing activities could have visual and noise impacts to those in close proximity.

Implementability

- The ability to remove sediment from a reservoir by sluicing will be dependent on inflow into the reservoir, which is dependent on the weather or on upstream reservoirs.
- Another factor that limits sluicing is the availability of temporary sediment storage areas and the rate at which they can receive the sluiced water-sediment mixture.
- The Flood Control District has conducted numerous sluicing projects in the past.

Performance

- Depending on the reservoir and the wetness of the storm season, from 150,000 to 2,600,000 CY of sediment could be removed in a given sluicing season.

Cost

- The cost of sluicing sediment from a reservoir is approximately $2.50 per cubic yard.

Conclusion

Sluicing is a removal alternative that could be feasible at large reservoirs, which have enough base flows. However, it is not feasible at small reservoirs or at debris basins.

Sediment Management Alternatives - Transportation

What is Sluicing?

Sluicing

Sediment removed from a reservoir by sluicing is transported downstream along the river or other waterway that stems from the reservoir. This section focuses on the impacts sluicing has on the waterways downstream of the reservoirs.

Environmental Impacts

- Impacts from sluicing operations on biological resources below the dam vary, depending on whether there are significant aquatic resources. Riparian vegetation could be positively impacted due to the nutrients provided by the sluiced sediment.
- As sediment is transported, some of the resuspended silt deposits in the channel and affects water conservation. Flushing the channel after sluicing helps; however, the ability to do so is dependent on the availability of water from storms or upstream reservoirs.

Social Impacts

- If waterways have permitted recreation, recreation would be impacted.
- There would be visual impacts along the channel as the flows would not be clear.
- There could be odor impacts and a temporary rise in insects near the channel.

Implementability

- The ability to transport sediment by sluicing is affected by a channel's slope and other characteristics which need to be considered.

Performance

- Sediment will settle as sediment-laden water travels downstream. Heavy equipment may be needed to manage sediment deposition.

Cost

- The cost of transporting sediment via sluicing is included in the cost to remove sediment by means of sluicing - approximately $2.50 per cubic yard.

Conclusion

Sluicing is a transportation alternative that is exclusively associated with sluicing as a removal alternative, which is only feasible at large reservoirs.

What is Trucking?

Trucking

Using trucks to transport sediment from reservoirs and debris basins involves the use of single-dump and double-dump trucks. The impacts associated with employing traditional or low emission trucks would be the same, except for the impact on air quality.

Environmental Impacts

- If new or temporary roads are used, there would be habitat impacts and potentially water quality impacts associated with the construction and use of those routes.
- The use of low emission trucks would result in lower air quality impacts than if standard trucks were used.

Social Impacts

- Employing trucks could significantly impact traffic.
- New or temporary roads in some locations would help alleviate some of the social impacts.
- Heavy truck traffic can also impact pavement which could lead to more re-paving projects, which would also have social impacts.

Implementability

- Some cities require trucking permits. If new or temporary roads are used, right of way issues would need to be addressed.

Performance

- A six-month long trucking operation that utilizes single-dump trucks could transport approximately 400,000 CY of sediment while one that utilizes double-dump trucks could transport approximately 800,000 CY.

Cost

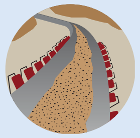
- The cost of employing single dump trucks is approximately $0.65 per cubic yard per mile traveled.
- The cost of employing double-dump trucks is approximately $0.30 per cubic yard per mile traveled.

Conclusion

Trucking is a transportation alternative that could be feasible for sediment removed from reservoirs and debris basins. Wherever it is feasible to use trucks, employment of low-emission trucks will be considered to reduce air quality impacts.

What is a Conveyor Belt?

Conveyor Belt



This could involve the permanent or temporary installation of conveyor belt systems or the use of existing conveyors as a potential transportation alternative for sediment that has been excavated or that needs to be transported from a temporary sediment storage area to another site.

Environmental Impacts

- Habitat along the conveyor alignment would have to be studied in order to identify and minimize the potential impacts.
- Air quality could be impacted by dust as sediment is transported on the conveyor belts. Moisture levels of the sediment, enclosing the conveyor system, or spraying the sediment with water would help reduce emissions. If there is inadequate electrical power available, there would be air quality impacts from generators.

Social Impacts

- There would be some visual disturbances during the life of a conveyor operation.
- Depending on the alignment of the conveyor belt system, recreational resources could be impacted.
- During the installation and removal of the conveyor belt system there could be additional noise impacts to nearby areas.

Implementability

- Depending on the alignment of the conveyor belt, right of way issues would have to be addressed, including roadway safety issues.

Performance

- Approximately 800,000 CY of sediment could be moved by a conveyor belt system in a 6-month removal operation.

Cost

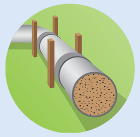
- The cost of a generally linear conveyor belt would be approximately $800 per linear foot. More difficult conveyors with turns and larger elevations changes would cost approximately $1,200 per linear foot.

Conclusion

Conveyors are a transportation alternative that could be feasible for sediment removed from large and small reservoirs. Transport of sediment from debris basins on conveyors is not feasible.

What are Slurry Pipelines?

Slurry Pipelines



Slurry pipelines are used in conjunction with the dredging sediment removal alternative, and involve the pressurized mixture of water and sediment dredged from a reservoir.

Environmental Impacts

- In order to identify and minimize the potential environmental impacts of placing and operating a slurry pipeline, the habitat along the potential alignments would have to be studied. No impacts are expected on water quality, water quantity, and air quality.

Social Impacts

- If placed above ground, construction of a slurry pipeline would cause some visual disturbances and temporary construction impacts.

Implementability

- Placement of a slurry pipeline could present both right of way and permitting issues. If a slurry pipeline is to be placed along a roadway, roadway impacts would need to be considered while determining the best alignment.
- Requires a discharge location where sediment can be dewatered and temporarily stored

Performance

- The slurry pipeline would transport approximately 2,000 CY of the water-sediment slurry per hour (or approximately 15 cubic feet of the slurry per second).

