FORM APPROVED COUNTY COUNSEL
BY: GREGORY P. PRIAMOS DATE 12/3/14

Departmental Concurrence

SUBMITTAL TO THE FLOOD CONTROL AND WATER CONSERVATION DISTRICT BOARD OF SUPERVISORS COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

6.18B

FROM: General Manager-Chief Engineer

SUBMITTAL DATE: January 6, 2015

SUBJECT: Adopt Resolution No. F2015-01 - Setting a Public Hearing Date for the Lakeland Village Master Drainage Plan, 1st District [$0]

RECOMMENDED MOTION: That the Board of Supervisors:

1. Adopt Resolution No. F2015-01 which sets February 24, 2015 as the date for a Public Hearing concerning the approval of the Lakeland Village Master Drainage Plan in accordance with Section 18 of the District Act; and
2. Direct the Clerk of the Board to advertise and post said Notice of Public Hearing to approve the project in accordance with Section 18 of the District Act.

BACKGROUND:

Summary

Section 18 of the District's Act requires the Board to hold a Public Hearing for the purpose of considering all comments regarding any proposed facilities before authorizing the construction of such facilities.

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WARREN D. WILLIAMS
General Manager-Chief Engineer

FINANCIAL DATA	Current Fiscal Year:	Next Fiscal Year:	Total Cost:	Ongoing Cost:	POLICY/CONSENT (per Exec. Office)
COST	$ N/A	$ N/A	$ N/A	$ N/A	Consent ☐ Policy ☐
NET DISTRICT COST	$ N/A	$ N/A	$ N/A	$ N/A	

SOURCE OF FUNDS: N/A

Budget Adjustment: N/A

For Fiscal Year: N/A

C.E.O. RECOMMENDATION:

APPROVE

BY: Imelda Delos Santos

County Executive Office Signature

MINUTES OF THE BOARD OF SUPERVISORS

☐ Positions Added ☐ Change Order

☐ A-30 ☐ 4/5 Vote

Prev. Agn. Ref.: | **District:** 1st | **Agenda Number:** 11-9

BACKGROUND:

Summary (continued)

The General Manager-Chief Engineer of the District has found that the construction of the Master Drainage Plan facilities will have a significant effect on the environment and has prepared a Final Programmatic Environmental Impact Report, which will require certification by this Board.

Impact on Residents and Businesses

Not applicable.

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Board of Supervisors

Riverside County Flood Control and Water Conservation District

RESOLUTION NO. F2015-01
SETTING A PUBLIC HEARING DATE FOR
LAKELAND VILLAGE MASTER DRAINAGE PLAN
IN ACCORDANCE WITH SECTION 18 OF THE DISTRICT ACT

WHEREAS, this Board intends to consider approval of the Lakeland Village Master Drainage Plan (MDP) located within the District's Zone 3 and encompassing portions of the cities of Lake Elsinore and Wildomar and unincorporated Riverside County; and

WHEREAS, the MDP is generally bounded by Lake Elsinore to the north, the ridgeline of the Santa Ana Mountains to the south, Bryant Street and Sheila Lane to the east, and Riverside Drive to the west; and

WHEREAS, one use of the MDP is to allow the future construction of MDP drainage facilities which are comprised of open channels, underground storm drains and detention basins; and

WHEREAS, reference is made to a report entitled "Lakeland Village Master Drainage Plan" (MDP Report) and dated June 2013 on file with the Clerk of the Board; and

WHEREAS, reference is made to the engineering estimate of the cost of the MDP facilities, contained in the MDP Report; and

WHEREAS, reference is made to a map in the MDP Report, dated June 2013, bearing the name and showing the general location and general construction of the MDP facilities; and

WHEREAS, the General Manager-Chief Engineer of the District has found that the construction of the MDP facilities will have a significant effect on the environment and has prepared a Final Programmatic Environmental Impact Report which will require certification by this Board; and

FORM APPROVED COUNTY COUNSEL
BY: AARON C. GETTIS DATE 12/3/14

WHEREAS, Section 18 of the District Act requires that the District give public notice and conduct a public hearing prior to undertaking construction of any project; and

WHEREAS, the Resolution and MDP Report may be inspected at the District's offices, located at 1995 Market Street, Riverside, California 92501 or via the District's website at www.rcflood.org, and any written comments will be received at the above address or can be emailed to jdswenson@rcflood.org; and

WHEREAS, pursuant to Section 18 of the District Act, any person wishing to comment on the MDP facilities may do so in writing between the date of this notice and the public hearing, or may appear and be heard at the time and place noted below; and

WHEREAS, prior to making a decision on the MDP, this Board will consider all written and oral comments.

NOW, THEREFORE, BE IT RESOLVED, DETERMINED AND ORDERED by the Board of Supervisors of the Riverside County Flood Control and Water Conservation District in regular session assembled on January 6, 2015 that:

1. A public hearing concerning Section 18 of the District Act for the Lakeland Village Master Drainage Plan will be held on February 24, 2015 at 10:30 a.m. at the meeting room of this Board, 1st Floor, County Administrative Center, 4080 Lemon Street, Riverside, California, 92502 at which time all public comments shall be heard.

2. A copies of this Resolution and copies of the MDP Report shall be posted at least 21 days before the said hearing at the following locations:

- Lake Elsinore City Hall, 130 South Main Street, Lake Elsinore, CA 92530;
- City of Wildomar City Hall, 23873 Clinton Keith Road, Wildomar, CA 92595; and

- Lakeside Library, 32593 Riverside Drive, Lake Elsinore, California 92530.

3. A copy of this resolution shall be posted at least 21 days before said hearing at the Riverside County Clerk and Recorder's Office, 2724 Gateway Drive, Riverside, California 92507.

4. The Clerk of this Board is directed to cause a copy of this resolution to be published twice, once at least 21 days before said hearing, and once 7 days following the initial publication, in a newspaper of general circulation in accordance with Section 18 of the District Act.

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RIVERSIDE COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT
Riverside, California

LAKELAND VILLAGE

MASTER DRAINAGE PLAN

ZONE THREE

June 2013

WARREN D. WILLIAMS
General Manager-Chief Engineer

LAKELAND VILLAGE
MASTER DRAINAGE PLAN

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APPENDIX

MAP

SECTION I – PURPOSE

The purpose of the Lakeland Village Master Drainage Plan (MDP) report is to identify the network of drainage facilities needed to address the major drainage problems within the community of Lakeland Village. The MDP presented herein provides an effective and economical approach to providing flood protection and drainage to the area and may be used as a guide for locating and sizing critically needed drainage facilities.

Readers should bear in mind that the drainage network presented herein is conceptual in nature. As such, the MDP provides a conceptual solution that addresses the known drainage problems in the Lakeland Village area based on various engineering, environmental, and economic considerations. By no means does the MDP represent the only feasible solution.

The alignment and location of the facilities proposed in this MDP are conceptual. Precise locations will be dictated by site specific conditions and other factors existing at the time of detailed design. Similarly, the facility sizing information shown on the enclosed map is preliminary. More detailed analysis performed at the facility design stage will determine the final facility sizing.

SECTION II – SCOPE

Tasks involved in the development of this master plan include:

1. Determination of the points of concentration and quantity of stormwater runoff produced at various locations.
2. Determination of the quantity of debris produced by major canyons in the watershed.
3. Determination of the location and size of the proposed drainage facilities.
4. Investigation of alternative routes and conveyance methods as a basis for selecting the most economical, environmental, and soundly engineered plan.
5. Preparation of a drainage facility map.
6. Preparation of preliminary plan and profile sheets.
7. Preparation of individual facility cost estimates.

SECTION III – GENERAL DISCUSSION

GENERAL LOCATION

Lakeland Village is a small community located within unincorporated Riverside County. The community is roughly bounded by Lake Elsinore to the north, the ridgeline of the Santa Ana Mountains to the south, Bryant Street and Sheila Lane to the east, and Riverside Drive to the west.

The Lakeland Village Master Drainage Plan study area encompasses approximately thirteen (13) square miles and includes sixteen (16) separate watersheds. These watersheds are characteristically steep with high debris production potential. Runoff originating from these watersheds generally flows northeasterly, across Grand Avenue (the community's principal thoroughfare) and into Lake Elsinore. Existing land-use within the study area is predominantly residential or vacant open space. The majority of the existing developments are located within the northerly portion of the study area.

FLOODING CONCERNS

Since the 1980s, all flooding concerns and complaints received from Lakeland Village residents have been documented by Riverside County Flood Control and Water Conservation District (District) staff. Over the years, various concerns and complaints have been received from local residents through phone calls, letters to the District, community meetings, and the District's annual Budget Hearing process. The concerns discussed below are representative of those concerns expressed by the residents.

