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## Technical Memorandum

Date: July 29, 2011

To: Emmett Dobey, Director of Utilities and Waste Management, Mason County

From: Gordon Wilson, FCS GROUP

Subject: Benchmark for Belfair Sewer Equivalent Residential Units (ERUs)

This memo is to report the results of our ERU benchmark analysis for the Belfair Sewer System area. Based on the analysis described below, we recommend that one ERU be defined as an average water consumption of 155 gallons per day.

The benchmark discussed with the Board and the public last week was 135 gallons per day. This recommendation differs from that figure due to two types of changes. First, excluding properties outside of the UGA changed the average residential consumption from 135 to 139 gallons per day. More significantly, we are recommending that the County consider an approach under which residents of the Golden Bell Mobile Home Park would be treated as multi-family rather than single-family customers. That approach has an impact on the benchmark measurement. Treating Golden Bell residents as multi-family removes them from the single-family rate class, which increases the average consumption for the single-family residential class to 155 gallons per day.

Our recent data—received earlier this week—about the water consumption of Golden Bell residents also has implications for another aspect of the ERUs. Last month, Commissioner Ring-Erickson asked about the basis for treating multi-family dwelling units as 0.8 of an ERU. At the time we did not have any data from Belfair that would help anchor that assumption in actual water use. We still do not have water consumption data for most multi-family properties in Belfair, but because we do have data for Golden Bell, it is clear that if Golden Bell is treated as multi-family, the ratio between multi-family dwelling units and single-family residential structures should probably be reduced. Until further data is received and analyzed, we suggest that the definition of an ERU for a multi-family dwelling unit be changed from 0.8 to .07.

### Background

The “equivalent residential unit” (ERU) is the basis for both monthly sewer charges and connection charges to be paid to the Belfair sewer system. The ERU is a way to allocate the cost burden of the sewer system equitably between commercial customers and residential customers as a whole.

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### How ERUs are Used

The interim sewer ordinance currently under consideration by the Board of Commissioners contains the following rules for assigning ERUs. Each single-family residential structure counts as 1 ERU. In the current text of the interim ordinance, each dwelling unit in a multi-family residential structure counts as 0.8 ERU; a ten-unit apartment building would thus be 8 ERUs. At this point, our recommendation is that this factor be reduced to 0.7.

For commercial properties, the interim sewer ordinance defines two quantities: a *minimum ERU*, and the way the *actual ERU* is calculated, since the actual charge may be above the minimum.

The *minimum ERU* for a commercial structure is at least 1 ERU. If a commercial structure has more than one tenant occupying it, the minimum number of ERUs for that structure depends on whether the tenant leaseholds have individual plumbing fixtures or rely on shared plumbing fixtures for the building as a whole. Any tenant leaseholds with separate plumbing fixtures have a minimum of 1 ERU per tenant. Tenant leaseholds who depend entirely on plumbing fixtures (such as in bathrooms or kitchen areas) that are shared with other tenants have a minimum of .5 ERU per tenant.

The *actual* number of commercial ERUs charged may be higher than those minimums based on either (a) the water consumption in the most recent year for which meter data is available, or (b) if site-specific water use data is not available, a set of general engineering standards that relate the estimated sewage flows to some characteristic of the business (such as the number of square feet or the number of restaurant chairs). In the interim sewer ordinance, the actual ERU calculations above the minimum are rounded to the nearest one-tenth.

For existing structures to be connected as part of Phase 1 of the Belfair Sewer System project, water use data is the preferred method for calculating the number of ERUs for a given commercial structure. We now have water consumption data from the Belfair Water District for over 70% of the commercial ERUs forecasted to be part of the initial connections.

### ERU Benchmark – Single-family Residential Consumption

Because water consumption data is the primary source for commercial ERUs, it is important to have an accurate measurement of the average water consumption for single-family residential structures, so this average can serve as a benchmark upon which the relative consumption of commercial structures is calculated.

The attached Table 1 shows the analysis and the resulting average of 155 gallons per day.

### Methodology

With cooperation from the Belfair Water District, we obtained monthly water use data for all single-family residential customers for the 12-month period from July 2010 through June 2011. We sorted the data based on January water consumption, from smallest to largest, and then, in order to protect customer privacy, we removed customer names and replaced them with a simple identifying number. This week, we received address data, which allowed us to exclude Water District customers outside the Belfair Urban Growth Area (UGA), since the Belfair sewer project is intended to eventually provide sewer service only to properties within the UGA. For reasons described below, we also excluded water data from the Golden Bell Mobile Home Park.



