CONTRA COSTA WATER DISTRICT

Retirement Plan

June 30, 2017 Actuarial Funding Valuation
for Calendar Year 2018 Contributions

December 20, 2017
Final Results

This page intentionally left blank

CONTRA COSTA WATER DISTRICT RETIREMENT PLAN

June 30, 2017 Actuarial Funding Valuation for 2018 Contributions

Table of Contents

Introduction and Actuarial Certification

Purposes of the valuation

This report presents the results of the June 30, 2017 actuarial funding valuation for the Contra Costa Water District

- to determine the Actuarially Determined Contributions for the 2018 calendar year, and
- to evaluate the funded status of the plan.

This report has been prepared solely for the Contra Costa Water District to summarize the Plan’s actuarial funding considerations. Computations for other purposes, such as plan accounting or termination, may differ significantly from the results shown in this report.

This report may not be used for any other purpose, and Van Iwaarden Associates is not responsible for the consequences of any unauthorized use. Its content may not be modified, incorporated into or used in other material, or otherwise provided, in whole or in part, to any other person or entity, without the District's permission.

Prior year results

Results shown as of June 30, 2016 for the 2017 calendar year were calculated by the prior actuary.

Changes from the prior year

Changes to the plan provisions and actuarial assumptions reflected in this valuation are described at the end of each of those sections in this report. These changes include:

- The general inflation assumption was updated from 3.00% to 2.75% to reflect historical data and forward-looking market expectations.
- A 2.0% 2018 retiree Cost of Living Adjustment (COLA) assumption was added. No assumption regarding additional future COLAs is included in this report.
- The mortality assumption was updated to reflect the Society of Actuaries' MP-2016 mortality improvement scale.

Summary of valuation results

Since the prior valuation, the plan's funded status increased from 83.0% to 87.1% on a market asset value basis and from 85.8% to 86.6% on an actuarial asset basis. This change was primarily due to investment returns greater than expected.

The total Actuarially Determined Contribution (ADC) increased from $6,591,000 to $6,795,535. The primary reason for the ADC increase is the awarding of 2017 and 2018 COLAs. PEPRA employee contribution rates remained at 5.75%. Additional contribution details can be found on pages 11 to 13.

Introduction and Actuarial Certification (continued)

Actuarial certification

To the best of our knowledge, this report is complete and accurate and all Plan liabilities were determined in accordance with generally accepted actuarial principles and practices. Upon receipt of the report, the District should notify us if you disagree with any information contained in the report or if you are aware of any information that would affect the results that has not been communicated to us. The report will be deemed final and acceptable to the District unless the District promptly notifies us otherwise.

The District is responsible for selecting the funding policy, actuarial assumptions, and methods used to calculate the Actuarially Determined Contribution and other results in this report. With the exception of the COLA assumption, we believe that these assumptions are reasonable estimates of future plan experience, both individually and in the aggregate. The District assumes no long-term COLAs because these are not automatically granted. However, we believe the District's policy of consistently granting retiree COLAs suggests they are substantively automatic and should be reflected in the actuarial calculations.

All results in this report have been prepared based on our understanding of the District's pension funding policy and the Plan's benefit provisions. Additional contributions to the Plan may be required if actual plan economic and demographic experience do not match actuarial assumptions, or if contributions to the Plan are less than expected.

The undersigned credentialed actuaries are members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein. We are available to answer questions on the material contained in the report or to provide explanations or further detail, as may be appropriate. We are not aware of any direct or material indirect financial interest or relationship that could create a conflict of interest or impair the objectivity of the work.

Respectfully submitted,

Mark W. Schulte, FSA, EA, MAAA
Consulting Actuary

James A. van Iwaarden, FSA, EA, MAAA
Consulting Actuary

L/D/C/R: 4/st/gg/ms/jvi
December 20, 2017

Summary of Results

	June 30, 2017	June 30, 2016[1]
A. Plan participant data (see page 15)		
1. Number of participants		
a. Active employees	288	291
b. Vested terminated and reciprocals	91	90
c. Retirees and beneficiaries	363	336
d. Total	742	717
e. Projected payroll for contribution year	$ 30,331,660	$ 29,312,000
B. Benefit liabilities (see page 9)		
1. Present value of projected benefits	$ 248,267,503	$ 235,134,000
2. Actuarial accrued liability	203,469,801	191,580,000
C. Value of plan assets (see pages 5 and 7)		
1. Market value of assets	177,228,515	159,022,000
2. Investment return (market value)	12.1%	2.1%
3. Actuarial value of assets	176,126,394	164,392,000
D. Funded status - market value basis		
1. Unfunded actuarial accrued liability (B.2. - C.1.)	$ 26,241,286	$ 32,558,000
2. Funded status (C.1./B.2.)	87.1%	83.0%
E. Funded status - actuarial value basis		
1. Unfunded actuarial accrued liability (B.2. - C.3.)	$ 27,343,407	$ 27,188,000
2. Funded status (C.3./B.2.)	86.6%	85.8%
F. Actuarially Determined Contribution (ADC, see page 11)	2018	2017
1. Total normal cost (% of payroll)	16.77%	17.32%
2. Employee normal cost	8.28%	8.38%
3. District normal cost (1. - 2.)	8.49%	8.94%
4. Amortization of unfunded liability[2]	13.12%	13.55%
5. Preliminary total employer ADC (3. + 4.)	21.61%	22.49%
6. Effect of COLA[3]	0.80%	0.89%
7. Total employer ADC with COLA adjustment (5. + 6.)	22.41%	23.38%

[1] All June 30, 2016 valuation results shown in this report were calculated by the prior actuary.