Cost

- The cost to install and operate a slurry pipeline is approximately $37.50 per linear foot.
- The cost to install a lift station is approximately $1 per station per cubic yard moved.

Conclusion

Slurry pipelines are a transportation alternative that could be feasible for sediment removed by dredging from reservoirs. Since wet removal alternatives (dredging or sluicing) are not feasible at debris basins, slurry pipelines are not either.

Sediment Management Alternatives - Placement

What are Sediment Placement Sites?

Sediment Placement Sites

Sediment placement sites (SPSs) are sites developed by the Flood Control District throughout the County to be strategically filled with sediment resulting from the cleanout of facilities such as reservoirs and debris basins.

Previously Used Sediment Placement Sites

- The Flood Control District owns 36 SPSs. Of these, 17 are considered active and have a combined estimated remaining capacity of 48 MCY. One of these site in particular, Burro Canyon SPS, has a remaining capacity of approximately 29 MCY, accounting for the bulk of the remaining capacity at all sites.
- These facilities will continue to be used as part of the Flood Control District's sediment management operations until other placement alternatives have been fully analyzed and developed for use. As a result, this alternative is not compared with the other placement alternatives considered by the Sediment Management Strategic Plan unless the site is needed for future placement.

Potential Sediment Placement Sites

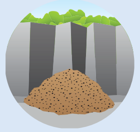
- While it is understood that there are environmental concerns associated with the development of new SPSs, this alternative is still being considered as part of this Sediment Management Strategic Plan. The reason for this being that utilizing a new SPS and/or transportation of sediment to that SPS could have less impacts than placing and transporting sediment to another placement alternative that is farther away.

Conclusion

Sediment Placement Sites will continue to be used as part of the Flood Control District's sediment management operations until other placement alternatives have been fully analyzed and developed for use.

What are Pits?

Pits



Pits include inert landfills, engineered fill operations, quarries that are currently being mined, and retired quarries. Inert landfills are facilities that are permitted to accept inert waste. Engineered fill operations must meet specifications prepared and certified for a specific project designed to act as a structural element.

Environmental Impacts

- Use of inert landfills, engineered fill operations, and quarries for placement of sediment from reservoirs and debris basins would have minimal environmental impact because the sites are already disturbed.

Social Impacts

- Depositing material in the subject facilities would have minimal social impacts given the magnitude of the facilities and their existing uses. However, placing sediment at an inactive facility that is adjacent to residential neighborhoods would result in traffic and noise impacts.

Implementability

- No agreement would be needed in order to deliver sediment to the inert landfills or engineered fill operations, unless the operator was willing to engage in a long-term agreement with the Flood Control District for the receipt of sediment at a reduced rate.
- Agreements would be needed to deliver sediment at the quarries currently being mined.

Performance

- It was assumed that existing and future inert landfill and engineered fill operations would have the capacity to accept material at the rate at which it would need to be delivered for optimum sediment management operations at the reservoir and debris basins.
- Existing conveyors between some of the facilities could facilitate deliveries to the quarries, if use of the conveyor belts can be arranged.

Cost

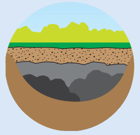
- For nonmarketable material, cost would vary by location between $7.00 and $15.00 per cubic yard.
- The estimated cost to acquire a quarry is approximately $1 per cubic yard.

Conclusion

The District is currently analyzing opportunities to use pits for sediment placement. It is assumed that with the number of pits that there would be one or more available for use or purchase. Given the large capacity of the pits, it is also assumed only a few would need to be utilized.

What are Landfills?

Landfills



Some solid waste landfills use dirt to cover daily deposits of solid waste in order to avoid odors and other issues. This alternative considers delivering sediment from the Flood Control District's sediment management operations to solid waste landfills to be used as daily cover. It is important to note that landfill operations, including the quantity of sediment needed for daily cover and tipping fees, change over time.

Environmental and Social Impacts

- It is assumed sediment deliveries from the Flood Control District would only be changing the source of the sediment used as daily cover and not the landfills' operations. Therefore, use of solid waste landfills for placement of sediment from reservoirs and debris basins would have minimal environmental and social impacts.

Implementability

- Landfill acceptance of sediment could be constrained to their daily cover needs if landfill space for stockpiling material is limited. Additionally, landfills have limitations on the maximum stone size and moisture content in sediment used for daily cover. This could limit the implementability of this alternative.

Performance

- If sediment from various Flood Control District facilities needed a placement site at the same time and the quantity of sediment available is greater than the quantity that can be accepted by the landfills, a determination would have to be made as to what sediment would be taken to the landfills.

Cost

- Depending on the landfill, the cost of sediment placement is approximately $6.00 to $7.50 per cubic yard.

Conclusion

Landfills can be a partial placement solution. Landfills are not considered feasible to replace the use of SPSs but will continue to be considered.

Sediment Management Alternatives

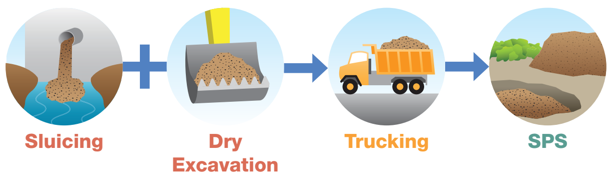
San Gabriel Canyon Reservoirs

Cogswell Reservoir

Over the next 20 years, 5.7 MCY of sediment are planned to be removed from Cogswell Reservoir.

