



OVAM Mortsel: Bi-weekly report

Soil remediation by Electric Resistance Heating

July 5 – August 30, 2024

Former Electra Site, Statielei 111 Mortsel

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1 Introduction

This letter report contains a brief description of the Electrical Resistance Heating (ERH) remediation system operations performed at the former Electra Site at Statielei 105 – 113 in Mortsel. The time period addressed in this report is from July 5 – August 30, 2024. **Figure 1** contains a site map displaying the locations of the thermal treatment area, electrodes, temperature monitoring points (TMPs) and other pertinent Site features.

This is the last bi-weekly report. The installation phase started in March 2023. The operational phase started in Oktober 2023, and restarted (after a fire) December 11. Active heating stopped April 20, 2024. Active cooling stopped July 10 and all demobilization was finished end of August 2024.

2 System Operation Activities

The weeks of the reporting period involve week 28-31 of 2024. During this period the site was visited 14 times.

In the reporting period the following works were performed:

- General checks and equipment maintenance
 - General data collection and inspections (TMPs)
- **Stopped the active cooling on the 10th of July.**
- Progression of demobilization works
 - Removed grout in all boreholes
 - Removed wooden fence at SL105/107.
 - Removed surface materials like piping, cables, insulation, etc;
 - All PIR plates were recycled by Unilin
 - Cables and steel recycled by Remondis (HD cables re-used by HMVT)
 - CPVC piping recycled by Remondis.
 - Removed the high voltage connection (Fluvius) and HV cabin (Goorts).
 - Removed all electrodes and VR wells in SL105/107
 - With the exception of one electrode (probably P03) and 2 TMP pipes
 - Electrodes, and TMP's in SL109, 111 and 113 were finished underground and filled with grout
 - Electrodes and TMP in garden SL109 and 111 removed
 - MACH4 carbon filters and CV3 carbon filter have been removed by Chemviron, activated carbon will be reactivated
 - Equipment was lifted and shipped back to the HMVT workshop.
 - Removed JDK and JDK soil, soil was transported to and treated by GRC Kallo (OVAM contract)
 - Repaired floors, walls, doors, windows, as described in document "Lijst beschadigingen_HMVT".
 - Finalized surface and fences in gardens Statielei 109 – 115 and Grotenhof 13.
 - Removed rainwater pit and replaced pit by infiltration box.
- Provisional acceptance September 3.

3 ERH Application Summary

The ERH system operational parameters from the current reporting period are presented in **Table 1**.

Table 1. ERH System Parameters

ERH System Parameters	Estimated	Up to August 30th	Percentage of total
Operation Time (days)	137	283 ¹	207%
Cumulative Energy Applied (MWh)	3.800	3.122	82%

¹ This is with regard to the days that ERH was not active.



Total energy for ERH and auxiliary Equipment was ca. 3.122 MWh (based on invoices for electricity). ERH was completely shut off on April 17th, the electricity consumption until that point was ca. 3.010 MWh, with ca. 2.905 MWh used for ERH.

The contractual remediation target has been met on March 18: the ERH treatment time was 118 days (86% of total estimated time). The global electricity consumption up to March 18 was ca. 2.500 MWh.

4 Temperature Monitoring

The last temperature monitoring measurement by the system was on the 10th of July. The site average subsurface temperature was 55,8 °C. The average temperature in the vadose zone was 49,7 °C. The saturated zone had an average temperature of 62,4 °C.

With the shutdown of ERH and the stop of active cooling temperatures still appear to decrease around 0,3 °C per day. As the soil and the groundwater cool down, the temperature difference between the coolant (water / air) and the medium decreases, causing a lower heat transfer rate. It is expected that this overall daily change will decrease further.

Subsurface temperatures at different depths per TMP location and over time are presented in **Figure 2**. The highest temperature on July 4 was 77,7 °C in TMP E05 at 6 m bgs.

In total 4 shallow RTD's are installed near utilities (Statielei 109 front and Statielei 113 back) to measure the temperature close to the utilities. The average temperature at the utility RTDs is 26,8 °C, the maximum temperature is 32,8 °C in RTD T1 (SL 109 front). Utilities are no longer monitored as temperatures keep decreasing below levels that are deemed of concern.

5 Vapor Recovery

On the 10th of July, the active cooling phase, including soil vapor extraction was finished. Vapor Recovery is no longer monitored. TEC will monitor ambient air at several locations for the coming period.

6 Vapor treatment

Two Mach4X vessels, containing respectively 18 and 10 m³ of vapor GAC and the third vessel, a MACH3S vessel, containing 2 m³ of VGAC, were removed from the site during the reporting period. The saturated activated carbon will be reactivated by Chemviron Carbon.

7 Condensate and water treatment

During the reporting period no more water was recovered via condensed water by the vapor recovery system. The amount of condensate is decreasing because of the lower soil temperatures. A total of 2.511 m³ of condensate has been produced since the start-up of the ERH system.

The condensate produced from the steam condensers was collected and treated in 2 liquid granular activated carbon vessels, before being discharged to the sewer. The 2 LGAC vessels were drained by Allclean and the carbon will be shipped to Chemviron Carbon for reactivation.

8 Mass removal (by PID)

The mass removal calculation is based on the PID measurements in the influent of VGAC1. We use a 10,6 eV bulb, so the correction factor for PCE is 0,57. During the reporting period no mass was removed from the subsurface. The total mass (based on PCE) recovered from the subsurface since the start of the project is circa 400 kg (**Figure 3**).



It has been discovered that a significant part of the extracted soil vapor contains different compounds such as aldehydes, alcohols and ketones. The quantity (level) of these compounds fluctuates per influent measurement. For this reason the PID value on the influent side is not representative for just PCE.

When reviewing the 6 laboratory results from January 12 to March 14, the average VOCl percentage was 66% ± 13%. However, it also stands out that the percentage of VOCl's in the total is decreasing. For comparison, it was 86% in the sample of the January 12, while having decreased to 55% on March 14. The latest analyses showed that the proportion of VOCl's was decreasing even more. As vapour inlet concentrations appeared to decrease even further, this was not further investigated. **From the 10th of July, no more mass is removed by the system.**

9 Health & Safety

During the reporting period on 16 July 2024 an incident occurred, in which a 73 year old lady got hit by a fence. This occurred purely incidental; while A. Kerste and T. Meijer were lifting a metal fence (werfhek) wind blew against the sail, causing it to blow towards the pedestrian pavement. The woman, being in a physically poor state (she had just been operated on her back) was transferred to the hospital. Shortly after the police arrived at the site to review the situation. The contact information of the inspector of the police (S. Pauwels) was handed over to Antea Group, who alerted their insurance company. As of this reporting period, no claims were yet made against HMVT for this incident (confirmed after calling the police on 5 July 2024 to get an update on the situation). A detailed report of this incident can be found in: *HMVT MEMO: incident Mortsel hek aan statielei 111.*

Step & Touch

ERH is shut off, so no Step & Touch measurements were performed during this period. Step & Touch will no longer be necessary after this period.

