Las Virgenes Creek

The Las Virgenes Creek watershed is approximately 89 percent undeveloped, although the stream has been altered considerably below the Ventura County-Los Angeles County jurisdictional line. Below the county jurisdictional line to Agoura Road and other segments downstream, the creek has been straightened, rip-rapped, relocated, and given other treatments typical of an urbanizing area. This has caused accelerated water flow velocity in general throughout the creek, especially within and immediately downstream of concreted reaches. Refer to Exhibit A (Figure 4.1 – Las Virgenes Creek) for project code references.

Las Virgenes Creek crosses the northern boundary of Calabasas flowing south out of the Upper Las Virgenes Canyon Open Space Preserve (formerly Ahmanson Ranch). A short segment of incised dirt channel lined with emergent wetland vegetation (LVC-01, 02 and 03) transitions to a 20-foot wide trapezoidal concrete channel that is flanked by dense residential uses (LVC-04). From Thousand Oaks Boulevard, south to Parkmor Road, the channel flows through a box culvert. Tributary to this reach is a detention basin that drains runoff from a large development to the west and runs east under Las Virgenes Road to the creek (LVC-05 and 06). At Parkmor Road, the culvert goes underground and resurfaces south of the commercial uses northeast of the intersection of Las Virgenes Road and the Ventura Freeway. A tributary that flows west along the north side of the Ventura Freeway joins the creek there.

The creek passes west under Las Virgenes Road into a stretch of willow forest that extends along the north side of the Ventura Freeway (outside the City's boundaries) approximately 1,500 feet before crossing under the highway to the south (LVC-08 through 12A). Along this reach, the creek is bordered to the northwest by a small floodplain and disturbed hillside and to the southeast by riprap and concrete stabilizing structures. Meanders, riffle/pool complexes, and a gentle slope characterize the natural portion of the channel in this reach. In some areas, the banks show signs of instability, and there are bar formations in the channel.

Just south of the Ventura Freeway, Las Virgenes Creek flows through a 50-foot-wide trapezoidal concrete channel for a distance of approximately 400 feet (LVC-12B). Sediment deposits on the concrete bottom support some vegetation, including willow saplings. Both sides of the channel are bordered by commercial uses with large asphalt parking lots. The concrete channel ends after passing south under Agoura Road.

South of Agoura Road, Las Virgenes Creek flows approximately 3 miles through dense residential and commercial uses before passing south into Malibu Creek State Park (LVC-13 through 30). Throughout this reach, most of the creek maintains a natural soft bottom with small pockets of mulefat scrub, southern willow scrub, and emergent wetlands combined with primarily willow forest vegetation. Pockets of exotic vegetation such as eucalyptus, tamarisk, and vinca exist along the banks.

While much of the channel in this stretch is characterized by a gentle slope and shallow depth, development encroaches on the creek floodplain, and in several locations cement structures have been installed to stabilize banks or channelize the stream for short distances. In addition, storm water outlets drain into the creek periodically throughout this segment. In some places, restriction of flow has led to channel incision or bank instability.

North of the intersection of Lost Hills Road and Las Virgenes Road, the Resource Conservation District of the Santa Monica Mountains (RCD) has completed the Las Virgenes Creek Stream and Habitat Restoration project, a riparian habitat improvement project. The creek passes under Lost Hills Road through a concrete culvert, then flows adjacent to De Anza Park and into Malibu Creek State Park.

As the creek flows through Malibu Creek State Park, it maintains a fairly natural course due to the lack of development within the floodplains (LVC-31 through 44). Las Virgenes Road parallels the creek south about 300 feet from the eastern bank. Throughout this reach, the creek is characterized by a meandering channel incised in some locations due to increased flow from the upper watershed.

The analysis of identified projects on Las Virgenes Creek resulted in twenty construction projects listed in Tables 1A and 2A. Table 1A includes seven proposed habitat improvement projects that are entirely contained within Calabasas City Limits. Table 2A includes thirteen habitat improvement projects that are either entirely or partially outside of Calabasas City Limits. The total estimated design and construction cost for implementation of all eighteen proposed projects on Las Virgenes Creek is slightly over $10.4 Million.

Table 1A
Las Virgenes Creek Habitat Improvement Projects Inside Calabasas City Limits

