Appendix UTL

Carlson, Barbee & Gibson, Inc.
CIVIL ENGINEERS • SURVEYORS • PLANNERS

May 26, 2016
Job No.: 2012-030

M E M O R A N D U M

TO: Leigha Schmidt, City of Hayward – Planning Department

FROM: Ryan T. Hansen, P.E., Project Manager

SUBJECT: Preliminary Sanitary Sewer Capacity Analysis
Lincoln Landing
Hayward, California

This memorandum presents our preliminary analysis of the sanitary sewer demands for the proposed Lincoln Landing project located in Hayward, California. Our analysis compares existing sewer demands to projected demands following completion of the project. The OLSD's standard procedures require a sanitary sewer study to analyze the impacts of a proposed project on the capacity of their system when it has; more than 10 residential units, 10,000sf of commercial, 1000 sf of restaurant or a Laundromat. The sewer study must determine the existing flow in the area by conducting flow monitoring of at least two manholes for at least two weeks, determine the proposed flow to be added and then compare the total post project flow with the capacity of their system. This design level study would be expected to be completed during the design phase of the project, once the project entitlement package has been approved.

Service Provider

The project site is located in a part of Hayward where sewer service is provided by the City of Hayward, the Castro Valley Sanitary District (CVSD) and the Oro Loma Sanitary District (OLSD). The project site is within, and currently served by, the Oro Loma Sanitary District.

Existing Facilities

OLSD has an existing 24" trunk sewer in Foothill Boulevard that is relatively shallow, flows from south to north and conveys wastewater from the most southeasterly portion of the district. OLSD also has a 15" trunk sewer that collects wastewater from the old City Center area on the east side of Foothill Boulevard and continues westerly in Hazel Avenue, turning at Rio Vista Street and continuing northerly to Grove Way where it connects to the downstream continuation of the 24" trunk sewer in Foothill Boulevard.

CVSD has a 36" trunk sewer on the east side of Foothill Boulevard that flows from south to north, turns at Hazel Avenue and continues in a westerly direction. Wastewater collected by both OLSD and CVSD is conveyed in a northwesterly direction to a jointly owned and operated wastewater treatment plant located at the end of Grant Road on the edge of the San Francisco Bay.

OLSD staff is not certain of the location of the connection point from the existing Mervyns building to their system. The 24"trunk sewer in Foothill Boulevard is above the ground floor of the Mervyns building so we initially concluded that it is must either be pumped to the 24" trunk sewer in Foothill Boulevard or that it must flow by gravity to the 15" trunk sewer in Hazel Avenue. After looking in to this more closely we were able to confirm from the mechanical plans for the existing building that there is an ejector pump on the first floor that pumps wastewater up to an existing 6" sanitary sewer lateral that is connected to the 24" trunk sewer in Foothill Boulevard.

Proposed Point of Connection

There are two possible points of connection to the existing sanitary sewer, the 24" trunk sewer in Foothill Boulevard or the 15" sewer in Hazel Avenue. The project currently proposes to have one single connection to the existing 15" trunk sewer in Hazel Avenue at the intersection of Rio Vista Street. A new 8" sanitary sewer main would extend from this point up into the site and collect wastewater flow from the retail and residential buildings.

Capacity

CBG has estimated the pre and post project wastewater flows for the project using available generation rates and historical EBMUD meter records. Since OLSD does not have wastewater generation rates for non-residential uses, EBMUD domestic water usage records were used to approximate the pre project wastewater flows from 1997 to 2008 to determine the average pre project wastewater flows for the existing Mervyns building. The domestic usage dropped off significantly after 1998 so the data was separated into two periods; 1997 to 1998 and 1999 to 2008. From 1997 to 1998 the average pre project average water usage was 40,879gpd and from 1999 to 2008 it was 14,167gpd. Using this data the pre project peak wet weather wastewater flows were estimated, using a peaking factor of 4.0 to be 163,516gpd using the records from 1997 to 1998 and 56,668gpd using the records from 1999 to 2008. This assumes that the interior domestic water usage and wastewater flows are equal to one another.

OLSD Standards were used to calculate the post project wastewater flows for residential use; however, Water Demand Factors from the City of San Leandro Shoreline Water Supply Assessment Report were used for the retail component to closely resemble the information given by the City to EBMUD for their Water Supply Assessment Report.

