

Project No.  
**5698.002.000**

March 26, 2018

Ms. Peri Dean  
City of Fairfield  
1000 Webster Street, 3<sup>rd</sup> Floor  
Fairfield, CA 94533-4883

Subject: Paradise Valley Geologic Maintenance and Monitoring District  
Fairfield, California

### RESERVE FUND STUDY

Dear Ms. Dean:

At your request, ENGEO is providing a Reserve Fund Study for the Paradise Valley Geologic Maintenance and Monitoring District (GMMD) in Fairfield, California. The Geologic Hazard Abatement District (GHAD) was formed on July 6, 2010.

The reserve fund study is based on the levels of expenditure expected to address future maintenance responsibilities and develop appropriate long-term reserves to address larger geologic events. The projected long-term reserve requirement is based on the published work, "Estimating an Appropriate Geologic Hazard Abatement District (GHAD) Reserve" and is provided as an attachment to this study.

### GHAD ASSESSMENT

As listed in the approved Engineer's Report (Reference 1) for FY 2010/11, initial assessment limits for the GHAD were established at \$940.00 per low-density residence and \$470.00 per medium-density residence. The initial assessment limits for residential units are adjusted annually on June 30 to reflect the percentage change in the San Francisco-Oakland-San Jose Consumers Price Index for All Urban Consumers. The inflation adjustment to the assessment limits are shown on Table 1.

**TABLE 1: Inflation Limit Adjustments**

FISCAL YEAR	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
ANNUAL CPI (JUNE)	-	2.43%	2.64%	2.56%	3.00%	2.29%	2.67%	3.48%
ASSESSMENT LIMIT (LOW DENSITY)	\$940.00	\$962.84	\$988.26	\$1,013.56	\$1,043.97	\$1,067.87	\$1,096.39	\$1,134.54
ASSESSMENT LIMIT (MEDIUM DENSITY)	\$470.00	\$481.42	\$494.13	\$506.78	\$521.98	\$533.94	\$548.19	\$567.27

The FY 2017/18 assessment roll shows 150 low-density residences levied at a rate of \$1,072.56 per unit. The total levy for the 2017/18 FY is \$160,884.00.

## **GMMD RESPONSIBILITIES**

Based on the District's Plan of Control (Reference 2) and Open Space Management Plan (Reference 3), GHAD responsibilities include:

- Sedimentation basins "A", "C-D", and "I".
- Three deflection walls with berms and riprap aprons.
- Maintenance roads.
- Concrete-lined drainage ditches.
- Storm drain inlets, outfalls, and pipelines within the open space area.

In addition to GHAD responsibilities to abate, mitigate, prevent, and control geologic hazards, the GHAD has responsibilities as a landowner within the GHAD-owned parcels, including:

- Vegetation management for fire suppression.
- Litter and debris collection.
- Fencing.

## **PROJECTED EXPENSES**

Based on our experience managing and budgeting for over 25 GHADs over a 25-year period and general experience performing geologic monitoring and maintenance activities, ENGEO prepared the initial Engineer's Report used to establish the assessment limit for the GHAD. By resolution, the GHAD Board of Directors approved the Engineer's Report and ordered the assessment in 2010. Since the GHAD was formed, ENGEO has completed two site-monitoring events (Reference 5) to observe and summarize site conditions. To prepare the current GHAD reserve amount, we reviewed the initial Engineer's Report, the existing site conditions, and revenue and expense information provided by the GHAD. Most of the initial expense estimates remain valid, but some amounts have been adjusted to account for site performance over the past 10 years, since development of Area "L," or other estimated cost changes since the GHAD was formed in 2011 (Exhibit A).

## **RESERVE ESTIMATION AND METHODOLOGY**

We have estimated the reserve (R) appropriate for the open space using the following factors from the attached paper titled, "Estimating an Appropriate GHAD Reserve" dated June 1999 (Exhibit D). As discussed above, we used the reserve calculation for Geologic Hazard Abatement Districts (GHADs) that are tasked with similar activities as identified for the Open Space Reserve Fund.

- Number of assessed units (n)
- Level of geotechnical risk within the development boundaries (g)
- Average value of assessed properties (v)
- Relative density of construction is the maximum number of units expected to be impacted in a major geologic event (d)

Based on these parameters, we estimate that an appropriate long-term reserve for the GMMD for 320 units would be approximately \$1,700,000 in current dollars. Use of a total of 320 units within the GHAD assumes construction of the maximum residences within Area "I", 107 units.

The \$1,700,000 reserve amount would allow the GMMD to repair the largest anticipated events within the GMMD, while still having funds to continue its other administration, maintenance, and monitoring functions.

## DISCUSSION AND CONCLUSIONS

As discussed above, based on the GHAD responsibilities in the Plan of Control, the initial Engineer's Report, the above reserve expenditures expected to address future maintenance, replacement, and abatement responsibilities would be approximately \$1,700,000. The pro forma budget in the initial Engineer's Report (Exhibit 4 within Reference 1) estimated that the target reserve would be achieved over a 40-year period. With a current reserve of approximately \$906,000, the reserve amount is approximately double the amount estimated to be accumulated by fiscal year 2017/18 in the initial Engineer's Report. It appears that this is largely due to lower expenses than were anticipated. Since some of these lower expense amounts are due to generally less than normal rainfall amounts since 2011, we expect these expenses to vary over time.


