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St James House Mansfield Road Derby DE1 3TQ	St Mary's Wharf P19-308 SW NW1		
Date 29/08/2019	Designed by CGD		
File P19-308 SW NW1.MDX	Checked by		
Micro Drainage		Network 2017.1.2	

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

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
S1.000	21.693	0.219	99.1	0.075	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.001	11.788	0.070	168.4	0.054	0.00	0.0	0.600	o	225	Pipe/Conduit	
S2.000	18.878	0.607	31.1	0.063	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.002	23.207	0.138	168.2	0.030	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.003	34.333	0.354	97.0	0.034	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.004	31.888	0.635	50.2	0.133	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.005	36.371	0.537	67.7	0.143	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.006	19.911	0.191	104.2	0.088	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.007	15.451	0.182	84.9	0.030	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.008	18.105	0.199	91.0	0.054	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.009	42.509	0.650	65.4	0.064	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.010	19.194	0.868	22.1	0.042	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.011	5.369	0.537	10.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.012	7.500	0.031	241.9	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	

Network Results Table

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)
S1.000	50.00	5.28	60.900	0.075	0.0	0.0	0.0	1.31	52.2	10.2
S1.001	50.00	5.47	60.681	0.129	0.0	0.0	0.0	1.00	39.9	17.5
S2.000	50.00	5.13	61.218	0.063	0.0	0.0	0.0	2.35	93.6	8.5
S1.002	50.00	5.79	60.536	0.222	0.0	0.0	0.0	1.21	85.5	30.1
S1.003	50.00	6.15	60.398	0.256	0.0	0.0	0.0	1.60	112.9	34.7
S1.004	50.00	6.39	60.044	0.389	0.0	0.0	0.0	2.22	157.2	52.7
S1.005	50.00	6.66	59.334	0.532	0.0	0.0	0.0	2.20	243.5	72.0
S1.006	50.00	6.85	58.797	0.620	0.0	0.0	0.0	1.77	196.0	84.0
S1.007	50.00	6.98	58.606	0.650	0.0	0.0	0.0	1.97	217.3	88.0
S1.008	50.00	7.14	58.424	0.704	0.0	0.0	0.0	1.90	209.9	95.3
S1.009	50.00	7.46	58.225	0.768	0.0	0.0	0.0	2.24	247.8	104.0
S1.010	50.00	7.54	57.575	0.810	0.0	0.0	0.0	3.87	427.2	109.7
S1.011	50.00	7.55	56.707	0.810	0.0	0.0	0.0	5.76	636.0	109.7
S1.012	50.00	7.64	56.020	0.810	0.0	0.0	0.0	1.44	310.8	109.7

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St James House	St Mary's Wharf	P19-308	
Mansfield Road		SW NW1	
Derby DE1 3TQ			
Date 29/08/2019		Designed by CGD	
File P19-308 SW NW1.MDX		Checked by	
Micro Drainage		Network 2017.1.2	

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
SNW2 1	62.385	1.485	Open Manhole	1200	S1.000	60.900	225				
SNW2 2	62.374	1.693	Open Manhole	1200	S1.001	60.681	225	S1.000	60.681	225	
S3	62.643	1.425	Open Manhole	1200	S2.000	61.218	225				
SNW2 3	62.356	1.820	Open Manhole	1200	S1.002	60.536	300	S1.001	60.611	225	
								S2.000	60.611	225	
SNW2 4	62.092	1.694	Open Manhole	1200	S1.003	60.398	300	S1.002	60.398	300	
SNW2 5	61.544	1.500	Open Manhole	1200	S1.004	60.044	300	S1.003	60.044	300	
SNW2 6	60.909	1.575	Open Manhole	1350	S1.005	59.334	375	S1.004	59.409	300	
SNW2 7	60.372	1.575	Open Manhole	1350	S1.006	58.797	375	S1.005	58.797	375	
SNW2 8	60.181	1.575	Open Manhole	1350	S1.007	58.606	375	S1.006	58.606	375	
SNW2 9	59.999	1.575	Open Manhole	1350	S1.008	58.424	375	S1.007	58.424	375	
SNW2 10	59.800	1.575	Open Manhole	1350	S1.009	58.225	375	S1.008	58.225	375	
SNW2 11	59.150	1.575	Open Manhole	1350	S1.010	57.575	375	S1.009	57.575	375	
SNW2 12	59.000	2.293	Open Manhole	1350	S1.011	56.707	375	S1.010	56.707	375	
SNW2 13	59.150	3.130	Open Manhole	1500	S1.012	56.020	525	S1.011	56.170	375	
S	59.180	3.191	Open Manhole	0		OUTFALL		S1.012	55.989	525	