Using information from the OLSD base maps, the full flow capacity of the existing 24" trunk sewer in Foothill Boulevard was calculated to be 9.2mgd and that in the 15" trunk sewer in Hazel Avenue was calculated to be 2.6mgd. The estimated increase in wastewater flow was then evaluated as a percentage of the capacity of the existing trunk sewers as a means of quantifying the order of magnitude of the change. The increase in wastewater flow was found to be between 5.2% and 9.2 of the capacity of the existing 15" trunk sewer depending on which period of records and which trunk sewer was used. The impact of the estimated increase in wastewater flow as a percentage of the capacity of the existing trunk sewers will decrease further downstream and would be less than 0.1% in the vicinity of the Wastewater Treatment Plant. This is a very small increase and in our opinion less than the accuracy of the calculations used to estimate it.

Sewer Flow Calculations

Pre-Project

From EBMUD water meter data for 3-3" domestic meters assumes that domestic / indoor water usage is the same as wastewater flow. (See attached Consumption History Table).

1997 – 1998	40,879	gpd Average
	x 4	OLSD Peak Factor
	163,516	gpd Peak Wet Weather
1999 – 2008	14,167	gpd Average
	x 4	OLSD Peak Factor
	56,668	gpd Peak Wet Weather

Post-Project

From OLSD Standards, per capita wastewater flow = 60 gpd for residential. Assume average occupancy of 2 persons per DU.

Average Daily Flow (Residential) = 476 DU x 2 Person / DU x 60 gpd / person
= 57,120 gpd

From San Leandro Shoreline Water Supply Assessment, per capita wastewater flow = 0.22 gal/unit/day for retail.

Average Daily Flow (Retail) = 81,000 SF x 165 gpd / unit / day
= 17,620 gpd

Total Average Daily Flow = 57,120 gpd + 17,620 gpd
= 74,940 gpd

Peak Factor 4
Peak Wet Weather Flow 299,760 gpd

Increased Flow:	**1997 -1998**	**1999-2008**
	299,760	299,760
	- 163,516	- 56,668
	136,244	243,092
Percentage (%) of Full Flow – 15" Capacity 2.6 MGD	5.2%	9.2%

Conclusions

Back in 2011 during CBG's due diligence research, Bennett Cruz of OLSD had indicated that the treatment plant has excess capacity, that there is no limitation on new connections and that he did not foresee any problems in that area.

OLSD staff was not aware of any capacity problems within the existing sanitary sewer system that serves the proposed project site at the time and the estimated increase in wastewater flow from the proposed project equates to somewhere between 5.2% and 9.2% of the full flow capacity of the existing 15" trunk sewer and less than 0.1% further downstream in the vicinity of the Wastewater Treatment Plant. OLSD will require a more detailed sanitary sewer study to confirm that there is adequate capacity within their existing system to serve the proposed project during design, but based on the provided calculations, the post project impact appears to be minimal and should not require off-site improvements to the Hazel Avenue 15" sanitary sewer main.

Attachments

1. Domestic Water Consumption History
2. 15" Full Flow Pipe Calculation

Carlson, Barbee & Gibson, Inc.
CIVIL ENGINEERS • SURVEYORS • PLANNERS

May 26, 2016
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CONSUMPTION HISTORY
MERVYNS HQ SITE
HAYWARD, CALIFORNIA