As shown in Exhibit B, at the current assessment amount adjusted for inflation, the GMMD would achieve the target reserve amount in fiscal 2026/27. If the target reserve amount is met, the GHAD Board of Directors could consider lowering the amounts levied on residences within the GMMD.

As an alternative, starting in FY 2018/19 or any time after, the GHAD Board of Directors could consider reducing the amount levied on residences within the GMMD to allow the accumulation of funds to reach the target reserve in a total of 40 years as anticipated in the initial Engineer's Report. Under this scenario, the fiscal year 2017/18 assessment would have been \$878 annually for low-density residential units and \$439 for medium-density residential units (Exhibit C). We have assumed that the minimum allowable number of residential units will be constructed in Area "I".

If you have any questions regarding the contents of this letter, please do not hesitate to contact us.

Sincerely,

ENGEO Incorporated

  
Eric Harrell, CEG  
eh/pcg/cjn



  
Paul C. Guerin, GE

Attachments: List of Selected References  
Exhibit A: Budget Details  
Exhibit B: \$1,700,000 Reserve (2017/18 dollars) at Current Assessment  
Exhibit C: \$1,700,000 Reserve (2017/18 dollars) at Initial 40-Year Reserve Accumulation Term  
Exhibit D: Estimating an Appropriate GHAD Reserve

### LIST OF SELECTED REFERENCES

1. ENGEO; Engineer's Report for Geologic Maintenance and Monitoring District, Paradise Valley Areas "I", "K", and "L", City of Fairfield, California; July 22, 2010; Project No. 5698.100.101.
2. ENGEO; Plan of Control for Paradise Valley Areas "I", "K", and "L" Geologic Maintenance and Monitoring District, Fairfield, California; July 22, 2010; Project No. 5698.100.101.
3. ENGEO; Open Space Management Plan, Paradise Valley, Fairfield, California; March 7, 2008; Project No. 5698.100.101.
4. ENGEO; Monitoring Report (Draft), Paradise Valley Geologic Maintenance and Monitoring District, Fairfield, California; January 31, 2018; Project No. 5698.002.000.

# ENGEO INCORPORATED

## BUDGET DETAILS

### Paradise Valley GMMD

Item No.	Description	Unit	Quantity	Unit Price	Total Cost	Reoccurrence Interval (Years)	Annual Total Budget	Comments
1	<b>Administration and Accounting</b>	ls	1	\$24,000.00	\$24,000.00	1.00	\$24,000.00	We have reviewed records for GHADs operating within Contra Costa County and on a long term basis these cost have averaged about 10 to 20 percent of the GHADs operating budget. The Paradise Valley GHAD administration and accounting budget estimate of \$24,000 (FY 2010/11) is in the typical range for GHAD administration costs.
	Membership dues for the California Association of Geologic Hazard Abatement Districts	ls	1	\$180.00	\$180.00	1.00	\$180.00	This cost estimate is based of membership fees currently charged by the California Association of GHADs
	Insurance - General Liability	ls	1	\$500.00	\$500.00	1.00	\$500.00	This estimated cost was obtained from general liability insurance fees for open space from other GHADs within California.
	Insurance - Directors and Officers	ls	1	\$800.00	\$800.00	1.00	\$800.00	This estimated cost was obtained from Directors and Officers insurance estimates provided for the Leona Quarry and Oakland Area Geologic Hazard Abatement Districts.
	Annual Report and Budget Preparation	ls	1	\$4,000.00	\$4,000.00	1.00	\$4,000.00	
	GHAD Treasurer	ls	1	\$2,958.00	\$2,958.00	1.00	\$2,958.00	Based on fees charged to GHADs in Contra Costa and Alameda Counties.
	GHAD Attorney	ls	1	\$4,732.00	\$4,732.00	1.00	\$4,732.00	Based on fees charged to GHADs in Contra Costa and Alameda Counties.
						<b>Subtotal</b>	<b>\$37,170.00</b>	
2	<b>Professional Services</b>							
	GHAD Monitoring Event - April and October	ls	1	\$3,549.00	\$3,549.00	0.50	\$7,098.00	The frequency of monitoring is based on the Plan of Control for the Paradise Valley GHAD. Monitoring budget estimates are based on the fees these services are currently being provided by ENGEO Incorporated for numerous GHADs within Contra Costa County and Alameda County.
	Heavy Rainfall Event Monitoring	ls	1	\$1,775.00	\$1,775.00	1.00	\$1,775.00	Based on the anticipated frequency of heavy rainfall events as defined in the Plan of Control, 2 heavy rainfall events were included within the budget for estimating purposes. If a heavy rainfall events occur in close proximity to a scheduled monitoring event, the GHAD manager will provide direction regarding the need for additional monitoring.
						<b>Subtotal</b>	<b>\$8,873.00</b>	

