Attachment A

Inspection Check Lists

1.	Year 2, Quarter 1	Inspection 5	August 31 and September 17, 2017
2.	Year 2, Quarter 2	Inspection 6	December 10, 2017
3.	Year 2, Quarter 3	Inspection 7	March 26, 2018
4.	Year 2, Quarter 4	Inspection 8	June 22, 2018

LONG-TERM MONITORING INSPECTION REPORT

YEAR 2, Quarter 1 ***INSPECTION #5***

LOS ALAMOS COUNTY AIRPORT LANDFILL COVER REPLACEMENT

Inspection Date: *August 31, 2017*
Report Date: *October 5, 2017*

prepared for:
Department of Energy
Environmental Management Los Alamos Field Office (EM-LA)
Los Alamos Field Office
Los Alamos, NM 87544

prepared by:
Dwyer Engineering LLC under contract to The Lakeworth Group
Stephen F. Dwyer, PhD, PE
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Revision 1

EXECUTIVE SUMMARY

This is the fifth inspection (Year 1, Quarter 1 - inspection date: August 31, 2017) of the ET Cover and associated project elements for the Los Alamos County Airport Landfill. The construction of the cover system was completed in July 2016.

All features of the closure are currently in good condition and working as designed. Vegetation has increased significantly since the prior inspection. There is no recommended maintenance or repairs at this time.

All methane monitoring locations measured no methane. The heat dissipation units were replaced with newer probes in May 2017. Initial trends in the moisture content and HDU probes reveal that moisture is migrating up from the waste, thus there is a negative flux to date through the cover. There is also sensitivity of the probe data to temperature. Longer term trends will need to be evaluated to better assess the effectiveness of the cover system.

A staked grid was surveyed in on the landfill with associated elevations. This grid will be surveyed with each subsequent inspection to monitor the ongoing differential settlement within the landfill (if any).

INSPECTION CHECK LIST

Table 1. Long-Term Monitoring Check List for the Los Alamos County Airport Landfill Closure

Site Name: Los Alamos County Airport Landfill Cover Replacement	Date of Inspection: August 31, 2017
City: Los Alamos	Weather: warm, sunny
State: New Mexico	Temperature: 80s
Agency: Department of Energy	Inspector: Stephen F Dwyer, PhD, PE
Site Element	**Remarks**
ET Cover	
1. Settlement (Low Spots): Yes ( ) No (X) Areal Extent: none Depth: NA Repairs Necessary Yes ( ) No (X) If yes, explain	Visual inspection showed no obvious differential settlement noted to date. A grid was established on the cover surface and surveyed. This grid will be surveyed each inspection with the quantified settlement summarized in subsequent inspection reports.
2. Surface Cracks: Yes ( ) No (X) Length: NA Width: NA Depth: NA Repairs Necessary Yes ( ) No (X) If yes, explain	No surface cracking was identified during this inspection.
3. Erosion: Yes ( ) No (X) Areal Extent: NA Depth: NA Repairs Necessary Yes ( ) No (X) If yes, explain	No erosion noted to date. The gravel/soil top admixture top layer (6-inches thick) referred to as a 'desert pavement' is developing well and appears to be working as designed to minimize erosion (Picture 17).
4. Biointrusion Holes: Yes ( ) No (X) Areal Extent: NA Depth: NA Suspected Cause (Rodent or Other): NA Repairs Necessary Yes ( ) No (X) If yes, explain	No biointrusion noted to date.
5. Vegetation Condition:	Vegetation increased in size and areal extent since the

Site Name: Los Alamos County Airport Landfill Cover Replacement	**Date of Inspection: August 31, 2017**
City: Los Alamos	**Weather: warm, sunny**
State: New Mexico	**Temperature: 80s**
Agency: Department of Energy	**Inspector: Stephen F Dwyer, PhD, PE**
Site Element	**Remarks**
General Condition progressing as expected: Yes (X) No ( ) If no, explain Issues Observed: Yes ( ) No (X) If yes, explain Repairs Necessary: Yes ( ) No (X) If yes, explain	prior inspection in June 2017. The vegetation is uneven across the cover where some areas have vegetation a couple of feet tall while most areas the grass is 2 to 6-inches tall (Pictures 1, 4, 5, 6, 7, 14, 15,16 and 20). This is likely due to the moisture in the soil directly beneath the cover that is migrating up. The moist areas are producing thicker and taller vegetation at this time. The vegetation is expected to even out over time as this underlying moisture equilibrates.
6. Rill/Gully: Yes ( ) No (X) Areal Extent: NA Depth: NA Suspected Cause: NA Repairs Necessary Yes ( ) No (X) If yes, explain	No erosion noted to date.
7. Wet Areas: Yes ( ) No (X) Ponding: Yes ( ) No (X) Areal Extent: NA Seeps: Yes ( ) No (X) Areal Extent: NA Soft Subgrade: Yes ( ) No (X) Areal Extent: NA Repairs Necessary Yes ( ) No (X) If yes, explain	No unusual wet areas noted to date on the cover. The inspection began with dry surface conditions visible across the cover.
8. Slope Instability: Yes ( ) No (X) Areal Extent: NA Suspected Cause: NA Exposed Cover Components: NA Repairs Necessary Yes ( ) No (X) If yes, explain	No slope instability noted to date.

Site Name: Los Alamos County Airport Landfill Cover Replacement	**Date of Inspection: August 31, 2017**
City: Los Alamos	**Weather: warm, sunny**
State: New Mexico	**Temperature: 80s**
Agency: Department of Energy	**Inspector: Stephen F Dwyer, PhD, PE**

Site Element	Remarks
9. Water Balance Instrumentation: Functioning Properly: Yes (X) No ( ) Damage: Yes ( ) No (X) Repairs Necessary Yes ( ) No (X) If yes, explain	Moisture content probes appeared to be working correctly and are in good condition to date (Pictures 6 and 7). The heat dissipation units (HDU) were replaced in March 2017. Refer to Figures 1 to 6 for a summary of the data collected to date.
9. Methane Monitoring Instrumentation: Functioning Properly: Yes (X) No ( ) Damage: Yes ( ) No (X) Repairs Necessary Yes ( ) No (X) If yes, explain	Felicia Aguilar, The Lakeworth Group, performed methane monitoring on September 21, 2017. All measurements showed zero methane (Table 2). Refer to Pictures 2 to 4 for methane monitoring locations.
Rip Rap Lined Drainage Channels	
1. Settlement: Yes ( ) No (X) Areal Extent: NA Depth: NA Repairs Necessary Yes ( ) No (X) If yes, explain	Visual inspection revealed no settlement to date. Storm water appeared to be conveyed as designed during the rain storm.
2. Material Degradation: Yes ( ) No (X) Material Type: Rock, geotextile, geomembrane (polyethylene) Areal Extent: NA Degree of Degradation: none Repairs Necessary Yes ( ) No (X) If yes, explain	No material degradation noted to date (Pictures 10, 11, and 12).
3. Erosion: Yes ( ) No (X) Areal Extent: NA Depth: NA Repairs Necessary Yes ( ) No (X) If yes, explain	No erosion noted to date.
4. Undercutting:	No undercutting noted to date.

Site Name: Los Alamos County Airport Landfill Cover Replacement	**Date of Inspection: August 31, 2017**
City: Los Alamos	**Weather: warm, sunny**
State: New Mexico	**Temperature: 80s**
Agency: Department of Energy	**Inspector: Stephen F Dwyer, PhD, PE**
Site Element	**Remarks**
Yes ( ) No (X) Areal Extent: NA Depth: NA Repairs Necessary Yes ( ) No (X) If yes, explain	
5. Obstructions: Yes ( ) No (X) Type: NA Areal Extent: NA Size: NA Repairs Necessary Yes ( ) No (X) If yes, explain	No obstructions noted to date.
6. Slope Instability: Yes ( ) No (X) Type: NA Areal Extent: NA Repairs Necessary Yes ( ) No (X) If yes, explain	No slope instability noted to date.
7. Siltation: Yes ( ) No (X) Areal Extent: NA Depth: NA Repairs Necessary Yes ( ) No (X) If yes, explain	No siltation noted to date.
8. Drop Inlet Structures: Working Properly Yes (X) No ( ) Condition: good Extent of Damage: NA Repairs Necessary Yes ( ) No (X) If yes, explain	Drop inlet structures are in good condition (Picture 12).
Concrete Culvert	

Site Name: Los Alamos County Airport Landfill Cover Replacement	**Date of Inspection: August 31, 2017**
City: Los Alamos	**Weather: warm, sunny**
State: New Mexico	**Temperature: 80s**
Agency: Department of Energy	**Inspector: Stephen F Dwyer, PhD, PE**
Site Element	**Remarks**
1. Siltation: Yes ( ) No (X) Areal Extent: NA Depth: NA Repairs Necessary Yes ( ) No (X) If yes, explain	No siltation noted to date (Picture 13).
2. Concrete Condition and Joints General Condition progressing as expected: Yes (X) No ( ) If no, explain Issues Observed: Yes ( ) No (X) If yes, explain Repairs Necessary: Yes ( ) No (X) If yes, explain	Concrete in new condition (Picture 13).
3. Grating Condition: General Condition progressing as expected: Yes (X) No ( ) If no, explain Issues Observed: Yes ( ) No (X) If yes, explain Repairs Necessary: Yes ( ) No (X) If yes, explain	Grating in good condition (Picture 13).
Fencing	
1. Airport Fence Adjacent to Landfill: bent posts: Yes ( ) No (X) loose posts: Yes ( ) No (X) broken links or wire: Yes ( ) No (X) damaged gates: Yes ( ) No (X) Description of damage: NA Repairs Necessary Yes ( ) No (X) If yes, explain	Airport fencing is in good condition and securing the site (Pictures 9, 21, 23, 25, and 26). This fencing is maintained by the County of Los Alamos.
Retaining Wall	
1.Retaining Wall Condition: General Condition progressing as expected: Yes (X) No ( ) If no, explain	Retaining walls are in good condition. No damage or issues were noted (Pictures 22 to 26).

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City: Los Alamos	**Weather: warm, sunny**
State: New Mexico	**Temperature: 80s**
Agency: Department of Energy	**Inspector: Stephen F Dwyer, PhD, PE**

Site Element	Remarks
2. Retaining Wall Damage Description (if any): Issues Observed: Yes ( ) No (X) If yes, explain	None
3.**Repairs Necessary** Repairs Necessary: Yes ( ) No (X) If yes, explain	None
Temporary Erosion & Sedimentation Control Measures (if any)	
1. Erosion Control Blanket: Functional Yes (X) No ( ) if no, describe locations Damaged Blanket: Yes ( ) No (X) Other damage: Yes ( ) No (X) Description of damage: NA Repairs Necessary Yes ( ) No (X) If yes, explain	The erosion control blankets (ECBs) were placed around the perimeter of the new cover surface and other disturbed areas. They are intended to mitigate erosion until vegetation is established and are a temporary erosion control measure. The ECBs have significantly degraded as expected since they are a short-term erosion control feature.
Permanent Erosion & Sedimentation Control Measures	
1. Rip Rap Berm near Retaining Wall: Functional Yes (X) No ( ) if no, describe locations Damage or degradation: Yes ( ) No (X) Description of damage: NA Repairs Necessary Yes ( ) No (X) If yes, explain	The Rip Rap drainage on side slope is in good condition (Pictures 18 and 19).
2. Rock Check Dams near Retaining Wall: Functional Yes (X) No ( ) if no, describe locations Damage, displaced rock, or other damage: Yes ( ) No (X) Description of damage: NA Repairs Necessary Yes ( ) No (X) If yes, explain	The rock check dams are in good condition (Pictures 23, 25, and 26).
3. Landfill Terrace above Retaining Wall: Functional Yes (X) No ( ) if no, describe locations Damage, adjunct erosion, slope problem, or other damage/degradation: Yes ( ) No (X)	The landfill terraces above the retaining walls are in good condition (Pictures 22 and 24).

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City: Los Alamos	**Weather: warm, sunny**
State: New Mexico	**Temperature: 80s**
Agency: Department of Energy	**Inspector: Stephen F Dwyer, PhD, PE**
Site Element	**Remarks**
Description of damage: NA Repairs Necessary Yes ( ) No (NA) If yes, explain	
4. Drainage Channels adjacent to Retaining Wall: Functional Yes (X) No ( ) if no, describe locations Damage, adjunct erosion, slope problem, or other damage/degradation: Yes ( ) No (X) Description of damage: NA Repairs Necessary Yes ( ) No (X) If yes, explain	The drainage channels adjacent to the retaining wall appear in good condition (Pictures 23 to 26). Drainage channels are working properly as observed during the rainstorm that occurred during this inspection.
5. Gabion above Drainage Channels adjacent to Retaining Wall: Functional Yes (X) No ( ) if no, describe locations Damage or degradation: Yes ( ) No (X) Description of damage: NA Repairs Necessary Yes ( ) No (X) If yes, explain	The gabions above drainage channels adjacent to the retaining walls are in good condition (Picture 22 and 23).
Site Access	
1.Access Restrictions: Yes (X) No ( ) Description: Secured fence with keyed lock Repairs Necessary Yes ( ) No (X) If yes, explain	The site has controlled access with a security fence and locked gates.
Debris Disposal Area (DDA)	
Debris Disposal Area Condition Good Condition (X) Poor Condition ( )	The DDA area is in good condition. There is no observed degradation of the site. The vegetation on the site is in good condition (Picture 27).
General	
1. Vandalism: Yes ( ) No (X) Description of damage:	No vandalism noted.

Site Name: Los Alamos County Airport Landfill Cover Replacement	**Date of Inspection: August 31, 2017**
City: Los Alamos	**Weather: warm, sunny**
State: New Mexico	**Temperature: 80s**
Agency: Department of Energy	**Inspector: Stephen F Dwyer, PhD, PE**

Site Element	Remarks
Repairs Necessary Yes ( ) No ( ) If yes, explain	
2. Land Use Change: Yes ( ) No (X) Description: Repairs Necessary Yes ( ) No ( ) If yes, explain	No land use changes.
Summary of Recommended Maintenance and/or Repairs	
1. Maintenance / Repairs Necessary Yes ( ) No (X) If yes, explain	None at this time.
Other	
1. Describe: Project management officials toured the site during inspection.	**Ramoncita Massey, DOE/LA, Cheryl Rodriguez, DOE/LA, and Felicia Aguilar, The Lakeworth Group participated for part of the inspection on August 31, 2017.**
2. Materials have been stockpiled on the new asphalt adjacent to the new concrete hangar foundation west of the landfill (Picture 28). The materials are for erection of the new LA County Airport Hangar.	

Picture 1. Cover Southeast View

Picture 2. Methane Monitoring Port - West of Landfill

Picture 3. Methane Monitoring Port - North of New Hangar Pad

Picture 4. Methane Monitoring Port - South Slope of Landfill

Picture 5. West Slope End of Landfill

Picture 6. Water Balance Monitoring Nest - South Slope of Landfill

Picture 7. Water Balance Monitoring Nest - North Slope of Landfill

Picture 8. New Asphalt and Concrete Hangar Pad - West of Landfill

Picture 9. Reseeded Disturbed Area North of New Hangar Pad

Picture 10. Drainage Channel - North Perimeter of ET Cover

Picture 11. Drainage Channel - East Perimeter of ET Cover

Picture 12. Drainage Channel - South Perimeter of ET Cover

Picture 13. Concrete Culvert - West Perimeter of ET Cover

Picture 14. ET Cover - Northeast View

Picture 15. ET Cover - East View

Picture 16. ET Cover - West View

Picture 17. 'Desert Pavement' and Emerging Vegetation - Surface of ET Cover

Picture 18. SE Berm - Adjacent to Airport Taxiway

Picture 19. NE Berm - Side Slope of Landfill

Picture 20. Eastern Side Slope of Landfill

Picture 21. Concrete Drainage - East End of SE Berm

Picture 22. Gabion Retaining Structure - East End of Landfill

Picture 23. Large Rip Rap Slope - East End of Landfill Site

Picture 24. Concrete Retaining Wall - East End of Landfill

Picture 25. Concrete Retaining Wall - NE End of Landfill

Picture 26. Rock Check Dams - Erosion Control East End of Landfill

Picture 27. Debris Disposal Area

Picture 28. Materials Stockpiled for Construction of New Hangar West of Landfill

WATER BALANCE MONITORING SUMMARY

The moisture content probes data was collected and summarized in this inspection report (Figures 1 and 2). The probes were installed on August 29, August 30, and September 4, 2016. The data collected to date is summarized and presented in Figures 1 to 2. Figure 3 contains the available daily precipitation events for comparison of the response to the moisture probe data.

The moisture content probes reveal that moisture is migrating upward from the underlying waste through the cover system (Figures 1 and 2). That is, the landfill is drying. There is some undulation in the upper 6-inches - wetting due to precipitation and quickly drying thereafter. There also appears to be some sensitivity of the moisture content measurements to soil temperature.

Heat dissipation units (HDU) were replaced on May 18, 2017. These probes measure the matric potential or soil suction in the soil cover system at various depths. The new probes are the most advanced available to date through Decagon Corp. Collected data to date is shown in Figures 4 and 5. Figure 6 contains the available daily precipitation events for comparison to response of the soil suction data. Figure 7 shows the monitoring point locations.

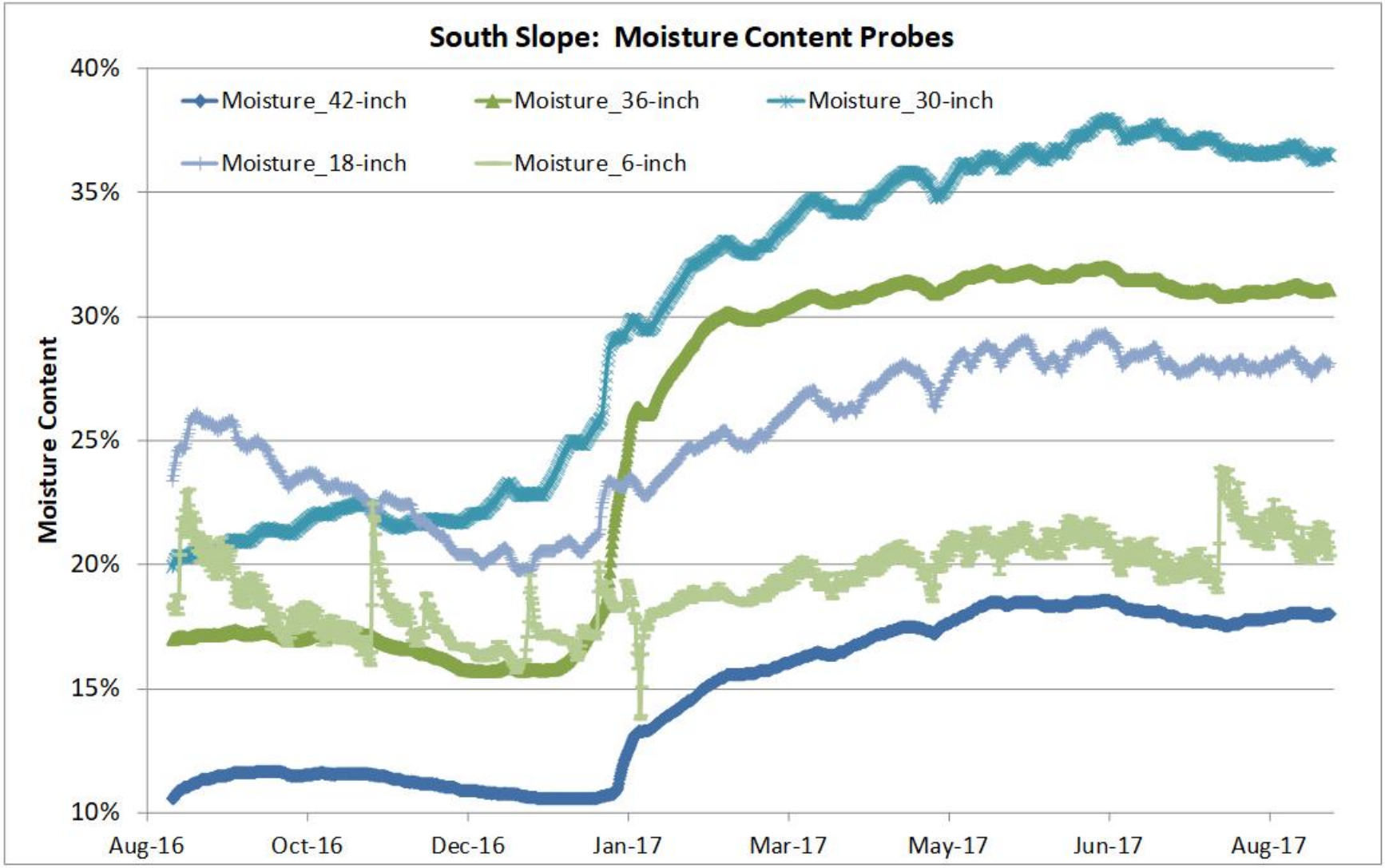

Figure 1. Moisture Probe Data (September 2016 to Aug 2017) - ET Cover South Slope

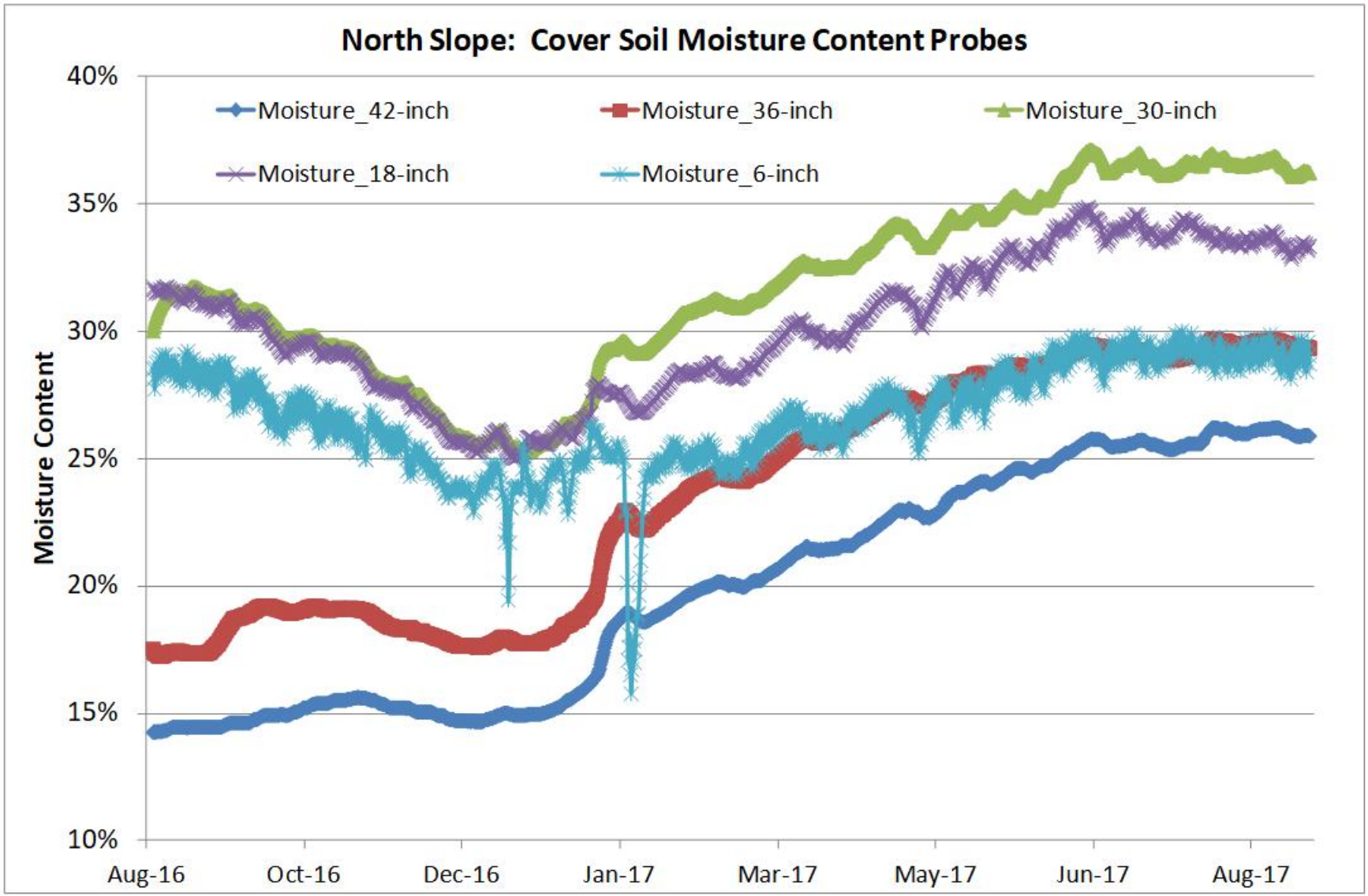

Figure 2. Moisture Probe Data (September 2016 to Aug 2017) - ET Cover North Slope