Ambient air monitoring

During the reporting period, no presence of CVOC in daily ambient air monitoring was measured (PID). No PPMs were measured during the reporting period. TEC will provide the measurement data from the VaporSafe and the radiello's.

10 Settlement measurements

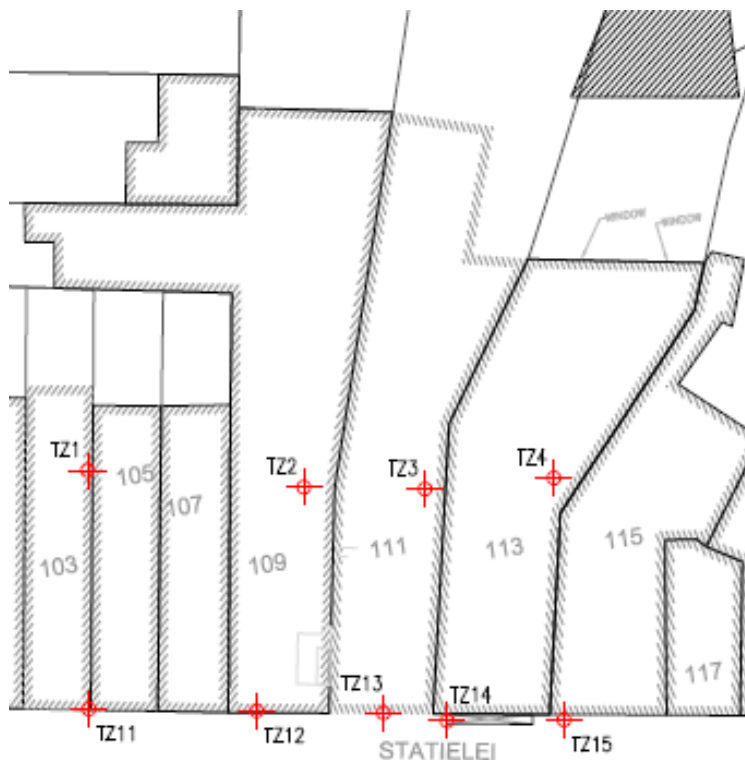
The settlement measurements are being monitored on a two weekly basis by buro Teugels. The latest results of the measurements can be found in table 2, displayed in meters. Settlement is expressed in mm. The measuring points can be found in the map below.

Table 2. Results settlement measurements

		dossier nr.: 2227978
		werf: Wegrosan - Mortsel Statielei
		datum: 23/08/24
		Operator: K.J. - S.B.

ZETTINGSMETING																					
Nr. pt	19/04/23	Δ	TOT Δ	10/05/24	Δ	TOT Δ	29/05/24	Δ	TOT Δ	05/07/24	Δ	TOT Δ	16/07/24	Δ	TOT Δ	09/08/24	Δ	TOT Δ	23/08/24	Δ	TOT Δ
TZ1	5,705			5,702	-1	-3	5,700	-2	-5	5,699	-1	-6	5,699	0	-6	5,698	-1	-7	5,698	0	-7
TZ2	8,780			8,774	-2	-6	8,773	-1	-7	8,770	-3	-10	8,769	-1	-11	8,769	0	-11	8,769	0	-11
TZ3	12,178			12,174	-1	-4	12,172	-2	-6	12,169	-3	-9	12,170	1	-8	12,170	0	-8	12,170	0	-8
TZ4	9,256			9,254	0	-2	9,252	-2	-4	9,250	-2	-6	9,250	0	-6	9,250	0	-6	9,250	0	-6
TZ5	8,482												8,482	0	0	8,482	0	0	8,482	0	0
TZ6	9,975												9,975			9,975	0	0	9,975	0	0
TZ11	5,211			5,209	0	-2	5,208	-1	-3	5,207	-1	-4	5,207	0	-4	5,206	-1	-5	5,206	0	-5
TZ12	8,150			8,145	-1	-5	8,143	-2	-7	8,141	-2	-9	8,141	0	-9	8,140	-1	-10	8,140	0	-10
TZ13	11,095			11,094	-1	-1	11,092	-2	-3	11,090	-2	-5	11,089	-1	-6	11,089	0	-6	11,089	0	-6
TZ14	8,922			8,922	-1	0	8,920	-2	-2	8,918	-2	-4	8,918	0	-4	8,918	0	-4	8,918	0	-4
TZ15	3,971			3,970	-1	-1	3,968	-2	-3	3,967	-1	-4	3,967	0	-4	3,967	0	-4	3,967	0	-4
TZ16	10,164												10,164			10,163	-1	-1	10,163	0	-1
TZ17	10,195												10,195			10,195	0	0	10,195	0	0

OPMERKINGEN	
Ref meting: 19/04/23	
Ref meting TZ5-TZ6-TZ16-TZ17: 16/07/24	
Δ	: verschil t.o.v. vorige meting
TOT Δ	: verschil t.o.v. ref. meting



Increased settlements (4 – 11 mm) have been measured in buildings Statielei 103, 109 and 111. According to stability engineer Herman Peiffer, settlements over 6 mm can pose a potential problem. After consulting with Herman Peiffer, two extra measurement points were placed to see if the whole block settles at a similar rate. Settlements increased in the period May – July, but seem to be more stable now (July – August).