Most of the existing properties located in the Lakeland Village area were subdivided as far back as the early 1900s, long before the Subdivision Map Act granted local agencies the authority to regulate and control the design of subdivisions to protect public health and safety. Consequently, most subdivisions within the Lakeland Village community were developed without consideration of the area's significant flood hazards and without adequate flood protection and drainage infrastructure in place.

Within the Lakeland Village area, the Federal Emergency Management Agency (FEMA) has designated and mapped four (4) separate Special Flood Hazard Areas (SFHA). These SFHA indicate areas that are especially prone to flood hazards (i.e., subject to a one percent (1%) annual chance of being flooded). The SFHA are located in the general vicinity of Gregory Place, Baldwin Boulevard, Maiden Lane and Santa Rosa Drive (located in watersheds D, H, L and M, respectively). There are approximately 210 existing structures located within the SHFA. These structures are subject to high flood hazards and are typically subject to mandatory purchase of flood insurance under the provisions of the National Flood Insurance Program (NFIP).

Grand Avenue is the major thoroughfare into and out of Lakeland Village community and provides access to the adjacent cities of Lake Elsinore and Wildomar. Stormwater runoff from each of the sixteen watersheds must cross Grand Avenue on its way to Lake Elsinore. In general, Grand Avenue lacks adequate drainage improvements (road culverts) to convey significant stormwater flows. Therefore, vehicular travel along Grand Avenue during storm events is a major concern for the Lakeland Village residents. In a large storm event, Grand Avenue would likely become impassable, rendering the area inaccessible and isolated.

Existing drainage facilities that currently provide some level of flood protection within the study area are as follows: Lime Street Channel, Ortega Channel, Ortega Channel Lateral A, Ortega Channel Lateral A -1 Debris Basin, Ortega Channel Lateral A-1, Ortega Channel Lateral A-2, Lakeland Village Channel, Churchill Street Drainage Ditch, Stoneman Street Channel, Corydon Channel, Palomar Channel, Ontario Way Storm Drain, Tract 23111 Drainage Ditch, Sedco-Bryant Street Storm Drain Stage 1 and Sedco-Bryant Street Storm Drain and Debris Basin. Additional drainage facilities are needed in order to provide 100-year flood protection to the area.

ADDITIONAL CONCERNS

The watersheds in the Lakeland Village area are considered to have high debris production potential and the area has historically experienced excess debris deposition. When fires occur within the steep canyons, vegetation is destroyed and leaves the soil more susceptible to erosion. During high intensity rainfall events, the debris originating from fires along with eroded sediment is swiftly carried downstream toward Lake Elsinore. This combination of debris and stormwater runoff is referred to as "bulked flow", and includes sand, silt and vegetative debris from the Santa Ana Mountains. As the bulked flow drains to

Lake Elsinore, debris is deposited in the flatter areas causing severe property damage. Additionally, the excess debris and sediment that eventually flows into Lake Elsinore may contribute to water quality degradation of the lake.

Debris from the nearby Santa Ana Mountains also creates a major problem for the existing Ortega Channel Storm Drain. A portion of this facility is constructed on a very mild slope in which the bulked flow moves slowly and sediment tends to settle out. As the sediment accumulates inside the storm drain, the blockage reduces the hydraulic capacity of the facility and makes it susceptible to overflow. To ensure adequate capacity of the channel at all times, frequent routine maintenance is required, which overtime, has become costly.

Lastly, Lake Elsinore is currently listed as a 303(d) impaired water body. The Santa Ana Regional Water Quality Control Board has identified nutrients, specifically nitrogen and phosphorous, as the principal cause of impairment. Very few, if any, of the existing developments within the Lakeland Village area were required to implement water quality best management practices as a condition of their development. Thus, "first flush" events typically collect and carry trash, dirt and other pollutants directly to the lake. Addressing the area's urban runoff will help improve the existing water quality of Lake Elsinore.

SECTION IV – MASTER DRAINAGE PLAN OBJECTIVES

Based on the concerns of the Lakeland Village area, the following objectives were established for the Lakeland Village Master Drainage Plan:

1. Reduce the level of risk from flooding and debris flows to existing/future development and infrastructure to below the "100-year" level[1];

2. Provide "all-weather" access along Grand Avenue by conveying 100-year tributary flood flows below the travelled way;

3. Provide a Master Drainage Plan that meets the project objectives at the lowest construction and right-of-way acquisition cost;

4. Economically manage debris to ensure that the 100-year design capacity is maintained during major storm events;

5. Consider, and where feasible, incorporate regional water quality facilities to mitigate for the impacts from existing development and to improve the water quality of Lake Elsinore;

6. Avoid or minimize impacts to potentially sensitive areas.

[1] i.e., the 1% annual chance flood event

SECTION V – CRITERIA

Underground Storm Drains

The underground facilities proposed in this MDP are located within existing or assumed future right-of-way, whenever possible, and generally consist of reinforced concrete pipe ranging in size from 36 inches to 102 inches in diameter. Reinforced concrete boxes are usually placed under dedicated road crossings or where the flow rates exceed the capacity of standard pipe sizes. All of the underground facilities proposed in the MDP are intended to carry the runoff from a (1%) annual chance ("100-year") storm.

Open Channels

The proposed open channels are located along existing drainage ditches or washes, and where the proposed construction of the channel would have minimal impacts on adjacent properties. The open channels not only serve as flow conveyors, they also provide an outlet for the underground facilities proposed in the plan. The open channels proposed in this MDP consist of two types, lined and unlined. Lined channels[2] are utilized in high velocity flow situations and are typically rectangular shaped with concrete paving on the sides and bottom. Unlined facilities[3] are utilized in low velocity flow situations, are typically trapezoidal in shape and have no protection for the bottom or sideslopes. The channel right-of-way required for both lined and unlined facilities must accommodate the full channel width along with adequate maintenance access. Channels with top widths of less than 20 feet require one maintenance access road; where the top width exceeds 20 feet, two maintenance access roads are necessary. All of the open channels proposed in the MDP are intended to carry the runoff from a 1% annual chance ("100-year") storm.

Detention Basin

The detention basin proposed in this MDP is located upstream of an existing channel with limited hydraulic capacity and room for widening. The purpose of the detention basin is to lower the peak flow rate down to the capacity of the existing channel through the use of temporary detention storage. It should be noted that the detention basin proposed in this plan is sized for the 1% annual chance ("100-year" storm) event. Flows exceeding the design capacity of the basin would pass over the emergency spillway in flow patterns approximating present conditions.

Debris Basins

Debris basins are proposed in watersheds that are equal to or greater than 64 acres and are generally located upstream of the proposed facilities to capture the debris before it enters the downstream conveyance system. The proposed debris basins were sized based on the *Los Angeles District Method for Prediction of Debris Yield* (Method) by the U.S. Army Corps of Engineers Los Angeles District, dated February 2000. The Method is intended to be used for the estimation of debris yield in watersheds of 64 to 128,000 acres (0.1 to 200 mi^2) in area with a high proportion of their total area in steep, mountainous terrain. The calculated debris yield was multiplied by a factor of safety of 2 to produce the ultimate storage volume needed for the sizing of the basins.

[2] Ref. RCFC&WCD Standard Drawing No. CH 327
[3] Ref. RCFC&WCD Standard Drawing No. CH 324

In watersheds that are less than 64 acres in size, the proposed facilities are sized to convey the 1% annual chance "bulked flows", (i.e., a flow rate that includes both stormwater runoff and its associated debris load). The bulked flow rates were obtained by multiplying the 1% annual chance flow rate by a factor of 1.2 (20% increase).

Water Quality Basins

The proposed water quality basins are sized per the *Riverside County Water Quality Management Plan for Urban Runoff*, dated July 2006, and are proposed downstream of existing developments. These water quality basins would capture urban runoff generated from existing developments and would accommodate temporary storage to allow the urban runoff to infiltrate into the ground. The infiltration process is intended to "treat" the urban runoff.

SECTION VI – HYDROLOGY

The hydrology for this MDP was developed using two methods: the Rational Method and the Synthetic Unit Hydrograph Method. The Rational Method was used to determine the peak discharges (cubic feet per second) generated from smaller watersheds less than 300 to 500 acres in size. For watersheds larger than 500 acres, the Synthetic Unit Hydrograph Method was used. To account for the attenuating effects of channel and basin storage, the Convex Routing Method and Modified Puls Methods were used, respectively. Methodology and supportive data for both Rational and Synthetic hydrology, including estimation of loss rates/infiltration, may be found in the *Riverside County Flood Control and Water Conservation District Hydrology Manual*, dated April 1978 (District Hydrology Manual).

