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Memo

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Reference: Mackay Potash Project – Lysimeter Testing

1. INTRODUCTION

This technical memo outlines the lysimeter test work conducted adjacent to the Recharge Trial Site (RTS).

2. ON-LAKE INVESTIGATION

2.1 Purpose

To characterize the evaporation characteristics of the near surface sediments at Lake Mackay.

2.2 Background

The closed end lysimeter is an instrument used for determining rate of evaporation from soil profiles of differing depths. Results can be used to determine various hydrological properties.

2.3 Lysimeter Methodology

2.3.1 Equipment

- 100 mm PVC pipe & end caps
- PVC cement glue
- Adjustable pliers
- Cleaning cloth
- Weighing scales (±0.01g)

2.3.1.1 Procedure

1. A representative, undisturbed area of the lake surface 20m north of the recharge trial area (Appendix A, Figure 1) was selected to conduct the lysimeter testing.
2. Four lengths (200, 300, 400, 500mm) of 100 mm PVC pipe were prepared and weighed prior to extracting samples of sediment (Appendix A, Figure 2).
3. Sediment was sampled by inserting each length of 100mm PVC into the ground until the sediment was 20mm from the lip of the pipe (Appendix A, Figure 1).
4. The samples were recovered by rotating the PVC ¼ turn to separate the end of the core from ground. Using two pairs of plyers griping the lip of the PVC, the tube was slowly pulled up to extract the core sample. Recovery of 100% was achieved for all samples (Appendix A, Figure 2 and 3).
5. The extracted tubes of core were cleaned prior to having a PVC end cap installed with PVC cement (Appendix A, Figure 4).
6. The core samples were weighed, date and time recorded, then reinserted into their respective

holes.

2.3.1.2 Measuring

1. Daily measurements were taken by removing each lysimeter from the ground and thoroughly cleaning with a damp rag.
2. Once clean and dry, each tube was weighed, and the time and date recorded.
3. Lysimeters were then reinserted into their corresponding holes.

2.3.1.3 Results

Results for Test 1 and 2 are summarized below. There is a third test with core tube samples from the T13 location which is currently ongoing.

2.3.1.3.1 Test 1

Below is a table that summarizes the weight loss due to evaporation for each depth interval for Test 1 over the 46-day test period.

Test 1			
Depth (mm)	Initial Weight (g)	Final Weight (g)	Weight Loss (g)
200	3657	3614	43
300	5131	5086	45
400	6923	6839	84
500	8553	8478	75

Table 1: Lysimeter Test 1 weight summary

2.3.1.3.2 Test 2

Below is a table that summarizes the weight loss due to evaporation for each depth interval for Test 2 over the 46-day test period.

Test 2			
Depth (mm)	Initial Weight (g)	Final Weight (g)	Weight Loss (g)
200	3453	3393	60
300	5134	5044	90
400	6829	6753	76
500	7778	7705	73

Table 2: Lysimeter Test 2 weight summary

2.3.1.3.3 Test 3

Below is a table that summarizes the weight loss due to evaporation for Test 3 (sample from T13). The test is ongoing.

Test 3 (T13)			
Depth (mm)	Initial Weight (g)	Final Weight (g)	Weight Loss (g)
350	4878	-	-
450	6233	-	-

2.4 Summary

Two lysimeter tests were undertaken at the recharge trial site located south of T02A. The first test was commenced on the 26th of May, however due to issues with the weighing scales, the data recorded for the first 3 weeks showed a high degree of variability and had to be disregarded. A second test (and a new set of samples) was set up on the 16th June when new scales arrived on site. Test 1 was continued with the new scales (and the original samples) despite the loss of the initial data. Both tests were recorded at intervals ranging from 1 to 5 days.

The results of both tests are summarized in the graphs in Appendix B, Graphs 1 and 2. Weight loss due to evaporation for the lysimeter tubes has been plotted against time and the average daily temperature data recorded for the test period from the weather station has been added.

The third lysimeter test being conducted at the recharge trial site with core samples taken from the T13 location is still underway.

