D08 FIU SITE CHARACTERIZATION: SUMMARY

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See Configuration Management System for approval history.

Change Record

REVISION	DATE	ECO/CRE #	DESCRIPTION OF CHANGE
1.0	06/15/2010	NEON.FIU.000243.CRE	Initiation
A	12/02/2010	NEON.FIU.000264.CRE	INITIAL RELEASE
B	6/30/2011	ECO-00215	Original site was Armistead, but this site was not suitable/available for NEON. Dead Lake was substituted and the site characterization was conducted in Spring 2011.
C	9/23/2011	ECO-00279	Update to new document numbers/template throughout document.
D	5/14/2012	ECO-00400	Replace Choctaw site with Lenoir Landing site.

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1 DESCRIPTION

1.1 Purpose

The data summarized here is used to inform the site design activities for NEON project Teams, EHS (permitting), FCC, ENG and FSU. This document summarizes the FIU site characterization data collected, analyzed, and described in the FIU D08 Site Characterization: Supporting Data (AD[01]).

1.2 Scope

This document summarizes the FIU site characterization data for three D08 tower locations: Talladega Forest (Core), Lenoir Landing (Relocatable 1), and Dead Lake (Relocatable 2). Accuracy of our GPS locations are only as good as the methodology used, i.e., GPS units to ~ ±3 m.

2 RELATED DOCUMENTS AND ACRONYMS

2.1 Applicable Documents

AD[01]	NEON.DOC.011039	FIU D08 Site Characterization Supporting Data.docx
AD[02]	NEON.DOC.011018	WID between FIU and FCC
AD[03]	NEON.DOC.011008	FIU Tower Science Requirements
AD[04]	NEON.DOC.011072	FIU Precipitation Collector Site Design Requirements

2.2 Reference Documents

RD[01]	NEON.DOC.000008	NEON Acronym List
RD[02]	NEON.DOC.000243	NEON Glossary of Terms
RD[03]		
RD[04]		

2.3 Acronyms

m.a.s.l.	meters above sea level
m.a.g.l.	meters above ground level

2.4 Verb Convention

"Shall" is used whenever a specification expresses a provision that is binding. The verbs "should" and "may" express non-mandatory provisions. "Will" is used to express a declaration of purpose on the part of the design activity.

3 TALLADEGA NATIONAL FOREST (ADVANCED TOWER SITE)

3.1 Desired ecosystem

Table 1 Ecosystem at Talladega National Forest Advanced tower site.

Ecosystem Type	Management activity
Longleaf-pine forest	Controlled burns

The ecosystem we are interested in is the restored longleaf pine forest. Candidate tower location was lat 32.95045448°, long -87.39337396. After FIU site characterization, we determine the exact **tower location** to be at 32.95046°, -87.39327° to minimize the needs for tree cutting during tower construction. New location is next to the original site, and next to access road (county road 723). The canopy height of the pine forest is about 25 meters. Canopy is closed. Lowest branch is about 8 m above ground level. No obvious strata observed at canopy, aside from groundcover/understory. Shrub understory is about 1.2 m tall. Groundcover/understory species are unclear.

Table 2. Ecosystem and site attributes for Talladega National Forest Advanced tower site.

Ecosystem attributes	Measure and units
Mean canopy height	25 m
Surface roughness[a]	1.7 m
Zero place displacement height[a]	21.5 m
Structural elements	Closed pine forest canopy, uniform
Time zone	Eastern time
Magnetic declination	2° 14' W

Note, [a] From field survey.

3.2 Site Design and Tower Attributes

The site layout is summarized in the table below. Assume the projected area of the tower is square. **Anemometer/temperature boom arm direction** is ***from*** the tower ***toward*** the prevailing wind direction or designated orientation. **Instrument hut orientation vector** is parallel to the long side of the instrument hut (short-side of instrument hut is perpendicular to the **Instrument hut orientation vector)**. **Instrument hut distance z** is the distance from the center of tower projection to the center of the instrument hut projection on the ground. The numbering of the **measurement levels** is that the lowest is level one, and each subsequent increase in height is numbered sequentially, in this case, level 5 being the upper most level at this tower site.