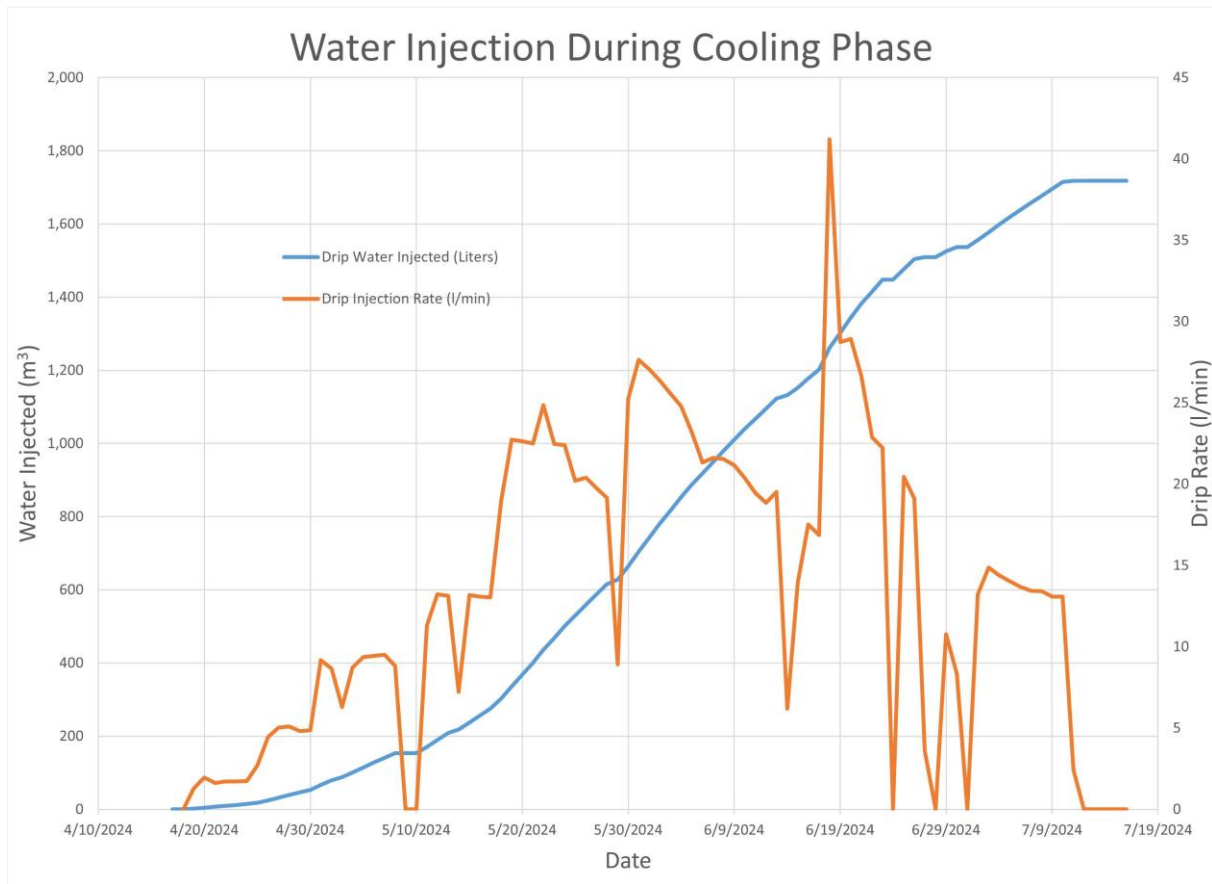
So far no increased cracks have been spotted in the buildings. Herman Peiffer (by phone) indicated that since the settlement is similar to the front and back, there is no indication that certain tension would build up in specific parts of the building. However, since a limit has been reached of 7 mm, the measurement frequency has been increased, as well as monitoring for cracks in walls, ceilings, etc.

Herman Peiffer has visited the site and he did not see any cracks that might be an indication for uneven settlements. He advised to perform another settlement measurement in September and a last one in December 2024.

11 Dripping

We started dripping tap water for cooling on April 18 (after shutdown of ERH). We slightly increased the drip water flow. The drip flow and volume are shown in the Figure below.

Drip rate was steadily increasing up to ca. 30 m³/day. June 4th we started the cooling test and drip in the filters in building SL 109 was stopped. On June 17th drip in SL 109 started again. As a result of this the drip rate decreased temporarily. The drip rate drops of the last days are probably caused by measurement registration disruption due to cable removal (cables getting loose, causing disruption). After the 10th of July dripping was stopped and approximately 1.800 m³ tap water was dripped into the soil for cooling. In reality, this number may be slightly higher.



12 Planned Activities

Planned activities for the following three/four weeks (32-36) involve:

- Provisional Acceptance
- Location descriptions (“Plaatsbeschrijvingen”)
- Finishing and repairs