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### Benchmark for Belfair Sewer Equivalent Residential Units (ERUs)

In order to ensure a fair comparison with commercial customers, we needed to exclude data resulting from three types of situations: (a) months when the house was unoccupied or appeared to be occupied less than half the time; (b) months when increased water usage suggests “consumptive” use, such as lawn irrigation, that does not translate into sewage flow; (c) months when there was a probable water leak.

The first screening decision was for irrigation. Looking at the averages for each month, it was clear that water consumption in June, July, and August was affected by irrigation. So we excluded the months of June-August from all water accounts. Instead, we focused on what we call the “winter average”—September through May. Table 1 shows the excluded summer months in orange shading. This filter avoids overstating residential sewage volume for unrelated water uses.

Secondly, we wanted to exclude months when the home was unoccupied at least half the time. In order to do that, we calculated the winter average from the raw data for each account, and then we excluded any month in which the water use was less than half the non-zero winter average. After that, there were still a few accounts that appeared to be unoccupied so much of the time that even the winter average did not appear to be valid, so we excluded any account in which—after subtracting those months that were less than half the winter average—the total cubic feet for the September-May period was less than 500 cubic feet. In Table 1, the green shading indicates months that were excluded because of temporary or seasonal vacancy. This filter avoids understating residential sewage volume due to vacancy or seasonal occupancy.

Finally, we spot checked the data and identified one instance where an inordinately high monthly consumption number meant that a leak probably occurred that month. In Table 1, the probable leak is shown with blue shading. The remaining cells, shaded in white, are the cells used in the calculation of the ERU benchmark. This adjustment avoids overstating sewage volume for an apparent water leak or possible meter reading error.

In Table 1, the far right-most column shows the winter average for each customer after excluding months with leaks or with the house unoccupied at least half the time. The average across all customers within the Belfair UGA is shown at the bottom of the last page of the table. After all the exclusions, the average water consumption for residential customers within the Belfair UGA was 632 cubic feet per month. Each cubic foot is approximately 7.48 gallons, so that average is equivalent to 155 gallons per month.

## Questions and Answers

*Q: Why is this ERU benchmark lower than many other jurisdictions report as their ERU standard?*

A: This measurement is actually superior to the assumptions used by most other jurisdictions for a standard ERU, because (a) it is based on recent actual water use data, and (b) the residential water use measured here is specific to Belfair.

For most jurisdictions, the definition of an ERU is an engineering standard used mainly to plan and design facilities to serve new development. (Because most cities, counties, and combined water/sewer utility districts have access to monthly water meter data, their rates do not depend on ERUs; instead, they use metered water use directly in the calculation of each month’s sewer bill.) When an ERU is used only an engineering standard for new development, the typical water

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consumption assumed to be the definition of one ERU is not the subject of much public scrutiny, and it is not updated very often in most jurisdictions. An out-of-date ERU benchmark is likely to be too high, because average water consumption has been dropping consistently across a variety of jurisdictions—all those low-flow showerheads and high efficiency washing machines really do work. Our experience with other utilities is that the current average residential water consumption is less than many of the older ERU standards would indicate.

*Q: Why has the assumption about the ERU benchmark kept changing?*

A: First of all, remember that there are two main uses of an ERU, and they can have different values. In determining the capacity needed for the Belfair wastewater treatment plant, the standard sewer flow per ERU has been assumed to be 250 gallons per day per design guidelines published by the State Department of Health, and that figure is still appropriate when considering total potential flows and particularly peak flows at the treatment plant. In planning a treatment plant, you have to look at maximum monthly flows, not average annual flows, and you have to include infill and infiltration (I&I). I&I refers to water entering all sewer systems (even new ones) from the outside environment that did not originally pass through a water meter. So while plant capacity has to be designed based on peak flows, designing rates and allocating costs to different groups of customers should be based on average annual flows, excluding peak irrigation months. That second type of ERU is the one we are focusing on here.

