Projection of Replacement Reserves
Based on Fairlington Glen's 2018 Reserve Study

Purpose

This projection of Fairlington Glen's replacement reserves is a financial model, in Microsoft Excel, intended to estimate the effects of various assumptions on the association's eventual reserve balances, as well as its reserve funding ratio, over the next 20 years. It is also a stress test for the replacement reserves, intended to determine their adequacy throughout the period. However, it is not a forecast, as it relies on many assumptions that cannot be accurately estimated beyond a year or two, and it is biased by current economic conditions. The key assumptions, including inputs for reserve expenditures, inflation, interest rates, and the growth rates of operating expenses and reserve contributions, are all certain to change.

Inflation

Inflation is the most powerful assumption in the model, and all other growth rates are tied to it. The rate of inflation is assumed to be 2.8%, and it remains at that rate for all 20 years. For reference, CPI inflation from 1998 to 2018 averaged 2.2%. The Federal Reserve targets 2.0% inflation as its stated policy.

Inflation can be volatile, of course. There have been notable spikes in inflation, such as in the 1970s, when CPI inflation reached double digits. Over Fairlington Glen's history, 1974-2018, CPI inflation has averaged 3.8%, and prices have more than quintupled.

Expense Growth

The starting point for the projection is the 2018 audit. The 2020 proposed budget was available at the time of this writing, and key numbers are also taken from it. The association's expenses are divided into two categories: operating and reserves. The operating expenses are assumed to grow at the rate of inflation, 2.8%, from 2018 through 2039, whereas reserve expenditures follow the recommended amounts from the 2018 REI reserve study, adjusted for future inflation.

Reserve contributions are also assumed to grow at 2.8% annually from 2018 levels. In addition, reserve contributions are augmented by the interest income received on them because of the Glen's policy of reinvesting reserve interest income in reserves instead of spending it. Note that this projection assumes that the reserves pay all income taxes on the interest income they generate. The 2013 projection assumed that the operating budget would pay the taxes.

Interest Income

Interest rates have been at historic lows in recent years, below the rate of inflation, as the Federal Reserve has maintained a policy of low rates since the financial crisis of 2008. I assume here that interest rates will rise very gradually, eventually enabling Fairlington Glen to earn slightly higher yields on its certificates of deposit. Starting in 2020 at an overall interest rate of 1.36%, I increased the assumed rate of interest to 2.0% by 2026 and capped it at that level. I also assume that only replacement reserves not earmarked for reserve expenses in the current year will be earning interest; funds to be expended within a year are kept in cash for payments to contractors for the full year and earn no interest.

Funding Ratio

A key output of the projection is the funding ratio, which is the amount of replacement reserves divided by the accumulated depreciation of the association's common elements. The replacement reserves at year-end 2018 stood at $2,717,615. In the 2018 REI reserve study, the Glen's accumulated depreciation on reserve items was estimated at $8,242,927. Thus, the Glen's funding ratio was 33.0% at the end of 2018.

The Glen has made huge progress in its reserve funding since 2008, when the reserve ratio was at only 4.9%. This occurred even during heavy reserve spending because boards placed unwavering emphasis on building up reserves.

	2008	2013	2018
Reserve Ending Balance	352,593	1,313,539	2,717,615
Ending Reserve Full-Funding Amt	7,238,654	6,619,893	8,242,927
Reserve Funding Ratio	4.9%	19.8%	33.0%
Reserve Contribution Pct of Income	32.8%	36.9%	37.5%

In the reserve study accumulated depreciation is also referred to as the full-funding amount, because an association with reserves equal to its accumulated depreciation would have funds sufficient to replace all its worn-out assets. It would be fully funded, and its funding ratio would be 100%.

Each year, as the Glen's common elements physically wear out, accumulated depreciation grows directly as a result of decay. In addition, every year inflation raises the cost of replacing assets. Therefore, the model must account for two kinds of deterioration: the physical wear-and-tear on assets and the shrinking value of the dollars that measure accumulated depreciation (i.e., financial depreciation).