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	225	SNW2 1	62.385	60.900	1.260	Open Manhole	1200
S1.001	o	225	SNW2 2	62.374	60.681	1.468	Open Manhole	1200
S2.000	o	225	S3	62.643	61.218	1.200	Open Manhole	1200
S1.002	o	300	SNW2 3	62.356	60.536	1.520	Open Manhole	1200
S1.003	o	300	SNW2 4	62.092	60.398	1.394	Open Manhole	1200
S1.004	o	300	SNW2 5	61.544	60.044	1.200	Open Manhole	1200
S1.005	o	375	SNW2 6	60.909	59.334	1.200	Open Manhole	1350
S1.006	o	375	SNW2 7	60.372	58.797	1.200	Open Manhole	1350
S1.007	o	375	SNW2 8	60.181	58.606	1.200	Open Manhole	1350
S1.008	o	375	SNW2 9	59.999	58.424	1.200	Open Manhole	1350
S1.009	o	375	SNW2 10	59.800	58.225	1.200	Open Manhole	1350
S1.010	o	375	SNW2 11	59.150	57.575	1.200	Open Manhole	1350
S1.011	o	375	SNW2 12	59.000	56.707	1.918	Open Manhole	1350
S1.012	o	525	SNW2 13	59.150	56.020	2.605	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	21.693	99.1	SNW2 2	62.374	60.681	1.468	Open Manhole	1200
S1.001	11.788	168.4	SNW2 3	62.356	60.611	1.520	Open Manhole	1200
S2.000	18.878	31.1	SNW2 3	62.356	60.611	1.520	Open Manhole	1200
S1.002	23.207	168.2	SNW2 4	62.092	60.398	1.394	Open Manhole	1200
S1.003	34.333	97.0	SNW2 5	61.544	60.044	1.200	Open Manhole	1200
S1.004	31.888	50.2	SNW2 6	60.909	59.409	1.200	Open Manhole	1350
S1.005	36.371	67.7	SNW2 7	60.372	58.797	1.200	Open Manhole	1350
S1.006	19.911	104.2	SNW2 8	60.181	58.606	1.200	Open Manhole	1350
S1.007	15.451	84.9	SNW2 9	59.999	58.424	1.200	Open Manhole	1350
S1.008	18.105	91.0	SNW2 10	59.800	58.225	1.200	Open Manhole	1350
S1.009	42.509	65.4	SNW2 11	59.150	57.575	1.200	Open Manhole	1350
S1.010	19.194	22.1	SNW2 12	59.000	56.707	1.918	Open Manhole	1350
S1.011	5.369	10.0	SNW2 13	59.150	56.170	2.605	Open Manhole	1500
S1.012	7.500	241.9	S	59.180	55.989	2.666	Open Manhole	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.012	S	59.180	55.989	0.000	0	0

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Date 29/08/2019 File P19-308 SW NW1.MDX	Designed by CGD Checked by	
Micro Drainage Network 2017.1.2		
<u>Simulation Criteria for Storm</u> Volumetric Runoff Coeff 0.750 Additional Flow - % of Total Flow 0.000 Areal Reduction Factor 1.000 MADD Factor * 10m³/ha Storage 2.000 Hot Start (mins) 0 Inlet Coefficient 0.800 Hot Start Level (mm) 0 Flow per Person per Day (l/per/day) 0.000 Manhole Headloss Coeff (Global) 0.500 Run Time (mins) 60 Foul Sewage per hectare (l/s) 0.000 Output Interval (mins) 1 Number of Input Hydrographs 0 Number of Storage Structures 0 Number of Online Controls 0 Number of Time/Area Diagrams 0 Number of Offline Controls 0 Number of Real Time Controls 0 <u>Synthetic Rainfall Details</u> Rainfall Model FSR Profile Type Summer Return Period (years) 100 Cv (Summer) 0.750 Region England and Wales Cv (Winter) 0.840 M5-60 (mm) 19.000 Storm Duration (mins) 30 Ratio R 0.393		
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Micro Drainage Network 2017.1.2		