Our earliest estimate for the average residential water consumption was 166 gallons per day; more recently we used 150 gallons per day; others in Belfair have guessed 185 gallons per day or even higher amounts. But those were just guesses; they were based on other jurisdictions, because no one had data that was specific to Belfair. On July 8, we received actual residential water consumption data from the Belfair Water District. By July 11, we had analyzed it, adjusting for irrigation, leaks, and vacancy. The actual average turned out to be 135 gallons per day for the entire Water District service area, which we reported in a public presentation on July 12. At the request of Belfair business owners, we went back to the Water District on July 26<sup>th</sup> and obtained addresses so we could limit our average to just those accounts within the Urban Growth Area (UGA), which is the area intended for eventual sewer service. After excluding the non-UGA accounts, the figure is 139 gallons per day. Since the July 26 data showed that Golden Bell Mobile Home Park residents' water use was far below the average, it would be reasonable for them to be connected and treated as a single sewer account, in which case they would qualify as multi-family customers. If that approach is adopted, then the average water use for the remaining single-family customers would be 155 gallons per day.

*Q: Does the County General Fund make more money if the benchmark is lower?*

A: No. The County General Fund is not affected either way by the ERU benchmark because the Belfair sewer utility is expected to be a self-supporting enterprise. Countywide tax dollars have helped with construction costs (\$1 million of real estate excise tax has been committed to the project), and the County's borrowing authority improves the credit of the bonds sold for the Belfair sewer utility, but in general, the Belfair sewer utility is intended to be financially independent.

*Q: Does the Belfair sewer utility make more money if the benchmark is lower?*

A: No. The ERU benchmark does affect the total number of ERUs in the system. However, the sewer utility has certain costs to recover, and the amount of those costs does not change if the

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ERU benchmark changes. Those costs are the numerator in the rate calculation. (Costs divided by number of ERUs equals the rate.) Since the ERU is the denominator in the rate calculation, a higher number of ERUs means lower rates; a lower number of ERUs means higher rates. The total cost to be recovered is the same.

*Q: But doesn't the sewer utility make more connection charge revenue if the benchmark is lower?*

A: Yes, it does, and the more connection charge revenue is received, the lower the monthly rates can be. If less connection charge revenue is received, the higher the monthly rates have to be in order to cover the utility's costs. The total revenue is the same either way. So a more precise way to describe the basic rate calculation is:

(Total costs minus non-rate revenue such as connection charges)  
Divided by number of ERUs  
Equals the ongoing monthly sewer rate

*Q: The recommended benchmark of 155 gallons per day is higher than the 150 gallons per day that was previously assumed in the sewer utility's financial models. What is the impact of a higher-than-expected benchmark on the total number of ERUs, and how does the total number of projected ERUs compare now with what we expected earlier?*

A: A higher ERU benchmark leads to a lower ERU count, all else being equal. In addition, there are several other factors that affect the ERU count in the Belfair Phase 1 area, and the total number of projected ERUs is now lower than it was several months ago.

The financial model presented to the public in November 2010 projected a \$3,000 initial connection charge for existing residents and businesses, a \$14,500 connection charge (escalated each year by 3%) for new development, and a \$96 monthly sewer rate through 2025, which is the last year of the forecast and the projected year when system is fully built out. That forecast assumed 573 ERUs in 2011, with 5-6% annual growth in the future.

Since that time, we have been gradually building a database of commercial customers based on tax parcels, some basic information about each business occupying space in the commercial core (the Phase 1 area), and to the degree possible, water consumption data. (There is no existing customer database because this is a new utility. The estimate of 573 initial ERUs was based on general planning and engineering studies for which the source data is over ten years old, with assumptions about intervening growth since that time.) As we have received more specific and current information about potential customers and their characteristics, our estimate of the total ERUs has been dropping somewhat. That process continues—the total might decrease yet more as we continue to gather case-by-case information about actual businesses and sites.

In addition, the earlier ERU totals were based on an assumption that ERUs would be rounded up to the next whole number. This approach is typical in many other jurisdictions. In this case, however, since the effort has been made to measure actual residential water consumption, we have a stronger basis for defining an ERU than other jurisdictions typically have. With greater precision and reliability in the benchmark, it would be more equitable to round off the ERU calculation for a given customer to the nearest tenth rather than rounding up to the nearest whole number. Rounding to the nearest tenth of an ERU is now written into the interim sewer ordinance, and that decision further reduces the total number of ERUs.

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We reported to the Board last week that the most recent ERU count was 546.6 ERUs, assuming a benchmark of 135 gallons per day. With a benchmark of 155 gallons per day instead of 135, the equivalent total is 514.1, or about 514 ERUs. However, we just received the water consumption data for several more businesses two days ago, and that data has not been incorporated into the estimate yet. So the total number of initial ERUs is still a moving target, but it is safe to say that it will be lower than the 573 figure that was assumed last November.