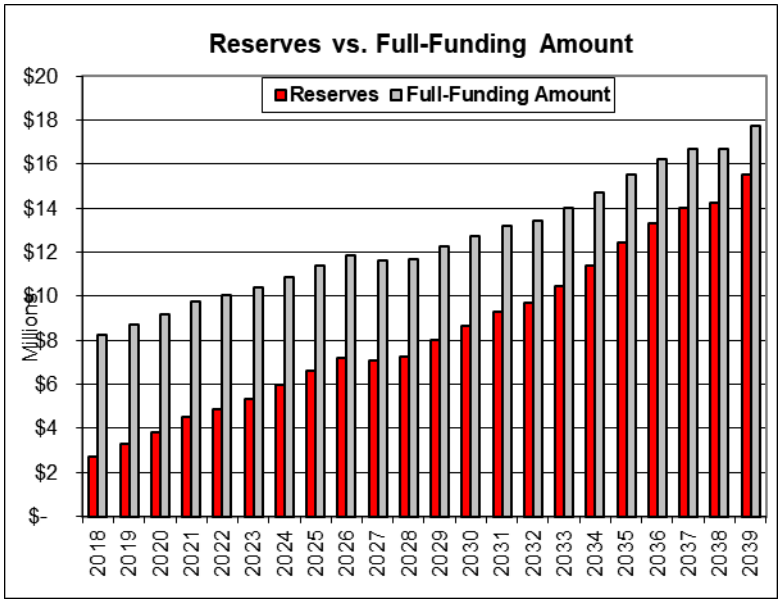
In 2018, the REI study estimated the value of a single year's physical wear and tear to be $317,701. The model increases this amount for inflation (compounding at 2.8%) each year thereafter. In addition, the Glen's previous accumulated depreciation is also increased by inflation. Offsetting these increases are annual expenditures from reserves, which reduce accumulated depreciation as

reserve dollars are spent to replace worn-out assets. Thus, we can calculate each year's accumulated depreciation with this formula:

Beginning-of-year accumulated depreciation
Plus that year's inflation-adjusted annual depreciation
Plus inflation adjustment for all prior years' accumulated depreciation
Minus annual reserve expenditures
Equals end-of-year accumulated depreciation

Meanwhile, the Glen's replacement reserves grow at a rate exceeding both the rate of depreciation and expenditure. Starting from a base of $631,955 in 2020 (the 2019 amount was frozen at that level in the 2020 proposed budget), reserve contributions grow at 2.8% annually, and also earn after-tax interest that is contributed back to the reserve balance. The combination of positive reserve growth net of spending plus interest on reserves causes reserves to build up steadily over time (Exhibit 2).

Exhibit 2

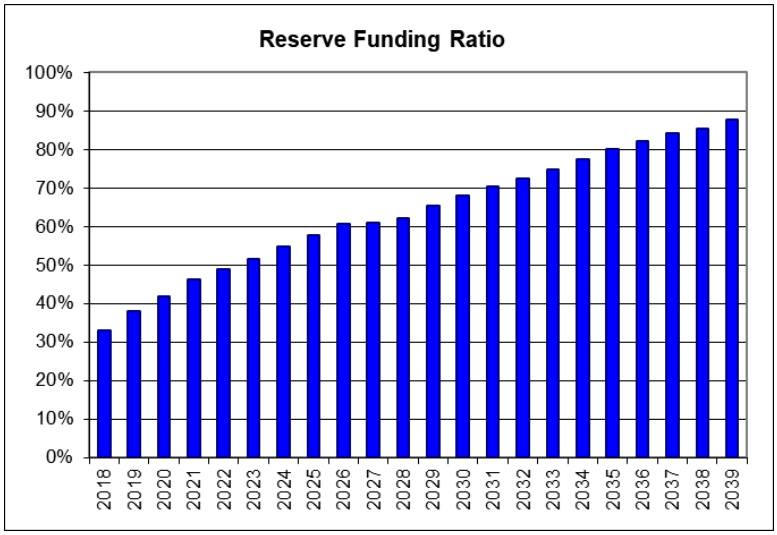


Thus, both accumulated depreciation and the replacement reserves grow steadily over time, but the reserves grow faster, causing the funding ratio to rise (Exhibit 3).

