



CASCADE
T H E R M A L

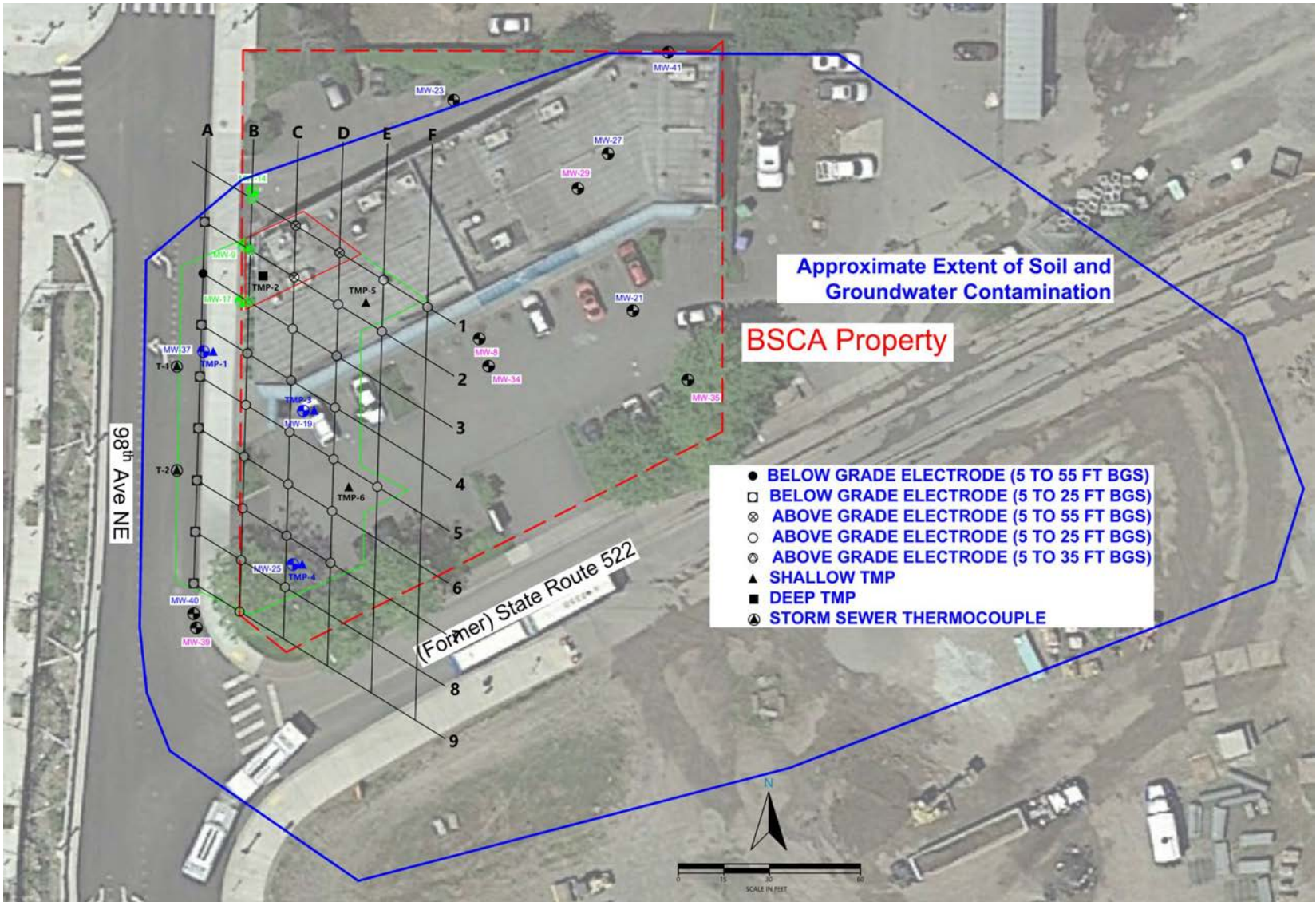
BSCSS ERH Project – Bothell, WA

11/20/2018