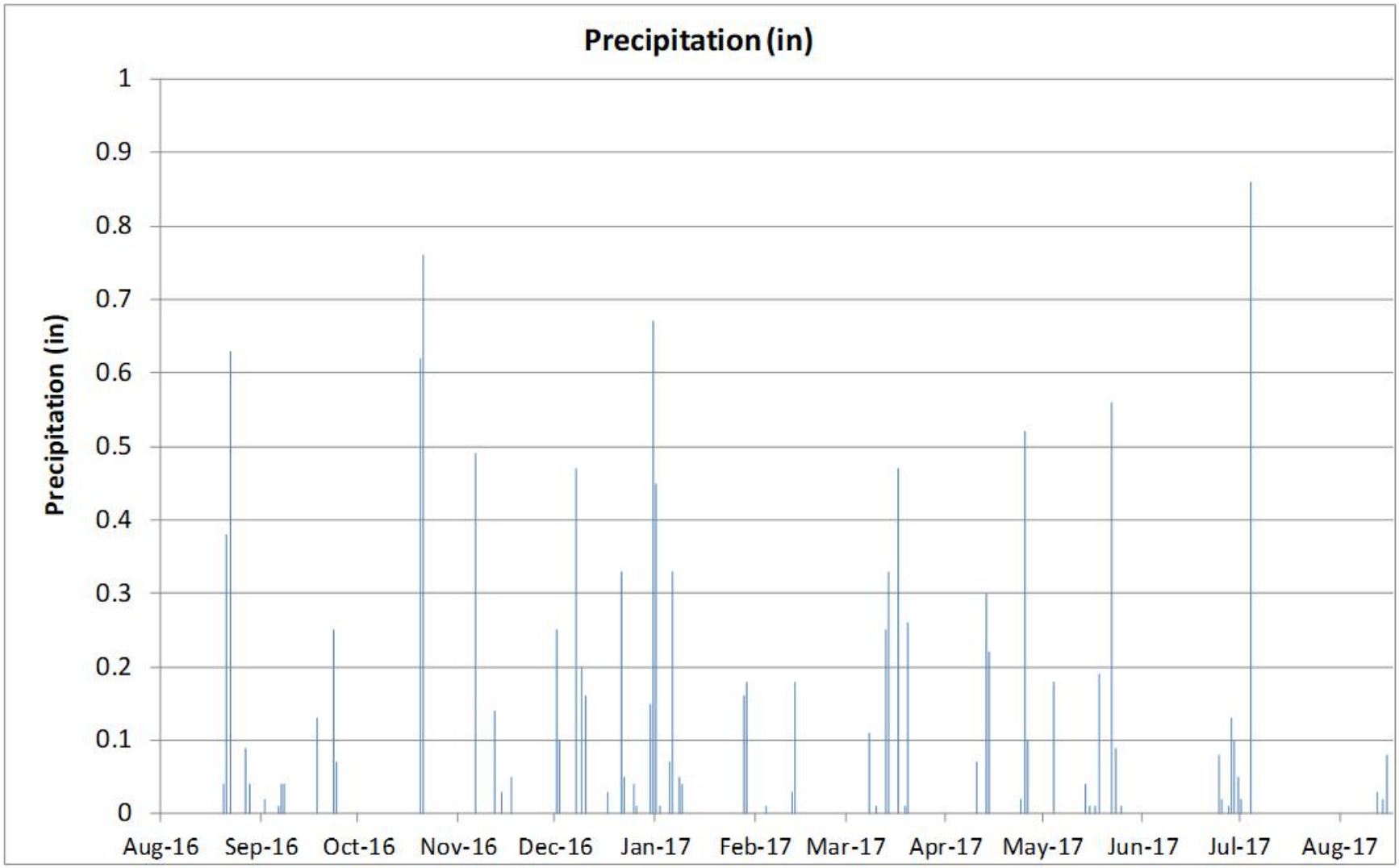

Figure 3. Precipitation (Sept 2016 to Aug 2017

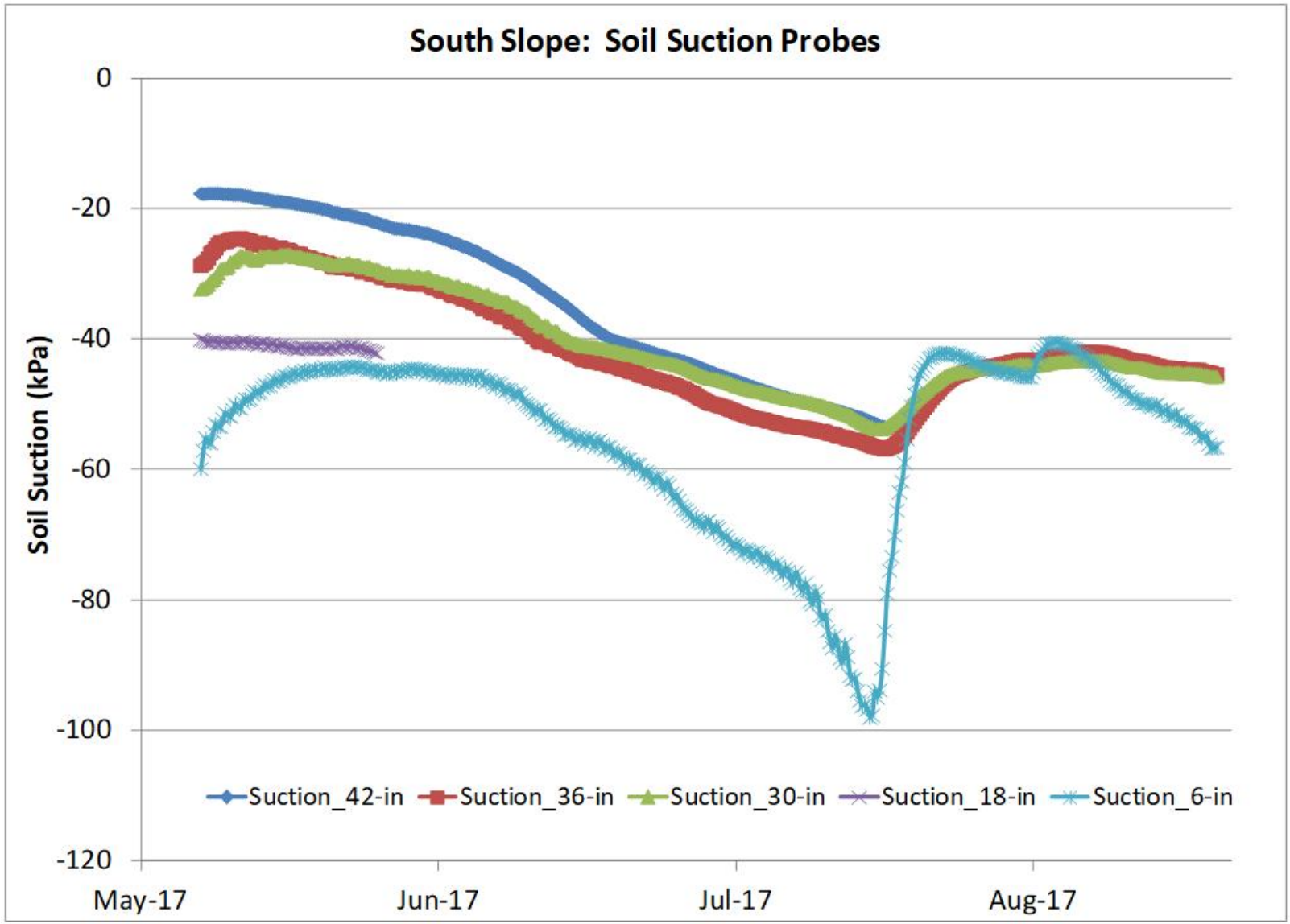

Figure 4. HDU Data (May 2017 to Aug 2017) - ET Cover South Slope

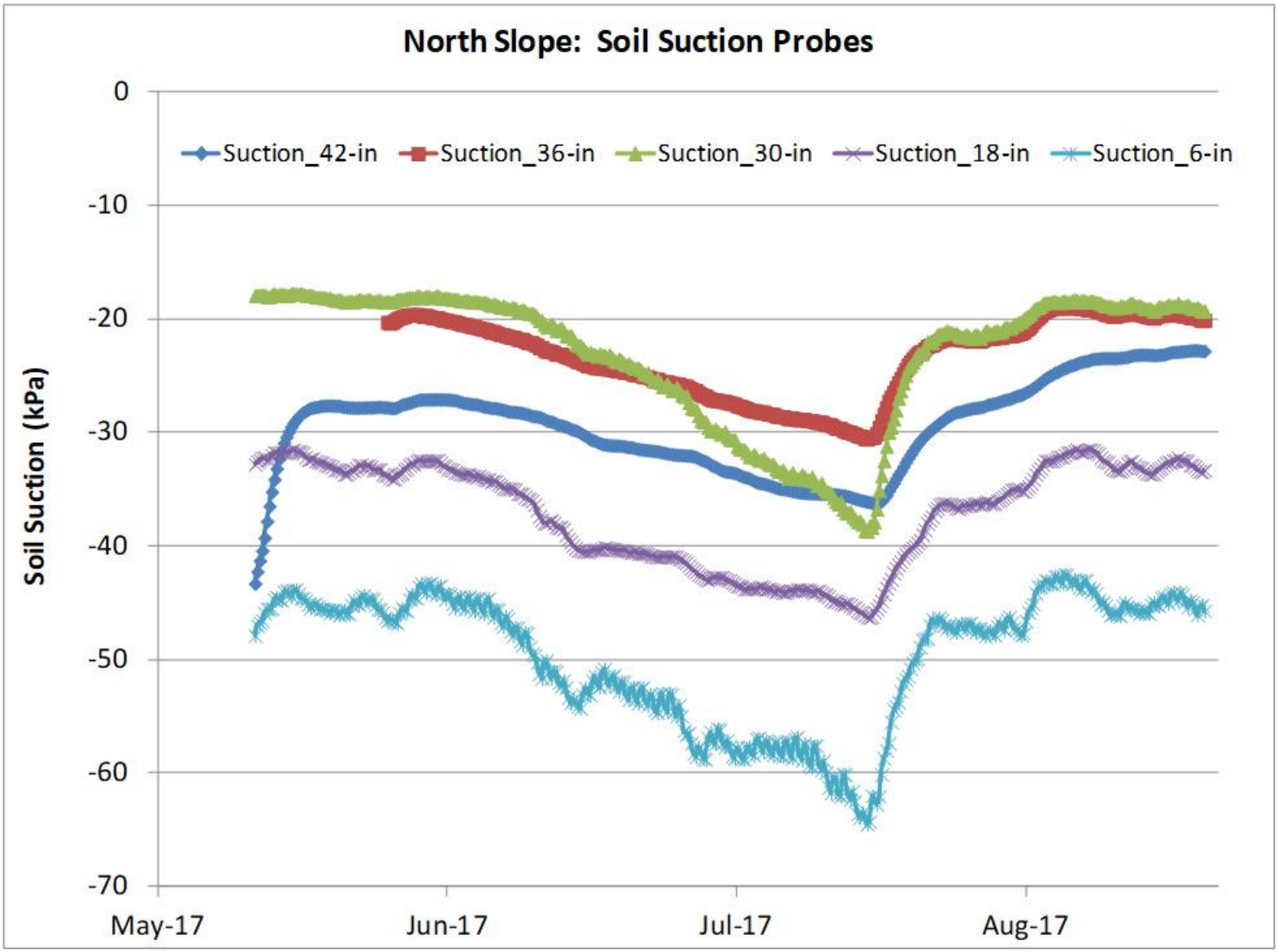

Figure 5. HDU Data (May 2017 to Aug 2017) - ET Cover North Slope

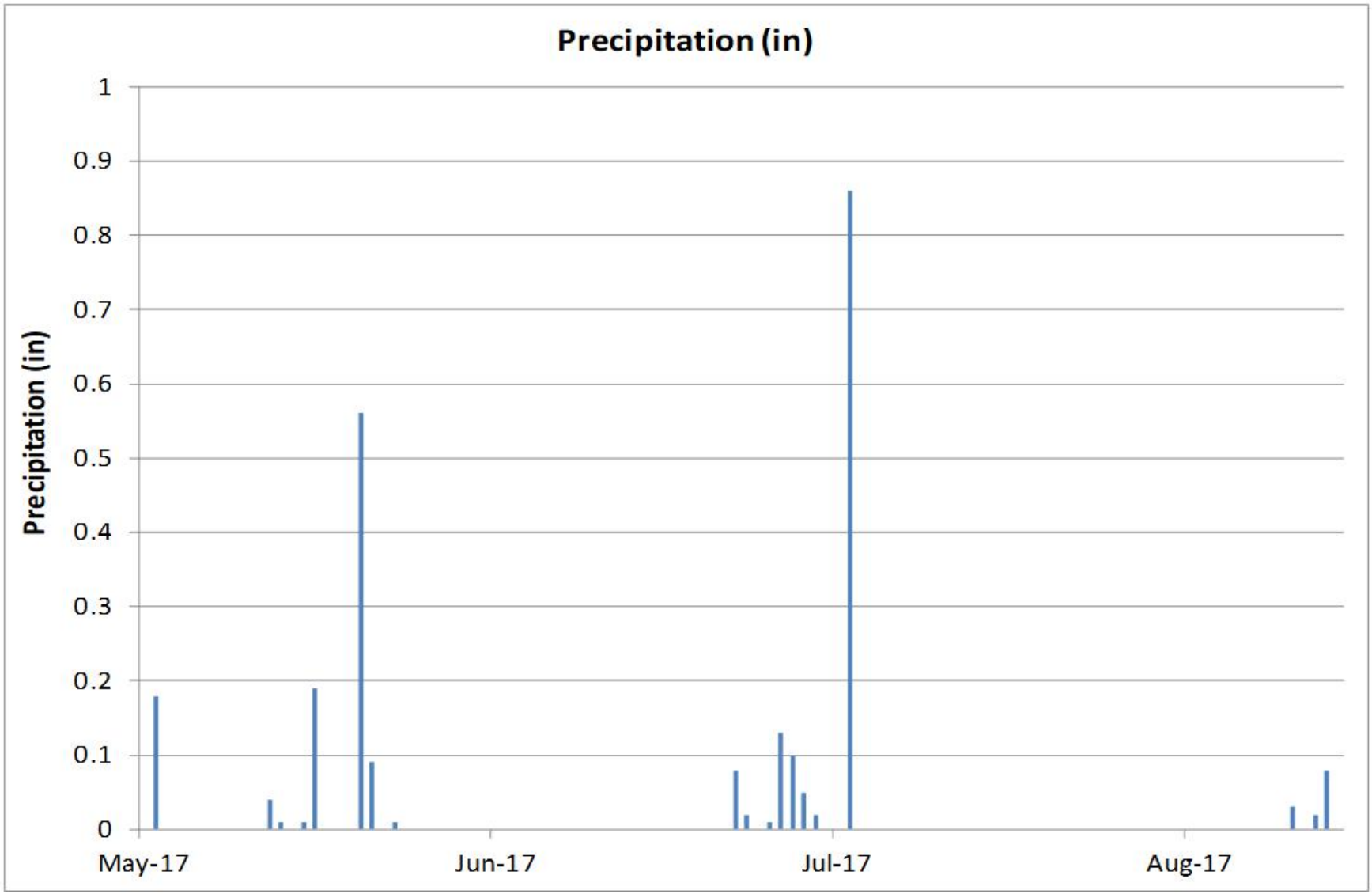

Figure 6. Precipitation (May to Aug 2017)

METHANE MONITORING

Field measurements of methane are contained in Table 2. Figure 7 shows the monitoring point locations.

Table 2. Methane Monitoring Readings

Site Name: Los Alamos County Airport Landfill Cover Replacement	**Date of Inspection: September 21, 2017**
City: Los Alamos	**Weather: sunny, warm**
State: New Mexico	**Temperature: 60s**
Agency: Department of Energy	**Inspector: Felicia Aguilar**
Methane Monitoring Station	**Readings**
Methane-1	0
Methane-2	0
Methane-3	0
Methane-4	0

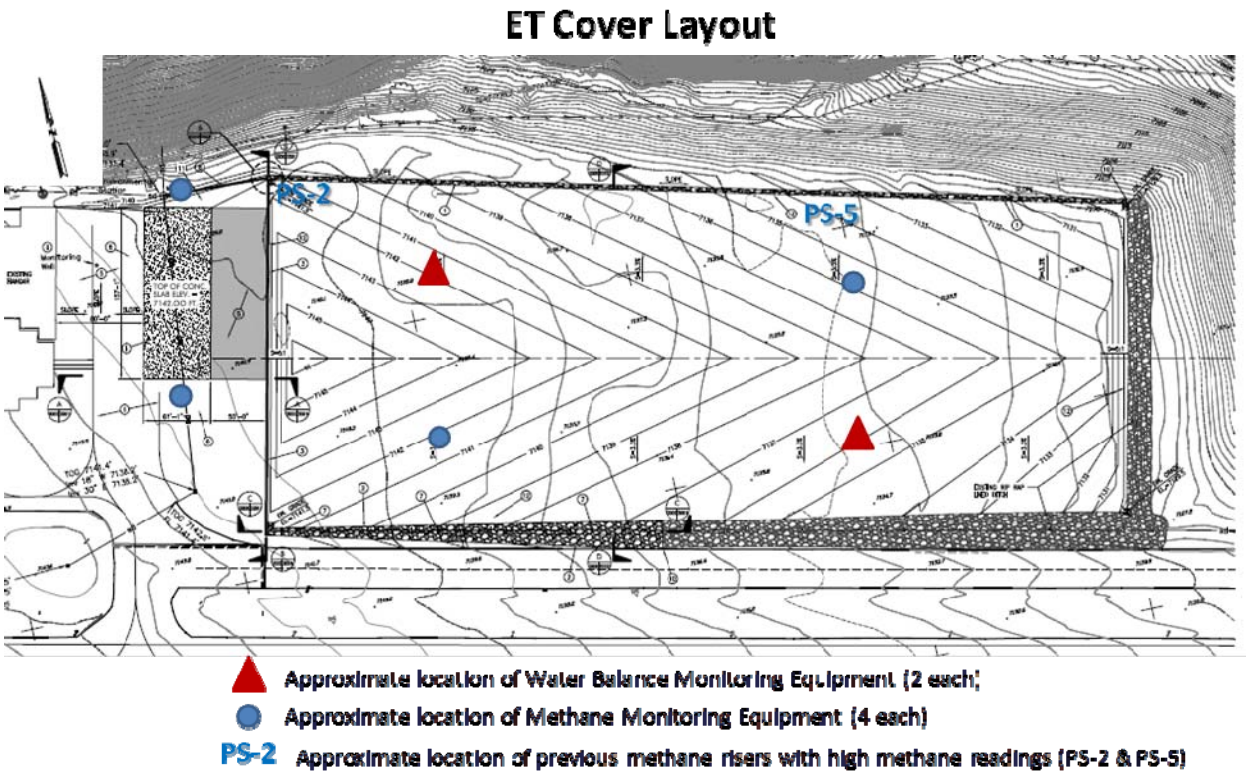

Figure 7. Methane and Water Balance Probe Monitoring Locations

SETTLEMENT MONITORING

Table 3 provides a summary of the initial elevation measurements for the identified survey points to monitor any differential settlement in the landfill. Figure 8 shows the settlement survey locations.

Table 3. Settlement Monitoring Points Elevation Measurements

Survey Point	Elevation
	9-17-17
1	7141.41
2	7141.50
3	7141.44
4	7141.50
5	7141.26
6	7140.79
7	7144.06
8	7146.42
9	7143.40
10	7140.54
11	7139.55
12	7142.73
13	7145.29
14	7142.02
15	7139.42
16	7138.25
17	7141.40
18	7143.99
19	7140.76
20	7137.75
21	7137.21
22	7139.96
23	7142.96
24	7139.90
25	7136.70

Survey Point	Elevation
	9-17-17
26	7136.46
27	7138.69
28	7141.52
29	7138.58
30	7135.30
31	7135.20
32	7137.51
33	7140.22
34	7138.06
35	7134.25
36	7134.30
37	7136.59
38	7138.62
39	7135.85
40	7132.78
41	7133.04
42	7135.20
43	7137.28
44	7134.56
45	7131.89
46	7131.91
47	7134.12
48	7136.06
49	7133.29
50	7130.81
51	7130.48
52	7132.27
53	7134.60
54	7132.38

Survey Point	Elevation
	9-17-17
55	7129.37
56	7129.08
57	7130.40
58	7129.75
59	7129.59
60	7128.90

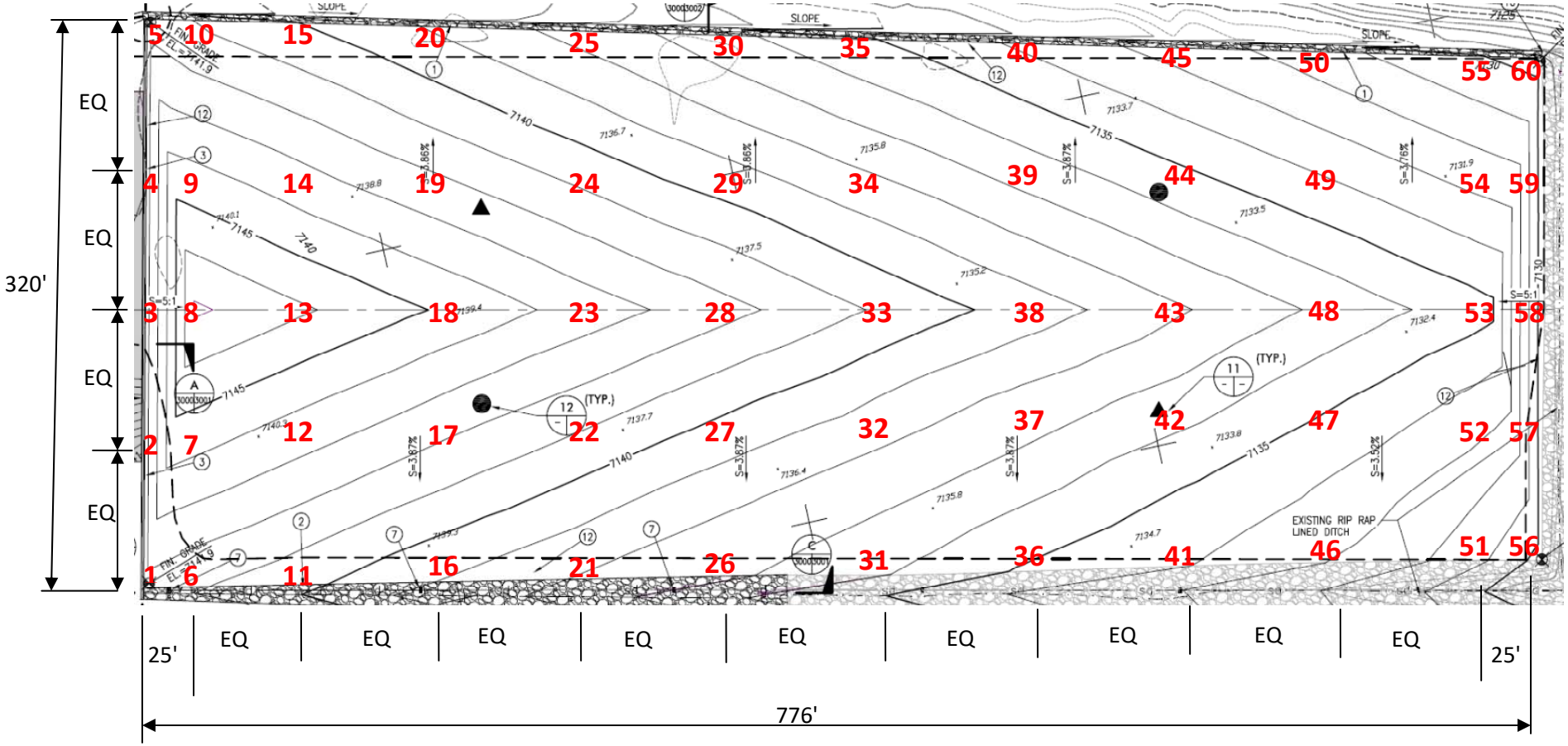

Figure 8. Survey Point Locations

LONG-TERM MONITORING INSPECTION REPORT

YEAR 2, Quarter 2 ***INSPECTION #6***

LOS ALAMOS COUNTY AIRPORT LANDFILL COVER REPLACEMENT

Inspection Date: *December 10, 2017*
Report Date: *January 5, 2018*

prepared for:
Department of Energy
Environmental Management Los Alamos Field Office (EM-LA)
Los Alamos Field Office
Los Alamos, NM 87544

prepared by:
Dwyer Engineering LLC under contract to The Lakeworth Group
Stephen F. Dwyer, PhD, PE
1813 Stagecoach Rd.
Albuquerque, NM 87123
(505) 270-0215

Revision 1

EXECUTIVE SUMMARY

This is the sixth inspection (Year 2, Quarter 2 - inspection date: December 10, 2017) of the ET Cover and associated project elements for the Los Alamos County Airport Landfill. The construction of the cover system was completed in July 2016.

All features of the closure are currently in good condition. Vegetation was dormant during this inspection. The vegetation is in excellent condition with full coverage and dominated by grasses varying in height from a few inches to about a foot. All drainage systems are in excellent working condition. There are no erosion or slope issues. There is no biointrusion to date on the new ET Cover although minimal animal burrowing was identified on the existing side slopes of the older cover system. There is no recommended maintenance or repairs at this time.

All methane monitoring locations measured no methane. The water balance monitoring (soil moisture and soil suction) appears to show infiltration in response to precipitation that moves into the cover profile and subsequently move up and out via ET. The heat dissipation units were replaced with newer probes in May 2017. There is sensitivity of the probe data to temperature. Longer term trends will need to be evaluated to better assess the effectiveness of the cover system water balance data.

A grid was staked out on the cover and surveyed for each point's respective elevation. This settlement survey grid will be tracked in the annual report for any differential settlement.

INSPECTION CHECK LIST

Table 1. Long-Term Monitoring Check List for the Los Alamos County Airport Landfill Closure

Site Name: Los Alamos County Airport Landfill Cover Replacement	Date of Inspection: December 10, 2017
City: Los Alamos	Weather: cool, sunny
State: New Mexico	Temperature: 40s
Agency: Department of Energy	Inspector: Stephen F Dwyer, PhD, PE
Site Element	**Remarks**
ET Cover	
1. Settlement (Low Spots): Yes ( ) No (X) Areal Extent: none Depth: NA Repairs Necessary Yes ( ) No (X) If yes, explain	Visual inspection showed no obvious differential settlement noted to date. A grid was established on the cover surface and surveyed. This survey data will be quantified in the annual reports with respect to differential settlement (if any).
2. Surface Cracks: Yes ( ) No (X) Length: NA Width: NA Depth: NA Repairs Necessary Yes ( ) No (X) If yes, explain	No surface cracking was identified during this inspection.
3. Erosion: Yes ( ) No (X) Areal Extent: NA Depth: NA Repairs Necessary Yes ( ) No (X) If yes, explain	No erosion noted to date. The gravel/soil top admixture top layer (6-inches thick) referred to as a 'desert pavement' is developing well and appears to be working as designed to minimize erosion (Picture 17).
4. Biointrusion Holes: Yes (X) No ( ) Areal Extent: minimal Depth: approx. 12-inches Suspected Cause (Rodent or Other): small mammal Repairs Necessary Yes ( ) No (X) If yes, explain	No biointrusion noted to date on the new ET Cover. There was minimal biointrusion (small animal burrow holes) noted on the side slopes of the prior cover system (Picture 28). The biointrusion noted is within expected tolerances to date.
5. Vegetation Condition:	Vegetation has full coverage of the cover system. The size/height of the vegetation is uneven across the cover.

Site Name: Los Alamos County Airport Landfill Cover Replacement	**Date of Inspection: December 10, 2017**
City: Los Alamos	**Weather: cool, sunny**
State: New Mexico	**Temperature: 40s**
Agency: Department of Energy	**Inspector: Stephen F Dwyer, PhD, PE**
Site Element	**Remarks**
General Condition progressing as expected: Yes (X) No ( ) If no, explain Issues Observed: Yes ( ) No (X) If yes, explain Repairs Necessary: Yes ( ) No (X) If yes, explain	The vegetation is predominantly native grasses that were seeded at the conclusion of the construction of the cover system. The grasses vary in height from about 2-inches to about a foot. All vegetation was dormant during this inspection. The vegetation on the new ET Cover has not been mowed to date. It is believed the varied grass height on the ET Cover is due to varied subsurface moisture levels (remnants of preferential flow from the removed asphaltic cover). The vegetation on the DDA and side slopes of the prior cover appears relatively mature and consists of grasses averaging about a foot in height mixed with forbs. These areas have been mowed in the past to keep the height to within acceptable levels per FAA regulations. (Refer to pictures 1, 4, 5, 6, 7, 14, 15, 16 and 27).
6. Rill/Gully: Yes ( ) No (X) Areal Extent: NA Depth: NA Suspected Cause: NA Repairs Necessary Yes ( ) No (X) If yes, explain	No erosion noted to date.
7. Wet Areas: Yes ( ) No (X) Ponding: Yes ( ) No (X) Areal Extent: NA Seeps: Yes ( ) No (X) Areal Extent: NA Soft Subgrade: Yes ( ) No (X) Areal Extent: NA Repairs Necessary Yes ( ) No (X) If yes, explain	The cover was uniformly dry during the inspection. No unusual wet areas noted to date on the cover.

Site Name: Los Alamos County Airport Landfill Cover Replacement	**Date of Inspection: December 10, 2017**
City: Los Alamos	**Weather: cool, sunny**
State: New Mexico	**Temperature: 40s**
Agency: Department of Energy	**Inspector: Stephen F Dwyer, PhD, PE**
Site Element	**Remarks**
8. Slope Instability: Yes ( ) No (X) Areal Extent: NA Suspected Cause: NA Exposed Cover Components: NA Repairs Necessary Yes ( ) No (X) If yes, explain	No slope instability noted to date.
9. Water Balance Instrumentation: Functioning Properly: Yes (X) No ( ) Damage: Yes ( ) No (X) Repairs Necessary Yes ( ) No (X) If yes, explain	Moisture content probes appeared to be working correctly and are in good condition to date (Pictures 6 and 7). The heat dissipation units (HDU) were replaced in March 2017.
9. Methane Monitoring Instrumentation: Functioning Properly: Yes (X) No ( ) Damage: Yes ( ) No (X) Repairs Necessary Yes ( ) No (X) If yes, explain	Felicia Aguilar, The Lakeworth Group, performed methane monitoring. All measurements will be included in the annual report. Refer to Pictures 2 to 4 for methane monitoring locations.
Rip Rap Lined Drainage Channels	
1. Settlement: Yes ( ) No (X) Areal Extent: NA Depth: NA Repairs Necessary Yes ( ) No (X) If yes, explain	Visual inspection revealed no significant differential settlement to date. Storm water appeared to be conveyed as designed during the rain storm. The site was surveyed. The surveys from each quarterly inspection will be combined in the annual report whereby settlement will be quantified.
2. Material Degradation: Yes ( ) No (X) Material Type: Rock, geotextile, geomembrane (polyethylene) Areal Extent: NA Degree of Degradation: none Repairs Necessary Yes ( ) No (X) If yes, explain	No material degradation noted to date (Pictures 10, 11, and 12).

Site Name: Los Alamos County Airport Landfill Cover Replacement	**Date of Inspection: December 10, 2017**
City: Los Alamos	**Weather: cool, sunny**
State: New Mexico	**Temperature: 40s**
Agency: Department of Energy	**Inspector: Stephen F Dwyer, PhD, PE**
Site Element	**Remarks**
3. Erosion: Yes ( ) No (X) Areal Extent: NA Depth: NA Repairs Necessary Yes ( ) No (X) If yes, explain	No erosion noted to date.
4. Undercutting: Yes ( ) No (X) Areal Extent: NA Depth: NA Repairs Necessary Yes ( ) No (X) If yes, explain	No undercutting noted to date.
5. Obstructions: Yes ( ) No (X) Type: NA Areal Extent: NA Size: NA Repairs Necessary Yes ( ) No (X) If yes, explain	No obstructions noted to date.
6. Slope Instability: Yes ( ) No (X) Type: NA Areal Extent: NA Repairs Necessary Yes ( ) No (X) If yes, explain	No slope instability noted to date.
7. Siltation: Yes ( ) No (X) Areal Extent: NA Depth: NA Repairs Necessary Yes ( ) No (X) If yes, explain	No siltation noted to date.
8. Drop Inlet Structures: Working Properly	Drop inlet structures are in good condition (Picture 12).

Site Name: Los Alamos County Airport Landfill Cover Replacement	**Date of Inspection: December 10, 2017**
City: Los Alamos	**Weather: cool, sunny**
State: New Mexico	**Temperature: 40s**
Agency: Department of Energy	**Inspector: Stephen F Dwyer, PhD, PE**
Site Element	**Remarks**
Yes (X) No ( ) Condition: good Extent of Damage: NA Repairs Necessary Yes ( ) No (X) If yes, explain	
Concrete Culvert	
1. Siltation: Yes ( ) No (X) Areal Extent: NA Depth: NA Repairs Necessary Yes ( ) No (X) If yes, explain	No siltation noted to date (Picture 13).
2. Concrete Condition and Joints General Condition progressing as expected: Yes (X) No ( ) If no, explain Issues Observed: Yes ( ) No (X) If yes, explain Repairs Necessary: Yes ( ) No (X) If yes, explain	Concrete in new condition (Picture 13).
3. Grating Condition: General Condition progressing as expected: Yes (X) No ( ) If no, explain Issues Observed: Yes ( ) No (X) If yes, explain Repairs Necessary: Yes ( ) No (X) If yes, explain	Grating in good condition (Picture 13).
Fencing	
1. Airport Fence Adjacent to Landfill: bent posts: Yes ( ) No (X) loose posts: Yes ( ) No (X) broken links or wire: Yes ( ) No (X) damaged gates: Yes ( ) No (X) Description of damage: NA	Airport fencing is in good condition and securing the site (Pictures 9, 21, 23, and 25). This fencing is maintained by the County of Los Alamos.

Site Name: Los Alamos County Airport Landfill Cover Replacement	**Date of Inspection: December 10, 2017**
City: Los Alamos	**Weather: cool, sunny**
State: New Mexico	**Temperature: 40s**
Agency: Department of Energy	**Inspector: Stephen F Dwyer, PhD, PE**
Site Element	**Remarks**
Repairs Necessary Yes ( ) No (X) If yes, explain	
Retaining Wall	
1.Retaining Wall Condition: General Condition progressing as expected: Yes (X) No ( ) If no, explain	Retaining walls are in good condition. No damage or issues were noted (Pictures 22 to 26).
2. Retaining Wall Damage Description (if any): Issues Observed: Yes ( ) No (X) If yes, explain	None
3.**Repairs Necessary** Repairs Necessary: Yes ( ) No (X) If yes, explain	None
Temporary Erosion & Sedimentation Control Measures (if any)	
1. Erosion Control Blanket: Functional Yes (X) No ( ) if no, describe locations Damaged Blanket: Yes ( ) No (X) Other damage: Yes ( ) No (X) Description of damage: NA Repairs Necessary Yes ( ) No (X) If yes, explain	The erosion control blankets (ECBs) were placed around the perimeter of the new cover surface and other disturbed areas immediately after seeding. They are intended to mitigate erosion until vegetation is established and are a temporary erosion control measure. These ECBs have significantly degraded as expected since they are a short-term erosion control feature. They are no longer helpful in reducing erosion.
Permanent Erosion & Sedimentation Control Measures	
1. Rip Rap Berm near Retaining Wall: Functional Yes (X) No ( ) if no, describe locations Damage or degradation: Yes ( ) No (X) Description of damage: NA Repairs Necessary Yes ( ) No (X) If yes, explain	The Rip Rap drainage on side slope is in good condition (Pictures 18 and 19).
2. Rock Check Dams near Retaining Wall: Functional Yes (X) No ( ) if no, describe locations Damage, displaced rock, or other damage: Yes ( ) No (X)	The rock check dams are in good condition (Pictures 24, 25, and 26).