Table 3. Tower oriented design attributes for Talladega National Forest Advanced tower site.
0° is true north with declination accounted for. Color of Instrument hut exterior shall be tan to best match the surrounding environment.

Attribute	lat	long	degree	meters	notes
Airshed Area			185° to 330°		Clockwise from 185°

Tower location	32.95046°	-87.39327°	--	--	new site
Instrument hut	32.95047°	-87.39312°			
Instrument hut orientation vector	--	--	90° - 270°		Short face parallel to 0° - 180°
Instrument hut distance z	--	--	--	14	
Anemometer/Temperature boom orientation	--	--	270°		
DFIR	32.97813,	-87.41145	--	--	
Height of the measurement levels					
Level 1				0.3	m.a.g.l.
Level 2				2.0	m.a.g.l.
Level 3				22.0	m.a.g.l.
Level 4				28.0	m.a.g.l.
Level 5				35.0	m.a.g.l.
Tower Height				35.0	m.a.g.l.

See AD 03 for technical requirement to determine the boom height for the bottom most measurement level.

Eddy covariance, sonic wind and air temperature **boom arms** orientation toward the west will be best to capture signals from all major wind directions. **Radiation boom arms** should always be facing south to avoid any shadowing effects from the tower structure.

Because the forest is very dense and spreads widely around tower location, it is very difficult to find a open area to meet class 1 or class 2 criteria for **DFIR** (Double Fenced International Reference) to collect bulk precipitation within 500 m from tower. Two locations are recommended here: first is at 32.97813, -87.41145, which is a clear cut spot that next to NEON aquatic site (<200 m). Power will be available at aquatic site, and can be extended to DFIR site. This site is about 3500 m from tower location. If for any reason this site does not work into our site design, the suggested second site (also agreed by USFS) is at Oakmulgee Wildlife Management Area Check Point (32.95634, -87.45945). This open area is right next to AL-50 highway. AC power is at site. But is about 6200 m away from tower site. **Wet deposition collector** will collocate at the top of the tower. See AD 04 for further information and requirements for bulk precipitation collection and wet deposition collection.

Boardwalks.

- There is always a boardwalk from the instrument hut to the tower
- If there is a boardwalk on the south side of the tower, it is never underneath the radiation booms, and it is more than 4 m from the side of the tower

Specific Boardwalks at Talladega Forest Advanced site utilize the orientation outlined in Table 3, and **option 1 in Figure 3**.

- Boardwalk is from the access road (county road 723) to instrument hut, pending landowner decision, and ease to bring supplies to instrument hut
- Boardwalk from the instrument hut to the tower to intersect on north face of the tower,
- Boardwalk to the soil array
- Boardwalks must be protected from controlled burns

- No boardwalk from the soil array boardwalk to the individual soil plots
- No boardwalk needed at DFIR site

3.3 Soil Attributes

Soil type is Maubila-Smithdale complex, 15 to 35 percent slopes. The soils are Hyperthermic, uncoated Lamellic Quartzipsamments. During construction a soil profile shall be dug at each core site and samples throughout the profile will be extracted. The soil array vector is ***from*** the soil plot closest to the tower ***toward*** the farthest soil plot.

Table 4. Summary of soil array and soil pit information at Talladega.
0° represents true north and accounts for declination.