The 2003 Riverside County General Plan land use designations were used to develop the hydrology for this MDP. The following table indicates the correspondence between the 2003 Riverside County General Plan land use designations and the District Hydrology Manual land use designations:

Table 1 – Lakeland Village Area Land Use

2003 Riverside County General Plan	District Hydrology Manual April 1978
RR – Rural Residential	Natural (Good) Chaparral Broadleaf
RM – Rural Mountainous	Natural (Good) Chaparral Broadleaf
OS – Open Space	Natural (Good) Chaparral Broadleaf
EDR-RC – Estate Density Residential	1 Acre Lots
VLDR – Very Low Density Residential	1 Acre Lots
Low Density Residential	½ Acre Lots
MDR – Medium Density Residential	¼ Acre Lots
MHDR – Medium High Density Residential	Condominiums
HDR – High Density Residential	Apartments
LI – Light Industrial	Commercial
CR - Commercial	Commercial

NOAA Atlas 14 Version 4 rainfall was used in the hydrology calculations for this MDP. The rainfall frequencies examined are the 2-year (50% annual chance) and the 100-year (1% annual chance) recurrence intervals with 1, 3, 6 and 24 hour durations. The calculated slope of the intensity-duration

curve is 0.6. The following NOAA Atlas 14 Version 4 area weighted point rainfall values were used to develop the hydrology:

Table 2 – NOAA Atlas 14 Point Rainfall Values

Storm Frequency and Duration	Area Weighted Point Rainfall (Inches)
2 Year – 1 Hour	0.62
2 Year – 3 Hour	1.06
2 Year – 6 Hour	1.60
2 Year – 24 Hour	2.64
100 Year – 1 Hour	1.65
100 Year – 3 Hour	2.56
100 Year – 6 Hour	3.78
100 Year – 24 Hour	6.71

SECTION VII – EXISTING FACILITIES

Currently, existing drainage facilities that provide some level of flood protection in the area are as follows:

Lime Street Channel
Ortega Channel
Ortega Channel Lateral A
Ortega Channel Lateral A-1
Ortega Channel Lateral A-2
Lakeland Village Channel
Churchill Street Storm Drain
Stoneman Street Channel
Corydon Channel
Palomar Channel
Ontario Way Storm Drain
Sedco-Bryant Street Storm Drain, Stage 1
Sedco-Bryant Street Storm Drain
Tract 23111 Drainage Ditch

Additional drainage facilities would need to be constructed in order to provide comprehensive "100-year" flood protection to the area. A brief description of the existing facilities is as follows:

Watershed A:

Lime Street Channel (Project No. 3-0-00030) – The construction of the Lime Street Channel system was completed in 1963. Lime Street Storm Drain is a concrete trapezoidal channel whose upstream origin is located at a point approximately 350 feet west of the intersection of Jamieson and Orange Street. The channel extends northeasterly towards Laguna Avenue, transitions into a 42" RCP then heads northerly toward Lake Elsinore. The channel has a base width of 3 feet, a sideslope of 1:1 and depths ranging from 3.5 feet to 4.5 feet.

Watershed B:

Ortega Channel (Project No. 3-0-00070) – The construction of Ortega Channel was completed in 1995. Ortega Channel is a concrete trapezoidal channel that begins at a point approximately 800 feet south of the intersection of Shoreline and Lighthouse Drive. The channel extends northerly toward Ortega Highway. At Ortega Highway, the channel transitions into an 84-inch RCP and extends along Ortega Highway for approximately 815 feet. At this point, the 84-inch RCP transitions into a 96-inch RCP and extends in Lake Terrace Drive for approximately 280 feet. The 96-inch RCP then transitions into a 102-inch RCP and extends parallel to Lake Terrace Drive for approximately 430 feet. At Grand Avenue, the 102-inch RCP transitions into a 10.5'W by 6'D RCB. From there, the concrete trapezoidal channel begins and extends parallel to Serena Way toward Lake Elsinore. The channel has a typical base width of 2 feet and sideslope of 1.5:1.

Ortega Channel Lateral A (Project No. 3-0-00071) – The construction of Ortega Channel Lateral A was completed in 1992. Ortega Channel Lateral A is an RCP ranging in sizes from 54-inches to 60-inches in diameter. Additionally, a small debris basin was constructed at the upstream end of the facility in 2000. The upstream terminus begins at the existing debris basin outlet and extends northerly in Welford Place toward Lake Ridge Road. At Lake Ridge Road, the RCP extends easterly in Lake Ridge Road toward Grandview Avenue. At Grandview Avenue, the RCP extends northerly in Grandview and terminates at its confluence with existing Ortega Channel.

Ortega Channel Lateral A-1 (Project No. 3-0-00071) – The construction of Ortega Channel Lateral A-1 was completed in 1992. Ortega Channel Lateral A-1 is a 48-inch RCP whose upstream origin begins at the intersection of Trabuco Drive and Laguna Avenue. The RCP extends northerly in Laguna Avenue until it terminates and confluences with existing Ortega Channel Lateral A.

Ortega Channel Lateral A-2 (Project No. 3-0-00071) – The construction of Ortega Channel Lateral A-2 was completed in 1994. The upstream terminus is located near the intersection of Grandview Avenue and Lake Ridge Road. From there, the 36-inch RCP extends northerly in Grandview until it confluences with existing Ortega Channel Lateral A.

Watershed H:

Lakeland Village Channel (Project No. 3-0-00010) – The construction of Lakeland Village Channel was completed in 1955. Lakeland Village Channel is a concrete bottom rectangular channel with Elmwood fence and rock filled channel walls. The upstream origin begins near Nelson Avenue. The channel then extends northerly along an existing wash and terminates at Lake Elsinore.

Watershed I:

Churchill Street Storm Drain (Project No. 3-0-00080) – Churchill Street "Storm Drain" begins at Grand Avenue and extends northerly toward Lake Elsinore. It consists of an earthen drainage ditch with a base width of 2.5 feet, depth of approximately 3 feet and sideslope of 1.5:1, located on both sides of Churchill Street.

Watershed N:

Stoneman Street Channel (Project No. 3-0-00060) – Construction of Stoneman Street Channel was completed circa 1966. Stoneman Street is a paved trapezoidal channel and has a typical base width of 24 feet and 6:1 sideslopes. The channel begins near Stoneman Street at a point approximately 1,015 feet south of Grand Avenue and extends northerly in Stoneman Street until it terminates at approximately 300 feet north of Grand Avenue.

Watershed O:

Corydon Channel (Project No. 3-0-00045) – The construction of Corydon Channel was completed after 2006, and was accepted by the District for maintenance in August 2009. Corydon Channel is a rectangular concrete channel with an average width of approximately 28.7 feet and depth of 12.5 feet. Beginning at Union Street as a double 14'W x 8'D RCB, the facility transitions to a rectangular channel extending parallel to Union Street then transitions into a double 14'W x 8'D RCB and terminates at the confluence with existing Palomar Channel.

Palomar Channel (Project No. 3-0-00045) – The construction of Palomar Channel was completed after 2006, and was accepted by the District for maintenance in August 2009. Palomar Channel is predominantly a rock riprap lined channel. The upstream origin begins at Corydon Street as a triple 14'W x 4.2'D RCB, transitions into a trapezoidal channel with base widths ranging from 22 to 24 feet, top widths ranging from 70 to 76 feet, depths ranging from 12 to 13 feet, respectively, and sideslope of 2:1. The trapezoidal channel extends northerly along Old Coach Road. At Palomar Street, the trapezoidal channel transitions into a two - 14'W x 8'D RCB.

Ontario Way Storm Drain – The construction of Ontario Way Storm Drain was completed with Tracts 24138 and 24139. The Ontario Way Storm Drain is an RCP ranging in size from 72inches to 78inches. The upstream origin begins at Grand Avenue then extends northerly in Ontario Way toward Lake Elsinore for approximately 2,800 feet. This facility is maintained by the City of Lake Elsinore.

Watershed P:

Sedco - Bryant Street Storm Drain, Stage 1 (Project No. 3-0-00085-01) – The construction of Bryant Street Storm Drain Stage 1 was completed in 2008. The Bryant Street Storm Drain Stage 1 is a 30-inch RCP. The upstream origin begins near Palomar Street. The storm drain then extends southerly in Bryant Street for approximately 1,325 feet then northerly and parallel to Union Street for approximately 810 feet where it terminates at the confluence with proposed Channel A.