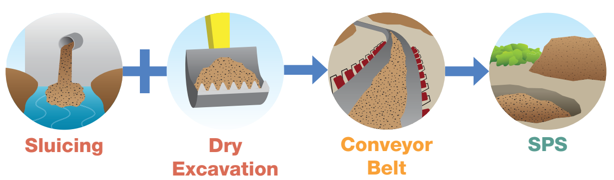
Alternative 1A

Sluice to San Gabriel Reservoir + Dry Excavate at Cogswell Reservoir > Truck to Cogswell SPS



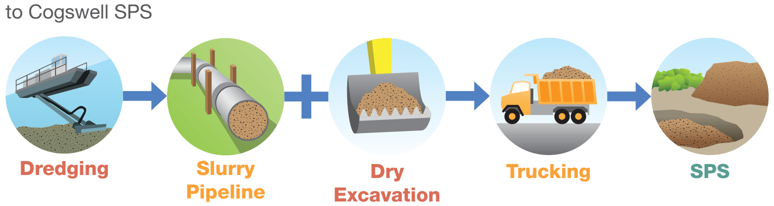
Alternative 1B

Sluice to San Gabriel Reservoir + Dry Excavate at Cogswell Reservoir > Conveyor Belt to Cogswell SPS



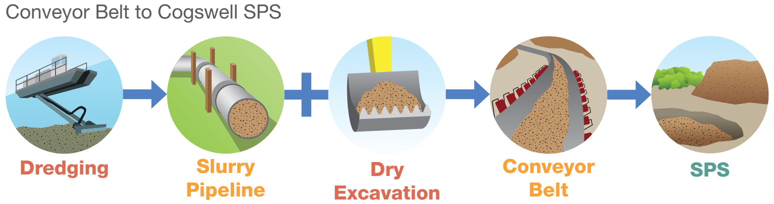
Alternative 2A

Dredge > Slurry to San Gabriel Reservoir + Dry Excavate at Cogswell Reservoir > Truck to Cogswell SPS



Alternative 2B

Dredge > Slurry to San Gabriel Reservoir + Dry Excavate at Cogswell Reservoir > Conveyor Belt to Cogswell SPS

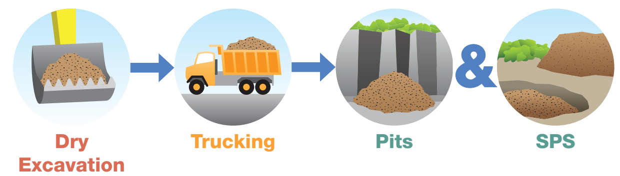


San Gabriel Reservoir

Over the next 20 years, 22.9 MCY of sediment are planned to be removed from San Gabriel Reservoir.

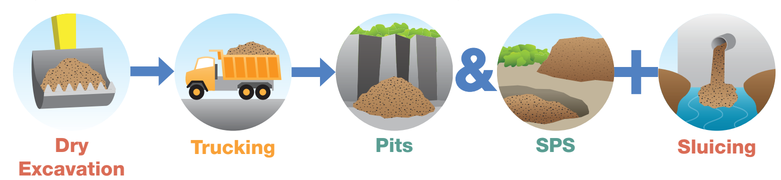
Alternative 1A

Dry Excavate > Truck to Irwindale Pits & Burro Canyon SPS



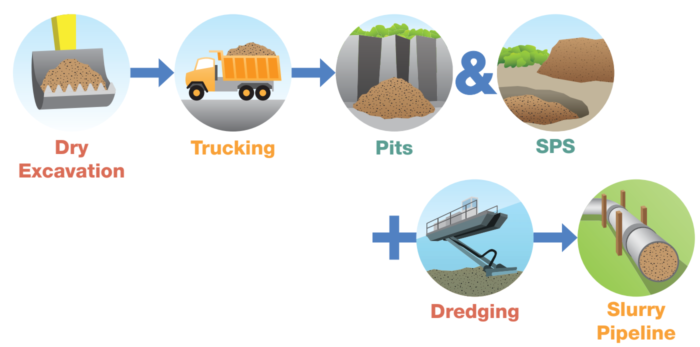
Alternative 1B

Dry Excavate > Truck to Irwindale Pits & Burro Canyon SPS + Sluice to Morris Reservoir



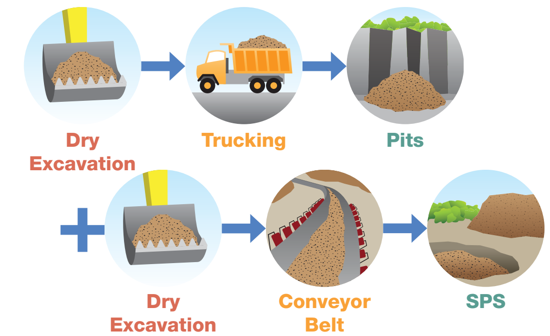
Alternative 1C

Dry Excavate > Truck to Irwindale Pits & Burro Canyon SPS + Dredge and Slurry Pipeline to Morris Reservoir



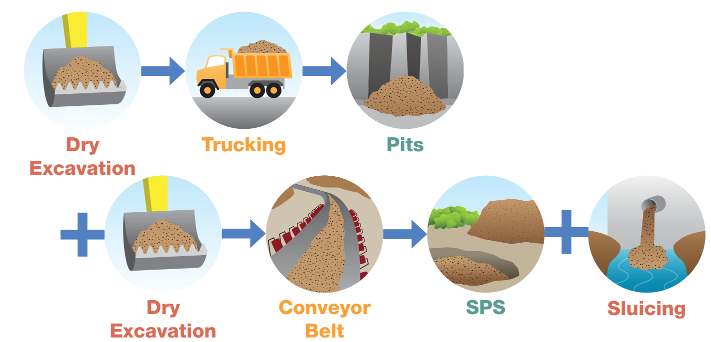
Alternative 2A

Dry Excavate > Truck to Irwindale Pits + Dry Excavate > Conveyor Belt to Burro Canyon SPS