Site Name: Los Alamos County Airport Landfill Cover Replacement	**Date of Inspection: December 10, 2017**
City: Los Alamos	**Weather: cool, sunny**
State: New Mexico	**Temperature: 40s**
Agency: Department of Energy	**Inspector: Stephen F Dwyer, PhD, PE**
Site Element	**Remarks**
Description of damage: NA Repairs Necessary Yes ( ) No (X) If yes, explain	
3. Landfill Terrace above Retaining Wall: Functional Yes (X) No ( ) if no, describe locations Damage, adjunct erosion, slope problem, or other damage/degradation: Yes ( ) No (X) Description of damage: NA Repairs Necessary Yes ( ) No (NA) If yes, explain	The landfill terraces above the retaining walls are in good condition (Pictures 22 and 24).
4. Drainage Channels adjacent to Retaining Wall: Functional Yes (X) No ( ) if no, describe locations Damage, adjunct erosion, slope problem, or other damage/degradation: Yes ( ) No (X) Description of damage: NA Repairs Necessary Yes ( ) No (X) If yes, explain	The drainage channels adjacent to the retaining wall appear in good condition (Pictures 23 to 26). Drainage channels appear to be working properly.
5. Gabion above Drainage Channels adjacent to Retaining Wall: Functional Yes (X) No ( ) if no, describe locations Damage or degradation: Yes ( ) No (X) Description of damage: NA Repairs Necessary Yes ( ) No (X) If yes, explain	The gabions above drainage channels adjacent to the retaining walls are in good condition (Picture 22, 23and 24).
Site Access	
1.Access Restrictions: Yes (X) No ( ) Description: Secured fence with keyed lock Repairs Necessary Yes ( ) No (X) If yes, explain	The site has controlled access with a security fence and locked gates.
Debris Disposal Area (DDA)	
Debris Disposal Area Condition	The surface of the DDA cover system is in good condition. There is no observed degradation of the site.

Site Name: Los Alamos County Airport Landfill Cover Replacement	**Date of Inspection: December 10, 2017**
City: Los Alamos	**Weather: cool, sunny**
State: New Mexico	**Temperature: 40s**
Agency: Department of Energy	**Inspector: Stephen F Dwyer, PhD, PE**
Site Element	**Remarks**
Good Condition (X) Poor Condition ( )	The vegetation on the site is in good condition (Picture 27). Vegetation is in good condition and varies in height from about 6-inches to a foot. This area is mowed during the summer months by the airport personnel to remain compliant with FAA regulations (vegetation should be less than a foot in height).
General	
1. Vandalism: Yes ( ) No (X) Description of damage: Repairs Necessary Yes ( ) No ( ) If yes, explain	No vandalism noted.
2. Land Use Change: Yes ( ) No (X) Description: Repairs Necessary Yes ( ) No ( ) If yes, explain	No land use changes.
Summary of Recommended Maintenance and/or Repairs	
1. Maintenance / Repairs Necessary Yes ( ) No (X) If yes, explain	None at this time.
Other	

Site Name: Los Alamos County Airport Landfill Cover Replacement	**Date of Inspection: December 10, 2017**
City: Los Alamos	**Weather: cool, sunny**
State: New Mexico	**Temperature: 40s**
Agency: Department of Energy	**Inspector: Stephen F Dwyer, PhD, PE**
Site Element	**Remarks**
1. Materials have been stockpiled on the new asphalt adjacent to the new concrete hangar foundation west of the landfill. The materials are for erection of the new LA County Airport Hangar.	There has been no progress toward erection of the hangar from the prior inspection.

Picture 1. Cover Southeast View

Picture 2. Methane Monitoring Port - West of Landfill

Picture 3. Methane Monitoring Port - North of New Hangar Pad

Picture 4. Methane Monitoring Port - South Slope of Landfill

Picture 5. West Slope End of Landfill

Picture 6. Water Balance Monitoring Nest - South Slope of Landfill

Picture 7. Water Balance Monitoring Nest - North Slope of Landfill

Picture 8. New Asphalt and Concrete Hangar Pad - West of Landfill

Picture 9. Reseeded Disturbed Area North of New Hangar Pad

Picture 10. Drainage Channel - North Perimeter of ET Cover

Picture 11. Drainage Channel - East Perimeter of ET Cover

Picture 12. Drainage Channel - South Perimeter of ET Cover

Picture 13. Concrete Culvert - West Perimeter of ET Cover

Picture 14. ET Cover - Northeast View

Picture 15. ET Cover - East View

Picture 16. ET Cover - West View

Picture 17. 'Desert Pavement' and Emerging Vegetation - Surface of ET Cover

Picture 18. SE Berm - Adjacent to Airport Taxiway

Picture 19. NE Berm - Side Slope of Landfill

Picture 20. Eastern Side Slope of Landfill

Picture 21. Concrete Drainage - East End of SE Berm

Picture 22. Gabion Retaining Structure - East End of Landfill

Picture 23. Large Rip Rap Slope - East End of Landfill Site

Picture 24. Concrete Retaining Wall - East End of Landfill

Picture 25. Concrete Retaining Wall - NE End of Landfill

Picture 26. Rock Check Dams - Erosion Control East End of Landfill

Picture 27. Debris Disposal Area

Picture 28. Burrow Holes on Side Slope of Older Landfill Cover

WATER BALANCE MONITORING SUMMARY

The moisture content probes data was collected and summarized in this inspection report (Figures 1 and 2). The probes were installed on August 29, August 30, and September 4, 2016. Figure 7 shows the monitoring point locations. The data collected to date is summarized and presented in Figures 1 to 2. Figure 3 contains the available daily precipitation events for comparison of the response to infiltration reflected in the moisture probe data.

The moisture content probes reveal that infiltrated moisture due to precipitation quickly dries shortly after (Figures 1 and 2). There was a considerable amount of precipitation at the site from September 27 to October 6, 2017– about 6.04-inches. The probes showed that the moisture infiltrated the cover during that period and took several weeks to dry via Evapotranspiration (ET). There also appears to be some sensitivity of the moisture content measurements to soil temperature. This data is in early in the data acquisition process and it will take multiple seasons of data to analyze the data and better reflect understand the water balance trends in the cover system.

Heat dissipation units (HDU) were replaced on May 18, 2017. These probes measure the matric potential or soil suction in the soil cover system at various depths. The new probes are the most advanced available to date through Decagon Corp. Collected data to date is shown in Figures 4 and 5. Figure 6 contains the available daily precipitation events for comparison to response of the soil suction data. Figure 7 shows the monitoring point locations. The infiltration of water due to the excessive rain the site received (September 27 to October 6, 2017– about 6.04-inches) is reflected in the HDU probes whereby the soil suction was reduced when the moisture infiltrated and has been drying since. Despite this extreme amount of precipitation, there was no saturation recorded in the cover reflecting the ET Cover is working as designed. Saturation of the soil is equivalent to a zero soil suction value.

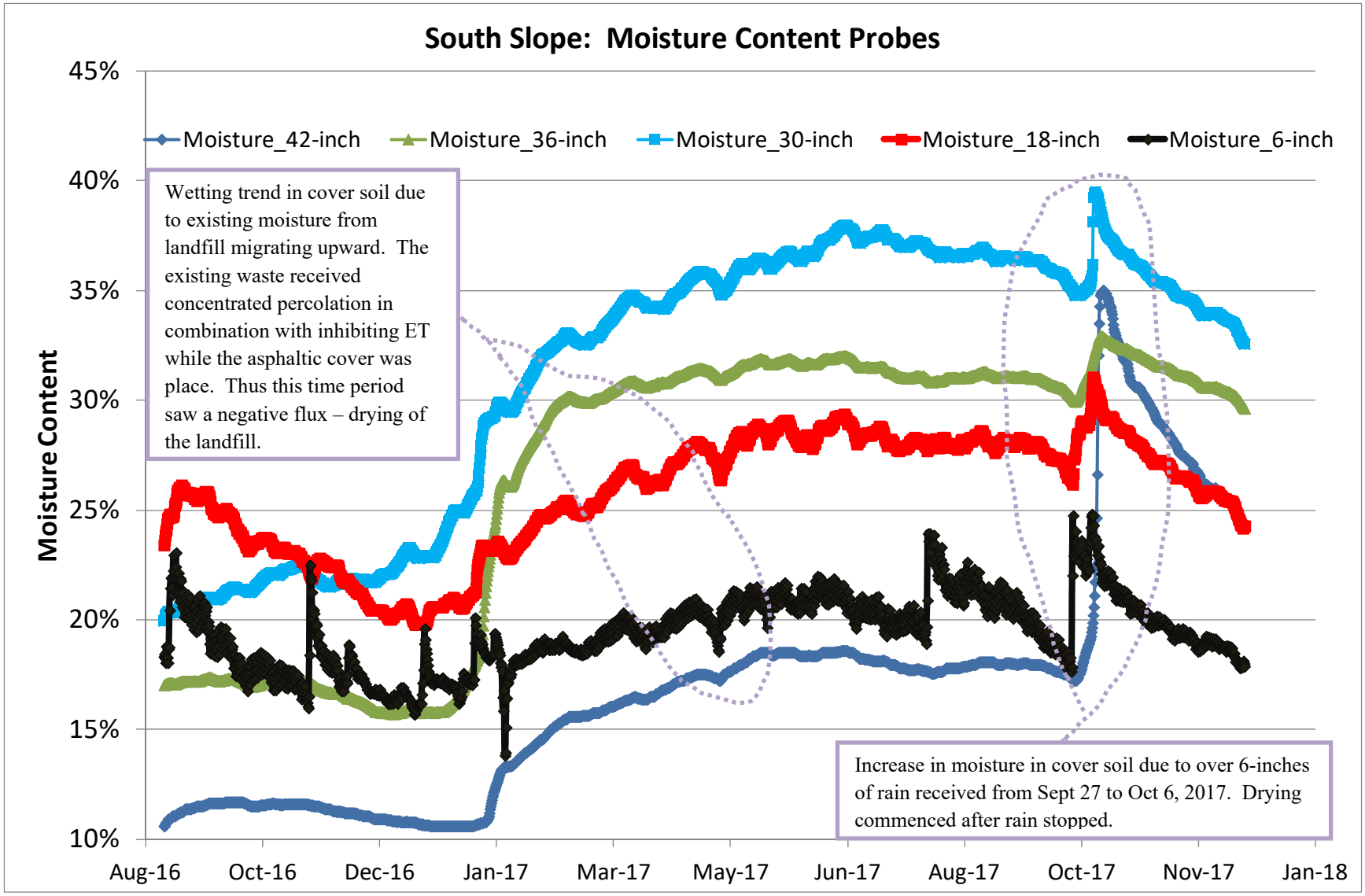

Figure 1. Moisture Probe Data (September 2016 to Dec 2017) - ET Cover South Slope

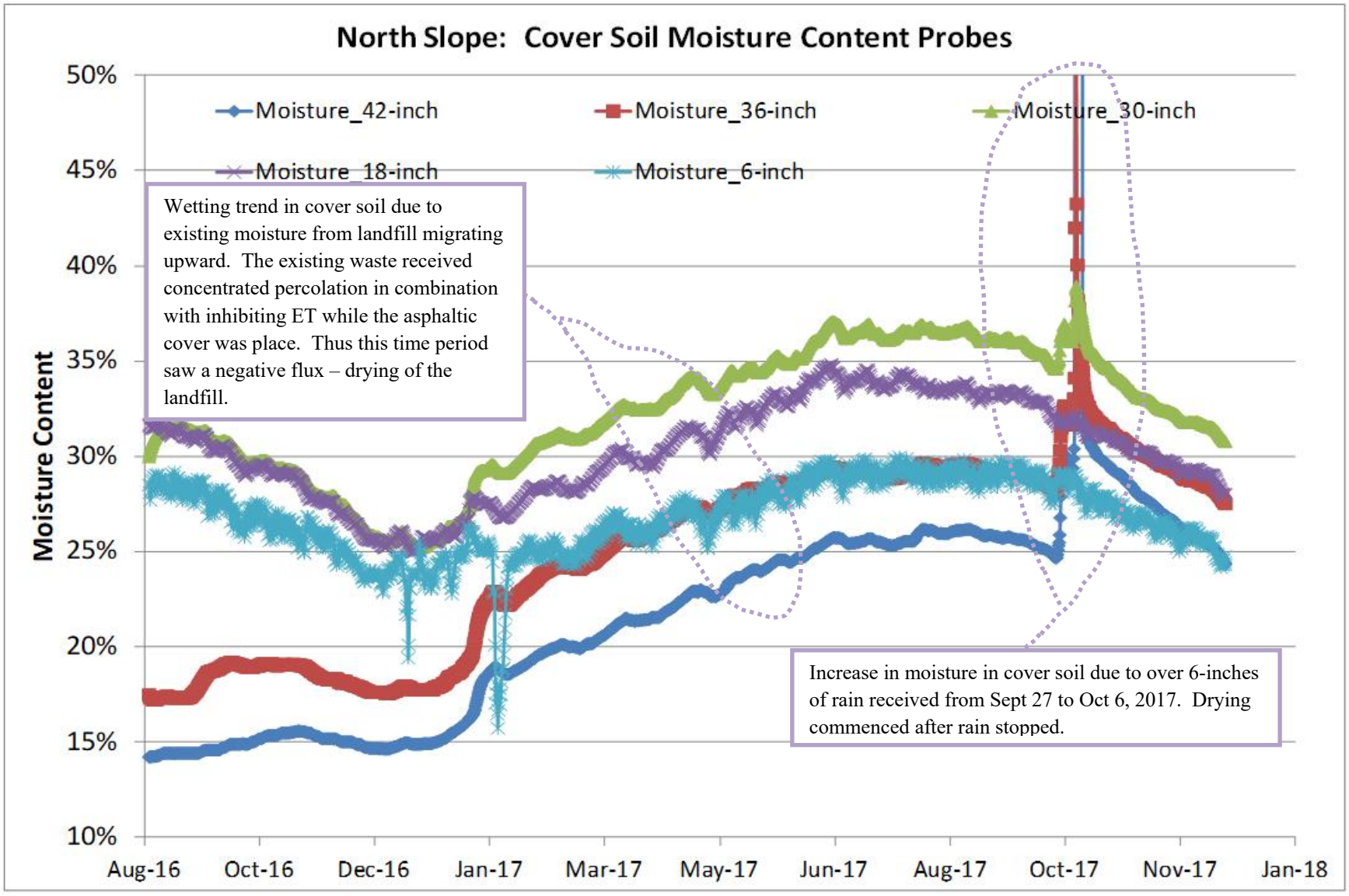

Figure 2. Moisture Probe Data (September 2016 to Dec 2017) - ET Cover North Slope

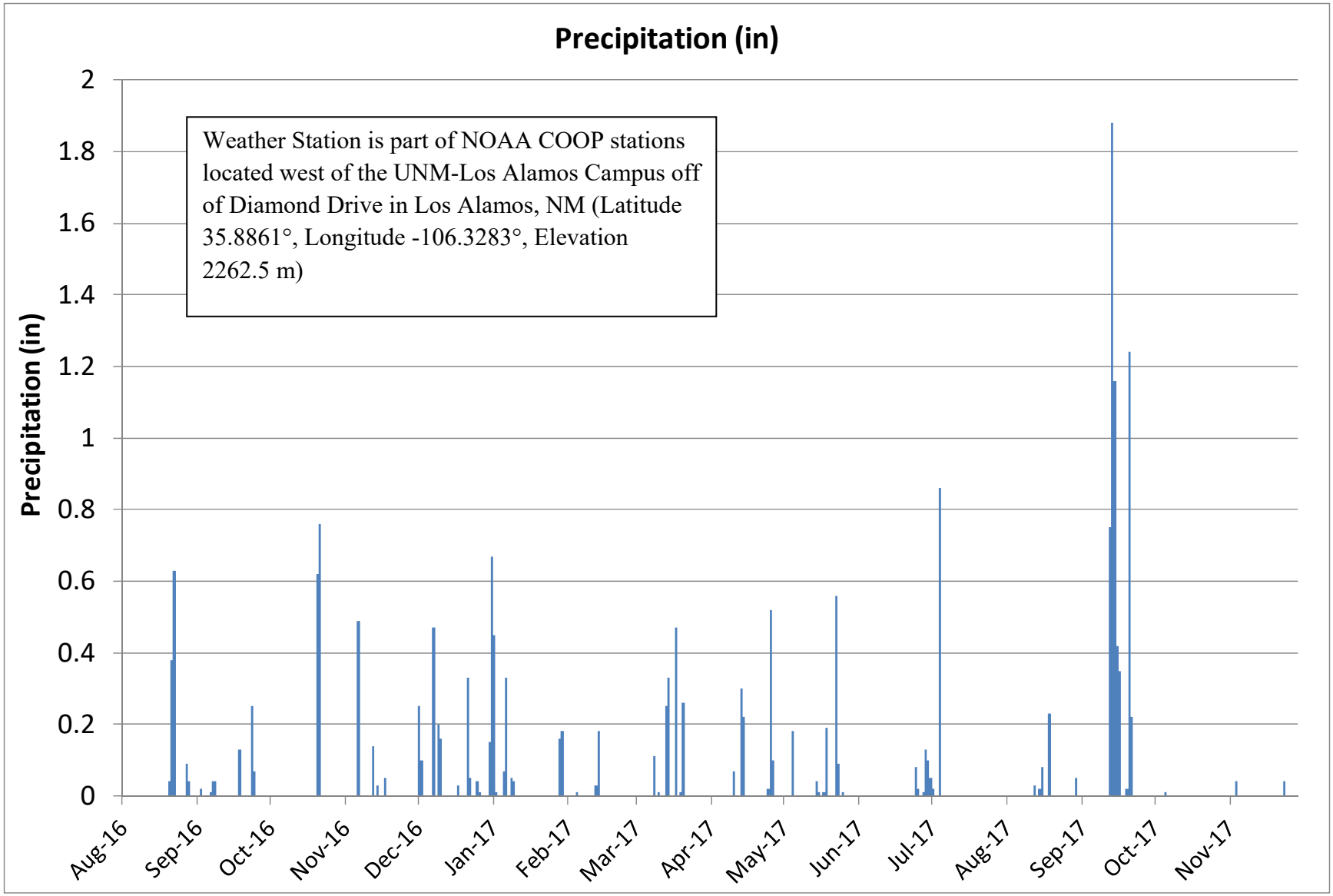

Figure 3. Precipitation (Sept 2016 to Dec 2017)

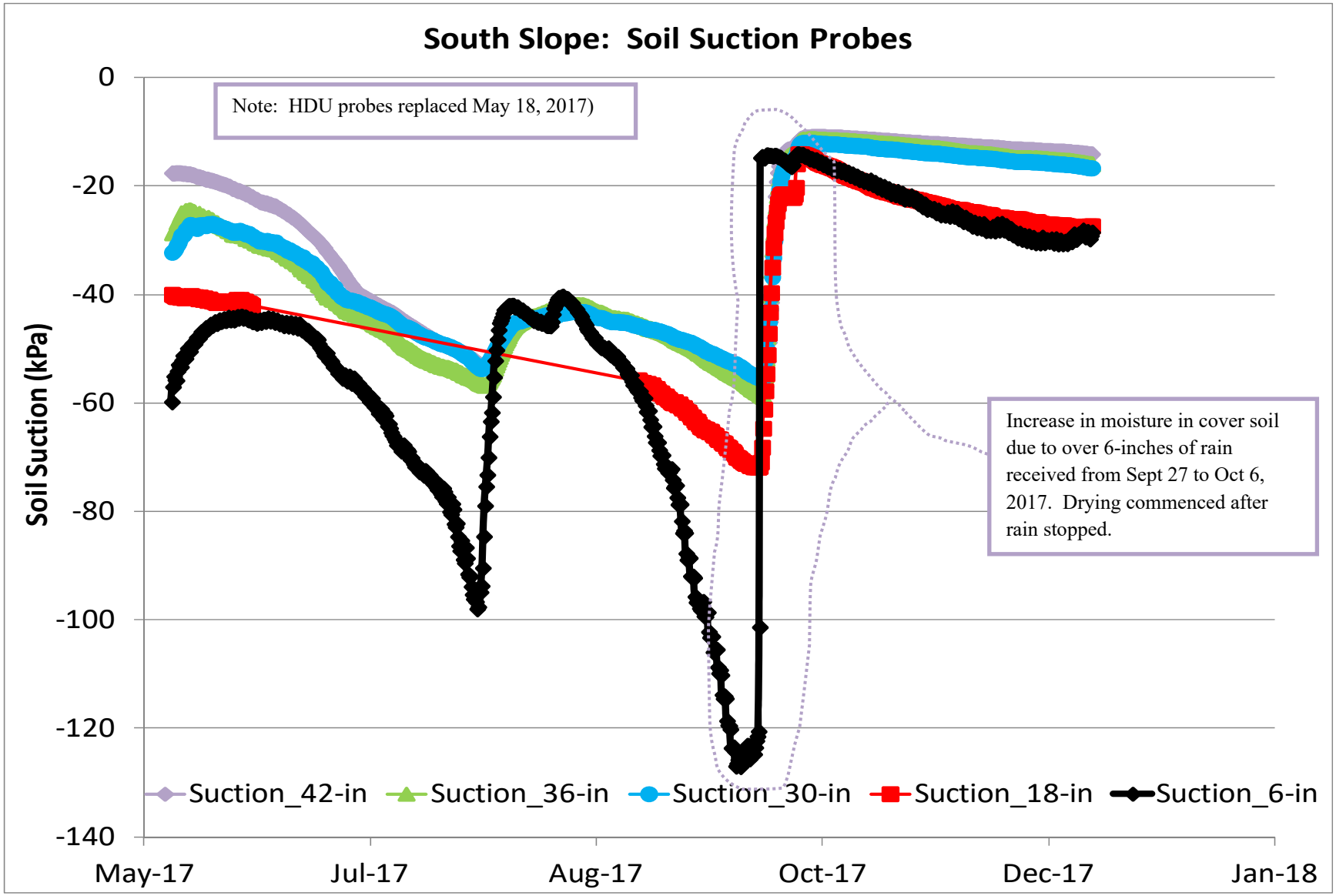

Figure 4. HDU Data (May 2017 to Dec 2017) - ET Cover South Slope

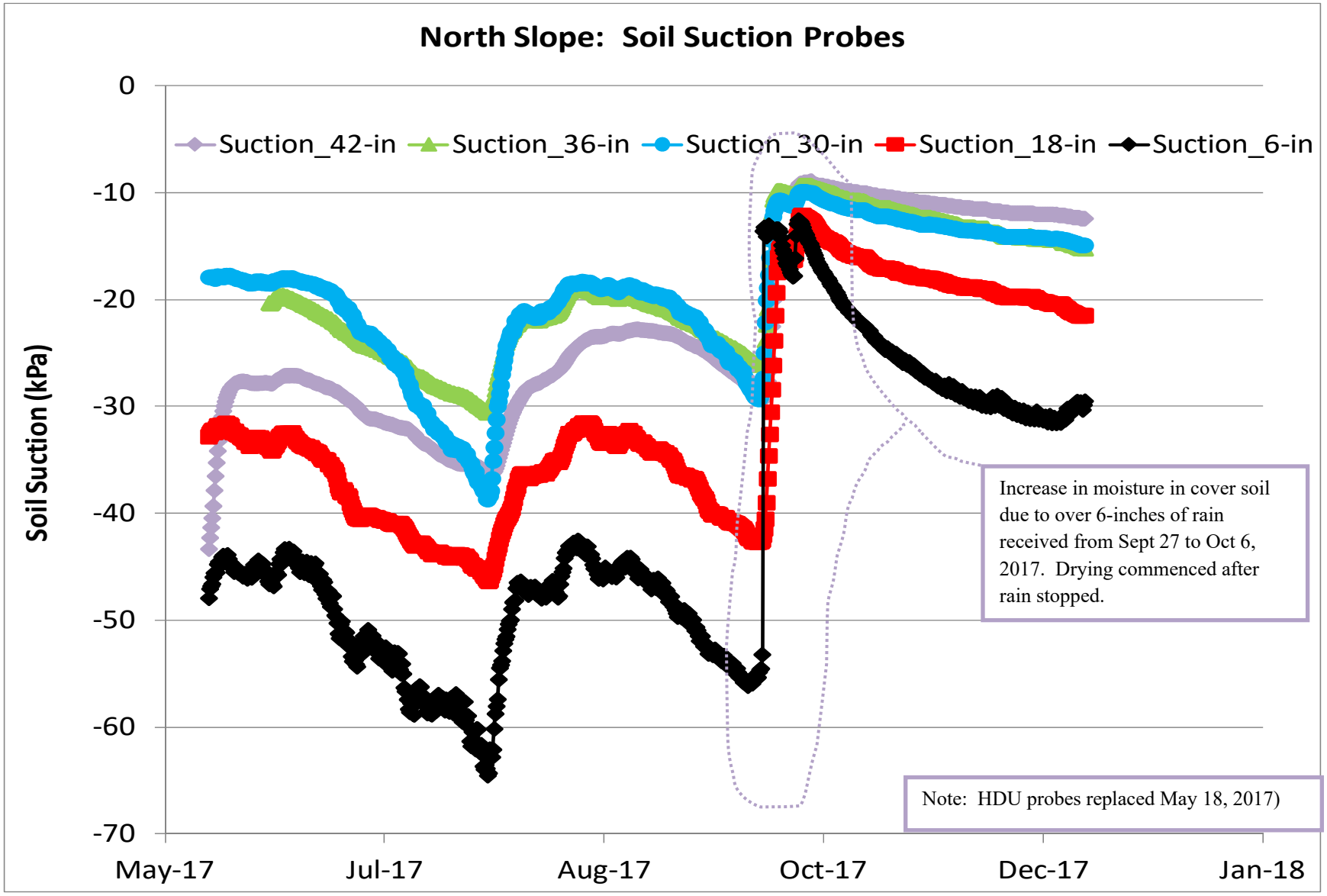

Figure 5. HDU Data (May 2017 to Dec 2017) - ET Cover North Slope

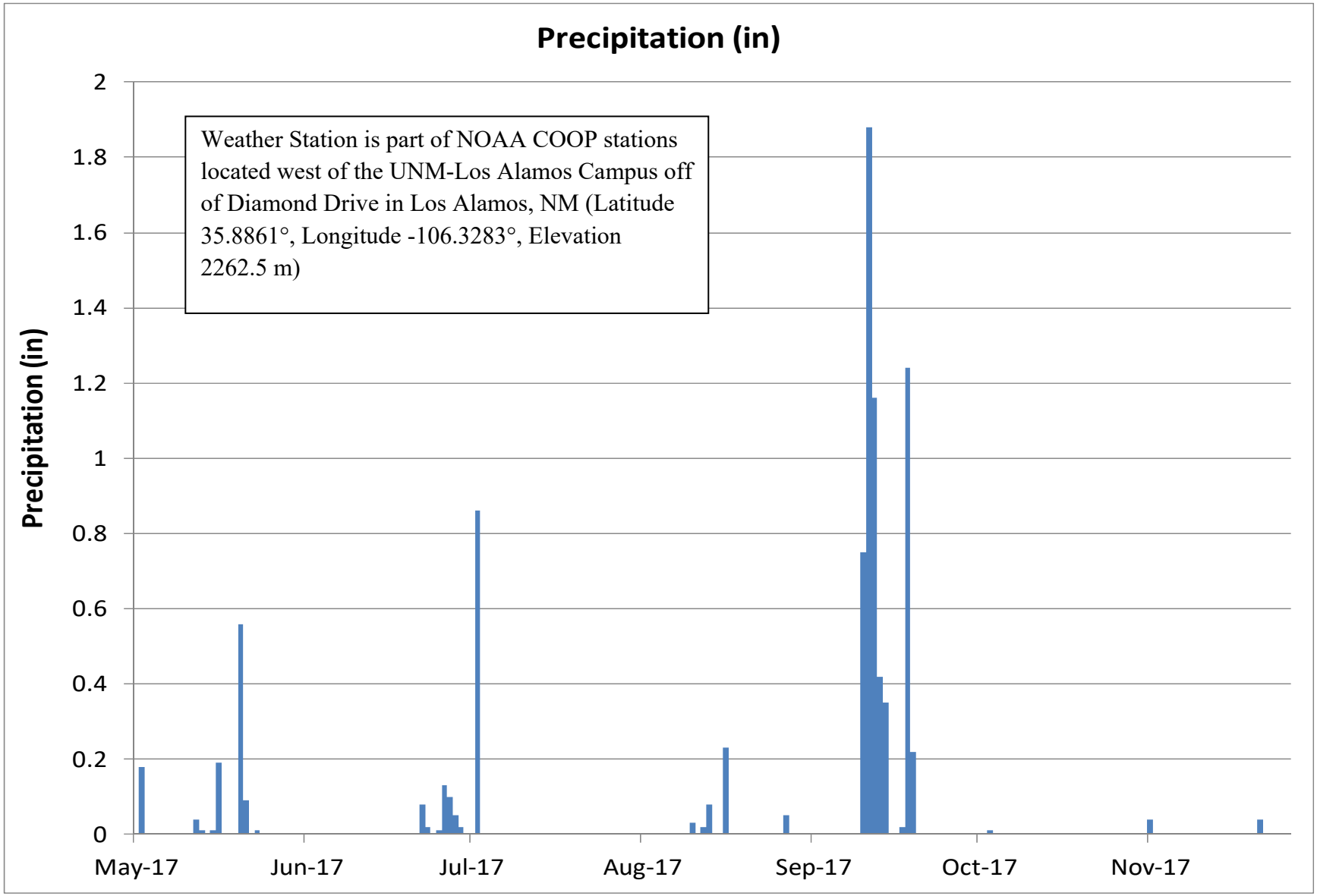

Figure 6. Precipitation (May to Dec 2017)

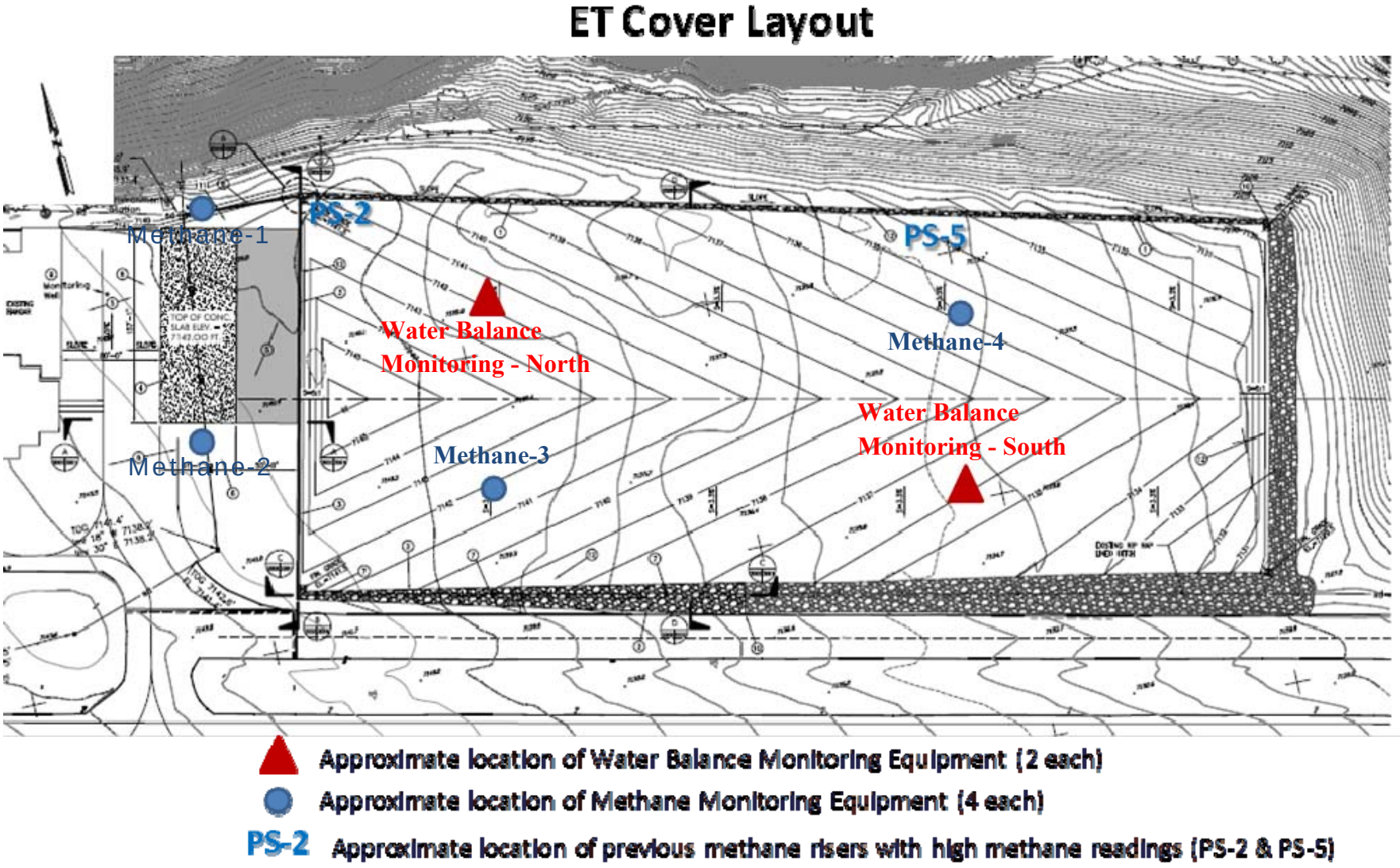

Figure 7. Methane and Water Balance Probe Monitoring Locations

METHANE MONITORING

Field measurements of methane are contained in Table 2. Figure 7 shows the monitoring point locations.