	3" Domestic				2" Irrigation			
	Meter 3189420/ 70081625	Meter 3270234/ 70081628	Meter 5636436	Subtotal 3" Domestic	Meter 30029054	Meter 31933698	Subtotal 2" Irrigation	TOTAL
1997								
January	18,049	13,850	1,013	32,912	169	24	193	33,105
February	17,952	21,238	1,069	40,259	1,202	614	1,816	42,075
March	18,121	20,944	1,062	40,127	1,182	627	1,809	41,936
April	19,298	18,974	1,147	39,419	4,837	2,144	6,981	46,400
May	18,917	18,700	1,134	38,751	5,115	2,220	7,335	46,086
June	17,902	17,902	923	36,727	5,361	2,269	7,630	44,357
July	18,097	18,628	917	37,642	5,357	2,268	7,625	45,267
August	18,869	21,185	796	40,850	4,995	2,461	7,456	48,306
September	18,800	21,742	773	41,315	4,887	2,394	7,281	48,596
October	18,628	23,478	458	42,564	1,255	458	1,713	44,277
November	18,426	22,689	449	41,564	1,247	449	1,696	43,260
December	18,145	21,209	1,448	40,802	241	24	265	41,067
Total 1997	**221,204**	**240,539**	**11,189**	**472,932**	**35,848**	**15,952**	**51,800**	**524,732**
Average 1997	**18,434**	**20,045**	**932**	**39,411**	**2,987**	**1,329**	**4,317**	**43,728**
1998								
January	18,435	21,402	1,472	41,309	193	24	217	41,526
February	19,902	22,547	1,149	43,598	240	53	293	43,891
March	20,148	22,561	1,158	43,867	241	48	289	44,156
April	21,168	22,515	1,147	44,830	1,147	125	1,272	46,102
May	21,523	22,826	1,158	45,507	1,279	217	1,496	47,003
June	22,415	23,537	1,396	47,348	3,541	2,443	5,984	53,332
July	22,923	23,936	1,399	48,258	3,643	2,461	6,104	54,362
August	24,370	25,070	1,182	50,622	5,139	2,751	7,890	58,512
September	23,537	24,410	1,172	49,119	5,136	2,743	7,879	56,998
October	20,751	22,199	1,689	44,639	1,182	651	1,833	46,472
November	15,932	17,029	1,695	34,656	1,197	673	1,870	36,526
December	6,298	6,684	1,424	14,406	217	145	362	14,768
Total 1998	**237,402**	**254,716**	**16,041**	**508,159**	**23,155**	**12,334**	**35,489**	**543,648**
Average 1998	**19,784**	**21,226**	**1,337**	**42,347**	**1,930**	**1,028**	**2,957**	**45,304**
AVERAGE 1997-1998	***19,109***	***20,636***	***1,135***	***40,879***	***2,458***	***1,179***	***3,637***	***44,516***

	3" Domestic				2" Irrigation			
	Meter 3189420/ 70081625	Meter 3270234/ 70081628	Meter 5636436	Subtotal 3" Domestic	Meter 30029054	Meter 31933698	Subtotal 2" Irrigation	TOTAL
1999								
January	6,322	6,804	1,424	14,550	169	121	290	14,840
February	6,518	7,507	1,523	15,548	321	160	481	16,029
March	6,587	7,480	1,544	15,611	338	169	507	16,118
April	7,156	7,480	1,471	16,107	3,216	1,172	4,388	20,495
May	7,408	7,432	1,472	16,312	3,450	1,255	4,705	21,017
June	8,178	7,206	1,396	16,780	4,787	1,845	6,632	23,412
July	8,518	7,456	1,399	17,373	4,753	1,834	6,587	23,960
August	9,507	8,131	1,472	19,110	3,692	1,737	5,429	24,539
September	9,425	8,178	1,496	19,099	3,640	1,695	5,335	24,434
October	9,097	8,276	1,448	18,821	1,327	941	2,268	21,089
November	8,602	7,804	1,446	17,852	1,346	947	2,293	20,145
December	7,190	6,563	1,231	14,984	579	24	603	15,587
Total 1999	**94,508**	**90,317**	**17,322**	**202,147**	**27,618**	**11,900**	**39,518**	**241,665**
Average 1999	**7,876**	**7,526**	**1,444**	**16,846**	**2,302**	**992**	**3,293**	**20,139**
2000								
January	7,215	6,684	1,231	15,130	579	24	603	15,733
February	7,248	7,119	1,393	15,760	619	181	800	16,560
March	7,287	7,239	1,399	15,925	627	169	796	16,721
April	7,779	7,879	1,521	17,179	3,341	1,222	4,563	21,742
May	7,818	7,625	1,544	16,987	3,619	132	3,751	20,738
June	7,929	6,707	1,321	15,957	3,939	2,568	6,507	22,464
July	8,035	6,829	1,303	16,167	3,933	2,606	6,539	22,706
August	8,493	7,166	1,448	17,107	3,233	2,606	5,839	22,946
September	8,328	7,106	1,471	16,905	3,191	2,568	5,759	22,664
October	7,287	6,732	1,424	15,443	2,413	1,110	3,523	18,966
November	6,557	5,984	1,446	13,987	2,419	1,122	3,541	17,528
December	4,681	4,150	1,279	10,110	1,303	314	1,617	11,727
Total 2000	**88,657**	**81,220**	**16,780**	**186,657**	**29,216**	**14,622**	**43,838**	**230,495**
Average 2000	**7,388**	**6,768**	**1,398**	**15,555**	**2,435**	**1,219**	**3,653**	**19,208**
2001								
January	5,381	4,922	1,375	11,678	1,375	338	1,713	13,391
February	6,572	6,438	1,549	14,559	534	321	855	15,414
March	7,384	6,370	1,568	15,322	531	314	845	16,167
April	7,305	6,582	1,546	15,433	1,920	1,346	3,266	18,699
May	7,456	6,708	1,544	15,708	2,003	1,399	3,402	19,110
June	7,904	7,031	1,496	16,431	4,338	3,291	7,629	24,060
July	8,035	7,166	1,496	16,697	4,319	3,282	7,601	24,298
August	8,566	7,625	1,593	17,784	3,426	3,113	6,539	24,323
September	7,929	7,056	1,571	16,556	3,316	2,992	6,308	22,864
October	6,249	5,598	1,448	13,295	1,906	1,110	3,016	16,311
November	6,258	5,585	1,446	13,289	1,895	1,097	2,992	16,281
December	6,249	5,598	1,448	13,295	362	0	362	13,657
Total 2001	**85,288**	**76,679**	**18,080**	**180,047**	**25,925**	**18,603**	**44,528**	**224,575**
Average 2001	**7,107**	**6,390**	**1,507**	**15,004**	**2,160**	**1,550**	**3,711**	**18,715**