# ENGEO INCORPORATED

## BUDGET DETAILS

### Paradise Valley GMMD

Item No.	Description	Unit	Quantity	Unit Price	Total Cost	Reoccurrence Interval (Years)	Annual Total Budget	Comments
3	<b>Maintenance &amp; Operation</b>							
	Sedimentation Basin Maintenance - riser, outfall, spillway and vegetation/sediment removal	each	3	\$5,000.00	\$15,000.00	1.00	\$15,000.00	Based on the basin design we do not anticipate that the sedimentation basins will contain water for an extended period of time reducing certain maintenance operations such as mosquito abatement and some vegetation management functions. It is anticipated that the majority of funds within this budget items will be used for sediment removal from transported material which is included in this budget item, however a failure of a basin is provided in the Major Repair category.
	Sediment/Debris Removal Concrete lined drainage ditches	lf	6,000	\$0.75	\$4,500.00	1.00	\$4,500.00	This estimated cost was obtained from a review of GHAD records from sites in Contra Costa County.
	Sediment/Debris Removal, Storm Drain Inlets and Pipelines	ls	1	\$2,500.00	\$2,500.00	1.00	\$2,500.00	With the steepness of the site and the storm drain pipelines it is expected that the majority of material entering the storm drain system will not remain in the storm drain system but be transported to the detention basin. This item is to provide for incidental removal of material from the storm drain catch basins.
	Access-Maintenance Roadways	lf	3,500	\$12.00	\$42,000.00	15	\$2,800.00	We anticipate an overlay of class 2 aggregate base rock on roadways will occur every 15 years.
						<b>Subtotal</b>	<b>\$24,800.00</b>	
4	<b>Slope Stabilization and Erosion Protection</b>							
	Slope Stabilization	ls	1	\$24,139.00	\$24,139.00	1.00	\$24,139.00	This budget items provides for ongoing slope stabilization activities which may include minor landslide repair activities. This figure is comparable to other GHADs of this size.
	Erosion Protection	ls	1	\$24,139.00	\$24,139.00	1.00	\$24,139.00	This budget items provides for ongoing slope erosion protection activities. This figure is comparable to other GHADs of this size.
						<b>Subtotal</b>	<b>\$48,278.00</b>	

5698.002.000

March 1, 2018

# ENGEO INCORPORATED

## BUDGET DETAILS

### Paradise Valley GMMD

Item No.	Description	Unit	Quantity	Unit Price	Total Cost	Reoccurrence Interval (Years)	Annual Total Budget	Comments
5	<b>Capital Improvements</b>							
	Concrete-lined drainage ditch replacement	lf	2800	\$47.00	\$131,600.00	50.00	\$2,632.00	We have provided for a 50-year replacement cycle for the "U" profile concrete lined drainage ditches. This replacement quantity applies to concrete lined drainage ditch that is not involved with slope instability. Drainage ditches that are involved with slope instability would be repaired or replaced during corrective work for the individual events.
	Concrete-lined drainage ditch replacement	lf	3200	\$47.00	\$150,400.00	60.00	\$2,506.67	We have provided for a 60-year replacement cycle for the "V" profile concrete-lined drainage ditches. This replacement quantity applies to concrete lined drainage ditch that is not involved with slope instability. Drainage ditches that are involved with slope instability would be repaired or replaced during corrective work for the individual events.
	Open Space Storm Drain Pipeline Replacement	lf	1375	\$59.00	\$81,125.00	75.00	\$1,081.67	We have provided for a 75-year replacement cycle for the open space storm drain pipelines. This replacement quantity applies to storm drain system components that are not involved with slope instability. Storm drain system elements that are involved with slope instability would be repaired or replaced during corrective work for the individual events.
	Deflection Wall Replacement	lf	780	\$95.00	\$74,100.00	50.00	\$1,482.00	The estimated costs for this item anticipates that the replacement consist will involve the rip rap and fabric potion of the deflection wall system. We do not anticipate the "K" rail portion of the defection wall.
						<b>Subtotal</b>	<b>\$7,702.33</b>	
6	<b>Major Repair (Annualized)</b>	ls	1	\$229,946.00	\$229,946.00	10.00	\$22,994.60	This figure represents the annualized repair cost estimate for a \$200,000 (FY 2010/11) repair event that occurs on average every 10 years for the entire Paradise Valley GHAD area. As with the other cost estimate items this budget item is indexed to the Consumer Price Index as outlined in the Engineer's Report. This figure is based on our experience, the geology of the site, the planned grading of the site and the configuration of the site improvements.
						<b>Subtotal</b>	<b>\$22,994.60</b>	
						<b>TOTAL</b>	<b>\$149,817.93</b>	

Exhibit B

Paradise Valley Areas "I", "K" and "L" Geologic Hazard Abatement District  
Pro Forma Budget  
March 1, 2018