Table 2. Methane Monitoring Readings

Site Name: Los Alamos County Airport Landfill Cover Replacement	**Date of Inspection: December 27, 2017**
City: Los Alamos	**Weather: sunny, calm wind**
State: New Mexico	**Temperature: 40s**
Agency: Department of Energy	**Inspector: Felicia Aguilar**
Methane Monitoring Station	**Readings**
Methane-1	0
Methane-2	0
Methane-3	0
Methane-4	0

SETTLEMENT MONITORING

Table 3 provides a summary of the elevation measurements for the identified survey points to monitor any differential settlement in the landfill. Figure 8 shows the settlement survey locations. The annual report will include a combination of all surveyed data from each location inclusive of calculated differential settlement (if any).

Table 3. Settlement Monitoring Points Elevation Measurements

Survey Point	Elevation
	12-10-17
1	7141.30
2	7141.40
3	7141.33
4	7141.36
5	7141.08
6	7140.64
7	7143.97
8	7146.27
9	7143.33
10	7140.41
11	7139.41
12	7142.70
13	7145.22
14	7141.90
15	7139.29
16	7138.12
17	7141.19
18	7144.18
19	7140.73
20	7137.50
21	7137.19
22	7139.91
23	7142.90
24	7139.79

Survey Point	Elevation
	12-10-17
25	7136.52
26	7136.40
27	7138.55
28	7141.41
29	7138.45
30	7135.25
31	7135.05
32	7137.49
33	7140.13
34	7137.90
35	7134.25
36	7134.20
37	7136.48
38	7138.53
39	7135.77
40	7132.71
41	7132.92
42	7135.11
43	7137.19
44	7134.47
45	7131.83
46	7131.71
47	7134.12
48	7135.96
49	7133.22
50	7130.79
51	7130.42
52	7132.27
53	7134.48

Survey Point	Elevation
	12-10-17
54	7132.40
55	7129.40
56	7129.00
57	7130.32
58	7129.67
59	7129.51
60	7128.81

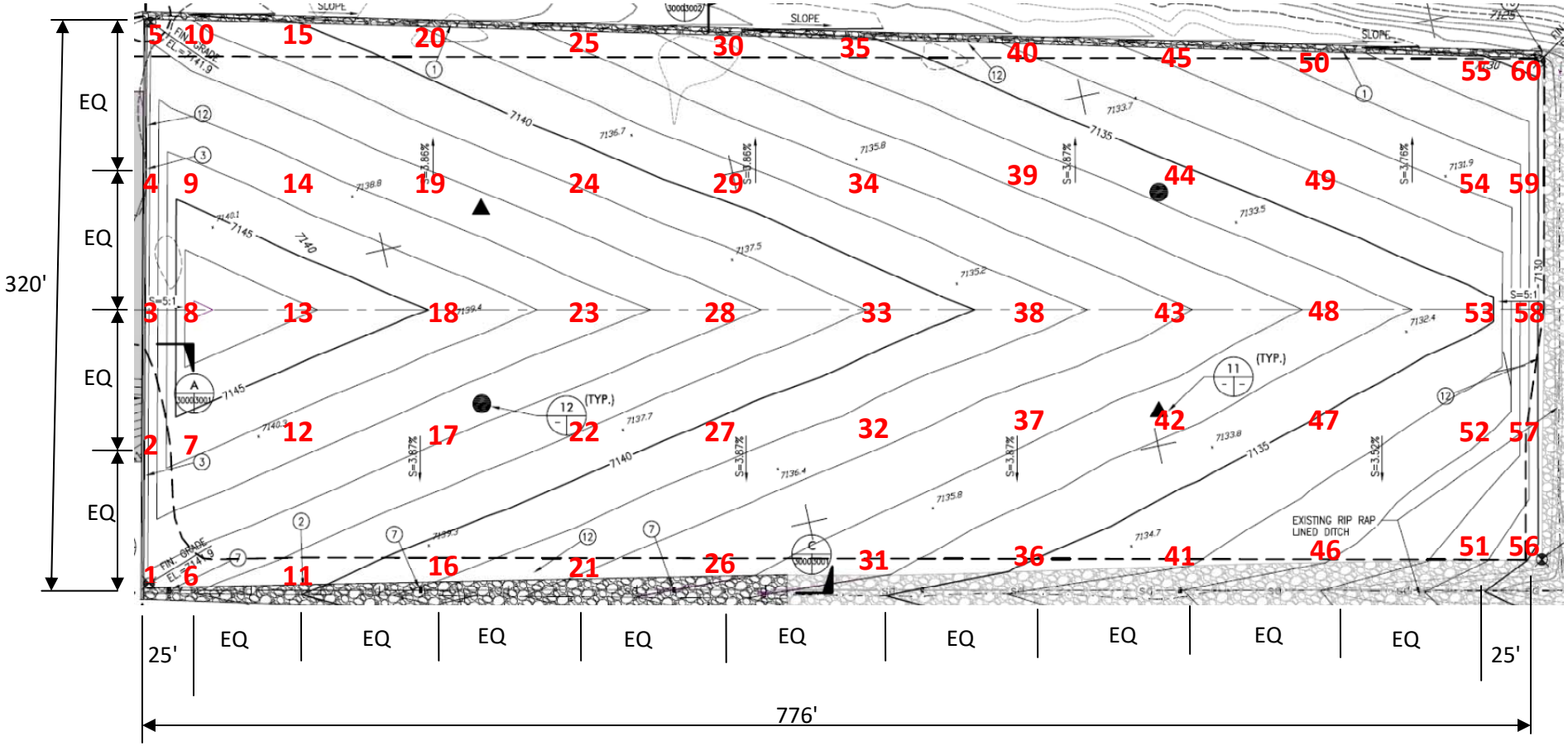

Figure 8. Survey Point Locations

LONG-TERM MONITORING INSPECTION REPORT

YEAR 2, Quarter 3 *INSPECTION #7*

LOS ALAMOS COUNTY AIRPORT LANDFILL COVER REPLACEMENT

Inspection Date: *March 26, 2018*
Report Date: *April 19, 2018*

prepared for:
Department of Energy
Environmental Management Los Alamos Field Office (EM-LA)
Los Alamos Field Office
Los Alamos, NM 87544

prepared by:
Dwyer Engineering LLC under contract to The Lakeworth Group
Stephen F. Dwyer, PhD, PE
1813 Stagecoach Rd.
Albuquerque, NM 87123
(505) 270-0215

Revision 1

EXECUTIVE SUMMARY

This is the seventh inspection (Year 2, Quarter 3 - inspection date: March 26, 2018) of the Evapotranspiration (ET) Cover and associated project elements for the Los Alamos County Airport Landfill. The inspections are performed in accordance with the Long-Term Monitoring Plan[1]. The construction of the cover system was completed in July 2016.

All features of the closure are currently in good condition. Vegetation was dormant during this inspection. The vegetation is in excellent condition with full coverage and dominated by grasses varying in height from a few inches to about a foot. All drainage systems are in excellent working condition. There are no erosion or slope issues. There is no biointrusion to date on the new ET Cover although minimal animal burrowing was identified on the existing side slopes of the older cover system. There was also some burrowing noted on the Debris Disposal Area (DDA) cover. A surface tension crack was identified on the southern slope, eastern half of the new ET Cover. The crack was about 1/8-inch wide and about 6-ft long. This indicates ongoing settlement in the area. This area will continue to be monitored closely with future inspections. No maintenance or repairs are recommended at this time.

Methane monitoring during the reporting period revealed no detectable methane. The water balance monitoring (soil moisture and soil suction) appears to show infiltration in response to precipitation that moves into the cover profile and subsequently is removed via ET. The heat dissipation units were replaced with newer probes in May 2017. Temperature sensitivity of the probes, especially contrasting winter and summer, has contributed to the initial undulation in the data. Longer term trends will need to be evaluated to better assess the effectiveness of the cover system water balance data.

A grid was staked out on the cover and surveyed for each point's respective elevation. This settlement survey grid will be tracked in the annual report for any differential settlement.

[1] Dwyer Engineering. March 2017. Long-Term Monitoring Plan. Los Alamos County Airport Landfill Cover Replacement Solid Waste Management Units 73-001 (a,d) Technical Area 73.

INSPECTION CHECK LIST

Table 1. Long-Term Monitoring Check List for the Los Alamos County Airport Landfill Closure

Site Name: Los Alamos County Airport Landfill Cover Replacement	Date of Inspection: March 26, 2018
City: Los Alamos	Weather: cool, breezy, cloudy
State: New Mexico	Temperature: 50s
Agency: Department of Energy	Inspector: Stephen F Dwyer, PhD, PE
Site Element	**Remarks**
ET Cover	
1. Settlement (Low Spots): Yes ( ) No (X) Areal Extent: none Depth: NA Repairs Necessary Yes ( ) No (X) If yes, explain	Visual inspection showed that some differential settlement has occurred. A surface tension crack was noted on the southern slope, eastern half of the landfill that was about 1/8-inch wide and about six-feet long (Picture 19). There does not appear to be any ponding associated with the settlement to date. A grid was established on the cover surface and surveyed. This survey data will be quantified in the annual reports with respect to differential settlement.
2. Surface Cracks: Yes (X) No ( ) Length: 6-feet Width: 1/8-inch Depth: estimated to be a few inches Repairs Necessary Yes ( ) No (X) If yes, explain	A single surface tension crack was noted on the southern slope, eastern half of the landfill that was about 1/8-inch wide and about six-feet long (Picture 19).
3. Erosion: Yes ( ) No (X) Areal Extent: NA Depth: NA Repairs Necessary Yes ( ) No (X) If yes, explain	No erosion noted to date. The gravel/soil top admixture top layer (6-inches thick) referred to as a 'desert pavement' is developing well and appears to be working as designed to minimize erosion (Picture 17).
4. Biointrusion Holes: Yes (X) No ( ) Areal Extent: minimal Depth: approx. 12-inches	No biointrusion noted to date on the new ET Cover. There was minimal biointrusion (small animal burrow holes) noted on the side slopes of the prior cover system (Picture 28). The biointrusion noted is within expected

Site Name: Los Alamos County Airport Landfill Cover Replacement	**Date of Inspection: March 26, 2018**
City: Los Alamos	**Weather: cool, breezy, cloudy**
State: New Mexico	**Temperature: 50s**
Agency: Department of Energy	**Inspector: Stephen F Dwyer, PhD, PE**
Site Element	**Remarks**
Suspected Cause (Rodent or Other): small mammal Repairs Necessary Yes ( ) No (X) If yes, explain	tolerances to date.
5. Vegetation Condition: General Condition progressing as expected: Yes (X) No ( ) If no, explain Issues Observed: Yes ( ) No (X) If yes, explain Repairs Necessary: Yes ( ) No (X) If yes, explain	Vegetation has full coverage of the cover system. The size/height of the vegetation is uneven across the cover. The vegetation is predominantly native grasses that were seeded at the conclusion of the construction of the cover system. The grasses vary in height from a few inches to about a foot. All vegetation was dormant during this inspection. The vegetation on the new ET Cover has not been mowed to date. It is believed the varied grass height on the ET Cover is due to varied subsurface moisture levels (remnants of preferential flow from the removed asphaltic cover). The vegetation on the DDA and side slopes of the prior cover appears relatively mature and consists of grasses averaging about a foot in height mixed with forbs. These areas have been mowed in the past to keep the height to within acceptable levels per FAA regulations. (Refer to pictures 1, 4, 5, 6, 14, 15, 16 and 27).
6. Rill/Gully: Yes ( ) No (X) Areal Extent: NA Depth: NA Suspected Cause: NA Repairs Necessary Yes ( ) No (X) If yes, explain	No erosion noted to date.
7. Wet Areas: Yes ( ) No (X) Ponding: Yes ( ) No (X) Areal Extent: NA Seeps: Yes ( ) No (X)	The cover was uniformly dry during the inspection. No unusual wet areas noted to date on the cover.

Site Name: Los Alamos County Airport Landfill Cover Replacement	**Date of Inspection: March 26, 2018**
City: Los Alamos	**Weather: cool, breezy, cloudy**
State: New Mexico	**Temperature: 50s**
Agency: Department of Energy	**Inspector: Stephen F Dwyer, PhD, PE**
Site Element	**Remarks**
Areal Extent: NA Soft Subgrade: Yes ( ) No (X) Areal Extent: NA Repairs Necessary Yes ( ) No (X) If yes, explain	
8. Slope Instability: Yes ( ) No (X) Areal Extent: NA Suspected Cause: NA Exposed Cover Components: NA Repairs Necessary Yes ( ) No (X) If yes, explain	No slope instability noted to date.
9. Water Balance Instrumentation: Functioning Properly: Yes (X) No ( ) Damage: Yes ( ) No (X) Repairs Necessary Yes ( ) No (X) If yes, explain	Moisture content probes appeared to be working correctly and are in good condition to date (Picture 6). The heat dissipation units (HDU) were replaced in March 2017.
9. Methane Monitoring Instrumentation: Functioning Properly: Yes (X) No ( ) Damage: Yes ( ) No (X) Repairs Necessary Yes ( ) No (X) If yes, explain	Felicia Aguilar, The Lakeworth Group, performed methane monitoring. No methane was detected. All measurements will be included in the annual report. Refer to Figure 7 for methane monitoring locations and Pictures 2, 3, and 4 for methane monitoring ports.
Rip Rap Lined Drainage Channels	
1. Settlement: Yes ( ) No (X) Areal Extent: NA Depth: NA Repairs Necessary Yes ( ) No (X) If yes, explain	Visual inspection revealed no significant differential settlement to date.
2. Material Degradation: Yes ( ) No (X) Material Type: Rock, geotextile, geomembrane	No material degradation noted to date (Pictures 10, 11, and 12).

Site Name: Los Alamos County Airport Landfill Cover Replacement	**Date of Inspection: March 26, 2018**
City: Los Alamos	**Weather: cool, breezy, cloudy**
State: New Mexico	**Temperature: 50s**
Agency: Department of Energy	**Inspector: Stephen F Dwyer, PhD, PE**
Site Element	**Remarks**
(polyethylene) Areal Extent: NA Degree of Degradation: none Repairs Necessary Yes ( ) No (X) If yes, explain	
3. Erosion: Yes ( ) No (X) Areal Extent: NA Depth: NA Repairs Necessary Yes ( ) No (X) If yes, explain	No erosion noted to date.
4. Undercutting: Yes ( ) No (X) Areal Extent: NA Depth: NA Repairs Necessary Yes ( ) No (X) If yes, explain	No undercutting noted to date.
5. Obstructions: Yes ( ) No (X) Type: NA Areal Extent: NA Size: NA Repairs Necessary Yes ( ) No (X) If yes, explain	No obstructions noted to date.
6. Slope Instability: Yes ( ) No (X) Type: NA Areal Extent: NA Repairs Necessary Yes ( ) No (X) If yes, explain	No slope instability noted to date.
7. Siltation: Yes ( ) No (X) Areal Extent: NA	No siltation noted to date.

Site Name: Los Alamos County Airport Landfill Cover Replacement	**Date of Inspection: March 26, 2018**
City: Los Alamos	**Weather: cool, breezy, cloudy**
State: New Mexico	**Temperature: 50s**
Agency: Department of Energy	**Inspector: Stephen F Dwyer, PhD, PE**
Site Element	**Remarks**
Depth: NA Repairs Necessary Yes ( ) No (X) If yes, explain	
8. Drop Inlet Structures: Working Properly Yes (X) No ( ) Condition: good Extent of Damage: NA Repairs Necessary Yes ( ) No (X) If yes, explain	Drop inlet structures are in good condition (Picture 12).
Concrete Culvert	
1. Siltation: Yes ( ) No (X) Areal Extent: NA Depth: NA Repairs Necessary Yes ( ) No (X) If yes, explain	No siltation noted to date (Picture 13).
2. Concrete Condition and Joints General Condition progressing as expected: Yes (X) No ( ) If no, explain Issues Observed: Yes ( ) No (X) If yes, explain Repairs Necessary: Yes ( ) No (X) If yes, explain	Concrete in new condition (Picture 13).
3. Grating Condition: General Condition progressing as expected: Yes (X) No ( ) If no, explain Issues Observed: Yes ( ) No (X) If yes, explain Repairs Necessary: Yes ( ) No (X) If yes, explain	Grating in good condition (Picture 13).
Fencing	
1. Airport Fence Adjacent to Landfill: bent posts: Yes ( ) No (X)	Airport fencing is in good condition and securing the site (Pictures 7, 9, 21, 23, and 25). This fencing is

Site Name: Los Alamos County Airport Landfill Cover Replacement	**Date of Inspection: March 26, 2018**
City: Los Alamos	**Weather: cool, breezy, cloudy**
State: New Mexico	**Temperature: 50s**
Agency: Department of Energy	**Inspector: Stephen F Dwyer, PhD, PE**
Site Element	**Remarks**
loose posts: Yes ( ) No (X) broken links or wire: Yes ( ) No (X) damaged gates: Yes ( ) No (X) Description of damage: NA Repairs Necessary Yes ( ) No (X) If yes, explain	maintained by the County of Los Alamos.
Retaining Wall	
1.Retaining Wall Condition: General Condition progressing as expected: Yes (X) No ( ) If no, explain	Retaining walls are in good condition. No damage or issues were noted (Pictures 22 to 25).
2. Retaining Wall Damage Description (if any): Issues Observed: Yes ( ) No (X) If yes, explain	None
3.**Repairs Necessary** Repairs Necessary: Yes ( ) No (X) If yes, explain	None
Temporary Erosion & Sedimentation Control Measures (if any)	
1. Erosion Control Blanket: Functional Yes (X) No ( ) if no, describe locations Damaged Blanket: Yes ( ) No (X) Other damage: Yes ( ) No (X) Description of damage: NA Repairs Necessary Yes ( ) No (X) If yes, explain	The erosion control blankets (ECBs) were placed around the perimeter of the new cover surface and other disturbed areas immediately after seeding. They are intended to mitigate erosion until vegetation is established and are a temporary erosion control measure. These ECBs have significantly degraded as expected since they are a short-term erosion control feature. They are no longer helpful in reducing erosion.
Permanent Erosion & Sedimentation Control Measures	
1. Rip Rap Berm near Retaining Wall: Functional Yes (X) No ( ) if no, describe locations Damage or degradation: Yes ( ) No (X) Description of damage: NA	The Rip Rap drainage on side slope is in good condition (Picture 18).

Site Name: Los Alamos County Airport Landfill Cover Replacement	**Date of Inspection: March 26, 2018**
City: Los Alamos	**Weather: cool, breezy, cloudy**
State: New Mexico	**Temperature: 50s**
Agency: Department of Energy	**Inspector: Stephen F Dwyer, PhD, PE**
Site Element	**Remarks**
Repairs Necessary Yes ( ) No (X) If yes, explain	
2. Rock Check Dams near Retaining Wall: Functional Yes (X) No ( ) if no, describe locations Damage, displaced rock, or other damage: Yes ( ) No (X) Description of damage: NA Repairs Necessary Yes ( ) No (X) If yes, explain	The rock check dams are in good condition (Pictures 23 to 26).
3. Landfill Terrace above Retaining Wall: Functional Yes (X) No ( ) if no, describe locations Damage, adjunct erosion, slope problem, or other damage/degradation: Yes ( ) No (X) Description of damage: NA Repairs Necessary Yes ( ) No (NA) If yes, explain	The landfill terraces above the retaining walls are in good condition (Pictures 22 and 24).
4. Drainage Channels adjacent to Retaining Wall: Functional Yes (X) No ( ) if no, describe locations Damage, adjunct erosion, slope problem, or other damage/degradation: Yes ( ) No (X) Description of damage: NA Repairs Necessary Yes ( ) No (X) If yes, explain	The drainage channels adjacent to the retaining wall appear in good condition (Pictures 23 to 26). Drainage channels appear to be working properly.
5. Gabion above Drainage Channels adjacent to Retaining Wall: Functional Yes (X) No ( ) if no, describe locations Damage or degradation: Yes ( ) No (X) Description of damage: NA Repairs Necessary Yes ( ) No (X) If yes, explain	The gabions above drainage channels adjacent to the retaining walls are in good condition (Picture 22 and 23).
Site Access	
1.Access Restrictions: Yes (X) No ( ) Description: Secured fence with keyed lock	The site has controlled access with a security fence and locked gates.

Site Name: Los Alamos County Airport Landfill Cover Replacement	**Date of Inspection: March 26, 2018**
City: Los Alamos	**Weather: cool, breezy, cloudy**
State: New Mexico	**Temperature: 50s**
Agency: Department of Energy	**Inspector: Stephen F Dwyer, PhD, PE**
Site Element	**Remarks**
Repairs Necessary Yes ( ) No (X) If yes, explain	
Debris Disposal Area (DDA)	
Debris Disposal Area Condition Good Condition (X) Poor Condition ( )	The surface of the DDA cover system is in good condition. There is no observed degradation of the site. The vegetation on the site is in good condition (Picture 27). Vegetation is in good condition and varies in height from a few inches to about a foot. This area is mowed during the summer months by the airport personnel to remain compliant with FAA regulations (vegetation should be less than a foot in height). There was some small mammal burrowing noted on the cover. The amount of burrowing does not appear to be excessive at this time.
General	
1. Vandalism: Yes ( ) No (X) Description of damage: Repairs Necessary Yes ( ) No ( ) If yes, explain	No vandalism noted.
2. Land Use Change: Yes ( ) No (X) Description: Repairs Necessary Yes ( ) No ( ) If yes, explain	No land use changes.
Summary of Recommended Maintenance and/or Repairs	
1. Maintenance / Repairs Necessary Yes ( ) No (X) If yes, explain	None at this time.

Site Name: Los Alamos County Airport Landfill Cover Replacement	Date of Inspection: March 26, 2018
City: Los Alamos	Weather: cool, breezy, cloudy
State: New Mexico	Temperature: 50s
Agency: Department of Energy	Inspector: Stephen F Dwyer, PhD, PE
Site Element	**Remarks**
Other	
1. Materials have been stockpiled on the new asphalt adjacent to the new concrete hangar foundation west of the landfill. The materials are for erection of the new LA County Airport Hangar. 2. The area directly north of the new airport hangar pad was disturbed by Los Alamos County utility work activities. This area is outside of the footprint of the landfill and has no impact on the landfill. The disturbed area appeared to be seeded and then covered with a temporary erosion blanket (Picture 7). Additionally, a concrete drop inlet structure was installed to capture surface water from the hangar area (Picture 9).	1. There has been no progress toward erection of the hangar from the prior inspection.

Picture 1. Cover Northeast View

Picture 2. Methane Monitoring Port - West of Landfill

Picture 3. Methane Monitoring Port - North of New Hangar Pad

Picture 4. Methane Monitoring Port - South Slope of Landfill

Picture 5. West Slope End of Landfill

Picture 6. Water Balance Monitoring Nest - South Slope of Landfill

Picture 7. Recent Placement of Erosion Matting by Los Alamos County North of New Hangar Pad

Picture 8. New Asphalt and Concrete Hangar Pad - West of Landfill

Picture 9. New Drop Inlet Structure Installed by Los Alamos County North of New Hangar Pad

Picture 10. Drainage Channel - North Perimeter of ET Cover

Picture 11. Drainage Channel - East Perimeter of ET Cover

Picture 12. Drainage Channel - South Perimeter of ET Cover

Picture 13. Concrete Culvert - West Perimeter of ET Cover

Picture 14. ET Cover - South View

Picture 15. ET Cover - East View

Picture 16. ET Cover - West View

Picture 17. 'Desert Pavement' and Emerging Vegetation - Surface of ET Cover

Picture 18. Eastern Berm on Sideslope East of Landfill

Picture 19. Surface Tension Crack – North Slope / Eastern Half of Landfill

Picture 20. Eastern Side Slope of Landfill

Picture 21. Concrete Drainage - East End of SE Berm

Picture 22. Gabion Retaining Structure - East End of Landfill

Picture 23. Large Rip Rap Slope and Gabion Retainment Wall - East End of Landfill Site

Picture 24. Concrete Retaining Wall - East End of Landfill

Picture 25. Erosion Control below Concrete Retaining Wall - NE End of Landfill

Picture 26. Rock Check Dams - Erosion Control East End of Landfill

Picture 27. Debris Disposal Area

Picture 28. Burrow Holes on Side Slope of Older Landfill Cover

WATER BALANCE MONITORING SUMMARY

The moisture content probes data was collected and summarized in this inspection report (Figures 1 and 2). The probes were installed on August 29, August 30, and September 4, 2016. Figure 7 shows the monitoring point locations. The data collected to date is summarized and presented in Figures 1 to 2. Figure 3 contains the available daily precipitation events for comparison of the response to infiltration reflected in the moisture probe data.

The moisture content probes reveal that infiltrated moisture due to precipitation quickly dries shortly after (Figures 1 and 2). There also appears to be some sensitivity of the moisture content measurements to soil temperature. This data will take multiple seasons to analyze and better understand the water balance trends in the cover system.

Heat dissipation units (HDU) were replaced on May 18, 2017. These probes measure the matric potential or soil suction in the soil cover system at various depths. Collected data to date is shown in Figures 4 and 5. Figure 6 contains the available daily precipitation events for comparison to response of the soil suction data. Figure 7 shows the monitoring point locations.

