

- Implement storm drain master plan.
2. **Property Protection Activities**
- Request to elevate existing structures as a part of any proposed development to the existing properties in special flood hazard areas.
 - Recommend flood proofing of existing non-residential buildings that have repetitive losses.
 - Prioritize properties to: A) Acquire B) elevate and C) relocate with FMA grant, Disaster Relief Grant Program (DRGP) for those that have had numerous NFIP losses claims. Use these properties for parks and recreation.
 - Assist to acquire/elevate/relocate properties and buildings with aid from FEMA's Hazard Mitigation Grant Program (HMGP) for those properties that suffered losses or future flood loss.
 - Assist in retrofitting non-residential properties with flood proofing.
3. **Natural Resource Protection Activities**
- All structural projects shall start with a project study report. This project study report shall include a comprehensive approach that will include:
 - ✓ Upstream and downstream watershed impacts
 - ✓ Water quality impact in relation to the proposed improvement
 - ✓ Reduction in peak flow
 - ✓ Addition of detention and filtration basins
 - ✓ Impact to endangered plant and animal
 - ✓ Impact of erosion and scour
 - ✓ Incorporation of soft engineering such as reduction of use of concrete and riprap and increase in use of channel grass lining and channel vegetation at various stages with different species in accordance with the depth of water and frequency of flood
 - ✓ Bioengineering solutions
 - ✓ Integration of treatment BMPs
 - ✓ Sediment reduction and mitigation measures
 - ✓ Watershed management
 - ✓ Concept level design of the proposed improvements
 - ✓ Integrate watershed improvement ideas without fatal flaws from local interest groups
 - The project study report shall be submitted to the Environmental Review Board (ERB) for review and comments prior to the start of any preliminary design of any facilities.
 - Enforce Best Management Practices (BMPs) within the watershed.
 - Provide technical assistance to select appropriate BMPs.
 - Review the Environmentally Sensitive Habitat Area(ESHA)) in relation to the repetitive loss map for integration of the design solutions and enhancement of the environment. All ESHA are to be identified in the repetitive loss map.

4. **Emergency Services Activities**
 - Provide flood forecasting, warning systems and emergency plans for potential flooding.
 - Prepare an emergency evacuation plan, and health and safety plan during flood event.
 - Develop flood emergency measures, disaster preparedness, flood recovery plans.
5. **Structural Project Activities**
 - Recommend future and existing roof drainage systems for the properties located along the shoreline to be designed to drain towards the ocean side rather than to the front of buildings.
 - Encourage runoff entrapment within the site with filtration system for reusing the storm water for irrigating landscape areas without creating public health hazards and degradation of geologic conditions.
 - Prepare structural mitigation plans for site-specific areas with priorities based on the extent of damage to life and property.
6. **Public Information Activities**
 - Participate in FEMA's CRS program to reduce flood insurance premium rates.
 - Create a computerized tracking system to follow up on multiple loss properties and improvements and other pertinent information with a database.
 - Advise and assist property owners on retrofitting buildings with multiple losses.
 - Request and maintain FEMA's elevation certification for all new buildings and for existing buildings with proposed substantial improvements.
 - Provide information and education about flooding and protection measures in a public forum.
 - Create a GIS map and maintain the repetitive loss areas and floodplain zones.
 - Continue to provide map information and formulate a regular outreach program.
 - Provide technical assistance for locating properties within the floodplain.
 - Maintain flood data, FIRM and relevant information in the library.

1.0 ACTION PLAN

Based on the review of the six categories, it is recommended that the City implement the following floodplain management activities.

- **Floodplain regulations:** For the properties along the coastal areas, enforce the zoning ordinances of special flood hazard areas such as V Zones to require a minimum of one-foot free board above base flood elevation for lowest horizontal member of structures for new structures or substantial improvement to the existing structure. Enforce permit

requirements for all new developments in the floodplain. Prohibit developments within floodway and prepare a specific Storm Water Management Plan for Malibu Creek, Zuma Creek, Trancas Canyon and Los Flores Creek. Implement storm drain master plan.

- **Flood Mapping:** For major watersheds that do not have floodway delineation's, the City shall prepare comprehensive floodway delineations using NFIP standards recognizing the fact that the County standards that include the burn and bulked condition would yield conservative results. Since the flood insurance program is based on the FIRM maps, NFIP standard should be followed. Until the comprehensive floodway mapping and preparation is completed for a specific watershed, any encroachment or construction activities within the floodplain area shall have its own hydrology/ hydraulics studies to prove that the proposed improvement within the flood plain does not increase the flood elevation by more than one foot which would follow the definition of the floodway. The City shall monitor and review the proposed improvements within the floodplain on a case by case basis until the preparation of a comprehensive floodway mapping for a specific watershed. The City shall adopt the new floodway delineations for the major watersheds after the review and approval of the new comprehensive floodway studies by FEMA.

- **Flood Protection Assistance:** City should obtain grants from OES and FBMA through programs such as DRGP and HMGP to assist to acquire/elevate/relocate properties and buildings that have had numerous NFIP loss claims. Also City should assist in retrofitting non-residential properties with flood proofing through low interest loans in coordination with the County, State and Federal government.

- **Flood Protection Materials:** City should mail FEMA's book, " Repairing Your Flooded Home" to all of the single- and multiple-loss property owners and other property owners that have potential of flooding. Copies of these books and other FEMA's publications should be available for distribution at the City Hall as well as the local library. City should provide technical assistance in understanding of the books and BMPs.

- **Flood Protection Activities:** For new buildings and proposed substantial improvements of the existing buildings, City should pass an ordinance that roof drainage systems for the properties located along the shoreline to be designed to drain towards the ocean side rather than to the front of buildings. City should encourage or provide incentives to entrap runoff within the property/site with filtration system for reusing the storm water for irrigating landscape areas without creating public health hazards and degradation of geologic conditions. City should prepare a long term and short term budgets with priorities to implement projects as stated in the Master Plan of Drainage.

- **Emergency Manager Training:** City should set up a task force comprising of the Building and Safety, Fire Department, Sheriff's Department and Public Works Department and provide training for coordinated effort for flood warning, evacuation and response to emergencies. City should assign a lead person such as Emergency Manager for this task force to coordinate these training and planning. The Emergency Manager should attend appropriate training on flood warning and flood response planning.
- **Flood Warning and Preparedness:** After the training, the Emergency Manager and the City Engineer in coordination with other departments should prepare a flood warning system and emergency flood preparedness systems for Trancas Canyon, Zuma Canyon, Ramirez Canyon, Escondido Canyon, Solistica Canyon, Malibu Creek and Las Flores Canyon. City should explore the possibility of installing level control system with telemetry devices with audio and video signals that could be connected to the City Hall, Emergency Manager's office and other Task Force members.

