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Science Park Square Brighton East Sussex	4501_Marmont_EastPreston Marmont Developments Ltd Proposed Calculations - REV B													
Date 12/07/2019	Designed by SD													
File 4501_Marmont_EastPreston_DrainageNetwork_...	Checked by													
XP Solutions		Network 2018.1												
<u>Time Area Diagram for Storm</u> <table border="1"> <thead> <tr> <th>Time (mins)</th> <th>Area (ha)</th> <th>Time (mins)</th> <th>Area (ha)</th> <th>Time (mins)</th> <th>Area (ha)</th> </tr> </thead> <tbody> <tr> <td>0-4</td> <td>0.057</td> <td>4-8</td> <td>0.059</td> <td>8-12</td> <td>0.000</td> </tr> </tbody> </table> Total Area Contributing (ha) = 0.116 Total Pipe Volume (m³) = 2.716			Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)	0-4	0.057	4-8	0.059	8-12	0.000
Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)									
0-4	0.057	4-8	0.059	8-12	0.000									
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STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	7.320	0.049	150.0	0.002	4.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	11.626	0.078	150.0	0.002	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	7.026	0.047	150.0	0.002	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.003	17.869	0.119	150.0	0.014	0.00	0.0	0.600	o	150	Pipe/Conduit	
2.000	12.288	0.154	80.0	0.005	4.00	0.0	0.600	o	150	Pipe/Conduit	
2.001	13.672	0.137	100.0	0.006	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E I.Area (ha)	E Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	4.15	7.430	0.002	0.0	0.0	0.0	0.82	14.5	0.2
1.001	50.00	4.39	7.381	0.004	0.0	0.0	0.0	0.82	14.5	0.5
1.002	50.00	4.53	7.303	0.006	0.0	0.0	0.0	0.82	14.5	0.8
1.003	50.00	4.89	7.253	0.020	0.0	0.0	0.0	0.82	14.5	2.7
2.000	50.00	4.18	7.500	0.005	0.0	0.0	0.0	1.12	19.9	0.6
2.001	50.00	4.41	7.346	0.011	0.0	0.0	0.0	1.00	17.8	1.5

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PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.004	11.946	0.000	0.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
3.000	10.882	0.109	100.0	0.004	4.00	0.0	0.600	o	150	Pipe/Conduit	
3.001	8.274	0.083	100.0	0.004	0.00	0.0	0.600	o	150	Pipe/Conduit	
3.002	6.502	0.000	0.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
4.000	11.015	0.110	100.0	0.004	4.00	0.0	0.600	o	150	Pipe/Conduit	
4.001	7.893	0.079	100.0	0.004	0.00	0.0	0.600	o	150	Pipe/Conduit	
<u>Network Results Table</u>											
PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)	
1.004	50.00	7.04	7.420	0.031	0.0	0.0	0.0	0.09	1.6«	4.2	
3.000	50.00	4.18	7.500	0.004	0.0	0.0	0.0	1.00	17.8	0.6	
3.001	50.00	4.32	7.391	0.008	0.0	0.0	0.0	1.00	17.8	1.1	
3.002	50.00	5.49	7.420	0.008	0.0	0.0	0.0	0.09	1.6	1.1	
4.000	50.00	4.18	7.500	0.004	0.0	0.0	0.0	1.00	17.8	0.5	
4.001	50.00	4.31	7.390	0.008	0.0	0.0	0.0	1.00	17.8	1.1	
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Area Summary for Storm <table><thead><tr><th>Pipe Number</th><th>PIMP Type</th><th>PIMP Name</th><th>PIMP (%)</th><th>Gross Area (ha)</th><th>Imp. Area (ha)</th><th>Pipe Total (ha)</th></tr></thead><tbody><tr><td>1.000</td><td>User</td><td>-</td><td>100</td><td>0.002</td><td>0.002</td><td>0.002</td></tr><tr><td>1.001</td><td>User</td><td>-</td><td>100</td><td>0.002</td><td>0.002</td><td>0.002</td></tr><tr><td>1.002</td><td>User</td><td>-</td><td>100</td><td>0.002</td><td>0.002</td><td>0.002</td></tr><tr><td>1.003</td><td>User</td><td>-</td><td>100</td><td>0.003</td><td>0.003</td><td>0.003</td></tr><tr><td></td><td>User</td><td>-</td><td>100</td><td>0.011</td><td>0.011</td><td>0.014</td></tr><tr><td>2.000</td><td>User</td><td>-</td><td>100</td><td>0.005</td><td>0.005</td><td>0.005</td></tr><tr><td>2.001</td><td>User</td><td>-</td><td>100</td><td>0.006</td><td>0.006</td><td>0.006</td></tr><tr><td>1.004</td><td>-</td><td>-</td><td>100</td><td>0.000</td><td>0.000</td><td>0.000</td></tr><tr><td>3.000</td><td>User</td><td>-</td><td>100</td><td>0.004</td><td>0.004</td><td>0.004</td></tr><tr><td>3.001</td><td>User</td><td>-</td><td>100</td><td>0.004</td><td>0.004</td><td>0.004</td></tr><tr><td>3.002</td><td>-</td><td>-</td><td>100</td><td>0.000</td><td>0.000</td><td>0.000</td></tr><tr><td>4.000</td><td>User</td><td>-</td><td>100</td><td>0.004</td><td>0.004</td><td>0.004</td></tr><tr><td>4.001</td><td>User</td><td>-</td><td>100</td><td>0.004</td><td>0.004</td><td>0.004</td></tr><tr><td>3.003</td><td>-</td><td>-</td><td>100</td><td>0.000</td><td>0.000</td><td>0.000</td></tr><tr><td>5.000</td><td>User</td><td>-</td><td>100</td><td>0.002</td><td>0.002</td><td>0.002</td></tr><tr><td>1.005</td><td>User</td><td>-</td><td>100</td><td>0.067</td><td>0.067</td><td>0.067</td></tr><tr><td></td><td></td><td></td><td></td><td>Total</td><td>Total</td><td>Total</td></tr><tr><td></td><td></td><td></td><td></td><td>0.116</td><td>0.116</td><td>0.116</td></tr></tbody></table>						Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)	1.000	User	-	100	0.002	0.002	0.002	1.001	User	-	100	0.002	0.002	0.002	1.002	User	-	100	0.002	0.002	0.002	1.003	User	-	100	0.003	0.003	0.003		User	-	100	0.011	0.011	0.014	2.000	User	-	100	0.005	0.005	0.005	2.001	User	-	100	0.006	0.006	0.006	1.004	-	-	100	0.000	0.000	0.000	3.000	User	-	100	0.004	0.004	0.004	3.001	User	-	100	0.004	0.004	0.004	3.002	-	-	100	0.000	0.000	0.000	4.000	User	-	100	0.004	0.004	0.004	4.001	User	-	100	0.004	0.004	0.004	3.003	-	-	100	0.000	0.000	0.000	5.000	User	-	100	0.002	0.002	0.002	1.005	User	-	100	0.067	0.067	0.067					Total	Total	Total					0.116	0.116	0.116
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Storage Structures for Storm