2.5 Comments and Observations

- During the first week of the tests, rainfall was recorded at the pond weather station, 0.2mm on 19/06/19 and 0.6mm on 20/06/19 (Appendix B, Graph 3)

Appendix A – Lysimeter Equipment

Figure 1: Inserting PVC pipe into lake surface.

Figure 2: Lysimeters immediately after sample extraction.

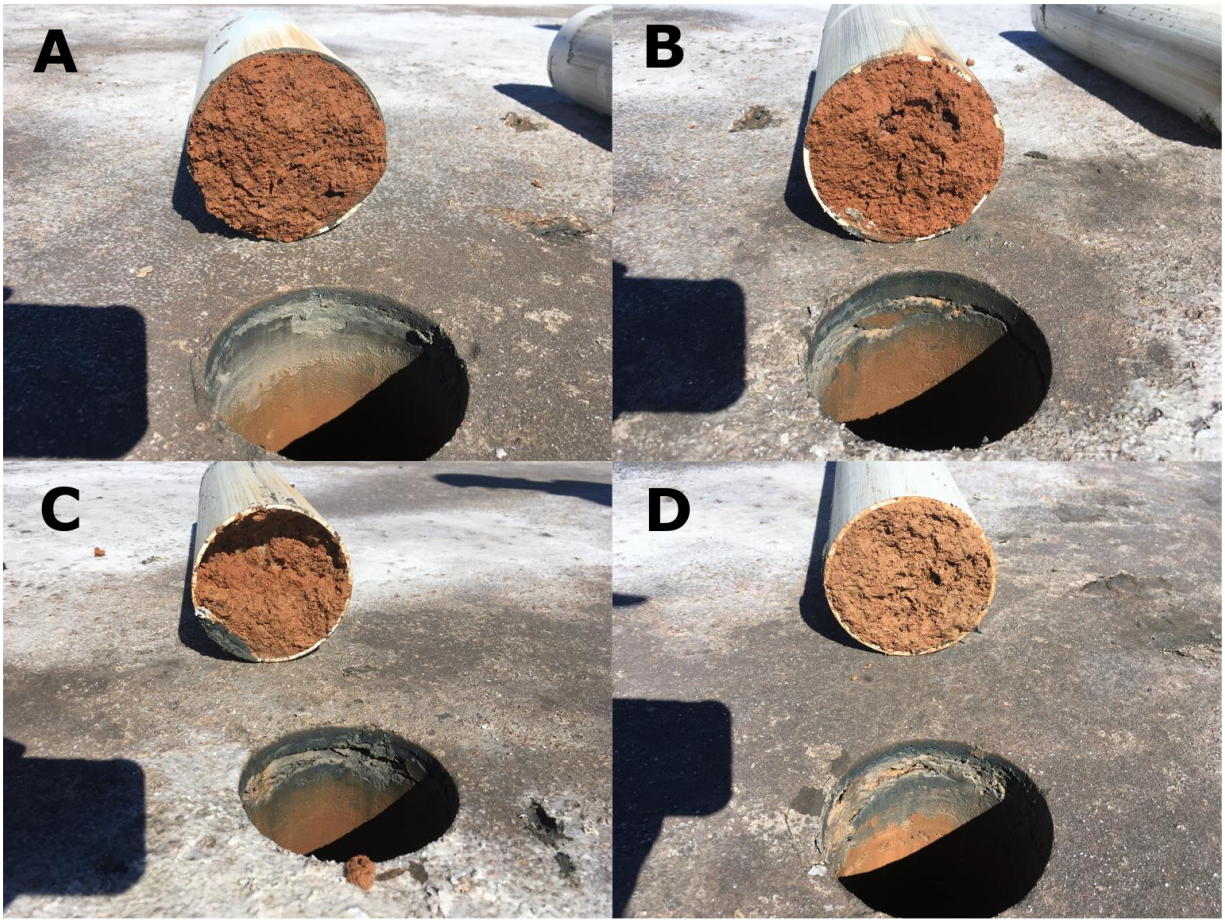
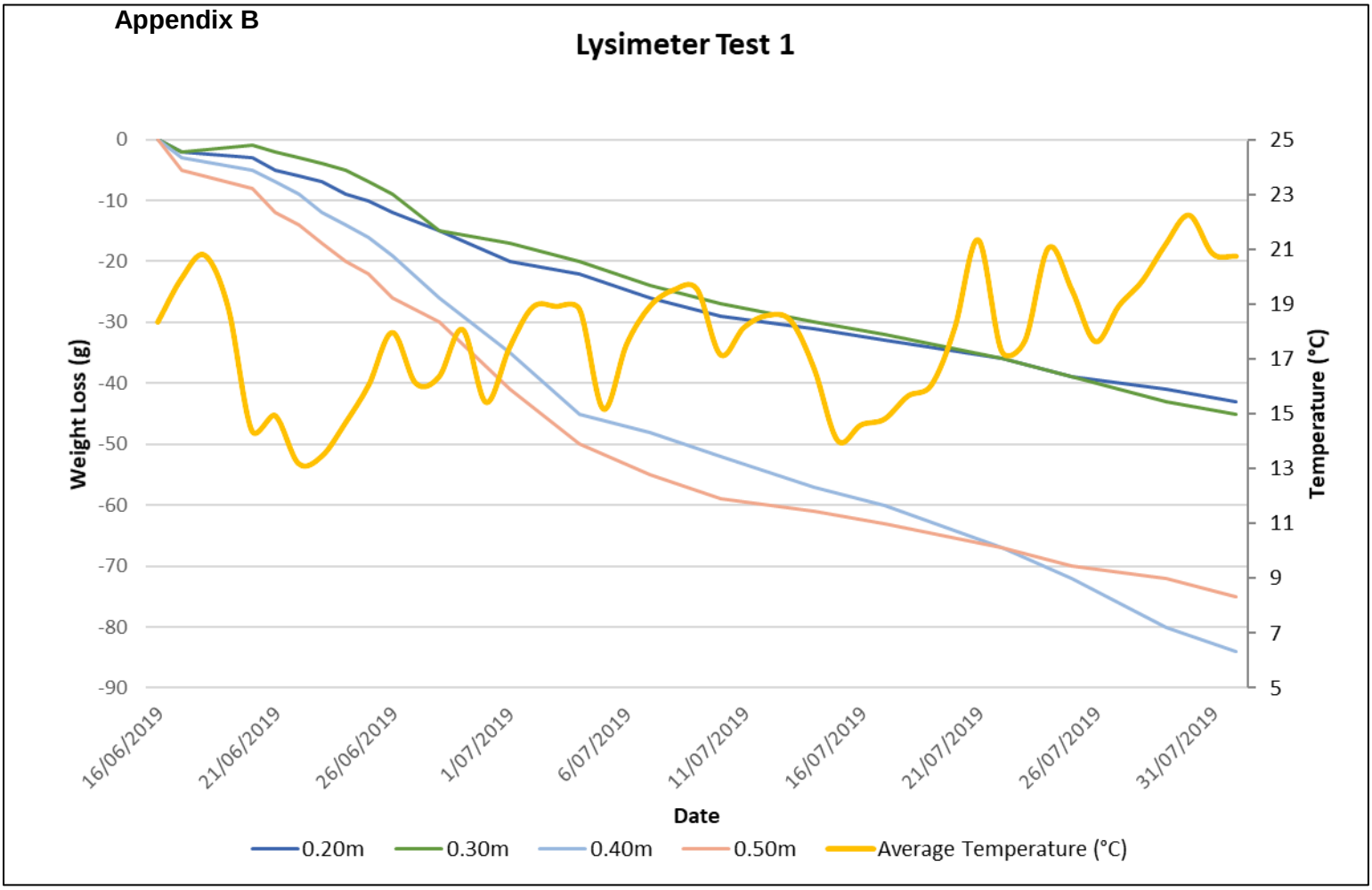


Figure 3: Lysimeter sample recovery. A – 200 mm, B – 300 mm, C – 400 mm, D – 500 mm.