Mitigation Activities for Specific Areas

Waterbody Name	Exposure Description	Mitigation Priority	Mitigation Priority	Low Priority	Notes
Area A	Triangular area at southeast end of the City Limits in between Topanga Canyon Blvd and Tuna Canyon Road.	<ol style="list-style-type: none"> Increase height of the AC berm at Topanga Beach Drive with a vertical curve along PCH to keep the PCH runoff within PCH. Re-profile Topanga Beach Drive to drain the street flow along the gutter adjacent to the retaining wall along the north side of the street. 		<ol style="list-style-type: none"> Improve existing 1-18" and 1-24" storm drain(SD) and inlets that are inadequate to discharge runoff from 24 acres. 	
Area B	Triangular area between Tuna Canyon (Area A1) and Pena Canyon (Area B1).	<ol style="list-style-type: none"> Construct levee along Tuna Canyon Road Re-profile and elevate Tuna Canyon Road for approximately 500' from PCH Enlarge the Tuna Canyon culvert 	<ol style="list-style-type: none"> Add additional inlet at north side of PCH east of Tuna Canyon Road 	<ol style="list-style-type: none"> Replace existing three Storm Drains (1-18" Dia and 2-24" Dia) that are inadequate to discharge runoff from 49 acres (100 cfs for 10-year, 125 cfs for 25-year) with larger sizes. Construct relief drain for the spill over of Tuna Canyon Creek Improve drainage system at the low point between 19036 and 19040 PCH including upsizing the inlet and storm drain pipe 	
Area C	Triangular area between Pena Canyon (Area B1) and Piedra Gorda Canyon (Area C1).	<ol style="list-style-type: none"> Construct levees and increase the headwall of the 54" pipe inlet at the "hairpin" bend location Re-profile and elevate Big Rock Drive at this location Enlarge the 6'x4' existing RCB which is under capacity to discharge the runoff across PCH. 	<ol style="list-style-type: none"> Add additional inlets at southwesterly curb return of Big Rock / Tuna Canyon Road and increase the size of the existing 24" drain 	<ol style="list-style-type: none"> Consider rolled curbs to keep the PCH runoff away from the garage level - reroute the roof drain to the back of the building 	<ol style="list-style-type: none"> Caltrans to enlarge the 6' X 4' Reinforced Concrete Box(RCB) under court order
Area D	Triangular area between Piedra Gorda Canyon (Area C1) and Las Flores (Area D1).	<ol style="list-style-type: none"> Enlarge the 6'x4' existing RCB which is under capacity to discharge the runoff across PCH. 	<ol style="list-style-type: none"> Remove "bottleneck" storm drain and replace or add a relief drain at 20330 to 20340 PCH areas. Replace the 18" storm drain with larger size storm drain at the area in front of garage to eliminate local ponding and positive drainage for 19016 PCH 		
Area Las Flores (Area D1)	Area bounded by E1, E, D, C1, B1, and A1 (minimal coastal frontage)	<ol style="list-style-type: none"> Elevate the Las Flores Canyon Road and adding Las Flores Mesa storm drain 	<ol style="list-style-type: none"> Prepare a specific emergency plan for Las Flores Canyon at PCH crossing until completion of construction of the proposed enlargement of the flow area by Caltrans, include evacuation of the nursery and the premises in the plan. 		
Area E	Triangular area between Las Flores (Area D1) and Carbon Canyon (Area E1).	<ol style="list-style-type: none"> Provide a SD system to pick up the flows across PCH at 21400 PCH to 21422. Construct a new SD system at the low point in front of 21640 PCH to pick up the flows across PCH from the 24" outlet 	<ol style="list-style-type: none"> Provide storm drain system with inlets at the Intersection of Rambla Vista and PCH to drain across PCH. Improve the existing 18" SD system at 21330 PCH. 		
Area F	Triangular area between G and Carbon Cyn (Area E1)	<ol style="list-style-type: none"> Provide inlets at the intersection of PCH and direct the runoff in to Carbon Canyon creek east of PCH to prevent runoff crossing over PCH to the said low point. 		<ol style="list-style-type: none"> Replace the deficient existing inlet and 14" SD at 21962 PCH Construct inlet at the "T" intersection of Fanning and PCH and connect to the existing 30" SD 	
Area G	Triangular area bounded by H, F and E1			<ol style="list-style-type: none"> Consider a new inlet at the low point of 22522 PCH and a storm drain system connecting to existing 48" storm drain 	

Mitigation Activities for Specific Areas

Watershed Name	Targeted District	Mitigation Activity	Low Priority	Comments
Area Malibu Canyon (Area H1)	Large area that includes Malibu Creek drainage area (H1)	<ol style="list-style-type: none"> 1) Construct a structural levee west of the Malibu Colony Drive adjacent to the Tennis courts along the Creek. Disturbance to the environment need to be considered also. 2) Construct a new storm drain in Malibu Colony Drive to drain towards the south end of the street in to the ocean. (easement along the sideyard will not be needed) 3) Construct a flap gate for the 13.5' W X 5.5'H RCS outlet in to Malibu Creek to prevent "bubbling" of Malibu Creek in to the Civic Center area. 4) Perform a detailed design study for detention basin and year around wetland creek improvement near the Civic center. Expand the master plan concept study. 5) Add a new storm drain system with inlets in Malibu Road to eliminate ponding and flow diversion in to Malibu Colony Road. 6) Re-profile Malibu Road to eliminate the flat slope, low points and to keep Malibu Road runoff away from the garage level along with new rolled curb and gutter 7) Upgrade the existing storm drain in Webb Way 	<ol style="list-style-type: none"> 1) Upgrade the sump pump and storm drain within the gated community area of Malibu Colony 2) Create a "V" gutter and change the street cross slope for Malibu Colony Drive to keep the runoff flowing in the garages 	<ol style="list-style-type: none"> 1) Breach the sand dune/bar during a major storm event with early warning system such as telemetry attached to the upstream stream gaugs to prevent backup of Malibu Creek
Area Winter Canyon (Area H2)	Winter Creek (H2)		<ol style="list-style-type: none"> 1) Extend the 60" storm drain system across Malibu Road and add inlet north of 23936 Malibu Road 	<ol style="list-style-type: none"> 1) Construct rolled curb and gutter along the south side of Malibu Road to keep runoff within the street
Area I	Triangular area bounded by H2 and Marie Cyn (I1)	<ol style="list-style-type: none"> 1) Remove and replace the existing corroded 12" CMP at 24460 Malibu Road 		<ol style="list-style-type: none"> 1) Construct rolled curb and gutter along the south side of Malibu Road to keep runoff within the street
Area Marie Canyon (Area I1)	Area bounded by H1, H2, I and I2	<ol style="list-style-type: none"> 1) Add a relief drain to the existing 6' H X 10' W RCB to provide additional capacity. 		<ol style="list-style-type: none"> 1) Construct rolled curb and gutter along the south side of Malibu Road to keep runoff within the street
Area Puerto Canyon (Area I2)	Area bounded by H1, I1, J and J1	<ol style="list-style-type: none"> 1) Re-profile Malibu Road to create cross fall and prevent spillover across the road 2) Construct a natural swale along the westerly side of Malibu Road (without creating any public driving hazard) to increase the depth of flow at inlets and increase the capacity of inlets. 		<ol style="list-style-type: none"> 1) Construct rolled curb and gutter along the south side of Malibu Road to keep runoff within the street
Area J	Triangular area bounded by I2 and J1	<ol style="list-style-type: none"> 1) Re-profile Malibu Road to create cross fall and prevent spillover across the road 2) Construct a natural swale along the westerly side of Malibu Road (without creating any public driving hazard) to increase the depth of flow at inlets and increase the capacity of inlets. 		<ol style="list-style-type: none"> 1) Construct rolled curb and gutter along the south side of Malibu Road to keep runoff within the street
Area K	Triangular area bounded by J3 and Escondido Cyn		<ol style="list-style-type: none"> 1) Construct a storm drain system across Malibu Cove Colony Drive to pick up the flows from the 10' X 10' culvert outlet located west of Malibu Cove Colony Drive at 29542 Latigo Shore Drive. 	<ol style="list-style-type: none"> 1) Re-profile Malibu Road to create cross fall and prevent spillover across the Road also Construct rolled curb and gutter along the east side of Malibu Road to keep runoff within the street 2) Construct additional inlets and storm drain system to capture the flows from the westerly side of Malibu Cove Colony Drive.
Area L	Triangular area bounded by Escondido Cyn and Ramirez Cyn		<ol style="list-style-type: none"> 1) Raise the profile of Sea Lane at PCH to prevent PCH runoff spillover in to Sea Lane. (Private and Public) 	