Sedco - Bryant Street Storm Drain (Project No. 3-0-00085) – The construction of Sedco Bryant Street Storm Drain was completed after 2006. Sedco Bryant Street Storm Drain is a system of RCPs ranging in sizes from 42inches to 66inches. The upstream origin begins at the existing debris basin outlet located at the southernmost end of Sweet Nectar Road. From there, the storm drain extends northerly in Sweet Nectar Road and continues northerly in Bryant Street to Grand Avenue. The storm drain then traverses northerly in Grand Avenue for approximately 1,016 feet where it terminates.

Construction of the debris basin was completed after 2005. The debris basin is located upstream of the existing Bryant Street Storm Drain at the southernmost end of Sweet Nectar Road and has a volume of 1.2 acre-feet.

Tract 23111 Drainage Ditch – The upstream origin of the paved ditch begins at the downstream terminus of Sedco - Bryant Street Storm Drain at Grand Avenue. From there, the paved ditch extends northerly and parallel to Bryant Street until it confluences with the proposed Channel A and existing Sedco - Bryant Street Storm Drain, Stage 1. This facility is maintained by the District pursuant to an agreement with the Riverside County Economic Development Agency.

SECTION VIII – PROPOSED IMPROVEMENTS

The improvements proposed in this MDP are shown on the enclosed map found at the back of this report. Supporting data for all proposed facilities is available at the Riverside County Flood Control and Water Conservation District's Office.

The design engineer should be aware that a detailed utility search was not completed. This means that, while the major known facilities were considered during the development of this Master Plan, a more thorough search may reveal additional or newly placed utilities that may necessitate minor alignment and size changes, or utility relocations during final design.

Watershed A:

Line A Debris Basin – Line A Debris Basin is located at a point approximately 350 feet west of the intersection of Jamieson Street and Orange Street, just upstream of existing Lime Street Channel, and has a volume of approximately 9.3 acre-feet and an approximate right-of-way of 1.5 acres. The partially incised debris basin has an approximate embankment height of 20 feet and includes a low flow outlet and a spillway structure.

Line A / Lime Street Channel – Floodwalls ranging in heights from 1 to 2 feet would be added to the existing Lime Street Channel. The improved Lime Street Channel will ultimately have a uniform height ranging from 4.5 to 5.5 feet. The upstream origin of Line A begins as a 72-inch RCP at the downstream terminus of existing Lime Street Channel located at the intersection of Hill Street and Laguna Avenue. From there, the 72-inch RCP extends northerly in Hill Street until it connects to the existing Lime Street Channel. The 72-inch RCP would replace the existing 42-inch RCP.

Line A Water Quality Basin – Located at the northwest corner of the intersection of Hill Street and Grand Avenue, the water quality basin would require a connection to the existing drainage system of the existing tract located at the southwest corner of the intersection of Grand Avenue and Hill Street. The incised water quality basin has a volume of approximately 5.5 acre-feet and approximate right-of-way of 3.3 acres.

Watershed B:

Line B (Ortega Channel) Debris Basin – Ortega Channel Debris Basin is located at a point approximately 700 feet south of the intersection of Shoreline Drive and Lighthouse Drive, just upstream of the existing Ortega Channel, and has a volume of approximately 15.7 acre-feet and an approximate right-of-way of 1.6 acres. The partially incised debris basin has an approximate embankment height of 27 feet and includes a low flow outlet and a spillway structure.

Line B (Ortega Channel) Channel Outlet – One foot floodwalls would be added to the existing Ortega Channel Outlet located on the north side of Grand Avenue.

Line B (Ortega Channel) Water Quality Basin – Line B Water Quality Basin is located at the southeast intersection of Serena Way and Grand Avenue. The incised basin has a volume of approximately 5.0 acre-feet and an approximate area footprint of 3.2 acres.

Watershed C:

Line C – The upstream origin of Line C begins at the intersection of Windward Way and Grand Avenue as a 48-inch RCP. From there, the 48-inch RCP extends easterly in Grand Avenue, transitions into a 60-inch, then a 78-inch RCP. Near the intersection of Blanche Drive and Grand Avenue, the 78-inch RCP transitions into a 90-inch RCP and extends northerly toward Lake Elsinore.

Line C-1 – The upstream origin of Line C-1 begins near the intersection of Santa Rosa Drive and Grand Avenue as a 48-inch RCP. The RCP then extends westerly in Grand Avenue and transitions into a 66-inch RCP. Near Blanche Drive, the 66-inch RCP transitions into a 78-inch RCP and confluences with the proposed Line C.

Watershed D:

Line D – The upstream origin of Line D begins at a point approximately 840 feet south of the southern end of Santa Rosa Drive as a 60-inch RCP. From there, the RCP extends northerly towards Santa Rosa Avenue, continues in Santa Rosa Avenue, transitions into a 66-inch, 72-inch, 78-inch RCP, then a daylight/outlet structure with an approximate length of 105 feet, width of 40 feet and a maximum depth of 6.5 feet.

Watershed E:

Line E – The upstream origin of Line E begins near the intersection of the future alignment of Union Avenue and Esther Street as a 54-inch RCP. From there, the RCP would extend northerly in Esther Street and transition into a 72-inch RCP as it continues northerly and parallel to Olive Street toward Lake Elsinore.

Watershed F:

Line F Debris Basin – Line F Debris Basin is located at a point approximately 1,090 feet southwest of the intersection of Evergreen Street and Union Avenue at the upstream origin of proposed Line F and has a volume of approximately 2.6 acre-feet and approximate right-of-way of 1.9 acres. The partially incised debris basin has an approximate embankment height of 13 feet and includes a low flow outlet pipe and a spillway structure.

Line F – The upstream origin of Line F begins at a point approximately 1,090 feet southwest of the intersection of Evergreen Street and Union Avenue as a 42-inch RCP. From there, the 42-inch RCP extends easterly towards a point located approximately 1,000 feet southeast of the intersection of Evergreen Street and Union Avenue. Near this point, the 42-inch RCP transitions into a 60-inch RCP, a 66-inch RCP and then a daylight/outlet structure with an approximate length of 75 feet, width of 25 feet and a maximum depth of 4.5 feet as it extends northerly and parallel to Evergreen Street towards Lake Elsinore.

Line F-1 – The upstream origin of Line F-1 begins at a point approximately 370 feet southwest of the intersection of Akley Street and Gillette Street as a 42-inch RCP. From there, the 42-inch RCP extends northwesterly for approximately 1,040 feet to a point where it confluences with the proposed Line F.

Watershed G:

Line G – The upstream origin of Line G begins near the intersection of Deeble Entrance and Grand Avenue as a 54-inch RCP. From there, the 54-inch RCP transitions into a 66-inch RCP and continues westerly along Grand toward Adelfa Street. Near Adelfa Street, the 66-inch RCP transitions into a 72-inch RCP then a daylight structure/outlet with an approximate length of 65 feet, width of 15 feet and a maximum depth of 6.5 feet as it continues northeasterly toward Lake Elsinore.

Line G Water Quality Basin – An approximate 4.0 acre-feet water quality basin with an approximate right-of-way of 1.9 acres is proposed at the southwest corner of the intersection of Grand Avenue and Adelfa Street. The water quality basin is located west of an existing development located at the southeast corner of the intersection of Adelfa Street and Grand Avenue. The incised water quality basin would require a connection to the existing local drainage system.

Watershed H:

Line H (Adelfa Channel) – The upstream origin of Line H begins at Gillette Street as a 48-inch RCP. From there, the 48-inch RCP extends easterly toward Zellar Street and then northerly in Zellar Street. At Cottrell Boulevard, the 48-inch RCP transitions into a 66-inch RCP and extends easterly in Cottrell Boulevard. At Landerville Boulevard, the 66-inch RCP transitions into an 84-inch RCP and continues easterly in Cottrell Boulevard and then northerly in Blackwell Boulevard toward Lake Elsinore.

Line H-1 – The upstream origin of Line H-1 begins approximately 127 feet south of Cottrell Boulevard in Adelfa Street. From there, the 42-inch RCP extends northerly in Adelfa Street until it confluences with the proposed Line H.

Line H-2 – The upstream origin of Line H-2 begins near the intersection of Brand Street and Anthony Avenue as a 60-inch RCP. From there, the 60-inch RCP extends easterly in Anthony Avenue and heads northerly in Landerville Boulevard. At Peeler Avenue, the 60-inch RCP transitions into a 54-inch RCP and continues in Landerville Boulevard until it confluences with the proposed Line H at Cottrell Boulevard.

Lakeland Village Channel Debris/Detention Basin – The debris/detention basin is proposed approximately 350 feet south of the southernmost end of Blackwell Boulevard and has a volume of approximately 97 acre-feet and an approximate right-of-way of 10.8 acres. The partially incised basin has an approximate embankment height of 58 feet.