[2] Includes minor adjustment for 2017 to account for difference between 2017 funding report and COLA letter dated 12/1/2016.

[3] The 2017 COLA was 2.2%. The COLA for 2018 is 2.0%.

Funded Status and Contribution Rate History

(amounts in $000s)[1]

Actuarial Valuation Date (6/30)	Actuarial Value of Assets	Actuarial Accrued Liability (AAL)	Unfunded AAL (UAAL)	Funded Ratio	Covered Payroll[2]	UAAL as a Percentage of Covered Payroll	Pre-COLA District Contribution Rate	District Contribution Rate w/ COLA
1997	$34,217	$38,281	$4,064	89.4%	$15,822	25.7%	N/A	N/A
1998	40,184	42,511	2,327	94.5%	17,190	13.5%	N/A	N/A
1999	46,725	46,197	(528)	101.1%	17,462	-3.0%	N/A	N/A
2000	53,495	50,773	(2,722)	105.4%	18,348	-14.8%	N/A	N/A
2001	59,537	56,002	(3,535)	106.3%	19,438	-18.2%	N/A	N/A
2002	62,724	62,183	(541)	100.9%	20,777	-2.6%	N/A	N/A
2003	72,447	71,628	(819)	101.1%	21,308	-3.8%	N/A	N/A
2004	75,560	77,667	2,107	97.3%	21,651	9.7%	N/A	N/A
2005	78,950	83,194	4,244	94.9%	22,160	19.2%	7.02%	N/A
2006	83,533	88,926	5,393	93.9%	23,034	23.4%	7.56%	N/A
2007	93,937	95,166	1,229	98.7%	22,991	5.3%	6.24%	N/A
2008	101,765	103,699	1,934	98.1%	24,578	7.9%	7.27%	N/A
2009	102,581	105,933	3,352	96.8%	26,049	12.9%	8.52%	N/A
2010	102,277	113,841	11,564	89.8%	26,769	43.2%	19.68%	N/A
2011	105,068	122,542	17,474	85.7%	27,893	62.6%	21.84%	N/A
2012	104,867	138,161	33,294	75.9%	27,604	120.6%	19.11%	N/A
2013	126,095	152,849	26,754	82.5%	27,375	97.7%	21.23%	21.54%
2014	140,843	164,326	23,483	85.7%	27,179	86.4%	19.67%	20.41%
2015	154,251	176,013	21,762	87.6%	27,700	78.6%	19.48%	20.15%
2016[3]	164,392	191,580	27,188	85.8%	28,847	94.2%	22.49%	23.38%
2017	176,126	203,470	27,343	86.6%	29,850	91.6%	21.61%	22.41%

1 Amounts may not add due to rounding

2 Projected compensation for year beginning on valuation date, with PEPRA compensation limited to statutory amount

3 Includes minor adjustment for 2017 to account for difference between 2017 funding report and COLA letter dated 12/1/2016.

Reconciliation of Market Value of Assets

	Trust Year Ending June 30, 2017	Trust Year Ending June 30, 2016
A. Market value of assets at beginning of year[1]	$ 159,021,973	$ 155,601,000
B. Contributions		
1. Employer[2]	7,475,193	7,554,000
2. Employee[3]	2,455,448	2,290,000
3. Total	9,930,641	9,844,000
C. Investment earnings		
1. Gross investment earnings	19,653,916	3,748,000
2. Investment expenses	(399,889)	(546,000)
3. Net investment earnings	19,254,027	3,202,000
D. Benefit payments	(10,978,126)	(9,625,000)
E. Administrative expenses	-	-
F. Market value of assets at end of year (A. + B. + C.3. + D. + E.)	**177,228,515**	**159,022,000**
G. Asset return since prior valuation	12.1%	2.1%

[1] Market value of assets at beginning and end of year are adjusted for contributions made during first month of fiscal year but attributable to final pay period of prior fiscal year ($304,775 at beginning of year and $340,445 at end of year).

[2] Includes employer reimbursement to trust for quarterly investment management fees ($546,000 in FY2016 and $399,889 in FY2017).

[3] Includes amounts paid by District and credited to member accounts ($478,000 in FY2016 and $426,625 in FY2017) and employee service purchases of $179,044 in FY2017.

Asset Allocation - Market Value of Assets

The June 30, 2017 trust asset allocation is provided by the Contra Costa Water District. Details are shown below.

	Market Value	Percentage
Cash & Cash Equivalents	$ 3,564,710	2.0%
Investments		
Mutual funds - equities	10,789,969	6.1%
Mutual funds - corporate bonds	18,602,809	10.5%
Collective funds - equities	97,965,921	55.3%
Collective funds - fixed income	37,234,387	21.0%
Mutual funds - REITs	8,730,274	4.9%
Total investments	173,323,360	97.8%
Total Cash & Investments	176,888,070	99.8%
Receivables		
Accrued Income	-	0.0%
Contribution due from District[1]	269,102	0.2%
Contribution due from participants	71,343	0.0%
Total receivables	340,445	0.2%
Total Assets	177,228,515	100.0%

Target Asset Allocation

The Board Directors of Contra Costa Water District last revised the asset allocation in September 2015, as shown below.