*Q: What is the impact of a lower benchmark on different customer groups in Belfair?*

A: A lower benchmark increases the number of ERUs for those businesses who consume enough water to be paying more than the minimum. Because a lower number of ERUs corresponds to higher monthly sewer rates, a higher benchmark is less advantageous for all residential customers and the smallest businesses who are at the minimum number of ERUs regardless of the benchmark.

*Q: How many of the businesses in the Phase 1 area are currently projected to be at the minimum number of ERUs?*

A: Our current list shows a total of 193 business tenants. Of those, 125 are projected to be at the minimum number of ERUs regardless of the benchmark. The remaining 68 are either above the minimum or they are part of a larger property that is expected to pay more than the minimum because the overall water bill is more than 1 ERU per tenant.

*Q: Should the Golden Bell mobile home park be excluded from the ERU benchmark analysis?*

A: Yes. The reason for excluding Golden Bell residents does not have to do with the legal uncertainty about whether and when they might actually connect—after all, the benchmark analysis includes properties in Phases 3 and 4 that might not actually connect for many years in the future. The benchmark analysis addresses single-family residential customers within the Belfair UGA—the area for which the system was designed and who will eventually be expected to connect.

However, the data obtained this week showed that the average consumption for Golden Bell homes is only 94 gallons per day, considerably less than the average for other single-family residences. The mobile homes are individually metered, and for that reason, we have been assuming up to this point that they would qualify as single-family homes. However, if the mobile home park as a whole were to receive a single physical connection and be treated as a single customer for sewer purposes, then the interim ordinance could be revised to allow mobile home parks to be treated as multi-family properties. (Because the language in the ordinance needs to apply to all similar situations, it should carefully define what constitutes a mobile home park.)

Treating Golden Bell as multi-family has two implications for the measurement of ERUs in Belfair. First, excluding Golden Bell from the single-family residential class raises the single-family average water use from 139 to 155 gallons per day.

Secondly, allowing Golden Bell to be classified with multi-family customers raises the question about which factor should be applied to multi-family properties connecting to the system. In the current text of the interim ordinance, that factor is .8 (as it has been throughout our financial planning so far). We do not have data about the water use of multi-family dwelling units in Belfair, but we do now have data for Golden Bell, which is about 61% of the water usage of other single-family residential customers inside the UGA (94 gallons per day divided by 155

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gallons per day). That suggests that it would be worthwhile to obtain data for the other multi-family accounts and do a formal comparison. In the meanwhile, we suggest that the multi-family factor in the interim ordinance be reduced from 0.8 to 0.7 until multi-family data is received.

*Q: Could the County Commissioners adopt a benchmark above 155 gallons per day, and if so, what would be the impact?*

A: If the Commissioners were inclined to increase the benchmark above 155 gallons per day, we believe the most reasonable basis would be an assumption about indoor seasonality in sewage flows. In words, the County could assume that excluding June, July, and August from the benchmark analysis not only excludes irrigation consumption but also excludes peak sewer flows which would otherwise raise the annual average. Summer peaks in sewage flows are clearly to be expected among many of the businesses in Belfair—that is the reason the interim sewer ordinance only allows commercial properties to request seasonal adjustments for irrigation for a two-year period, after which they would need to install a deduct meter to actually measure the irrigation water consumed. Raising the benchmark above 155 gallons per day would be equivalent to assuming that the same tendency toward increased indoor usage also applies to residential customers. This assumption would not be based on any data that is specific to Belfair, but if the County chose to adopt a benchmark above 155 gallons per day, that would have to be the rationale.

However, there would be a rate impact from choosing a higher benchmark. The attached Table 2 shows the rate impact of two different ERU totals. (Both scenarios assume that the connection charge for new development, instead of starting at \$14,500 and increasing by 3% per year thereafter, is gradually phased-in to that level over a five-year period.) Using the most current ERU estimates, these scenarios correspond to 155 and 175 gallons per day, respectively. At 155 gallons per day, the current financial forecast would require rates of \$106 per month through the life of the forecast. At 175 gallons per day, the monthly rates would need to be \$115 per month throughout the life of the forecast. These rate forecasts are still subject to change, particularly with respect to total ERUs and operating costs, but they still illustrate the impact of a higher benchmark.

Who would gain and who would lose? If the benchmark were to be 175 gallons per day instead of 155 gallons per day, all 146 households and 125 of the business tenants in Belfair would end up paying an additional \$9 per month. Their initial connection charge would remain the same at \$3,000 each.