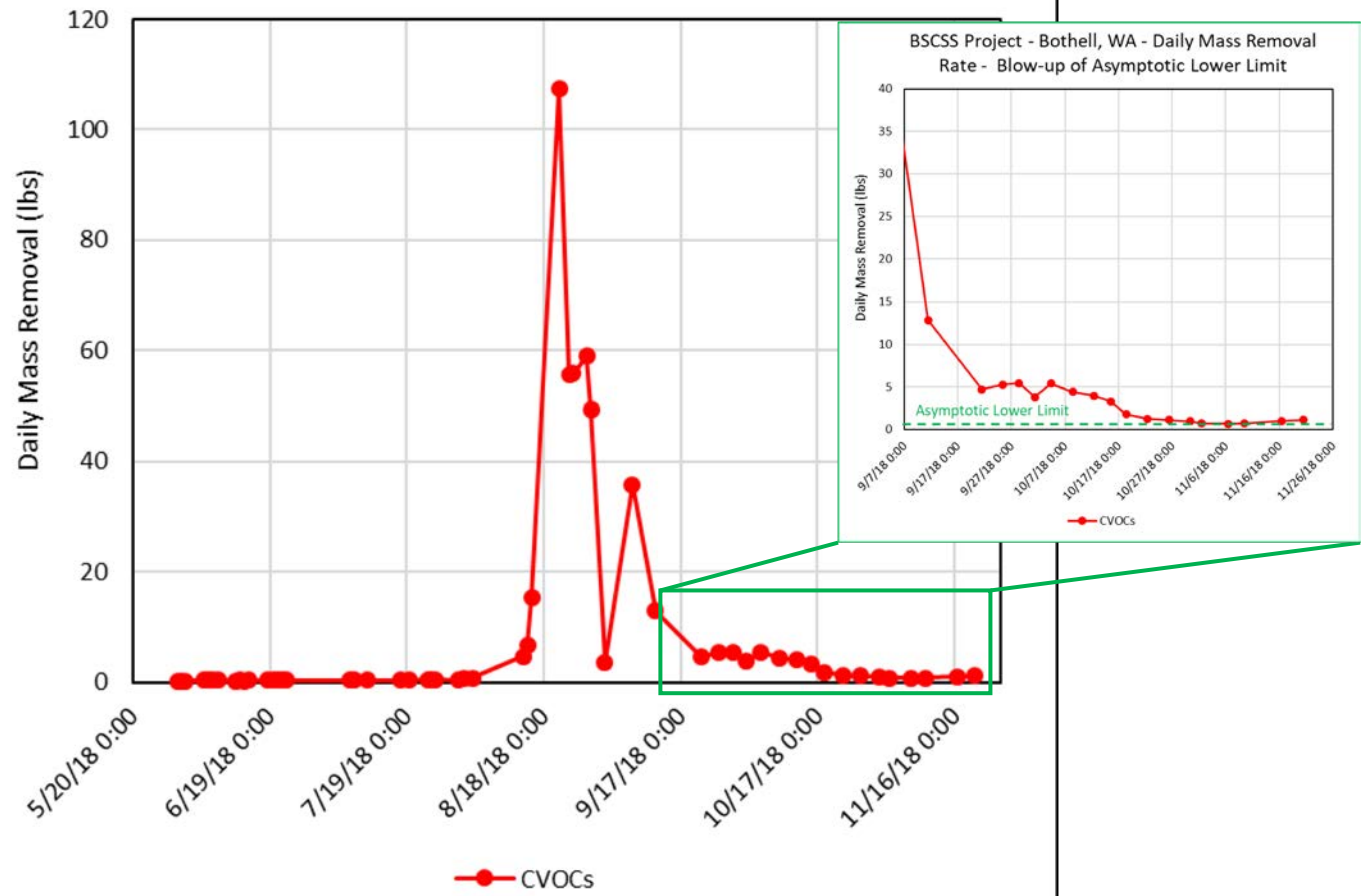


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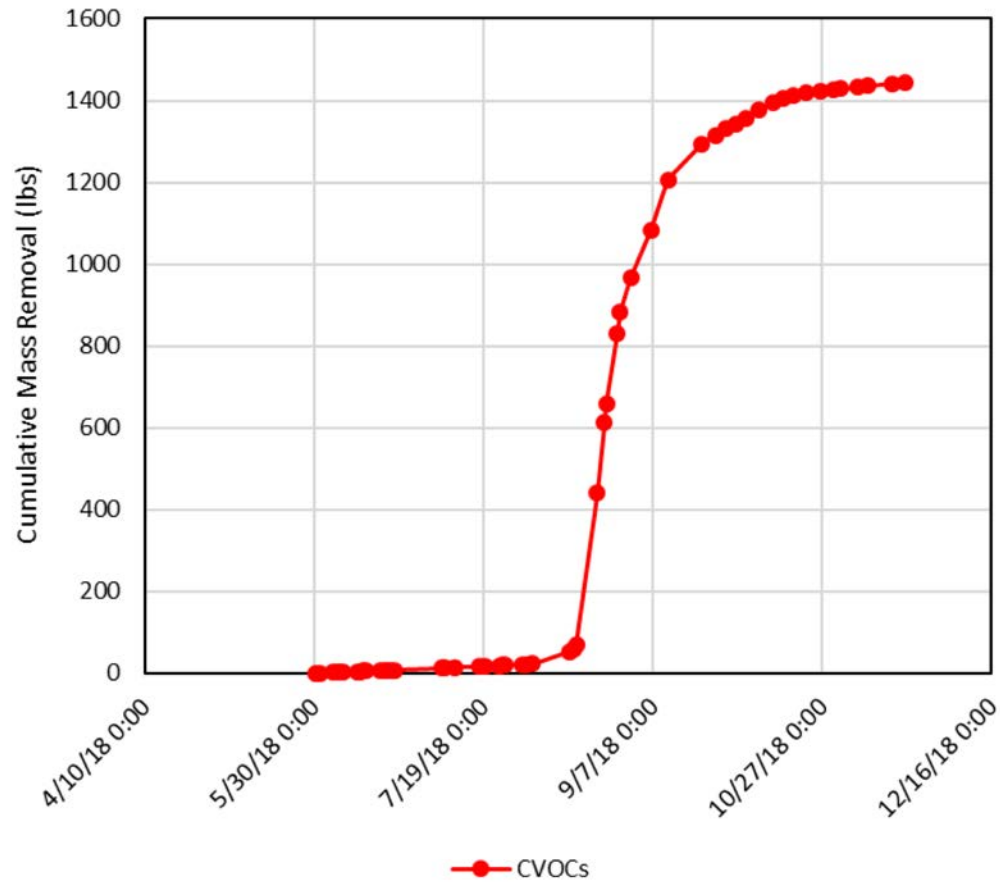