Figures

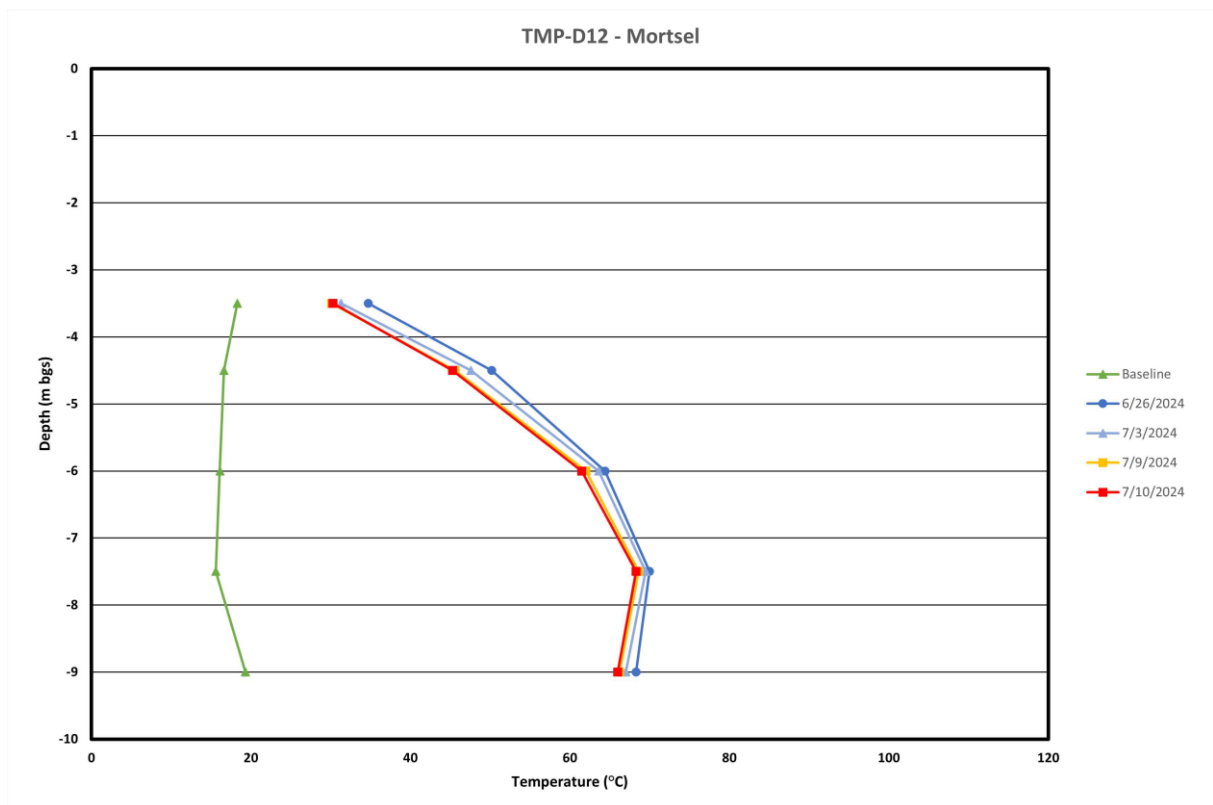
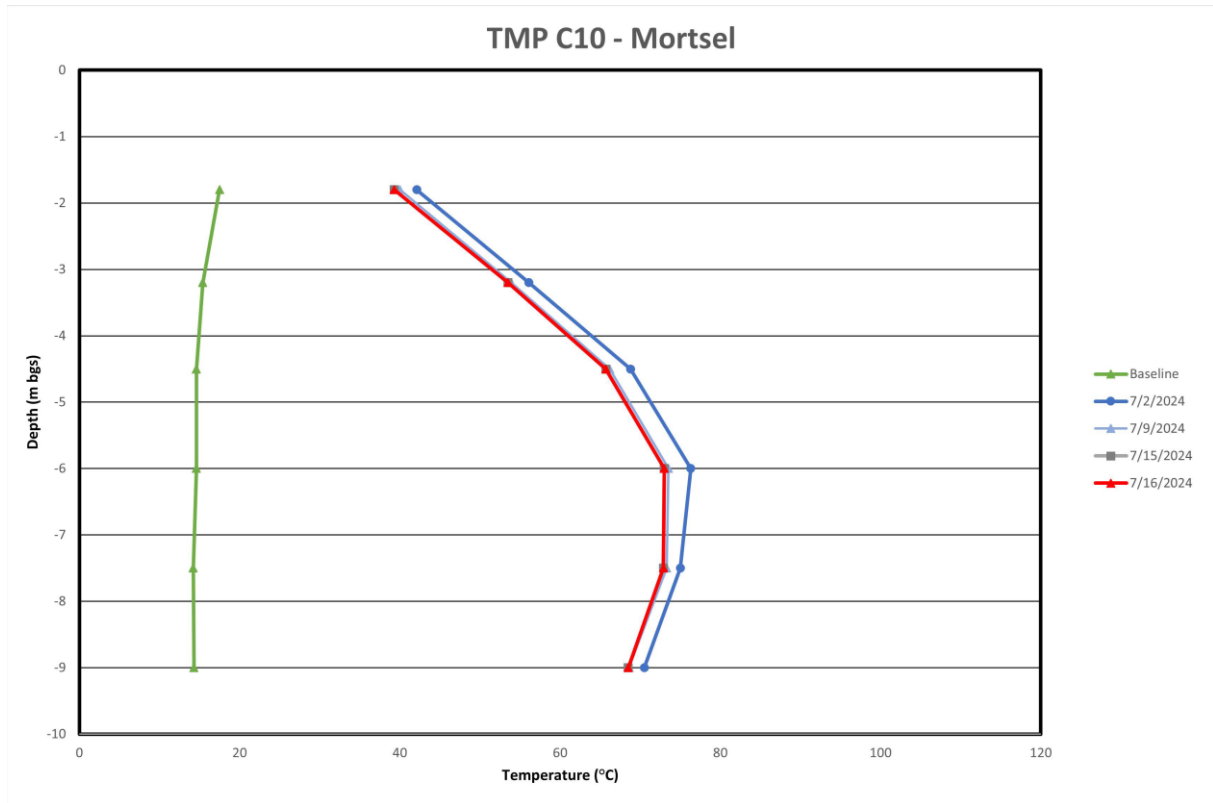
1. Site plan
2. Average Temperature vs. Time (by TMP)
3. Cumulative Mass Removed vs. Time