The remaining 68 business tenants or properties would have about an 11% reduction in the number of ERUs assigned to them. The reduction in ERUs would be the most noticeable for the largest businesses. For example, a typical large grocery store would be charged for 22.6 instead of 25.5 ERUs, a difference of 2.9 ERUs. The grocery store would thus save \$8,700 (2.9 ERUs times \$3,000 per ERU) in up-front connection charges if the benchmark were 175 instead of 155. Those businesses that consume more than 1 ERU of water would also save on an ongoing basis for each ERU saved, though those savings would be partially offset by the fact that they would be paying a higher monthly rate per ERU. So, to continue with the grocery store as an example, the store would be charged  $\$116 \times 22.6 = \$2,622$  per month for ongoing sewer rates instead of  $\$106 \times 25.5 = \$2,703$  per month, a savings of \$81 per month.



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**Recommendation**

While the Commissioners could opt to define the benchmark above 155 gallons per day and still have a reasonable basis for the decision, our recommendation is that the County adopt the ERU benchmark that results from the actual data, which is 155 gallons per day. The people who are most hurt by the overall project are the smallest businesses and poorest residents who have the fewest options; for these customers, paying \$108 per month is already a hardship. To shift costs further onto them would make the project even more disruptive than it already is, and we do not see a compelling policy rationale for doing that.



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Table 1: Belfair Single-Family Residential Water Use Inside UGA

Belfair Water District Single-Family Residential Water Use, July 2010-June 2011

Raw Data in cubic feet (cf)

7.48 gallons per 1 cubic foot

Source: Belfair Water District billing system. Accounts outside Belfair UGA are excluded, as is Golden Bell Mobile Home Park. Names removed for privacy purposes; accounts sorted in ascending order of January water use.

Months excluded if water use was less than half of Sept-May average for a given account. Accounts excluded if Sept-May occupied months totaled less than 500 cf/yr. Leaks also excluded. June-Aug excluded due to irrigation.

Key	
<input type="checkbox"/>	Included in calculations
<input type="checkbox"/>	Excluded due to probable leaks
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<input type="checkbox"/>	Excluded due to seasonal or temporary vacancy

Accounts within UGA	Non-Summer Months					Summer Months			Non-Summer Months				Year-round avg w/o exclusions	Winter avg w/o exclusions	Total Sept-May usage	Winter Avg with all exclusions
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec				
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
11	0	0	0	0	0	0	470	503	457	219	0	0	412	338	676	338
25	0	330	413	377	433	433	284	397	348	540	741	82	398	408	3,182	455
30	0	2	39	191	43	45	23	36	43	19	12	5	42	44	316	
38	0	120	89	152	194	208	139	120	193	124	98	149	144	140	1,119	140
44	1	0	61	26	1	0	0	0	0	0	0	0	22	22	87	
45	1	0	6	554	696	673	811	629	944	1,194	1,245	1	614	580	4,633	927
48	2	0	39	86	109	61	7	59	378	32	0	14	79	94	573	191
49	2	405	533	775	875	1,144	7	0	0	0	1	0	468	432	2,588	647
50	2	3	4	2	0	0	229	237	229	308	26	1	104	72	537	269
52	5	51	17	3	0	1,104	938	992	786	9	67	21	363	120	853	427
59	14	5	3	442	615	1,335	340	229	143	3	60	21	268	145	1,200	400
60	18	53	34	28	68	92	297	423	41	10	81	0	104	42	305	
66	27	142	402	419	398	558	1,528	1,861	594	2	0	0	593	283	1,955	391
72	40	2	1	4	2	7	74	91	15	0	2	1	22	8	55	
85	84	81	53	31	42	122	5	13	4	8	38	57	45	44	386	
91	96	641	96	81	37	83	103	124	98	107	95	117	140	152	1,331	166
99	115	125	117	110	144	134	186	328	148	123	141	119	149	127	1,142	127
105	131	0	148	183	203	283	400	352	240	171	285	186	235	193	1,547	193
115	169	158	150	138	168	180	161	162	195	162	182	139	164	162	1,461	162
122	196	182	180	182	188	183	184	185	153	195	203	187	185	185	1,666	185
124	207	203	200	436	397	387	279	383	227	187	170	158	270	243	2,185	243
128	218	609	429	333	356	1,190	525	564	471	351	298	347	474	379	3,412	379
136	250	301	217	231	223	218	185	221	1,200	495	333	124	333	375	2,050	293
137	251	342	354	327	322	411	1,032	527	416	349	428	390	429	353	3,179	353
139	258	331	334	350	408	659	496	461	497	291	3,122	289	625	653	5,042	840
145	275	253	254	267	299	295	689	504	592	270	297	353	362	318	2,860	318
150	286	300	273	364	404	348	304	297	244	286	260	266	303	298	2,683	298
152	290	339	320	270	325	454	281	330	299	259	344	318	319	307	2,764	307
153	299	253	251	244	289	311	303	350	300	313	291	247	288	276	2,487	276
156	307	239	355	335	300	319	366	323	352	530	426	315	347	351	3,159	351
159	315	5	8	914	780	847	467	554	591	568	568	616	519	485	4,352	622
169	349	574	531	647	555	721	823	584	548	458	525	1,298	634	609	5,485	609
170	352	374	375	402	359	283	440	799	1,327	332	459	390	491	486	4,370	486
171	354	276	272	310	324	390	363	280	300	269	263	290	308	295	2,658	295
173	355	708	420	361	432	548	984	1,047	680	351	388	360	553	451	4,055	451