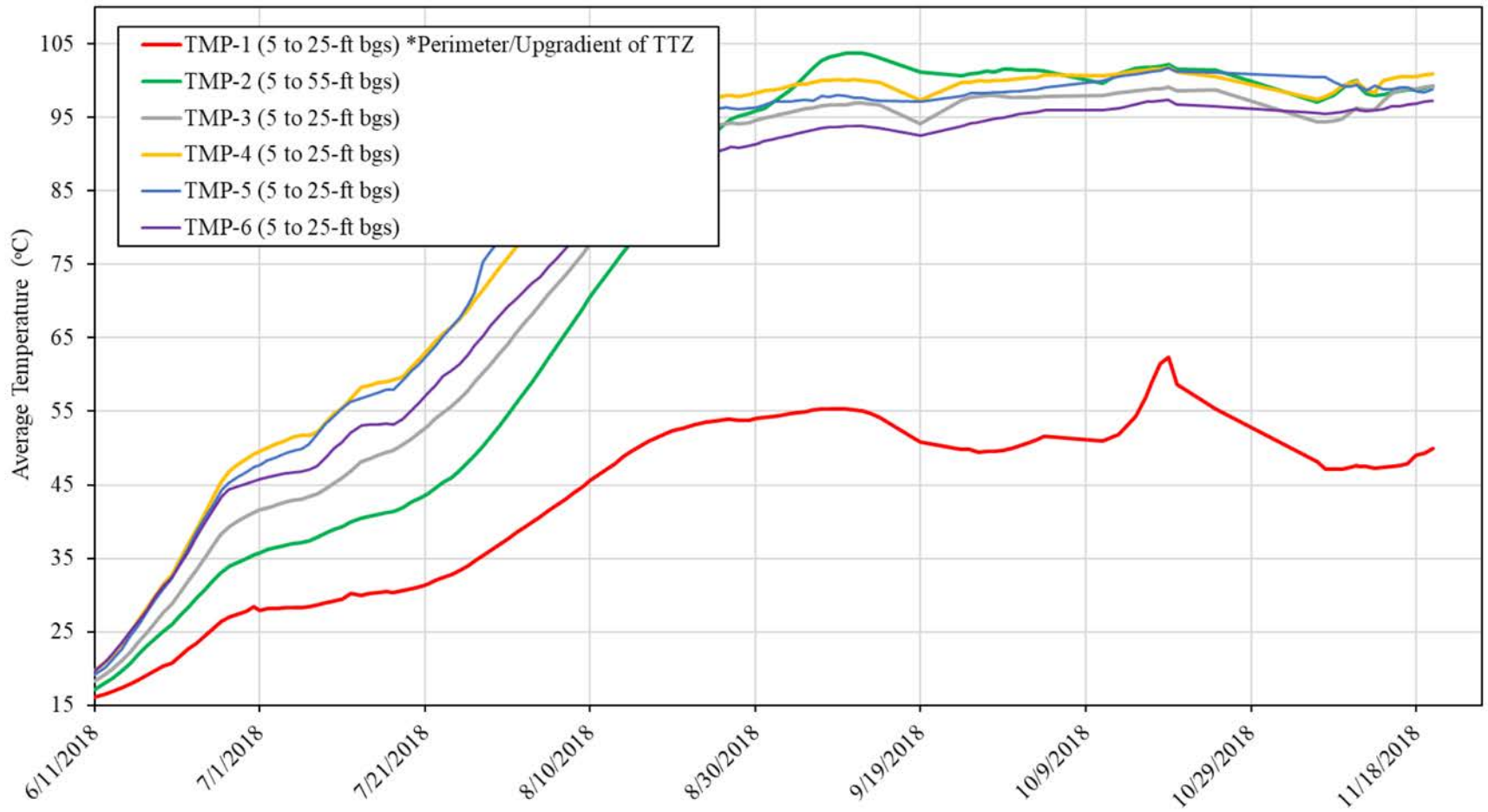
BSCSS ERH Project - Bothell, WA - Daily Mass Removal Rate Based on PID Readings