FISCAL YEAR (Starting July 1)	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Cumulative No. of Low Density Residential Units (Assessed)	150	150	150	150	150	150	150	150	150	150	150	150	150	150
Cumulative No. of Medium Density Residential Units (Assessed)	32	63	97	131	131	131	131	131	131	131	131	131	131	131
Total Residential Units	182	213	247	281	281	281	281	281	281	281	281	281	281	281
<b>A. INCOME</b>														
Assessment	80,442	198,564	221,505	245,284	250,190	255,194	260,298	265,504	270,814	276,230	281,755	287,390	293,137	299,000
<b>B. PROJECTED EXPENSES</b>														
1. Administration Legal, Insurance, and Accounting	37,170	37,913	38,672	39,445	40,234	41,039	41,859	42,697	43,551	44,422	45,310	46,216	47,141	48,083
County Fees	364	371	379	386	394	402	410	418	426	435	444	453	462	471
2. Professional Services - Site Monitoring	8,873	9,050	9,231	9,416	9,604	9,797	9,992	10,192	10,396	10,604	10,816	11,032	11,253	11,478
3. Maintenance & Operation	16,063	19,175	22,680	26,318	26,844	27,381	27,929	28,487	29,057	29,638	30,231	30,836	31,452	32,081
4. Slope Stabilization and Erosion Protection	31,269	37,327	44,151	51,233	52,258	53,303	54,369	55,456	56,565	57,697	58,851	60,028	61,228	62,453
5. Sedimentation Basin and Storm Drain Maintenance	4,988	5,955	7,044	8,173	8,337	8,504	8,674	8,847	9,024	9,205	9,389	9,576	9,768	9,963
6. Repair	-	-	-	-	255,070	-	-	-	-	-	-	-	-	-
7. Miscellaneous Expenses	22,995	23,455	23,924	24,402	24,891	25,388	25,896	26,414	26,942	27,481	28,031	28,591	29,163	29,746
8. Debt Service	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SUBTOTAL - EXPENSES	121,722	133,246	146,080	159,374	417,632	165,813	169,129	172,512	175,962	179,481	183,071	186,732	190,467	194,276
RESERVE	864,720	65,317	75,425	85,910	(167,442)	89,381	91,168	92,992	94,852	96,749	98,684	100,657	102,670	104,724
EARNINGS	25,942	26,720	29,481	32,628	36,184	32,247	35,895	39,707	43,688	47,844	52,182	56,708	61,429	66,352
CUMULATIVE RESERVE	890,661	982,699	1,087,604	1,206,142	1,074,885	1,196,512	1,323,576	1,456,275	1,594,815	1,739,408	1,890,273	2,047,639	2,211,738	2,382,814

<b>ASSUMPTIONS</b>	
Total No. of Low Density Single Family Residential Units	150
Annual Assessment per Unit	\$1,073
Total No. of Medium Density Family Residential Units	131
Annual Assessment per Unit	\$536
Annual Increase in Assessment	2.0%
Inflation	2.0%
Investment Earnings	3.0%
Existing Reserve February 24, 2018	\$906,000
Amount Financed	\$0
Borrowing Rate	8.0%
Term of Loan (years)	0
Frequency of Large-Scale Repair (years)	10
Cost of Large-Scale Repair (current \$)	\$229,946

<b>ESTIMATED ANNUAL EXPENSES IN 2017/2018 DOLLARS</b>	
1. Administration, Legal, Insurance, and Accounting	37,170
2. Professional Services - Site Monitoring	8,873
3. Maintenance & Operation	24,800
4. Slope Stabilization and Erosion Protection	48,278
5. Sedimentation Basin and Storm Drain Outfall Maintenance	7,702
7. Large Scale Repair (annualized)	22,995
TOTAL	149,818



Exhibit B

Paradise Valley Areas "I", "K" and "L" Geologic Hazard Abatement District  
Pro Forma Budget  
March 1, 2018

FISCAL YEAR (Starting July 1)	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
Cumulative No. of Low Density Residential Units (Assessed)	150	150	150	150	150	150	150	150	150	150	150	150	150	150
Cumulative No. of Medium Density Residential Units (Assessed)	131	131	131	131	131	131	131	131	131	131	131	131	131	131
Total Residential Units	281	281	281	281	281	281	281	281	281	281	281	281	281	281
<b>A. INCOME</b>														
Assessment	304,980	311,080	317,301	323,647	330,120	336,723	343,457	350,326	357,333	364,480	371,769	379,205	386,789	394,524
<b>B. PROJECTED EXPENSES</b>														
1. Administration Legal, Insurance, and Accounting	49,045	50,026	51,026	52,047	53,088	54,150	55,233	56,337	57,464	58,613	59,786	60,981	62,201	63,445
County Fees	480	490	500	510	520	530	541	552	563	574	585	597	609	621
2. Professional Services - Site Monitoring	11,708	11,942	12,181	12,424	12,673	12,926	13,185	13,449	13,717	13,992	14,272	14,557	14,848	15,145
3. Maintenance & Operation	32,723	33,378	34,045	34,726	35,421	36,129	36,851	37,589	38,340	39,107	39,889	40,687	41,501	42,331
4. Slope Stabilization and Erosion Protection	63,702	64,976	66,275	67,601	68,953	70,332	71,739	73,173	74,637	76,130	77,652	79,205	80,789	82,405
5. Sedimentation Basin and Storm Drain Maintenance	10,163	10,366	10,573	10,785	11,000	11,220	11,445	11,674	11,907	12,145	12,388	12,636	12,889	13,146
6. Repair	369,854	-	-	-	-	-	-	-	-	-	369,854	-	-	-
7. Miscellaneous Expenses	30,341	30,948	31,567	32,199	32,843	33,499	34,169	34,853	35,550	36,261	36,986	37,726	38,480	39,250
8. Debt Service	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SUBTOTAL - EXPENSES	568,016	202,125	206,168	210,291	214,497	218,787	223,163	227,626	232,178	236,822	611,412	246,389	251,317	256,344
RESERVE	(263,036)	108,955	111,134	113,356	115,623	117,936	120,295	122,701	125,155	127,658	(239,643)	132,815	135,471	138,181
EARNINGS	71,484	65,738	70,979	76,442	82,136	88,069	94,249	100,685	107,387	114,363	121,624	118,083	125,610	133,442
CUMULATIVE RESERVE	2,191,263	2,365,955	2,548,068	2,737,866	2,935,625	3,141,630	3,356,174	3,579,560	3,812,101	4,054,122	3,936,102	4,187,000	4,448,082	4,719,705