Soil plot dimensions	5 m x 5 m
Soil array pattern	B
Distance between soil plots: x	40 m
Distance from tower to closest soil plot: y	~19 m
Latitude and longitude of 1st soil plot OR direction from tower	32.95064°, -87.39329°
Direction of soil array	330°
Latitude and longitude of FIU soil pit	32.95058°, -87.39308°
Dominant soil type	Maubila-Smithdale complex, 15 to 35 percent slopes
Expected soil depth	>2 m
Depth to water table	0.61-1.07 m

Expected depth of soil horizons	Expected measurement depths*
0-0.10 m (flaggy loam)	0.05 m
0.10-0.69 m (clay)	0.40 m
0.69-0.81 m (sandy clay loam)	0.75 m
0.81-1.07 m (silty clay)	0.94 m
1.07-2 m (clay)	1.54 m

*Actual soil measurement depths will be determined based on measured soil horizon depths at the NEON FIU soil pit and may differ substantially from those shown here

3.4 Information for ecosystem productivity plots.

The tower at Talladega Forest Advanced site has been positioned to optimize the collection of the air/wind signals both temporally and spatially over the desired ecosystem (pine-dominated forest). Airshed at this site is from 185° to 330° (clockwise from 185°) in Figure 1, and 90% signals for flux measurements are within a distance of 1000 m from tower, and 80% within 600 m. We suggest FSU Ecosystem Productivity plots be placed within the boundaries of 185° to 330° (clockwise from 185°).

Figure 1. Site layout for Talladega National Forest Advanced tower site

i) new tower location is presented (red pin), ii) red lines indicate the airshed boundaries. Vectors 185° and 330° are the southwest most and northwest most vectors (starting clockwise from 185°) that would have quality wind data without causing flow distortions, respectively. iii) Yellow line is the suggested access road to instrument hut.

3.5 Issues and attentions

According to our communication with C. O. Ragland, Talladega National Forest Oakmulgee District is wiling to provide continous support to NEON's work, including aquatic site, tower establishment and DFIR site. They are willing to maintain the clear cut area will be used for the DFIR location, and can potentially cut more trees to creat adequate open space if we request and let them schedule ahead. If NEON has other requets for land use or other type forest managements, they could be considered and incoporrated into Talladega Frorest's schedule. But proposals and requests need to be submitted ahead of time (suggest at least 6 months) for discussion and approval.

4 LENOIR LANDING, RELOCATEABLE TOWER 1

4.1 Desired ecosystem

Lenoir Landing relocatable site was chosen to replace the NEON candidate Relocatable tower site at Choctaw National Wildlife Refuge (CNWR). The proposed tower site is at 31.85388, -88.16122. It is ~0.7 miles northeast of CNWR site. The property owner of Lenoir Landing site is Army Corps of Engineers. This site is located in southwest Alabama along the Tombigbee River approximately 80 miles north of Mobile.

The ecosystem at Lenoir Landing site is dominated by pine-oak mixed forest (~1/4 trees are pine trees), and also includes meadow, wetland, and water bodies. This area is periodically flooded and the vegetation type is classified as "Gulf and Atlantic Coastal Plain Floodplain Systems". Oak distributed the whole area, including the lower land with standing water. Pine trees typically found at the relatively less flooded area. The ecosystem is a closed-canopy forest. Tree species is unclear. The mean canopy height around tower is ~35 m with lowest branch at ~8 m above ground. Shrub, seedlings and saplings understory varies from 1 to 20 m in height without obvious strata. Grass and other annuals form understory at ground level with height ~0.5 m. Canopy area density is estimated to be 4 in summer and 2.5 in winter.

Table 5. Ecosystem at Lenoir Landing Relocatable site.

Ecosystem Type	Management activity
Oak-dominant closed-canopy hardwood forest	No active management

Table 6. Ecosystem and site attributes for Lenoir Landing Relocatable site.

Ecosystem attributes	Measure and units
Mean canopy height	35 m
Surface roughness[a]	1.3 m
Zero place displacement height[a]	31.5 m
Structural elements	Tall, closed-canopy, uniform, homogeneous
Time zone	Eastern time
Magnetic declination	1° 32' W

Note, [a] From footprint analysis.