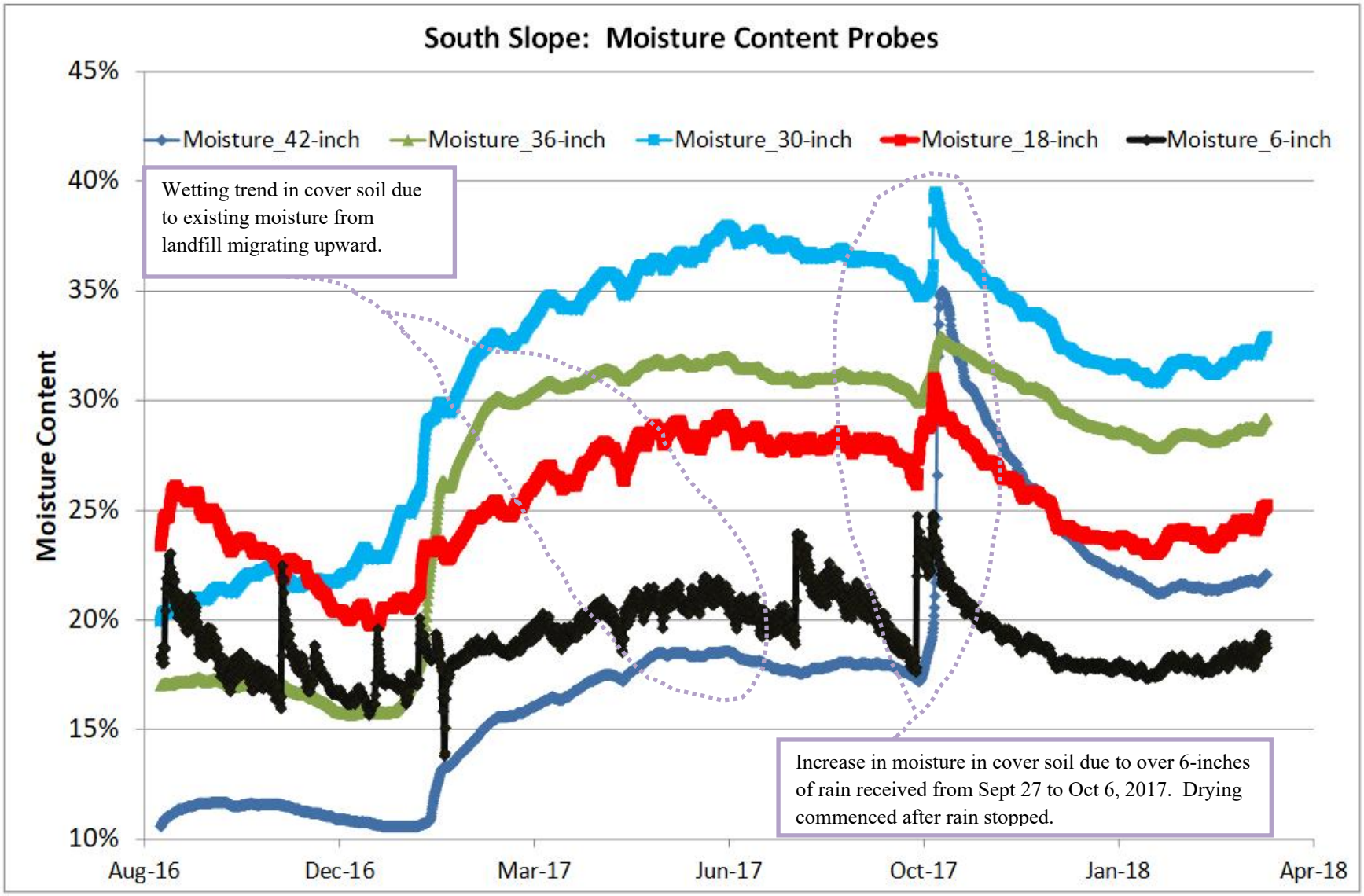

Figure 1. Moisture Probe Data (September 2016 to March 2018) - ET Cover South Slope

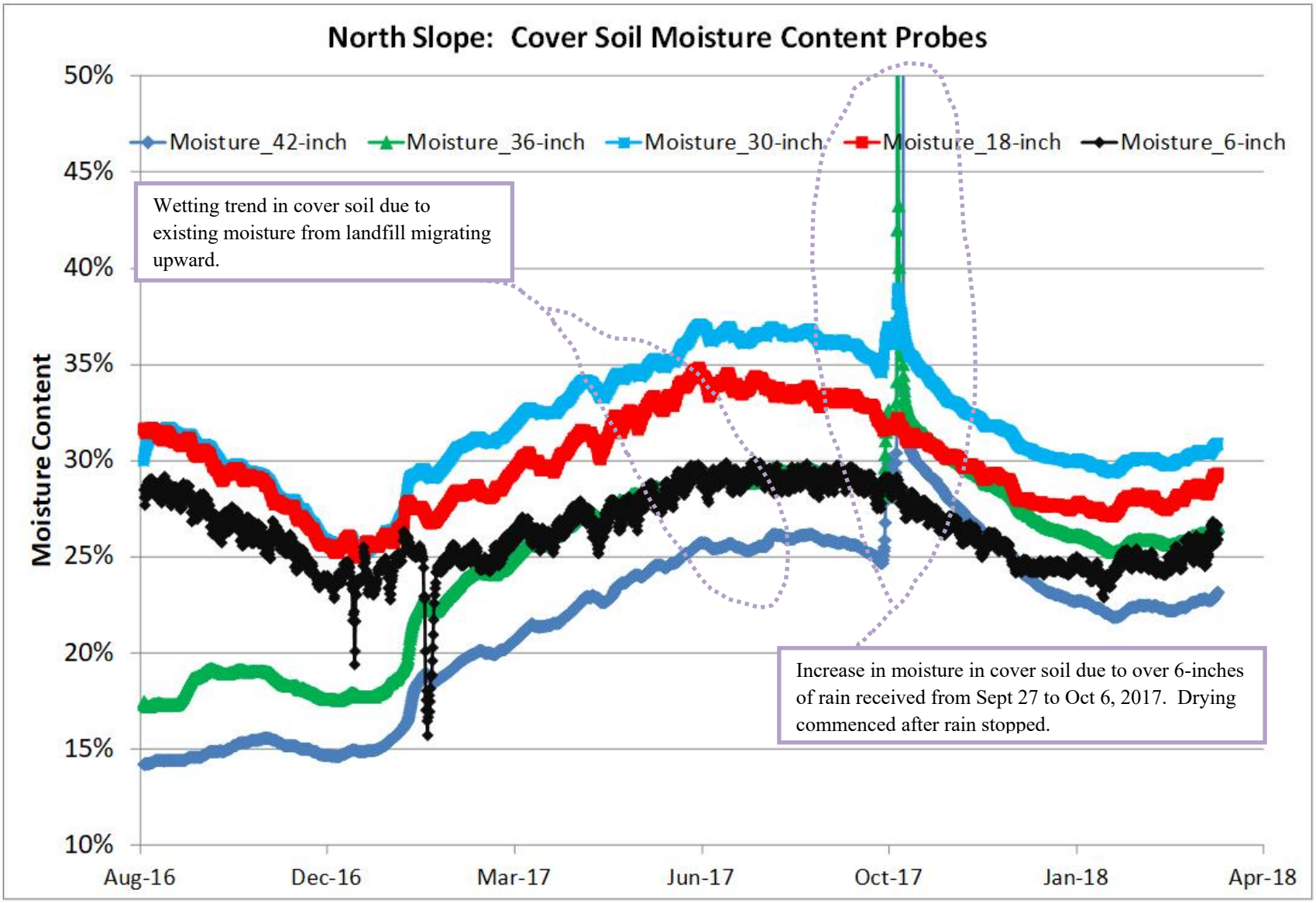

Figure 2. Moisture Probe Data (September 2016 to March 2018) - ET Cover North Slope

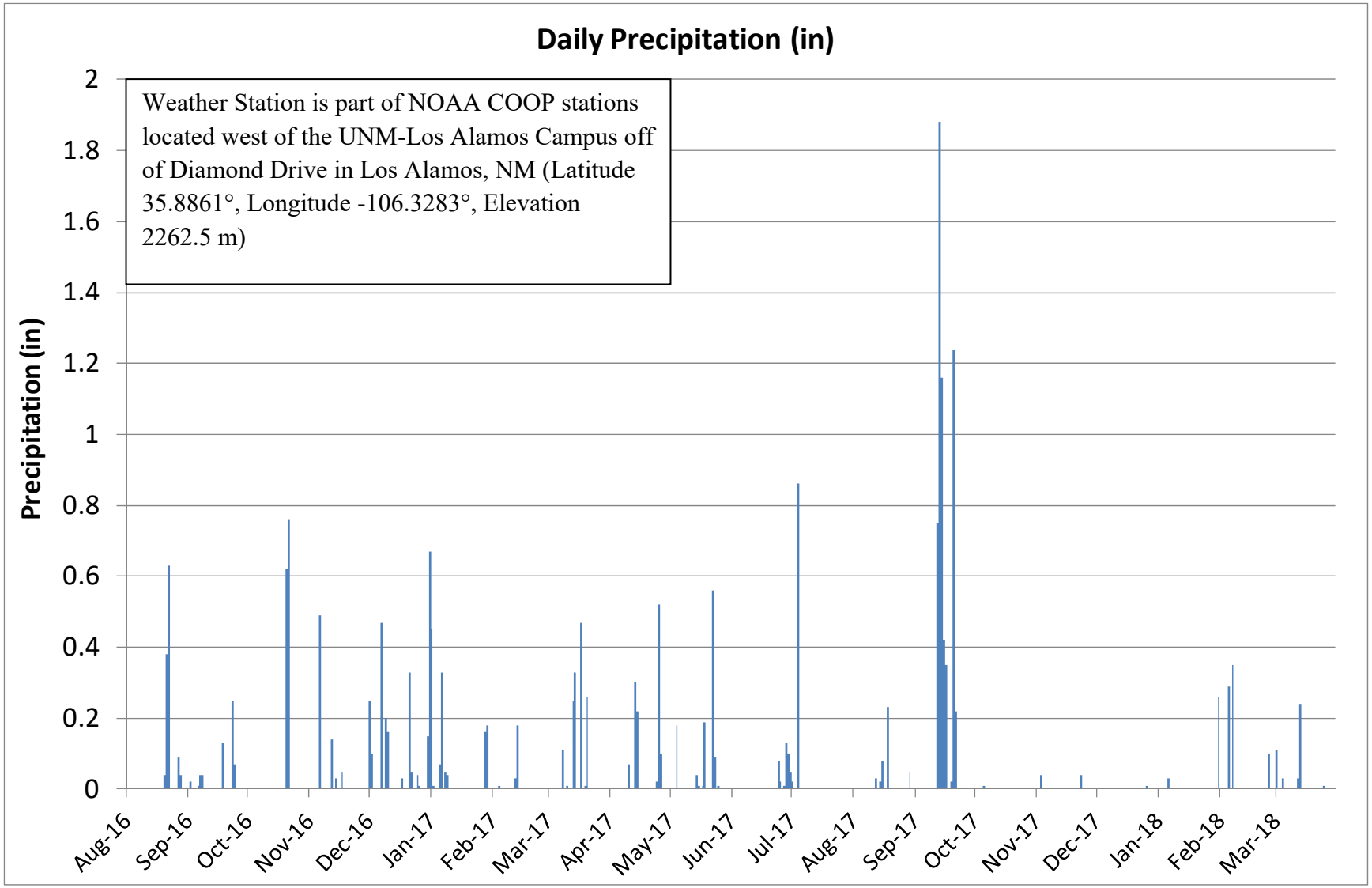

Figure 3. Daily Precipitation (Sept 2016 to March 2018)

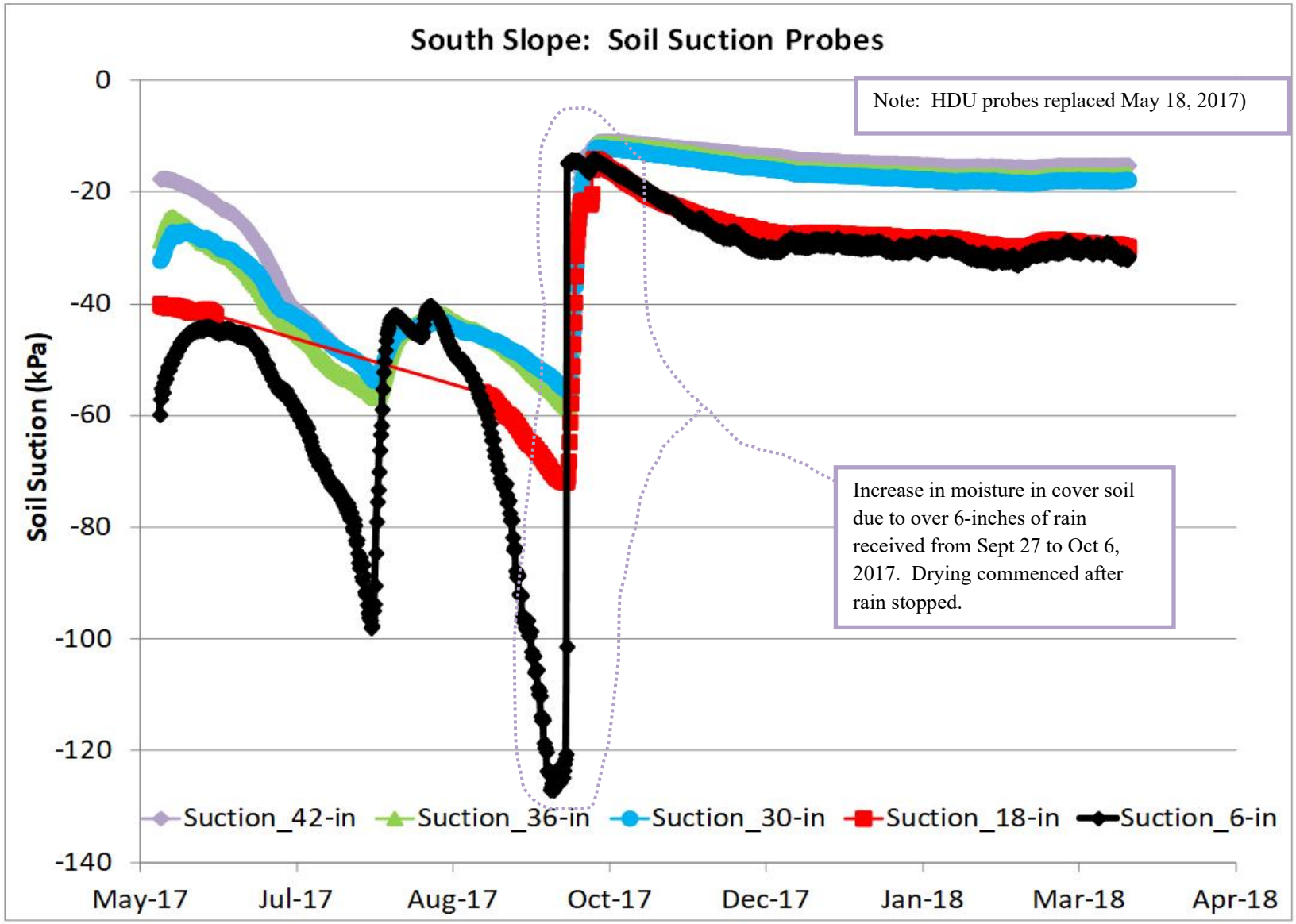

Figure 4. HDU Data (May 2017 to March 2018) - ET Cover South Slope

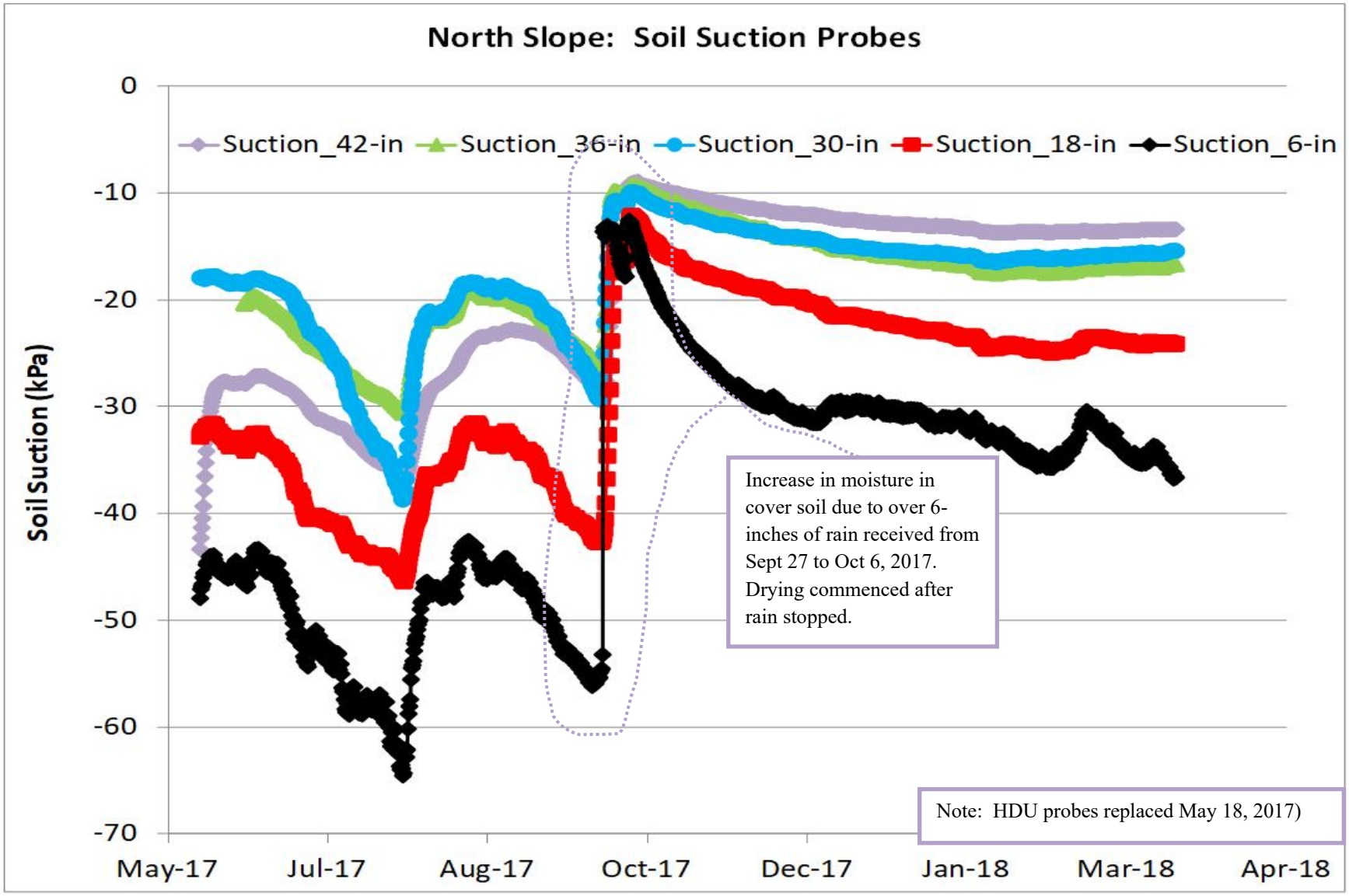

Figure 5. HDU Data (May 2017 to March 2018) - ET Cover North Slope

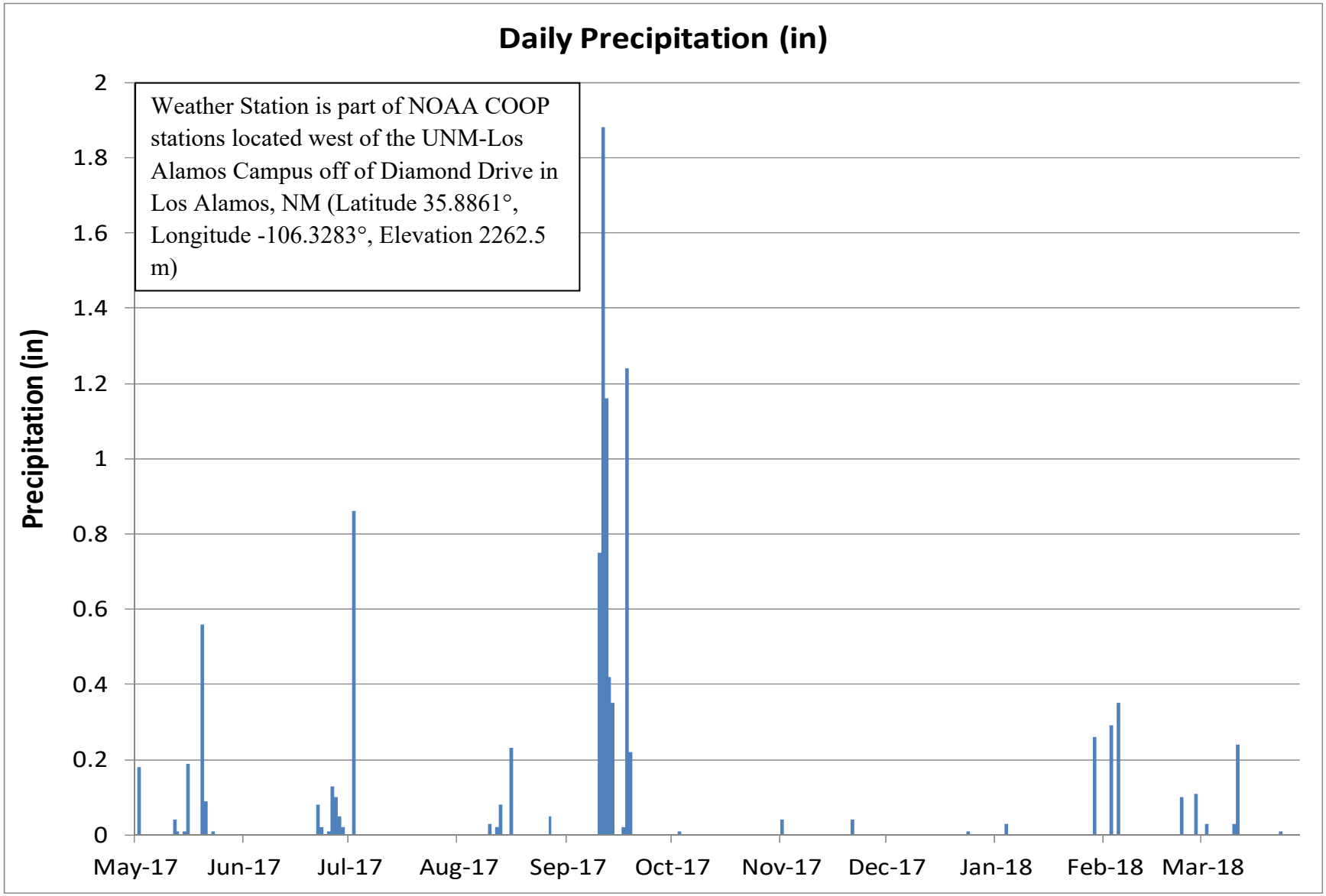

Figure 6. Precipitation (May to March 2018)

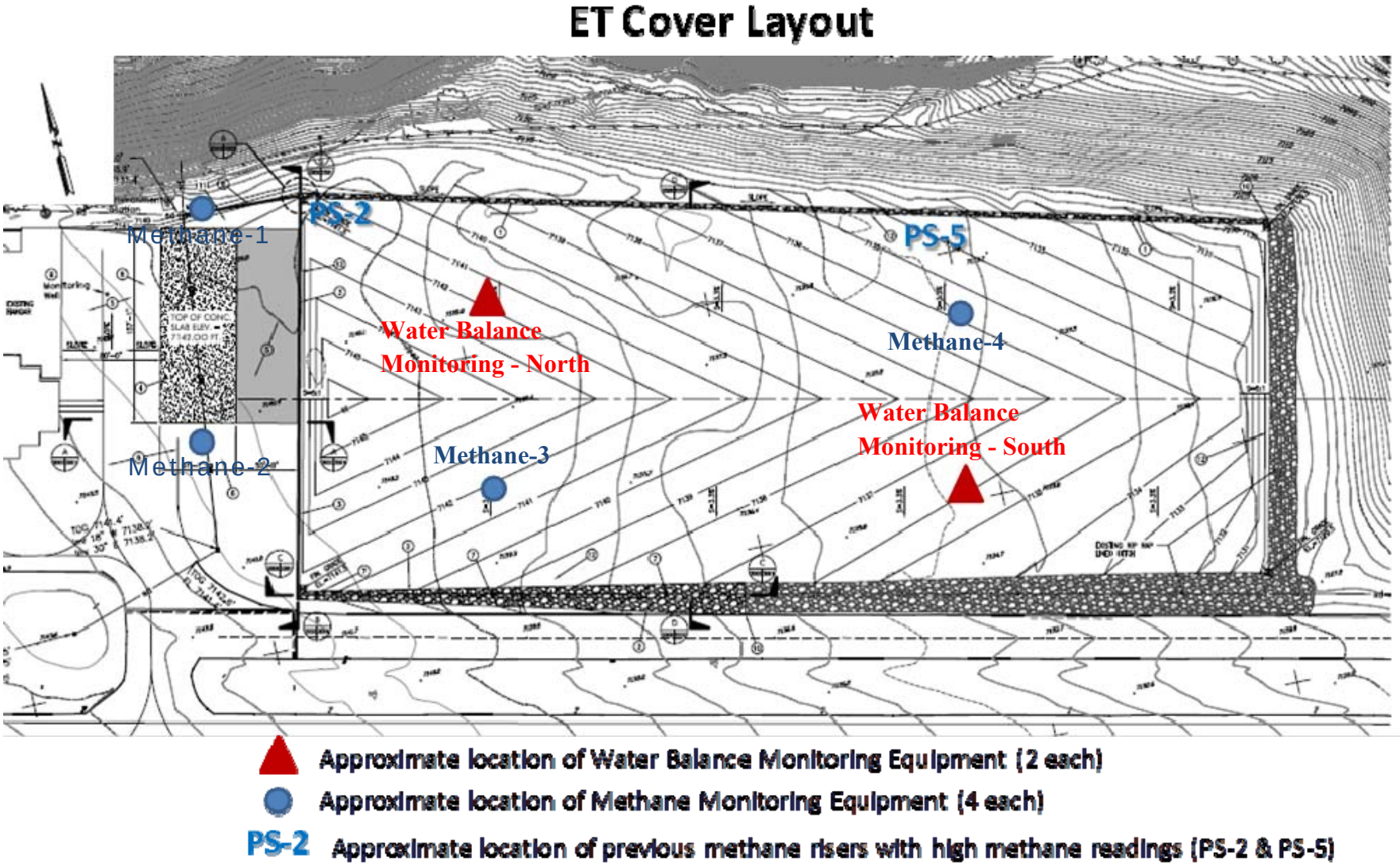

Figure 7. Methane and Water Balance Probe Monitoring Locations

METHANE MONITORING

Field measurements of methane are contained in Table 2. Methane monitoring measurements are collected using a hand-held GX-2012 Multi-Gas Monitor with a sample hose and 10 inch probe accessory. The GX-2012 gas monitor detects the presence of combustible gas (CH_4) as percent (%) of the Lower Explosive Limit (LEL). Figure 7 shows the monitoring point locations.

Table 2. Methane Monitoring Readings

Site Name: Los Alamos County Airport Landfill Cover Replacement	**Date of Inspection: March 26, 2018**
City: Los Alamos	**Weather: calm wind**
State: New Mexico	**Temperature: 45°F**
Agency: Department of Energy	**Inspector: Felicia Aguilar**
Methane Monitoring Station	**Readings (% of LEL)**
Methane-1	0
Methane-2	0
Methane-3	0
Methane-4	0

SETTLEMENT MONITORING

Table 3 provides a summary of the elevation measurements for the identified survey points to monitor any differential settlement in the landfill. Figure 8 shows the settlement survey locations. The annual report will include a combination of all surveyed data from each location inclusive of calculated differential settlement (if any).

Table 3. Settlement Monitoring Points Elevation Measurements

Survey Point	Elevation
	3-26-18
1	7141.38
2	7141.44
3	7141.41
4	7141.43
5	7141.14
6	7140.71
7	7144.03
8	7146.26
9	7143.36
10	7140.47
11	7139.47
12	7142.76
13	7145.27
14	7141.9
15	7139.35
16	7138.15
17	7141.35
18	7143.97
19	7140.71
20	7137.56
21	7137.17
22	7139.91
23	7142.85
24	7139.82

Survey Point	Elevation
	3-26-18
25	7136.58
26	7136.36
27	7138.58
28	7141.44
29	7138.48
30	7135.16
31	7135.13
32	7137.46
33	7140.16
34	7137.07
35	7134.27
36	7134.27
37	7136.55
38	7138.57
39	7135.83
40	7132.78
41	7132.96
42	7135.19
43	7137.23
44	7134.53
45	7131.9
46	7131.75
47	7134.07
48	7136.03
49	7133.23
50	7130.78
51	7130.46
52	7132.28
53	7134.51

Survey Point	Elevation
	3-26-18
54	7132.39
55	7129.26
56	7129.08
57	7130.26
58	7129.76
59	7129.58
60	7128.84

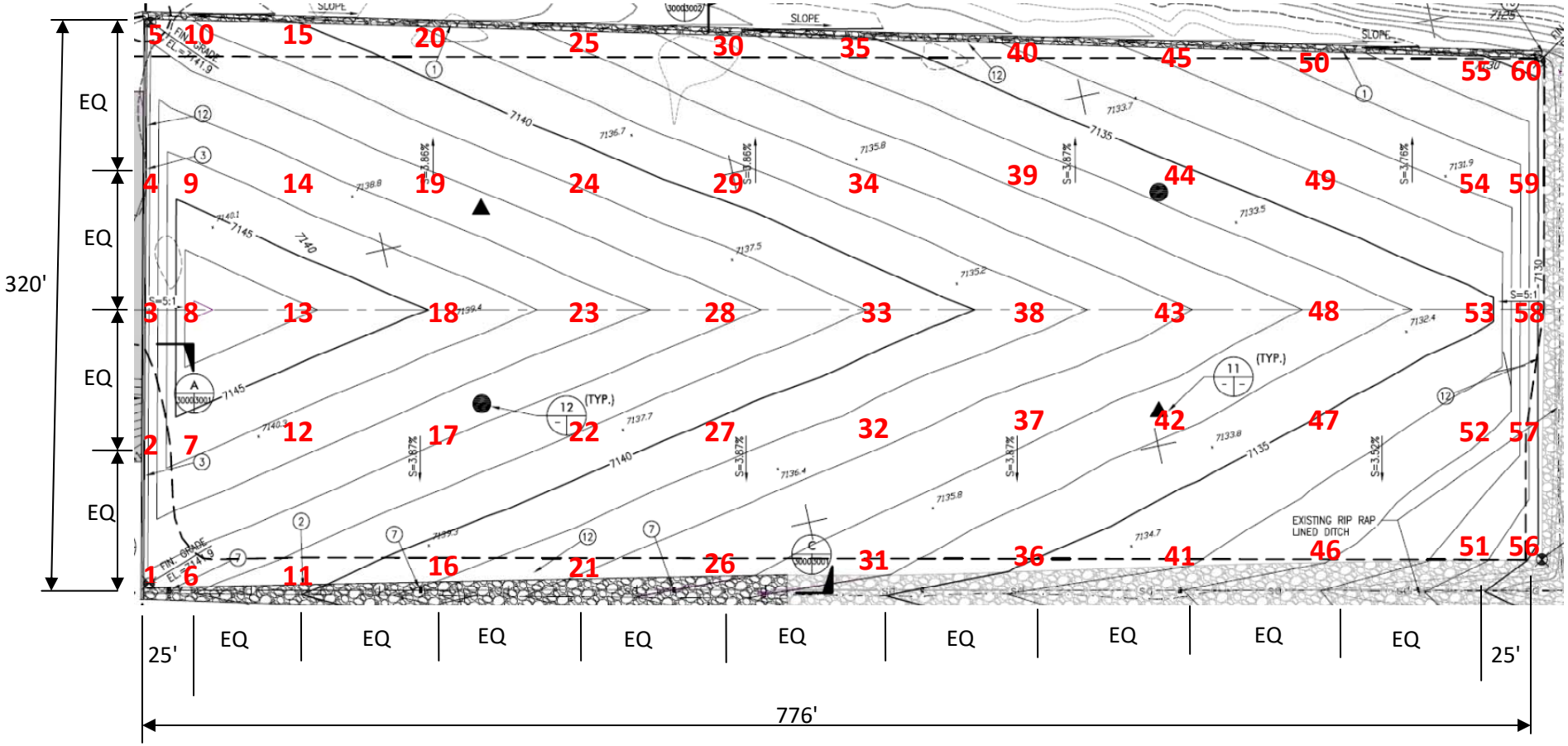

Figure 8. Survey Point Locations

LONG-TERM MONITORING INSPECTION REPORT

YEAR 2, Quarter 4 ***INSPECTION #8***

LOS ALAMOS COUNTY AIRPORT LANDFILL COVER REPLACEMENT

Inspection Date: *June 22, 2018*
Report Date: *July 19, 2018*

prepared for:
Department of Energy
Environmental Management Los Alamos Field Office (EM-LA)
Los Alamos Field Office
Los Alamos, NM 87544

prepared by:
Dwyer Engineering LLC under contract to The Lakeworth Group
Stephen F. Dwyer, PhD, PE
1813 Stagecoach Rd.
Albuquerque, NM 87123
(505) 270-0215

Revision 0

EXECUTIVE SUMMARY

This is the eighth inspection (Year 2, Quarter 4 - inspection date: June 22, 2018) of the Evapotranspiration (ET) Cover and associated project elements for the Los Alamos County Airport Landfill. The inspections are performed in accordance with the Long-Term Monitoring Plan[1]. The construction of the cover system was completed in July 2016.