Complex Manhole: COMPLEX, DS/PN: 1.005

Cellular Storage

Invert Level (m) 6.550 Infiltration Coefficient Side (m/hr) 0.00385 Porosity 0.95
 Infiltration Coefficient Base (m/hr) 0.00000 Safety Factor 3.0

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	24.5	24.5	1.200	24.5	49.7	1.201	0.0	49.7

Porous Car Park

Infiltration Coefficient Base (m/hr) 0.01516 Porosity 0.30 Slope (1:X) 0.0
 Membrane Percolation (mm/hr) 1000 Invert Level (m) 7.570 Depression Storage (mm) 5
 Max Percolation (l/s) 152.8 Width (m) 22.0 Evaporation (mm/day) 3
 Safety Factor 3.0 Length (m) 25.0 Cap Volume Depth (m) 0.418

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2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
 Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coefficient 0.800
 Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Site Location GB 506868 102558 Cv (Summer) 0.750
 FEH Rainfall Version 2013 Data Type Point Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
 Analysis Timestep 2.5 Second Increment (Extended) Inertia Status ON
 DTS Status ON

Profile(s)

Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
 Return Period(s) (years) 2, 30, 100
 Climate Change (%) 40, 40, 40

Winter

PN	US/MH Name	Event	Duration (mins)	Storm Rank	US/CL (m)	Water Surcharged			Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
						Level (m)	Depth (m)						
1.000	1-0	1440 minute 2 year Winter I+40%	1440	1	8.180	7.644	0.064	0.00	0.033	1.032	0.0	SURCHARGED	

