

03 Sep 2017

Project: **Marsh Creek Flood Mitigation**

Pg 1 of 16

Total Benefits: **\$464,653**

Total Costs: **\$188,654**

BCR: **2.46**

Project Number:

Disaster #:

Program:

Agency:

State: **California**

Point of Contact:

Analyst:

Project Summary:

Project Number:

Disaster #:

Program:

Agency:

Analyst:

Discount Rate: 0.070

Point of Contact:

Phone Number:

Address: California

Email:

Comments:

Structure Summary For:

DFA_Equip shed, California, , Contra Costa

Structure Type: Building

Historic Building: No

Contact:

Benefits: \$1,853

Costs: \$2,000

BCR: 0.93

| Mitigation | Hazard | BCR | Benefits | Costs |
|------------|-----------------------------|------|----------|---------|
| Elevation | Damage-Frequency Assessment | 0.93 | \$1,853 | \$2,000 |

Sunset Rd Fire Station, , , California, 94513, Contra Costa

Structure Type: Building

Historic Building: No

Contact:

Benefits: \$462,800

Costs: \$186,654

BCR: 2.48

| Mitigation | Hazard | BCR | Benefits | Costs |
|------------|--------|------|-----------|-----------|
| Elevation | Flood | 2.48 | \$462,800 | \$186,654 |

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Total Benefits: **\$464,653**

Total Costs: **\$188,654**

BCR: **2.46**

Project Number:

Disaster #:

Program:

Agency:

State: **California**

Point of Contact:

Analyst:

Structure and Mitigation Details For: DFA_Equip shed, California, , Contra Costa

Benefits: \$1,853

Costs: \$2,000

BCR: .93

Hazard: **Damage-Frequency Assessment - Flood**

Mitigation Option: Elevation

Latitude:

Longitude:

Project Useful Life: 25

Mitigation Information

Basis of Damages: Historical Damages

Number of Estimated Damage Events: 3

Number of Events with Know Recurrence
Intervals: 0

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Program:

Agency:

State: **California**

Point of Contact:

Analyst:

Historic Damages Before and After Mitigation

Analysis Year: 2017

Analysis Duration: 18

Utilities (\$/day):

Year Built: 2000

User Input Analysis Duration:

Buildings (\$/day):

Roads/Bridges (\$/day):

Damages Before Mitigation

Damage Year: 2002

RI:

Are Damages In Current Dollars? No

Buildings (Days):

Utilities (Days):

Roads (Days):

| | |
|----------------|-----|
| damages (\$) | \$0 |
| Total | \$0 |
| Total Inflated | \$0 |

Damages After Mitigation

RI: 700.00

Are Damages In Current Dollars? Yes

Buildings (Days):

Utilities (Days):

Roads (Days):

| | |
|--------------|---------|
| damages (\$) | \$2,000 |
| Total | \$2,000 |

Volunteers Cost

Number of Volunteers Required:

Cost of Volunteers Time (\$/Hour/Person):

Per-Person Cost of Lodging for a Volunteer:

Number of Hours Volunteered/Person:

Number of Days Lodging/Volunteer:

Cost of Volunteers:

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Project Number:

Disaster #:

Program:

Agency:

State: **California**

Point of Contact:

Analyst:

Damage Year: 2010

RI:

Are Damages In Current Dollars? No

Buildings (Days):

Utilities (Days):

Roads (Days):

| | |
|----------------|-------|
| damages (\$) | \$500 |
| Total | \$500 |
| Total Inflated | \$596 |

Volunteers Cost

Number of Volunteers Required:

Cost of Volunteers Time (\$/Hour/Person):

Per-Person Cost of Lodging for a Volunteer:

Number of Hours Volunteered/Person:

Number of Days Lodging/Volunteer:

Cost of Volunteers:

Damage Year: 2017

RI:

Are Damages In Current Dollars? No

Buildings (Days):

Utilities (Days):

Roads (Days):

| | |
|----------------|---------|
| damages (\$) | \$2,000 |
| Total | \$2,000 |
| Total Inflated | \$2,000 |

Volunteers Cost

Number of Volunteers Required:

Cost of Volunteers Time (\$/Hour/Person):

Per-Person Cost of Lodging for a Volunteer:

Number of Hours Volunteered/Person:

Number of Days Lodging/Volunteer:

Cost of Volunteers:

Social Benefits

Mental Stress and Anxiety

Lost Productivity

Number of Person: 0

Number of Worker: 0

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Total Costs: **\$188,654**

BCR: **2.46**

Project Number:

Disaster #:

Program:

Agency:

State: **California**

Point of Contact:

Analyst:

Treatment Costs per person: \$2,443.00

Productivity Loss per person: \$8,736.00

Total Mental Stress and Anxiety Cost: \$0.00

Total Lost Productivity Cost: \$0.00

BCR Calculation Results

Expected Annual Damages Before Mitigation

Expected Annual Damages After Mitigation

Expected Avoided Damages After Mitigation (Benefits)

| | |
|----------------|---------|
| Annual: | \$162 |
| Present Value: | \$1,888 |

| | |
|----------------|------|
| Annual: | \$3 |
| Present Value: | \$35 |

| | |
|----------------|---------|
| Annual: | \$159 |
| Present Value: | \$1,853 |

Mitigation Benefits: \$1,853

Mitigation Costs: \$2,000

Benefits Minus Costs: (\$147)

Benefit-Cost Ratio: 0.93

Cost Estimate

Project Useful Life (years): 25

Construction Type:

Mitigation Project Cost: \$2,000

Detailed Scope of Work: Yes

Annual Project Maintenance Cost: \$0

Detailed Estimate for Entire Project: Yes

Final Mitigation Project Cost: \$2,000

Years of Maintenance: 25

Cost Basis Year:

Present Worth of Annual Maintenance Costs: \$0

Construction Start Year:

Estimate Reflects Current Prices: No

Construction End Year:

Project Escalation:

Justification/Attachments

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Project Number:

Disaster #:

Program:

Agency:

State: **California**

Point of Contact:

Analyst:

| Field | Description | Attachments |
|------------------------------------|--|-------------|
| Annual Project Maintenance Cost | no maintenance to keep equipment located in station | |
| Historic damages before mitigation | shed has flooded 3 times in past. 2002 no damages, 2010 had to replace some equipment, 2017 much of the equipment was ruined and had to be replaced. Please see attached receipts for costs to replace equipment | |
| Mitigation Project Cost | to move the equipment and demolish the shed | |

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Program:

Agency:

State: **California**

Point of Contact:

Analyst:

Structure and Mitigation Details For: Sunset Rd Fire Station, , , California, 94513, Contra Costa

Benefits: \$462,800

Costs: \$186,654

BCR: 2.48

Hazard: **Flood**

Mitigation Option: Elevation

Latitude:

Longitude:

Size of Building: 8,700

BRV (\$/sf): \$150.00

Total BRV: \$1,305,000

Residential: No

Building Type:

Obstruction: N/A

Foundation Type:

Basement:

Building Primary Use: Protective Services

Structure Type: Engineered

Historic Building: No

Structure Elevation: 58.50

First Floor Being Raised: 2.00

Demolition Threshold: 50.00%

Source of Flood Data: FIS and HH

Project in SFHA: Yes

Community ID Number: 0

Effective FIS Date: 03/21/2017

FIRM Panel Number: 0

FIRM Effective Date: 08/31/2017

Project Useful Life: 25

H&H Study Title:

H&H Effective Date: 08/31/2017

Flood Zone: Unknown

Loss of Rent:

Building Contents: \$900,450 (Default)

Value of Crawlspace Contents:

Ground Surface Elevation:

Flood Zone Determination:

Breaking Wave Height:

Utilities that are not elevated: No

Height FFE Above Grade:

One Time Displacement Costs: \$0

NFIP: No

Displacement Costs: \$0

ICC: No

Street Maintenance Details

Street maintenance budget (\$)

Miles of street (miles)

Length of road (miles)

Total Reduced Street Maintenance Costs

\$0.00

Volunteer Costs

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Disaster #:

Program:

Agency:

State: **California**

Point of Contact:

Analyst:

| | | | |
|---|--------|-------------------------------------|--------|
| Number of Volunteers Required: | 0 | Number of Hours Volunteered/Person: | 0 |
| Cost of Volunteers Time (\$/Hour/Person): | \$0.00 | Number of Days Lodging/Volunteer: | 0 |
| Per-Person Cost of Lodging for a Volunteer: | \$0.00 | Cost of Volunteers: | \$0.00 |

Social Benefits

Mental Stress and Anxiety

Lost Productivity

| | | | |
|---------------------------------------|------------|-------------------------------|------------|
| Number of Person: | 0 | Number of Worker: | 0 |
| Treatment Costs per person: | \$2,443.00 | Productivity Loss per person: | \$8,736.00 |
| Total Mental Stress and Anxiety Cost: | \$0.00 | Total Lost Productivity Cost: | \$0.00 |