4.2 Site Design and Tower Attributes

The site layout is summarized in the table below. Assume the projected area of the tower is square. **Anemometer/temperature boom arm direction** is ***from*** the tower ***toward*** the prevailing wind direction or designated orientation. **Instrument hut orientation vector** is parallel to the long side of the instrument hut (short-side of instrument hut is perpendicular to the **Instrument hut orientation vector)**. **Instrument hut distance z** is the distance from the center of tower projection to the center of the instrument hut projection on the ground. The numbering of the **measurement levels** is that the lowest is level one, and each subsequent increase in height is numbered sequentially, in this case, level 6 being the upper most level at this tower site.

Table 7. Site design and tower attributes for D08 Lenoir Landing Relocatable site

0° is true north with declination accounted for. Color of Instrument hut exterior shall be tan to best match the surrounding environment.

Attribute	lat	long	degree	meters	notes
Airshed area			240° to 30°		Clockwise from 240°
Tower location	31.85388°,	-88.16122°	--	--	new site
Instrument hut	31.85377°,	-88.16116°			
Instrument hut orientation vector	--	--	135° - 315°		Short face parallel to 45° - 225°
Instrument hut distance z	--	--	--	14*	
Anemometer/Temperature boom orientation	--	--	315°	--	
Height of the measurement levels					
Level 1				0.3	m.a.g.l.
Level 2				2.0	m.a.g.l.
Level 3				16.0	m.a.g.l.
Level 4				32.0	m.a.g.l.
Level 5				38.0	m.a.g.l.
Level 6				45.0	m.a.g.l.
Tower Height				45.0	m.a.g.l.

See AD 03 for technical requirement to determine the boom height for the bottom most measurement level.

*Although the distance calculated from tower and IH instrument hut is 14 m, the actual distance measured at field is 18 m. Wooden stakes were placed on the ground to mark the exact locations FIU identified.

Eddy covariance, sonic wind and air temperature **boom arms** orientation toward the northwest will be best to capture signals from all major wind directions. **Radiation boom arms** should always be facing south to avoid any shadowing effects from the tower structure.

Secondary **precipitation collector** for bulk precipitation collection will be located the top of tower at this site. **Wet deposition collector** will be collocated on the top of tower. See AD 04 for further information and requirements for bulk precipitation collection and wet deposition collection.

Boardwalks.

- There is always a boardwalk from the instrument hut to the tower
- If there is a boardwalk on the south side of the tower, it is never underneath the radiation booms, and it is more than 4 m from the side of the tower

Specific Boardwalks at Lenoir Landing Relocatable site utilize the orientation outlined in Table 7, and **option 1 in Figure 4**.

- Boardwalk is from the access road to instrument hut, pending landowner decision, and ease to bring supplies to instrument hut)
- Boardwalk from the instrument hut to the tower to intersect on north face of the tower,
- Boardwalk to the soil array
- Boardwalk from the soil array boardwalk to the individual soil plots

4.3 Soil Attributes

The dominant soil type is Urbo-Mooreville-Una complex, gently undulating, frequently flooded. The soil array vector is ***from*** soil plot closest to the tower ***toward*** the farthest soil plot from the tower.

Table 8. Summary of soil array and soil pit information at Lenoir Landing Relocatable site. 0° represents true north and accounts for declination.

Soil plot dimensions	5 m x 5 m
Soil array pattern	Non-standard pattern
Distance between soil plots: x	Varies (approximately ~45 m)
Distance from tower to closest soil plot: y	14 m
Latitude and longitude of 1st soil plot OR direction from tower	31.85388, -88.16137°
Latitude and longitude of 2nd soil plot	31.85410, -88.16180
Latitude and longitude of 3rd soil plot	31.85452, -88.16177
Latitude and longitude of 4th soil plot	31.85431, -88.16111
Latitude and longitude of 5th soil plot	31.85469, -88.16082
Latitude and longitude of FIU soil pit	31.85305, -88.16090
Dominant soil type	Urbo-Mooreville-Una complex, gently undulating, frequently flooded
Expected soil depth	>2 m
Depth to water table	0-0.91 m