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PN	US/MH Name	Event	Duration (mins)	Storm Rank	US/CL (m)	Water Surcharged		Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Pipe	
						Level (m)	Depth (m)				Flow (l/s)	Status
1.001	1-1	1440 minute 2 year Winter I+40%	1440	1	8.180	7.644	0.113	0.01	0.162	1.903	0.1	SURCHARGED
1.002	1-2	1440 minute 2 year Winter I+40%	1440	1	8.500	7.644	0.191	0.01	0.291	2.922	0.2	SURCHARGED
1.003	1-3	1440 minute 2 year Winter I+40%	1440	1	8.550	7.644	0.241	0.03	0.223	10.922	0.4	SURCHARGED
2.000	4-0	1440 minute 2 year Winter I+40%	1440	1	8.250	7.644	-0.006	0.00	0.039	2.584	0.1	OK
2.001	4-1	1440 minute 2 year Winter I+40%	1440	1	8.120	7.644	0.148	0.01	0.286	5.946	0.2	SURCHARGED
1.004	1-4	1440 minute 2 year Winter I+40%	1440	1	8.250	7.644	0.074	0.10	0.679	16.181	0.5	SURCHARGED
3.000	2-0	1440 minute 2 year Winter I+40%	1440	1	8.250	7.644	-0.006	0.00	0.022	2.356	0.1	OK
3.001	2-1	1440 minute 2 year Winter I+40%	1440	1	8.320	7.644	0.103	0.01	0.216	4.667	0.1	SURCHARGED
3.002	2-2	1440 minute 2 year Winter I+40%	1440	1	8.150	7.644	0.074	0.02	0.230	4.472	0.2	SURCHARGED
4.000	3-0	1440 minute 2 year Winter I+40%	1440	1	8.250	7.643	-0.007	0.00	0.039	2.032	0.1	OK
4.001	3-1	1440 minute 2 year Winter I+40%	1440	1	8.320	7.644	0.104	0.01	0.217	4.313	0.1	SURCHARGED
3.003	2-3	1440 minute 2 year Winter I+40%	1440	1	8.150	7.644	0.074	0.04	0.327	8.509	0.3	SURCHARGED
5.000	5-0	1440 minute 2 year Winter I+40%	1440	1	8.150	7.643	0.073	0.01	0.062	1.008	0.0	SURCHARGED
1.005	COMPLEX	1440 minute 2 year Winter I+40%	1440	1	8.050	7.643	0.143	0.00	38.226	0.000	0.0	SURCHARGED

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<u>30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm</u>																																		
<u>Simulation Criteria</u> Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000 Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coefficient 0.800 Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000 Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0 Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0 <u>Synthetic Rainfall Details</u> Rainfall Model FEH Site Location GB 506868 102558 Cv (Summer) 0.750 FEH Rainfall Version 2013 Data Type Point Cv (Winter) 1.000 Margin for Flood Risk Warning (mm) 0.0 DVD Status ON Analysis Timestep 2.5 Second Increment (Extended) Inertia Status ON DTS Status ON Profile(s) Winter Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080 Return Period(s) (years) 2, 30, 100 Climate Change (%) 40, 40, 40 <table border="1"> <thead> <tr> <th rowspan="2">PN</th> <th rowspan="2">US/MH Name</th> <th rowspan="2">Event</th> <th rowspan="2">Duration (mins)</th> <th rowspan="2">Storm Rank</th> <th rowspan="2">US/CL (m)</th> <th colspan="3">Water Surcharged</th> <th colspan="3">Pipe</th> <th rowspan="2">Status</th> </tr> <tr> <th>Level (m)</th> <th>Depth (m)</th> <th>Flow / Cap.</th> <th>Maximum Vol (m³)</th> <th>Discharge Vol (m³)</th> <th>Flow (l/s)</th> </tr> </thead> <tbody> <tr> <td>1.000</td> <td>1-0 15 minute</td> <td>30 year Winter I+40%</td> <td>15</td> <td>1</td> <td>8.180</td> <td>7.898</td> <td>0.318</td> <td>0.10</td> <td>0.074</td> <td>0.520</td> <td>1.2</td> <td>SURCHARGED</td> </tr> </tbody> </table> ©1982-2018 Innovyze			PN	US/MH Name	Event	Duration (mins)	Storm Rank	US/CL (m)	Water Surcharged			Pipe			Status	Level (m)	Depth (m)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Flow (l/s)	1.000	1-0 15 minute	30 year Winter I+40%	15	1	8.180	7.898	0.318	0.10	0.074	0.520	1.2	SURCHARGED
PN	US/MH Name	Event							Duration (mins)	Storm Rank	US/CL (m)	Water Surcharged				Pipe			Status															
			Level (m)	Depth (m)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Flow (l/s)																										
1.000	1-0 15 minute	30 year Winter I+40%	15	1	8.180	7.898	0.318	0.10	0.074	0.520	1.2	SURCHARGED																						