Riverine Elevation and Discharge Data

Streambed Elevation (ft): 48.2

Flood Profile Number:

Flood Source Name: marsh creek

Elevation At Which Barrier Will Be Overtopped:

FEMA Elevation Certificate Diagram Description:

Other Elevation Source:

| Recurrence Interval (yr) | Percent Annual Chance (%) | Elevation Before Mitigation (ft) | Discharge Before Mitigation (cfs) | Elevation After Mitigation (ft) | Discharge After Mitigation (cfs) |
|--------------------------|---------------------------|----------------------------------|-----------------------------------|---------------------------------|----------------------------------|
| 10 | 10.00% | 56.50 | 2,110.0 | 56.50 | 2,110.0 |
| 50 | 2.00% | 58.00 | 3,330.0 | 58.00 | 3,330.0 |
| 100 | 1.00% | 58.70 | 3,810.0 | 58.70 | 3,810.0 |
| 500 | 0.20% | 60.00 | 4,680.0 | 60.00 | 4,680.0 |

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Program:

Agency:

State: **California**

Point of Contact:

Analyst:

Depth-Damage Functions Using USACE - Galveston: Fire Station

| Building Flood Depth (ft) | Before Mitigation Values: | | | After Mitigation Values: | | |
|------------------------------|---------------------------|--------------------------------------|------------------------|--------------------------|-------------------------------------|-----------------------|
| | Before Mitigation (pct) | Before Mitigation User Entered (pct) | Before Mitigation (\$) | After Mitigation (pct) | After Mitigation User Entered (pct) | After Mitigation (\$) |
| -2.0 | 0.0% | 0.0% | \$0 | 0.0% | 0.0% | \$0 |
| -1.0 | 0.0% | 0.0% | \$0 | 0.0% | 0.0% | \$0 |
| 0.0 | 0.0% | 0.0% | \$0 | 0.0% | 0.0% | \$0 |
| 1.0 | 1.0% | 0.0% | \$13,050 | 1.0% | 0.0% | \$13,050 |
| 2.0 | 5.0% | 0.0% | \$65,250 | 5.0% | 0.0% | \$65,250 |
| 3.0 | 5.0% | 0.0% | \$65,250 | 5.0% | 0.0% | \$65,250 |
| 4.0 | 5.0% | 0.0% | \$65,250 | 5.0% | 0.0% | \$65,250 |
| 5.0 | 6.0% | 0.0% | \$78,300 | 6.0% | 0.0% | \$78,300 |
| 6.0 | 7.0% | 0.0% | \$91,350 | 7.0% | 0.0% | \$91,350 |
| 7.0 | 9.0% | 0.0% | \$117,450 | 9.0% | 0.0% | \$117,450 |
| 8.0 | 11.0% | 0.0% | \$143,550 | 11.0% | 0.0% | \$143,550 |
| 9.0 | 14.0% | 0.0% | \$182,700 | 14.0% | 0.0% | \$182,700 |
| 10.0 | 17.0% | 0.0% | \$221,850 | 17.0% | 0.0% | \$221,850 |
| 11.0 | 20.0% | 0.0% | \$261,000 | 20.0% | 0.0% | \$261,000 |
| 12.0 | 24.0% | 0.0% | | 24.0% | 0.0% | |
| 13.0 | 28.0% | 0.0% | | 28.0% | 0.0% | |
| 14.0 | 32.0% | 0.0% | \$417,600 | 32.0% | 0.0% | \$417,600 |
| 15.0 | 36.0% | 0.0% | \$469,800 | 36.0% | 0.0% | \$469,800 |
| 16.0 | 41.0% | 0.0% | \$535,050 | 41.0% | 0.0% | \$535,050 |

Total Benefits: **\$464,653**Total Costs: **\$188,654**BCR: **2.46**

Project Number:

Disaster #:

Program:

Agency:

State: **California**

Point of Contact:

Analyst:

Depth-Damage Functions Using USACE - Galveston: Fire Station

| Contents Flood Depth (ft) | Before Mitigation Values: | | | After Mitigation Values: | | |
|------------------------------|---------------------------|--------------------------------------|------------------------|--------------------------|-------------------------------------|-----------------------|
| | Before Mitigation (pct) | Before Mitigation User Entered (pct) | Before Mitigation (\$) | After Mitigation (pct) | After Mitigation User Entered (pct) | After Mitigation (\$) |
| -2.0 | 0.0% | 0.0% | | 0.0% | 0.0% | |
| -1.0 | 0.0% | 0.0% | | 0.0% | 0.0% | |
| 0.0 | 0.0% | 0.0% | | 0.0% | 0.0% | |
| 1.0 | 10.0% | 0.0% | | 10.0% | 0.0% | |
| 2.0 | 25.0% | 0.0% | \$225,113 | 25.0% | 0.0% | \$225,113 |
| 3.0 | 50.0% | 0.0% | \$450,225 | 50.0% | 0.0% | \$450,225 |
| 4.0 | 75.0% | 0.0% | \$675,338 | 75.0% | 0.0% | \$675,338 |
| 5.0 | 91.0% | 0.0% | \$819,410 | 91.0% | 0.0% | \$819,410 |
| 6.0 | 100.0% | 0.0% | \$900,450 | 100.0% | 0.0% | \$900,450 |
| 7.0 | 100.0% | 0.0% | \$900,450 | 100.0% | 0.0% | \$900,450 |
| 8.0 | 100.0% | 0.0% | \$900,450 | 100.0% | 0.0% | \$900,450 |
| 9.0 | 100.0% | 0.0% | \$900,450 | 100.0% | 0.0% | \$900,450 |
| 10.0 | 100.0% | 0.0% | \$900,450 | 100.0% | 0.0% | \$900,450 |
| 11.0 | 100.0% | 0.0% | \$900,450 | 100.0% | 0.0% | \$900,450 |
| 12.0 | 100.0% | 0.0% | \$900,450 | 100.0% | 0.0% | \$900,450 |
| 13.0 | 100.0% | 0.0% | \$900,450 | 100.0% | 0.0% | \$900,450 |
| 14.0 | 100.0% | 0.0% | \$900,450 | 100.0% | 0.0% | \$900,450 |
| 15.0 | 100.0% | 0.0% | \$900,450 | 100.0% | 0.0% | \$900,450 |
| 16.0 | 100.0% | 0.0% | \$900,450 | 100.0% | 0.0% | \$900,450 |

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Program:

Agency:

State: **California**

Point of Contact:

Analyst:

Depth-Damage Functions Using USACE - Galveston: Fire Station

| Displacement Flood Depth (ft) | Before Mitigation Values: | | | After Mitigation Values: | | |
|----------------------------------|---------------------------|---------------------------------------|------------------------|--------------------------|--------------------------------------|-----------------------|
| | Before Mitigation (Days) | Before Mitigation User Entered (Days) | Before Mitigation (\$) | After Mitigation (Days) | After Mitigation User Entered (Days) | After Mitigation (\$) |
| -2.0 | 0.0 | | | 0.0 | | |
| -1.0 | 0.0 | | | 0.0 | | |
| 0.0 | 0.0 | | | 0.0 | | |
| 1.0 | 45.0 | | | 45.0 | | |
| 2.0 | 90.0 | | \$0 | 90.0 | | \$0 |
| 3.0 | 135.0 | | \$0 | 135.0 | | \$0 |
| 4.0 | 180.0 | | \$0 | 180.0 | | \$0 |
| 5.0 | 225.0 | | \$0 | 225.0 | | \$0 |
| 6.0 | 270.0 | | \$0 | 270.0 | | \$0 |
| 7.0 | 315.0 | | \$0 | 315.0 | | \$0 |
| 8.0 | 360.0 | | \$0 | 360.0 | | \$0 |
| 9.0 | 405.0 | | \$0 | 405.0 | | \$0 |
| 10.0 | 450.0 | | \$0 | 450.0 | | \$0 |
| 11.0 | 495.0 | | \$0 | 495.0 | | \$0 |
| 12.0 | 540.0 | | \$0 | 540.0 | | \$0 |
| 13.0 | 585.0 | | \$0 | 585.0 | | \$0 |
| 14.0 | 630.0 | | \$0 | 630.0 | | \$0 |
| 15.0 | 675.0 | | \$0 | 675.0 | | \$0 |
| 16.0 | 720.0 | | \$0 | 720.0 | | \$0 |

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Total Benefits: **\$464,653**Total Costs: **\$188,654**BCR: **2.46**

Project Number:

Disaster #:

Program:

Agency:

State: **California**

Point of Contact:

Analyst:

Depth-Damage Functions Using USACE - Galveston: Fire Station

| Loss of Function Flood Depth (ft) | Before Mitigation Values: | | | After Mitigation Values: | | |
|--------------------------------------|---------------------------|---------------------------------------|------------------------|--------------------------|--------------------------------------|-----------------------|
| | Before Mitigation (Days) | Before Mitigation User Entered (Days) | Before Mitigation (\$) | After Mitigation (Days) | After Mitigation User Entered (Days) | After Mitigation (\$) |
| -2.0 | 0.0 | | | 0.0 | | |
| -1.0 | 0.0 | | | 0.0 | | |
| 0.0 | 0.0 | | | 0.0 | | |
| 1.0 | 45.0 | | | 45.0 | | |
| 2.0 | 90.0 | | \$5,159,937 | 90.0 | | \$5,159,937 |
| 3.0 | 135.0 | | \$7,739,905 | 135.0 | | \$7,739,905 |
| 4.0 | 180.0 | | \$10,319,873 | 180.0 | | \$10,319,873 |
| 5.0 | 225.0 | | \$12,899,842 | 225.0 | | \$12,899,842 |
| 6.0 | 270.0 | | \$15,479,810 | 270.0 | | \$15,479,810 |
| 7.0 | 315.0 | | \$18,059,778 | 315.0 | | \$18,059,778 |
| 8.0 | 360.0 | | \$20,639,747 | 360.0 | | \$20,639,747 |
| 9.0 | 405.0 | | \$23,219,715 | 405.0 | | \$23,219,715 |
| 10.0 | 450.0 | | \$25,799,684 | 450.0 | | \$25,799,684 |
| 11.0 | 495.0 | | \$28,379,652 | 495.0 | | \$28,379,652 |
| 12.0 | 540.0 | | \$30,959,620 | 540.0 | | \$30,959,620 |
| 13.0 | 585.0 | | \$33,539,589 | 585.0 | | \$33,539,589 |
| 14.0 | 630.0 | | \$36,119,557 | 630.0 | | \$36,119,557 |
| 15.0 | 675.0 | | \$38,699,525 | 675.0 | | \$38,699,525 |
| 16.0 | 720.0 | | \$41,279,494 | 720.0 | | \$41,279,494 |

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Total Costs: **\$188,654**

BCR: **2.46**

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Disaster #:

Program:

Agency:

State: **California**

Point of Contact:

Analyst:

Other Benefits

Other Benefits Before Mitigation

No Data

Other Benefits After Mitigation

No Data

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Project: **Marsh Creek Flood Mitigation**

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Total Benefits: **\$464,653**

Total Costs: **\$188,654**

BCR: **2.46**

Project Number:

Disaster #:

Program:

Agency:

State: **California**

Point of Contact:

Analyst:

Loss of Services

Fire Station:

Number of People Served by this Fire Station: 40,000

Type of Area Served by this Fire Station: Suburban

Distance in miles between this fire station and the fire station that would provide fire protection for the geographical area normally served by this fire station: 2.00

Fire Station Provide Emergency Medical Services (EMS)? Yes

Distance in miles between this fire station and the fire station that would provide EMS for the geographical area normally served by this fire station? 4.00

BCR Calculation Results

Expected Annual Damages Before Mitigation

Expected Annual Damages After Mitigation

Expected Avoided Damages After Mitigation (Benefits)

Annual: \$72,768

Present Value: \$848,003

Annual: \$33,054

Present Value: \$385,203

Annual: \$39,714

Present Value: \$462,800

Mitigation Benefits: \$462,800

Mitigation Costs: \$186,654

Benefits Minus Costs: \$276,146

Benefit-Cost Ratio: 2.48

Cost Estimate

Project Useful Life (years): 25

Construction Type:

Mitigation Project Cost: \$175,000

Detailed Scope of Work: Yes

Annual Project Maintenance Cost: \$1,000

Detailed Estimate for Entire Project: Yes

Final Mitigation Project Cost: \$186,654

Years of Maintenance: 25

Cost Basis Year:

Present Worth of Annual Maintenance Costs: \$11,654

Construction Start Year:

Estimate Reflects Current Prices: No

Construction End Year:

Project Escalation:

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Project: **Marsh Creek Flood Mitigation**

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BCR: **2.46**

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Project Number:

Disaster #:

Program:

Agency:

State: **California**

Point of Contact:

Analyst:

Justification/Attachments

| Field | Description | Attachments |
|-------|-------------|-------------|
|-------|-------------|-------------|