Mitigation Activities for Specific Areas

Watershed Name	Location and Priority	Location	Priority	Low Priority	Comments
Area Ramirez Canyon	Area bounded by Escondido Cyn, L, M, and M1				
		1) Replace the two CMPs with one large arch culvert or RCB at ocean outlet			1) Schedule regular maintenance at the outlet to remove sand buildup.
Area M	Triangular area (on point) bounded by Ramirez Cyn and M1				1) Consider a storm drain system at the end of the cul-de-sac
Area Zuma Canyon (Area M1)	Area bounded by M, Ramirez Cyn, H1, N, and N1				1) Remove and replace the existing onsite inlets and storm drain line with larger sizes at the property 29221 Heathercliff Road (private project) 2) Construct an opening in the perimeter screen wall for secondary flows at the property 29221 Heathercliff Road (private project)
Area O	Triangular area bounded by N1 and O1	1) Perform a project study for the Broad Beach Road diversion drain project, project No.7 as stated in the Master Plan of Drainage. Evaluate all impacts such as environmental, structural and physical to the Trancas Canyon creek and watershed 2) Prepare plans, specifications and estimate and construct the project			1) Remove the "bottleneck" (8" connector pipes) and replace with large connector pipes. Construct a 30" SD westerly of PCH to easterly of Broad Beach Drive. Connect the inlet connector pipe in to the proposed 30" SD at 31034 Broad Beach Drive. 2) Remove the existing "bottleneck" (24" dia end 30" up/s end) at this low point at 31310 Broad Beach Road. Replace with larger storm drain system at the downstream end easterly of Broad Beach Road. Replace the existing 10" catch basin connector pipes with larger pipes. Construct inlets east of Broad Beach Road between 31302 and 31310 Broad Beach Road.
Area P	Triangular area bounded by O1 and P1		1) Remove the existing "bottleneck" Steep Hills Canyon 18" SD and replace it with larger size at 31431 Broad Beach Road. Remove the existing connector pipes and replace with larger size.		1) Replace existing 6' X 6' culvert across PCH which is under capacity to drain 3,090 cfs for 50 year storm. This will avoid spill over along the westerly side of PCH at Encinal Canyon.
Area Q	Triangular area bounded by P1 and Q1		1) Re-profile the access road at 31974 PCH to the gate to higher elevation at gate to keep off the PCH runoff (private)		
Area R	Triangular area bounded by Q2 and R1		1) Re-profile the access road in to the property at 33306 PCH to higher elevation at the entrance to keep off the PCH runoff		

12.0 PLAN ADOPTION

Following assessment of flooding problem, setting goals, and reviewing all possible solutions, the draft FMP is being presented in a public forum so that the most appropriate actions can be selected for final implementation. The draft plan will also be made available to the FMP Committee, LACDPW, FEMA, OES, and various departments and organizations. Following discussion, debate, and common agreement, a written, final plan will emerge in the form of a series of recommendations. The Final FMP will be submitted to the City Council for adoption.

13.0 IMPLEMENTATION, EVALUATION AND REVISIONS

This is a relatively long process. The City's planning staff will be involved in this effort on a day to day basis. Inexpensive projects could be implemented quickly. Policy changes and Ordinances are inexpensive and take a longer time due to the procedural requirements.

Some of the structural and non-structural mitigation measures require close monitoring and periodic revisions based on the performance. The City's project manager will be responsible for overall implementation of the plan and presentation of the annual update to the City Council. This update will provide an overview of the plan and the progress made over the previous 12 months towards implementing the mitigation activities.

The City will use the CRS work sheets to claim credits for the FMP. Close coordination with FEMA and their involvement from the beginning will help the City get the maximum credit. The City will also provide a model annual evaluation report on progress that will be used for CRS re-certification.

APPENDIX

DRAFT OF PUBLIC NOTICE

The City of Malibu will hold a public meeting to discuss the preparation of a Comprehensive Flood Mitigation Plan.

Date: Thursday, June 29, 2000
Time: 7-9 p.m.
Location: HRL Laboratory Auditorium
3011 Malibu Canyon Road

There are 21 major canyon water courses that cross the Pacific Coast Highway (PCH) within the City's boundary. The watershed areas extend far beyond the City's boundaries. The City of Malibu has a history of repetitive flooding caused by a variety of conditions. The City is preparing a Flood Mitigation Plan to take measures to reduce and eliminate repetitive losses of property due to flooding. Possible mitigation could include non-structural and structural improvements.

The focus of the June 29th meeting is for the public to:

- Provide input on existing conditions
- Identify problem areas
- Discuss the cause(s) of the problem

Project Background

The project, which is partially funded by the Federal Emergency Management Agency (FEMA), consists of the following steps:

- Identify areas of historic flooding and problem areas
- Determine existing hydrologic conditions in the watersheds
- Develop goals and objectives for the Flood Mitigation Plan
- Consider possible solutions to the problems
- Evaluate and prioritize the potential solutions
- Identify funding sources
- Prepare the Draft Flood Mitigation Plan
- Adopt the Flood Mitigation Plan

Public input is extremely important! Please attend to provide your input. If you are unable to attend the meeting but would like to provide input, please contact Claudio Sanchez at (310) 456-2489 Ext. 237.



Harry Barovsky
Honorary Mayor 2000-2001
In Memoriam

City of Malibu

23555 Civic Center Way - Malibu, CA 90265
(310) 456-2489 FAX (310) 456-3356

FLOOD MITIGATION PLAN

PUBLIC MEETING

THURSDAY, JUNE 29, 2000 7-9PM

1. Introductions
2. Existing Conditions and Explanation of Problem
 - Problem and Risk Areas
 - Repetitive Loss
 - Watershed Areas
 - Floodplain and Floodway
 - National Flood Insurance Program
3. Flood Mitigation Plan
 - Reasons for a flood mitigation plan
 - Steps
4. Public Comment
 - Reports of Flood Problems
 - Suggested Solutions
 - Questions and Answers
5. Summary
 - Schedule and Public Meetings
 - Flood Mitigation Plan Committee

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Area R

SPECIFIC AREA MITIGATION ACTIVITIES

1. Preventive activities

- Increase the "n" value with additional landscaping and planting within the San Nicholas Canyon Watershed and Area Q.
- Prevent spillover from the PCH

2. Property protection activities

- Provide flood proofing with secondary outlets through the garage at 33306 PCH

3. Natural resource protection activities

- Prevent Bluff erosion by slope stabilizing with vegetation along the westerly side of PCH.