Under these assumptions, Fairlington Glen's funding ratio will rise from 33.0% in 2018 to 51.5% in 2023, 62.1% in 2028, and 85.4% by 2038. To determine when the Glen would reach a funding ratio of 100%, I extended the model several years beyond the end of the REI reserve study and assumed $400,000 in annual reserve expenditures in 2018 dollars from 2040. Under those assumptions, full funding is achieved in 2047.

Reserve expenditures vary from year to year, following REI's estimates. The funding ratio climbs steadily.

Exhibit 3

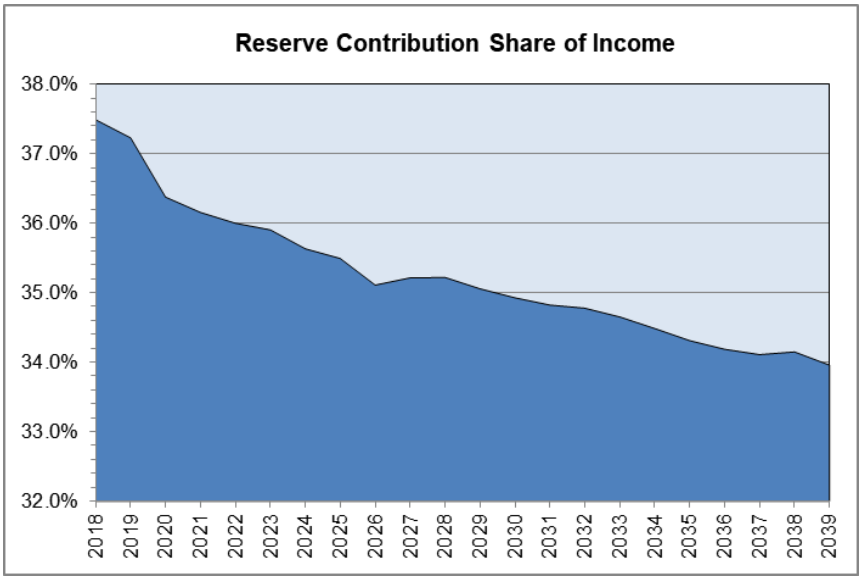


Condo Fees

In this model, condo fees are treated as a function of cost growth, and are simply an output of total costs. Since all input costs are tied to the assumed 2.8% inflation rate, condo fees increase at that rate. In actual practice, future inflation rates will vary each year and dictate the amount and volatility of condo fee increases that are necessary to keep pace with the Glen's rising costs.

In the projection, the percentage of condo fees consumed by reserve contributions will gradually decline from 37.2% in 2019 to 34.0% by 2039 (Exhibit 4). Both figures are well above the 20% of the total budget that went to reserve contributions in 2003, when the Board began to recognize the urgency of increasing reserves.

Exhibit 4



What-Ifs

I tested the impact of earning different interest rates than described above on both the funding ratio and condo fee increases. My finding is that reserve growth is not highly dependent on higher interest rates.

On the other hand, a spike in inflation could be very detrimental to the reserves. Higher inflation slows the rise of the funding ratio, because inflation increases accumulated depreciation. However, even at a high inflation rate, as long as the Board raises condo fees in line with inflation, the reserve funding ratio will continue to rise, albeit more slowly. For example, even at sustained 10% inflation for 20 years, with all parts of the budget rising at that same rate, the funding ratio would still be 34.6% in 2039.

The risk of that scenario is that the Board would be under intense co-owner pressure not to raise fees in line with inflation, and rising replacement costs would not be met with commensurate reserve increases. Then the funding ratio would collapse. For example, in the 10% inflation scenario, if reserves were increased by only 5% per year, the funding ratio would drop to 12.1% by 2039.