	3" Domestic				2" Irrigation			
	Meter 3189420/ 70081625	Meter 3270234/ 70081628	Meter 5636436	Subtotal 3" Domestic	Meter 30029054	Meter 31933698	Subtotal 2" Irrigation	TOTAL
2002								
January	6,153	5,501	1,472	13,126	386	0	386	13,512
February	5,850	5,209	1,683	12,742	427	27	454	13,196
March	5,984	5,333	1,665	12,982	410	24	434	13,416
April	6,533	5,884	1,695	14,112	3,191	1,471	4,662	18,774
May	6,853	6,201	1,665	14,719	3,450	1,786	5,236	19,955
June	7,754	7,006	1,621	16,381	2,967	6,857	9,824	26,205
July	7,745	7,022	1,617	16,384	3,016	6,756	9,772	26,156
August	7,697	6,949	1,593	16,239	3,837	5,501	9,338	25,577
September	7,605	6,882	1,571	16,058	3,815	5,411	9,226	25,284
October	7,239	6,539	1,520	15,298	3,837	4,440	8,277	23,575
November	6,533	5,909	1,546	13,988	3,565	4,139	7,704	21,692
December	5,115	4,585	1,810	11,510	1,954	2,172	4,126	15,636
Total 2002	**81,061**	**73,020**	**19,458**	**173,539**	**30,855**	**38,584**	**69,439**	**242,978**
Average 2002	**6,755**	**6,085**	**1,622**	**14,462**	**2,571**	**3,215**	**5,787**	**20,248**
2003								
January	5,308	4,753	1,834	11,895	1,930	2,147	4,077	15,972
February	5,931	5,370	1,923	13,224	1,549	1,469	3,018	16,242
March	6,009	5,477	1,906	13,392	1,544	1,472	3,016	16,408
April	6,433	5,884	1,745	14,062	549	1,421	1,970	16,032
May	6,853	6,225	1,761	14,839	724	1,544	2,268	17,107
June	7,829	7,131	1,745	16,705	3,964	3,216	7,180	23,885
July	7,890	7,215	1,761	16,866	3,933	3,257	7,190	24,056
August	8,107	7,480	1,882	17,469	2,823	4,681	7,504	24,973
September	7,929	7,330	1,845	17,104	2,768	4,638	7,406	24,510
October	7,215	6,756	989	14,960	1,641	2,727	4,368	19,328
November	6,258	5,859	873	12,990	1,496	2,369	3,865	16,855
December	4,367	4,054	265	8,686	651	0	651	9,337
Total 2003	**80,129**	**73,534**	**18,529**	**172,192**	**23,572**	**28,941**	**52,513**	**224,705**
Average 2003	**6,677**	**6,128**	**1,544**	**14,349**	**1,964**	**2,412**	**4,376**	**18,725**
2004								
January	4,802	4,464	314	9,580	651	48	699	10,279
February	7,067	6,655	1,444	15,166	387	1,212	1,599	16,765
March	7,118	6,708	1,448	15,274	386	1,231	1,617	16,891
April	7,330	6,907	1,222	15,459	2,119	3,915	6,034	21,493
May	7,359	6,925	1,182	15,466	2,268	4,102	6,370	21,836
June	7,380	6,907	1,297	15,584	2,917	5,361	8,278	23,862
July	7,480	6,997	1,279	15,756	2,920	5,429	8,349	24,105
August	7,697	7,239	1,279	16,215	2,968	6,635	9,603	25,818
September	7,455	6,981	1,297	15,733	2,942	6,483	9,425	25,158
October	6,587	6,201	1,231	14,019	1,255	2,268	3,523	17,542
November	5,959	5,585	1,247	12,791	1,222	2,219	3,441	16,232
December	4,633	4,295	1,158	10,086	700	555	1,255	11,341
Total 2004	**80,867**	**75,864**	**14,398**	**171,129**	**20,735**	**39,458**	**60,193**	**231,322**
Average 2004	**6,739**	**6,322**	**1,200**	**14,261**	**1,728**	**3,288**	**5,016**	**19,277**