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	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec				
178	370	351	365	324	382	618	883	1,221	474	349	375	383	508	375	3,373	375
179	372	414	555	574	849	867	51	521	645	533	572	659	551	575	5,173	575
181	375	506	439	448	375	468	625	863	467	513	506	323	492	439	3,952	439
183	380	358	319	376	598	1,021	2,087	837	709	456	376	340	655	435	3,912	435
184	384	359	312	316	364	393	827	437	447	229	340	314	394	341	3,065	341
186	389	386	323	295	258	325	515	302	318	329	407	414	355	347	3,119	347
191	403	550	434	451	439	454	595	845	585	493	479	408	511	471	4,242	471
195	417	549	572	575	796	977	765	754	462	351	482	390	591	510	4,594	510
198	433	442	393	381	251	172	280	341	377	345	317	371	342	368	3,310	368
200	436	432	444	463	401	842	110	775	626	429	890	416	522	504	4,537	504
202	437	420	445	374	289	652	491	430	442	358	432	330	425	392	3,527	392
205	440	463	378	414	541	340	1,278	1,253	543	376	536	374	578	452	4,065	452
206	441	485	425	357	475	541	426	345	354	491	494	350	432	430	3,872	430
212	458	477	436	279	329	521	480	550	456	428	404	498	443	418	3,765	418
213	459	521	229	224	429	571	464	309	0	490	482	438	420	409	3,272	409
215	463	496	442	481	338	392	285	1	55	399	351	635	362	407	3,605	451
216	468	293	434	463	652	655	472	618	306	400	547	576	490	460	4,139	460
219	471	501	557	412	549	476	1,418	877	773	935	925	938	736	673	6,061	673
224	492	506	438	400	517	552	679	570	574	496	498	305	502	470	4,226	470
230	505	529	558	512	585	702	631	500	594	494	510	550	556	537	4,837	537
232	508	503	575	528	462	571	383	345	420	362	491	478	469	481	4,327	481
233	508	445	445	379	442	62	674	623	475	400	494	466	451	450	4,054	450
237	537	506	470	503	561	836	883	803	617	409	559	678	614	538	4,840	538
242	545	592	455	459	522	899	1,379	1,515	771	449	590	415	716	533	4,798	533
243	557	522	549	554	565	605	638	524	598	538	565	478	558	547	4,926	547
244	558	517	557	455	541	824	1,350	1,184	610	533	628	454	684	539	4,853	539
247	566	566	494	593	536	557	561	556	582	542	553	529	553	551	4,961	551
249	568	729	583	801	828	706	870	670	738	684	1,764	631	798	814	7,326	814
251	581	499	75	85	409	457	2,229	449	455	449	599	576	572	414	3,568	510
252	585	608	470	497	487	493	505	573	503	465	527	474	516	513	4,616	513
254	591	618	586	578	589	697	388	442	485	464	542	540	543	555	4,993	555
257	605	525	492	465	567	514	556	656	680	507	558	520	554	547	4,919	547
258	607	600	492	476	524	518	640	596	635	601	591	457	561	554	4,983	554
259	612	798	488	604	358	312	610	599	476	497	559	581	541	553	4,973	553
260	617	593	593	633	586	583	466	339	592	660	691	652	584	624	5,617	624
261	625	738	542	337	390	317	584	886	674	708	722	536	588	586	5,272	586
264	634	574	529	535	562	620	701	658	633	512	605	483	587	563	5,067	563
266	645	533	427	320	484	1,445	1,272	669	350	391	456	400	616	445	4,006	445
268	661	696	698	642	595	1,050	156	723	86	54	521	574	538	503	4,387	627



