

MEMORANDUM

Date: 11/30/2023

To: Town of Vestal

From: Tim Steed, PE (HUNT)
Ben Wolfling, PE (HUNT)

Project: Bunn Hill Development Sanitary Analysis

Project No.: 2384-020

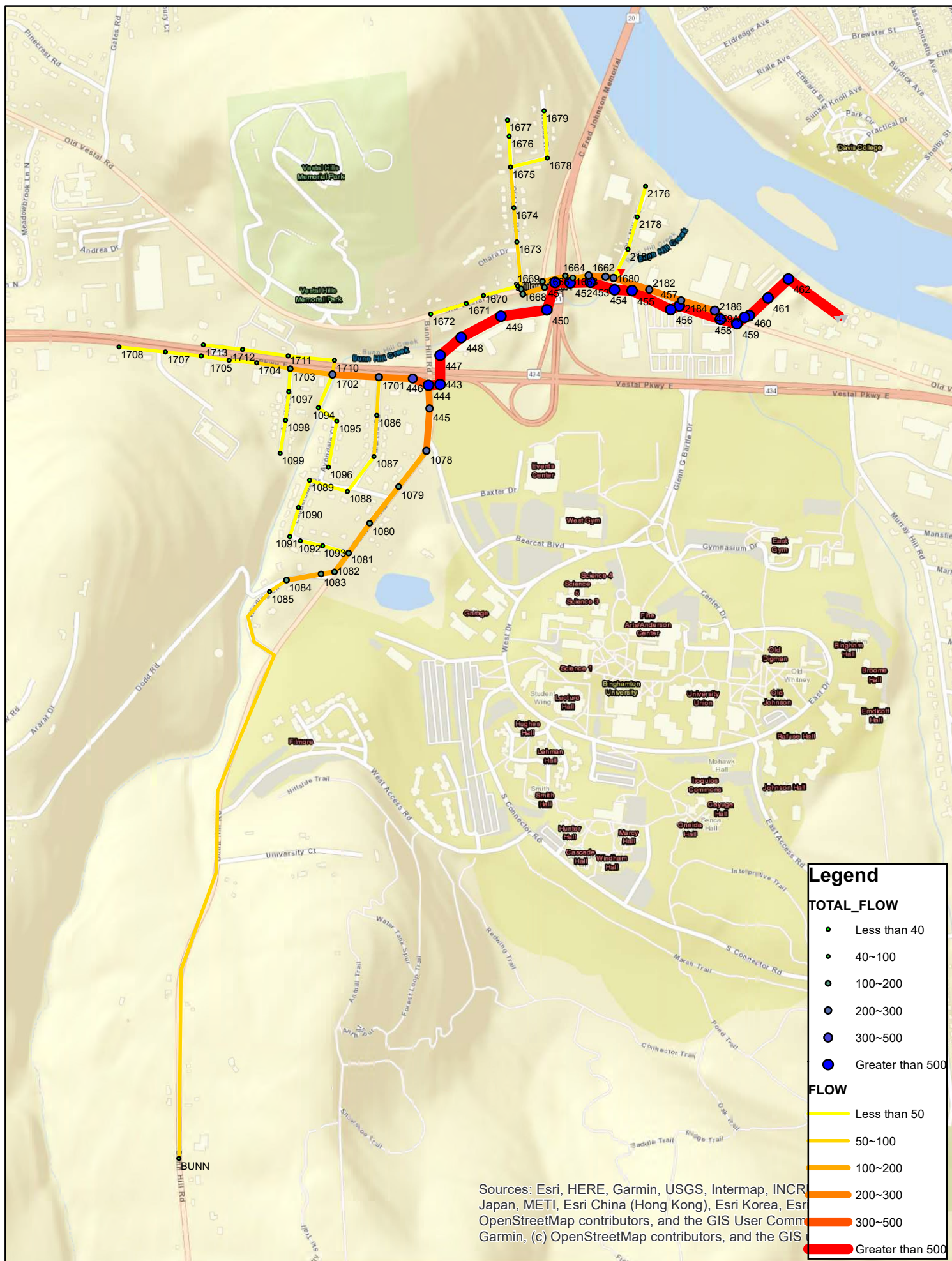


The purpose of this technical memorandum is to provide an analysis of the proposed addition of the Bunn Hill Development (the "Development") sanitary flows to the existing Town of Vestal sanitary sewer system. The Development proposes an estimated average daily flow of 77,000 gpd (53.5 gpm) to be conveyed through approximately 4,500 linear feet of 8-inch SDR-35 PVC pipe along Bunn Hill Road to the existing sanitary sewer system at a manhole on Winding Lane. This flow rate would account for a peaking factor of 3.89 and a peak flow rate of 208 gpm.