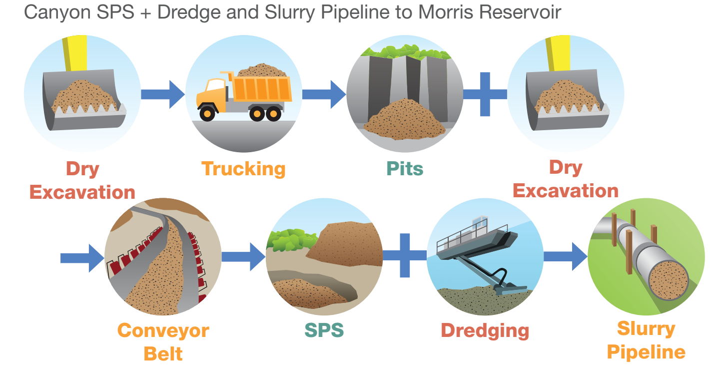
Alternative 2B

Dry Excavate > Truck to Irwindale Pits + Dry Excavate > Conveyor Belt to Burro Canyon SPS + Sluice to Morris Reservoir



Alternative 2C

Dry Excavate > Truck to Irwindale Pits + Dry Excavate > Conveyor Belt to Burro Canyon SPS + Dredge and Slurry Pipeline to Morris Reservoir



Sediment Management Alternatives

Large Reservoirs

Morris Reservoir

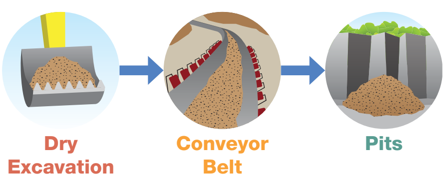
Over the next 20 years, 3.3 MCY of sediment are planned to be removed from Morris Reservoir.

Alternative 1

Dry Excavate > Truck to Irwindale Pits

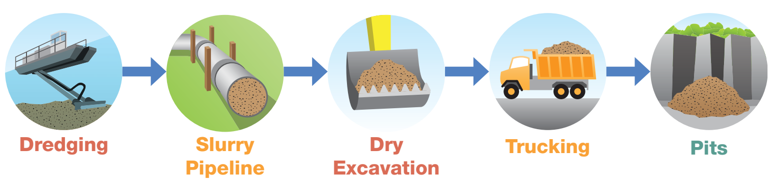
Alternative 2

Dry Excavate > Conveyor Belt to Irwindale Pits



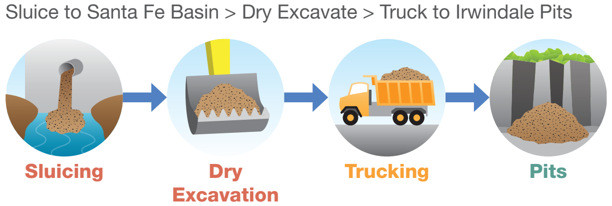
Alternative 3

Dredge and Slurry Pipeline to Santa Fe Basin > Dry Excavate > Truck to Irwindale Pits



Alternative 4

Sluice to Santa Fe Basin > Dry Excavate > Truck to Irwindale Pits



Big Tujunga Reservoir

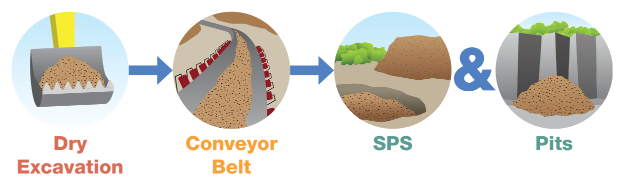
Over the next 20 years, 7.2 MCY of sediment are planned to be removed from Big Tujunga Reservoir.

Alternative 1A

Dry Excavate > Truck to Maple SPS & Sun Valley Pits

Alternative 1B

Dry Excavate > Conveyor to Maple SPS & Sun Valley Pits

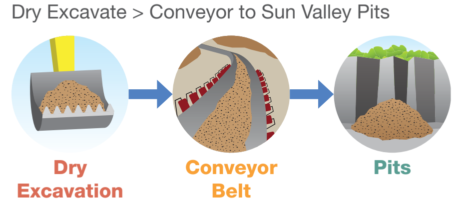


Alternative 2A

Dry Excavate > Truck to Sun Valley Pits

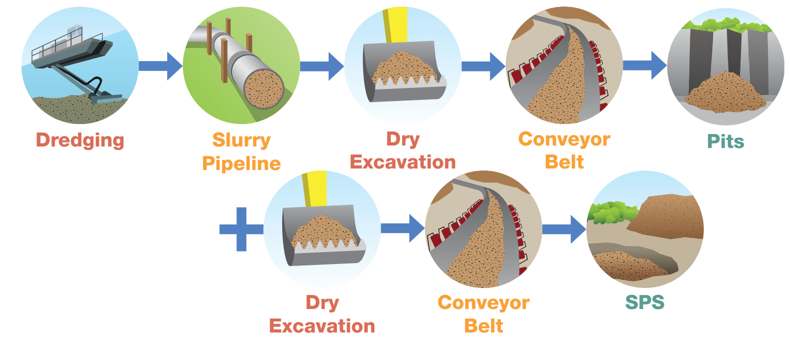
Alternative 2B

Dry Excavate > Conveyor to Sun Valley Pits



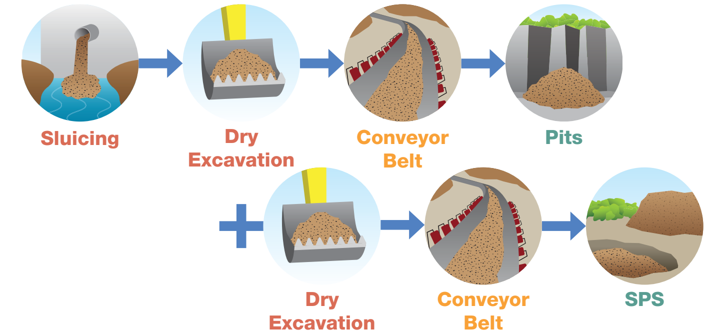
Alternative 3

Dredge > Slurry Pipeline to Hansen FCB > Dry Excavate at Hansen FCB > Conveyor Belt to Sun Valley Pits + Dry Excavate at Big Tujunga Reservoir > Conveyor Belt to Maple SPS