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coefficient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.392
Region England and Wales	Cv (Summer)		0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	SNW2 1	15 Winter	1	+0%	100/15 Summer			
S1.001	SNW2 2	15 Winter	1	+0%	30/15 Summer			
S2.000	S3	15 Winter	1	+0%	100/15 Summer			
S1.002	SNW2 3	15 Winter	1	+0%	100/15 Summer			
S1.003	SNW2 4	15 Winter	1	+0%	100/15 Summer			
S1.004	SNW2 5	15 Winter	1	+0%	100/15 Summer	100/15 Winter		
S1.005	SNW2 6	15 Winter	1	+0%	100/15 Summer			
S1.006	SNW2 7	15 Winter	1	+0%	30/15 Summer	100/15 Winter		
S1.007	SNW2 8	15 Winter	1	+0%	30/15 Summer			
S1.008	SNW2 9	15 Winter	1	+0%	30/15 Summer			
S1.009	SNW2 10	15 Winter	1	+0%	100/15 Summer			
S1.010	SNW2 11	15 Winter	1	+0%				
S1.011	SNW2 12	15 Winter	1	+0%	100/15 Summer			
S1.012	SNW2 13	15 Winter	1	+0%	100/15 Summer			

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St James House	St Mary's Wharf	P19-308	
Mansfield Road		SW NW1	
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Micro Drainage		Network 2017.1.2	

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

		Water	Surcharged	Flooded				Pipe		
	US/MH	Level	Depth	Volume	Flow /	Overflow	Flow		Level	
PN	Name	(m)	(m)	(m³)	Cap.	(l/s)	(l/s)	Status	Exceeded	
S1.000	SNW2 1	60.969	-0.156	0.000	0.20		9.7	OK		
S1.001	SNW2 2	60.789	-0.117	0.000	0.46		15.8	OK		
S2.000	S3	61.265	-0.178	0.000	0.10		8.3	OK		
S1.002	SNW2 3	60.661	-0.175	0.000	0.36		27.2	OK		
S1.003	SNW2 4	60.509	-0.189	0.000	0.29		30.3	OK		
S1.004	SNW2 5	60.159	-0.185	0.000	0.31		44.4	OK		
S1.005	SNW2 6	59.468	-0.241	0.000	0.27		59.2	OK		
S1.006	SNW2 7	58.967	-0.205	0.000	0.42		68.6	OK	1	
S1.007	SNW2 8	58.778	-0.203	0.000	0.43		72.0	OK		
S1.008	SNW2 9	58.600	-0.199	0.000	0.45		77.6	OK		
S1.009	SNW2 10	58.383	-0.217	0.000	0.37		83.6	OK		
S1.010	SNW2 11	57.701	-0.249	0.000	0.25		87.4	OK		
S1.011	SNW2 12	56.849	-0.233	0.000	0.30		87.2	OK		
S1.012	SNW2 13	56.272	-0.273	0.000	0.47		87.6	OK		

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coefficient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.392
Region England and Wales	Cv (Summer)	0.750	
M5-60 (mm)	19.000 Cv (Winter)	0.840	

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	SNW2 1	15 Winter	30	+0%	100/15 Summer			
S1.001	SNW2 2	15 Winter	30	+0%	30/15 Summer			
S2.000	S3	15 Winter	30	+0%	100/15 Summer			
S1.002	SNW2 3	15 Winter	30	+0%	100/15 Summer			
S1.003	SNW2 4	15 Winter	30	+0%	100/15 Summer			
S1.004	SNW2 5	15 Winter	30	+0%	100/15 Summer	100/15 Winter		
S1.005	SNW2 6	15 Winter	30	+0%	100/15 Summer			
S1.006	SNW2 7	15 Winter	30	+0%	30/15 Summer	100/15 Winter		
S1.007	SNW2 8	15 Winter	30	+0%	30/15 Summer			
S1.008	SNW2 9	15 Winter	30	+0%	30/15 Summer			
S1.009	SNW2 10	15 Winter	30	+0%	100/15 Summer			
S1.010	SNW2 11	15 Winter	30	+0%				
S1.011	SNW2 12	15 Winter	30	+0%	100/15 Summer			
S1.012	SNW2 13	30 Summer	30	+0%	100/15 Summer			