Referencing a previous Sewer Modelling/I&I report done by initially completed by Hunt in 2016, flows for groundwater infiltration and wet weather inflows were calculated and distributed across the entire sewershed subbasin servicing the Bunn Hill area. Groundwater infiltration was calculated to be 0.30 MGD (208.33 gpm), wet weather inflow was calculated to be 1.03 MGD (715.27 gpm), and dry weather flows (DWF) were calculated based on average metered data for water usage. These flows were assigned to each of the 83 junction nodes within the InfoSWMM model HUNT had previously developed. The sum of the inflow and infiltration (I&I) flows divided among the 83 junction nodes results in a total inflow of 11.0 gpm, as shown below.

$$\frac{(300000 \frac{\text{gal}}{\text{day}} + 1,030,000 \frac{\text{gal}}{\text{day}})}{(24 \frac{\text{hr}}{\text{day}})(60 \frac{\text{min}}{\text{hr}})} = 923.6 \text{ gpm} \qquad \frac{923.6 \text{ gpm}}{83 \text{ nodes}} = 11.13 \frac{\text{gpm}}{\text{node}}$$

The model was then run using existing manhole rim and invert information obtained from lidar data in addition to the rim and invert data noted on the plans for the proposed development transmission sewer. An existing residential diurnal curve was used in the 24-hour time series to determine the time of the highest flows, which occurred at 1:00 pm. The resulting data for all nodes is noted in the attached table, with a map of the sewershed subbasin included for reference. No surcharging at any manholes was observed during the modelling of the new flows from the proposed development. This analysis is not representative of influent flow rate modifications at the WWTP during periods of flooding events, etc.