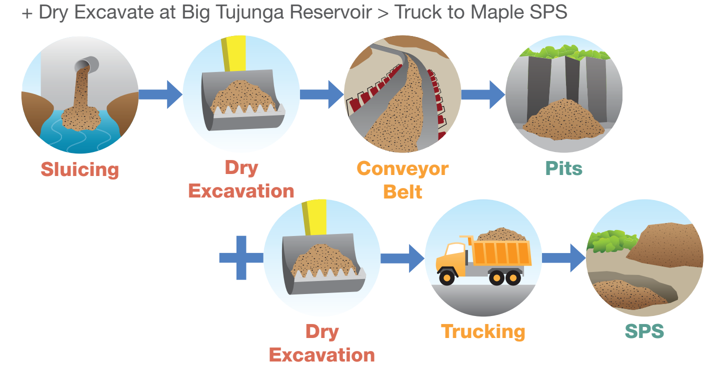
Alternative 4A

Sluice to Hansen FCB > Dry Excavate at Hansen FCB > Conveyor Belt to Sun Valley Pits + Dry Excavate at Big Tujunga Reservoir > Conveyor Belt to Maple SPS



Alternative 4B

Sluice to Hansen FCB > Dry Excavate at Hansen FCB > Conveyor to Sun Valley Pits + Dry Excavate at Big Tujunga Reservoir > Truck to Maple SPS



Recommendation

Alternative 3 should be considered only after all other alternatives are deemed infeasible. This is based on the high estimated cost.

Sediment Management Alternatives

Pacoima Reservoir

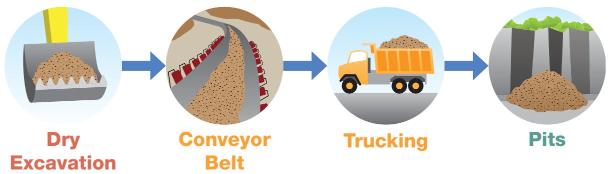
Over the next 20 years, 7.6 MCY of sediment are planned to be removed from Pacoima Reservoir.

Alternative 1

Dry Excavate > Truck to Sun Valley Pits

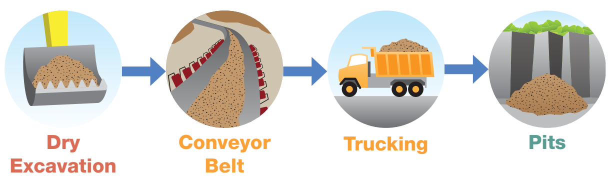
Alternative 2A

Dry Excavate > Conveyor Belt to Canyon Transfer Point > Truck to Sun Valley Pits



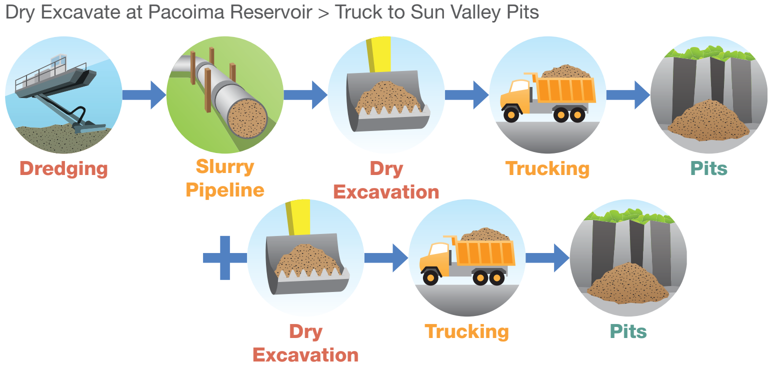
Alternative 2B

Dry Excavate > Conveyor Belt to Lopez FCB > Truck to Sun Valley Pits



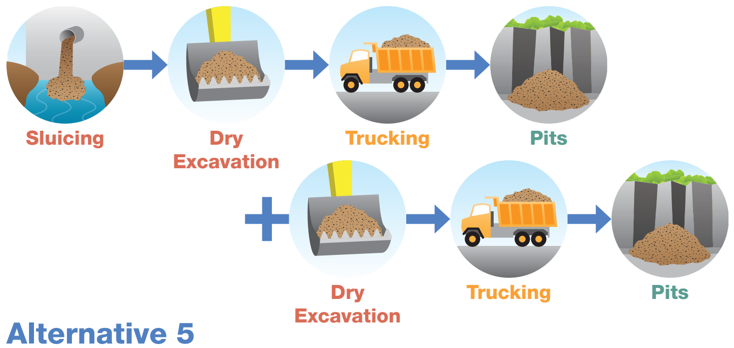
Alternative 3

Dredging > Slurry Pipeline to Lopez FCB > Dry Excavate > Truck to Sun Valley Pits + Dry Excavate at Pacoima Reservoir > Truck to Sun Valley Pits



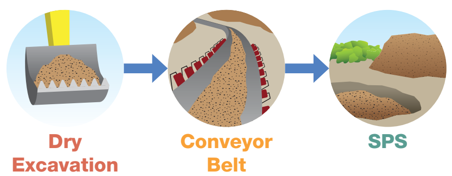
Alternative 4

Sluice to Lopez FCB > Dry Excavate > Truck to Sun Valley Pits + Dry Excavate at Pacoima Reservoir > Truck to Sun Valley Pits



Alternative 5

Dry Excavate at Pacoima Reservoir > Conveyor Belt to Canyon SPS



Recommendation

Alternatives 1 and 3 should be considered only after all other alternatives are deemed infeasible. This is based on the high estimated cost.

Puddingstone Reservoir

Over the next 20 years, 0.8 MCY of sediment are planned to be removed from Puddingstone Reservoir.