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St James House	St Mary's Wharf	P19-308	
Mansfield Road		SW NW1	
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Micro Drainage		Network 2017.1.2	

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap. (l/s)	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	SNW2 1	61.014	-0.111	0.000	0.50		23.8	OK	
S1.001	SNW2 2	60.935	0.029	0.000	1.21		41.3	SURCHARGED	
S2.000	S3	61.293	-0.150	0.000	0.24		20.2	OK	
S1.002	SNW2 3	60.769	-0.067	0.000	0.94		71.1	OK	
S1.003	SNW2 4	60.599	-0.099	0.000	0.78		80.5	OK	
S1.004	SNW2 5	60.259	-0.085	0.000	0.84		120.5	OK	
S1.005	SNW2 6	59.600	-0.109	0.000	0.74		163.1	OK	
S1.006	SNW2 7	59.318	0.146	0.000	1.09		179.7	SURCHARGED	1
S1.007	SNW2 8	59.086	0.105	0.000	1.13		188.0	SURCHARGED	
S1.008	SNW2 9	58.854	0.055	0.000	1.16		200.7	SURCHARGED	
S1.009	SNW2 10	58.517	-0.083	0.000	0.95		215.3	OK	
S1.010	SNW2 11	57.793	-0.157	0.000	0.63		224.7	OK	
S1.011	SNW2 12	56.957	-0.125	0.000	0.78		224.2	OK	
S1.012	SNW2 13	56.545	0.000	0.000	1.07		201.2	OK	

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Micro Drainage Network 2017.1.2		

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coefficient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.392
Region England and Wales	Cv (Summer)	0.750	
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	SNW2 1	15 Winter	100	+40%	100/15 Summer			
S1.001	SNW2 2	15 Winter	100	+40%	30/15 Summer			
S2.000	S3	15 Winter	100	+40%	100/15 Summer			
S1.002	SNW2 3	15 Winter	100	+40%	100/15 Summer			
S1.003	SNW2 4	15 Winter	100	+40%	100/15 Summer			
S1.004	SNW2 5	15 Winter	100	+40%	100/15 Summer	100/15 Winter		
S1.005	SNW2 6	15 Winter	100	+40%	100/15 Summer			
S1.006	SNW2 7	15 Winter	100	+40%	30/15 Summer	100/15 Winter		
S1.007	SNW2 8	15 Winter	100	+40%	30/15 Summer			
S1.008	SNW2 9	15 Winter	100	+40%	30/15 Summer			
S1.009	SNW2 10	15 Winter	100	+40%	100/15 Summer			
S1.010	SNW2 11	15 Winter	100	+40%				
S1.011	SNW2 12	15 Winter	100	+40%	100/15 Summer			
S1.012	SNW2 13	15 Winter	100	+40%	100/15 Summer			

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Mansfield Road		SW NW1	
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Micro Drainage		Network 2017.1.2	

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Overflow Cap. (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	SNW2 1	62.267	1.142	0.000	0.67	31.8	FLOOD RISK	
S1.001	SNW2 2	62.167	1.261	0.000	1.61	54.9	FLOOD RISK	
S2.000	S3	62.073	0.630	0.000	0.40	33.8	SURCHARGED	
S1.002	SNW2 3	62.009	1.173	0.000	1.23	93.4	SURCHARGED	
S1.003	SNW2 4	61.820	1.122	0.000	1.02	105.6	FLOOD RISK	
S1.004	SNW2 5	61.543	1.199	0.005	1.03	147.2	FLOOD	
S1.005	SNW2 6	60.887	1.178	0.000	0.94	207.2	FLOOD RISK	
S1.006	SNW2 7	60.373	1.201	0.577	1.46	239.5	FLOOD	1
S1.007	SNW2 8	60.000	1.019	0.000	1.51	252.6	FLOOD RISK	
S1.008	SNW2 9	59.594	0.795	0.000	1.57	272.6	SURCHARGED	
S1.009	SNW2 10	59.092	0.492	0.000	1.32	299.1	SURCHARGED	
S1.010	SNW2 11	57.943	-0.007	0.000	0.87	309.4	OK	
S1.011	SNW2 12	57.279	0.197	0.000	1.08	310.0	SURCHARGED	
S1.012	SNW2 13	56.651	0.106	0.000	1.65	309.9	SURCHARGED	