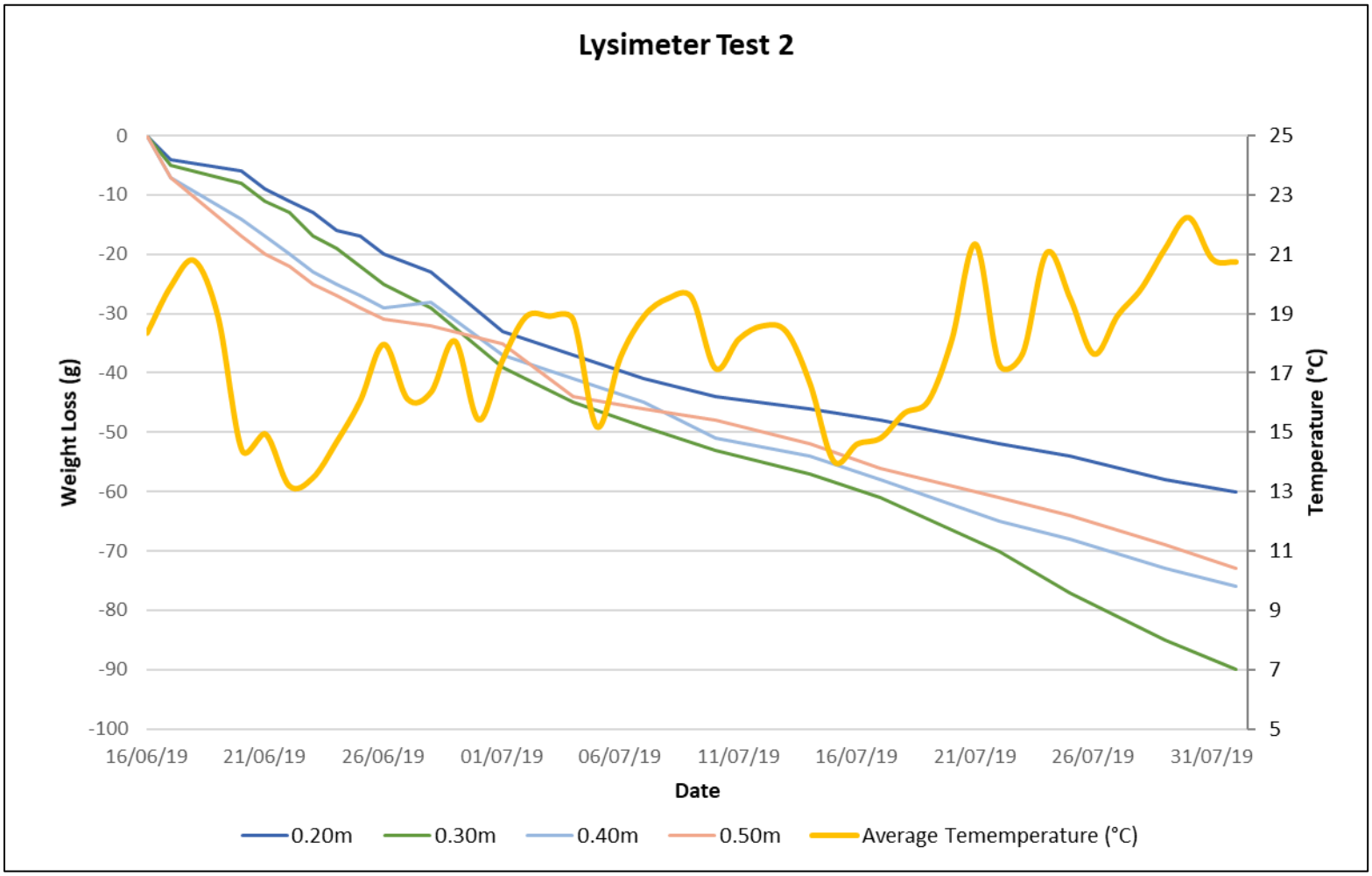
Figure 4: installing PVC cap to lysimeter base.