<b>ASSUMPTIONS</b>	
Total No. of Low Density Single Family Residential Units	150
Annual Assessment per Unit	\$1,073
Total No. of Medium Density Family Residential Units	131
Annual Assessment per Unit	\$536
Annual Increase in Assessment	2.0%
Inflation	2.0%
Investment Earnings	3.0%
Existing Reserve February 24, 2018	\$906,000
Amount Financed	\$0
Borrowing Rate	8.0%
Term of Loan (years)	0
Frequency of Large-Scale Repair (years)	10
Cost of Large-Scale Repair (current \$)	\$229,946

<b>ESTIMATED ANNUAL EXPENSES IN 2017/2018 DOLLARS</b>	
1. Administration, Legal, Insurance, and Accounting	37,170
2. Professional Services - Site Monitoring	8,873
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4. Slope Stabilization and Erosion Protection	48,278
5. Sedimentation Basin and Storm Drain Outfall Maintenance	7,702
7. Large Scale Repair (annualized)	22,995
TOTAL	149,818

## Exhibit B

Paradise Valley Areas "I", "K" and "L" Geologic Hazard Abatement District  
Pro Forma Budget  
March 1, 2018

FISCAL YEAR (Starting July 1)	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057
Cumulative No. of Low Density Residential Units (Assessed)	150	150	150	150	150	150	150	150	150	150	150	150	150
Cumulative No. of Medium Density Residential Units (Assessed)	131	131	131	131	131	131	131	131	131	131	131	131	131
Total Residential Units	281	281	281	281	281	281	281	281	281	281	281	281	281
<b>A. INCOME</b>													
Assessment	402,415	410,463	418,672	427,046	435,587	444,299	453,185	462,248	471,493	480,923	490,542	500,352	510,359
<b>B. PROJECTED EXPENSES</b>													
1. Administration Legal, Insurance, and Accounting	64,714	66,008	67,328	68,675	70,048	71,449	72,878	74,336	75,823	77,339	78,886	80,464	82,073
County Fees	634	646	659	673	686	700	714	728	743	757	773	788	804
2. Professional Services - Site Monitoring	15,448	15,757	16,072	16,394	16,722	17,056	17,397	17,745	18,100	18,462	18,831	19,208	19,592
3. Maintenance & Operation	43,177	44,041	44,922	45,820	46,737	47,671	48,625	49,597	50,589	51,601	52,633	53,686	54,759
4. Slope Stabilization and Erosion Protection	84,053	85,734	87,449	89,198	90,982	92,801	94,658	96,551	98,482	100,451	102,460	104,510	106,600
5. Sedimentation Basin and Storm Drain Maintenance	13,409	13,678	13,951	14,230	14,515	14,805	15,101	15,403	15,711	16,025	16,346	16,673	17,006
6. Repair	-	-	-	-	-	-	450,850	-	-	-	-	-	507,730
7. Miscellaneous Expenses	40,035	40,836	41,652	42,485	43,335	44,202	45,086	45,987	46,907	47,845	48,802	49,778	50,774
8. Debt Service	-	-	-	-	-	-	-	-	-	-	-	-	-
SUBTOTAL - EXPENSES	261,470	266,700	272,034	277,475	283,024	288,685	745,308	300,347	306,354	312,481	318,731	325,106	839,338
RESERVE	140,944	143,763	146,639	149,571	152,563	155,614	(292,124)	161,901	165,139	168,442	171,810	175,247	(328,978)
EARNINGS	141,591	150,067	158,882	168,048	177,576	187,480	197,773	194,943	205,648	216,772	228,328	240,332	252,800
CUMULATIVE RESERVE	5,002,240	5,296,071	5,601,591	5,919,210	6,249,350	6,592,444	6,498,094	6,854,937	7,225,724	7,610,937	8,011,076	8,426,655	8,350,476

### ASSUMPTIONS

Assessment		Reserve in
		2051/52
Total No. of Low Density Single Family Residential Units	150	
Annual Assessment per Unit	\$1,073	Dollars: 3,314,211
Total No. of Medium Density Family Residential Units	131	
Annual Assessment per Unit	\$536	
Annual Increase in Assessment	2.0%	
Inflation	2.0%	
Investment Earnings	3.0%	
Existing Reserve February 24, 2018	\$906,000	
Amount Financed	\$0	
Borrowing Rate	8.0%	
Term of Loan (years)	0	
Frequency of Large-Scale Repair (years)	10	
Cost of Large-Scale Repair (current \$)	\$229,946	

ESTIMATED ANNUAL EXPENSES IN 2017/2018 DOLLARS

<u>Estimated Annual Expenses for Erosion Control</u>	
1. Administration, Legal, Insurance, and Accounting	37,170
2. Professional Services - Site Monitoring	8,873
3. Maintenance & Operation	24,800
4. Slope Stabilization and Erosion Protection	48,278
5. Sedimentation Basin and Storm Drain Outfall Maintenance	7,702
7. Large Scale Repair (annualized)	<u>22,995</u>
TOTAL	149,818

Exhibit C

Paradise Valley Areas "I", "K", and "L" Geologic Hazard Abatement District  
Pro Forma Budget  
March 1, 2018