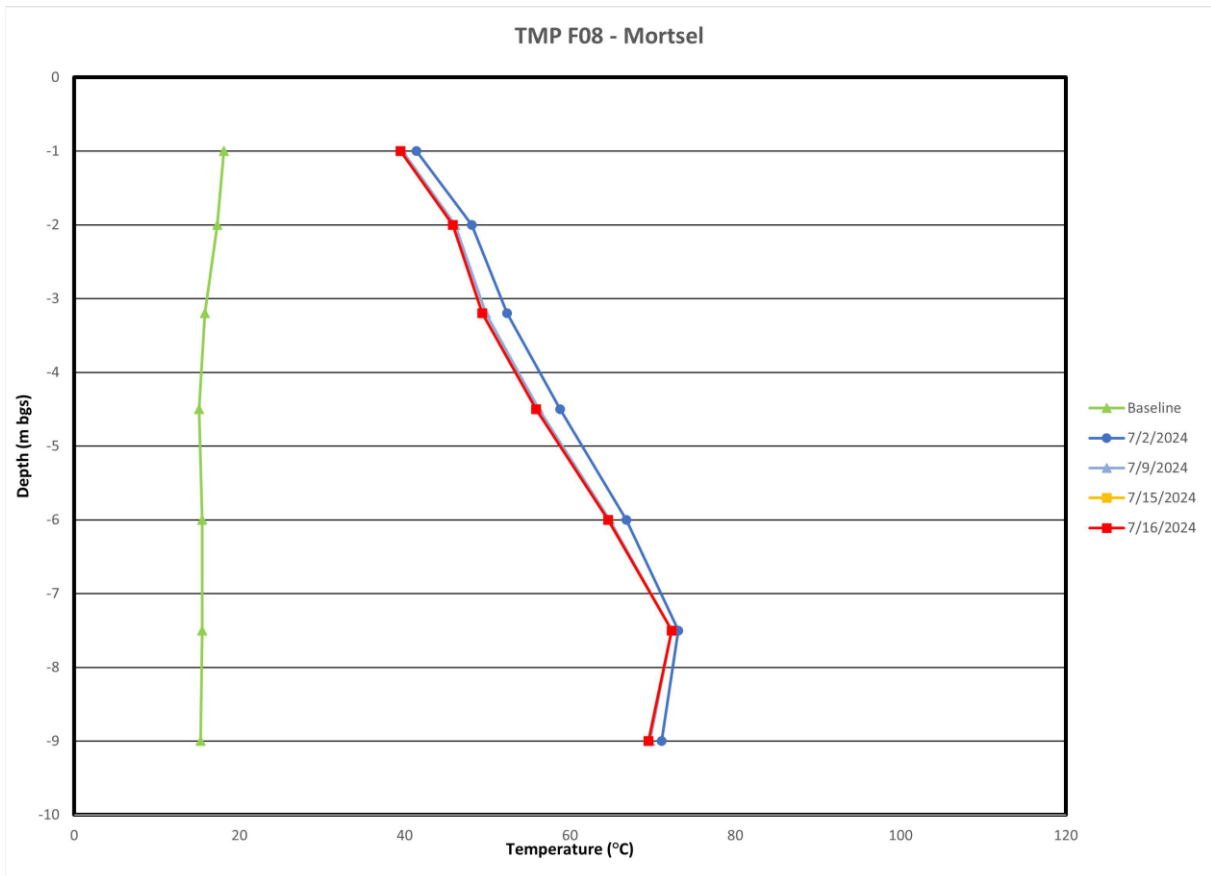
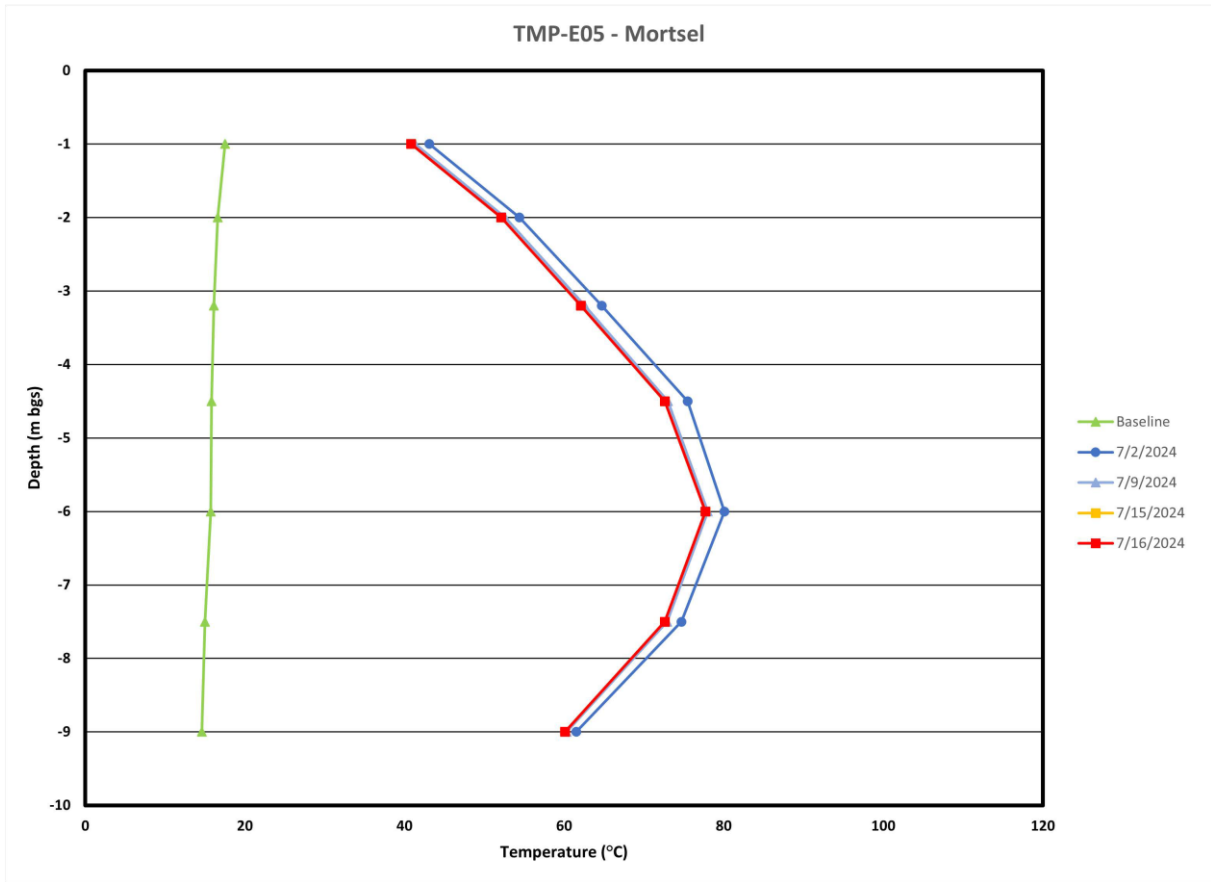