Figure 5: Fully assembled lysimeters, prior to reinsertion.

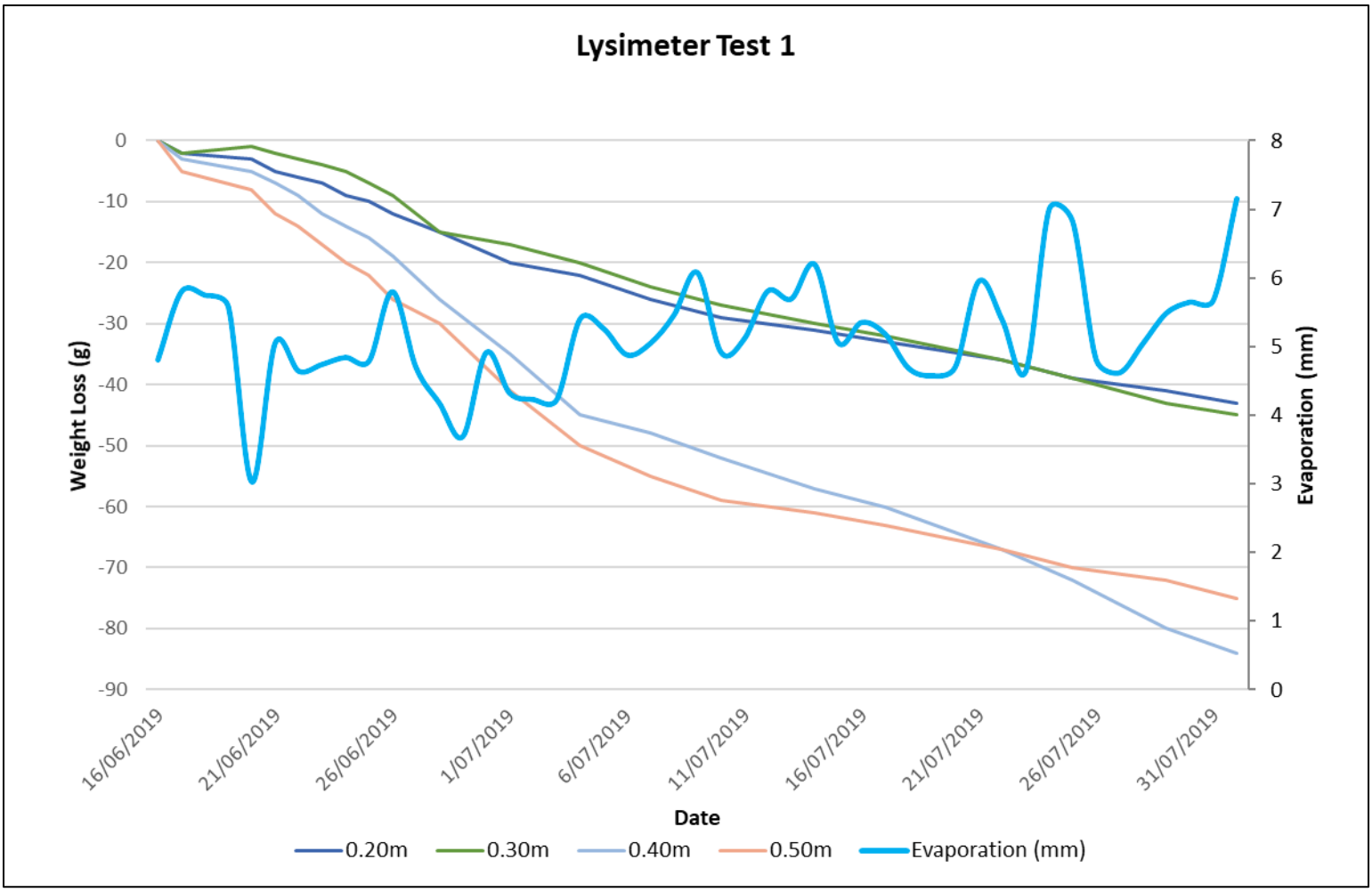
Appendix B