Recommendation

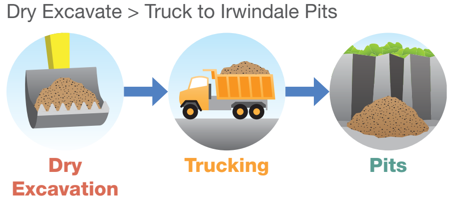
Puddingstone Reservoir should not be cleaned out until necessary, due to the environmental and social limitations, and the primary function of recreation.

San Dimas Reservoir

Over the next 20 years, 1.9 MCY of sediment are planned to be removed from San Dimas Reservoir.

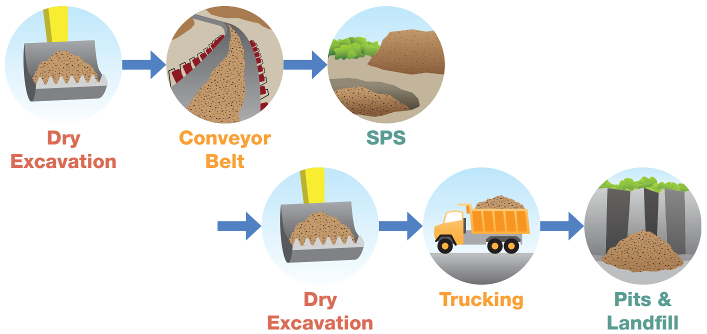
Alternative 1

Dry Excavate > Truck to Irwindale Pits



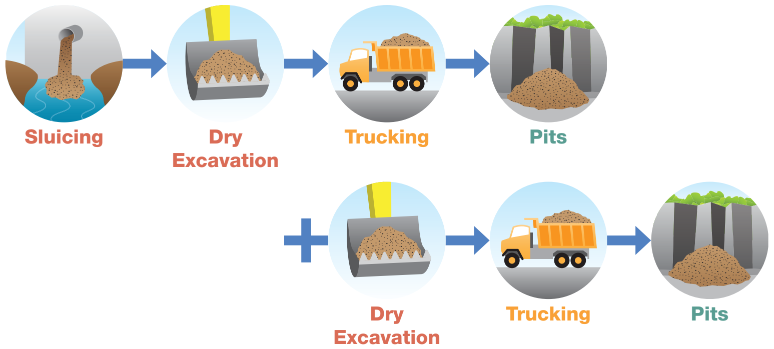
Alternative 2

Dry Excavate > Conveyor Belt to San Dimas SPS > Dry Excavate > Truck to Irwindale Pits & Landfills



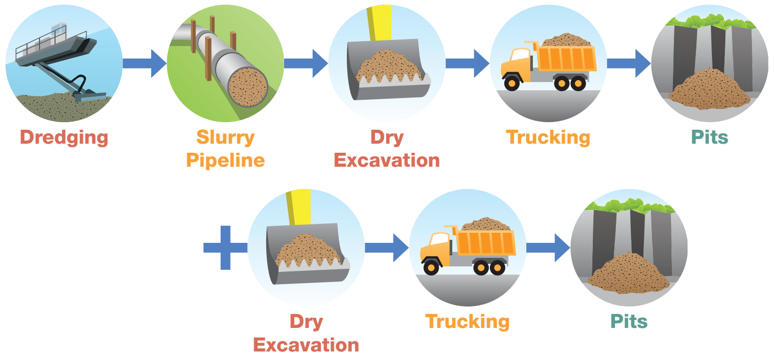
Alternative 3

Sluicing to Puddingstone Diversion Reservoir > Dry Excavate at Puddingstone Diversion Reservoir > Truck to Irwindale Pits + Dry Excavate at San Dimas Resrevoir > Truck to Irwindale Pits



Alternative 4

Dredging with Slurry Pipeline to Puddingstone Diversion Reservoir > Dry Excavate > Truck to Irwindale Pits + Dry Excavate at San Dimas Resrevoir > Truck to Irwindale Pits



Sediment Management Alternatives

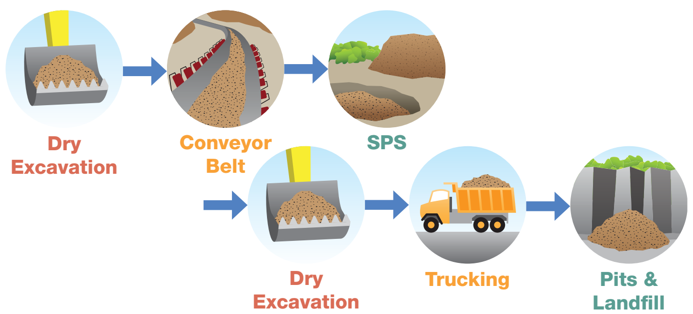
Small Reservoirs

Santa Anita Reservoir

Over the next 20 years, 1.2 MCY of sediment are planned to be removed from Santa Anita Reservoir.

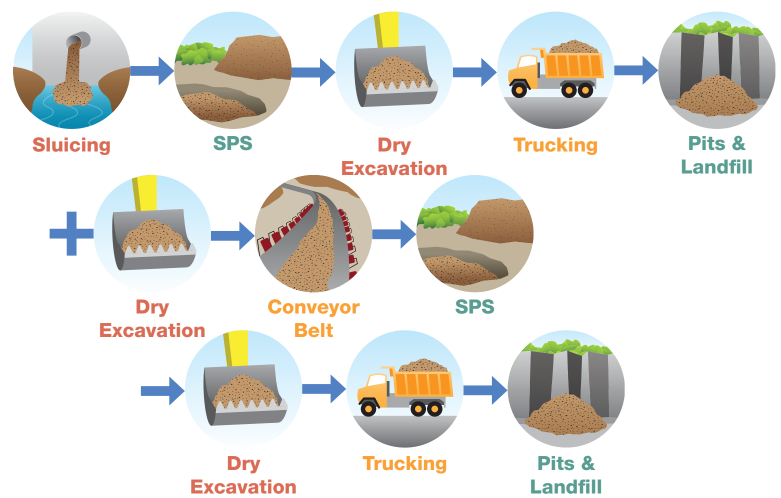
Alternative 1

Dry Excavate at Santa Anita Reservoir > Conveyor to Santa Anita SPS > Dry Excavation > Truck to Irwindale Pits & Landfills