A more likely scenario is one in which inflation is moderate but the Board freezes reserve contributions indefinitely. If inflation were 2.8% and the reserve contribution rose 0% every year, the reserve ratio in 2039 would be 62.9% and plateau around that level before slowly declining. Full funding would never be reached.

Conclusions and Recommendations

The projection bears good news, with a caveat: Fairlington Glen's replacement reserves will be adequate to meet the future capital expenditures recommended by the 2018 REI reserve study, if future budgets (and condo fees) simply increase at about the rate of inflation. The current level of annual reserve contribution, if also increased at the rate of inflation, is already high enough to keep the reserve funding ratio rising steadily for several years.

The biggest risk to the Glen's financial position is not financial, but behavioral. Future boards will be tempted to suppress condo fees by underfunding the reserve contribution. A simple way to eliminate this risk would be to adopt a policy of inflation-adjusting the reserve contribution every year without exception, using the previous year's CPI.

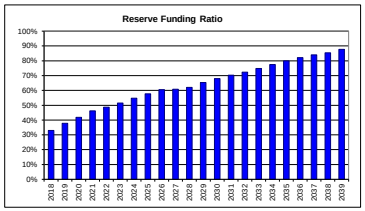
William Worsley
September 2019

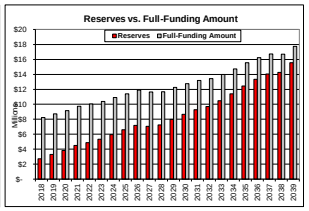
FAIRLINGTON GLEN
Long-Term Budget and Reserve Projection

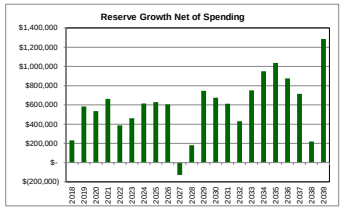
Growth Rates (inputs for all years)	
CPI Inflation	2.8%
Operating Expenses	2.8%
Reserve Expenses	From REI
Reserve Contributions	2.8%

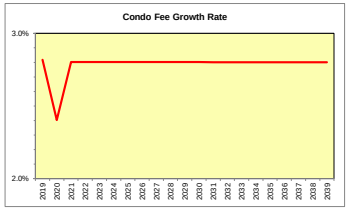
Reserve Funding Ratio (output)	
2018	33.0%
5 Years	51.5%
10 Years	62.1%
15 Years	74.8%
20 Years	85.4%

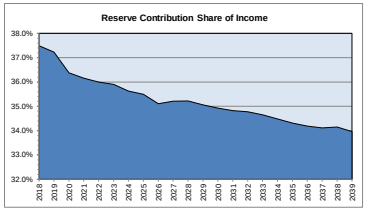
Blue indicates manual inputs











Year-by-year inputs	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
																							Extra Years Added to Analysis to Reach Full Funding							
Interest rate on Replacement Reserves	1.72%	1.56%	1.36%	1.50%	1.60%	1.60%	1.75%	1.75%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
Reserve Expenses (2018 dollars from REI)	(430,841)	(79,759)	(123,952)	(28,700)	(298,946)	(247,443)	(138,660)	(145,781)	(192,555)	(774,793)	(536,513)	(130,478)	(202,016)	(261,530)	(399,588)	(199,911)	(91,519)	(61,592)	(182,555)	(294,681)	(590,400)	(5,000)	(400,000)	(400,000)	(400,000)	(400,000)	(400,000)	(400,000)	(400,000)	(400,000)
Reserve Expenses (future dollars)	(430,841)	(81,992)	(130,990)	(31,179)	(333,861)	(284,080)	(163,648)	(176,869)	(240,159)	(993,399)	(707,150)	(176,792)	(281,386)	(374,483)	(588,188)	(302,506)	(142,364)	(98,493)	(300,103)	(497,991)	(1,025,672)	(8,929)	(734,359)	(754,921)	(776,059)	(797,789)	(820,127)	(843,090)	(866,697)	(890,964)