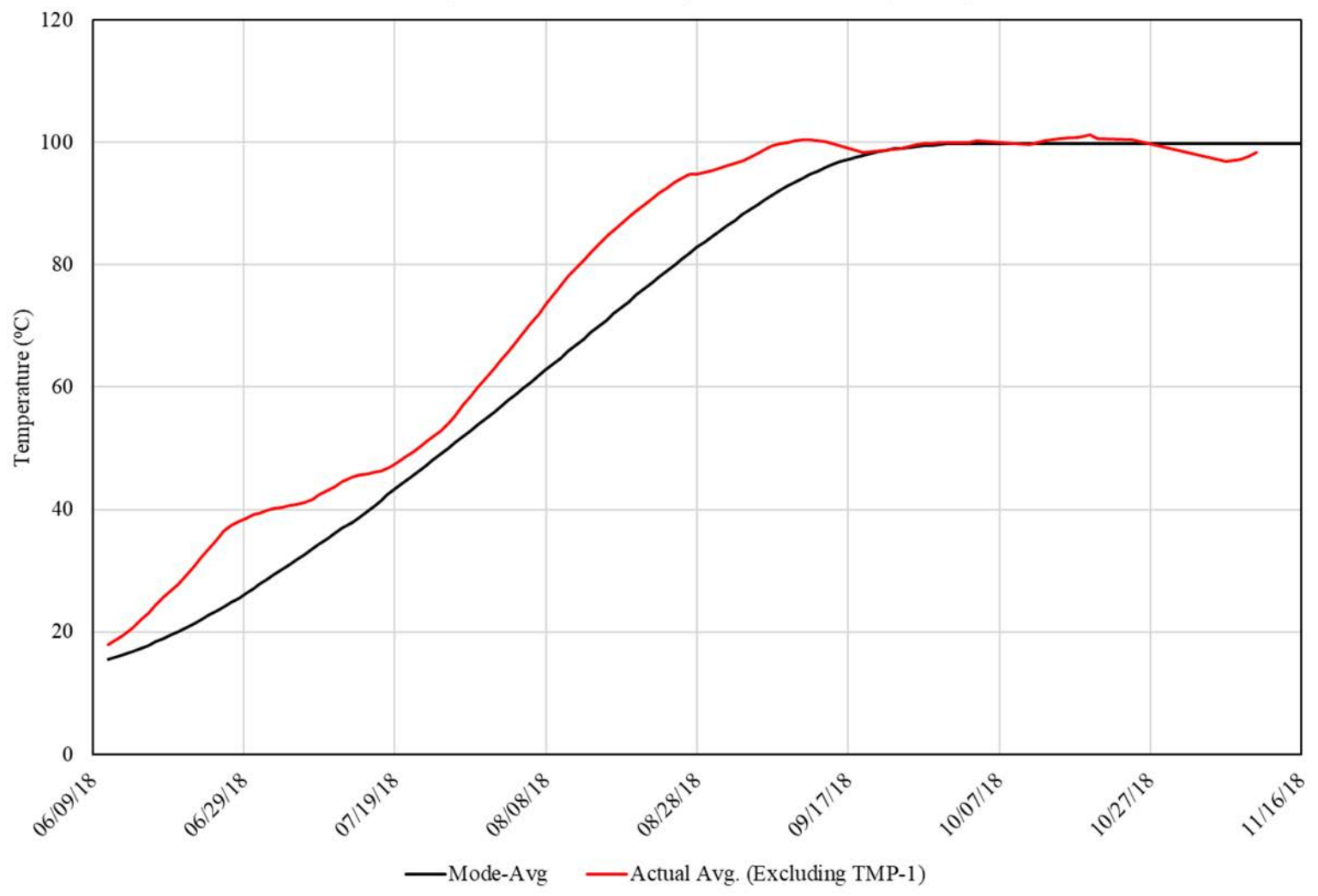
BSCSS ERH Project - Bothell, WA - Cumulative Mass Removal Based on PID Readings