Construction Code	Project Codes	Priority	Project Description	Study & Design Cost	Construction & Inspection Cost	Total Design & Construction	Projected O & M Costs	Comments
FH-LV02	LVC13, LVC14, LVC19	Medium	At LVC13, treat this area as an enhancement project, preserving all existing native material. Enhancement plantings should be installed at the toe of the slope, and in bare areas on the banks. Minor hand grading may be beneficial in some areas. At LVC14, to increase velocity, we recommend narrowing the effective flow area of the channel through strategic alternating placement of boulders, logs, and/or plantings. Changes is stream grade as recommended in the master plan are not feasible. At LVC19, Clean up trash and debris in the area. Plant Bacharis sarothroides, Juglans and Salix in the gully and immediate surrounding area. It is unlikely this area would be attractive as a mitigation area, so we recommend a limited maintenance and monitoring program of 2 years.	$21,645	$25,227	$46,872	$30,300	The entire existing riparian corridor in this reach is heavily vegetated with native species and many large mature trees. Grading solutions will come at a high temporary cost to habitat.
FH-LV03	LVC16	High	Remove the entire line of Pepper Trees along parking lot and replace with native species that can double as attractive landscape plants. Recontour the banks of the fill area and revegetate the area with native riparian forest.	$18,060	$106,350	$124,410	$36,500	
FH-LV04	LVC18, LVC20, LVC24	High	At LVC18, lay back the banks to a maximum grade of 1:1, preferably 2:1. Leave a portion of the bench, and be careful for the sewer lines. Grading in most areas should start just up-slope from the existing large trees. Salvage willows for replanting (other species as feasible). At LVC20, remove and kill all Eucalyptus and other exotic species. Expand riparian forest habitat to the top of banks and as far beyond as possible, roughly 15-20 feet. At LVC24, remove the storage yard and lay back banks to a more stable angle along 250' of creek, and revegetate the entire reach with riparian forest species.	$43,670	$344,678	$388,348	$69,500	
QL-03	LVC-26, 27, 28, 30A	High	Lost Hills Road above Meadow Creek Lane. Remove crib wall, stabilize banks, improve fish passage at Lost Hills Rd. box culvert.	$124,490	$451,800	$576,290	$52,000	Significant channel instabilities in this area; requires comprehensive analysis/plan
QL-05	LVC-34	Low	Remove barrier to fish movement.	$2,000	$25,000	$27,000	$2,000	
W-01	LVC-12B	High	Removal of approximately 400 linear feet of concrete trapezoidal channel and construction of naturalization improvements between Highway 101 and the Agoura Road Bridge. Scope of work includes restoring wildlife corridor, creating native riparian habitat, installation of an observation deck, and providing a trail system for public interaction with the restored channel.	$25,000	$1,300,000	$1,325,000	$50,000	Project study complete, all required permits are obtained and engineered plans, specifications and engineer's cost estimate on file.
W-02	N/A	Medium	Remediate and infiltrate dry weather flows from 48" storm drain outfalls into Las Virgenes Creek below the intersection of Lost Hills Road and Cold Springs.	$50,000	$500,000	$550,000	$1,500	Project envisioned to be similar to that being implemented in PD 1851
				SUBTOTAL TABLE 1A =		$3,037,920	$241,800	

Table 2A
Las Virgenes Creek Habitat Improvement Projects Outside Calabasas City Limits

Construction Code	Project Codes	Priority	Project Description	Study & Design Cost	Construction & Inspection Cost	Total Design & Construction	Projected O & M Costs	Comments
QL-01	LVC-01, 02, 03, 04, 12A, 05, 06	Medium	Beginning at upper end of Las Virgines Road. Stabilize headcut, monitor channel incision and restore wetlands, remove 2,000 l.f. of concrete channel bottom upstream of Mureau, improve detention basin and obstructions near Thousand Oaks Blvd.	$241,000	$3,937,000	$4,178,000	$77,000	Concrete channel may have significant geomorphic impact downstream.
FH-LV01	LVC07, LVC08	Low	Project is located to the west of Las Virgenes Rd and north of hwy 101. Recontour hwy fill area to widen floodplain to ~150' along 250' of the creek. Remove stand of eucalyptus and other exotic species. Establish riparian woodland habitat.	$28,970	$171,498	$200,468	$32,750	The area apparently gets heavy transient use.
QL-02	LVC-09, 10, 11, 15, 17*, 21, 22	High	Improvements between (below) Hwy 101 and above Meadow Creek Lane. Bank stabilization, wetland restoration, rip-rap removal.	$75,240	$250,800	$326,040	$58,000	Creek incised, natural, but within new urban/commercial setting. Changed urban hydrology effects beginning to occur? *100k included for possible required land purchase.
QL-04	LVC-31	High	Below Las Virgenes Road/Lost Hills Rd. intersection near northern border Malibu Creek State Park. Stabilize banks and ravine. Remove fish barrier and restore wetlands.	$5,760	$19,200	$24,960	$5,000	Channel incision becoming increasing problem; need comprehensive plan, few top of bank infrastructure / improvements threatened.
QL-07	LVC-43	High	500 feet north of Mulholland Drive. Malibu Cyn. Rd. at State Park intersection, near Park residence road. Remove fish barrier.	$50,000	$160,000	$210,000	$20,000	White Oak Dam a significant barrier to fish passage
FH-LV05	LVC23, LVC29	Medium	At LVC23, plant riparian forest habitat in the flat area between the toe of upland slopes and the riparian habitat to the east. At LVC29, eradicate the Tamarisk, Fennel and other exotic species and replace it with riparian woodland species.	$9,910	$16,536	$26,446	$43,250	This project has an excellent likelihood of success.
W-03	LVC 30	Medium	Project is located between Meadow Creek Lane and Lost Hills Road. Scope of work includes removal of failed concrete channel and construction of rip-rap lined trapezoidal channel to improve hydraulics, eliminate scour/downcutting and remove fish barriers along this portion of Las Virgenes Creek. The culverts as well as the concrete channel lining immediately up and downstream of Meadow Creek Lane and Lost Hills Road are intact. Deposits of silt within the culverts was observed and the channel was overgrown with trees, shrubs and weeds. Approximately 100 feet or more of the concrete cut-off walls immediately downstream of the concrete channel lining have overturned as the soft bottom section has scoured over time. The existing riprap on the channel side slopes has sloughed into the channel invert as a result. A vertical drop in the invert of the channel, of approximately 6-8 feet, was observed downstream of the existing concrete channel lining where the soft bottom channel, concrete cut off walls and riprap side slopes begin.	$200,000	$850,000	$1,050,000	$20,000	Project costs and description based on information provided in the draft Feasibility Study For the Removal of Concrete Lining in Las Virgenes Creek Downstream of Meadow Creek Lane, date July 2005.