	3" Domestic				2" Irrigation			
	Meter 3189420/ 70081625	Meter 3270234/ 70081628	Meter 5636436	Subtotal 3" Domestic	Meter 30029054	Meter 31933698	Subtotal 2" Irrigation	TOTAL
2005								
January	5,139	4,753	1,231	11,123	724	603	1,327	12,450
February	5,690	5,343	1,282	12,315	962	828	1,790	14,105
March	5,719	5,357	1,279	12,355	965	820	1,785	14,140
April	5,760	5,411	1,371	12,542	1,421	1,820	3,241	15,783
May	5,912	5,574	1,399	12,885	1,496	2,003	3,499	16,384
June	6,458	6,059	1,446	13,963	2,294	5,959	8,253	22,216
July	6,563	6,177	1,424	14,164	2,292	5,960	8,252	22,416
August	7,070	6,587	1,255	14,912	2,292	6,901	9,193	24,105
September	6,931	6,483	1,247	14,661	2,294	6,931	9,225	23,886
October	6,515	6,081	1,303	13,899	1,665	4,512	6,177	20,076
November	6,208	5,710	1,321	13,239	1,621	4,363	5,984	19,223
December	5,260	4,802	2,444	12,506	290	0	290	12,796
Total 2005	**73,225**	**68,337**	**17,002**	**158,564**	**18,316**	**40,700**	**59,016**	**217,580**
Average 2005	**6,102**	**5,695**	**1,417**	**13,214**	**1,526**	**3,392**	**4,918**	**18,132**
2006								
January	5,405	4,971	2,220	12,596	338	0	338	12,934
February	6,037	5,557	1,523	13,117	1,282	27	1,309	14,426
March	6,177	5,694	1,520	13,391	1,279	24	1,303	14,694
April	7,281	6,832	1,396	15,509	1,845	3,142	4,987	20,496
May	7,577	7,118	1,399	16,094	1,906	3,475	5,381	21,475
June	8,502	8,029	1,272	17,803	3,266	6,832	10,098	27,901
July	8,493	8,035	1,279	17,807	3,306	6,949	10,255	28,062
August	8,421	7,987	1,303	17,711	2,702	7,070	9,772	27,483
September	8,228	7,081	1,297	16,606	2,693	7,081	9,774	26,380
October	7,022	2,630	1,062	10,714	1,906	3,668	5,574	16,288
November	6,433	4,338	1,047	11,818	1,920	3,665	5,585	17,403
December	5,164	8,349	1,134	14,647	531	362	893	15,540
Total 2006	**84,740**	**76,621**	**16,452**	**177,813**	**22,974**	**42,295**	**65,269**	**243,082**
Average 2006	**7,062**	**6,385**	**1,371**	**14,818**	**1,915**	**3,525**	**5,439**	**20,257**
2007								
January	5,260	7,577	1,110	13,947	483	193	676	14,623
February	5,557	5,049	1,042	11,648	1,736	1,282	3,018	14,666
March	5,670	5,188	1,062	11,920	1,737	1,279	3,016	14,936
April	6,233	5,859	1,047	13,139	1,596	2,394	3,990	17,129
May	6,322	5,887	1,038	13,247	1,713	2,702	4,415	17,662
June	6,408	6,084	1,072	13,564	3,191	4,563	7,754	21,318
July	6,515	6,201	1,110	13,826	3,161	4,874	8,035	21,861
August	6,925	6,611	1,399	14,935	2,944	6,901	9,845	24,780
September	6,557	6,258	1,421	14,236	2,867	6,458	9,325	23,561
October	5,743	5,477	1,399	12,619	1,882	2,365	4,247	16,866
November	5,236	4,962	1,396	11,594	1,845	2,294	4,139	15,733
December	4,271	4,005	1,134	9,410	531	121	652	10,062
Total 2007	**70,697**	**69,158**	**14,230**	**154,085**	**23,686**	**35,426**	**59,112**	**213,197**
Average 2007	**5,891**	**5,763**	**1,186**	**12,840**	**1,974**	**2,952**	**4,926**	**17,766**