	Low	**Normal**	**High**
Domestic equity	29%	45%	61%
International equity	11%	15%	19%
Domestic fixed income	25%	30%	35%
International fixed income	3%	5%	7%
Real Estate	3%	5%	8%

[1] Includes employer-paid employee contributions (i.e. "pick-up" contributions)

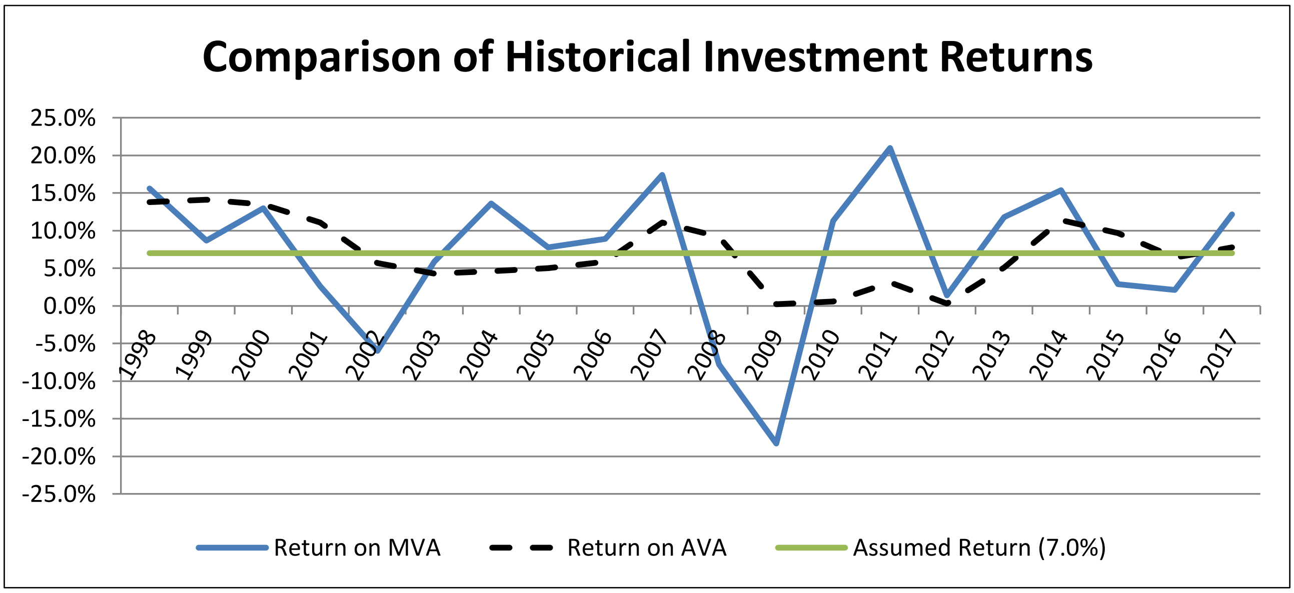
Actuarial Value of Assets

	Trust Year Ending June 30, 2017	Trust Year Ending June 30, 2016
A. Market value of assets (MVA)		
1. Market value of assets at beginning of year	$ 159,021,973	$ 155,601,000
i. Contributions (employee + employer)	9,930,641	9,844,000
ii. Expected earnings	11,094,876	11,289,000
iii. Benefit payments	(10,978,126)	(9,625,000)
2. Expected market value at end of year	169,069,364	167,109,000
3. Actual market value at end of year	177,228,515	159,022,000
4. Difference between actual MVA & expected MVA	(8,159,151)	8,087,000
B. Asset (gains) and losses[1]		
1. Year ending June 30, 2017, June 30, 2016		
i. Variance from expected return: loss or (gain)	(8,159,151)	8,087,000
ii. Portion not yet recognized	80%	80%
iii. Investment return not yet recognized (i. x ii.)	(6,527,321)	6,470,000
2. Year ending June 30, 2016, June 30, 2015		
i. Variance from expected return: loss or (gain)	8,087,000	6,612,000
ii. Portion not yet recognized	60%	60%
iii. Investment return not yet recognized (i. x ii.)	4,852,200	3,968,000
3. Year ending June 30, 2015, June 30, 2014		
i. Variance from expected return: loss or (gain)	6,612,000	(10,359,000)
ii. Portion not yet recognized	40%	40%
iii. Investment return not yet recognized (i. x ii.)	2,644,800	(4,144,000)
4. Year ending June 30, 2014, June 30, 2013		
i. Variance from expected return: loss or (gain)	(10,359,000)	(4,618,000)
ii. Portion not yet recognized	20%	20%
iii. Investment return not yet recognized (i. x ii.)	(2,071,800)	(924,000)
5. Total return not yet recognized (1.iii. + 2.iii. + 3.iii. + 4.iii.)	(1,102,121)	5,370,000
C. Actuarial Value of Assets (A.3. + B.5.)	176,126,394	164,392,000

[1] The Actuarial Value of Assets is equal to the Market Value of Assets with a five year smoothing of gains and losses. This method is intended to reduce contribution rate volatility resulting from investment return fluctuations.