4. Emergency services activities

5. Structural projects activities

The existing inadequate 8" catch basin connector pipes in PCH located north of 33306 PCH are under capacity to drain the PCH runoff. There is a 3" AC berm along PCH in the frontage of this property. The height of adjacent AC berm along PCH is 6". The property slopes downwards from PCH. The depth of flow could exceed 3" in PCH and runoff could spill over in the property.

- Replace the existing catch basin and 18" connector pipe with large storm drain system north of 33306 PCH to reduce the depth of flow in PCH.
- Replace the existing berm with 6" berm to match the existing AC berm along PCH.
- Re-profile the access road in to the property at 33306 PCH to higher elevation at the entrance to keep off the PCH runoff.

6. Public information activities

AGENCY LETTER

June *, 2000

The City of Malibu has a history of repetitive flooding caused by a variety of conditions. There are 21 major canyon water courses that cross the Pacific Coast Highway (PCH) within the City's boundary. The watershed areas extend far beyond the City boundaries. The City of Malibu is beginning to prepare a Flood Mitigation Plan to identify mitigation measures to protect the community from flooding.

The objective of the FMP is to identify and implement measures to reduce and eliminate repetitive losses of property due to flooding. We would like to request assistance and input from your agency regarding our efforts. Specifically:

- Does your agency have any information on past flood studies and any possible solutions to flooding in the City of Malibu or the surrounding area?
- Is your agency planning or implementing any flood mitigation projects of which we should be aware?
- Does your agency have any financial or technical assistance programs that could help the City of Malibu?
- Do you have any suggestions on types of activities we should review that would reduce flood damage in Malibu?

City will hold a public meeting to discuss the preparation of Flood Mitigation Plan:

Date: Thursday, June 29, 2000
Time: 7-9 p.m.
Location: HRL Laboratory Auditorium
3011 Malibu Canyon Road

You are invited to attend this meeting. If your agency is unable to attend the meeting please send your response to the above questions to the City Manager, City of Malibu.

We appreciate your response to this letter. If you have any questions or need additional information concerning the City's efforts in this regard, please contact Claudio Sanchez at (310) 456-2489 Ext. 237.

COVER LETTER TO REPETITIVE LOSS PROPERTIES

August *, 2000

As you know, the City of Malibu is preparing a Flood Mitigation Plan to identify ways to mitigate the flooding in the City because of the repetitive flooding losses that have historically occurred. The objective of the Flood Mitigation Plan is to identify and implement measures to reduce and eliminate repetitive losses of property due to flooding. Enclosed is a public notice for the second public meeting to be held on August 24, 2000.

Based on the FEMA's records, we believe that your property is located in an area that has experienced losses due to flooding. Therefore, the City would again like to invite you to participate in the public meeting so that you may provide your input on goals, objectives and mitigation regarding this issue. If you are unable to attend the meeting, but have information that may be helpful, please contact Claudio Sanchez at (310) 456-2489 Ext. 237 or send your comments in writing to the address above.

Area A

SPECIFIC AREA MITIGATION ACTIVITIES

1. Preventive activities

- Improve maintenance frequencies of the existing inlets and the 18" and 24" storm drain at this low point.
- Improve existing 1-18" and 1-24" storm drain(SD) and inlets that are inadequate to discharge runoff from 24 acres.
- Increase the "n" value with additional landscaping and planting within the watershed
- Prevent Tuna Canyon spill over across PCH.

2. Property protection activities

- Consider an offer for relocation or request to elevate the building at 18814 Topanga Beach Dr.
- Elevate the buildings at 18856 PCH, 18862 PCH

3. Natural resource protection activities

- Prevent Bluff erosion by slope stabilizing with vegetation.
- Enforce the temporary and permanent Best Management Practices (BMPs) and to improve and to maintain the water quality within the watershed for substantial improvements to the property.

4. Emergency services activities

5. Structural projects activities

- Increase height of the AC berm at Topanga Beach Drive with a vertical curve along PCH to keep the PCH runoff within PCH.
- Re-profile the Topanga Beach Drive to drain the street flow along the gutter adjacent to the retaining wall along the north side of the street.
- Construct local SD and catch basin to collect and discharge the runoff
- Consider rolled curb to keep the PCH runoff away from the garage level
- Reroute the roof drain to the back of the buildings

- From 18922 PCH to north end of area A, regarding the Tuna Canyon spill over consider the following:
 - a) clean the creek area and maintain low "n".
 - b) construct levee along Tuna Canyon Road
 - c) re-profile and elevate Tuna Canyon Road for approximately 500' from PCH
 - d) enlarge the Tuna Canyon culvert
 - e) add additional inlet at north side of PCH south of Tuna Canyon Rd
 - f) construct relief drain for the spill over of the Tuna Canyon Creek
 - g) enlarge the 4" dia pipe outlets and increase the size of the grate inlet.
 - h) encourage flood proofing the garage and provide a secondary drain from the garage to the ocean with flap gate for emergencies.

6. Public information activities

Area B

SPECIFIC AREA MITIGATION ACTIVITIES

1. Preventive activities

- Provide regular maintenance of the existing inlets and the three storm drains at the low point. Existing three Storm Drains (1-18" Dia and 2-24" Dia) are inadequate to discharge runoff from 49 acres (109 cfs for 10-year, 128 cfs for 25-year).
- Increase the "n" value with additional landscaping and planting within the watershed.
- Prevent Tuna Canyon Spillover flows across PCH

2. Property protection activities

- Provide flood proofing with secondary outlets through the garages
- Consider offer for relocation of the building at 19028 PCH
- Elevate the buildings at 19028 PCH, 19034 PCH, 19126 PCH

3. Natural resource protection activities

- Prevent Bluff erosion by slope stabilizing with vegetation.
- Enforce the temporary and permanent Best Management Practices (BMPs) and to improve and to maintain the water quality within the watershed for substantial improvements to the property.

4. Emergency services activities

5. Structural projects activities

- From 19130 PCH to north end of Area B regarding the Tuna Canyon Spill over consider the following:
 - a) clean the creek area and maintain low "n".
 - b) construct levee along Tuna Canyon Road
 - c) re-profile and elevate Tuna Canyon Road for approximately 500' from PCH
 - d) enlarge the Tuna Canyon culvert
 - e) add additional inlet at north side of PCH south of Tuna Canyon Rd

- f) construct relief drain for the spill over of the Tuna Canyon Creek
 - g) enlarge the 4" dia pipe outlets and increase the size of the grate inlet.
 - h) encourage flood proofing the garage and provide a secondary drain from the garage to the ocean with flap gate for emergencies
 - Repave the area in front of garage to eliminate local ponding and positive drainage at 19016 PCH
 - Improve the drainage system at the low point between 19036 and 19040 PCH including the upsizing the inlet and storm drain pipe
 - Improve the existing 4" dia storm drain and inlet at 19324 PCH
 - Consider rolled curb to keep the PCH runoff away from the garage level
- 6. Public information activities**

Area C

SPECIFIC AREA MITIGATION ACTIVITIES

1. Preventive activities

- Perform regular maintenance of the existing inlet and storm drain at southwesterly curb return of Big Rock Drive and the storm drain; perform regular maintenance of the three storm drains and inlets starting from 19700 PCH.
- Increase the "n" value with additional landscaping and planting within the watershed.
- Prevent Peidra Gorda Spillover at Big Rock Drive crossing "hairpin" bend. Existing 84" pipe and the culvert 6' X 4' is under capacity to discharge the runoff.