Output section	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Condo Fees	1,606,115	1,651,372	1,691,055	1,738,441	1,787,154	1,837,230	1,888,709	1,941,629	1,996,032	2,051,957	2,109,448	2,168,549	2,229,305	2,291,762	2,355,967	2,421,971	2,489,822	2,559,574	2,631,278	2,704,991	2,780,767	2,858,665	2,938,744	3,021,065	3,105,691	3,192,687	3,282,118	3,374,054	3,468,564	3,565,720
Other Income	44,907	46,155	46,254	58,397	67,978	74,960	92,035	102,545	128,316	125,371	128,523	142,761	155,574	167,181	175,163	189,465	207,688	227,584	244,283	257,823	261,574	286,286	297,460	308,999	320,911	333,209	345,905	359,009	372,536	386,496
Total Income	1,651,022	1,697,527	1,737,309	1,796,838	1,855,131	1,912,191	1,980,744	2,044,175	2,124,347	2,177,328	2,237,971	2,311,310	2,384,878	2,458,942	2,531,130	2,611,436	2,697,511	2,787,158	2,875,561	2,962,814	3,042,341	3,144,950	3,236,204	3,330,063	3,426,602	3,525,896	3,628,023	3,733,063	3,841,100	3,952,216
Operating Exp. (incl. contingency resv)	1,009,071	1,014,268	1,060,400	1,090,091	1,120,614	1,151,991	1,184,247	1,217,406	1,251,493	1,286,535	1,322,558	1,359,589	1,397,658	1,436,792	1,477,022	1,518,379	1,560,894	1,604,599	1,649,527	1,695,714	1,743,194	1,792,004	1,842,180	1,893,761	1,946,786	2,001,296	2,057,332	2,114,938	2,174,156	2,235,032
Replacement Reserve Interest Before Tax	42,767	42,400	44,954	57,097	66,678	73,660	90,735	101,245	127,016	124,071	127,223	141,461	154,274	165,881	173,863	188,165	206,388	226,284	242,983	256,523	260,274	284,986	296,160	307,699	319,611	331,909	344,605	357,709	371,236	385,196
Tax on Replacement Reserve Interest @ 21%	9,683	8,904	9,365	11,990	14,002	15,469	19,054	21,261	26,673	26,055	26,717	29,707	32,397	34,835	36,511	39,515	43,342	47,520	51,026	53,870	54,658	59,847	62,194	64,617	67,118	69,701	72,367	75,119	77,959	80,891
Replacement Reserve Contributions	618,957	631,955	631,955	649,650	667,840	686,539	705,763	725,524	745,839	766,722	788,190	810,260	832,947	856,269	880,245	904,892	930,229	956,275	983,051	1,010,576	1,038,872	1,067,961	1,097,864	1,128,604	1,160,205	1,192,691	1,226,086	1,260,416	1,295,708	1,331,988
Total Expenses	1,680,478	1,697,527	1,746,674	1,808,828	1,869,133	1,927,660	1,999,799	2,065,436	2,151,021	2,203,383	2,264,688	2,341,017	2,417,276	2,493,777	2,567,642	2,650,950	2,740,852	2,834,678	2,926,588	3,016,684	3,096,999	3,204,797	3,298,398	3,394,680	3,493,720	3,595,597	3,700,390	3,808,182	3,919,059	4,033,107
Total Expenses Less Tax on Reserve Interes	1,670,795	1,688,623	1,737,309	1,796,838	1,855,131	1,912,191	1,980,744	2,044,175	2,124,347	2,177,328	2,237,971	2,311,310	2,384,878	2,458,942	2,531,130	2,611,436	2,697,511	2,787,158	2,875,561	2,962,814	3,042,341	3,144,950	3,236,204	3,330,063	3,426,602	3,525,896	3,628,023	3,733,063	3,841,100	3,952,216