Historical Asset Return Information

Year Ended	CPI-W Increase[1]	Rate of Return on Market Value	Rate of Return on Actuarial Value
June 30, 1998	3.0%	15.6%	13.8%
June 30, 1999	4.1%	8.7%	14.1%
June 30, 2000	4.1%	13.0%	13.5%
June 30, 2001	6.7%	2.6%	11.1%
June 30, 2002	1.2%	-6.0%	5.7%
June 30, 2003	1.6%	5.9%	4.3%
June 30, 2004	1.7%	13.6%	4.6%
June 30, 2005	1.1%	7.8%	5.0%
June 30, 2006	3.9%	8.9%	5.9%
June 30, 2007	3.0%	17.4%	11.1%
June 30, 2008	4.7%	-7.8%	9.2%
June 30, 2009	-0.2%	-18.3%	0.2%
June 30, 2010	1.4%	11.3%	0.6%
June 30, 2011	2.9%	21.0%	3.1%
June 30, 2012	2.7%	1.4%	0.3%
June 30, 2013	2.6%	11.8%	5.1%
June 30, 2014	2.9%	15.4%	11.4%
June 30, 2015	1.9%	2.9%	9.7%
June 30, 2016	2.5%	2.1%	6.4%
June 30, 2017	3.3%	12.1%	7.8%
20-year compound average	2.7%	6.5%	7.1%



[1] Increase of Consumer Price Index for Urban Wage Earners and Clerical Workers (CPI-W), San Francisco-Oakland-San Jose, for 12 month period ending June 30.

Summary of Liabilities Used to Determine Contributions

	June 30, 2017	June 30, 2016
A. Actuarial present value of projected benefits[1]		
1. Active employees	$ 113,459,352	$ 115,089,000
2. Vested terminated employees and reciprocals	9,045,388	10,424,000
3. Service retirees	117,936,681	102,640,000
4. Disabled participants	515,668	509,000
5. Beneficiaries	7,310,414	6,472,000
6. Total	248,267,503	235,134,000
B. Actuarial accrued liability[2]		
1. Active employees	68,661,650	71,535,000
2. Vested terminated employees and reciprocals	9,045,388	10,424,000
3. Service retirees	117,936,681	102,640,000
4. Disabled participants	515,668	509,000
5. Beneficiaries	7,310,414	6,472,000
6. Total	203,469,801	191,580,000
C. Normal cost[3]		
1. Total normal cost	4,838,280	5,078,000
2. Employee normal cost	2,389,787	2,455,000
3. Net employer normal cost (1. - 2.)	2,448,493	2,623,000
D. Key economic assumptions		
1. Funding interest rate	7.00%	7.00%
2. Salary increases	See page 23	See page 23
3. Postretirement COLA[4]	2.0% in 2018	N/A

[1] The value of all future benefits to be paid to the current group of members

[2] The cost allocated to all prior years

[3] The cost allocated to the current year. The June 30, 2016 amounts shown are adjusted to the beginning of contribution year. The June 30, 2017 normal cost is unadjusted.

[4] Assumed annual Cost of Living Adjustment (COLA) applied to each retiree's pension benefit. The District assumes no long-term COLAs because they are not automatic. Future emerging COLAs create actuarial losses that are amortized over time.

Amortization Schedule

Amortization Base	Year Established	Original Amount	Remaining Amortization Period	Outstanding Balance on June 30, 2017	Annual Contribution for 2018
UAAL Base	2004	$ 2,107,000	2	$ 409,650	$ 226,574
UAAL Base	2005	2,157,000	3	670,550	255,514
UAAL Base	2006	1,223,000	4	516,820	152,580
UAAL Base	2007	(4,019,000)	5	(2,095,520)	(511,078)
UAAL Base	2008	889,000	6	537,560	112,778
UAAL Base	2009	1,657,000	7	1,101,470	204,381
UAAL Base	2010	8,504,000	8	6,074,960	1,017,360
UAAL Base	2011	6,369,000	9	4,828,350	741,086
UAAL Base	2012	16,207,000	10	12,882,780	1,834,218
UAAL Base	2013	(5,815,000)	11	(4,803,160)	(640,535)
2014 COLA	2013	759,000	11	603,800	80,521
UAAL Base	2014	(2,546,000)	12	(2,192,490)	(276,039)
2015 COLA	2014	1,826,000	12	1,594,460	200,746
UAAL Base	2015	(1,947,000)	13	(1,787,970)	(213,932)
2016 COLA	2015	1,682,000	13	1,544,120	184,755
UAAL Base	2016	5,450,000	14	5,233,500	598,424
2017 COLA	2016	2,374,000	14	2,279,528	260,652
UAAL Base[1]	2017	(2,259,672)	15	(2,259,672)	(248,100)
2018 COLA	2017	2,204,671	15	2,204,671	242,061
Total				**27,343,407**	**4,221,966**

[1] Includes adjustment for prior rounding of earlier amortization bases.

Actuarially Determined Contribution

	Contribution Year 2018	2017
A. Actuarially Determined Contribution (ADC)[1]		
1. Total normal cost[2]	$ 5,085,433	$ 5,078,000
2. Employee normal cost	2,511,864	2,455,000
3. Employer normal cost (1. - 2.)	2,573,569	2,623,000
4. Amortization of unfunded liability[3]	3,979,905	3,968,000
5. Preliminary total employer ADC (3. + 4.)	**6,553,474**	**6,591,000**
6. Effect of COLA	242,061	246,000
7. Total employer ADC with COLA	**6,795,535**	**6,837,000**
B. Projected payroll for contribution year[4]	30,331,660	29,312,000
C. ADC as a percent of payroll		
1. Total normal cost	16.77%	17.32%
2. Employee normal cost	8.28%	8.38%
3. Employer normal cost[5] (1. - 2.)	8.49%	8.94%
4. Amortization of unfunded liability[6]	13.12%	13.55%
5. Preliminary total employer ADC (3. + 4.)	**21.61%**	**22.49%**
6. Effect of COLA[7]	0.80%	0.89%
7. Total employer ADC with COLA adjustment (5. + 6.)	**22.41%**	**23.38%**