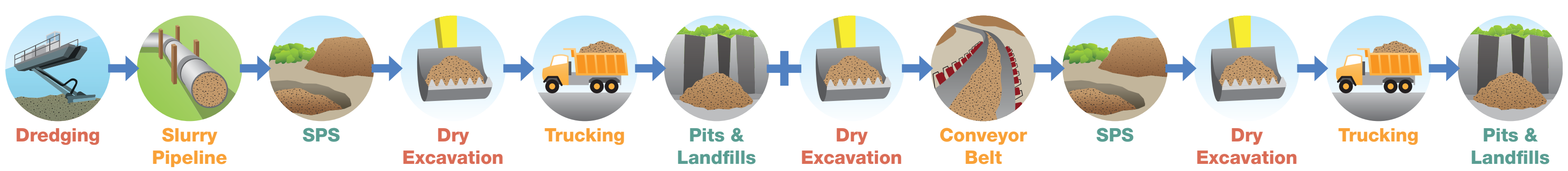
Alternative 2

Sluicing to Santa Anita SPS > Dry Excavate > Truck to Irwindale Pits + Dry Excavate at Santa Anita Reservoir > Conveyor Belt to Santa Anita SPS > Dry Excavate > Truck to Irwindale Pits & Landfills



Alternative 3

Dredging to Slurry Pipeline to Santa Anita SPS > Dry Excavate > Truck to Irwindale Pits & Landfills + Dry Excavate at Santa Anita Reservoir > Conveyor Belt to Santa Anita SPS > Dry Excavate > Truck to Irwindale Pits & Landfills



Big Dalton Reservoir

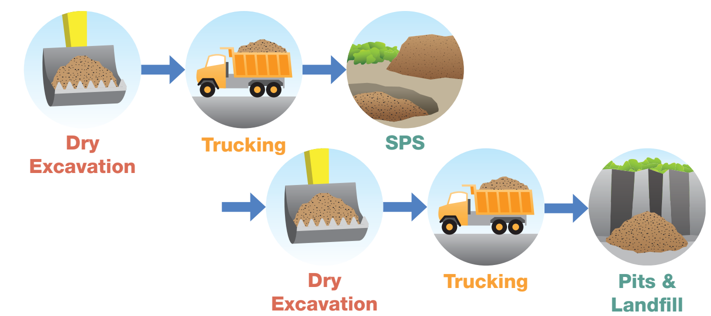
Over the next 20 years, 0.8 MCY of sediment are planned to be removed from Big Dalton Reservoir.

Alternative 1

Dry Excavate > Truck to Irwindale Pits

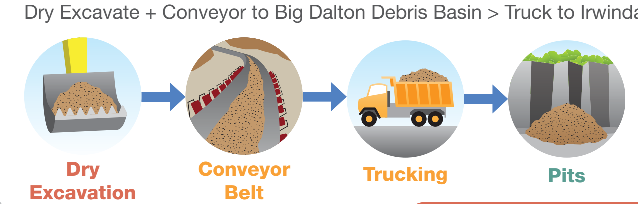
Alternative 2

Dry Excavate > Truck to Dalton SPS > Dry Excavate > Trucks to Irwindale Pits & Landfills



Alternative 3

Dry Excavate + Conveyor to Big Dalton Debris Basin > Truck to Irwindale Pits



Eaton Reservoir

Over the next 20 years, 0.6 MCY of sediment are planned to be removed from Eaton Reservoir.

Puddingstone Diversion Reservoir

Over the next 20 years, 0.6 MCY of sediment are planned to be removed from Puddingstone Diversion.

Live Oak Reservoir

Over the next 20 years, 210,000 CY of sediment are planned to be removed from Live Oak Reservoir.

Thompson Creek Reservoir

Over the next 20 years, 260,000 CY of sediment are planned to be removed from Thompson Creek Reservoir.