Reserve Beginning Balance	2,486,732	2,717,615	3,301,074	3,837,627	4,501,204	4,887,859	5,348,510	5,962,306	6,590,944	7,196,965	7,068,305	7,249,852	7,995,074	8,668,511	9,281,343	9,710,752	10,461,788	11,412,700	12,449,246	13,324,150	14,039,389	14,258,206	15,542,376	16,139,847	16,756,612	17,393,250	18,050,361	18,728,558	19,428,474	20,150,761
Reserve Expenses	(430,841)	(81,992)	(130,990)	(31,179)	(333,861)	(284,080)	(163,648)	(176,869)	(240,159)	(993,399)	(707,150)	(176,792)	(281,386)	(374,483)	(588,188)	(302,506)	(142,364)	(98,493)	(300,103)	(497,991)	(1,025,672)	(8,929)	(734,359)	(754,921)	(776,059)	(797,789)	(820,127)	(843,090)	(866,697)	(890,964)
Replacement Reserve Interest Before Tax	42,767	42,400	44,954	57,097	66,678	73,660	90,735	101,245	127,016	124,071	127,223	141,461	154,274	165,881	173,863	188,165	206,388	226,284	242,983	256,523	260,274	284,986	296,160	307,699	319,611	331,909	344,605	357,709	371,236	385,196
Tax on Replacement Reserve Interest @ 21%	(8,904)	(9,365)	(11,990)	(14,002)	(15,469)	(19,054)	(21,261)	(26,673)	(26,055)	(26,717)	(29,707)	(32,397)	(34,835)	(36,511)	(39,515)	(43,342)	(47,520)	(51,026)	(53,870)	(54,658)	(59,847)	(62,194)	(64,617)	(67,118)	(69,701)	(72,367)	(75,119)	(77,959)	(80,891)	
Reserve Contributions	618,957	631,955	631,955	649,650	667,840	686,539	705,763	725,524	745,839	766,722	788,190	810,260	832,947	856,269	880,245	904,892	930,229	956,275	983,051	1,010,576	1,038,872	1,067,961	1,097,864	1,128,604	1,160,205	1,192,691	1,226,086	1,260,416	1,295,708	1,331,988
Reserve Ending Balance	2,717,615	3,301,074	3,837,627	4,501,204	4,887,859	5,348,510	5,962,306	6,590,944	7,196,965	7,068,305	7,249,852	7,995,074	8,668,511	9,281,343	9,710,752	10,461,788	11,412,700	12,449,246	13,324,150	14,039,389	14,258,206	15,542,376	16,139,847	16,756,612	17,393,250	18,050,361	18,728,558	19,428,474	20,150,761	20,896,089
Net Reserve Growth	230,883	583,459	536,554	663,577	386,655	460,651	613,796	628,638	606,021	(128,661)	181,547	745,222	673,437	612,832	429,409	751,036	950,911	1,036,546	874,905	715,239	218,817	1,284,170	597,471	616,765	636,639	657,110	678,197	699,916	722,287	745,328
Beginning Reserve Full-Funding Amt	8,287,287	8,242,927	8,718,333	9,167,198	9,737,842	10,031,447	10,392,988	10,895,298	11,408,949	11,884,485	11,631,191	11,668,459	12,248,855	12,752,959	13,190,473	13,439,270	13,993,809	14,737,478	15,559,678	16,217,516	16,710,509	16,704,657	17,730,838	18,076,208	18,427,019	18,783,303	19,145,093	19,512,416	19,885,300	20,263,768
Inflation Addition to Full-Funding Amt	157,500	230,802	244,113	256,682	272,660	280,881	291,004	305,068	319,451	332,766	325,673	326,717	342,968	357,083	369,333	376,300	391,827	412,649	435,671	454,090	467,894	467,730	496,463	506,134	515,957	525,932	536,063	546,348	556,788	567,386
Annual Depreciation	317,701	326,597	335,741	345,142	354,806	364,741	374,953	385,452	396,245	407,340	418,745	430,470	442,523	454,914	467,651	480,746	494,206	508,044	522,269	536,893	551,926	567,380	583,267	599,598	616,387	633,646	651,388	669,627	688,376	707,651