2018 Employer Contribution Rates by Bargaining Unit[5]

	Clerical/ Maintenance	Professional/ Supervisory	Unrepresented	Confidential	Directors	Total
1. Normal cost	8.12%	7.80%	11.54%	10.22%	6.25%	8.49%
2. UAAL Amortization[8]	13.09%	13.47%	18.19%	15.67%	7.19%	13.92%
3. Total rate	21.21%	21.27%	29.73%	25.89%	13.44%	22.41%
4. Projected payroll ($000s)	$ 14,952	$ 10,717	$ 3,766	$ 836	$ 61	$ 30,332
5. Annual amount ($000s)	3,171	2,280	1,120	216	8	6,794

[1] The Actuarially Determined Contribution (ADC) is defined as "A target or recommended contribution to a defined benefit pension plan for the reporting period, determined in conformity with the Actuarial Standards of Practice based on the most recent measurement available when the contribution for the reporting period was adopted."

[2] The cost allocated to the contribution year. The amounts shown are adjusted to the beginning of the contribution year with interest and payroll growth.

[3] Excludes effect of annual ad-hoc COLAs

[4] Adjusted to beginning of contribution year with payroll growth

[5] Does not include contributions made by the District and credited to the employee accounts.

[6] Includes minor adjustment for 2017 to account for difference between 2017 funding report and COLA letter dated 12/1/2016.

[7] The 2017 COLA was 2.2%. The COLA for 2018 is 2.0%.

[8] Includes effect of expected 2018 COLA

Analysis of Contribution Rate Changes

	Actuarial Accrued Liability	Actuarial Value of Assets	Unfunded Accrued Liability	Contribution Rate Increase/ (Decrease)
A. June 30, 2016 actual value	$ 191,580,000	$ (164,392,000)	$ 27,188,000	22.49%
B. 2017 retiree COLA	2,374,000	-	2,374,000	0.89%
C. June 30, 2017 expected value	201,505,588	(174,107,180)	27,398,408	23.38%
1. Demographic (gain)/loss[1]	779,969	-	779,969	-0.68%
2. Assumption changes	(1,020,427)	-	(1,020,427)	-0.36%
3. Contribution more than expected	-	(643,914)	(643,914)	-0.23%
4. Investment (gain)/loss	-	(1,375,300)	(1,375,300)	-0.50%
5. 2018 retiree COLA	2,204,671	-	2,204,671	0.80%
D. Total change	1,964,213	(2,019,214)	(55,001)	-0.97%
E. June 30, 2017 actual value	$ 203,469,801	$ (176,126,394)	$ 27,343,407	22.41%

[1] Liability loss was more than offset by lower-than-expected normal cost, so the net contribution rate decreased.

PEPRA Contribution Rates

The District's policy for determining the PEPRA contribution rate is:

1. Until the number of actual PEPRA participants is ½ of the number in the initial study group, use the normal cost rate based on the study group.
2. When the number of actual PEPRA participants is ½ of the number in the initial study group, determine the employee normal cost rate as ½ of the rate for the study group and ½ of the rate for the actual PEPRA participants.
3. When the number of actual PEPRA participants equals or exceeds the number in the initial study group, determine the employee normal cost rate as the rate for the actual PEPRA participants.

Below is a comparison of the PEPRA participant counts for the current valuation

• Number of participants in initial PEPRA study group established in 2014	57
• Number of actual PEPRA participants as of June 30, 2017	76

Because the number of actual PEPRA participants exceeds the number in the original 2014 study, the employee normal cost rate for PEPRA participants will now be based solely on results for those participants.

Development of 2018 PEPRA employee normal cost rate

PEPRA employees must contribute at least half of the total normal cost rate, rounded to the nearest 0.25%. Rates are calculated annually but only adjusted if the total normal cost rate has increased or decreased by at least 1% since the date of the last rate change.

	Total Normal Cost Rate	Half of Total Rate	Employee Normal Cost Rate[2]
1. 2014 PEPRA normal cost rate (first established)	12.81%	6.41%	6.50%
2. 2015 PEPRA normal cost rate (current basis)[1]	11.54%	5.77%	5.75%
3. 2016 PEPRA normal cost rate	11.58%	5.79%	5.75%
4. 2017 PEPRA normal cost rate	11.90%	5.95%	5.75%
5. 2018 PEPRA normal cost rate	12.33%	6.17%	5.75%

The above rates should be applied to salary below the PEPRA compensation limit.

Since the 2018 PEPRA total normal cost rate of 12.33% is not more than 1% different from the current basis of 11.54% (the last adjustment to the employee normal cost rate), the employee normal cost rate remains unchanged at 5.75% for 2018.

[1] Year of most recent adjustment to employee normal cost rate

[2] PEPRA employee normal cost rate is adjusted when total normal cost rate changes by at least 1% from the amount used as the current PEPRA normal cost basis.

Risk Measures

The items below provide pension risk measurements for the Contra Costa Water District Retirement Plan. Evolving pension practice encourages review of these risks on a regular basis to help employers better manage their plans.