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Benchmark for Belfair Sewer Equivalent Residential Units (ERUs)

Table 1: Belfair Single-Family Residential Water Use Inside UGA

Belfair Water District Single-Family Residential Water Use, July 2010-June 2011

Raw Data in cubic feet (cf)

7.48 gallons per 1 cubic foot

Source: Belfair Water District billing system. Accounts outside Belfair UGA are excluded, as is Golden Bell Mobile Home Park. Names removed for privacy purposes; accounts sorted in ascending order of January water use.

Months excluded if water use was less than half of Sept-May average for a given account. Accounts excluded if Sept-May occupied months totaled less than 500 cf/yr. Leaks also excluded. June-Aug excluded due to irrigation.

Key	
<input type="checkbox"/>	Included in calculations
<input type="checkbox"/>	Excluded due to probable leaks
<input type="checkbox"/>	Excluded due to peak irrigation season
<input type="checkbox"/>	Excluded due to seasonal or temporary vacancy

Accounts within UGA	Non-Summer Months					Summer Months			Non-Summer Months				Year-round avg w/o exclusions	Winter avg w/o exclusions	Total Sept-May usage	Winter Avg with all exclusions
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec				
270	676	677	512	608	644	506	438	635	633	1,589	3,233	578	894	1,017	9,150	1,017
271	679	586	488	596	576	634	697	682	598	401	541	532	584	555	4,997	555
273	693	841	872	929	732	1,507	810	780	664	710	890	781	851	790	7,112	790
276	710	783	630	1,040	641	1,060	479	796	626	832	1,833	1,009	870	900	8,104	900
279	724	962	970	791	683	648	225	107	775	165	761	790	633	736	6,456	807
282	741	668	700	718	790	867	881	1,287	949	949	969	750	856	804	7,234	804
286	768	846	847	665	783	756	890	707	859	777	856	776	794	797	7,177	797
288	828	817	759	724	793	812	829	851	879	831	842	691	805	796	7,164	796
289	834	673	848	839	948	901	1,053	825	863	871	991	926	881	866	7,793	866
295	899	936	950	923	1,145	1,111	1,789	1,173	977	712	861	785	1,022	910	8,188	910
297	908	899	803	1,015	1,046	1,588	3,203	2,119	923	792	917	822	1,253	903	8,125	903
298	912	864	845	819	900	1,163	1,460	1,389	1,012	992	1,084	954	1,033	931	8,382	931
302	970	786	807	847	1,287	997	970	912	562	1,017	1,231	977	947	943	8,484	943
303	982	1,016	966	1,037	1,197	1,131	906	917	1,013	945	958	828	991	994	8,942	994
304	997	754	747	837	776	724	884	780	772	839	910	837	821	830	7,469	830
306	1,022	1,159	985	1,034	1,059	1,150	1,047	1,086	1,249	1,052	1,021	909	1,064	1,054	9,490	1,054
310	1,141	1,346	1,072	1,142	1,246	1,202	1,233	1,585	1,571	1,424	1,273	1,141	1,281	1,262	11,356	1,262
311	1,204	1,046	722	924	982	720	1,815	1,983	1,275	995	1,165	1,153	1,165	1,052	9,466	1,052
312	1,248	754	829	855	1,010	1,068	1,800	1,623	1,600	591	1,516	1,500	1,200	1,100	9,903	1,100
314	1,254	1,233	1,125	1,202	1,247	1,198	986	979	1,052	908	997	1,182	1,114	1,133	10,200	1,133
317	1,279	1,312	1,254	1,052	996	1,576	2,574	1,316	710	602	817	1,256	1,229	1,031	9,278	1,031
318	1,290	1,449	1,943	2,475	2,135	1,611	1,369	1,304	1,379	1,251	1,367	1,350	1,577	1,627	14,639	1,627
320	1,340	1,031	1,061	1,011	1,030	1,145	0	2	5	3	159	770	687	712	6,243	1,041
322	1,375	1,204	1,814	2,442	2,244	3,034	1,081	613	681	822	1,028	1,358	1,475	1,441	12,287	1,536
323	1,425	1,453	1,284	1,640	1,328	1,757	2,278	2,583	2,161	2,015	1,986	1,463	1,781	1,639	14,755	1,639
324	1,436	1,889	1,001	1,043	1,144	1,584	1,091	1,143	924	904	1,206	1,264	1,219	1,201	10,811	1,201
326	1,484	1,390	1,589	1,485	1,718	2,341	2,193	1,895	2,029	1,815	1,860	1,419	1,768	1,643	14,789	1,643
328	1,633	1,456	1,466	1,488	1,475	1,571	1,226	1,492	1,399	1,409	1,549	1,544	1,476	1,491	13,419	1,491
329	1,712	1,186	1,251	1,691	1,433	1,194	3,381	3,306	1,368	1,057	2,951	1,076	1,801	1,525	13,725	1,525
Avg cf/mo	525	539	506	551	574	684	743	692	581	504	646	516	596	556		632
Avg gals./mo.	3,925	4,029	3,785	4,125	4,293	5,117	5,559	5,173	4,345	3,770	4,835	3,860	4,401	4,107		4,725
Annual gals.													52,815	49,288		56,701
Avg gals./day													145	135		155
Median cf/month:																538
Median gallons/day:																132