Lakeland Village Channel – The upstream origin of the existing Lakeland Village Channel begins near the southernmost end of Blackwell Boulevard at the proposed debris/attenuation basin outlet. From there, the existing channel extends parallel to Baldwin Boulevard along the geographic low until it terminates at Lake Elsinore. The existing Lakeland Village Channel would remain and improvements would be made to the existing undersized culverts at Nelson Avenue, Hayes Street, Bobrick Avenue, MacKay Avenue, Brightman Avenue, Sutherland Avenue, Raley Avenue and Grand Avenue to meet the existing capacity.

The existing channel downstream of Grand Avenue would be removed and replaced with a 12'W x 4'D rectangular channel sized to convey 515 cfs.

Watershed I:

Line I Debris Basin – Line I Debris Basin is located at a point approximately 265 feet south of Hayes Street and upstream of proposed Line I. The debris basin has a volume of approximately 3.0 acre-feet and an approximate right-of-way of 0.9 acre. The partially incised debris basin has an approximate embankment height of 24 feet and includes a low flow outlet pipe and a spillway structure.

Line I – The upstream origin of Line I begins at a point approximately 265 feet south of Hayes Street as a 36-inch RCP. From there, a 36-inch RCP extends northerly in Wood Street. At Broomall Avenue, the 36-inch RCP transitions into a 48-inch RCP and continues westerly in Broomall Avenue. At Dowman Street, the 48-inch RCP transitions into a 72-inch RCP and continues northerly in Dowman Street, easterly in Brightman Avenue and then northerly in Lorimer Street. At Grand Avenue, the 72-inch RCP transitions into a 90-inch RCP and outlets into Lake Elsinore.

Line I-1 – The upstream origin of Line I-1 begins near the intersection of Baldwin Boulevard and Brightman Avenue as a 42-inch RCP. From there, the 42-inch RCP extends easterly in Brightman Avenue and transitions into a 48-inch RCP at Churchill Street. The 48-inch RCP extends easterly in Brightman Avenue until it confluences with the proposed Line I at Lorimer Street.

Watershed J:

Line J – The upstream origin of Line J begins near the intersection of Brightman Avenue and Benner Street as a 54-inch RCP. From there, the 54-inch RCP extends westerly in Brightman Avenue toward Turner Street. At Turner Street, the 54-inch RCP transitions into a 60-inch RCP. The 60-inch RCP continues northerly in Turner Street and transitions to a 5 'W x 5'D RCB. At Grand Avenue, the RCB transitions into a 7'W x 5'D RCB. The 7'W x 5'D RCB then transitions into a daylight/outlet structure with an approximate length of 350 feet, width of 7 feet and maximum depth of 5 feet as it extends northerly toward Lake Elsinore.

Watershed K:

Line K Debris Basin – Line K Debris Basin is located at the southernmost end of Ginger Lane, upstream of the proposed Line K, has a volume of approximately 7.4 acre-feet and an approximate right-of-way of 4.8 acres. The partially incised debris basin has an approximate embankment height of 36 feet and includes a low flow outlet pipe and a spillway structure.

Line K – The upstream origin of Line K begins near the southernmost end of Ginger Lane. From there, the 60-inch RCP extends northerly in Ginger Lane toward Grand Avenue. At Grand Avenue, the 60-inch RCP transitions into a 78-inch RCP and extends easterly in Turtle Dove Drive. The 78-inch RCP transitions into a 7'Wx5'D RCB, then into a daylight structure/outlet with an approximate length of 200 feet, width of 7 feet and maximum depth of 5 feet as it continues easterly in Turtle Dove Drive toward Lake Elsinore.

Line K-1 – The upstream origin of Line K-1 begins near the intersection of Kathryn Way and Grand Avenue as a 36-inch RCP. The 36-inch RCP extends westerly in Grand Avenue and then easterly and

parallel to Vail Street. Near Lake Elsinore, the 36-inch RCP transitions into a daylight/outlet structure with an approximate length of 265 feet, width of 10 feet and maximum depth of 3 feet.

Watershed L:

Line L – The upstream origin of Line L begins at a point approximately 696 feet south of Grand Avenue. From there, the 6'W x 5'D rectangular channel extends along the geographic low. At Grand Avenue, the open channel transitions into a 7'W x 7'D RCB. The RCB then transitions into a 15'W x 5'D, to a 18'W x 10'D, to a 15'W x 8'D, to a 60' W x 5'D rectangular channel, then a daylight/outlet structure with an approximate length of 180 feet, width of 60 feet and maximum depth of 5 feet as it outlets into Lake Elsinore.

Watershed M:

Line M – The upstream origin of Line M begins near the southern end of Koves Road as a 60-inch RCP. The 60-inch RCP extends northerly in Koves Road and transitions into a 66-inch RCP. At Grand Avenue, the 66-inch RCP transitions into a 72-inch RCP and extends westerly in Grand Avenue towards Gregory Place. At Gregory Place, the 72-inch RCP transitions into a 90-inch RCP and continues northerly in Gregory Place. At the geographic low, the 90-inch RCP transitions into a 15'W x 8'D then a 15'W x 10'D rectangular channel and confluences with the proposed Line L.

Watershed N:

Line N Debris Basin – Line N Debris Basin is located at a point approximately 690 feet south of Morrell Lane, just upstream of the proposed Line N and has a volume of approximately 9.3 acre-feet and approximate right-of-way of 2.9 acres. The partially incised debris basin has an approximate embankment height of 33 feet and includes a low flow outlet pipe and a spillway structure.

Line N – The upstream origin of Line N begins at a point approximately 690 feet south of Morrell Lane, just downstream of the proposed Line N debris basin. From there, the 66-inch RCP extends northerly towards Morrell Lane. At Morrell Lane, the 66-inch RCP transitions into a 90-inch RCP and continues northerly in Morrell Lane toward Grand Avenue. At Grand Avenue, the 90-inch RCP transitions into a 102-inch RCP. The 102-inch RCP extends westerly in Grand Avenue and northerly in Stoneman Street. At approximately 1,859 feet in Stoneman Street, the 90-inch RCP transitions into a 12'W x 7'D RCB. From there, the RCB transitions into a 20'W x 7'D open channel, then a daylight/outlet structure with an approximate length of 230 feet, width of 50 feet and maximum depth of 4 feet as it extends toward Lake Elsinore.

Lateral N-1 – The upstream origin of Lateral N-1 begins at a point approximately 367 feet west of Stoneman Street as a 36-inch RCP. From there, the 36-inch RCP extends easterly until it confluences with proposed Line N.

Line N Water Quality Basin – Line N Water Quality Basin is located at the southwest corner of the intersection of Palomar and Stoneman Street. The incised water quality basin has an approximate volume of 5.9 acre-feet and an approximate right-of-way of 3.7 acres, and would require a connection to the drainage system of the tract located west of the proposed water quality basin.

Watershed O:

Line O-10 Debris Basin – Line O-10 Debris Basin is located near the intersection of Skylark Drive and Cissna Place, just upstream of the proposed Line O-10 and has a volume of 9.1 ac-ft. and an approximate right-of-way of 1.8 acres. The partially incised debris basin has an approximate embankment height of 28 feet and includes a low flow outlet pipe and a spillway structure.

Line O-10 – The upstream origin of Line O-10 begins near the intersection of Skylark Drive and Cissna Place as a 66-inch RCP. From there, the 66-inch RCP extends northerly in Skylark Drive. At Grand Avenue, the 66-inch RCP transitions into a 78-inch RCP and extends easterly in Grand Avenue. At the geographic low between Gill Lane and Corydon Road, the 78-inch RCP transitions into a 20'W x 10'D open channel. Just before connecting to the existing Palomar Channel, the 20'W x 10'D transitions into a 14'W x 8'D open channel.

Line O-20 Debris Basin – Line O-20 Debris Basin is located at a point approximately 1,060 feet south of Grand Avenue on Borchard Drive, just upstream of the proposed Line O-20 and has a volume of approximately 6.7 acre-feet and an approximate right-of-way of 2.1 acres. The partially incised debris basin has an approximate embankment height of 23 feet and includes a low flow outlet pipe and a spillway structure.

Line O-20 – The upstream origin of Line O-20 begins at a point approximately 1060 feet south of Grand Avenue on Borchard Drive. From there, the 60-inch RCP extends northerly in Borchard Drive. At Grand Avenue, the 60-inch RCP transitions into a 72-inch RCP, extends westerly in Grand Avenue and connects to the existing 78-inch RCP in Ontario Way. The downstream terminus of the existing 78-inch RCP transitions into a proposed 7'W x 7'D RCB. The RCB then transitions into a daylight/outlet structure with an approximate length of 300 feet, width of 50 feet and maximum depth of 5 feet as it outlets into Lake Elsinore.