Expected depth of soil horizons	Expected measurement depths*
0-0.08 m (loam)	0.04 m
0.08-1.30 m (clay loam)	0.69 m
1.30-2 m (loam)	1.65 m

*Actual soil measurement depths will be determined based on measured soil horizon depths at the NEON FIU soil pit and may differ substantially from those shown here

4.4 Information for ecosystem productivity plots.

The tower at Lenoir Landing Relocatable site has been positioned to optimize the collection of the air/wind signals both temporally and spatially over the desired ecosystem (floodplain hardwood forest). Airshed at this site is from 240° to 30° (clockwise from 240°), and 90% signals for flux measurements are within a distance of 850 m from tower, and 80% within 500 m. We suggest FSU Ecosystem Productivity

plots be placed within the boundaries of 240° to 30° (clockwise from 240°). But considering this property is very small, FSU may eventually need the whole area for the plots and survey.

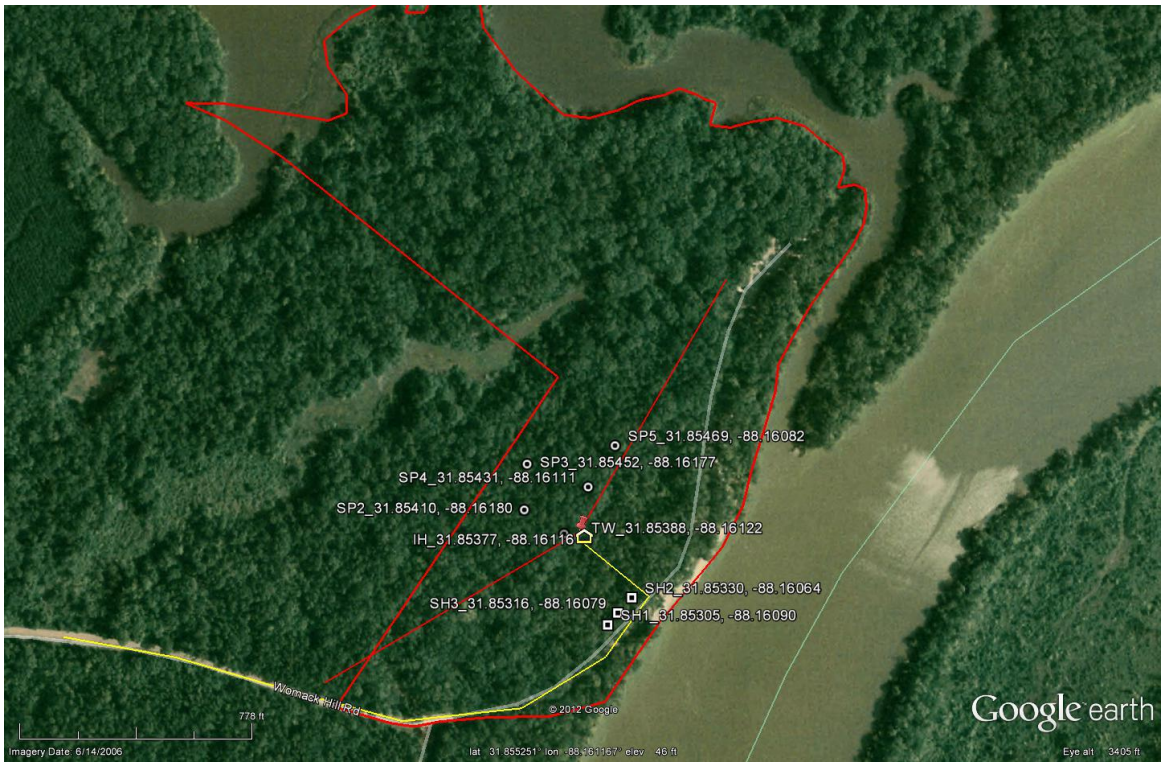


Figure 2. Overview and a close look of site layout at Lenoir Landing Relocatable site

i) New tower location is presented (red pin), ii) red lines indicate the airshed boundaries. Vectors 240° and 30° are the southwest most and northeast most vectors (starting clockwise from 240°) that would have quality wind data without causing flow distortions, respectively. iii) Yellow line is the suggested access road to instrument hut. iv) Soil plots (SP) and soil horizon (SH) are identified as round dots and square dots, respectively.