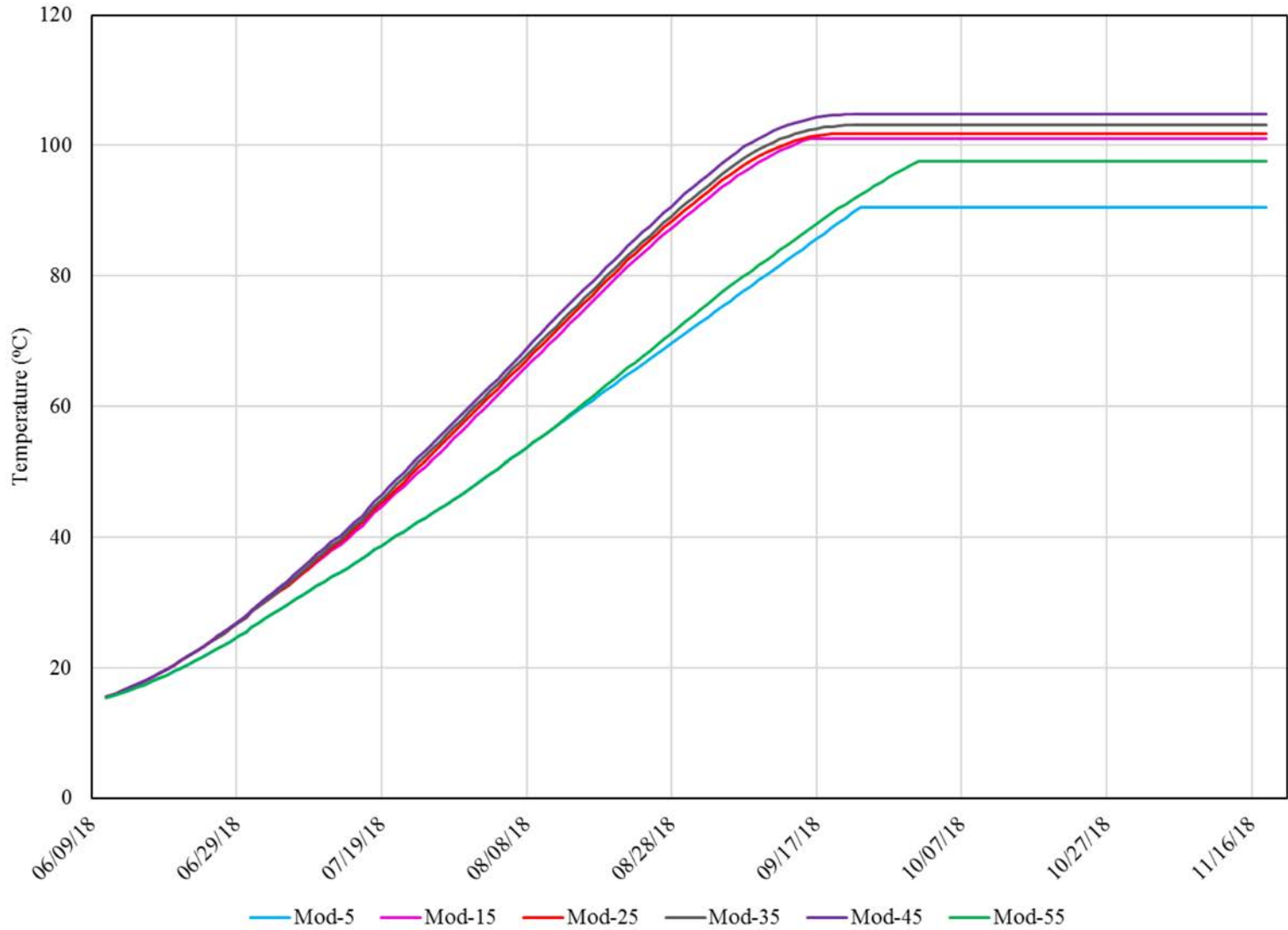
BSCSS ERH Project - Bothell, WA Average Temperature Progress



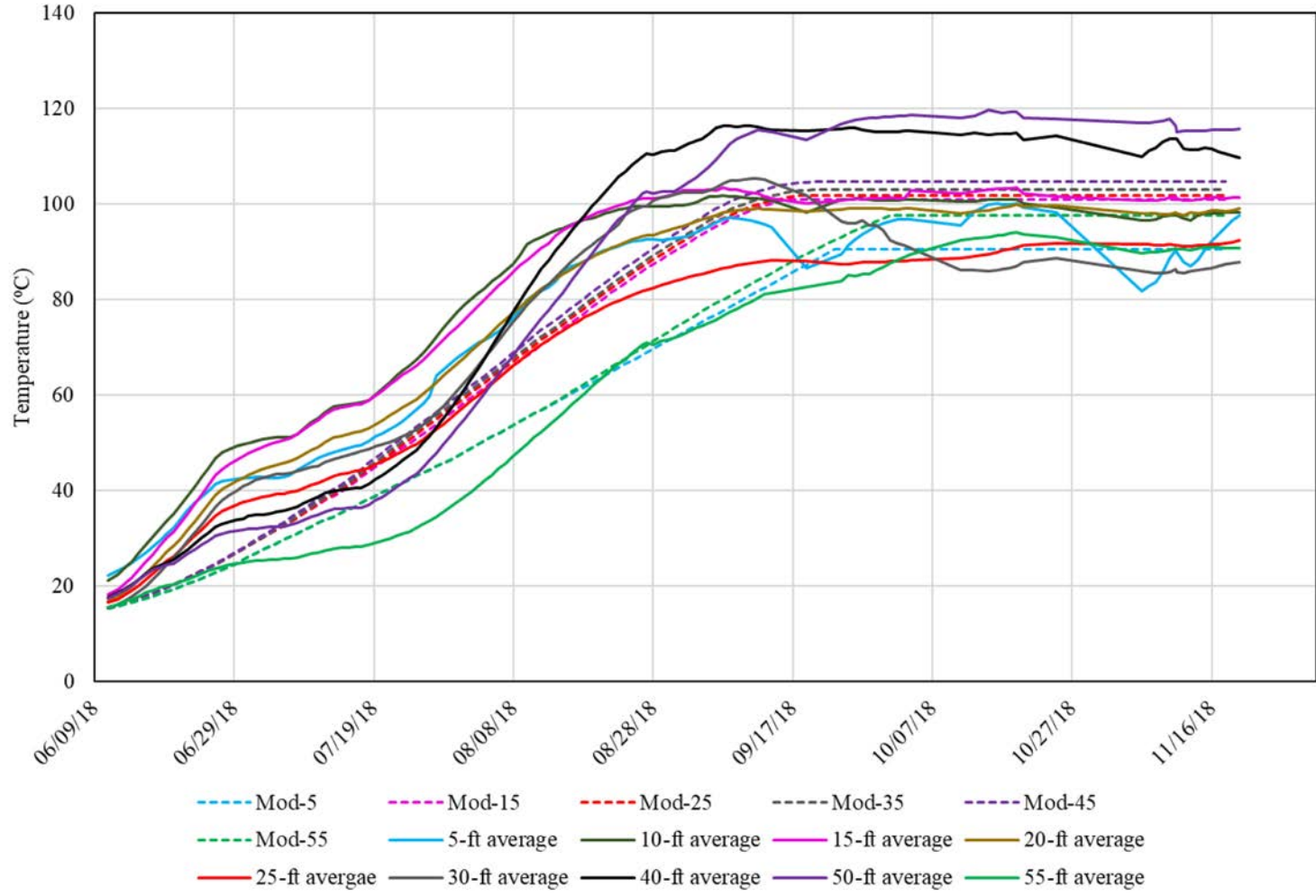
BSCSS- ERH Project - Modelled Average vs Actual Average Temperature Curves