FISCAL YEAR (Starting July 1)	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Cumulative No. of Low Density Residential Units (Assessed)	150	150	150	150	150	150	150	150	150	150	150	150	150	150
Cumulative No. of Medium Density Residential Units (Assessed)	32	63	97	131	131	131	131	131	131	131	131	131	131	131
Total Residential Units	182	213	247	281	281	281	281	281	281	281	281	281	281	281
<b>A. INCOME</b>														
Assessment	80,442	162,544	181,324	200,790	204,806	208,902	213,080	217,342	221,688	226,122	230,645	235,258	239,963	244,762
<b>B. PROJECTED EXPENSES</b>														
1. Administration Legal, Insurance, and Accounting	37,170	37,913	38,672	39,445	40,234	41,039	41,859	42,697	43,551	44,422	45,310	46,216	47,141	48,083
County Fees	364	371	379	386	394	402	410	418	426	435	444	453	462	471
2. Professional Services - Site Monitoring	8,873	9,050	9,231	9,416	9,604	9,797	9,992	10,192	10,396	10,604	10,816	11,032	11,253	11,478
3. Maintenance & Operation	16,063	19,175	22,680	26,318	26,844	27,381	27,929	28,487	29,057	29,638	30,231	30,836	31,452	32,081
4. Slope Stabilization and Erosion Protection	31,269	37,327	44,151	51,233	52,258	53,303	54,369	55,456	56,565	57,697	58,851	60,028	61,228	62,453
5. Sedimentation Basin and Storm Drain Maintenance	4,988	5,955	7,044	8,173	8,337	8,504	8,674	8,847	9,024	9,205	9,389	9,576	9,768	9,963
6. Repair	-	-	-	-	255,070	-	-	-	-	-	-	-	-	-
7. Miscellaneous Expenses	22,995	23,455	23,924	24,402	24,891	25,388	25,896	26,414	26,942	27,481	28,031	28,591	29,163	29,746
8. Debt Service	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SUBTOTAL - EXPENSES	121,722	133,246	146,080	159,374	417,632	165,813	169,129	172,512	175,962	179,481	183,071	186,732	190,467	194,276
RESERVE	864,720	29,298	35,244	41,416	(212,826)	43,089	43,951	44,830	45,726	46,641	47,574	48,525	49,496	50,486
EARNINGS	25,942	26,720	28,400	30,310	32,461	27,051	29,155	31,348	33,633	36,014	38,494	41,076	43,764	46,561
CUMULATIVE RESERVE	890,661	946,679	1,010,323	1,082,048	901,684	971,823	1,044,929	1,121,106	1,200,466	1,283,121	1,369,188	1,458,789	1,552,048	1,649,095

<b>ASSUMPTIONS</b>	
Total No. of Low Density Single Family Residential Units	150
Annual Assessment per Unit	\$878
Total No. of Medium Density Family Residential Units	131
Annual Assessment per Unit	\$439
Annual Increase in Assessment	2.0%
Inflation	2.0%
Investment Earnings	3.0%
Existing Reserve February 24, 2018	\$906,000
Amount Financed	\$0
Borrowing Rate	8.0%
Term of Loan (years)	0
Frequency of Large-Scale Repair (years)	10
Cost of Large-Scale Repair (current \$)	\$229,946

<b>ESTIMATED ANNUAL EXPENSES IN 2017/2018 DOLLARS</b>	
1. Administration, Legal, Insurance, and Accounting	37,170
2. Professional Services - Site Monitoring	8,873
3. Maintenance & Operation	24,800
4. Slope Stabilization and Erosion Protection	48,278
5. Sedimentation Basin and Storm Drain Outfall Maintenance	7,702
7. Large Scale Repair (annualized)	22,995
TOTAL	149,818

Exhibit C

Paradise Valley Areas "I", "K", and "L" Geologic Hazard Abatement District  
Pro Forma Budget  
March 1, 2018