Watershed P:

Channel A – The upstream origin of Channel A begins at the downstream terminus of Sedco-Bryant Street Storm Drain Stage 1. From there, the 40'W x 6'D trapezoidal channel extends westerly along the geographic low. At Corydon Road, the trapezoidal channel transitions into a 42'W x 6'D RCB. The 42'W x 6'D RCB would replace the existing 42'W x 4'D RCB.

SECTION IX – ALTERNATIVES

Four (4) alternative plans were developed using the Master Drainage Plan Objectives (Objectives) discussed in Section IV. Each alternative was evaluated and scored against the Objectives and the alternative with the highest score was selected as the Preferred Alternative. A description of each alternative can be found below. For more information on the alternatives analysis, refer to "Appendix 'A' – Alternatives Analysis."

Alternative 1 – Alternative 1 is the "No Project" alternative. No new facilities all proposed under this alternative; the level of flood protection is limited to that which is currently provided by the existing District and non-District maintained drainage facilities within the Lakeland Village area. Existing drainage facilities include: Lime Street Channel, Ortega Channel Lateral A-1 Debris Basin, Ortega Channel, Ortega Channel Lateral A, Ortega Channel Lateral A-1, Ortega Channel Lateral A-2, Lakeland

Village Channel, Churchill Street Drainage Ditch, Stoneman Street Channel, Corydon Channel, Palomar Channel, Ontario Way Storm Drain, Tract 23111 Drainage Ditch, Sedco – Bryant Street Storm Drain Stage 1, Sedco – Bryant Street Storm Drain and Debris Basin. (See Exhibit 1)

Alternative 2 – Alternative 2 proposes 21 underground storm drains (approximately 45,000 lineal feet), four open channels (approximately 9,000 lineal feet), two debris basins and one debris/detention basin. The proposed storm drains and open channels are sized to convey "bulked flows" (i.e., flows that include both stormwater runoff and its associated debris load) to Lake Elsinore. The two debris basins are proposed upstream of the existing Ortega and Lime Street Channels to capture sediment before entering the channels. These channels historically have been subject to debris accumulation and frequent maintenance due to relatively flat slopes. A debris/detention basin is proposed upstream of the existing Lakeland Village Channel to capture debris and attenuate flow during a 100-year storm event. (See Exhibit 2)

Alternative 2 also proposes improvements to the following existing facilities:

- Lime Street Channel – Floodwalls (2-feet high) would be added to the top of the channel. The existing 48-inch diameter pipe along Hill Street would be replaced with a 72-inch pipe.
- Ortega Channel – Floodwalls (2-feet high) would be added to the portion of Ortega Channel downstream of Grand Avenue.
- Lakeland Village Channel – The existing double 36-inch culverts located at Nelson Avenue, Bobrick Avenue, MacKay Avenue, Brightman Avenue, Sutherland Avenue, Raley Avenue and Grand Avenue would be replaced with a 12' x 4' reinforced concrete box.

Alternative 3 – Alternative 3 proposes 17 underground storm drains (approximately 37,000 linear feet), four open channels (approximately 7,000 lineal feet), and eight debris basins. Like Alternative 2, Alternative 3 also includes improvements to the existing Lime Street, Ortega and Lakeland Village Channels, such as flood walls and larger culverts. Alternative 3 also proposes the acquisition of properties and the removal of over 200 structures located within the FEMA mapped SFHAs. The existing culverts located along Grand Avenue, including those located within the SFHAs, are also proposed to be enlarged to convey the 100-year storm. (See Exhibit 3)

Alternative 4 - Preferred Alternative – Alternative 4 (Preferred) proposes 21 underground storm drains (approximately 45,000 lineal feet), four open channels (approximately 9,000 linear feet), eight debris basins, and one debris/detention basin. Like Alternatives 2 and 3, Alternative 4 proposes improvements to the existing Lime Street, Ortega and Lakeland Village Channels, such as flood walls and larger culverts. Alternative 4 also proposes construction of four water quality basins. (See Exhibit 4)

SECTION X – ESTIMATED COST

A cost summary for the MDP facilities is shown in "Table 3 – Cost Summary". Cost estimates were based on 2012 Planning Unit Cost Sheets and include construction, right of way and 28% for engineering, environmental mitigation, administration and contingencies.

The cost of the storm drains shown in Table 3 includes the cost of manholes, catch basins and pipe installations. Manholes are located as necessary with a maximum spacing of 500 feet. Catch basins are

not specifically located but the total number of lineal feet is included in the cost estimate. The cost of the open channels includes the cost of the access roads. Access roads are assumed to be 15 feet wide and two (2) access roads were included where the channel top width exceeds 20 feet. Water quality and debris basin costs include the cost of a 15-foot wide access road around the perimeter of the basin.

SECTION XI – CONCLUSIONS

Based on the studies and investigations made for this report, it is concluded that:

1. The Lakeland Village area has experienced serious problems related to flooding and excess debris, and will continue to experience these problems until a network of flood protection and drainage facilities is constructed. In addition, urban runoff from the Lakeland Village area currently flows into Lake Elsinore with little or no treatment.

2. When fully implemented, the Lakeland Village MDP described herein will (i) protect homes and businesses against a one percent (1%) annual chance flood; (ii) maintain ingress/egress along Grand Avenue during major storm events, and (iii) improve the quality of urban runoff that flows into Lake Elsinore.

3. The proposed MDP provides the maximum benefit to the Lakeland Village community and its residents.

4. The proposed MDP lends itself to staged construction as funds become available.

5. The total cost of the recommended improvements, including construction, rights-of-way, engineering, administration and contingencies, is estimated to be **$48,010,000**.

SECTION XII – RECOMMENDATIONS

It is recommended that:

1. The Lakeland Village MDP, Alternative 4 as set forth herein, be adopted by the District's Board of Supervisors.

2. The MDP, as set forth herein, be used as a guide for all future developments in the study area and that such developments be required to conform to the Plan insofar as possible.

3. All rights-of-way necessary for implementation of the MDP be protected from encroachment.

TABLE 3
LAKELAND VILLAGE MASTER DRAINAGE PLAN 154015
COST SUMMARY

Facility	Construction Cost	Engineering Admin *	Right of Way	Total Cost
Line A (Lime Street Channel)	$485,266	$185,659	$0	$663,000
Line A Debris Basin	$187,917	$71,895	$111,000	$368,000
Line A Water Quality Basin	$228,435	$87,397	$248,000	560,000
Line B	$17,600	$6,734	$0	$24,000
Line B Debris Basin	$307,965	$117,825	$120,000	$541,000
Line B Water Quality Basin	$220,455	$84,344	$240,000	$541,000
Line C	$831,345	$318,066	$0	$1,136,000
Line C-1	$350,847	$134,231	$0	$479,000
Line D	$1,052,803	$402,794	$8,000	$1,447,000
Line E	$462,774	$177,054	$0	$632,000
Line F	$833,898	$319,043	$8,000	$1,147,000
Line F Debris Basin	$164,115	$62,789	$437,000	$661,000
Line F-1	$281,548	$107,718	$0	$385,000
Line G	$517,211	$197,881	$0	$707,000
Line G Water Quality Basin	$114,765	$43,908	$143,000	$300,000
Line H	$2,170,862	$830,554	$0	$2,966,000
Line H-1	$72,244	$27,640	$0	$99,000
Line H-2	$514,149	$196,709	$0	$703,000
Lakeland Village Channel Debris/Detention Basin	$1,692,403	$647,500	$810,000	$3,122,000
Lakeland Village Channel	$1,184,299	$453,103	$53,000	$1,671,000
Line I Debris Basin	$134,205	$51,346	$68,000	$251,000
Line I	$1,244,570	$476,163	$0	$1,701,000
Line I-1	$472,136	$180,635	$0	$645,000
Line J	$900,131	$344,383	$15,000	$1,245,000
Line K Debris Basin	$771,489	$295,166	$360,000	$1,414,000
Line K	$1,540,490	$589,379	$0	$2,105,000
Line K-1	$593,311	$226,996	$0	$811,000
Line L	$672,425	$257,265	$180,000	$1,099,000
Line M	$2,880,384	$1,102,012	$68,000	$4,004,000
Line N Debris Basin	$389,992	$149,208	$218,000	$751,000
Line N	$4,869,738	$1,863,123	$98,000	$6,752,000
Lateral N-1	$261,056	$99,878	$0	$357,000
Line N Water Quality Basin	$146,231	$55,947	$278,000	$478,000
Line O-10 Debris Basin	$196,342	$75,119	$135,000	$403,000
Line O-10	$3,206,140	$1,226,643	$113,000	$4,494,000
Line O-20 Debris Basin	$192,775	$73,754	$158,000	$421,000
Line O-20	$775,958	$296,875	$0	$1,060,000
Channel A	$1,206,666	$461,661	$218,000	$1,867,000
TOTAL	**$32,144,937**	**$12,298,396**	**$4,087,000**	**$48,010,000**

* Includes 3% Mitigation

Appendix 'A' – Alternatives Analysis

All four (4) alternatives were analyzed against the Master Plan Objectives (Objectives) listed in Table 4. Various weights have been assigned to each of the objectives to emphasize the level of importance of the objective. The assigned weights range from 10% (lowest) to 20% (highest), which would result in points ranging from 10 to 20 points, respectively, for each objective. The total number of points possible is 100 points.