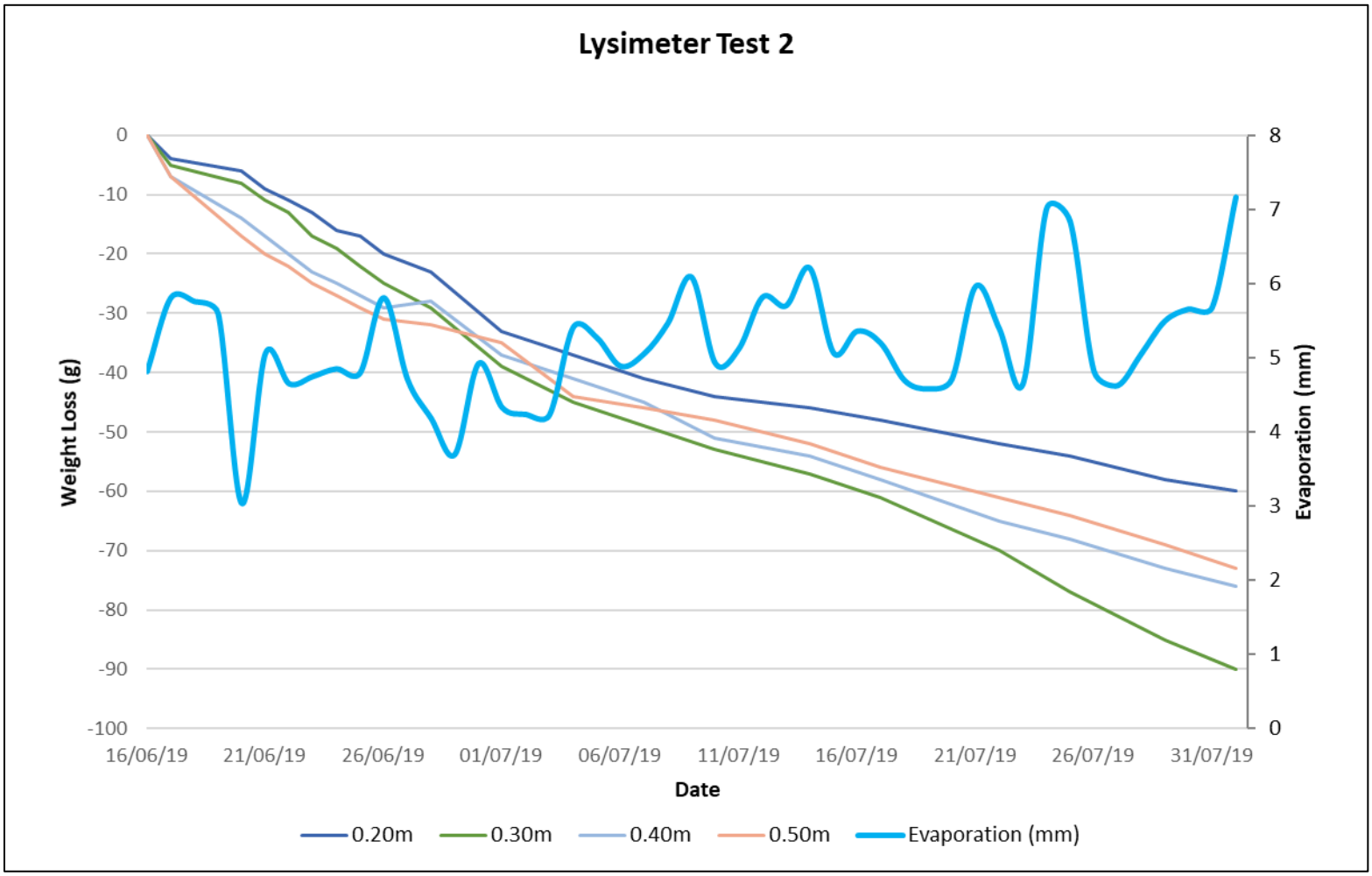
Graph 1: Lysimeter Test 1



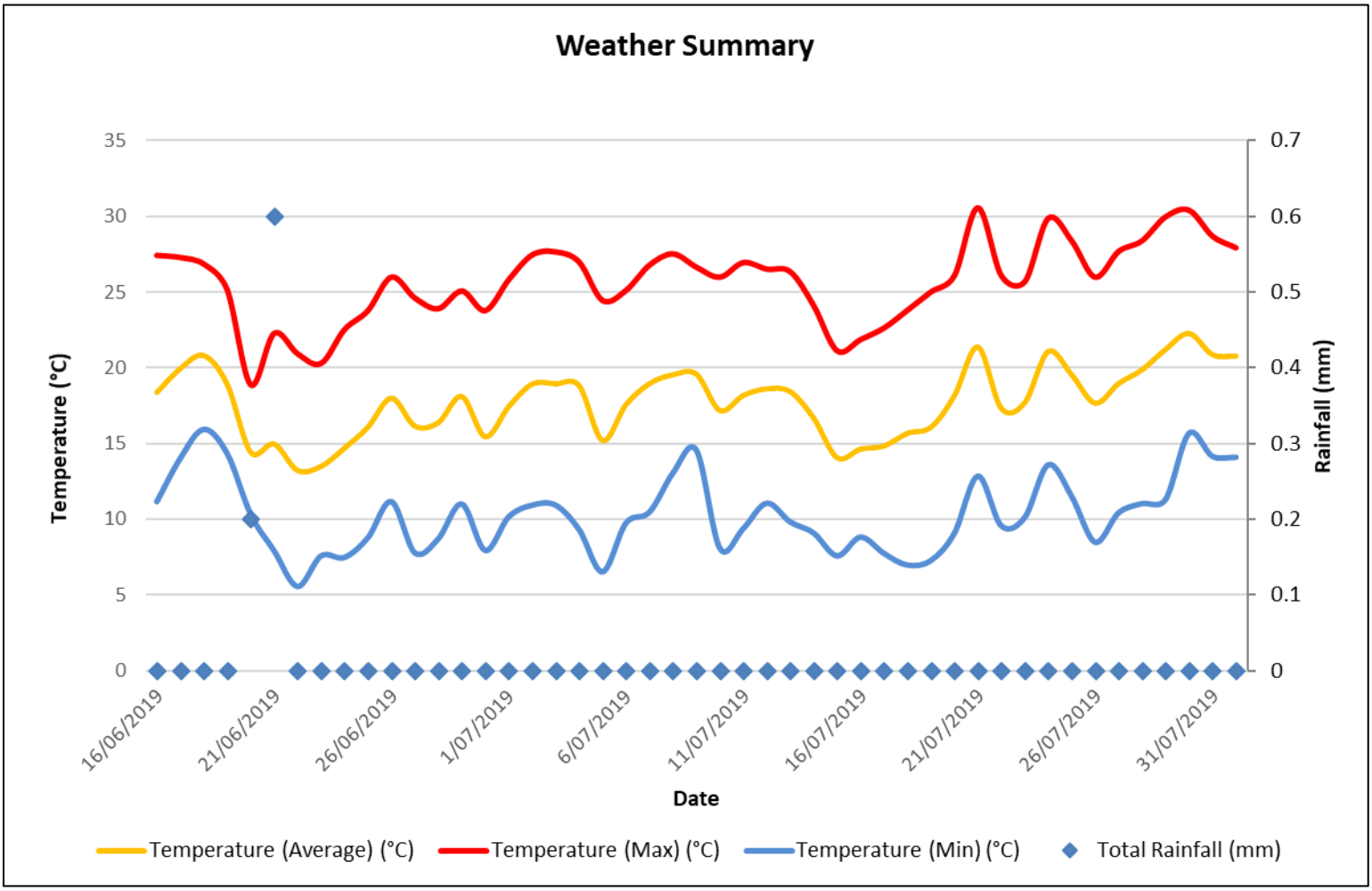
Graph 2: Lysimeter Test 2



Graph 3: Lysimeter Test 1



Graph 4: Lysimeter Test 2



Graph 5: Weather summary for test period.