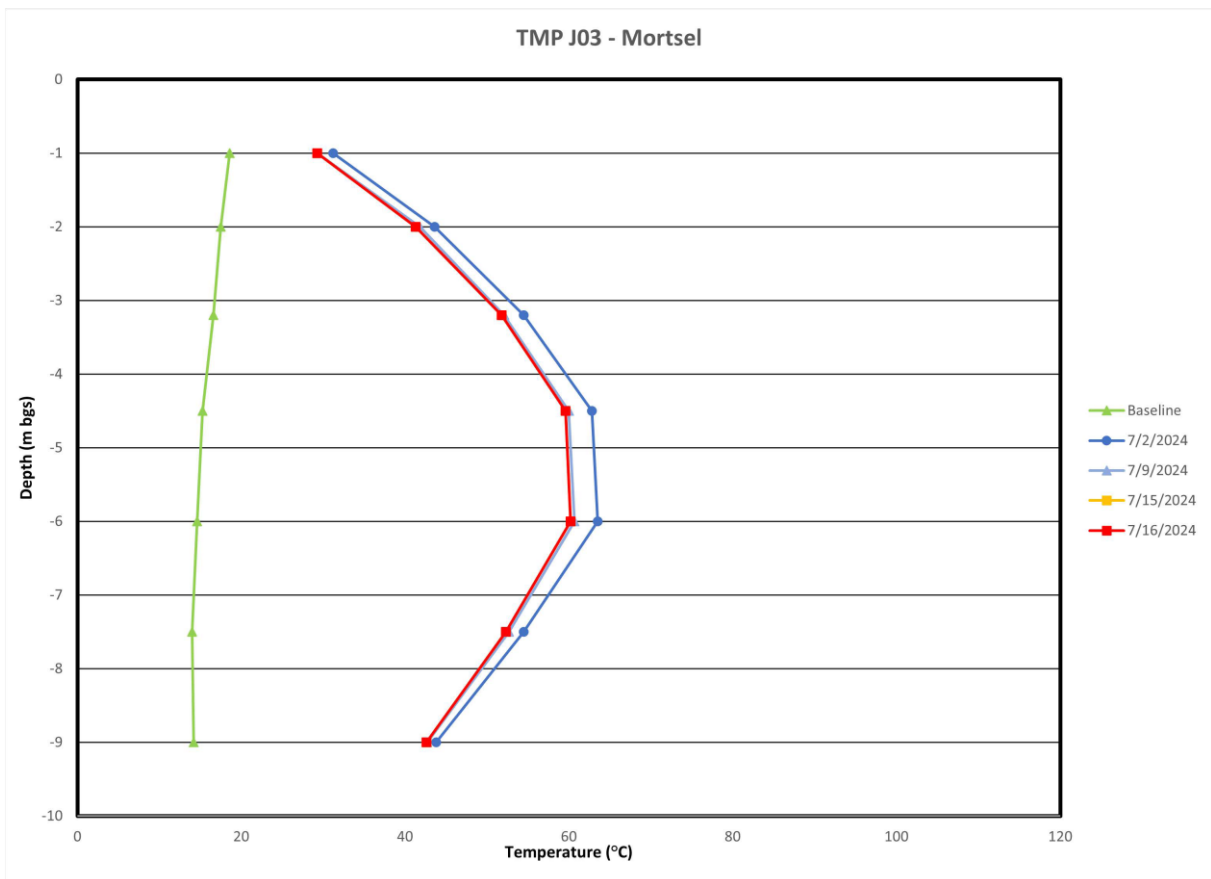
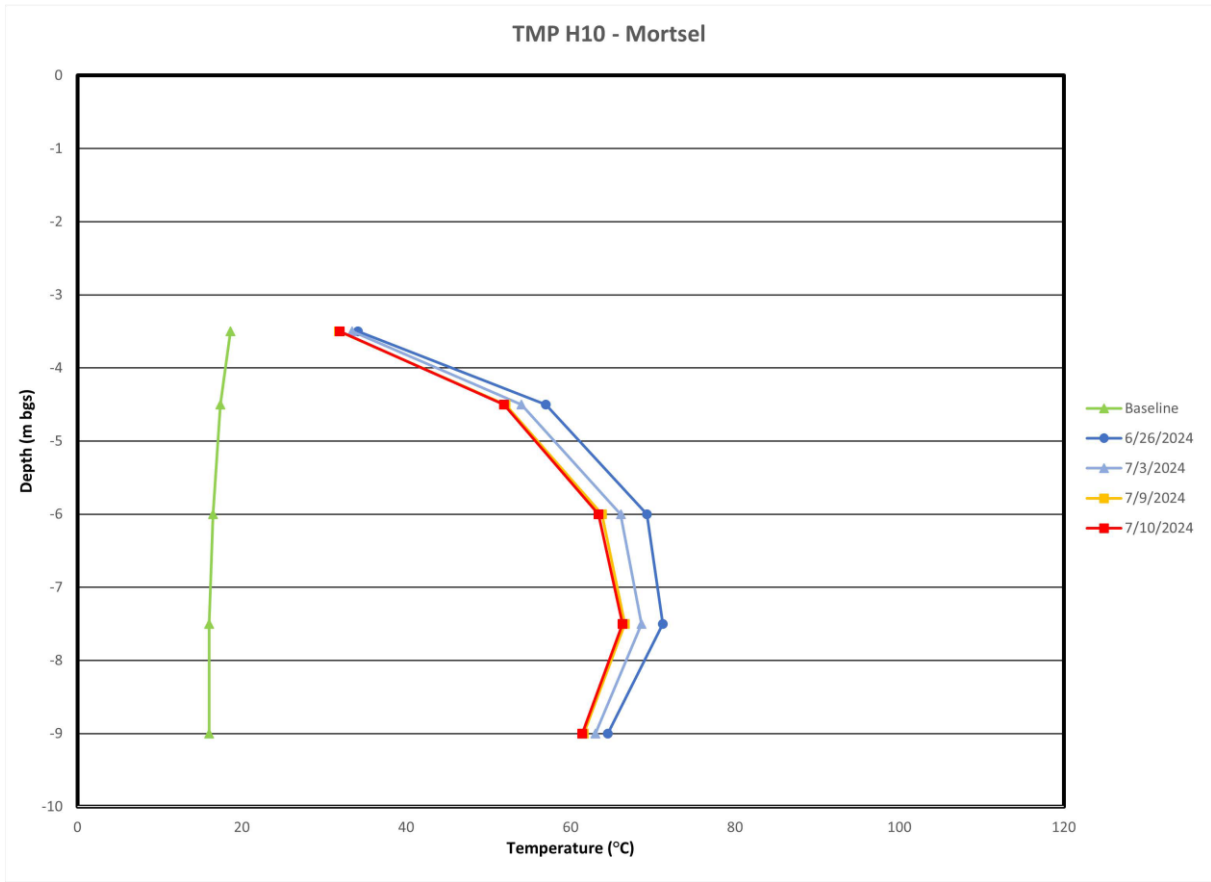
Figure 1: Site plan