4.5 Issues and attentions

The fetch area for this tower location could be over several different ecosystems, including floodplain hardwood forest (major), pine plantation, and water body, which will make it challenged to interpret the flux data.

There are several concerns for this site: first is that this site is a flooded site and could be flooded every year. NEON EHS will help communicate with local hosts to find out the frequency of flood and the min and max depth of the flood water. Tower instruments and instrument hut will require elevation at this site. Several wet spots are around tower location. Alligators are possibly present. The second concern is that half of the airshed area is outside Lenoir Landing site boundary and belongs to different owner, possibly a timber company. It is unknown if the land cover will be changed in next 5-10 years. It will also require negotiation with this timber company for permit for FSU sample plots.

Boardwalk (BW) is suggested from access point on Womack Hill road to instrument hut (but started from ~ 50' away from the road according to the request from Army Corp to make the BW less visible), BW from instrument hut to tower, BW to soil array, and to individual soil plots due to the potential muddy ground surface in the after storm and during flooded season.

Brandon Smith (site host representative) says the tower will likely be shot at.

Precipitation at the site is highest in spring and late fall/early winter. At these times the site becomes very muddy and impacts of construction activities on the site would likely be greater.

Army Corp doesn't seem to concerned about the BW or tower height we proposed.

Power line is along Womack Hill road and less than 100 m away from instrument hut.

5 DEAD LAKE, RELOCATEABLE TOWER 2

5.1 Desired ecosystem

Dead Lake Relocatable site is a periodically flooded deciduous forest site that can meet the science requirements for this relocatable design. The tower location was determined to be 32.54172, -87.80389. Tower location is < 100 m from the access point on dirt road. Power pole is < 200 m away from tower. This site is managed by Army Corp and open for licensed hunters for Turkey hunting during spring. Gated access ensured the security of facilities at site.

This site is periodically and seasonally flooded, leaving behind standing water in large depressions in the forest. Standing water was presented in the low depressions on April 18, 2011 during FIU site characterization. When the black warrior river floods, water is backed-up into the Dead Lake site. Water may be deep at times, but no velocity to the flows were apparent. Canopy is closed and very diverse, and has multiple layers. Tree density is ~120 stems ha^{-1} for DBH >10 cm. Overstory is broad mix of cypress, red oak, black gum, shagbark hickory, oaks, green ash. Mid story also includes other gum species and oak species. Ground cover includes bamboo, grass, smilax and sometimes large and complete poison ivy covers.

Table 9. Ecosystem at Dead Lake Relocatable site.

Ecosystem Type	Management activity
mixed closed-canopy deciduous hardwood forest	No active management, but hunting allowed

Table 10. Ecosystem and site attributes for the Dead Lake Relocatable site.

Ecosystem attributes	Measure and units
Mean canopy height	30.0 m
Surface roughness	2.5 m
Zero place displacement	26.0 m
Structural elements	Floodplain hardwood deciduous forest, multiples canopy layers
Time zone	Eastern
Magnetic declination	1° 59' W changing by 0° 6' W/year

5.2 Site Design and Tower Attributes

The site layout is summarized in the table below. Assume the projected area of the tower is square. **Anemometer/temperature boom arm direction** is ***from*** the tower ***toward*** the prevailing wind direction or designated orientation. . The side of the tower with the anemometer boom is perpendicular to the boom direction. **Instrument hut orientation vector** is parallel to the long side of the instrument hut. **Instrument hut distance z** is the distance from the center of tower projection to the center of the instrument hut projection on the ground. The numbering of the **measurement levels** is that the lowest is level one, and each subsequent increase in height is numbered sequentially.