BSCSS-ERH Project - Modelled Temperature Curves



BSCSS-ERH Project - Modelled vs Achieved Temperature Curves (Excluding TMP-1)



TMP-1 Temperatures (°C)					
Date/Time Stamp	TMP1-5	TMP1-10	TMP1-15	TMP1-20	TMP1-25
10/11/2018 0:00	55.1	56.7	59.6	47.6	35.6
10/13/2018 0:00	57.5	58.0	60.2	47.9	35.6
10/15/2018 0:00	65.7	60.6	61.2	48.3	35.6
10/16/2018 8:00	75.5	63.0	62.1	48.7	35.8
10/17/2018 0:00	82.3	64.3	62.6	49.1	36.0
10/18/2018 0:00	91.6	66.4	63.3	49.7	36.4
10/19/2018 0:00	93.7	67.5	63.8	50.1	36.7
10/20/2018 0:00	77.9	66.7	62.5	49.6	36.4
10/24/2018 16:00	66.6	61.0	62.2	50.1	36.7
11/6/2018 0:00	52.8	49.4	57.2	46.5	35.0
11/7/2018 0:00	47.6	49.3	57.2	46.5	35.1
11/8/2018 0:00	48.0	49.3	57.2	46.1	35.1
11/9/2018 0:00	48.3	49.5	56.7	45.9	35.1
11/10/2018 0:00	48.9	50.2	57.1	45.9	34.6
11/10/2018 20:00	50.1	50.7	56.9	45.7	34.5
11/11/2018 0:00	50.3	50.7	56.8	45.6	34.4
11/12/2018 0:00	51.9	50.1	56.1	45.1	34.1
11/13/2018 0:00	51.9	49.3	55.6	45.1	34.1
11/14/2018 0:00	51.8	49.9	55.6	45.1	34.3
11/15/2018 0:00	51.9	50.2	55.7	45.2	34.3
11/16/2018 0:00	52.8	50.4	55.8	45.1	34.3
11/17/2018 0:00	54.3	50.4	55.9	44.9	34.1
11/18/2018 0:00	55.7	50.5	60.0	44.8	33.9
11/19/2018 0:00	57.2	50.8	60.2	44.7	33.8
11/20/2018 0:00	59.3	51.2	60.4	44.9	33.9