Prepared by FCS Group on behalf of Mason County Utilities and Waste Management, July 2011



Technical Memorandum  
Benchmark for Belfair Sewer Equivalent Residential Units (ERUs)

Table 2: Rate Scenarios Showing Impact of Total ERUs

Impact of Alternate Assumptions about Number of Initial ERUs													
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
<b>18. 514 initial ERUs, 155 gpd benchmark, phase-in connection charge through 2016:</b>													
ERU Forecast	567	595	625	656	899	953	1,009	1,094	1,192	1,293	1,398	1,505	1,637
<i>Assumption: 514 ERUs in 2011 (instead of 573), 5% growth through 2019, 6% thereafter.</i>													
Connection Charge Existing	\$ 3,000												
Connection Chg New Develop	\$ 6,000	\$ 7,900	\$ 10,200	\$ 13,000	\$ 16,300	\$ 16,800	\$ 17,300	\$ 17,800	\$ 18,300	\$ 18,800	\$ 19,400	\$ 20,000	\$ 20,600
Connection Charge Revenue	161,910	223,841	303,460	406,101	2,930,747	914,600	971,611	1,505,252	1,798,865	1,902,495	2,022,805	2,150,488	2,718,703
Debt Repmt Fund End Balance	183,746	98,977	-	-	1,464,047	860,884	288,690	-	-	-	-	-	-
Monthly Capital Service Fee (Ph 2)	\$ 25.00	\$ 25.00	\$ 25.00	\$ 25.00									
Monthly Sewer Rate	\$ 106.00	\$ 106.00	\$ 106.00	\$ 106.00	\$ 106.00	\$ 106.00	\$ 106.00	\$ 106.00	\$ 106.00	\$ 106.00	\$ 106.00	\$ 106.00	\$ 106.00
<b>19. 488 initial ERUs, 175 gpd benchmark, phase-in connection charge through 2016:</b>													
ERU Forecast	538	565	593	623	864	917	971	1,053	1,149	1,248	1,349	1,454	1,583
<i>Assumption: 488 ERUs in 2011 (instead of 573), 5% growth through 2019, 6% thereafter.</i>													
Connection Charge Existing	\$ 3,000												
Connection Chg New Develop	\$ 6,000	\$ 7,900	\$ 10,200	\$ 13,000	\$ 16,300	\$ 16,800	\$ 17,300	\$ 17,800	\$ 18,300	\$ 18,800	\$ 19,400	\$ 20,000	\$ 20,600
Connection Charge Revenue	153,720	212,518	288,110	385,559	2,903,703	885,332	939,965	1,464,226	1,754,155	1,853,808	1,969,551	2,092,292	2,655,165
Debt Repmt Fund End Balance	128,893	26,675	-	-	1,431,699	792,672	180,801	-	-	-	-	-	-
Monthly Capital Service Fee (Ph 2)	\$ 30.00	\$ 30.00	\$ 30.00	\$ 30.00									
Monthly Sewer Rate	\$ 115.00	\$ 115.00	\$ 115.00	\$ 115.00	\$ 115.00	\$ 115.00	\$ 115.00	\$ 115.00	\$ 115.00	\$ 115.00	\$ 115.00	\$ 115.00	\$ 115.00