Reserve Expenses	(430,841)	(81,992)	(130,990)	(31,179)	(333,861)	(284,080)	(163,648)	(176,869)	(240,159)	(993,399)	(707,150)	(176,792)	(281,386)	(374,483)	(588,188)	(302,506)	(142,364)	(98,493)	(300,103)	(497,991)	(1,025,672)	(8,929)	(734,359)	(754,921)	(776,059)	(797,789)	(820,127)	(843,090)	(866,697)	(890,964)
Ending Reserve Full-Funding Amt	8,242,927	8,718,333	9,167,198	9,737,842	10,031,447	10,392,988	10,895,298	11,408,949	11,884,485	11,631,191	11,668,459	12,248,855	12,752,959	13,190,473	13,439,270	13,993,809	14,737,478	15,559,678	16,217,516	16,710,509	16,704,657	17,730,838	18,076,208	18,427,019	18,783,303	19,145,093	19,512,416	19,885,300	20,263,768	20,647,840
Breakeven Reserve Contribution	475,201	557,399	579,855	601,824	627,466	645,621	665,957	690,520	715,695	740,105	744,418	757,187	785,491	811,997	836,985	857,045	886,033	920,694	957,940	990,983	1,019,820	1,035,110	1,079,730	1,105,732	1,132,343	1,159,578	1,187,450	1,215,974	1,245,165	1,275,036
Reserve Funding Ratio	**33.0%**	**37.9%**	**41.9%**	**46.2%**	**48.7%**	**51.5%**	**54.7%**	**57.8%**	**60.6%**	**60.8%**	**62.1%**	**65.3%**	**68.0%**	**70.4%**	**72.3%**	**74.8%**	**77.4%**	**80.0%**	**82.2%**	**84.0%**	**85.4%**	**87.7%**	**89.3%**	**90.9%**	**92.6%**	**94.3%**	**96.0%**	**97.7%**	**99.4%**	**101.2%**
Reserve Contribution Pct of Income	37.5%	37.2%	36.4%	36.2%	36.0%	35.9%	35.6%	35.5%	35.1%	35.2%	35.2%	35.1%	34.9%	34.8%	34.8%	34.7%	34.5%	34.3%	34.2%	34.1%	34.1%	34.0%	33.9%	33.9%	33.9%	33.8%	33.8%	33.8%	33.7%	33.7%
Inside Clarendon Share of Reserves	8,071	9,804	11,398	13,369	14,517	15,885	17,708	19,575	21,375	20,993	21,532	23,745	25,745	27,566	28,841	31,072	33,896	36,974	39,573	41,697	42,347	46,161	47,935	49,767	51,658	53,610	55,624	57,703	59,848	62,061
(in 2018-equivalent dollars)	8,071	9,537	10,785	12,306	12,999	13,836	15,004	16,134	17,138	16,373	16,336	17,525	18,483	19,251	19,593	20,534	21,790	23,122	24,072	24,674	24,376	25,847	26,110	26,369	26,626	26,879	27,129	27,377	27,621	27,863
Inside Clarendon Condo Fee	397.51	408.71	418.54	430.26	442.32	454.71	467.46	480.55	494.02	507.86	522.09	536.72	551.75	567.21	583.10	599.44	616.23	633.49	651.24	669.49	688.24	707.52	727.34	747.71	768.66	790.19	812.32	835.08	858.47	882.52
(in 2018-equivalent dollars)	397.51	397.58	396.05	396.06	396.06	396.07	396.08	396.09	396.09	396.10	396.11	396.11	396.12	396.13	396.13	396.14	396.14	396.15	396.16	396.16	396.17	396.17	396.18	396.18	396.19	396.19	396.19	396.20	396.20	396.21
Condo Fee Growth Rate	-	2.8%	2.4%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%

	2008	2013	2018
Reserve Ending Balance	352,593	1,313,539	2,717,615
Ending Reserve Full-Funding Amt	7,238,654	6,619,893	8,242,927
Reserve Funding Ratio	4.9%	19.8%	33.0%
Reserve Contribution Pct of Income	32.8%	36.9%	37.5%