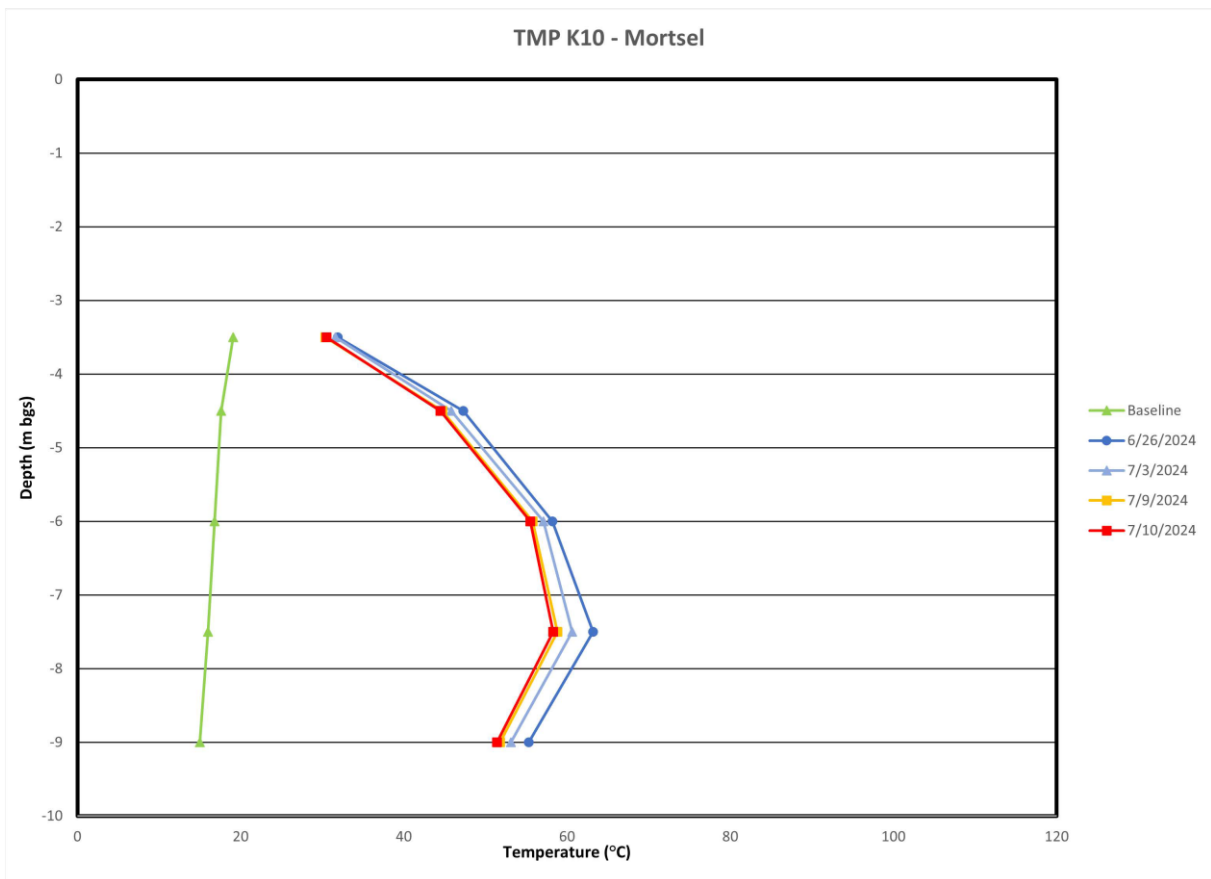
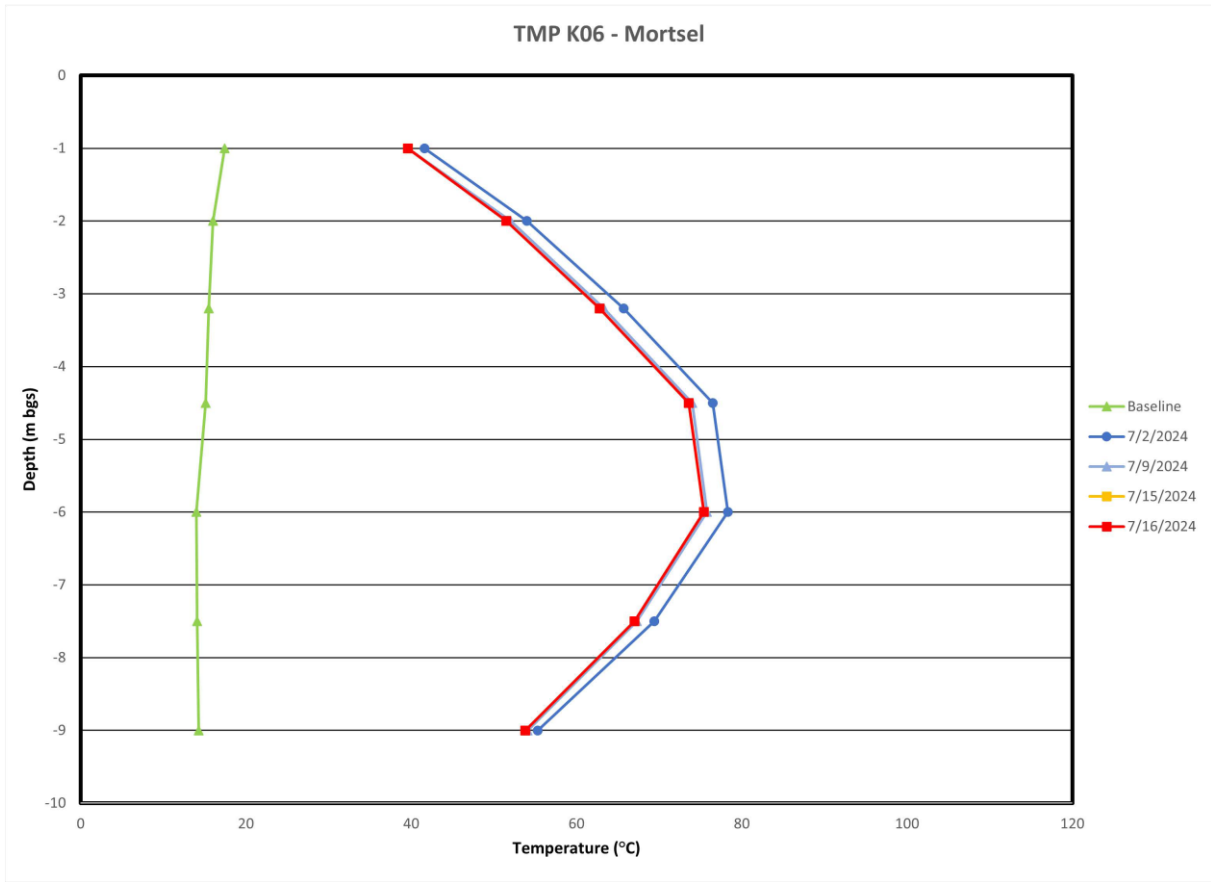
The as built site plan is attached separately

Figure 2. Average Temperature vs. Time (By TMP)