All features of the closure are currently in good condition. Vegetation was stressed during the recent inspection due to hot temperatures and prolonged drought conditions. The vegetation has full coverage and is dominated by grasses varying in height from a few inches to about a foot (the vegetation was recently mowed by the Los Alamos County). All drainage systems are in excellent working condition. There are no erosion or slope issues. There is no biointrusion to date on the new ET Cover although minimal animal burrowing was identified on the existing side slopes of the older cover system. There was also some burrowing noted in the Debris Disposal Area (DDA) cover. No maintenance or repairs are recommended at this time.

Methane monitoring during the reporting period revealed no detectable methane. The water balance monitoring (soil moisture and soil suction) appears to show infiltration in response to precipitation that moves into the cover profile and subsequently is removed via ET. The heat dissipation units were replaced with newer probes in May 2017. Temperature sensitivity of the probes, especially contrasting winter and summer seasons, has contributed to the initial undulation in the data. Longer term trends will need to be evaluated to better assess the effectiveness of the cover system water balance data.

A grid was staked out on the cover and surveyed for each point's respective elevation. This settlement survey grid will be tracked in the annual report for any differential settlement.

[1] Dwyer Engineering. March 2017. Long-Term Monitoring Plan. Los Alamos County Airport Landfill Cover Replacement Solid Waste Management Units 73-001 (a,d) Technical Area 73.

INSPECTION CHECK LIST

Table 1. Long-Term Monitoring Check List for the Los Alamos County Airport Landfill Closure

Site Name: Los Alamos County Airport Landfill Cover Replacement	**Date of Inspection: June 22, 2018**
City: Los Alamos	**Weather: hot, sunny, windy**
State: New Mexico	**Temperature: 90s**
Agency: Department of Energy	**Inspector: Stephen F Dwyer, PhD, PE**
Site Element	**Remarks**
ET Cover	
1. Settlement (Low Spots): Yes ( ) No (X) Areal Extent: none Depth: NA Repairs Necessary Yes ( ) No (X) If yes, explain	Visual inspection showed that some differential settlement has occurred. The surface tension crack reported in the previous inspection was not visible during this inspection. There does not appear to be any ponding associated with the settlement to date. A grid was established on the cover surface and surveyed. This survey data will be quantified in the annual reports with respect to differential settlement.
2. Surface Cracks: Yes ( ) No (X) Length: NA Width: NA Depth: NA Repairs Necessary Yes ( ) No (X) If yes, explain	The surface crack noted in the previous inspection was not visible during this inspection. No other cracks were identified.
3. Erosion: Yes ( ) No (X) Areal Extent: NA Depth: NA Repairs Necessary Yes ( ) No (X) If yes, explain	No significant erosion noted to date. The gravel/soil top admixture top layer (6-inches thick) referred to as a 'desert pavement' is developing well and appears to be working as designed to minimize erosion (Picture 17).
4. Biointrusion Holes: Yes (X) No ( ) Areal Extent: minimal Depth: approx. 12-inches Suspected Cause (Rodent or Other): small mammal	No biointrusion noted on the new ET Cover. There was minimal biointrusion (small animal burrow holes) noted on the side slopes of the prior cover system (Picture 28). The biointrusion noted is within expected tolerances to date.

Site Name: Los Alamos County Airport Landfill Cover Replacement	**Date of Inspection: June 22, 2018**
City: Los Alamos	**Weather: hot, sunny, windy**
State: New Mexico	**Temperature: 90s**
Agency: Department of Energy	**Inspector: Stephen F Dwyer, PhD, PE**
Site Element	**Remarks**
Repairs Necessary Yes ( ) No (X) If yes, explain	
5. Vegetation Condition: General Condition progressing as expected: Yes (X) No ( ) If no, explain Issues Observed: Yes ( ) No (X) If yes, explain Repairs Necessary: Yes ( ) No (X) If yes, explain	Vegetation has full coverage on the cover system. The size/height of the vegetation is uneven across the cover (Picture 19). It is believed the varied grass height on the ET Cover is due to varied subsurface moisture levels created while covered with the asphaltic cover system. The vegetation is predominantly native grasses that were seeded at the conclusion of the construction of the cover system. The grasses vary in height from a few inches to about a foot (the site was recently mowed by the Los Alamos County). The vegetation was stressed during this inspection due to prolonged drought conditions. The vegetation on the DDA (Picture 27) and side slopes of the prior cover (Picture 20) appears relatively mature and consists of grasses generally less than a foot in height mixed with forbs. These areas have been mowed in the past to keep the height to within acceptable levels per FAA regulations. (Refer to pictures 1, 4, 5, 6, 14, 15, 16, 19, 20 and 27).
6. Rill/Gully: Yes ( ) No (X) Areal Extent: NA Depth: NA Suspected Cause: NA Repairs Necessary Yes ( ) No (X) If yes, explain	No erosion noted to date.
7. Wet Areas: Yes ( ) No (X) Ponding: Yes ( ) No (X) Areal Extent: NA Seeps: Yes ( ) No (X) Areal Extent: NA	The cover was uniformly dry during the inspection. No unusual wet areas noted to date on the cover.

Site Name: Los Alamos County Airport Landfill Cover Replacement	**Date of Inspection: June 22, 2018**
City: Los Alamos	**Weather: hot, sunny, windy**
State: New Mexico	**Temperature: 90s**
Agency: Department of Energy	**Inspector: Stephen F Dwyer, PhD, PE**
Site Element	**Remarks**
Soft Subgrade: Yes ( ) No (X) Areal Extent: NA Repairs Necessary Yes ( ) No (X) If yes, explain	
8. Slope Instability: Yes ( ) No (X) Areal Extent: NA Suspected Cause: NA Exposed Cover Components: NA Repairs Necessary Yes ( ) No (X) If yes, explain	No slope instability noted to date.
9. Water Balance Instrumentation: Functioning Properly: Yes (X) No ( ) Damage: Yes ( ) No (X) Repairs Necessary Yes ( ) No (X) If yes, explain	Moisture content probes appeared to be working correctly and are in good condition to date (Picture 6). The heat dissipation units (HDU) were replaced in March 2017.
9. Methane Monitoring Instrumentation: Functioning Properly: Yes (X) No ( ) Damage: Yes ( ) No (X) Repairs Necessary Yes ( ) No (X) If yes, explain	Felicia Aguilar, The Lakeworth Group, performed methane monitoring. No methane was detected. All measurements will be included in the annual report. Refer to Figure 7 for methane monitoring locations and Pictures 2, 3, and 4 for methane monitoring ports.
Rip Rap Lined Drainage Channels	
1. Settlement: Yes ( ) No (X) Areal Extent: NA Depth: NA Repairs Necessary Yes ( ) No (X) If yes, explain	Visual inspection revealed no significant differential settlement to date.
2. Material Degradation: Yes ( ) No (X) Material Type: Rock, geotextile, geomembrane (polyethylene)	No material degradation noted to date (Pictures 10, 11, and 12).

Site Name: Los Alamos County Airport Landfill Cover Replacement	**Date of Inspection: June 22, 2018**
City: Los Alamos	**Weather: hot, sunny, windy**
State: New Mexico	**Temperature: 90s**
Agency: Department of Energy	**Inspector: Stephen F Dwyer, PhD, PE**
Site Element	**Remarks**
Areal Extent: NA Degree of Degradation: none Repairs Necessary Yes ( ) No (X) If yes, explain	
3. Erosion: Yes ( ) No (X) Areal Extent: NA Depth: NA Repairs Necessary Yes ( ) No (X) If yes, explain	No erosion noted to date.
4. Undercutting: Yes ( ) No (X) Areal Extent: NA Depth: NA Repairs Necessary Yes ( ) No (X) If yes, explain	No undercutting noted to date.
5. Obstructions: Yes ( ) No (X) Type: NA Areal Extent: NA Size: NA Repairs Necessary Yes ( ) No (X) If yes, explain	No obstructions noted to date.
6. Slope Instability: Yes ( ) No (X) Type: NA Areal Extent: NA Repairs Necessary Yes ( ) No (X) If yes, explain	No slope instability noted to date.
7. Siltation: Yes ( ) No (X) Areal Extent: NA Depth: NA	No siltation noted to date.

Site Name: Los Alamos County Airport Landfill Cover Replacement	**Date of Inspection: June 22, 2018**
City: Los Alamos	**Weather: hot, sunny, windy**
State: New Mexico	**Temperature: 90s**
Agency: Department of Energy	**Inspector: Stephen F Dwyer, PhD, PE**
Site Element	**Remarks**
Repairs Necessary Yes ( ) No (X) If yes, explain	
8. Drop Inlet Structures: Working Properly Yes (X) No ( ) Condition: good Extent of Damage: NA Repairs Necessary Yes ( ) No (X) If yes, explain	Drop inlet structures are in good condition (Picture 12).
Concrete Culvert	
1. Siltation: Yes ( ) No (X) Areal Extent: NA Depth: NA Repairs Necessary Yes ( ) No (X) If yes, explain	No siltation noted to date (Picture 13).
2. Concrete Condition and Joints General Condition progressing as expected: Yes (X) No ( ) If no, explain Issues Observed: Yes ( ) No (X) If yes, explain Repairs Necessary: Yes ( ) No (X) If yes, explain	Concrete in good condition (Picture 13).
3. Grating Condition: General Condition progressing as expected: Yes (X) No ( ) If no, explain Issues Observed: Yes ( ) No (X) If yes, explain Repairs Necessary: Yes ( ) No (X) If yes, explain	Grating in good condition (Picture 13).
Fencing	
1. Airport Fence Adjacent to Landfill: bent posts: Yes ( ) No (X) loose posts: Yes ( ) No (X)	Airport fencing is in good condition and securing the site (Pictures 9, 21, 23, 25 and 26). This fencing is maintained by the County of Los Alamos.

Site Name: Los Alamos County Airport Landfill Cover Replacement	**Date of Inspection: June 22, 2018**
City: Los Alamos	**Weather: hot, sunny, windy**
State: New Mexico	**Temperature: 90s**
Agency: Department of Energy	**Inspector: Stephen F Dwyer, PhD, PE**
Site Element	**Remarks**
broken links or wire: Yes ( ) No (X) damaged gates: Yes ( ) No (X) Description of damage: NA Repairs Necessary Yes ( ) No (X) If yes, explain	
Retaining Wall	
1.Retaining Wall Condition: General Condition progressing as expected: Yes (X) No ( ) If no, explain	Retaining walls are in good condition. No damage or issues were noted (Pictures 22 to 25).
2. Retaining Wall Damage Description (if any): Issues Observed: Yes ( ) No (X) If yes, explain	None
3.**Repairs Necessary** Repairs Necessary: Yes ( ) No (X) If yes, explain	None
Temporary Erosion & Sedimentation Control Measures (if any)	
1. Erosion Control Blanket: Functional Yes (X) No ( ) if no, describe locations Damaged Blanket: Yes ( ) No (X) Other damage: Yes ( ) No (X) Description of damage: NA Repairs Necessary Yes ( ) No (X) If yes, explain	The erosion control blankets (ECBs) were placed around the perimeter of the new cover surface and other disturbed areas immediately after seeding. They are intended to mitigate erosion until vegetation is established and are a temporary erosion control measure. These ECBs are beyond their useful life.
Permanent Erosion & Sedimentation Control Measures	
1. Rip Rap Berm near Retaining Wall: Functional Yes (X) No ( ) if no, describe locations Damage or degradation: Yes ( ) No (X) Description of damage: NA Repairs Necessary Yes ( ) No (X) If yes, explain	The Rip Rap drainage on side slope is in good condition (Picture 18).
2. Rock Check Dams near Retaining Wall:	The rock check dams are in good condition (Pictures 23

Site Name: Los Alamos County Airport Landfill Cover Replacement	**Date of Inspection: June 22, 2018**
City: Los Alamos	**Weather: hot, sunny, windy**
State: New Mexico	**Temperature: 90s**
Agency: Department of Energy	**Inspector: Stephen F Dwyer, PhD, PE**
Site Element	**Remarks**
Functional Yes (X) No ( ) if no, describe locations Damage, displaced rock, or other damage: Yes ( ) No (X) Description of damage: NA Repairs Necessary Yes ( ) No (X) If yes, explain	to 26).
3. Landfill Terrace above Retaining Wall: Functional Yes (X) No ( ) if no, describe locations Damage, adjunct erosion, slope problem, or other damage/degradation: Yes ( ) No (X) Description of damage: NA Repairs Necessary Yes ( ) No (NA) If yes, explain	The landfill terraces above the retaining walls are in good condition (Pictures 22 and 24).
4. Drainage Channels adjacent to Retaining Wall: Functional Yes (X) No ( ) if no, describe locations Damage, adjunct erosion, slope problem, or other damage/degradation: Yes ( ) No (X) Description of damage: NA Repairs Necessary Yes ( ) No (X) If yes, explain	The drainage channels adjacent to the retaining wall appear in good condition (Pictures 23 to 26). Drainage channels appear to be working properly.
5. Gabion above Drainage Channels adjacent to Retaining Wall: Functional Yes (X) No ( ) if no, describe locations Damage or degradation: Yes ( ) No (X) Description of damage: NA Repairs Necessary Yes ( ) No (X) If yes, explain	The gabions above drainage channels adjacent to the retaining walls are in good condition (Picture 22 and 23).
Site Access	
1. Access Restrictions: Yes (X) No ( ) Description: Secured fence with keyed lock Repairs Necessary Yes ( ) No (X) If yes, explain	The site has controlled access with a security fence and locked gates.

Site Name: Los Alamos County Airport Landfill Cover Replacement	**Date of Inspection: June 22, 2018**
City: Los Alamos	**Weather: hot, sunny, windy**
State: New Mexico	**Temperature: 90s**
Agency: Department of Energy	**Inspector: Stephen F Dwyer, PhD, PE**
Site Element	**Remarks**
Debris Disposal Area (DDA)	
Debris Disposal Area Condition Good Condition (X) Poor Condition ( )	The surface of the DDA cover system is in good condition. There is no observed degradation of the site. The vegetation on the site is in good condition (Picture 27). Vegetation is in good condition and varies in height from a few inches to about a foot. This area is mowed during the summer months by the airport personnel to remain compliant with FAA regulations (vegetation mowed to be less than a foot in height). There was some small mammal burrowing noted on the cover. The amount of burrowing does not appear to be excessive at this time.
General	
1. Vandalism: Yes ( ) No (X) Description of damage: Repairs Necessary Yes ( ) No ( ) If yes, explain	No vandalism noted.
2. Land Use Change: Yes ( ) No (X) Description: Repairs Necessary Yes ( ) No ( ) If yes, explain	No land use changes.
Summary of Recommended Maintenance and/or Repairs	
1.Maintenance / Repairs Necessary Yes ( ) No (X) If yes, explain	None at this time.
Other	

Site Name: Los Alamos County Airport Landfill Cover Replacement	**Date of Inspection: June 22, 2018**
City: Los Alamos	**Weather: hot, sunny, windy**
State: New Mexico	**Temperature: 90s**
Agency: Department of Energy	**Inspector: Stephen F Dwyer, PhD, PE**
Site Element	**Remarks**
1. Materials have been stockpiled on the new asphalt adjacent to the new concrete hangar foundation west of the landfill. The materials are for continued erection of the new LA County Airport Hangar. This is west of the footprint of the landfill. 2. The area directly north of the new airport hangar pad was disturbed by Los Alamos County utility work activities. This area is outside of the footprint of the landfill and has no impact on the landfill. The disturbed area appeared to be seeded and then covered with a temporary erosion blanket (Picture 7). Additionally, a concrete drop inlet structure was installed to capture surface water from the hangar area (Picture 9).	1. Erection of the hangar has progressed whereby the metal frame is complete (Pictures 2, 3, 4, and 8).

Picture 1. Cover East View

Picture 2. Methane Monitoring Port - West of Landfill

Picture 3. Methane Monitoring Port - North of New Hangar Pad

Picture 4. Methane Monitoring Port - South Slope of Landfill

Picture 5. West Slope End of Landfill

Picture 6. Water Balance Monitoring Nest - South Slope of Landfill

Picture 7. Recent Placement of Erosion Matting by Los Alamos County North of New Hangar Pad

Picture 8. New Asphalt and Hangar Under Construction - West of Landfill

Picture 9. New Drop Inlet Structure Installed by Los Alamos County North of New Hangar Pad

Picture 10. Drainage Channel - North Perimeter of ET Cover

Picture 11. Drainage Channel - East Perimeter of ET Cover

Picture 12. Drainage Channel - South Perimeter of ET Cover

Picture 13. Concrete Culvert - West Perimeter of ET Cover

Picture 14. ET Cover - South View

Picture 15. ET Cover - East View

Picture 16. ET Cover - Northeast View

Picture 17. 'Desert Pavement' and Emerging Vegetation - Surface of ET Cover

Picture 18. Eastern Berm on Sideslope East of Landfill

Picture 19. Area of Cover with Slower Vegetation Establishment

Picture 20. Eastern Side Slope of Landfill

Picture 21. Concrete Drainage - East End of SE Berm

Picture 22. Gabion Retaining Structure - East End of Landfill

Picture 23. Large Rip Rap Slope and Gabion Retainment Wall - East End of Landfill Site

Picture 24. Concrete Retaining Wall - East End of Landfill

Picture 25. Erosion Control below Concrete Retaining Wall - NE End of Landfill

Picture 26. Rock Check Dams - Erosion Control East End of Landfill

Picture 27. Debris Disposal Area

Picture 28. Burrow Holes on Side Slope of Older Landfill Cover

WATER BALANCE MONITORING SUMMARY

The moisture content probes data was collected and summarized in this inspection report (Figures 1 and 2). The probes were installed on August 29, August 30, and September 4, 2016. Figure 7 shows the monitoring point locations. Figure 3 contains the available daily precipitation events for comparison of the response to infiltration reflected in the moisture probe data.

The moisture content probes reveal that infiltrated moisture due to precipitation quickly dries shortly after (Figures 1 and 2). There also appears to be some sensitivity of the moisture content measurements to soil temperature (especially noted in variation of winter and summer months). This data will take multiple seasons to analyze and better understand the water balance trends in the cover system.

Heat dissipation units (HDU) were replaced on May 18, 2017. These probes measure the matric potential or soil suction in the soil cover system at various depths. Collected data to date is shown in Figures 4 and 5. Figure 6 contains the available daily precipitation events for comparison to response of the soil suction data. Figure 7 shows the monitoring point locations.

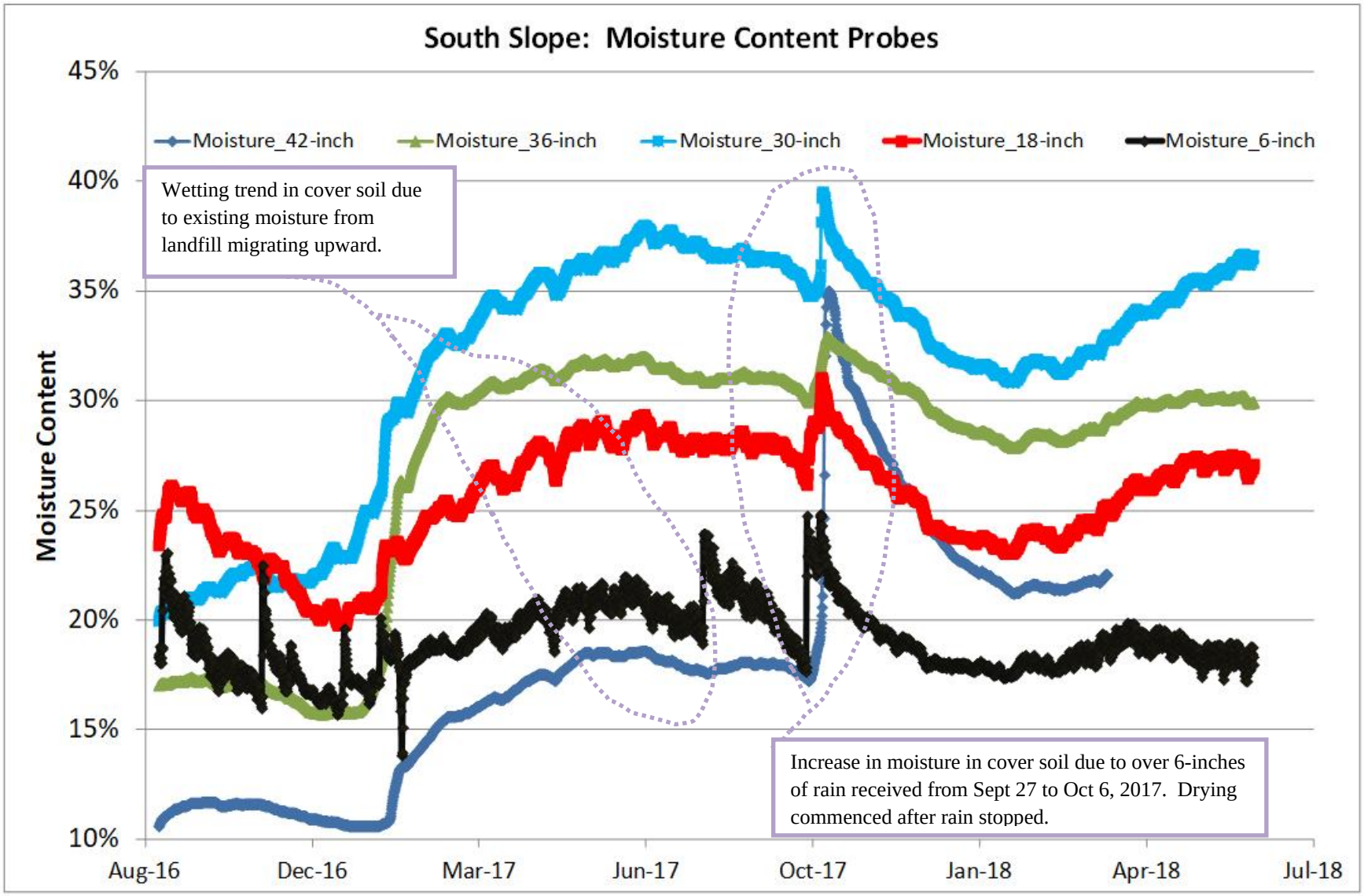

Figure 1. Moisture Probe Data (September 2016 to June 2018) - ET Cover South Slope

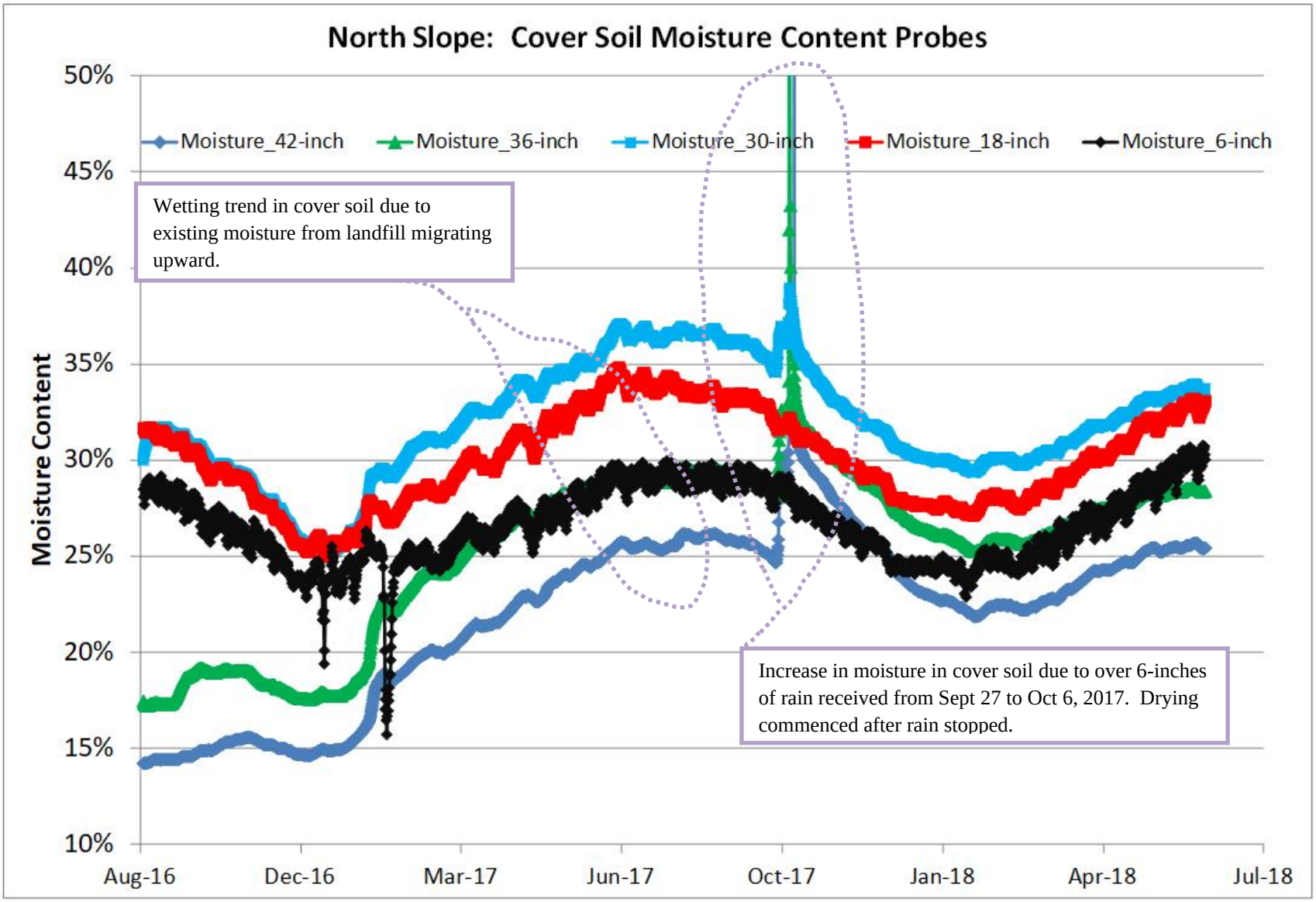

Figure 2. Moisture Probe Data (September 2016 to June 2018) - ET Cover North Slope

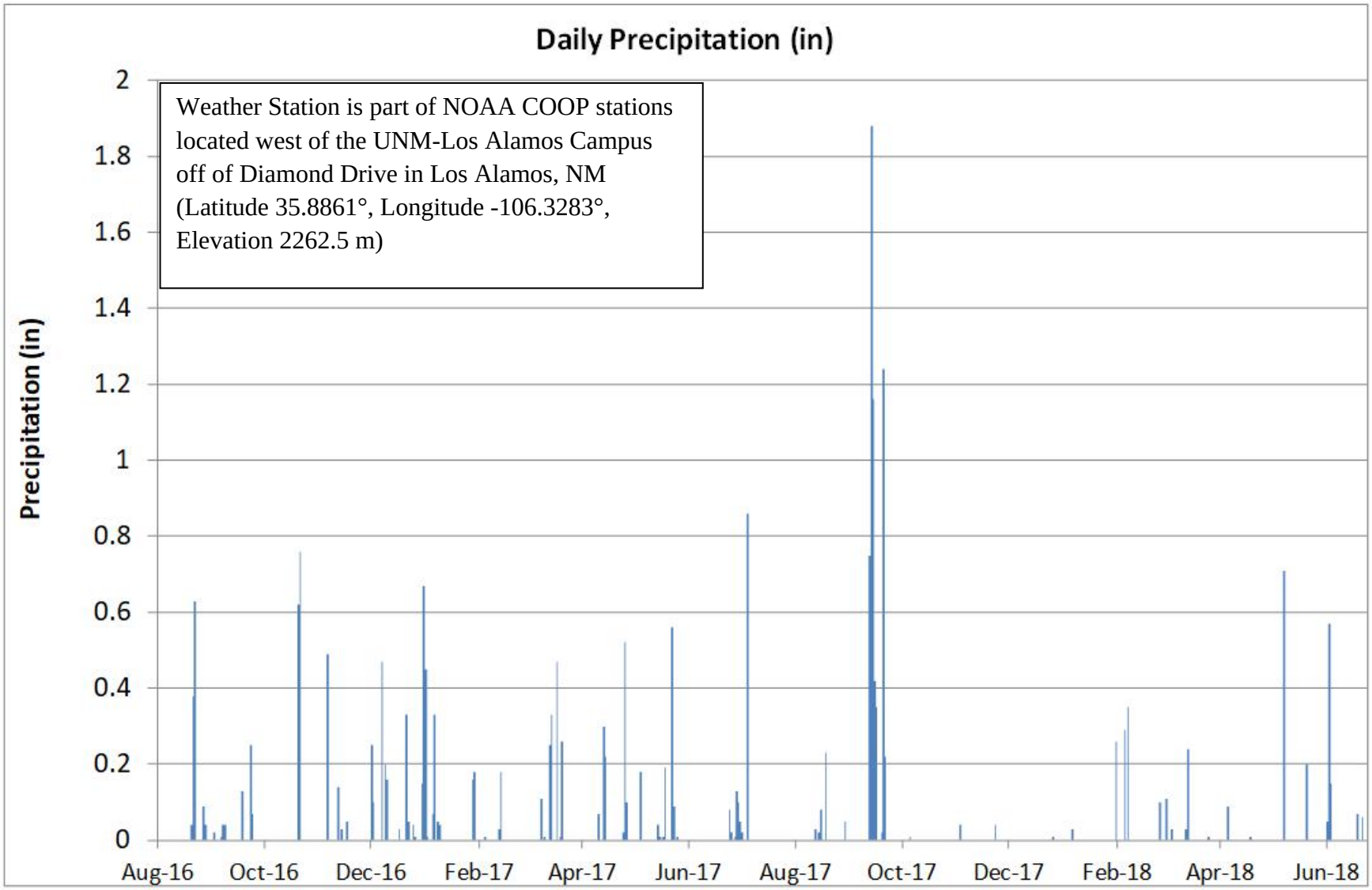

Figure 3. Daily Precipitation (Sept 2016 to June 2018)