2. Property protection activities

- Provide floodproofing with secondary outlets through the garages
- Elevate the buildings for 19728 PCH and 19848 PCH

3. Natural resource protection activities

- Prevent Bluff erosion by slope stabilizing with vegetation.

4. Emergency services activities

5. Structural projects activities

- Prevent the spill over of Peidra Gorda Creek at Big Rock Dr crossing and spill over at 6' X 4' RCB at PCH
 - a) clean the creek area and maintain low "n".
 - b) construct levees and increase the headwall of the 84" pipe inlet at the "hairpin" bend location
 - c) re-profile and elevate Big Rock Drive at this location
 - d) Add additional relief drain per the master plan
 - e) add additional inlets at southwesterly curb return of Big Rock Tuna Canyon Rd and increase the size of the existing 24" drain

g) enlarge the 6'X4' existing RCB which is under capacity to discharge the runoff across PCH.

- Encourage flood proofing the garage and provide a secondary drain from the garage to the ocean with flap gate for emergencies.
- Repave the area in front of garage to eliminate local ponding and positive drainage for 19848 PCH. Improve the drainage system at this low point with larger grate inlet
- Consider rolled curb to keep the PCH runoff away from the garage level
- Reroute the roof drain to the back of the building

6. Public Information activities

Area D

SPECIFIC AREA MITIGATION ACTIVITIES

1. Preventive activities

- Regular maintenance of the existing inlets and the storm drains are required at the low point.
- Increase the "n" value with additional landscaping and planting within the watershed.
- Prevent Peidra Gorda Spillover flows across PCH at 19932 PCH

2. Property protection activities

- Provide flood proofing with secondary outlets through the garages
- Consider offer for relocation or elevating the building for 19028 PCH
- Elevate the repetitive loss buildings in V zone especially 20848 PCH

3. Natural resource protection activities

- Prevent Bluff erosion by slope stabilizing with vegetation.

4. Emergency services activities

5. Structural projects activities

- Prevent the spill over at 1) Peidra Gorda Creek at Big Rock Dr crossing and at 2) spill over at 6' X 4' RCB at PCH (see Area C)
- Remove "bottleneck" storm drain and replace or add a relief drain at 20330 to 20340 PCH areas. Replace the 18" SD with larger size storm drain (36" SD) at the area in front of garage to eliminate local ponding and positive drainage for 19016 PCH
- Replace the existing grate inlet with larger size at 20832 and 20848 PCH
- Repave and replace the undersized grate inlet and storm drain at 20806 PCH
- Add additional inlets at eastside of PCH and storm drain at 20648 to 20654 PCH
- Elevate 20866 PCH and replace existing 24" SD with a larger SD

- Provide storm drain system at 21056 to 21070 PCH
- Consider rolled curb to keep the PCH runoff away from the garage level
- Reroute the roof drain to the back of the building.

6. Public information activities

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Area Los Flores

SPECIFIC AREA MITIGATION ACTIVITIES

1. **Preventive activities**
 - Increase the "n" value with additional landscaping and planting within the watershed.
2. **Property protection activities**
3. **Natural resource protection activities**
 - Prevent Bluff erosion by slope stabilizing with vegetation.
4. **Emergency services activities**
 - Close the nursery during the heavy rainfall and evacuate the premises. Prepare a specific emergency plan for 21201 PCH and 3945 Las Flores Canyon until the completion of the construction of the new project by Caltrans.
5. **Structural projects activities**
 - Add an additional culvert or a new bridge to convey 50 year frequency flow. This will be designed by Caltrans.
 - Consider elevating the Las Flores Canyon Road and add Las Flores Mesa storm drain
5. **Public information activities**

Area E

SPECIFIC AREA MITIGATION ACTIVITIES

1. Preventive activities

- Regular maintenance of the existing inlets and the storm drains are required at the low point.
- Prevent spill over from Rambla Vista Dr across PCH

2. Property protection activities

- Elevate the repetitive loss buildings in V zone especially 21422 PCH, 21506 PCH and 21596 PCH

2. Natural resource protection activities

- Prevent Bluff erosion by slope stabilizing with vegetation.

3. Emergency services activities

4. Structural projects activities

There are two existing 18" SD discharge at east of PCH . But there is no other SD system to pick up this runoff to transport across PCH in to the ocean. The runoff crosses the crown of PCH and floods 21400 to 21422 PCH

- Provide a SD system to pick up the flows across PCH at 21400 PCH to 21422
- Provide storm drain system with inlets at the intersection of Rambla Vista and PCH to drain across PCH. Improve the existing the 18" SD system at 21330 PCH.
- Upgrade the existing inlet size of 18" SD at 21506 PCH
An existing 24" SD located across 21640 PCH terminates east of PCH. There is no SD system to pick up the said flow and transport across PCH. There is low point at 21640 PCH in the street profile. Existing inlet located east of PCH at 21658 PCH is undersized to pick up spill over from Rambla Vista . Consider the following:
- Upsize the inlet and SD system at 21658 PCH

- Add a new SD system at the low point in front of 21640 PCH to pick up the flows across PCH from the 24" outlet
- Reroute the roof drain to the back of the building.

5. Public information activities

Area F

SPECIFIC AREA MITIGATION ACTIVITIES

1. Preventive activities

- Require regular maintenance of the inlets and the storm drains after major storm events and regular scheduled maintenance.
- Prevent Carbon Canyon Creek Spillover flows across PCH

2. Property protection activities

- Provide flood proofing with secondary outlets through the garages
- Consider offer for relocation and elevating the building for 19028 PCH
- Elevate the repetitive loss buildings in V zone especially 20848 PCH

3. Natural resource protection activities

- Prevent Bluff erosion by slope stabilizing with vegetation.

4. Emergency services activities

5. Structural projects activities

There are no inlets at the "T" intersection of Carbon Canyon Road and PCH. The street flow crosses the PCH and traverses towards the low point in the street at 21848 PCH. Consider the following:

- Provide inlets at the intersection and direct the runoff in to the Carbon Canyon creek east of PCH to prevent the runoff crossing over the PCH to the said low point.
- Construct new inlet and SD at the low point
- Perform flood proofing 21848 PCH

Replace the deficient existing inlet and 14" SD at 21962PCH
Local low point due to the flat profile of PCH contributed to the flooding of 22126 PCH, 22144 PCH, 22040 PCH and 22062 to 22104 PCH

- Replace the existing inlet and 15" SD at 22202 PCH with larger size
- Construct inlet at the "T" intersection of Fanning and PCH and connect to the existing 30" SD
- At 22306 PCH and 22338 PCH replace the inlets with larger sizes
- Reroute the roof drain to the back of the building.