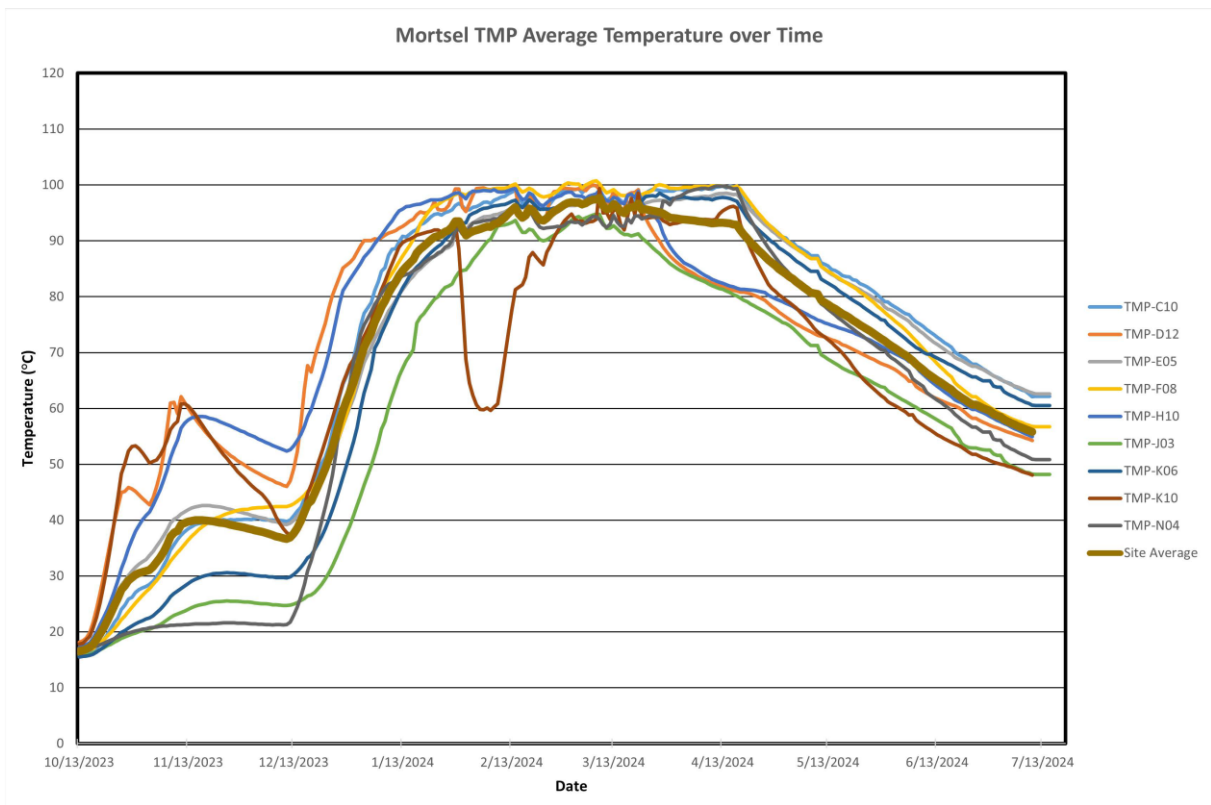
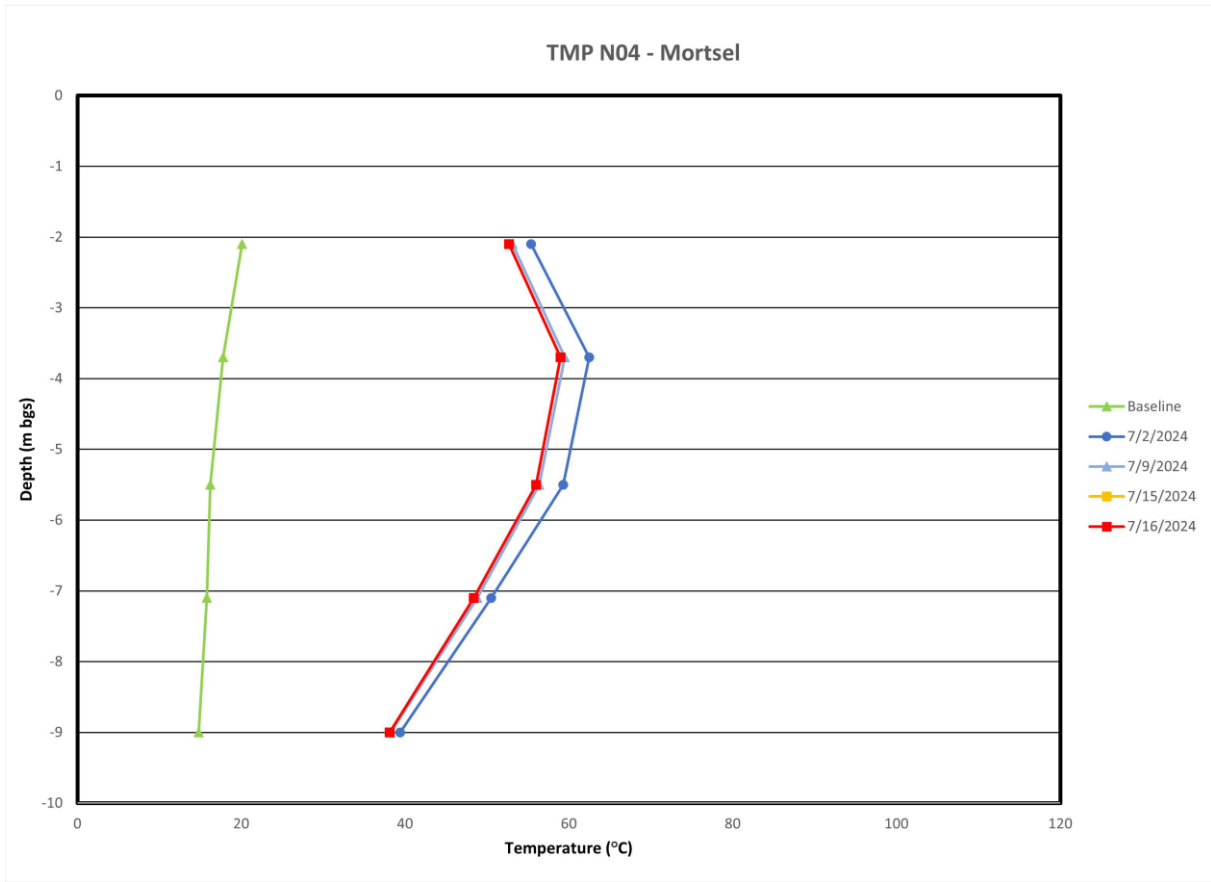


Figure 3. Cumulative Mass Removed vs. Time