	June 30, 2017	June 30, 2016
A. Payroll for year following valuation date	$ 29,850,468	$ 28,847,000
B. Risk measures - market value of assets		
1. Actuarial accrued liability	$ 203,469,801	$ 191,580,000
2. Market value of assets	177,228,515	159,022,000
3. Unfunded AAL (MVA basis)	26,241,286	32,558,000
4. Funded ratio (2./1.)	87.1%	83.0%
5. UAAL (MVA basis) as a percent of payroll (3./A.)	87.9%	112.9%
C. Risk measures - actuarial value of assets		
1. Actuarial accrued liability	$ 203,469,801	$ 191,580,000
2. Market value of assets	176,126,394	164,392,000
3. Unfunded AAL (MVA basis)	27,343,407	27,188,000
4. Funded ratio (2./1.)	86.6%	85.8%
5. UAAL (MVA basis) as a percent of payroll (3./A.)	91.6%	94.2%
D. Volatility ratios		
1. Liability volatility ratio (B.1./A.)	6.8	6.6
2. Asset volatility ratio (B.2./A.)	5.9	5.5
E. Maturity ratios		
1. Participant maturity ratio (# retirees/total participants)	48.9%	46.9%
2. Liability maturity ratio (retiree AAL/total AAL)	61.8%	57.2%

Summary of Membership Data

	June 30, 2017	June 30, 2016
A. Active employees		
1. Number	288	291
2. Average age	46.3	47.0
3. Average years of service	10.0	10.9
4. Total salary[1]	$ 29,850,468	$ 28,847,000
5. Average salary	103,647	99,131
B. Vested terminated and reciprocals		
1. Number	91	90
2. Average age	49.3	49.6
C. Retirees and beneficiaries		
1. Number		
a. Retired	311	286
b. Disabled	4	4
c. Beneficiaries	48	46
d. Total	363	336
2. Average age	67.8	67.9
4. Average monthly benefit	$ 2,611	$ 2,507
D. Total number of participants (A.1. + B.1. + C.1.)	742	717

[1] Projected compensation for year beginning on valuation date, with PEPRA compensation limited to statutory amount.

Summary of Membership Changes

	Actives	Vested Terminated	Retirees	Disabled	Beneficiaries	Total
A. Number of members on June 30, 2016	291	90	286	4	46	717
B. Changes in membership						
1. New entrants	31					31
2. Retirements	(26)	(6)	32			0
3. Vested terminations (deferred benefits)	(8)	8				0
4. Termination/refund of contributions		(2)				(2)
5. Deaths (no beneficiary)			(5)			(5)
6. Deaths (with beneficiary)			(2)		2	0
7. Data corrections		1				1
8. Rehires						0
9. QDRO						0
10. Total changes	(3)	1	25	0	2	25
C. Number of members on June 30, 2017	288	91	311	4	48	742

Age and Service Distribution of Active Members

Attained Age	Benefit Service										
	Under 1	1 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 plus	Total
Under 25	1	2									3
25 - 29	7	11									18
30 - 34	3	18	4	1							26
35 - 39	4	13	9	5	3						34
40 - 44	7	9	12	12	7						47
45 - 49	4	10	9	9	7	2	1				42
50 - 54	3	10	8	8	9	6	8	2			54
55 - 59	1	4	10	11	8	3	7	3	1		48
60 - 64	1	3	2	2	3	1	1				13
65 - 69					1						1
70 plus				1						1	2
Total	31	80	54	49	38	12	17	5	1	1	288

Age Distribution of Inactive Members

Age	Vested Terminated	Retired	Disabled	Beneficiary	Total
Under 50	45	0	0	2	47
50 - 54	26	13	1	0	40
55 - 59	14	44	0	4	62
60 - 64	6	76	1	7	90
65 - 69	0	73	1	5	79
70 - 74	0	57	1	11	69
75 - 79	0	27	0	6	33
80 - 84	0	13	0	4	17
85 - 89	0	3	0	6	9
90 - 94	0	3	0	3	6
95 - 99	0	2	0	0	2
100 & over	0	0	0	0	0
Total	91	311	4	48	454

Summary of Plan Provisions

A. Plan Effective Date

Originally established effective February 17, 1962. The plan is typically amended annually for ad hoc COLA increases granted by the board.

B. Plan Year

July 1 to June 30.

C. Participation

All permanent full-time employees, all project employees, and all directors of the District.

D. Eligibility to Retire

Meet vesting requirements and:

	Classic Members	PEPRA Members
Clerical, Maintenance, Confidential, Professional/Supervisory, and Unrepresented	Age 50	Age 52
Directors	Age 55	Age 52

E. Vesting

100% vested upon first attaining one of the following:

	Classic Members	PEPRA Members
Years of service		
Clerical, Maintenance, and Directors	10 years	5 years
Confidential, Professional/Supervisory, and Unrepresented	5 years	5 years
Normal retirement age	Age 62	None
Disability	Immediate	Immediate

Vesting service includes reciprocal service.

F. Final Average Compensation

Basic Compensation: Regular salary excluding overtime, shift premium, and all other irregular compensation.

Classic Members:

- Non-directors – Highest 12 consecutive months
- Directors – Highest 36 consecutive months during the last 5 years

PEPRA Members:

- Highest 36 consecutive months up to PEPRA compensation limit ($118,775 in 2017).