FISCAL YEAR (Starting July 1)	<u>2031</u>	<u>2032</u>	<u>2033</u>	<u>2034</u>	<u>2035</u>	<u>2036</u>	<u>2037</u>	<u>2038</u>	<u>2039</u>	<u>2040</u>	<u>2041</u>	<u>2042</u>	<u>2043</u>	<u>2044</u>	<u>2045</u>
Cumulative No. of Low Density Residential Units (Assessed)	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150
Cumulative No. of Medium Density Residential Units (Assessed)	<u>131</u>	<u>131</u>	<u>131</u>	<u>131</u>	<u>131</u>	<u>131</u>	<u>131</u>	<u>131</u>	<u>131</u>	<u>131</u>	<u>131</u>	<u>131</u>	<u>131</u>	<u>131</u>	<u>131</u>
Total Residential Units	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281
<b>A. INCOME</b>															
Assessment	249,657	254,650	259,743	264,938	270,237	275,642	281,155	286,778	292,513	298,364	304,331	310,417	316,626	322,958	329,417
<b>B. PROJECTED EXPENSES</b>															
1. Administration Legal, Insurance, and Accounting	49,045	50,026	51,026	52,047	53,088	54,150	55,233	56,337	57,464	58,613	59,786	60,981	62,201	63,445	64,714
County Fees	480	490	500	510	520	530	541	552	563	574	585	597	609	621	634
2. Professional Services - Site Monitoring	11,708	11,942	12,181	12,424	12,673	12,926	13,185	13,449	13,717	13,992	14,272	14,557	14,848	15,145	15,448
3. Maintenance & Operation	32,723	33,378	34,045	34,726	35,421	36,129	36,851	37,589	38,340	39,107	39,889	40,687	41,501	42,331	43,177
4. Slope Stabilization and Erosion Protection	63,702	64,976	66,275	67,601	68,953	70,332	71,739	73,173	74,637	76,130	77,652	79,205	80,789	82,405	84,053
5. Sedimentation Basin and Storm Drain Maintenance	10,163	10,366	10,573	10,785	11,000	11,220	11,445	11,674	11,907	12,145	12,388	12,636	12,889	13,146	13,409
6. Repair	303,409	-	-	-	-	-	-	-	-	-	369,854	-	-	-	-
7. Miscellaneous Expenses	30,341	30,948	31,567	32,199	32,843	33,499	34,169	34,853	35,550	36,261	36,986	37,726	38,480	39,250	40,035
8. Debt Service	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SUBTOTAL - EXPENSES	501,571	202,125	206,168	210,291	214,497	218,787	223,163	227,626	232,178	236,822	611,412	246,389	251,317	256,344	261,470
RESERVE	(251,914)	52,525	53,576	54,647	55,740	56,855	57,992	59,152	60,335	61,542	(307,082)	64,028	65,308	66,615	67,947
EARNINGS	49,473	43,400	46,277	49,273	52,391	55,635	59,009	62,519	66,169	69,964	73,910	66,915	70,843	74,927	79,174
CUMULATIVE RESERVE	1,446,655	1,542,579	1,642,433	1,746,353	1,854,483	1,966,973	2,083,974	2,205,645	2,332,150	2,463,656	2,230,484	2,361,426	2,497,578	2,639,120	2,786,240
<b>ASSUMPTIONS</b>															
Total No. of Low Density Single Family Residential Units	150														
Annual Assessment per Unit	\$878														
Total No. of Medium Density Family Residential Units	131														
Annual Assessment per Unit	\$439														
Annual Increase in Assessment	2.0%														
Inflation	2.0%														
Investment Earnings	3.0%														
Existing Reserve February 24, 2018	\$906,000														
Amount Financed	\$0														
Borrowing Rate	8.0%														
Term of Loan (years)	0														
Frequency of Large-Scale Repair (years)	10														
Cost of Large-Scale Repair (current \$)	\$229,946														
<b>ESTIMATED ANNUAL EXPENSES IN 2017/2018 DOLLARS</b>															
1. Administration, Legal, Insurance, and Accounting	37,170														
2. Professional Services - Site Monitoring	8,873														
3. Maintenance & Operation	24,800														
4. Slope Stabilization and Erosion Protection	48,278														
5. Sedimentation Basin and Storm Drain Outfall Maintenance	7,702														
7. Large Scale Repair (annualized)	<u>22,995</u>														
TOTAL	149,818														

Exhibit C

Paradise Valley Areas "I", "K", and "L" Geologic Hazard Abatement District  
Pro Forma Budget  
March 1, 2018

FISCAL YEAR (Starting July 1)	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057
Cumulative No. of Low Density Residential Units (Assessed)	150	150	150	150	150	150	150	150	150	150	150	150
Cumulative No. of Medium Density Residential Units (Assessed)	131	131	131	131	131	131	131	131	131	131	131	131
Total Residential Units	281	281	281	281	281	281	281	281	281	281	281	281
<b>A. INCOME</b>												
Assessment	336,006	342,726	349,580	356,572	363,703	370,978	378,397	385,965	393,684	401,558	409,589	417,781
<b>B. PROJECTED EXPENSES</b>												
1. Administration Legal, Insurance, and Accounting	66,008	67,328	68,675	70,048	71,449	72,878	74,336	75,823	77,339	78,886	80,464	82,073
County Fees	646	659	673	686	700	714	728	743	757	773	788	804
2. Professional Services - Site Monitoring	15,757	16,072	16,394	16,722	17,056	17,397	17,745	18,100	18,462	18,831	19,208	19,592
3. Maintenance & Operation	44,041	44,922	45,820	46,737	47,671	48,625	49,597	50,589	51,601	52,633	53,686	54,759
4. Slope Stabilization and Erosion Protection	85,734	87,449	89,198	90,982	92,801	94,658	96,551	98,482	100,451	102,460	104,510	106,600
5. Sedimentation Basin and Storm Drain Maintenance	13,678	13,951	14,230	14,515	14,805	15,101	15,403	15,711	16,025	16,346	16,673	17,006
6. Repair	-	-	-	-	-	450,850	-	-	-	-	-	507,730
7. Miscellaneous Expenses	40,836	41,652	42,485	43,335	44,202	45,086	45,987	46,907	47,845	48,802	49,778	50,774
8. Debt Service	-	-	-	-	-	-	-	-	-	-	-	-
SUBTOTAL - EXPENSES	266,700	272,034	277,475	283,024	288,685	745,308	300,347	306,354	312,481	318,731	325,106	839,338
RESERVE	69,306	70,692	72,106	73,548	75,019	(374,331)	78,050	79,611	81,203	82,827	84,483	(421,557)
EARNINGS	83,587	88,174	92,940	97,891	103,035	108,376	100,397	105,751	111,312	117,087	123,085	129,312
CUMULATIVE RESERVE	2,939,133	3,097,999	3,263,045	3,434,484	3,612,538	3,346,583	3,525,031	3,710,392	3,902,907	4,102,821	4,310,389	4,018,144