As previously discussed above, 100-year flood protection and all-weather access along Grand Avenue are major concerns in the Lakeland Village area. Therefore, Objectives 1, 2 and 4 have been assigned the highest weight of 20% (20 points). The cost to implement this MDP and the possibility of impacting potentially sensitive areas (Objectives 3 and 6) were also important areas of consideration. These two objectives have been assigned a weight of 15% (15 points). Lastly, the possibility of incorporating regional water quality facilities to mitigate impacts from existing development (Objective 5) was assigned a weight of 10%.

The assignment of scores is discussed below. The alternative with the highest score was selected as the Preferred Alternative. With the highest score of 90 out of a total of 100 points, Alternative 4 closely addressed all the Objectives and was selected as the Preferred Alternative. See Table 4: Alternatives Analysis – Summary of Scores.

Table 4: Alternatives Analysis - Summary of Scores

Objective		Alternative 1	Alternative 2	Alternative 3	Alternative 4
1	Reduce the level of risk from flooding and debris flows to existing/future development and infrastructure to below the 100-year level Weight = 20% (Points = 20 out of 100)	5	20	20	20
2	Provide "all-weather" access along Grand Avenue by conveying 100-year tributary flood flows below the travelled way Weight = 20% (Points = 20 out of 100)	0	20	20	20
3	Provide a MDP at the lowest construction and right-of-way acquisition cost Weight = 15% (Points = 15 out of 100)	0	15	5	12
4	Economically manage debris to ensure that the 100-year design capacity is maintained during major storm events Weight = 20% (Points = 20 out of 100)	5	10	20	20
5	Consider, and where feasible, incorporate regional water quality facilities to mitigate for the impacts from existing development and to improve the water quality of Lake Elsinore Weight = 10% (Points = 10 out of 100)	0	0	0	10
6	Avoid or minimize the impacts to potentially sensitive areas Weight = 15% (Points = 15 out of 100)	15	13	11	8
Total Score (out of 100):		25	78	76	90

ALTERNATIVE 1 – NO PROJECT

Alternative 1 is the "No Project" alternative. Thus, there are no new facilities proposed under this alternative. For this alternative, flood protection is only provided by the existing District and non-District maintained drainage facilities within the Lakeland Village area. Existing drainage facilities include: Lime Street Channel, Ortega Channel Lateral A-1 Debris Basin, Ortega Channel, Ortega Channel Lateral A, Ortega Channel Lateral A-1, Ortega Channel Lateral A-2, Lakeland Village Channel, Churchill Street Drainage Ditch, Stoneman Street Channel, Corydon Channel, Palomar Channel, Ontario Way Storm Drain, Tract 23111 Drainage Ditch, Sedco – Bryant Street Storm Drain Stage 1, Sedco – Bryant Street Storm Drain and Debris Basin. (See Exhibit 1)

Based on the discussion below, Alternative 1 was assigned a total score of 25 out of 100 points.

1. **Reduce the level of risk from flooding and debris flows to existing/future development and infrastructure to below the "100-year" level**
   (Score = 5 out of 20 points)
   There are no new drainage facilities proposed in Alternative 1; therefore, this alternative would not provide any additional protection against the 100-year flood event.

2. **Provide "all-weather" access along Grand Avenue by conveying 100-year tributary flood flows below the travelled way**
   (Score = 0 out of 20 points)
   Alternative 1 does not propose any additional facilities or improvements; therefore, access along Grand Avenue will continue to be limited or rendered impassable during storm events.

3. **Provide a Master Drainage Plan at the lowest construction and right-of-way acquisition cost**
   (Score = 0 out of 15 points)
   Alternative 1 does not propose any additional facilities or improvements; therefore, this alternative would be the least expensive but it would not meet the main project objective of providing flooding protection to the Lakeland Village area.

4. **Economically manage debris to ensure that the 100-year design capacity is maintained during major storm events**
   (Score = 5 out of 20 points)
   Alternative 1 does not propose any additional facilities or improvements; therefore, long-term maintenance costs would be incurred only for the maintenance of drainage facilities already in place in the area.

5. **Consider, and where feasible, incorporate regional water quality facilities to mitigate for the impacts from existing development to improve the water quality of Lake Elsinore**
   (Score = 0 out of 10 points)
   Alternative 1 does not include any water quality features; therefore, water quality concerns would not be addressed by this alternative.

6. **Avoid or minimize the impact to potentially sensitive areas**
   (Score = 15 out of 15 points)

Alternative 1 does not propose any additional facilities or improvements; therefore, no biologically or culturally sensitive areas would be impacted.

ALTERNATIVE 2

Alternative 2 proposes 21 underground storm drains (approximately 45,000 lineal feet), four open channels (approximately 9,000 lineal feet), two debris basins and one debris/detention basin. The proposed storm drains and open channels are sized to convey "bulked flows" (i.e., flows that include both stormwater runoff and its associated debris load) to Lake Elsinore. The two debris basins are proposed upstream of the existing Ortega and Lime Street Channels to capture sediment before entering the channels. These channels historically have been subject to debris accumulation and frequent maintenance due to relatively flat slopes. A debris/detention basin is proposed upstream of the existing Lakeland Village Channel to capture debris and attenuate flow during a 100-year storm event. (See Exhibit 2)

Alternative 2 also proposes improvements to the following existing facilities:

- Lime Street Channel – Floodwalls (2-feet high) would be added to the top of the channel. The existing 48-inch diameter pipe along Hill Street would be replaced with a 72-inch pipe.

- Ortega Channel – Floodwalls (2-feet high) would be added to the portion of Ortega Channel downstream of Grand Avenue.

- Lakeland Village Channel – The existing double 36-inch culverts located at Nelson Avenue, Bobrick Avenue, MacKay Avenue, Brightman Avenue, Sutherland Avenue, Raley Avenue and Grand Avenue would be replaced with a 12' x 4' RCB.

Based on the discussion below, Alternative 2 was assigned a total score of 78 out of 100 points.

1. **Reduce the level of risk from flooding and debris flows to existing/future development and infrastructure to below the "100-year" level**
   (Score = 20 out of 20 points)
   Alternative 2 proposes storm drains and open channels sized large enough to convey the bulked 100-year tributary flows to Lake Elsinore. In addition, improvements are proposed to the existing Lime Street, Ortega and Lakeland Village Channels.

2. **Provide "all-weather" access along Grand Avenue by conveying 100-year tributary flood flows below the travelled way**
   (Score = 20 out of 20 points)
   Alternative 2 proposes underground storm drains sized to provide 100-year flood protection to Grand Avenue, thereby, making the road accessible during all but the most extreme storm events.

3. **Provide a Master Drainage Plan at the lowest construction and right-of-way acquisition cost**
   (Score = 15 out of 15 points)
   The cost to construct and acquire the necessary rights-of-way for the proposed improvements in Alternative 2 is approximately $42,803,000. Aside from Alternative 1 (No Project), Alternative 2 is the least costly in terms of construction and right-of-way acquisition.

4. **Economically manage debris to ensure that the 100-year design capacity is maintained during major storm events**
(Score = 10 out of 20 points)
The proposed storm drains and open channels would convey the bulked flows to Lake Elsinore. Since the debris would not be captured upstream, the proposed underground storm drains and open channels would need to be routinely maintained to ensure that the design capacity is conveyed at all times. Storm drain inspection and debris removal is especially critical for those drainage facilities aligned along Grand Avenue due to the abrupt change in the storm drain profile from steep to flat slope. This abrupt change would result in the accumulation of debris in the flatter reaches, thereby, requiring more frequent storm drain inspection and debris removal. Due to the enclosed nature of the underground storm drains, removing the sediment would involve specialized methods, such as jetting or vacuuming. These specialized maintenance methods are far more expensive than the simple excavation methods used on channels and debris basins.