Only Viable Option

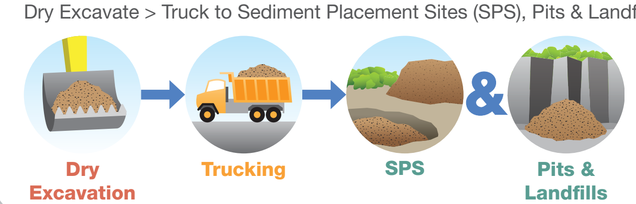
Dry Excavate > Truck to Irwindale Pits

Debris Basins

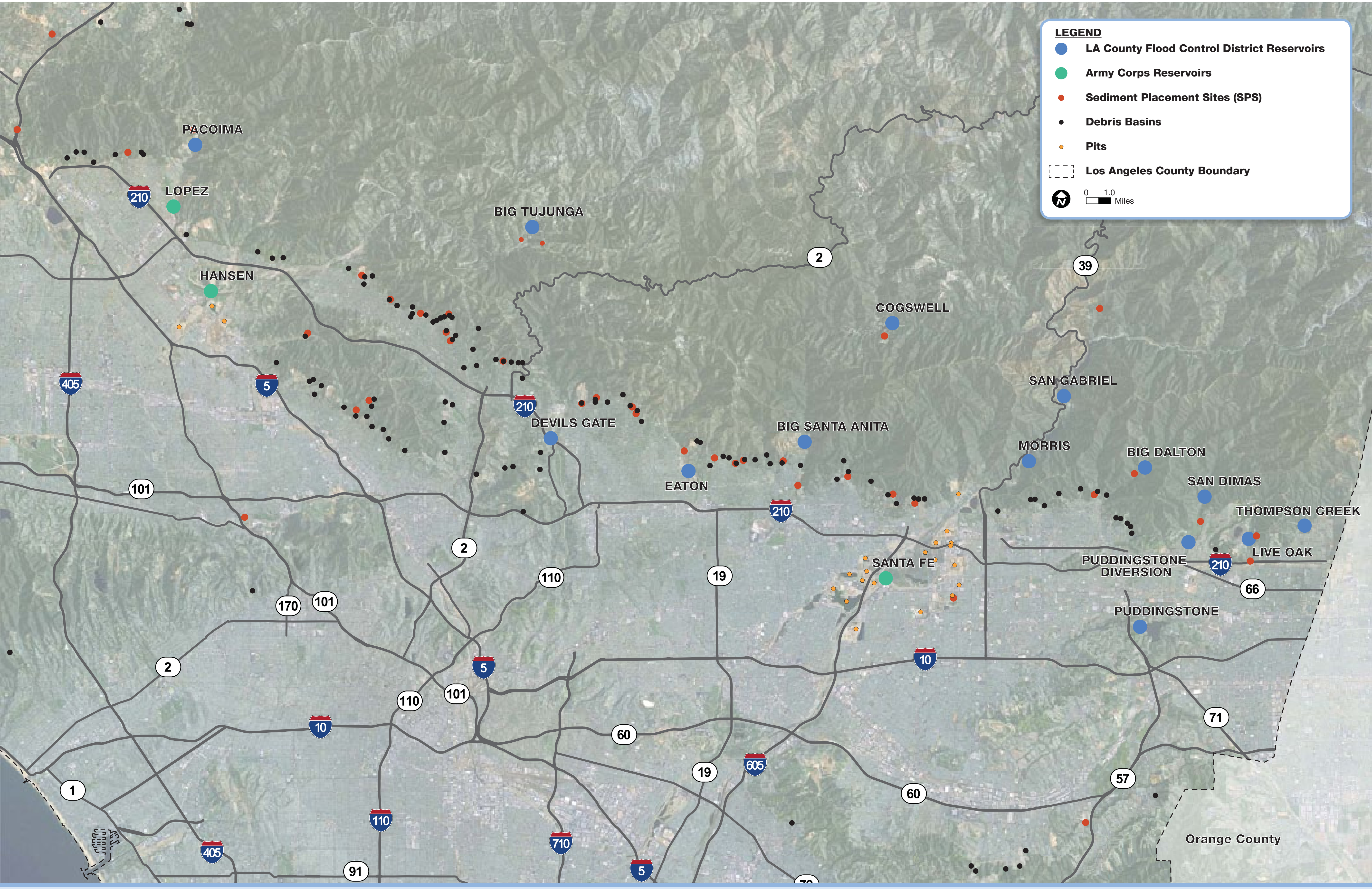
Over the next 20 years, close to 10 MCY of sediment are planned to be removed from the 162 Debris Basins.

Only Viable Option

Dry Excavate > Truck to Sediment Placement Sites (SPS), Pits & Landfills



For more information, visit our website: www.LASedimentManagement.com



For more information, visit our website: www.LASedimentManagement.com

Next Steps

What are the next steps in the Sediment Management Strategic Plan?

Fine-tune The Flood Control District will review comments and fine-tune the recommendations in the plan.

Finalize The Strategic Plan will be finalized in June, 2012.

Implement Implementation will begin with priority projects once the plan is finalized.

Continue Analysis More analysis is needed prior to choosing a specific alternative for the larger, more complicated dams.

Work with Pits Efforts will continue to develop agreements with the aggregate industry and to acquire pits for sediment placement.

Examine Uses Beneficial-use alternatives for both processing and placement will remain an option, particularly when cost-sharing partnerships are available.

Long-Term Vision Work with local stakeholders and the Army Corps of Engineers will continue as part of a comprehensive study to develop a region-wide plan to potentially restore some of the natural functions of the watershed.

What are future opportunities for public involvement?

- Stakeholders will have the opportunity to provide input on a project-by-project basis.
- Many of the District's sediment management implementation projects will require the preparation of an Environmental Impact Report (EIR) or a Mitigated Negative Declaration (MND) process.
- Pubic outreach is required and varies for each type of environmental analysis.
- At a minimum, the EIR process allows opportunities for public input during a scoping meeting period, a public review period, and a final public hearing.

Which projects are starting soon?

The following projects are a District priority and will be included in the initial implementation phase of the Sediment Management Strategic Plan.

1 Devil's Gate

The Flood Control District is currently in the process of preparing an Environmental Impact Report (EIR) for Devil's Gate Reservoir Sediment Removal and Management Project. EIR will thoroughly discuss all feasible alternatives to remove, transport, and place sediment for Devil's Gate Reservoir. Information about the EIR can be found at www.LASedimentManagement.com.

Opportunity for public input*:

- October to December, 2012 - Draft EIR Public Review Period
- May, 2013 - Board Hearing and Notice of Declaration

2 Big Tujunga

Big Tujunga Reservoir is located within the Angeles National Forest, in the Big Tujunga Canyon of the San Gabriel Mountains, approximately 8 miles east of the Sunland community of the City of Los Angeles.

Opportunity for public input*:

- The Initial Study (IS) and Mitigated Negative Declaration (MND) is anticipated to be released for public review in Summer, 2012.
- Early 2013 - Board Hearing

3 Pacoima

Pacoima Reservoir is located in the Pacoima Canyon of the San Gabriel Mountains, approximately four miles north of the Cities of Los Angeles and San Fernando. We anticipate an EIR process will begin in the Summer of 2012.

Opportunity for public input*:

- Winter, 2012 - Public Scoping Period
- Winter, 2013 - Draft EIR Public Review Period
- Spring, 2014 - Board Hearing and Notice of Declaration

4 Cogswell

Cogswell Reservoir is located in the San Gabriel Canyon approximately six miles north of the City of Azusa in the Angeles National Forest.

Opportunity for public input*:

- Fall, 2013 - Public Scoping Period
- Fall, 2014 - Draft EIR Public Review Period
- Future - Board Hearing and Notice of Declaration

*All dates are tentative and subject to change. Please check the sediment management website at www.LASedimentManagement.com periodically for updated information.