Junction Report

		ID	Maximum Depth (ft)	Maximum HGL (ft)	Freeboard (ft)	Max.Depth Day-Time (hr:min)	Maximum Lateral Inflow (cfs)	Maximum Total Inflow (cfs)	Lateral Inflow Volume (MG)	Total Inflow Volume (MG)	Flow Volume Difference (cfs)	Total Surcharge Time (hr:min)	Max.Surcharge Height Above Crown (ft)	Min.Surcharge Depth Below Rim (ft)
1		462	0.3934	820.7134	11.6066	0 - 13:03 hrs	11.1300	1,065.3795	0.0160	1.4193	792.1809	0.0000	0.0000	0.0000
2		461	0.6516	822.5516	12.4484	0 - 13:03 hrs	11.1300	1,054.2496	0.0160	1.4042	852.6902	0.0000	0.0000	0.0000
3		460	0.5791	823.8991	14.5009	0 - 13:03 hrs	11.1300	1,043.1196	0.0160	1.3887	499.2965	0.0000	0.0000	0.0000
4		459A	0.3677	824.4277	13.1323	0 - 13:03 hrs	11.1300	1,031.9896	0.0160	1.3728	165.1803	0.0000	0.0000	0.0000
5		459	0.3478	827.9778	14.0222	0 - 13:03 hrs	15.6000	1,020.8596	0.0192	1.3570	231.7169	0.0000	0.0000	0.0000
6		458	0.3743	832.6343	10.3657	0 - 13:03 hrs	17.1500	1,005.2597	0.0204	1.3383	529.1244	0.0000	0.0000	0.0000
7		457	0.6037	834.1038	12.9962	0 - 13:03 hrs	11.1300	686.7243	0.0160	0.8939	808.4246	0.0000	0.0000	0.0000
8		455	0.4361	836.9961	7.4039	0 - 13:03 hrs	11.1300	664.4643	0.0160	0.8626	651.5133	0.0000	0.0000	0.0000
9		454	0.3340	840.6541	8.2460	0 - 13:02 hrs	11.1300	653.3343	0.0160	0.8469	305.5676	0.0000	0.0000	0.0000
10		453	0.2248	853.7949	9.8051	0 - 13:02 hrs	11.1300	642.2043	0.0160	0.8311	131.6331	0.0000	0.0000	0.0000
11		452	0.2584	856.8184	8.4816	0 - 13:02 hrs	11.1300	631.0743	0.0160	0.8152	119.9323	0.0000	0.0000	0.0000
12		451	0.4660	858.2759	6.7241	0 - 13:02 hrs	11.1300	619.9444	0.0160	0.7997	394.0919	0.0000	0.0000	0.0000
13		450	0.3324	861.7324	4.2676	0 - 13:00 hrs	11.1300	608.8144	0.0160	0.7843	524.9913	0.0000	0.0000	0.0000
14		449	0.4920	863.7321	4.2679	0 - 13:00 hrs	14.0800	597.6845	0.0181	0.7689	1,013.4059	0.0000	0.0000	0.0000
15		448	0.4484	865.4384	5.7617	0 - 13:00 hrs	31.4300	583.6045	0.0306	0.7507	698.1818	0.0000	0.0000	0.0000
16		447	30.2344	876.8744	0.7656	0 - 13:00 hrs	11.1300	552.1746	0.0160	0.7406	19,697.4565	0.0000	0.0000	0.0000
17		443	0.1815	879.3215	8.1785	0 - 13:00 hrs	11.1300	541.0445	0.0160	0.7247	152.6213	0.0000	0.0000	0.0000
18		444	0.2283	882.4283	7.8716	0 - 13:00 hrs	19.7200	529.9146	0.0222	0.7087	45.2004	0.0000	0.0000	0.0000
19		445	0.2594	883.7794	7.2206	0 - 13:00 hrs	11.1300	209.7899	0.0160	0.2706	87.6455	0.0000	0.0000	0.0000
20		446	0.2873	884.7573	6.2427	0 - 12:18 hrs	11.1300	300.4047	0.0160	0.4163	309.2671	0.0000	0.0000	0.0000
21		1078	0.3598	886.4598	14.0402	0 - 13:00 hrs	11.3357	198.6600	0.0162	0.2550	465.7286	0.0000	0.0000	0.0000
22		1079	0.1765	903.3465	10.4535	0 - 13:00 hrs	11.6647	187.3244	0.0166	0.2390	300.5714	0.0000	0.0000	0.0000
23		1080	0.1763	913.9263	11.8737	0 - 13:00 hrs	12.1034	175.6597	0.0170	0.2225	173.8661	0.0000	0.0000	0.0000