Table 2A
Las Virgenes Creek Habitat Improvement Projects Outside Calabasas City Limits

Construction Code	Project Codes	Priority	Project Description	Study & Design Cost	Construction & Inspection Cost	Total Design & Construction	Projected O & M Costs	Comments
FH-LV07	LVC32, LVC33	Low	At LVC32, large-scale earthwork in this area would be impractical due to access limitations on the west bank, and the relatively low benefit from the project. More economically practical benefit will be realized by reinforcing the toe of the slope through plantings and bioengineering along the 150' project length. At LVC33, Investigate the exact alignment of the sewer infrastructure and the possibilities for relocating it, if necessary. If relocation would be necessary, but not feasible, then this project should not be pursued further. If relocation is not necessary or is feasible, then this project should recontour the banks to create 2:1 or gentler slopes and plant the area with riparian forest species.	$33,030	$253,579	$286,609	$47,250	These project sites are similar in nature to much of this reach of Las Virgenes Creek. All of these projects would benefit from further investigation of its historical morphology.
FH-LV08	LVC35, LVC36	Medium	At LVC35, do not recontour the banks; it would impact high quality habitat. Instead, expand riparian forest plantings as far as conditions will allow, roughly .14 acre, and implement a 3-5 year maintenance and monitoring program. At LVC36, recontour the side drainage to accommodate a 10-year storm or greater and design a cobble and boulder bed that will withstand the erosive forces of a 100-year storm. Plant the banks of the channel with facultative wetland species and upland species that will provide stability. Establish a consistent longitudinal grade along its length to avoid a drop at the end.	$26,310	$54,579	$80,889	$36,250	Two relatively small oak trees will be impacted by grading.
QL-06	LVC-37, 38, 39, 40	Medium	Las Virgines Road at northern meander Malibu Creek State Park, approx. 1300 feet south of Lost Hills Road. Pull back banks, stabilize headcuts and side drainage incision at sewer crossing. Create and restore wetlands.	$129,600	$432,000	$561,600	$22,000	
FH-LV09	LVC41, LVC42	Medium	At LVC41, lay back the vertical portion of the slope only and do not disturb the bottom 1/3 of the bank. Protect the bottom 1/3 of the bank from high flow events with dense plantings and bioengineering treatments such as brush mattresses. At LVC42, eradicate Vinca major and replant with native species as necessary. Maintain and monitor the site for 3-5 years to ensure eradication.	$29,190	$55,506	$84,696	$48,750	
QL-08	LVC-44	Low	400 feet north of Mulholland Drive, Malibu Cyn. Rd. Stabilize banks.	$72,600	$242,000	$314,600	$24,000	Probably historic bank problem, incised channel at meander bends. Top of bank sewer lines threatened if problem worsens significantly
FH-LV06	LVC25	Low	Any efforts to eradicate this species that are not done throughout the entire watershed will be wasted effort, because the species is highly mobile. This project should be addressed as a multi-year watershed-level eradication. A Biological Opinion from the USFWS will be necessary prior to the project, and at least one senior-level biologist will need to participate in the field work. A biological team should walk the entire length of the creek each year, catching and killing crayfish seen in all pools along the way. The project should be in-place for a minimum of 5 years.	$18,000	$33,000	$51,000	$132,000	LVC25 is listed in the master plan as eradication of Procambarus clarkii, which is a non-native crayfish that can prey on arroyo toad tadpoles. We did not directly observe the species during our field work, and could not in the time allotted conduct a more thorough investigation to determine its presence and extent. This cost estimate is based on virtually no site-specific factual information and should be used accordingly.
					SUBTOTAL TABLE 2A =	$7,395,307	$566,250	
					TOTAL TABLES 1A+2A =	**$10,433,227**	**$808,050**	