5. **Consider, and where feasible, incorporate regional water quality facilities to mitigate for the impacts from existing development and to improve the water quality of Lake Elsinore**
(Score = 0 out of 10 points)
Alternative 2 does not include any water quality features; therefore, Lake Elsinore water quality concerns would not be addressed by this alternative.

6. **Avoid or minimize the impacts to potentially sensitive areas**
(Score = 13 out of 15 points)
Biologically Sensitive Areas: The proposed underground facilities located within existing street rights-of-way and the proposed improvements to existing facilities located outside of biologically sensitive survey areas would not substantially impact biological resources. However, the proposed open channels are generally aligned along existing natural watercourses that may support sensitive biological resources. These biological resources may be impacted by construction activities.

ALTERNATIVE 3

Alternative 3 proposes 17 underground storm drains (approximately 37,000 linear feet), four open channels (approximately 7,000 linear feet), and eight debris basins. Like Alternative 2, Alternative 3 also includes improvements to the existing Lime Street, Ortega and Lakeland Village Channels, such as flood walls and larger culverts. Alternative 3 also proposes the acquisition of properties and the removal of over 200 structures located within the FEMA mapped SFHAs. The existing culverts located along Grand Avenue, including those located within the SFHAs, are also proposed to be enlarged to convey the 100-year storm. (See Exhibit 3)

Based on the discussion below, Alternative 3 was assigned a total score of 76 out of 100 points.

1. **Reduce the level of risk from flooding and debris flows to existing/future development and infrastructure to below the "100-year" level**
(Score = 20 out of 20 points)
Alternative 3 proposes a series of storm drains, channels and debris basins that would provide 100-year flooding protection to the Lakeland Village area. In addition to the proposed structural

improvements, this alternative would also implement a non-structural approach to flood risk reduction by removing at-risk structures from the FEMA mapped SFHAs. Over 200 properties located within four separate SFHAs would be acquired, the structures located on the properties demolished, and the floodplain areas would revert to open space.

2. **Provide "all-weather" access along Grand Avenue by conveying 100-year tributary flood flows below the travelled way**
(Score = 20 out of 20 points)
Alternative 3 would provide underground storm drains and culverts sized to provide 100-year flood protection to Grand Avenue, thereby, making the road accessible during all but the most extreme storm events.

3. **Provide a Master Drainage Plan at the lowest construction and right-of-way acquisition cost**
(Score = 5 out of 15 points)
The cost to construct the proposed improvements in Alternative 3 is approximately $36,630,000. Implementation of Alternative 3 would also include a non-structural approach to flood risk reduction and would require the acquisition of over 200 existing properties and structures. The cost to acquire properties, remove structures and relocate property owners is approximately $75,000,000. Due to the extensive right-of-way acquisition cost, Alternative 3 would be the most costly in terms of construction and right-of-way acquisition, with a total cost of $111,630,000.

4. **Economically manage debris to ensure that the 100-year design capacity is maintained during major storm events**
(Score = 20 out of 20 points)
Alternative 3 proposes several debris basins to capture sediment and debris from the mountains before it enters into the proposed storm drains. Although this alternative proposes storm drains aligned along Grand Avenue where there is an abrupt change from a steep to flat slope, the debris would be captured upstream and would not affect the hydraulic capacity of the storm drain over time. Given the topography of the Lakeland Village area, implementation of debris basins would best manage the debris and will ensure the hydraulic capacity of the underground systems is maintained at all times. The captured debris would need to be removed from the basins to ensure adequate storage capacity for subsequent storm events. Compared to the cost of specialized methods used to maintain underground storm drains, the cost to excavate debris from the basins would be significantly less.

5. **Consider, and where feasible, incorporate regional water quality facilities to mitigate for the impacts from existing development and to improve the water quality of Lake Elsinore**
(Score = 0 out of 10 points)
Other than the proposed debris basins, Alternative 3 does not include any water quality features; therefore, water quality concerns would not be addressed by this alternative.

6. **Avoid or minimize the impacts to potentially sensitive areas**
(Score = 11 out of 15 points)

Biologically Sensitive Areas: The proposed underground facilities located within existing street rights-of-way and the proposed improvements to existing facilities located outside of biologically sensitive survey areas would not substantially impact biological resources. However, the proposed open channels and debris basins are generally aligned along natural watercourses and may be located in areas that support sensitive biological resources. These biological resources may be permanently impacted by the facilities. Conversely, the acquired properties located within the FEMA mapped SFHA would be converted to open space and could support biological resources.

Culturally Sensitive Areas: There are four (4) recorded resources within 125 feet of the proposed storm drains and channels. Within the footprint of two of the debris basins, historical resources were found and further evaluation would be necessary. For the remaining debris basin footprints, there were no previous studies available. Since the proposed debris basins are generally located within undeveloped areas, there is a higher probability of finding prehistoric cultural resources in these areas.

The acquisition of properties located within the FEMA mapped SFHA areas would include approximately 50 architectural resources (structures at least 50 years old) and would require further evaluation.

ALTERNATIVE 4 - PREFERRED

Alternative 4 (Preferred) proposes 21 underground storm drains (approximately 45,000 lineal feet), four open channels (approximately 9,000 lineal feet), eight debris basins, and one debris/detention basin. Like Alternatives 2 and 3, Alternative 4 proposes improvements to the existing Lime Street, Ortega and Lakeland Village Channels, such as flood walls and larger culverts. Alternative 4 also proposes construction of four water quality basins. (See Exhibit 4)

Based on the discussion below, Alternative 4 was assigned a total score of 90 out of 100 points.

1. **Reduce the level of risk from flooding and debris flows to existing/future development and infrastructure to below the "100-year" level**
   (Score = 20 out of 20 points)
   Alternative 4 would provide 100-year flood protection to the entire Lakeland Village area, including FEMA mapped SFHA, by proposing drainage systems consisting of storm drains, open channels, debris basins, and improvements to the existing Lime Street, Ortega and Lakeland Village Channels.

2. **Provide "all-weather" access along Grand Avenue by conveying 100-year tributary flood flows below the travelled way**
   (Score = 20 out of 20 points)
   Alternative 4 would provide underground storm drains sized to provide 100-year flood protection to Grand Avenue, thereby, making the road accessible during all but the most extreme storm events.

3. **Provide a Master Drainage Plan at the lowest construction and right-of-way acquisition cost**

(Score = 12 out of 15 points)

The cost to construct and acquire the necessary rights-of-way for the proposed improvements in Alternative 4 is approximately: $48,000,000. The cost to implement Alternative 4 is higher than the cost to implement Alternative 2 ($42,803,000) but lower than the cost to implement Alternative 3 ($111,630,000).

4. Economically manage debris to ensure that the 100-year design capacity is maintained during major storm events

(Score = 20 out of 20 points)

Alternative 4 proposes several debris basins to capture sediment and debris from the mountains before it enters the proposed storm drains. Although this alternative proposes storm drains aligned along Grand Avenue where there is an abrupt change from a steep to flat slope, the debris would be captured upstream and would not affect the hydraulic capacity of the storm drain over time. Given the topography of the Lakeland Village area, implementation of debris basins would best manage the debris and will ensure the hydraulic capacity of the underground systems is maintained at all times. The captured debris would need to be removed from the basins to ensure adequate storage capacity for subsequent storm events. Compared to the cost of specialized methods used to maintain underground storm drains, the cost to excavate debris from the basins would be significantly less.

5. Consider, and where feasible, incorporate regional water quality facilities to mitigate for the impacts from existing development to improve the water quality of Lake Elsinore

(Score = 10 out of 10 points)

In addition to a network of flood protection and drainage improvements, Alternative 4 proposes several water quality basins located downstream of existing developments within the Lakeland Village area. The proposed basins are intended to capture and treat urban runoff originating from these existing development areas; thereby, reducing the amount of pollutants that would otherwise flow into Lake Elsinore.

6. Avoid or minimize the impacts to potentially sensitive areas

(Score = 8 out of 15 points)

Biologically Sensitive Areas: The proposed underground facilities located within existing street rights-of-way and the proposed improvements to existing facilities located outside of biologically sensitive survey areas would not substantially impact biological resources. However, the proposed open channels, debris basins, and water quality basins are generally aligned along natural watercourses or undeveloped areas and may be located in areas that support sensitive biological resources. The biological resources in these areas may be impacted by construction activities.

Culturally Sensitive Areas: There are four (4) recorded resources within 125 feet of the proposed storm drains and channels. Within the footprint of two of the proposed debris and water quality basins, historical resources were found. For the remaining debris and water quality basin footprints, further evaluation would be necessary. Since the proposed debris and water quality basins are generally located within undeveloped areas, there is a higher probability of finding prehistoric cultural resources in these areas.