Summary of Plan Provisions (continued)

G. Service Retirement Benefit

Benefit factor x Final Average Compensation

Classic Members:

- Non-directors benefit factor = 2.35% at 55
- Directors benefit factor = 2.35% at 62

PEPRA Members: benefit factor = 2.00% at age 62

Inactive Participants: Benefit factor varies by bargaining groups and separation dates

Sample benefit factors are shown below:

	Age at Retirement = 55			Age at Retirement = 62		
Years of Service	2.35% at 55	2.35% at 62	2.00% at 62	2.35% at 55	2.35% at 62	2.00% at 62
10	23.50%	11.02%	13.00%	26.58%	23.50%	20.00%
15	35.25%	16.53%	19.50%	39.87%	32.25%	30.00%
20	47.00%	22.04%	26.00%	53.16%	47.00%	40.00%
25	58.75%	27.55%	32.50%	66.45%	58.75%	50.00%
30	70.50%	33.06%	39.00%	79.74%	70.50%	60.00%
35	82.25%	N/A	45.50%	93.02%	82.25%	70.00%

H. Termination Benefit

Non-vested: Return of contributions plus interest in a lump sum

Vested: Return of contributions plus interest in a lump sum, or a deferred benefit

I. Disability Benefit

Clerical and Maintenance with 10 years of service and Social Security disability:

- 30% of current Basic Compensation
- Not less than service retirement benefit

Others:

- 100% vested immediately
- Return of contributions plus interest in a lump sum, or a deferred benefit

J. Death Benefit - Before Retirement

Non-vested: Return of contributions plus interest in a lump sum

Vested:

- Non-directors – 85% of member’s accrued service retirement benefit
- Directors – 50% of benefit that would have been paid under the 50% J&S option, upon retirement at the later of age 55 and death, and commencing no earlier than age 55

K. Death Benefit - After Retirement

Return of contributions plus interest less any monthly payments previously received by retiree. Remaining contribution balance is paid to a designated beneficiary if joint annuitant option not in effect.

Summary of Plan Provisions (continued)

L. Benefit Forms

Normal form of payment: Single life annuity.

Optional forms of payment (actuarial equivalent):
- Joint and survivor annuity
- Joint and survivor annuity with "pop-up"

M. Cost of Living Increases

Ad Hoc increases granted by the Board.
Recent history:

January 1st	Increase	January 1st	Increase
2007	1.8%	2013	1.8%
2008	3.0%	2014	1.2%
2009	2.0%	2015	2.2%
2010	0.0%	2016	1.8%
2011	0.0%	2017	2.2%
2012	1.8%	2018	2.0%

N. Employee Contributions

Classic Members (% of Basic Compensation):

	Employee	Paid[1]	
Group	Paid	Paid[1]	Total
Professional/Supervisory	6.43%	3.00%	9.43%
Confidential	6.28%	3.00%	9.28%
Unrepresented:			
< 7 years of service	5.00%	1.00%	6.00%
7 to 9 years of service	4.00%	2.00%	6.00%
≥ 10 years of service	3.00%	3.00%	6.00%
Clerical and Maintenance	8.00%	1.00%	9.00%
Directors	1.00%	0.00%	1.00%

PEPRA Members: 50% of the normal cost rate of the Plan, rounded to the nearest quarter of 1%. The contribution rate is applied to pay up to each year's PEPRA compensation limit.

O. Changes since prior year

None.

[1] The District-paid employee contributions are also known as "pick-up" contributions.

Actuarial Methods

A. Actuarial Cost Method

The Entry Age Normal level percent of pay cost method. Under this method, the normal cost for an individual participant is the level percentage of pay required to accumulate the funds needed to pay the participant's projected benefits by their assumed retirement age, beginning on the date of entry and ending at the last age before 100% retirement. The actuarial accrued liability is the accumulated value of these annual normal costs on a given date. The plan's normal cost and accrued liability are the total of these values for all participants.

B. Funding Policy

Each year, unexpected changes in the unfunded actuarial accrued liability are amortized as a level dollar amount over a closed 15-year period beginning on the January 1st following the valuation date. These changes may be due to actuarial gains and losses, assumption changes, or plan changes.

Any ad-hoc cost of living adjustments (COLAs) are separately amortized and funded as employer-paid contributions over a closed 15-year period beginning on the January 1st when the COLA is first effective.

Contribution rates determined in this report are for the calendar year following the valuation date, and are assumed to be applied to the payroll for each pay period during the contribution year.

C. Data Methods

The Contra Costa Water District supplied data for all participants and asset information for the years ending June 30, 2016 and June 30, 2017. We have relied on this data in preparing this report. The data was reviewed for reasonableness and consistency, but we have not performed a complete audit.

D. Asset Method

The Actuarial Value of Assets is equal to the Market Value of Assets with a 5-year smoothing of gains and losses.

E. Change in Actuarial Methods

None

Actuarial Assumptions

A. Economic Assumptions

Valuation Date	June 30, 2017	June 30, 2016
Discount Rate	7.00%	7.00%
General Inflation (CPI-U)[1]	2.75%	3.00%
Wage Inflation (CPI-W)	3.00%	3.00%
Payroll Growth[2]	3.25%	3.25%
Future COLAs	2.0% in 2018	None assumed

Salary Scale

3.00% wage inflation plus pay increase based on years of District service, employment group, and entry age with the District. Sample rates:

			Other (Entry Age)	
Service	Clerical	Directors	< 40	> 40
2	3.75%	0.00%	5.25%	2.75%
7	1.00%	0.00%	2.25%	0.75%
12	1.00%	0.00%	1.75%	0.75%
17	0.75%	0.00%	0.75%	0.75%

B. Demographic Assumptions

Mortality

Healthy post-retirement: Society of Actuaries base RP-2014 healthy, no-collar table (adjusted to 2006) with generational projection using scale MP-2016.

Disabled: Society of Actuaries base RP-2014 disabled retiree, no-collar table (adjusted to 2006) with generational projection using scale MP-2016.