24		1081	0.1563	925.3763	9.9237	0 - 13:00 hrs	11.1300	163.5563	0.0160	0.2055	105.4111	0.0000	0.0000	0.0000
25		1082	0.1255	936.3555	8.4445	0 - 13:00 hrs	11.1300	129.2340	0.0160	0.1565	47.7877	0.0000	0.0000	0.0000
26		1083	0.1086	946.3386	9.9614	0 - 13:00 hrs	11.1300	118.1040	0.0160	0.1405	50.1186	0.0000	0.0000	0.0000
27		1084	0.0995	975.9995	8.8005	0 - 13:00 hrs	11.1300	106.9740	0.0160	0.1245	48.7624	0.0000	0.0000	0.0000
28		1085	0.0982	990.2781	9.4219	0 - 13:00 hrs	11.3631	95.8441	0.0163	0.1090	553.3635	0.0000	0.0000	0.0000
29		1086	0.1295	894.5295	9.7704	0 - 12:25 hrs	11.7881	70.3721	0.0167	0.0996	120.1942	0.0000	0.0000	0.0000
30		1087	0.0993	904.9993	9.8007	0 - 12:18 hrs	12.2954	58.5840	0.0172	0.0830	88.2502	0.0000	0.0000	0.0000
31		1088	0.0837	919.2337	15.0663	0 - 12:15 hrs	11.6647	46.2887	0.0166	0.0658	66.9047	0.0000	0.0000	0.0000
32		1089	0.3912	924.5712	3.9288	0 - 12:11 hrs	11.4179	34.6239	0.0163	0.0494	226.4401	0.0000	0.0000	0.0000
33		1090	0.0581	935.2381	10.3619	0 - 12:22 hrs	11.6099	23.2060	0.0165	0.0330	30.6574	0.0000	0.0000	0.0000
34		1091	0.0411	947.7011	6.8989	0 - 12:07 hrs	11.5962	11.5962	0.0165	0.0165	0.0000	0.0000	0.0000	0.0000
35		1092	0.0503	940.9003	11.4998	0 - 00:02 hrs	11.5687	11.5687	0.0165	0.0165	0.0000	0.0000	0.0000	0.0000
36		1093	0.0592	936.5092	8.1909	0 - 12:34 hrs	11.6236	23.1950	0.0165	0.0330	37.9603	0.0000	0.0000	0.0000
37		1094	0.0865	897.0464	13.9536	0 - 12:48 hrs	11.1300	34.6925	0.0160	0.0494	49.1541	0.0000	0.0000	0.0000
38		1096	0.0453	917.8853	9.4147	0 - 12:26 hrs	11.7196	11.7196	0.0166	0.0166	0.0000	0.0000	0.0000	0.0000
39		1095	0.0590	905.0990	9.2010	0 - 12:23 hrs	11.8429	23.5625	0.0168	0.0334	34.3477	0.0000	0.0000	0.0000
40		1097	0.0791	903.9791	6.8209	0 - 00:53 hrs	11.1300	33.3900	0.0160	0.0481	39.0958	0.0000	0.0000	0.0000
41		1098	0.0635	910.9634	8.3365	0 - 00:48 hrs	11.1300	22.2600	0.0160	0.0321	35.0143	0.0000	0.0000	0.0000
42		1099	0.0428	921.4928	7.7072	0 - 00:28 hrs	11.1300	11.1300	0.0160	0.0160	0.0000	0.0000	0.0000	0.0000
43		456	0.4266	834.5266	10.4735	0 - 13:03 hrs	11.1300	675.5943	0.0160	0.8782	502.5274	0.0000	0.0000	0.0000
44		1661	0.2406	840.0806	7.2194	0 - 13:00 hrs	11.2000	216.9556	0.0161	0.3094	109.2690	0.0000	0.0000	0.0000
45		1662	0.2265	842.2565	5.7435	0 - 13:00 hrs	11.1300	205.7556	0.0160	0.2933	63.7628	0.0000	0.0000	0.0000
46		1663	0.1435	856.2235	6.2766	0 - 13:00 hrs	11.1300	194.6256	0.0160	0.2774	85.5477	0.0000	0.0000	0.0000
47		1664	0.2017	858.0516	6.1484	0 - 13:00 hrs	11.1300	183.4956	0.0160	0.2614	90.3563	0.0000	0.0000	0.0000
48		1665	0.3118	858.9618	6.0382	0 - 13:00 hrs	11.1300	172.3656	0.0160	0.2455	144.0431	0.0000	0.0000	0.0000
49		1666	0.2779	859.1179	4.3821	0 - 13:00 hrs	11.1300	161.2356	0.0160	0.2295	69.2933	0.0000	0.0000	0.0000