TMP-2 Temperatures (°C)											
Date/Time Stamp	TMP2-5	TMP2-10	TMP2-15	TMP2-20	TMP2-25	TMP2-30	TMP2-35	TMP2-40	TMP2-45	TMP2-50	TMP2-55
10/11/2018 0:00	83.0	99.6	99.0	83.7	85.3	87.1	113.3	115.6	118.5	117.7	92.5
10/13/2018 0:00	94.6	99.7	100.0	83.7	85.0	87.4	113.7	116.0	119.1	117.7	92.9
10/15/2018 0:00	100.2	99.7	100.5	84.4	85.4	86.6	112.9	116.1	119.2	120.0	93.0
10/16/2018 8:00	100.4	99.8	100.7	85.2	85.9	86.5	113.5	116.1	119.2	119.5	93.4
10/17/2018 0:00	100.2	99.7	100.8	85.7	86.2	86.4	113.4	116.0	119.1	119.2	93.5
10/18/2018 0:00	100.1	99.5	100.9	86.3	86.5	86.6	113.3	116.2	119.3	119.1	93.9
10/19/2018 0:00	100.2	99.6	101.0	86.7	86.9	87.1	113.6	116.2	119.3	119.1	94.1
10/20/2018 0:00	97.7	99.3	99.6	87.7	88.1	87.5	111.5	115.5	118.6	117.3	93.6
10/24/2018 16:00	94.8	99.0	98.9	88.8	87.7	89.5	112.3	116.3	118.8	116.7	93.1
11/6/2018 0:00	74.4	99.2	95.2	83.8	87.4	84.4	103.8	116.0	118.0	115.8	89.8
11/7/2018 0:00	77.2	99.4	95.4	83.7	87.2	84.2	106.5	115.9	118.1	115.9	89.9
11/8/2018 0:00	80.3	99.6	95.7	83.5	87.1	83.9	108.3	115.4	118.0	116.5	89.9
11/9/2018 0:00	86.3	99.3	96.0	83.6	87.0	84.2	110.6	115.3	117.8	117.1	90.2
11/10/2018 0:00	93.0	99.3	97.2	83.7	86.9	84.5	111.9	115.3	117.8	117.7	90.4
11/10/2018 20:00	93.6	99.5	98.5	84.2	86.8	86.1	112.3	115.2	117.8	115.1	90.7
11/11/2018 0:00	91.5	99.4	97.6	84.0	86.9	84.7	112.2	115.0	115.2	115.2	90.5
11/12/2018 0:00	84.3	99.3	96.8	84.2	85.4	85.9	108.1	115.1	115.3	115.2	90.5
11/13/2018 0:00	81.2	99.2	96.3	84.5	85.1	86.8	107.4	115.4	115.4	115.2	90.4
11/14/2018 0:00	81.4	99.1	96.4	84.7	85.2	87.2	107.8	115.1	115.5	115.2	90.7
11/15/2018 0:00	83.3	99.1	96.4	84.7	85.0	87.6	108.3	115.2	115.6	115.2	90.9
11/16/2018 0:00	85.5	99.0	96.9	85.1	85.3	88.0	108.0	115.0	115.7	115.2	90.9
11/17/2018 0:00	86.4	99.2	97.0	85.3	85.6	88.4	107.0	114.7	115.8	115.2	90.9
11/18/2018 0:00	87.3	99.1	96.9	85.5	85.9	88.8	106.5	114.5	115.9	115.2	90.8
11/19/2018 0:00	89.5	99.2	96.8	85.9	86.1	89.2	106.2	114.2	116.0	115.2	90.8
11/20/2018 0:00	92.8	99.1	96.5	86.2	86.2	89.6	105.1	114.1	116.1	115.2	90.8

TMP-3					
Date/Time Stamp	TMP3-5	TMP3-10	TMP3-15	TMP3-20	TMP3-25
10/11/2018 0:00	99.4	101.7	103.2	99.6	86.1
10/13/2018 0:00	99.6	102.3	103.5	99.7	86.6
10/15/2018 0:00	99.8	102.6	103.7	99.9	86.9
10/16/2018 8:00	99.8	102.5	103.9	100.4	87.2
10/17/2018 0:00	99.6	102.7	103.8	100.5	87.4
10/18/2018 0:00	99.7	102.7	103.8	100.7	87.6
10/19/2018 0:00	99.8	102.9	104.1	101.0	87.8
10/20/2018 0:00	99.5	101.8	102.8	100.7	87.9
10/24/2018 16:00	99.4	101.6	102.4	100.8	89.5
11/6/2018 0:00	77.3	100.1	103.8	100.8	89.6
11/7/2018 0:00	77.9	100.1	103.8	100.8	89.6
11/8/2018 0:00	78.4	100.3	103.6	100.8	89.4
11/9/2018 0:00	79.6	100.5	103.6	100.8	89.4
11/10/2018 0:00	83.0	100.9	103.5	100.8	90.0
11/10/2018 20:00	87.9	100.7	103.4	100.3	89.3
11/11/2018 0:00	87.8	100.7	103.1	100.3	89.2
11/12/2018 0:00	87.7	100.6	102.7	100.3	89.0
11/13/2018 0:00	87.3	100.5	102.7	100.5	89.2
11/14/2018 0:00	91.6	100.9	103.1	100.5	89.6
11/15/2018 0:00	96.0	101.2	103.4	100.6	89.7
11/16/2018 0:00	98.3	101.3	103.5	100.8	89.6
11/17/2018 0:00	99.2	101.2	103.3	100.9	89.6
11/18/2018 0:00	99.2	101.2	103.1	101.0	89.8
11/19/2018 0:00	99.2	101.3	103.2	101.1	90.8
11/20/2018 0:00	99.1	101.3	103.4	101.5	90.9