6. Public information activities

Area G

SPECIFIC AREA MITIGATION ACTIVITIES

1. Preventive activities

- Provide maintenance of the existing inlets, debris basin and the 48" dia storm drain at 22522 PCH after major storm event and regularly scheduled maintenance.

2. Property protection activities

- Provide flood proofing with secondary outlets through the garages
- Elevate the repetitive loss buildings in V zone especially 22522 PCH

3. Natural resource protection activities

- Prevent Bluff erosion by slope stabilizing with vegetation.

4. Emergency services activities

5. Structural projects activities

The surface flooding at 22522 PCH appears to be due to the low point and under capacity inlet connected to 48" dia SD

- Enlarge the size of the inlet at 22528 PCH
- Consider a new inlet at the low point of 22522 PCH and a storm drain system connecting to existing 48" storm drain
- Consider adding or upsizing inlets west side of PCH at the existing storm drain locations

6. Public information activities

Area Malibu Canyon

SPECIFIC AREA MITIGATION ACTIVITIES

1. Preventive activities

- Incorporate the mitigation activities in the Watershed Management Area Plan (WMAP) for the Malibu creek with the participation of Cities of Agoura Hills and Calabasas and County of Los Angeles.
- Participate the discussions for the upstream watershed development with the County of Ventura and County of Los Angeles.
- Prepare an City ordinance restricting any increase in runoff and setting the minimum water quality standards such as TMDLs at the upstream end of the City boundary
- Formulate a Malibu Creek Watershed committee and facilitate regularly scheduled meeting. (once a month or once in two months). Encourage participation from the Malibu Colony Home owners group and local businesses that are located within the floodplain.
- Discourage any construction activities within the floodplain area including any interim activities
- Prepare specific ordinance for the properties within the floodplain area to use Best Management Practices to improve the water quality
- Maintain and upgrade the sump pumps within the Colony area
- Maintain the local storm drain system
- Add the maintenance fee for the storm drain system in the Association fee within the Malibu Colony area
- Create a section under City's web page about the Malibu Creek watershed management
- Adopt set of requirements for detention basin along with the water quality control for developments within the Malibu Watershed especially near the Civic Center areas.

2. Property protection activities

- Provide flood proofing with secondary outlets through the garages
- Consider offer for relocation and elevating the buildings in V zones

3. Natural resource protection activities

- Prevent scour, debris and sediment loading from the upstream end of Malibu Creek

4. Emergency services activities

- Consider a telemetry system at the stream gauge station in relation to the depth of flow at the upstream end to provide flood warning and the quantity of runoff. Connect the telemetry system to the City hall and the maintenance personnel for evacuation. Post the related quantity of runoff in the Internet under City's web page.

5. Structural projects activities

- Consider construction of a structural levee south of the Malibu Colony Drive along the Creek. Disturbance to the environment need to be considered also.
- Remove the sand dune in the lagoon during a major storm event with early warning system to prevent backup of Malibu Creek
- Consider schedule periodic removal of sand dune.
- Construct a flap gate for the 13.5' W X 5.5'H RCB outlet in to Malibu Creek to prevent "bubbling" of Malibu Creek in to the Civic Center area.
- Perform a detailed design study for detention basin and year around wetland creek improvement near the Civic center. Expand the master plan concept study.
- Add a new storm drain system with inlets in Malibu Road to eliminate ponding and flow diversion in to Malibu Colony Road.
- Secure easement along the side yard of 23736 Malibu Colony Road for the new storm drain
- Re-profile Malibu Road to eliminate the flat slope and low points along with new rolled curb and gutter
- Upgrade the sump pump and storm drain within the gated community area of Malibu Colony

- Request the property owners to reroute the roof drains to the back of the buildings
- Consider new storm drain in Malibu Colony Drive to drain towards the south end of the street in to the ocean.(easement along the sideyard will not be needed)
- Create a "V" gutter and change the street cross slope for Malibu Colony Drive to keep the runoff flowing in the garages
- Consider upgrading of the existing storm drain in Web Way
- Replace the existing grate inlet and storm drain with larger sizes within Colony
- Consider rolled curb to keep the Malibu Road runoff away from the garage level

6. Public information activities

Area Winter Canyon

SPECIFIC AREA MITIGATION ACTIVITIES

1. Preventive activities

- Provide maintenance of the existing inlets, 18" and 24" storm drains north of 23936 Malibu Road.
- Increase the "n" value with additional landscaping and planting within the watershed.

2. Property protection activities

- Provide flood proofing with secondary outlets through the garages

3. Natural resource protection activities

- Prevent Bluff erosion by slope stabilizing with vegetation.

4. Emergency services activities

5. Structural projects activities

- Extend the 60" storm drain system across Malibu Road and add inlets north of 23936 Malibu Road
- Construct rolled curb and gutter along the east of Malibu Road to keep the runoff within street
- Request the property owners to reroute the roof drains to the back of the buildings

6. Public information activities

Area I

SPECIFIC AREA MITIGATION ACTIVITIES

1. Preventive activities

- Provide maintenance of the inlets, 18" storm drain at 24246 Malibu Road and 48" storm drain at 24320 Malibu Road.
- Increase the "n" value with additional landscaping and planting within the watershed.

2. Property protection activities

- Provide flood proofing and secondary outlets through the garages

3. Natural resource protection activities

- Prevent Bluff erosion by slope stabilizing with vegetation.

4. Emergency services activities

5. Structural projects activities

In general the street level is higher than the garage level and there is no gutter to contain the street runoff. Most of the local inlets are owned by the property owners. Storm drain systems with inlets, 18" storm drain and 48" storm drain pick up flows.

- Add additional inlets to the storm drain system and replace the existing inlets with larger inlets.
- Encourage local property owners to enlarge the grate inlets and replace the existing 4" and 8" storm drains with larger size pipes.
- Construct rolled curb and gutter along the east of Malibu Road to keep the runoff within street
- Existing system is inadequate to carry the bulked flows. Remove and replace all the existing 12" storm drains and inlets with larger sizes.
- Remove and replace the existing corroded 12" CMP at 24460 Malibu Road.

- Request the property owners to reroute the roof drains to the back of the buildings

6. Public information activities

Area MARIE CYN

SPECIFIC AREA MITIGATION ACTIVITIES

1. Preventive activities

- Prevent Marie Canyon Creek Spillover flows from 6' H X 10'W RCB across Malibu Road
- Increase the "n" value with additional landscaping and planting within the area west of Malibu Road.
- Clean and maintain the 6'H X 10'W RCB outlet at the ocean

2. Property protection activities

- Provide flood proofing with secondary outlets through the garages

3. Natural resource protection activities

- Prevent erosion control and slope protection at the downstream of the Arch Culvert at PCH

4. Emergency services activities

5. Structural projects activities

The flooding at 24608 Malibu road is due to the spill over from 6' H X 10'W RCB and Inlet located at 24604 Malibu Road. The RCB outlet has plugged conditions at the ocean.