Junction Report

		ID	Maximum Depth (ft)	Maximum HGL (ft)	Freeboard (ft)	Max.Depth Day-Time (ft)	Maximum Lateral Inflow (MGD)	Maximum Total Inflow (MGD)	Lateral Inflow Volume (MGD)	Total Inflow Volume (MGD)	Flow Volume Difference (MGD)	Total Surcharge Time (min)	Max.Surcharge Height Above Crown (ft)	Min.Surcharge Depth Below Rim (ft)
50		1667	0.2089	861.0189	5.6812	0 - 13:00 hrs	11.1300	150.1056	0.0160	0.2136	92.4234	0.0000	0.0000	0.0000
51		1668	0.2841	862.0741	6.8259	0 - 13:00 hrs	11.6373	138.9756	0.0166	0.1978	217.5079	0.0000	0.0000	0.0000
52		1669	0.1529	862.1629	9.3371	0 - 12:33 hrs	11.4453	45.4660	0.0164	0.0651	83.1104	0.0000	0.0000	0.0000
53		1670	0.0857	867.8157	9.7842	0 - 12:55 hrs	11.3494	34.0207	0.0163	0.0487	47.4615	0.0000	0.0000	0.0000
54		1671	0.0655	871.7955	8.8045	0 - 12:55 hrs	11.1300	22.6713	0.0160	0.0325	10.9880	0.0000	0.0000	0.0000
55		1672	0.0406	889.7706	8.5294	0 - 12:47 hrs	11.5413	11.5413	0.0165	0.0165	0.0000	0.0000	0.0000	0.0000
56		1673	0.1062	879.6162	10.8838	0 - 13:00 hrs	11.6373	81.8723	0.0166	0.1162	98.0425	0.0000	0.0000	0.0000
57		1674	0.0840	904.5340	11.2660	0 - 13:00 hrs	12.2680	70.2350	0.0172	0.0997	60.9728	0.0000	0.0000	0.0000
58		1675	0.0693	950.0193	9.4807	0 - 13:00 hrs	11.5276	57.9671	0.0164	0.0825	68.9102	0.0000	0.0000	0.0000
59		1676	0.0460	983.3860	10.5440	0 - 00:02 hrs	11.8155	23.3020	0.0167	0.0331	15.9244	0.0000	0.0000	0.0000
60		1677	0.0409	990.4709	14.7291	0 - 00:01 hrs	11.4865	11.4865	0.0164	0.0164	0.0000	0.0000	0.0000	0.0000
61		1678	0.1111	951.3411	10.6589	0 - 13:00 hrs	11.5824	23.1375	0.0165	0.0330	102.8995	0.0000	0.0000	0.0000
62		1679	0.0738	952.9138	4.5862	0 - 12:40 hrs	11.5550	11.5550	0.0165	0.0165	0.0000	0.0000	0.0000	0.0000
63		1680	0.3054	839.3054	9.8947	0 - 13:00 hrs	11.1300	267.1356	0.0160	0.3775	565.3051	0.0000	0.0000	0.0000
64		1701	0.2569	889.8769	7.3231	0 - 12:18 hrs	12.6700	289.2747	0.0171	0.4007	459.1650	0.0000	0.0000	0.0000
65		1702	0.3341	891.5341	11.7659	0 - 12:11 hrs	11.1300	206.2325	0.0160	0.2846	697.4554	0.0000	0.0000	0.0000
66		1703	0.1429	899.1229	7.2771	0 - 07:26 hrs	11.1300	104.3000	0.0160	0.1470	174.8000	0.0000	0.0000	0.0000
67		1704	0.1652	900.4453	8.9548	0 - 07:20 hrs	11.1300	59.7800	0.0160	0.0830	128.3114	0.0000	0.0000	0.0000
68		1705	0.1449	901.4849	6.5151	0 - 17:38 hrs	11.1300	48.6500	0.0160	0.0671	91.3217	0.0000	0.0000	0.0000
69		1706	0.0676	915.7576	6.4424	0 - 11:30 hrs	15.2600	37.5200	0.0190	0.0510	36.7838	0.0000	0.0000	0.0000
70		1707	0.0590	927.8690	6.1310	0 - 04:22 hrs	11.1300	22.2600	0.0160	0.0321	42.1667	0.0000	0.0000	0.0000
71		1708	0.0440	941.1439	6.8561	0 - 00:59 hrs	11.1300	11.1300	0.0160	0.0160	0.0000	0.0000	0.0000	0.0000
72		1710	0.1032	893.7731	9.2269	0 - 09:23 hrs	11.1300	56.1100	0.0160	0.0723	55.9112	0.0000	0.0000	0.0000
73		1711	0.1203	897.3403	9.4597	0 - 11:41 hrs	22.7200	44.9800	0.0244	0.0564	104.6359	0.0000	0.0000	0.0000
74		1712	0.1015	898.9015	12.4985	0 - 00:09 hrs	11.1300	22.2600	0.0160	0.0320	48.3381	0.0000	0.0000	0.0000
75		1713	0.0491	913.3291	8.1709	0 - 01:31 hrs	11.1300	11.1300	0.0160	0.0160	0.0000	0.0000	0.0000	0.0000
76		2176	0.0690	848.2690	7.7310	0 - 18:30 hrs	16.6100	16.6100	0.0200	0.0200	0.0000	0.0000	0.0000	0.0000
77		2178	0.0896	845.1896	8.8104	0 - 16:21 hrs	11.3100	27.9200	0.0162	0.0361	51.9508	0.0000	0.0000	0.0000
78		2180	0.1042	842.1142	7.8858	0 - 13:26 hrs	11.1300	39.0500	0.0160	0.0521	40.8412	0.0000	0.0000	0.0000
79		2182	0.3600	836.7601	8.2399	0 - 13:00 hrs	11.9900	279.1256	0.0166	0.3936	406.1089	0.0000	0.0000	0.0000
80		2184	0.3588	835.2588	10.2412	0 - 13:00 hrs	11.1300	290.2556	0.0160	0.4092	422.4519	0.0000	0.0000	0.0000
81		2186	0.3072	833.5071	10.4929	0 - 13:00 hrs	11.1300	301.3856	0.0160	0.4248	100.1248	0.0000	0.0000	0.0000
82		BUNN	0.0958	1,363.0658	0.5709	0 - 13:00 hrs	84.4810	84.4810	0.0931	0.0931	0.0000	0.0000	0.0000	0.0000