Termination

Rates vary based on service and classification. Sample rates are:

Service	Clerical	Other
0	3.0%	10.0%
5	3.0%	5.0%
10	1.5%	5.0%
15	4.0%	0.0%
20	4.0%	0.0%
25	4.0%	0.0%
30+	0.0%	0.0%

[1] Applies to assumed future increases in compensation and benefit limits.

[2] Payroll growth assumption is used to project normal cost and employee payroll from valuation date to the contribution year.

Actuarial Assumptions (continued)

B. Demographic Assumptions (continued)

Disability

Rates based on age and gender. Sample rates are:

Age	Male	Female
40	0.06%	0.08%
45	0.10%	0.11%
50	0.11%	0.11%
55	0.11%	0.09%
60	0.11%	0.07%
65	0.11%	0.06%
70	0.09%	0.06%
75+	0.07%	0.06%

Retirement

Rates vary based on age, service, and benefit level. Sample rates are:

Age	Classic
50	5.0%
55	8.0%
60	20.0%
65	25.6%
70	41.6%
75+	100.0%

	PEPRA (Years of Service)					
Age	5	10	15	20	25	30
50	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
55	4.4%	5.6%	6.8%	8.0%	9.2%	10.4%
60	6.2%	7.8%	9.5%	11.2%	12.9%	14.6%
65	12.9%	16.4%	19.9%	23.4%	26.9%	30.4%
70	12.5%	16.0%	19.4%	22.8%	26.2%	29.6%
75+	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Percent married

Current retirees: actual spouse coverage.

Future retirees: 80% of employees are assumed to be married.

Spouse age

Based on actual spouse birth dates when available. Otherwise husbands are assumed to be three years older than wives.

Actuarial Assumptions (continued)

B. Demographic Assumptions (continued)

Assumed payment form	Single employees: 100% are assumed to elect a single life annuity upon retirement. Married employees: 25% are assumed to elect a single life annuity. The remainder are assumed to elect a joint & survivor benefit. 65% are assumed to elect a 100% joint & survivor and the remainder are assumed to elect a 50% joint & survivor.
Reciprocity and Terminations	50% of terminated vested members are assumed to be employed by reciprocal agencies and receive 3.25% annual pay increases until retirement. Terminated vested members are assumed to retire at age 60. Terminated vested members not meeting the early retirement service requirements are assumed to receive an immediate refund of contributions with interest.
Death Benefit - After Retirement	Total monthly payments received by retirees prior to death are assumed to exceed employee contributions with interest.

C. Changes Since Last Valuation

Since the last valuation the following changes have been made:

- The general inflation assumption was updated from 3.00% to 2.75% to reflect historical data and forward-looking market expectations.
- A 2.0% 2018 retiree Cost of Living Adjustment (COLA) assumption was added. No assumption regarding additional future COLAs is included in this report.
- The mortality assumption was updated to reflect the Society of Actuaries' MP-2016 mortality improvement scale.

Selection of Economic Assumptions

The Actuarial Standards Board (ASB) provides coordinated guidance for measuring pension and retiree group benefit obligations through a series of Actuarial Standards of Practice (ASOPs). ASOP No. 27, Selection of Economic Assumptions for Measuring Pension Obligations, requires that the actuary disclose the rationale used in selecting each non-prescribed economic assumption and any changes to non-prescribed economic assumptions.

The table below summarizes the rationale for selecting the non-prescribed economic assumptions. The rationale for assumption changes, along with a description of the assumptions themselves, is included in the Actuarial Assumption and Methods section of this report.

Economic Assumptions (non-prescribed)	
Assumption	Rationale for Selecting Assumption
Discount rate / investment return	Based on blend of expected asset class returns and current asset allocation.
General inflation (CPI-U)	Based on analysis of historical CPI-U inflation rates and the estimated forward-looking inflation rate implied by 30-Year Treasury rates vs. 30-Year TIPS rates.
Wage inflation (CPI-W)	Based on historical CPI-W rates for San Francisco, Oakland, San Jose area.
Payroll growth	Based on 20-year history of District's total payroll growth.
Cost-of-living increases	2018 COLA assumption was based on information provided by the District. The District assumes no long-term COLAs because they are not automatic. Future emerging COLAs create actuarial losses that are amortized over time.
Salary increases	Based on the District's 2009 - 2014 actuarial experience study

Selection of Non-Economic Assumptions

The Actuarial Standards Board (ASB) provides coordinated guidance for measuring pension and retiree group benefit obligations through a series of Actuarial Standards of Practice (ASOPs). ASOP No. 35, Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations, requires that the actuary disclosure the rationale used in selecting each non-prescribed non-economic assumption and any changes to the non-prescribed non-economic assumptions.

The table below summarizes the rationale for selecting the non-prescribed non-economic assumptions. The rationale for assumption changes, along with a description of the assumptions themselves, is included in the Actuarial Assumption and Methods section of the report.

Non-Economic Assumptions (non-prescribed)	
Assumption	Rationale for Selecting Assumption
Mortality	Based on most recently published table and workforce demographics
Retirement	Based on the District's 2009 - 2014 actuarial experience study
Termination of employment	Based on the District's 2009 - 2014 actuarial experience study
Disability	Based on the District's 2009 - 2014 actuarial experience study
Form of payment	Based on the District's 2009 - 2014 actuarial experience study
Percent married and spouse ages	Based on the District's 2009 - 2014 actuarial experience study
Reciprocity and terminations	Based on the District's 2009 - 2014 actuarial experience study