- Add a relief drain to the existing 6' H X 10'W RCB to provide additional capacity.
- Encourage local property owners to enlarge the inlet at 24604 Malibu Road.
- Construct rolled curb and gutter along the east of Malibu Road to keep the runoff within street
- Request the property owners to reroute the roof drains to the back of the buildings

6. Public information activities

Area PUERCO CYN

SPECIFIC AREA MITIGATION ACTIVITIES

1. Preventive activities

- Increase the "n" value with additional landscaping and planting within the area east of PCH and west of Malibu Road. Runoff from the large lots could be reduced considerably to prevent local flooding in Malibu Road.
- Clean and maintain the numerous private drains west of Malibu road.
- Clean and maintain numerous drains that drain across Malibu Road in to the ocean.

2. Property protection activities

- Provide flood proofing with secondary outlets through the garages
- Elevate or relocate the repetitive loss buildings in V zone at 25154 Malibu Road

3. Natural resource protection activities

- Prevent erosion control and slope protection along the westerly side of Malibu Road.

4. Emergency services activities

5. Structural projects activities

There are numerous small 18" drains at the westerly side of Malibu Road from the large private lots. These drains discharge in to the street. There are only few storm drains that pick up these flow and drain across Malibu Road in to the ocean. Hence, there is surface overflow across the street. Malibu Road has very minimum to zero cross fall at these locations. Along the easterly side of the street, the runoff spills over the inlets and floods the adjacent property.

- Construct additional inlets and storm drain system along easterly side of Malibu Road to capture the flows from the private drains.
- Encourage local property owners to enlarge the local inlets and 4" drains especially at 24712 Malibu Road.

- Remove and replace the existing inlets and 18" storm drain with larger size at 25154 Malibu Road
- Construct rolled curb and gutter along the east of Malibu Road to keep the runoff within street
- Re-profile Malibu Road to create cross fall and prevent spillover across the Road
- Construct a natural swale along the westerly side of the Malibu Road without creating any public driving hazard. This will increase the depth of low at inlets and will increase the capacity of inlets.
- Request the property owners to reroute the roof drains to the back of the buildings

6. Public information activities

Area J

SPECIFIC AREA MITIGATION ACTIVITIES

1. Preventive activities

- Increase the "n" value with additional landscaping and planting within the area east of PCH and west of Malibu Road. Runoff from the large lots could be reduced considerably to prevent local flooding in Malibu Road.
- Clean and remove the silt in order to maintain the private drain at 25438 Malibu road that drains in to the ocean.

2. Property protection activities

- Provide flood proofing with secondary outlets through the garages
- Elevate or relocate the repetitive loss buildings in V zone at 25342 Malibu Road

3. Natural resource protection activities

- Prevent erosion control and slope protection along the westerly side of Malibu Road.

4. Emergency services activities

5. Structural projects activities

There are numerous small 18" drains at the westerly side of Malibu Road from the large private lots. These drains discharge in to the street. There are only few storm drains that pick up these flow and drain across Malibu Road in to the ocean. Hence, there is a potential for surface overflow across the street. Malibu Road has very minimum to zero cross fall at these locations. Along the easterly side of the street, the runoff spills over at the inlets and floods the adjacent property.

- Construct additional inlets and storm drain system along easterly side of Malibu Road to capture the flows from the private drains.
- Encourage local property owners to enlarge the local inlets and 6" drains especially at 25438 Malibu Road.
- Remove and replace the existing inlets and 18" storm drain with larger sizes

- Construct rolled curb and gutter along the east of Malibu Road to keep the runoff within street
- Re-profile Malibu Road to create cross fall and prevent spillover across the Road
- Construct a natural swale along the westerly side of the Malibu Road without creating any public driving hazard. This will increase the depth of low at inlets and will increase the capacity of inlets.
- Request the property owners to reroute the roof drains to the back of the buildings

6. Public information activities

Area K

SPECIFIC AREA MITIGATION ACTIVITIES

1. Preventive activities

- Increase the "n" value with additional landscaping and planting within the area east of PCH and west of Malibu Cove Colony Drive. Runoff from the large lots could be reduced considerably to prevent local flooding in Malibu Cove Colony Drive.
- Clean and remove the silt in order to maintain the storm drains that drain in to the ocean.

2. Property protection activities

- Provide flood proofing with secondary outlets through the garages
- Elevate or relocate the building in V zone at 27012 Malibu Cove Colony Drive

3. Natural resource protection activities

- Prevent erosion control and slope protection along the westerly side of Malibu Cove Colony Drive

4. Emergency services activities

5. Structural projects activities

Malibu Cove Colony Drive is relatively very flat. There are limited number of existing small drains lines 1 through 6 that drains from the westerly side of Malibu Cove Colony Drive in the ocean. There are no inlets along the easterly side of Malibu Cove Colony Drive.

- Construct a storm drain system across Malibu Cove Colony Drive to pick up the flows from the 10' X 10' culvert outlet located west of the Malibu Cove Colony Drive at 26642 Latigo Shore Drive.
- Construct additional inlets and storm drain system to capture the flows from the westerly side of Malibu Cove Colony Drive.
- Replace the existing 12" grate inlets at low points and storm drain at 27002 Malibu Cove Colony Drive.

- Remove and replace the inlets and storm drain lines 4, 5 and 6 with larger sizes
- Re-profile Malibu Road to create cross fall and prevent spillover across the Road
- Construct rolled curb and gutter along the east of Malibu Road to keep the runoff within street
- Request the property owners to reroute the roof drains to the back of the buildings

6. Public information activities

Area L

SPECIFIC AREA MITIGATION ACTIVITIES

1. Preventive activities

- Increase the "n" value with additional landscaping and planting within the gated community area
- Clean and remove the silt in order to maintain the storm drain at the ocean outlet

2. Property protection activities

- Provide flood proofing with secondary outlets through the garages

3. Natural resource protection activities

- Prevent erosion control and slope protection along the side slopes of the access road

4. Emergency services activities

5. Structural projects activities

Runoff from the V gutter exceeds the V gutter capacity and cascades along the side before reaching the curb opening catch basin. In addition, at the catch basin, there is no local depression to build up depth. Runoff cascades to the driveway along the side and floods the property. The original design was not done correctly for the quantity of discharge.

- Raise the profile of the Sea Lane at PCH to prevent PCH runoff spillover in to Sea Lane.
- Redesign the storm drain system at the inlet. Revise the grade at inlet and add grate inlets before the curb opening catch basin.
- Reduce the velocity of the flow across the street
- Remove and replace the inlets and storm drain line with larger sizes

6. Public information activities

Area Ramirez Cyn

SPECIFIC AREA MITIGATION ACTIVITIES

1. Preventive activities

- Clean and remove the silt in order to maintain the two existing CMP storm drain at the ocean outlet. One large 72" CMP outlet is fully plugged at the outlet. The other outlet is partially open.

2. Property protection activities

3. Natural resource protection activities

4. Emergency services activities

5. Structural projects activities

The two pipe capacities at the outlet in to the ocean are inadequate.

- Replace the two CMPs with one large arch culvert or RCB at ocean outlet
- Schedule a regular maintenance at the outlet to remove sand buildup.