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	Duration (mins)	Storm Rank	US/CL (m)	Water Surcharged		Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Pipe	
						Level (m)	Depth (m)				Flow (l/s)	Status
1.001	1-1	15 minute 30 year Winter I+40%	15	1	8.180	7.894	0.363	0.18	0.202	0.887	2.4	SURCHARGED
1.002	1-2	15 minute 30 year Winter I+40%	15	1	8.500	7.886	0.433	0.32	0.359	1.281	3.9	SURCHARGED
1.003	1-3	15 minute 30 year Winter I+40%	15	1	8.550	7.875	0.472	0.95	0.288	5.306	12.9	SURCHARGED
2.000	4-0	720 minute 30 year Winter I+40%	720	1	8.250	7.838	0.188	0.01	0.094	3.811	0.2	SURCHARGED
2.001	4-1	720 minute 30 year Winter I+40%	720	1	8.120	7.837	0.341	0.03	0.344	8.859	0.5	SURCHARGED
1.004	1-4	720 minute 30 year Winter I+40%	720	1	8.250	7.838	0.268	0.29	0.734	24.643	1.5	SURCHARGED
3.000	2-0	720 minute 30 year Winter I+40%	720	1	8.250	7.837	0.187	0.01	0.053	3.482	0.2	SURCHARGED
3.001	2-1	720 minute 30 year Winter I+40%	720	1	8.320	7.837	0.296	0.03	0.255	6.924	0.4	SURCHARGED
3.002	2-2	720 minute 30 year Winter I+40%	720	1	8.150	7.837	0.267	0.05	0.285	6.690	0.4	SURCHARGED
4.000	3-0	720 minute 30 year Winter I+40%	720	1	8.250	7.837	0.187	0.01	0.094	2.992	0.2	SURCHARGED
4.001	3-1	720 minute 30 year Winter I+40%	720	1	8.320	7.837	0.297	0.02	0.256	6.365	0.4	SURCHARGED
3.003	2-3	720 minute 30 year Winter I+40%	720	1	8.150	7.837	0.267	0.12	0.382	12.713	0.8	SURCHARGED
5.000	5-0	720 minute 30 year Winter I+40%	720	1	8.150	7.836	0.266	0.02	0.116	1.493	0.1	SURCHARGED
1.005	COMPLEX	720 minute 30 year Winter I+40%	720	1	8.050	7.836	0.336	0.00	72.803	0.000	0.0	SURCHARGED

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
 Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coefficient 0.800
 Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Site Location GB 506868 102558 Cv (Summer) 0.750
 FEH Rainfall Version 2013 Data Type Point Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 0.0 DVD Status ON
 Analysis Timestep 2.5 Second Increment (Extended) Inertia Status ON
 DTS Status ON

Profile(s)

Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
 Return Period(s) (years) 2, 30, 100
 Climate Change (%) 40, 40, 40

PN	US/MH Name	Event	Duration (mins)	Storm Rank	US/CL (m)	Water Surcharged		Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
						Level (m)	Depth (m)					
1.000	1-0 15 minute	100 year Winter I+40%	15	1	8.180	8.072	0.492	0.12	0.101	0.660	1.5	SURCHARGED

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	Duration (mins)	Storm Rank	US/CL (m)	Water Surcharged		Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
						Level (m)	Depth (m)					
1.001	1-1	15 minute 100 year Winter I+40%	15	1	8.180	8.068	0.537	0.23	0.230	1.158	3.0	SURCHARGED
1.002	1-2	15 minute 100 year Winter I+40%	15	1	8.500	8.058	0.605	0.40	0.408	1.720	4.9	SURCHARGED
1.003	1-3	15 minute 100 year Winter I+40%	15	1	8.550	8.045	0.642	1.19	0.336	6.884	16.1	SURCHARGED
2.000	4-0	960 minute 100 year Winter I+40%	960	1	8.250	7.967	0.317	0.01	0.131	4.959	0.2	SURCHARGED
2.001	4-1	960 minute 100 year Winter I+40%	960	1	8.120	7.967	0.471	0.03	0.381	11.627	0.5	SURCHARGED
1.004	1-4	960 minute 100 year Winter I+40%	960	1	8.250	7.968	0.398	0.28	0.770	32.595	1.5	SURCHARGED
3.000	2-0	960 minute 100 year Winter I+40%	960	1	8.250	7.967	0.317	0.01	0.073	4.532	0.2	SURCHARGED
3.001	2-1	960 minute 100 year Winter I+40%	960	1	8.320	7.967	0.426	0.03	0.275	9.059	0.4	SURCHARGED
3.002	2-2	960 minute 100 year Winter I+40%	960	1	8.150	7.967	0.397	0.05	0.322	8.818	0.4	SURCHARGED
4.000	3-0	960 minute 100 year Winter I+40%	960	1	8.250	7.967	0.317	0.01	0.131	3.894	0.2	SURCHARGED
4.001	3-1	960 minute 100 year Winter I+40%	960	1	8.320	7.967	0.427	0.02	0.276	8.343	0.4	SURCHARGED
3.003	2-3	960 minute 100 year Winter I+40%	960	1	8.150	7.967	0.397	0.11	0.418	16.828	0.7	SURCHARGED
5.000	5-0	960 minute 100 year Winter I+40%	960	1	8.150	7.966	0.396	0.02	0.153	1.947	0.1	SURCHARGED
1.005	COMPLEX	960 minute 100 year Winter I+40%	960	1	8.050	7.966	0.466	0.00	94.218	0.000	0.0	SURCHARGED