	3" Domestic				2" Irrigation			
	Meter 3189420/ 70081625	Meter 3270234/ 70081628	Meter 5636436	Subtotal 3" Domestic	Meter 30029054	Meter 31933698	Subtotal 2" Irrigation	TOTAL
2008								
January	4,440	4,150	1,255	9,845	483	145	628	10,473
February	4,875	4,617	1,780	11,272	181	206	387	11,659
March	5,115	4,826	1,761	11,702	386	434	820	12,522
April	5,884	5,585	1,671	13,140	3,291	3,640	6,931	20,071
May	5,815	5,550	1,641	13,006	3,233	3,595	6,828	19,834
June	5,710	5,460	1,147	12,317	2,768	2,992	5,760	18,077
July	5,815	5,574	1,182	12,571	2,727	2,992	5,719	18,290
August	6,105	5,887	869	12,861	3,595	3,716	7,311	20,172
September	5,435	5,261	648	11,344	4,014	3,890	7,904	19,248
October	3,716	3,450	434	7,600	3,475	2,292	5,767	13,367
November	2,867	2,643	374	5,884	3,017	1,995	5,012	10,896
December	1,182	1,013	97	2,292	24	217	241	2,533
Total 2008	**56,959**	**54,016**	**12,859**	**123,834**	**27,194**	**26,114**	**53,308**	**177,142**
Average 2008	**4,747**	**4,501**	**1,072**	**10,320**	**2,266**	**2,176**	**4,442**	**14,762**
AVERAGE 1999-2008	***6,634***	***6,156***	***1,376***	***14,167***	***2,084***	***2,472***	***4,556***	***18,723***

Manning Pipe Calculator

15" FULL FLOW

Given Input Data:

Shape	Circular
Solving for	Flowrate
Diameter	15.0000 in
Depth	15.0000 in
Slope	0.0040 ft/ft
Manning's n	0.0130

Computed Results:

Flowrate	4.0855 cfs = 2.6 MGD
Area	1.2272 ft2
Wetted Area	1.2272 ft2
Wetted Perimeter	47.1239 in
Perimeter	47.1239 in
Velocity	3.3292 fps
Hydraulic Radius	3.7500 in
Percent Full	100.0000 %
Full flow Flowrate	4.0855 cfs
Full flow velocity	3.3292 fps

Critical Information

Critical depth	11.6784 in
Critical slope	0.0071 ft/ft
Critical velocity	5.5117 fps
Critical area	1.0488 ft2
Critical perimeter	31.9187 in
Critical hydraulic radius	4.7318 in
Critical top width	15.0000 in
Specific energy	1.5169 ft
Minimum energy	1.4598 ft
Froude number	0.6917
Flow condition	Subcritical