6. Public information activities

Area M

SPECIFIC AREA MITIGATION ACTIVITIES

1. Preventive activities

2. Property protection activities

- Review the local drainage system within the large lot

3. Natural resource protection activities

4. Emergency services activities

5. Structural projects activities

There is an existing asphalt berm 6" high along the frontage of the property. Property has two unpaved entrances. Street has very mild cross slope. There is no drainage system at the end of the cul-de-sac of Greenwater Road. Street flow could top the berm for larger storms.

- Re-profile the property entrance to keep off the street runoff.
- Add local drainage within the lot if needed (private)
- Consider a storm drain system at the end of the Cul-de-sac

6. Public information activities

Area ZUMA CYN

SPECIFIC AREA MITIGATION ACTIVITIES

1. Preventive activities

- Clean and remove the silt in order to maintain the on site local storm drain
- Remove the flap gate and attach a down drain system at the outlet in the alley for the property at 29221 Heathercliff Road.

2. Property protection activities

- Provide flood proofing and secondary outlets

3. Natural resource protection activities

4. Emergency services activities

5. Structural projects activities

Runoff in the street is generated by small local area. Heathercliff Road has steep longitudinal slope and standard cross slope. The property at 29221 Heathercliff Road is a condominium complex. Driveway highpoint is along the property line at the street and the driveway drops to 4-5' feet at the entrance gate from the street level. Pedestrian access is the same way. The street highpoint is located at the "T" intersection of Wandermere. Street has considerable capacity due to the steep slope. The complex is landlocked and no secondary outlet due to the perimeter wall.

- Remove and replace the existing onsite inlets and storm drain line with larger sizes at the property 29221 Heathercliff Road. (private)
- Construct a drainage system with long grate inlets in front of the gate at the property 29221 Heathercliff Road. (private)
- Construct an opening in the perimeter screen wall for secondary flows at the property 29221 Heathercliff Road. (private)

6. Public information activities

Area O

SPECIFIC AREA MITIGATION ACTIVITIES

1. Preventive activities

- Increase the "n" value with additional landscaping and planting within the Steep Hills Canyon Watershed , Trancas Canyon Watershed and Area O.
- Prevent spillover from the Trancas Canyon Creek at PCH
- Prevent spillover from Trancas Canyon Creek at Principal Drive
- Prevent spillover from Steep Hills Canyon at PCH

2. Property protection activities

- Provide flood proofing with secondary outlets through the garages
- Elevate the repetitive loss buildings in V zone at 30962 Broad Beach Road.

3. Natural resource protection activities

- Prevent Bluff erosion by slope stabilizing with vegetation.

4. Emergency services activities

5. Structural projects activities

Within Broad Beach Drive, there are three low points. There is only one inlet along the easterly side of Broad Beach at one low point. The existing inlet and 8" connector pipes are under capacity to drain the street runoff. The runoff from Trancas Canyon Road could cross PCH and traverse in to Broad Beach Road. At 31400 Broad Beach Road, there is an existing 18" storm drain that is designated to carry 709 cfs for 50 year frequency storm. The existing storm drain capacity is inadequate to drain the quantity of flow. At the outlet, the pipe is enlarged into 4.75' X 4.75' RCB. This "bottle neck" across PCH and Broad Beach Drive need to be removed. Due to this "bottleneck" runoff spills over at Broad Beach Drive and traverses south to the low point.

- Replace existing grate inlets and storm drains with larger system at 30804 Broad Beach Drive.
- Replace existing grate inlets and 3" storm drain with larger system at 31220 Broad Beach Drive. (Garage level lower than the top of Inlet)

- Replace the existing catch basins and 8" connector pipes with large storm drain system along PCH
- Remove the "bottleneck" (8" connector pipes) and replace with large connector pipes. Construct a storm drain 30" SD westerly of PCH to easterly of Broad Beach Drive. Connect the inlet connector pipe in to the proposed 30" SD at 31034 Broad Beach Drive.
- Replace existing grate inlets and 3" storm drain with larger system at 30962 Broad Beach Drive. (Garage level lower than the top of inlet)
- Remove the existing "bottleneck" (24" d/s end 30" up/s end) at this low point 31310 Broad Beach Road. Replace with larger storm drain system at the downstream end easterly of Broad Beach Road. Replace the existing 10" catch basin connector pipes with larger pipes. Construct inlets east of Broad Beach Road between 31302 and 31310 Broad Beach Road.
- Remove the existing "bottleneck" Steep Hills Canyon 18" SD and replace it with larger size at 31400 Broad Beach Road. Remove the existing connector pipes and replace with larger size.
- Construct a storm drain system at 31372 Broad Beach Road with the at the low points

6. Public information activities

Area P

SPECIFIC AREA MITIGATION ACTIVITIES

1. Preventive activities

- Prevent spillover from the Steep Hills Canyon storm drain "bottleneck"
- Prevent spillover from Encinal Canyon at PCH

2. Property protection activities

- Provide flood proofing with secondary outlets through the garage at 31450 Broad Beach Road

3. Natural resource protection activities

4. Emergency services activities

5. Structural projects activities

At 31430 Broad Beach Road, there is an existing 18" storm drain that is designated to carry 709 cfs for 50 year frequency storm. The existing storm drain capacity is inadequate to drain the quantity of flow. At the outlet, the pipe is enlarged into 4.75' X 4.75' RCB. This "bottle neck" across PCH and Broad Beach Drive need to be removed. Due to this "bottleneck" runoff spills over at Broad Beach Drive and traverses south to the low point in area O.

- Replace the existing catch basin and 8" connector pipe with large storm drain system north of 31611 PCH to reduce the depth of flow in PCH.
- Construct a storm drain system at 31450 Broad Beach Drive.
- Replace existing 6' X 6' culvert across PCH which is under capacity to drain 3,090 cfs for 50 year storm. This will avoid the spill over along the westerly side of PCH at Encinal Canyon.
- Remove the existing "bottleneck" Steep Hills Canyon 18" SD and replace it with larger size at 31430 Broad Beach Road. Remove the existing connector pipes and replace with larger size.

6. Public information activities

Area Q

SPECIFIC AREA MITIGATION ACTIVITIES

1. Preventive activities

- Increase the "n" value with additional landscaping and planting within the Encinal Canyon Watershed and Area Q.
- Prevent spillover from the PCH

2. Property protection activities

- Provide flood proofing and with outlets through the garage at 31974 PCH

3. Natural resource protection activities

- Prevent Bluff erosion by slope stabilizing with vegetation along the westerly side of PCH.

4. Emergency services activities

5. Structural projects activities

The existing inadequate 8" connector pipes in PCH located north of 31974 PCH are under capacity to drain the PCH runoff. There is a 6" AC berm along PCH in the frontage of this property. The driveway slopes up to 6" at the gate location and slopes down from the gate towards the house. The depth of flow could exceed 6" in PCH and runoff could spill over in the property.

- Replace the existing catch basin and 8" connector pipe with large storm drain system north of 31974 PCH to reduce the depth of flow in PCH.
- Re-profile the access road at 31974 PCH to the gate to higher elevation at gate to keep off the PCH runoff. (private)

6. Public information activities

SECTION 19. ANNEX H: PLAN APPROVAL DOCUMENTATION

The following pages provide copies of Hazard Mitigation Plan approval documentation from each city.