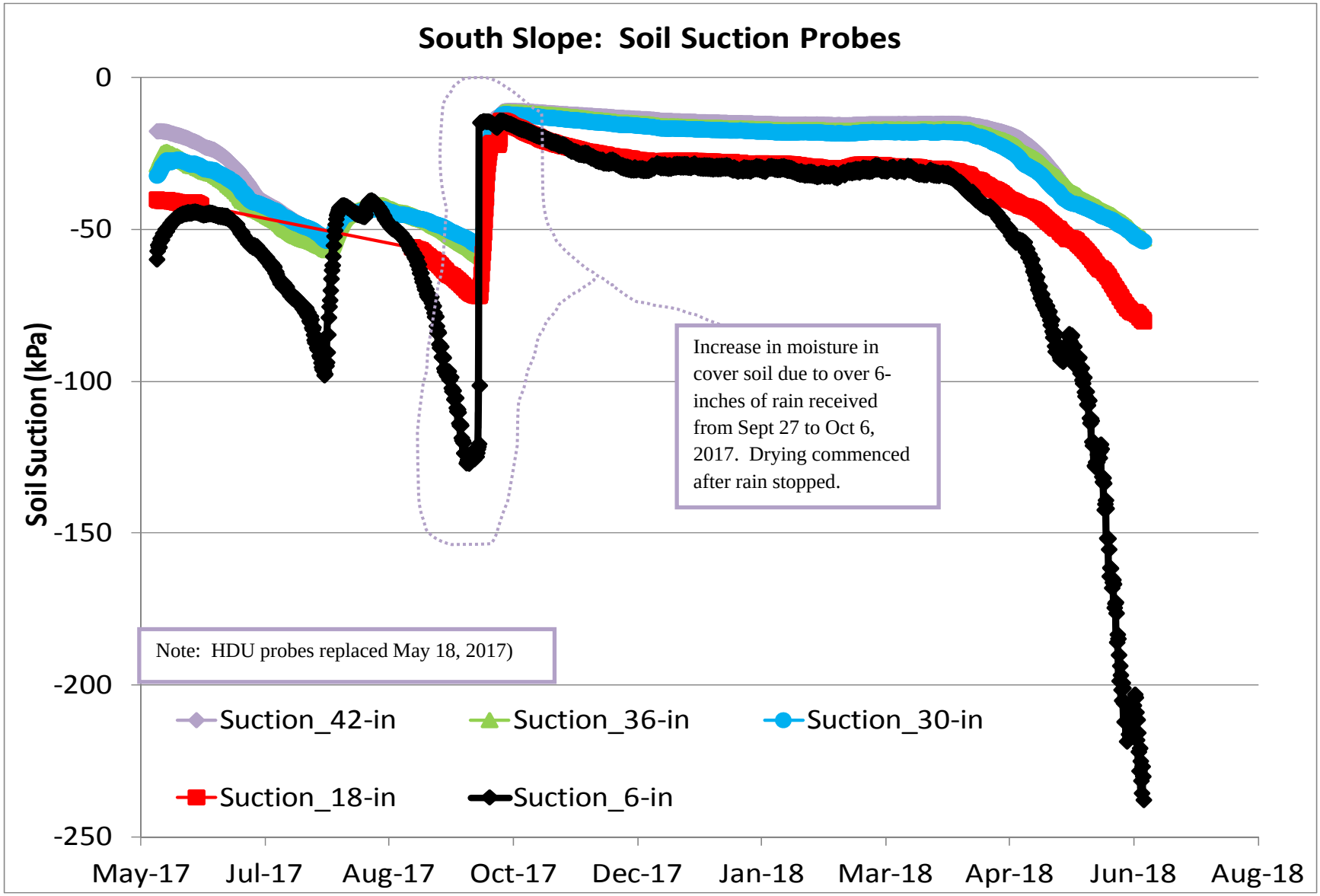

Figure 4. HDU Data (May 2017 to June 2018) - ET Cover South Slope

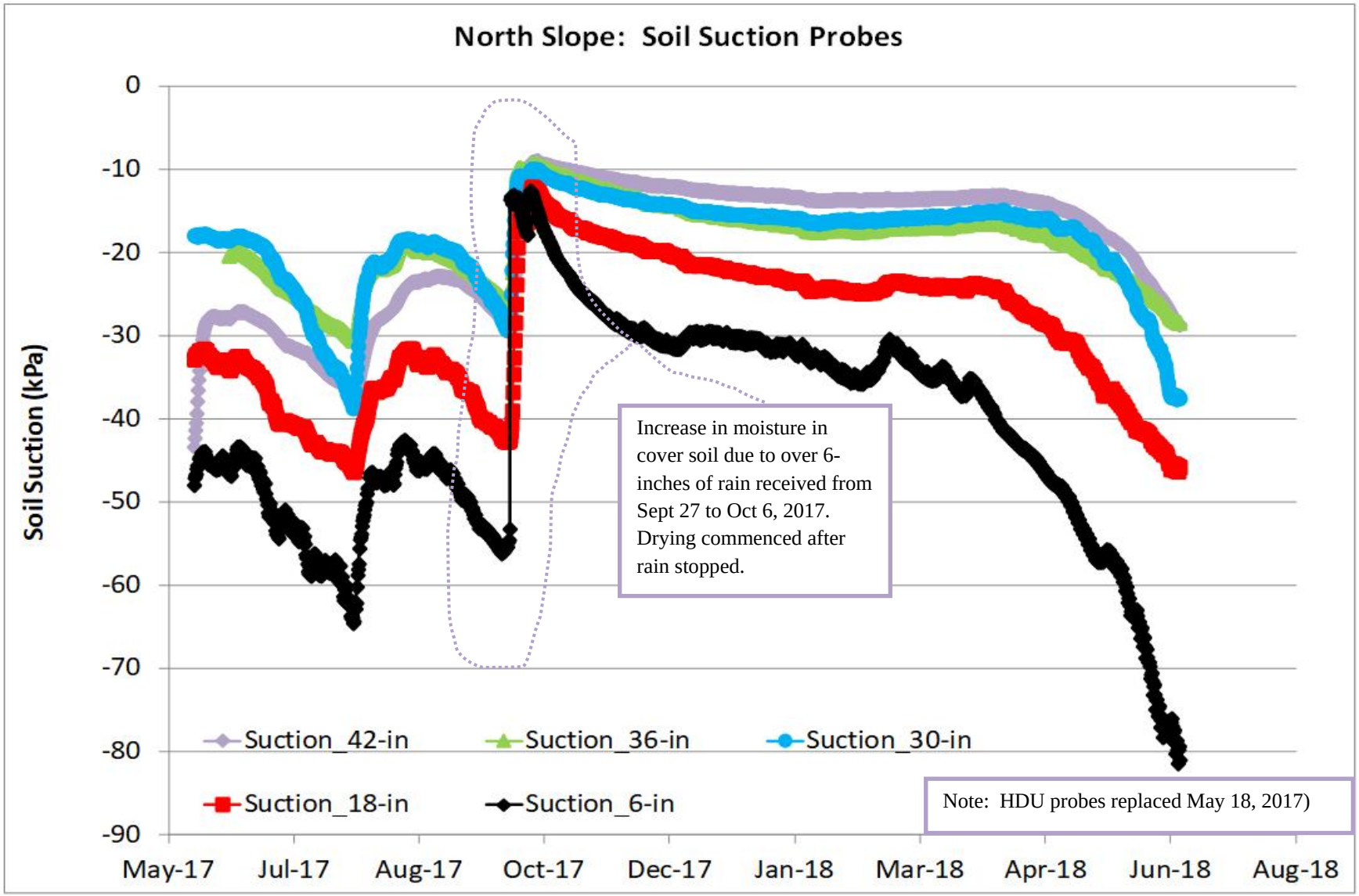

Figure 5. HDU Data (May 2017 to June 2018) - ET Cover North Slope

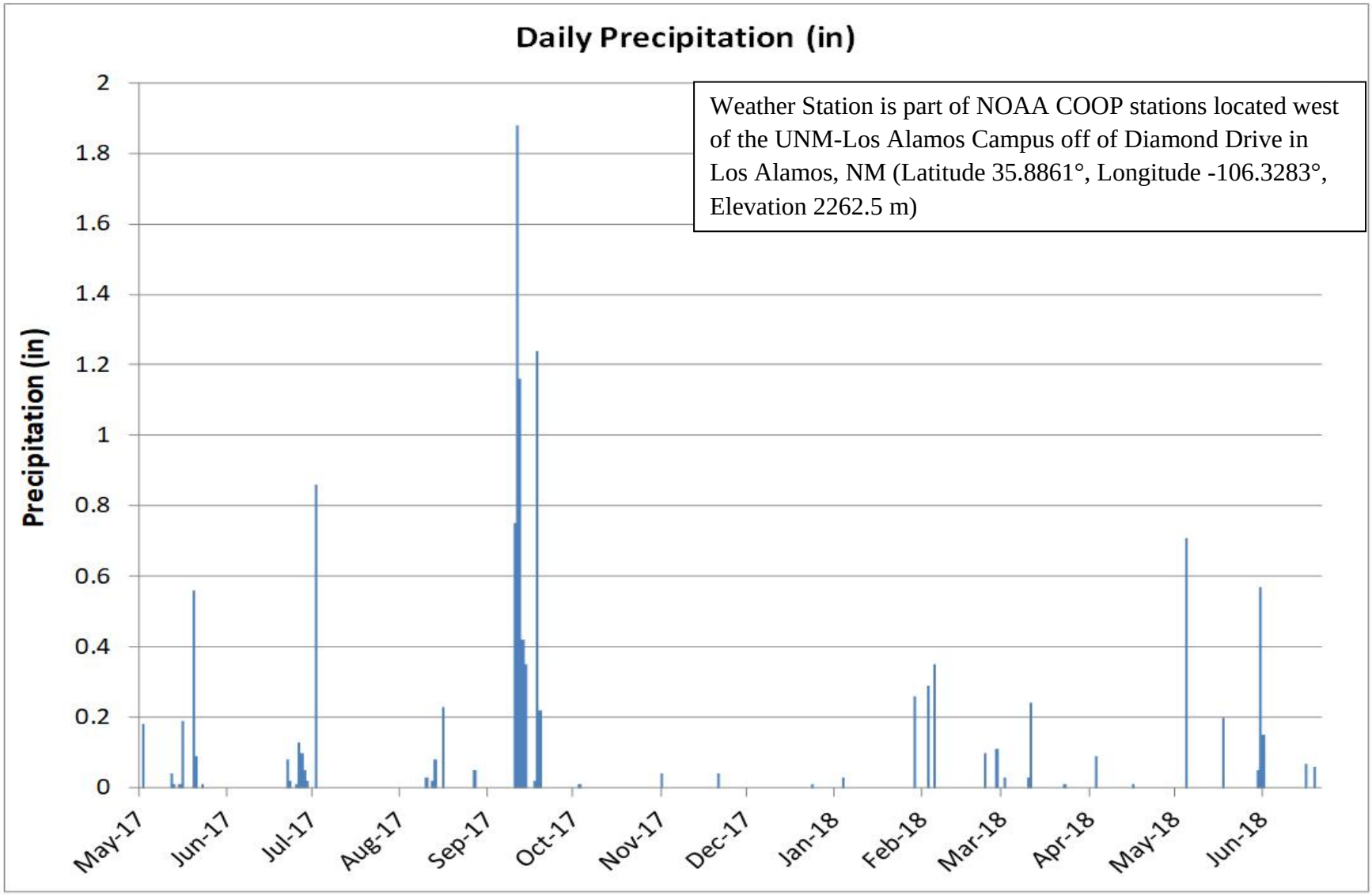

Figure 6. Precipitation (May 2017 to June 2018)

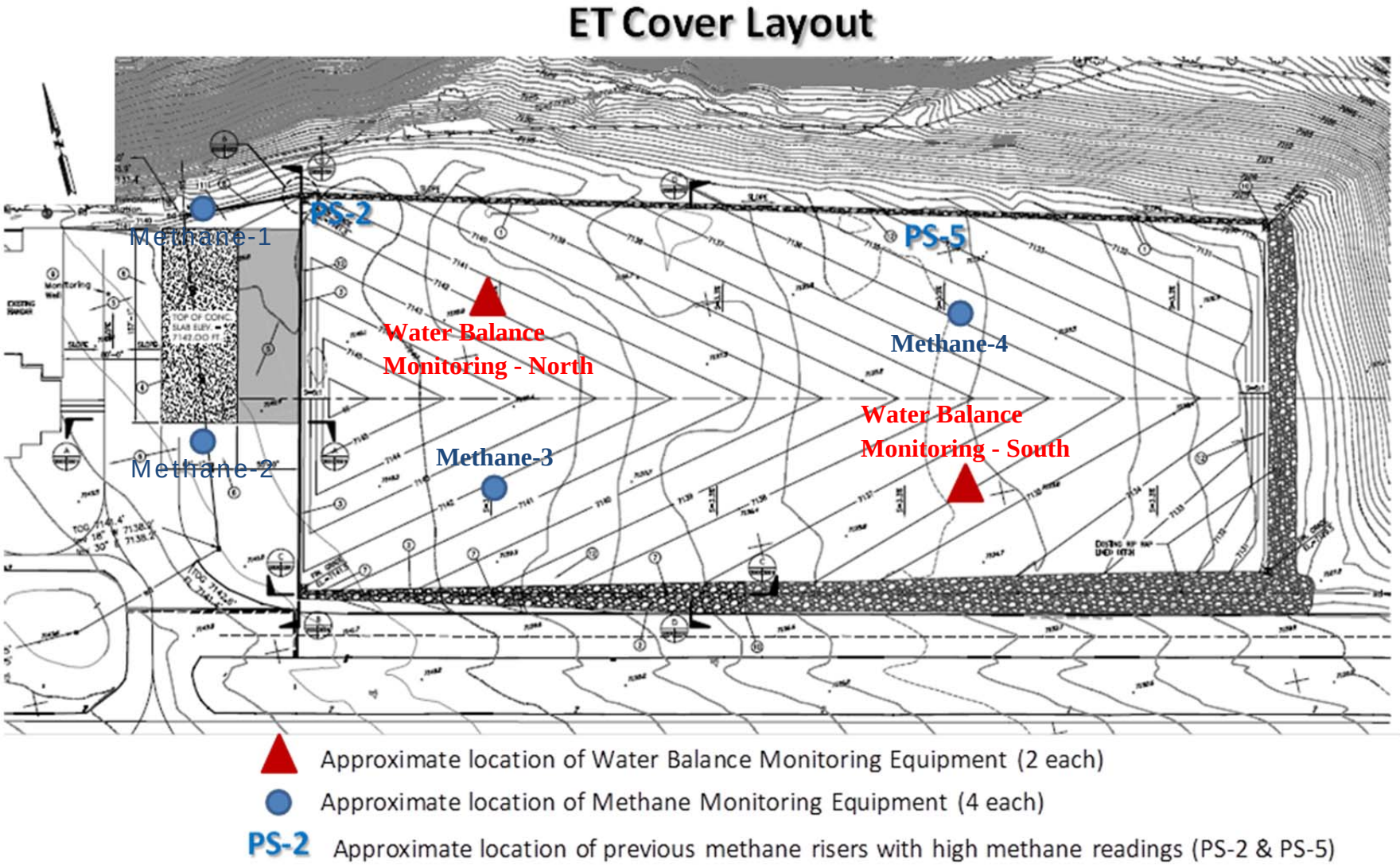

Figure 7. Methane and Water Balance Probe Monitoring Locations

METHANE MONITORING

Field measurements of methane are contained in Table 2. Methane monitoring measurements are collected using a hand-held GX-2012 Multi-Gas Monitor with a sample hose and 10 inch probe accessory. The GX-2012 gas monitor detects the presence of combustible gas (CH_4) as percent (%) of the Lower Explosive Limit (LEL). Figure 7 shows the monitoring point locations.

Table 2. Methane Monitoring Readings

Site Name: Los Alamos County Airport Landfill Cover Replacement	**Date of Inspection: July 13, 2018**
City: Los Alamos	**Weather: calm wind**
State: New Mexico	**Temperature: 80°F**
Agency: Department of Energy	**Inspector: Felicia Aguilar**
Methane Monitoring Station	**Readings (% of LEL)**
Methane-1	0
Methane-2	0
Methane-3	0
Methane-4	0

SETTLEMENT MONITORING

Table 3 provides a summary of the elevation measurements for the identified survey points to monitor any differential settlement in the landfill. Figure 8 shows the settlement survey locations. The annual report will include a combination of all surveyed data from each location inclusive of calculated differential settlement (if any).

Table 3. Settlement Monitoring Points Elevation Measurements

Survey Point	Elevation
	6-22-18
1	7141.33
2	7141.40
3	7141.34
4	7141.38
5	7141.06
6	7140.69
7	7143.95
8	7146.24
9	7143.28
10	7140.44
11	7139.46
12	7142.63
13	7145.18
14	7141.77
15	7139.32
16	7138.14
17	7141.22
18	7143.83
19	7140.58
20	7137.43
21	7137.14
22	7139.86
23	7142.79

Survey Point	Elevation
	6-22-18
24	7139.73
25	7136.52
26	7136.27
27	7138.55
28	7141.36
29	7138.62
30	7135.13
31	7134.82
32	7137.15
33	7139.85
34	7136.76
35	7133.96
36	7133.96
37	7136.24
38	7138.26
39	7135.52
40	7132.47
41	7132.65
42	7134.88
43	7136.92
44	7134.22
45	7131.59
46	7131.44
47	7133.76
48	7135.72
49	7132.92
50	7130.47
51	7130.15
52	7131.97

Survey Point	Elevation
	6-22-18
53	7134.20
54	7132.08
55	7128.95
56	7128.77
57	7129.95
58	7129.45
59	7129.27
60	7128.53

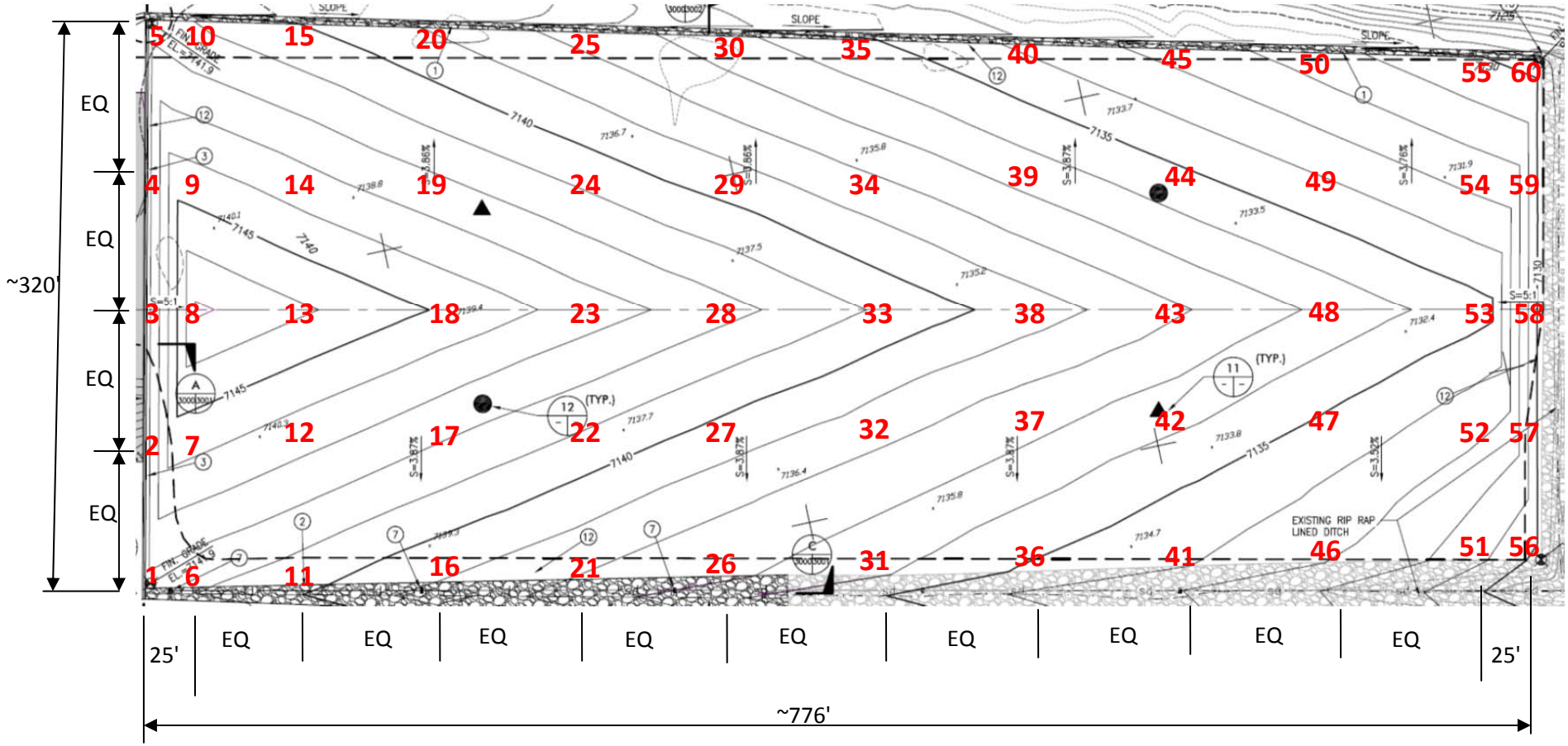

Figure 8. Survey Point Locations

Attachment B

Water Balance Data

WATER BALANCE MONITORING SUMMARY

The moisture content probes data was collected and summarized in this report (Figures 1 and 2). The probes were installed on August 29, August 30, and September 4, 2016. Figure 7 shows the monitoring point locations. Figure 3 contains the available daily precipitation events for comparison of the response to infiltration reflected in the moisture probe data.

The moisture content probes reveal that infiltrated moisture due to precipitation quickly dries shortly after (Figures 1 and 2). There also appears to be some sensitivity of the moisture content measurements to soil temperature (especially noted in variation of winter and summer months). This data will take multiple seasons to analyze and better understand the water balance trends in the cover system.

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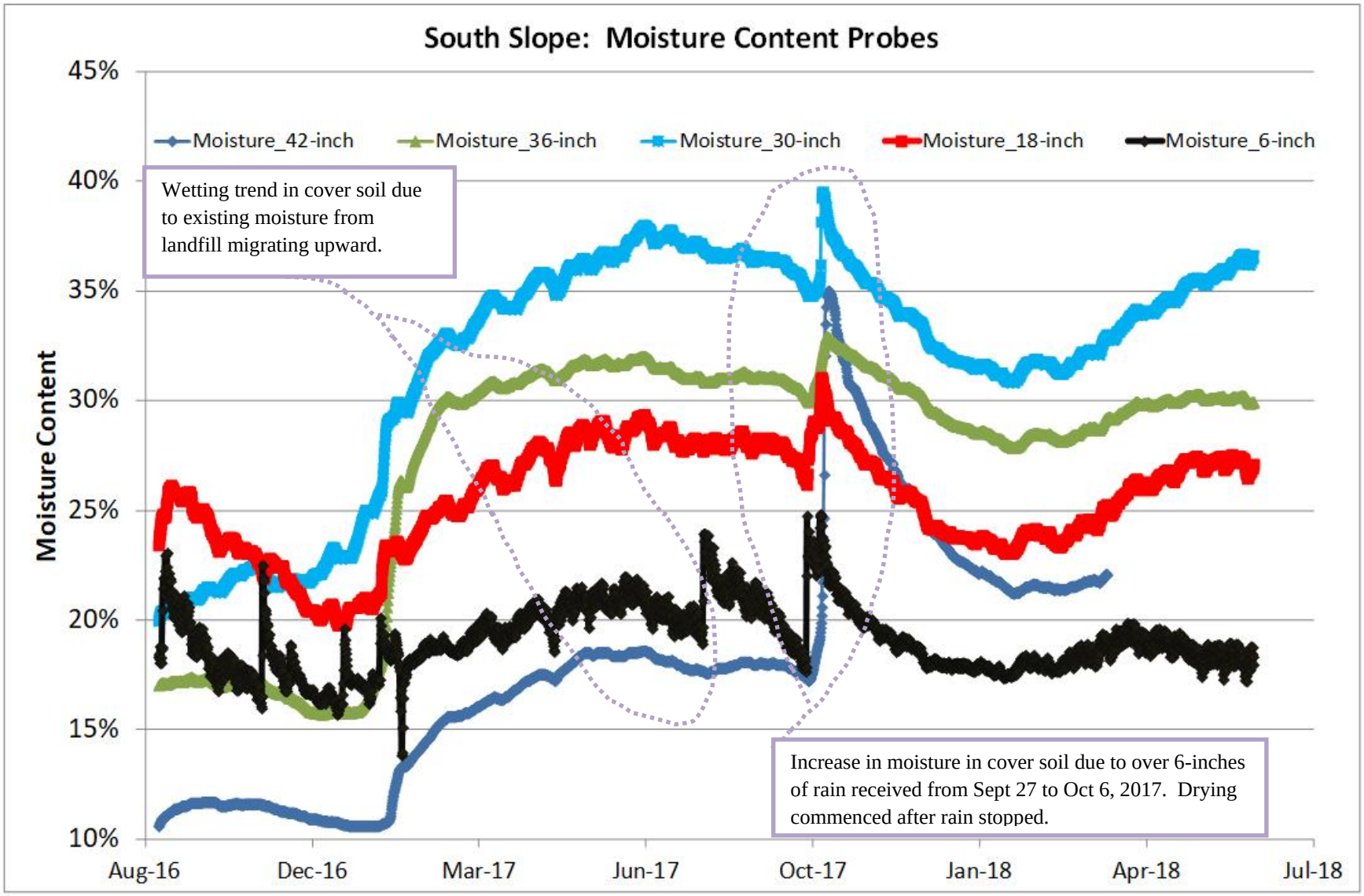

Figure 1. Moisture Probe Data (September 2016 to June 2018) - ET Cover South Slope

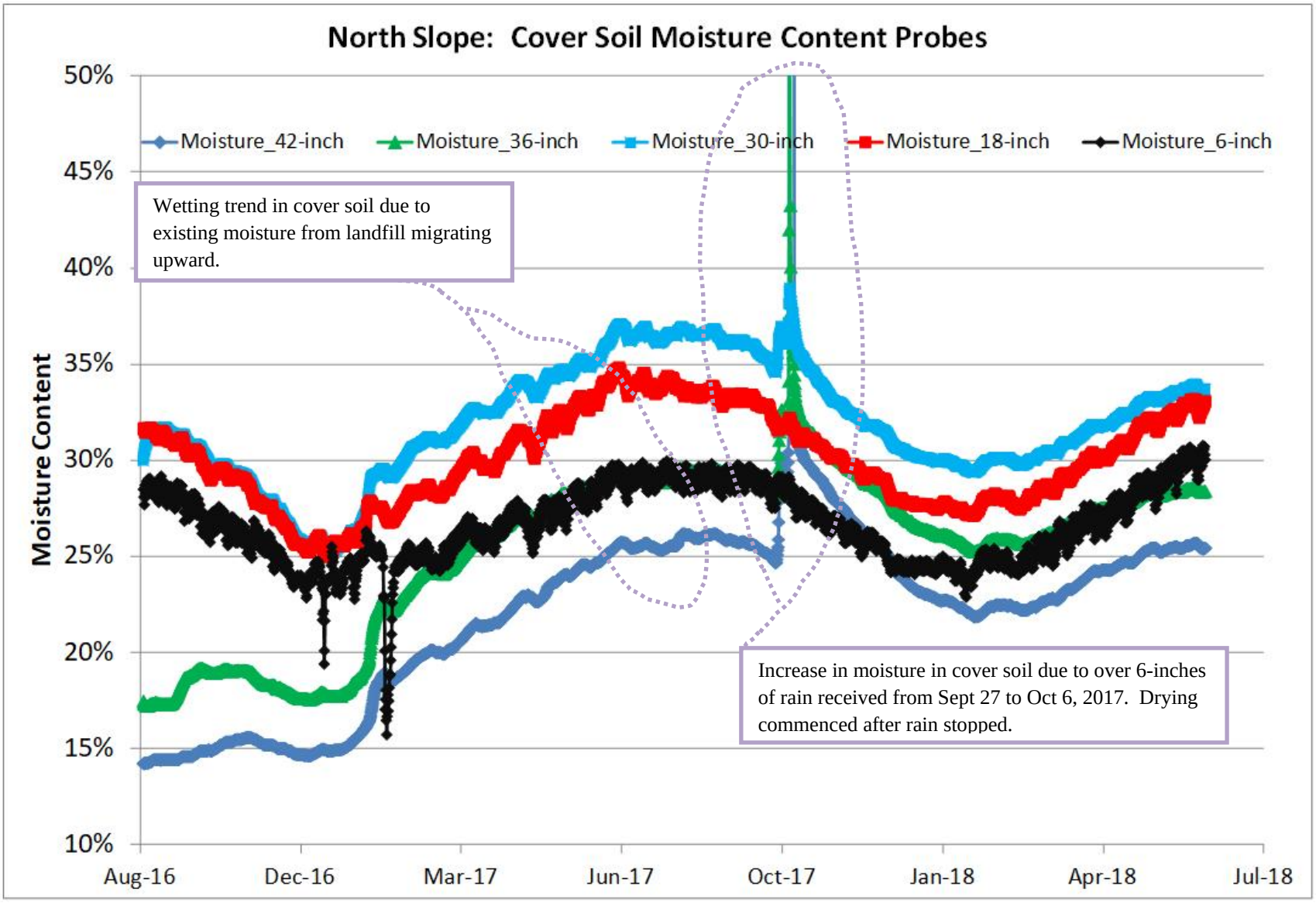

Figure 2. Moisture Probe Data (September 2016 to June 2018) - ET Cover North Slope