<b>ASSUMPTIONS</b>													Reserve in
Total No. of Low Density Single Family Residential Units	150												2051/52
Annual Assessment per Unit	\$878												Dollars:
Total No. of Medium Density Family Residential Units	131												1,706,852
Annual Assessment per Unit	\$439												
Annual Increase in Assessment	2.0%												
Inflation	2.0%												
Investment Earnings	3.0%												
Existing Reserve February 24, 2018	\$906,000												
Amount Financed	\$0												
Borrowing Rate	8.0%												
Term of Loan (years)	0												
Frequency of Large-Scale Repair (years)	10												
Cost of Large-Scale Repair (current \$)	\$229,946												

<b>ESTIMATED ANNUAL EXPENSES IN 2017/2018 DOLLARS</b>	
1. Administration, Legal, Insurance, and Accounting	37,170
2. Professional Services - Site Monitoring	8,873
3. Maintenance & Operation	24,800
4. Slope Stabilization and Erosion Protection	48,278
5. Sedimentation Basin and Storm Drain Outfall Maintenance	7,702
7. Large Scale Repair (annualized)	22,995
TOTAL	149,818

# ESTIMATING AN APPROPRIATE GHAD RESERVE

Uri Eliahu G.E., ENGEO Incorporated, June 1999

An important parameter in establishing initial GHAD budgets and in assessing the financial health of mature GHADs is the appropriate level of reserve needed to address probable future geologic events. The reserve must be unique to each GHAD, and must consider several factors, not all of which are geotechnical in nature.

As an initial approach, a loss history can be compiled based on records of actual losses that have occurred in the region in the last 20 years. If the last 20 years can be assumed to be representative of future years, this loss history can be distilled to obtain a current net present value (NPV) of the statistically-expected loss over a given time period. This can be expressed per dwelling unit, per parcel, or per dollar value of improvements. If, based on historic geologic and rainfall records, it is believed that the last two decades do not represent the full range of expected geologic activity, a correction factor can be applied to the calculated risk to arrive at the expected loss rate.



In converting the expected loss rate to an estimated reserve (**R**), consideration must be given to the following factors.

## Number of assessed units (**n**) in the GHAD.

The reserve per dwelling unit (**R/n** or **average reserve**) should, in theory, diminish asymptotically with increasing unit count to a “floor” value.

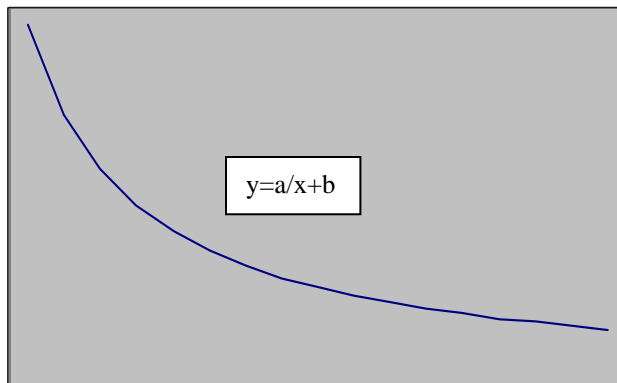
Level of geotechnical risk (**g**) within the GHAD boundaries. Depending on geology, terrain, prior mitigation measures, grading techniques, irrigation and age, geotechnical risk may vary, even within a particular region.

Average value of assessed properties (**v**). In areas of high property values, repair or reconstruction of private improvements may be more costly and may require greater average reserves.

Relative density of construction (**d**). The number of units likely to be affected during a major geologic event will have an impact on the total reserve.



In consideration of the foregoing, an expression describing the average reserve may take the general hyperbolic form,  $y = a/x + b$



Intuitively, this general expression may be applied to a GHAD reserve formula by substituting  $R/n$  for  $y$ ,  $n$  for  $x$ ,  $dv$  for  $a$ , and  $gv$  for  $b$ , to arrive at the relationship  $R/n = dv/n + gv$  where:

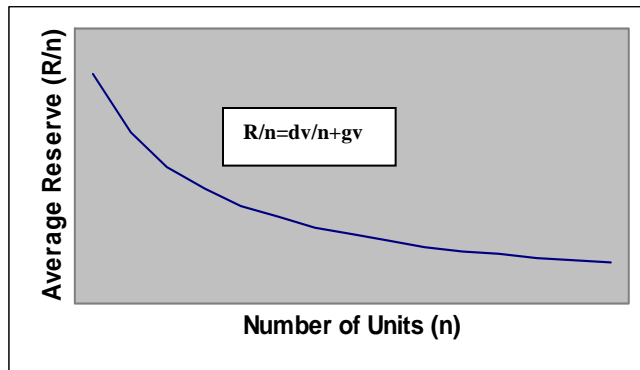
$R$  is the total reserve

$n$  is the total number of assessed parcels

$v$  is the average value of each residence

$g$  is the geotechnical risk factor

$d$  is a density factor related to the maximum number of units expected to be impacted in a major geologic event (eg. landslide)



This formula can be simplified to  $R = dv + gvn$  or  $R = v(d + gn)$

To apply this to a specific situation,  $g$  can be estimated based on historical data as described above, and  $d$  can be estimated by comparing regional landslide sizes to average lot sizes. Preliminarily, it appears that  $d$  may range from approximately 2 to 10 and  $g$  may range from 0.001 to 0.01, depending on the physical characteristics of the assessed areas as described above.