TMP-4 Temperatures (°C)					
Date/Time Stamp	TMP4-5	TMP4-10	TMP4-15	TMP4-20	TMP4-25
10/11/2018 0:00		99.1	103.0	103.9	96.8
10/13/2018 0:00		99.4	103.2	104.1	97.0
10/15/2018 0:00		99.5	103.9	104.2	97.6
10/16/2018 8:00		99.6	104.0	104.3	97.8
10/17/2018 0:00		99.5	104.1	104.4	98.0
10/18/2018 0:00		99.6	104.0	104.5	98.2
10/19/2018 0:00		99.8	104.1	104.8	98.6
10/20/2018 0:00		99.3	103.2	103.9	98.4
10/24/2018 16:00		99.1	101.8	103.3	98.1
11/6/2018 0:00		91.2	100.4	102.5	95.9
11/7/2018 0:00		91.5	100.6	103.2	95.9
11/8/2018 0:00		93.5	100.7	103.3	95.8
11/9/2018 0:00		96.7	100.9	103.3	96.1
11/10/2018 0:00		97.7	101.2	103.3	96.3
11/10/2018 20:00		98.5	101.1	103.3	96.4
11/11/2018 0:00		98.1	100.9	103.2	96.3
11/12/2018 0:00		94.8	100.7	103.1	96.2
11/13/2018 0:00		93.3	100.6	103.2	96.2
11/14/2018 0:00		98.6	101.0	103.6	96.8
11/15/2018 0:00		99.4	101.1	103.6	97.1
11/16/2018 0:00		99.4	101.4	103.7	97.4
11/17/2018 0:00		99.4	101.4	103.6	97.5
11/18/2018 0:00		99.4	101.4	103.8	97.7
11/19/2018 0:00		99.4	101.6	104.0	98.0
11/20/2018 0:00		99.3	101.8	104.4	98.3

TMP-5					
Date/Time Stamp	TMP5-5	TMP5-10	TMP5-15	TMP5-20	TMP5-25
10/11/2018 0:00	100.0	100.1		105.0	94.7
10/13/2018 0:00	100.3	100.4		106.1	95.4
10/15/2018 0:00	100.3	100.5		106.4	96.2
10/16/2018 8:00	100.4	100.6		106.5	96.9
10/17/2018 0:00	100.4	100.5		106.5	97.3
10/18/2018 0:00	100.3	100.6		106.7	97.9
10/19/2018 0:00	100.5	100.7		107.1	98.5
10/20/2018 0:00	100.3	99.8		105.7	98.9
10/24/2018 16:00	100.0	96.8		106.6	100.9
11/6/2018 0:00	100.0	92.4		106.7	102.8
11/7/2018 0:00	100.3	92.1		106.5	103.0
11/8/2018 0:00	100.4	90.6		105.7	102.7
11/9/2018 0:00	100.2	90.4		104.4	102.2
11/10/2018 0:00	100.3	90.3		104.3	102.0
11/10/2018 20:00	100.2	90.1		105.5	101.8
11/11/2018 0:00	100.2	89.9		105.5	101.8
11/12/2018 0:00	99.5	89.9		103.3	102.1
11/13/2018 0:00	99.5	89.9		105.6	102.1
11/14/2018 0:00	99.4	89.8		103.7	102.1
11/15/2018 0:00	99.4	89.9		104.1	101.7
11/16/2018 0:00	99.2	90.1		105.5	101.4
11/17/2018 0:00	99.3	90.1		105.4	101.2
11/18/2018 0:00	99.3	90.3		103.3	101.2
11/19/2018 0:00	99.2	90.5		103.2	100.9
11/20/2018 0:00	99.4	90.8		103.7	101.4

TMP-6 Temperatures (°C)					
Date/Time Stamp	TMP6-5	TMP6-10	TMP6-15	TMP6-20	TMP6-25
10/11/2018 0:00	99.4	101.7	103.5	98.0	80.8
10/13/2018 0:00	99.6	101.3	103.9	98.6	81.2
10/15/2018 0:00	99.6	102.1	104.2	98.9	81.7
10/16/2018 8:00	99.7	102.5	104.3	99.4	82.3
10/17/2018 0:00	99.6	102.3	104.2	99.4	82.5
10/18/2018 0:00	99.5	102.1	104.4	99.6	82.8
10/19/2018 0:00	99.6	102.1	104.5	100.0	83.1
10/20/2018 0:00	99.4	100.9	103.6	99.5	83.1
10/24/2018 16:00	98.5	100.3	103.4	98.8	83.3
11/6/2018 0:00	75.4	100.3	103.5	96.6	82.1
11/7/2018 0:00	75.7	99.9	103.4	96.5	82.3
11/8/2018 0:00	76.0	100.1	103.3	96.7	82.2
11/9/2018 0:00	76.7	100.2	103.5	96.7	82.4
11/10/2018 0:00	78.2	100.4	103.4	97.2	83.0
11/10/2018 20:00	79.9	100.6	103.2	97.5	83.1
11/11/2018 0:00	80.2	100.5	103.2	97.2	83.0
11/12/2018 0:00	80.2	100.1	103.2	97.0	82.9
11/13/2018 0:00	80.3	100.1	103.5	97.2	83.1
11/14/2018 0:00	80.3	100.2	103.5	97.6	83.3
11/15/2018 0:00	82.3	100.6	103.5	98.0	83.8
11/16/2018 0:00	85.8	100.7	103.6	98.0	83.8
11/17/2018 0:00	89.7	100.7	103.7	98.6	84.2
11/18/2018 0:00	94.6	101.0	103.5	98.8	84.4
11/19/2018 0:00	98.8	101.2	103.6	99.0	84.7
11/20/2018 0:00	99.0	101.2	103.7	99.3	85.0