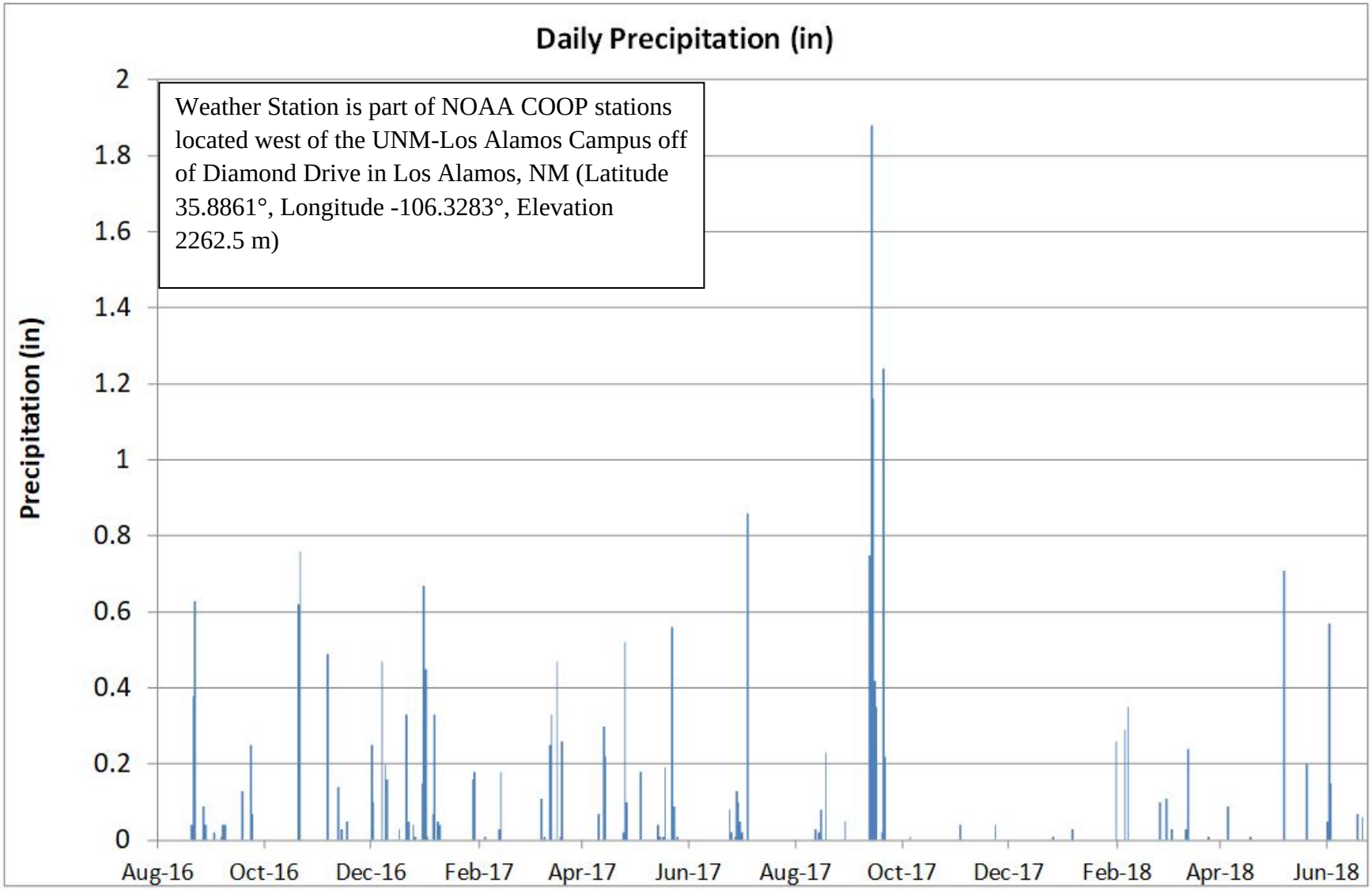

Figure 3. Daily Precipitation (Sept 2016 to June 2018)

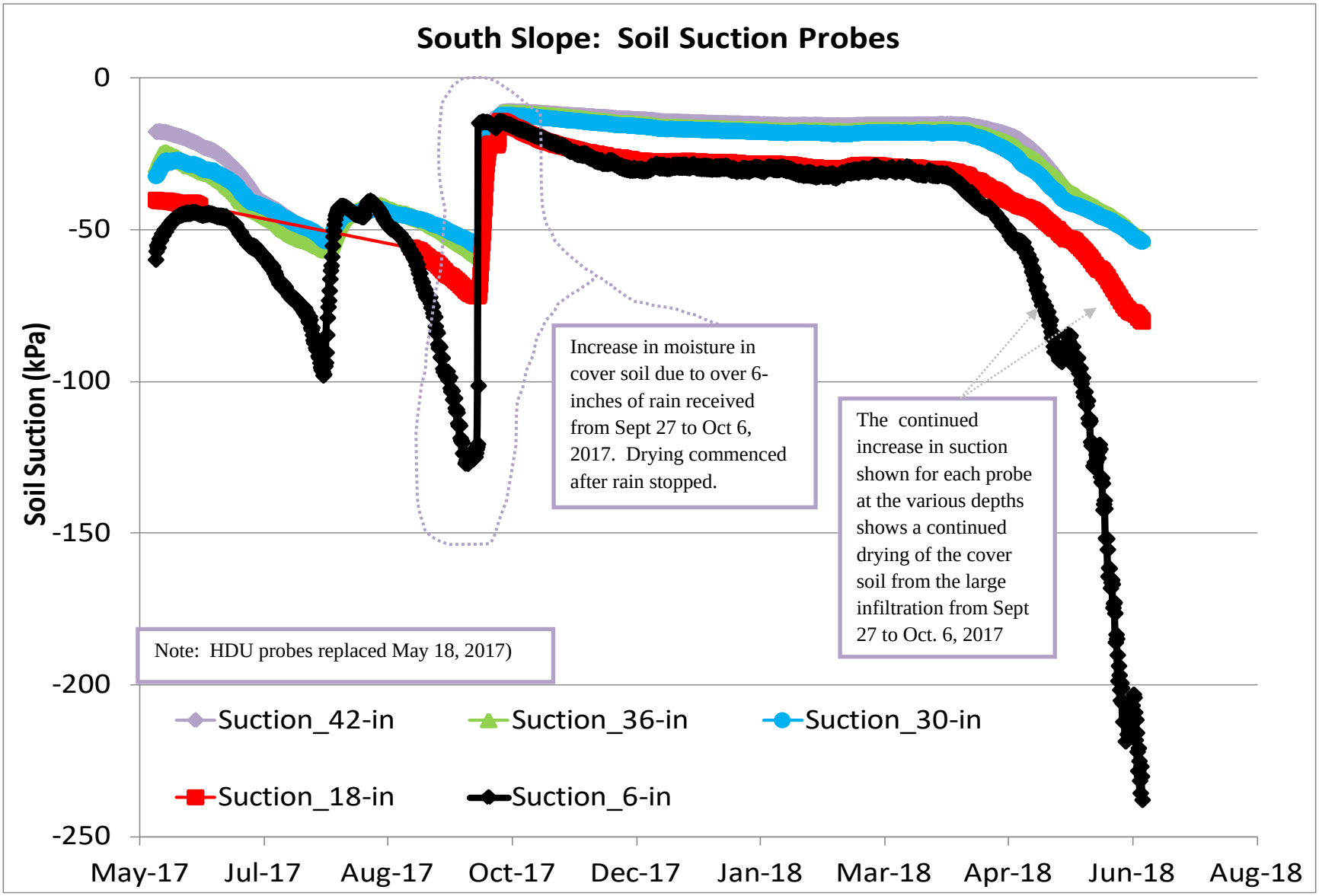

Figure 4. HDU Data (May 2017 to June 2018) - ET Cover South Slope

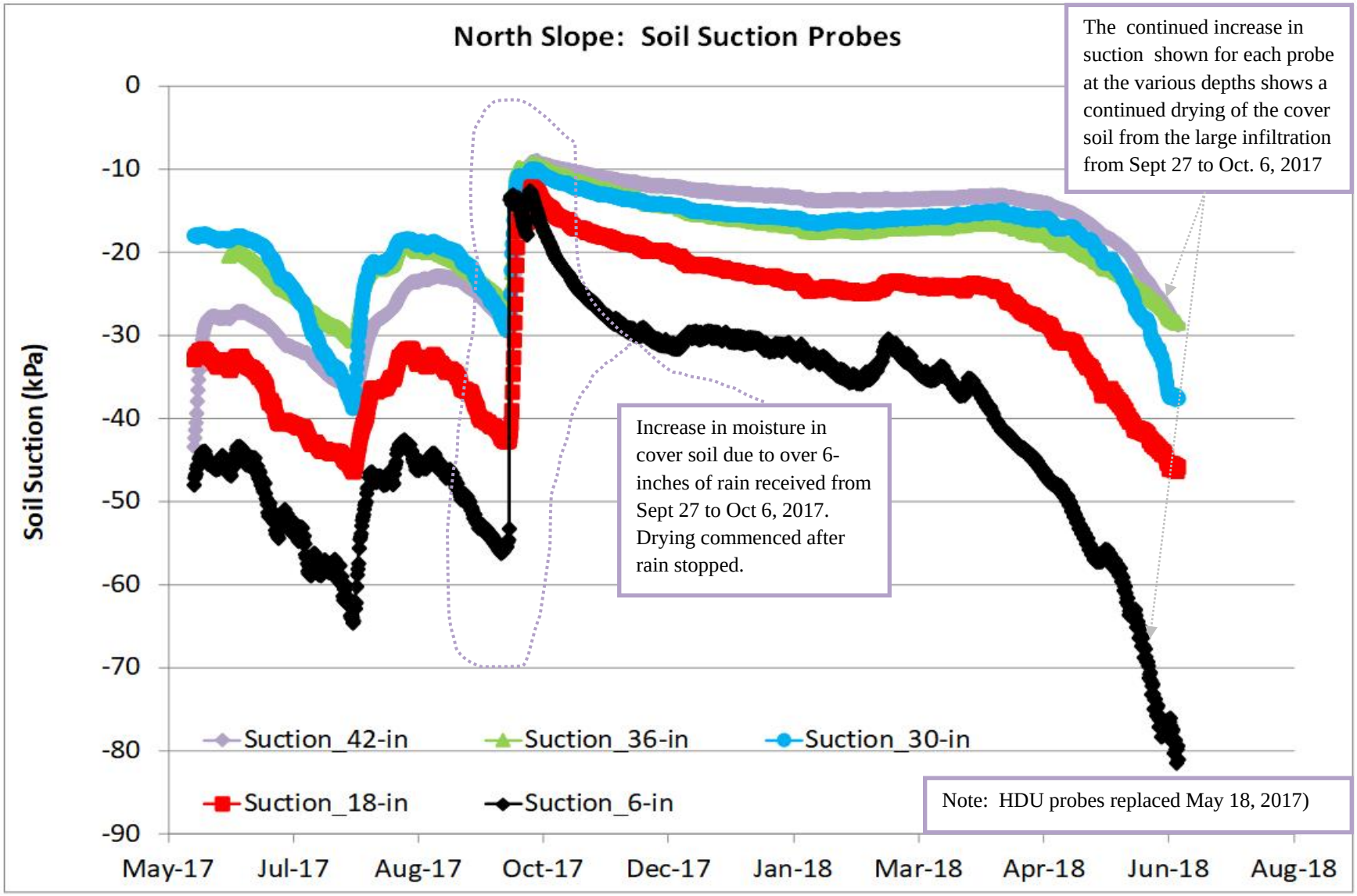

Figure 5. HDU Data (May 2017 to June 2018) - ET Cover North Slope

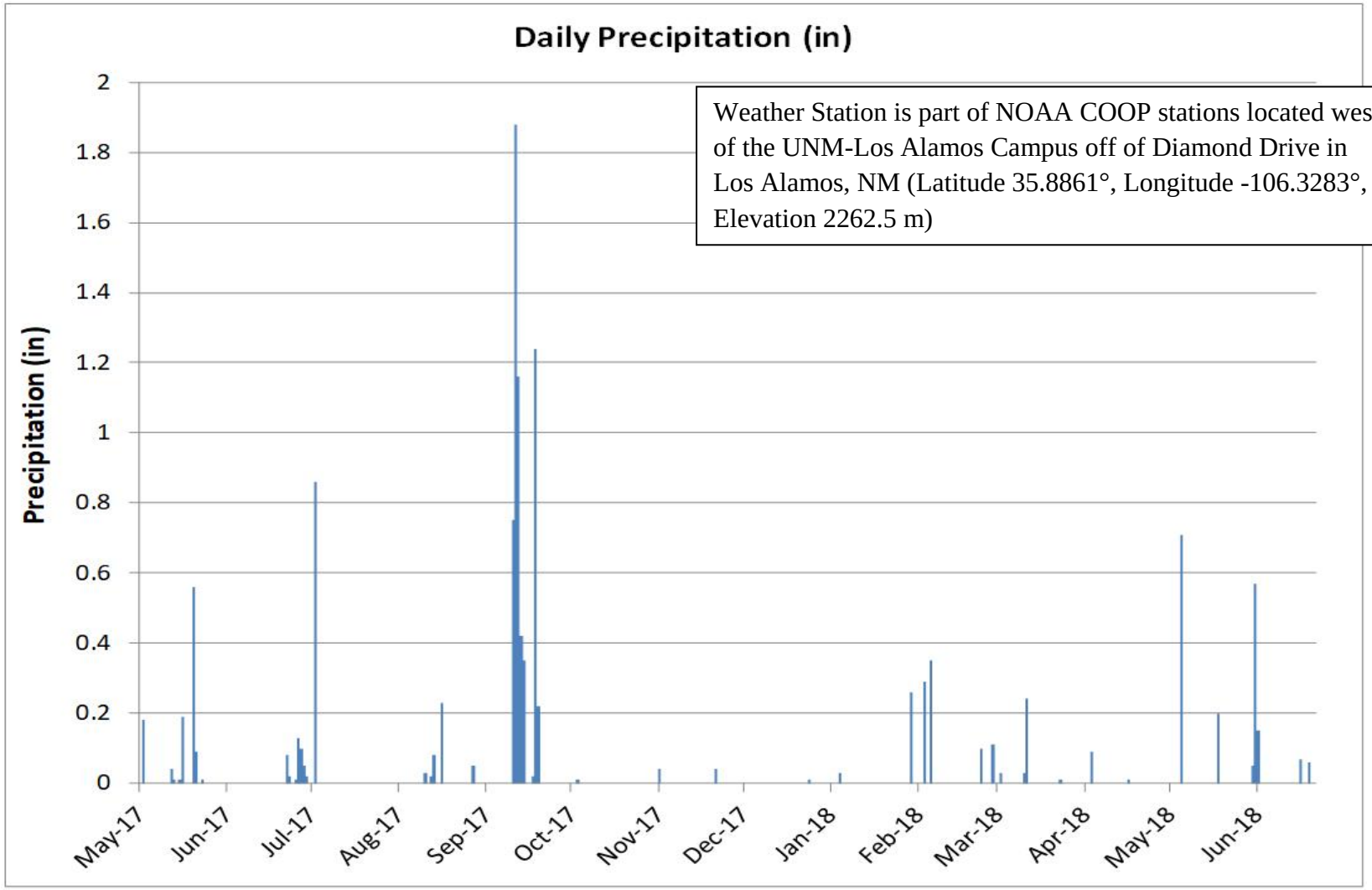

Figure 6. Precipitation (May 2017 to June 2018)

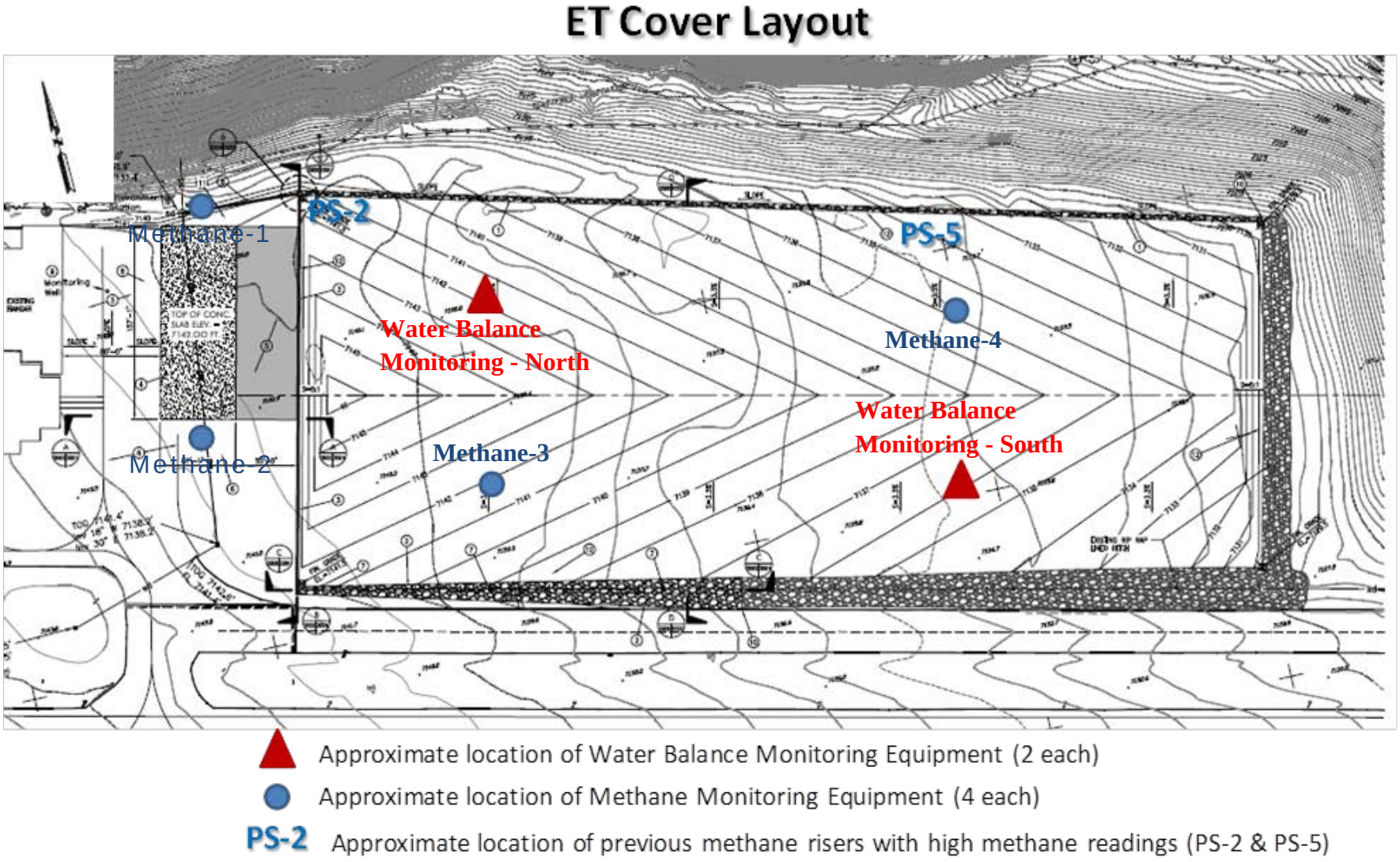

Figure 7. Methane and Water Balance Probe Monitoring Locations

Attachment C

1. Methane Monitoring Summary Table
2. Methane Monitoring Field Notes

METHANE MONITORING

Table 1. Methane Monitoring Readings

Site Name: Los Alamos County Airport Landfill Cover Replacement				
City: Los Alamos	State: New Mexico			
Agency: Department of Energy	Inspector: Felicia Aguilar			
Date	Methane Monitoring Station (units are % of lower explosive limit)			
	Methane-1	Methane-2	Methane-3	Methane-4
September 21, 2017	0	0	0	0
December 27, 2017	0	0	0	0
March 26, 2018	0	0	0	0
July 13, 2018	0	0	0	0

Airport LANDFILL
Methane Readings
=> After Construction

The Lakeworth Group
Felicia Aguilar
505-662-7275

October 18, 2016
- Met S. Dwyer onsite @ 10am. Discussed inspection needs, met with air port manager to notify him of our activities.
- collected methane readings but wind had kicked up. Determined it was better to return tomorrow morning

59°F clear
11.5 mph SSE wind
31% humidity
30.19 in pressure

October 19, 2016
- 10 am

54.9°F clear
3.5 mph -
32% humidity
30.24 in pressure
0% LEL @ all 4 locations

December 30, 2016
– 10am
25.3°F clear
calm
74% humidity
30.23 in pressure
0% LEL at all locations for methane
⇒ Oxygen reading not accurate (multi-gas meter) and sounding alarm. Will take meter in for calibration / servicing to determine issue.

January 4, 2017
Took monitor in for servicing/calibration
- Essential Safety Products - Albuquerque
- O2 sensor needed replacing, they need replacement approx. every 2 years - normal servicing
- calibration completed

Was told Methane readings would've been okay – only O2 sensor was affected.

April 12, 2017
- 9:30 am
- 50°F little cloudy
- calm
- 30.21 pressure
0% LEL @ all locs for methane

June 30, 2017
- 9:00 am
- 70°F clear
- calm w/ gusts to 25 mph
- 29.62 in pressure
0% LEL @ all locs for methane

September 21, 2017
- 9:30 am
- Wind S @ 9mpH
- 30.15 pressure
- 66°F clear
0% LEL @ all locations for Methane

December 27, 2017
- 12:00 NOON
- wind - calm
- 30.3 barometric pressure
- 45°F clear
0% LEL @ all locations for Methane

March 26, 2018
- 8:55 am
- wind - calm
- 29.95 barometric pressure
- 45°F clear
0% LEL @ all locations for Methane

July 13, 2018
- 8:30 am
- Wind N @ 3 mph
- 30.37 pressure (in)
- 66°F clear
0% LEL @ all methane locations

Attachment D

There were no post-high intensity storm events to inspect during the 2017/2018 monitoring period.

Attachment E

Survey Dates corresponding to Quarterly Inspections

1.	Year 2, Quarter 1	Inspection 5	September 17, 2017
2.	Year 2, Quarter 2	Inspection 6	December 10, 2017
3.	Year 2, Quarter 3	Inspection 7	March 26, 2018
4.	Year 2, Quarter 4	Inspection 8	June 22, 2018

Survey Data Summary					
Survey Point	Elevation – feet above sea level				Settlement (ft)
	9/17/2017	12/10/2017	3/27/2018	6/22/2018	
1	7141.41	7141.30	7141.38	7141.33	0.08
2	7141.50	7141.40	7141.44	7141.40	0.10
3	7141.44	7141.33	7141.41	7141.34	0.10
4	7141.50	7141.36	7141.43	7141.38	0.12
5	7141.26	7141.08	7141.14	7141.06	0.20
6	7140.79	7140.64	7140.71	7140.69	0.10
7	7144.06	7143.97	7144.03	7143.95	0.11
8	7146.42	7146.27	7146.26	7146.24	0.18
9	7143.40	7143.33	7143.36	7143.28	0.12
10	7140.54	7140.41	7140.47	7140.44	0.10
11	7139.55	7139.41	7139.47	7139.46	0.09
12	7142.73	7142.70	7142.76	7142.63	0.10
13	7145.29	7145.22	7145.27	7145.18	0.11
14	7142.02	7141.90	7141.90	7141.77	0.25
15	7139.42	7139.29	7139.35	7139.32	0.10
16	7138.25	7138.12	7138.15	7138.14	0.11
17	7141.40	7141.19	7141.35	7141.22	0.18
18	7143.99	7144.18	7143.97	7143.83	0.16
19	7140.76	7140.73	7140.71	7140.58	0.18
20	7137.75	7137.50	7137.56	7137.43	0.32
21	7137.21	7137.19	7137.17	7137.14	0.07
22	7139.96	7139.91	7139.91	7139.86	0.10
23	7142.96	7142.90	7142.85	7142.79	0.17
24	7139.90	7139.79	7139.82	7139.73	0.17
25	7136.70	7136.52	7136.58	7136.52	0.18
26	7136.46	7136.40	7136.36	7136.27	0.19
27	7138.69	7138.55	7138.58	7138.55	0.14
28	7141.52	7141.41	7141.44	7141.36	0.16
29	7138.58	7138.45	7138.48	7138.62	-0.04
30	7135.30	7135.25	7135.16	7135.13	0.17
31	7135.20	7135.05	7135.13	7134.82	0.38
32	7137.51	7137.49	7137.46	7137.15	0.36
33	7140.22	7140.13	7140.16	7139.85	0.37
34	7138.06	7137.90	7137.07	7136.76	1.30
35	7134.25	7134.25	7134.27	7133.96	0.29
36	7134.30	7134.20	7134.27	7133.96	0.34
37	7136.59	7136.48	7136.55	7136.24	0.35
38	7138.62	7138.53	7138.57	7138.26	0.36
39	7135.85	7135.77	7135.83	7135.52	0.33
40	7132.78	7132.71	7132.78	7132.47	0.31
41	7133.04	7132.92	7132.96	7132.65	0.39
42	7135.20	7135.11	7135.19	7134.88	0.32

Survey Data Summary					
Survey Point	Elevation – feet above sea level				Settlement (ft)
	9/17/2017	12/10/2017	3/27/2018	6/22/2018	
43	7137.28	7137.19	7137.23	7136.92	0.36
44	7134.56	7134.47	7134.53	7134.22	0.34
45	7131.89	7131.83	7131.90	7131.59	0.30
46	7131.91	7131.71	7131.75	7131.44	0.47
47	7134.12	7134.12	7134.07	7133.76	0.36
48	7136.06	7135.96	7136.03	7135.72	0.34
49	7133.29	7133.22	7133.23	7132.92	0.37
50	7130.81	7130.79	7130.78	7130.47	0.34
51	7130.48	7130.42	7130.46	7130.15	0.33
52	7132.27	7132.27	7132.28	7131.97	0.30
53	7134.60	7134.48	7134.51	7134.20	0.40
54	7132.38	7132.40	7132.39	7132.08	0.30
55	7129.37	7129.40	7129.26	7128.95	0.42
56	7129.08	7129.00	7129.08	7128.77	0.31
57	7130.40	7130.32	7130.26	7129.95	0.45
58	7129.75	7129.67	7129.76	7129.45	0.30
59	7129.59	7129.51	7129.58	7129.27	0.32
60	7128.90	7128.81	7128.84	7128.53	0.37

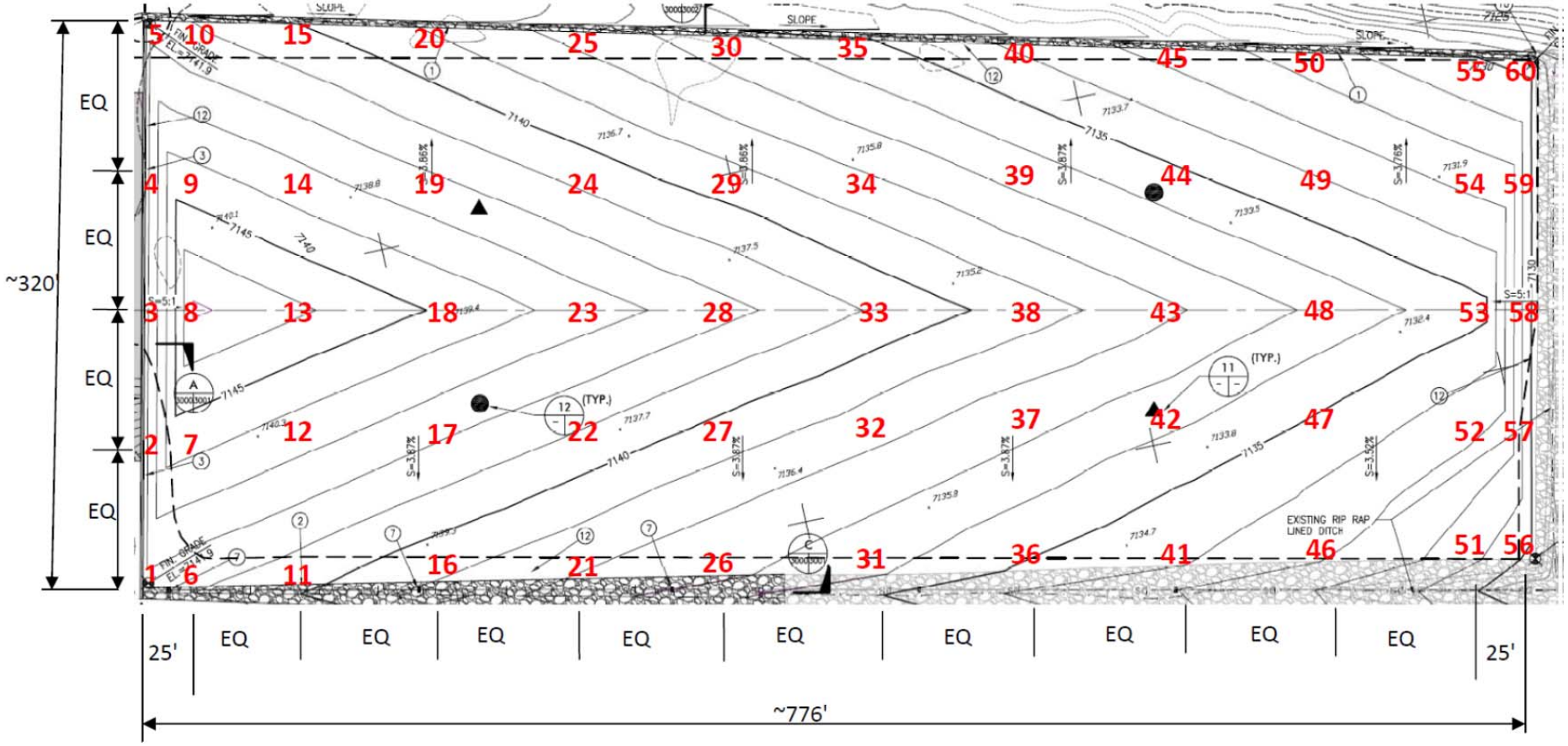

Figure 1. Survey Locations on ET Cover