Table 11. Site design and tower attributes for the Dead Lake alternative Relocatable tower site.

0° is true north with declination accounted for. Color of Instrument hut exterior shall be tan to best match the surrounding environment.

Attribute	lat	long	degree	meters	notes
Airshed area			190° to 280° (major), 80° to 190° (secondary)		Clockwise from first angle
Tower location	32.54172,	-87.80389	--	--	new site
Instrument hut	32.541730,	-87.804120			
Instrument hut orientation vector	--	--	235° - 55°		longwise
Instrument hut distance z	--	--	--	22	
Anemometer/Temperature boom orientation	--	--	190°	--	
Height of the measurement levels					
Level 1				0.3	m.a.g.l.
Level 2				5.0	m.a.g.l.
Level 3				19.0	m.a.g.l.
Level 4				28.0	m.a.g.l.
Level 5				33.0	m.a.g.l.
Level 6				42.0	m.a.g.l.
Tower Height				42.0	m.a.g.l.

See AD 03 for technical requirement to determine the boom height for the bottom most measurement level.

Eddy covariance, sonic wind and air temperature **boom arms** orientation toward the SSW will be best to capture signals from all major wind directions. **Radiation boom arms** should always be facing south to avoid any shadowing effects from the tower structure.

Secondary **precipitation collector** for bulk precipitation collection will be located the top of tower at this site. **Wet deposition collector** will be collocated on the top of tower. See AD 04 for further information and requirements for bulk precipitation collection and wet deposition collection.

Boardwalks. Ultimately, the decision to use a boardwalk will be, in part, based on owner's preferences. There are strong science requirements that minimize site disturbance to the surrounding area, which will be difficult to manage over a 30-y period. Traffic control is key to minimizing the site disturbance. Confining foot traffic to boardwalks minimizes site impact; this is particularly true in places where wear caused by foot traffic becomes noticeable and grows. For example, in places with snow part of the year, worn footpaths tend to have low places that collect water, or places where the snow pack becomes uneven causing personnel to walk farther and farther around the sides of the original path, causing the path to grow in width. This is a very common phenomenon. Here FIU assumes that all conduits will be either buried, or placed inside the boardwalk such that it does not extend beyond the 36' wide

footprint. While the final design is not yet known, there are some general criteria that can be outlined. We assume that the boardwalk width is 36" (0.914 m). Material is not known, but must be fire proof, and in some locations the site is seasonally flooded and inundated with water. Boardwalks may also provide a scratching structure for grazing animals that in turn, would wear and unduly impact the site. Site by site evaluations must be done.

- There is always a boardwalk from the instrument hut to the tower
- If there is a boardwalk on the south side of the tower, it is never underneath the radiation booms, and it is more than 4 m from the side of the tower
- There is never a boardwalk within 4 m of the tower, except where it perpendicularly intersects the tower for access
- The boardwalk to access the tower is not on any side that has a boom.
- There is never boardwalk within 10 m of a soil plot, except where it perpendicularly intersects a soil plot for access.

Specific Boardwalks at Dead Lake alternative Relocatable site:

- Boardwalk is from the access point to instrument hut, pending landowner decision, and ease to bring supplies to instrument hut)
- Boardwalk from the instrument hut to the tower to intersect on north face of the tower,
- Boardwalk to the soil array from access road
- Boardwalk from the soil array boardwalk to the individual soil plots due to the very muddy conditions and periodic flooding that often occur at this site.

5.3 Soil Attributes

The dominant soil type is Leaf-Angie association. The soil array vector is ***from*** soil plot closest to the tower ***toward*** the farthest soil plot from the tower.

Table 12. Summary of soil array and soil pit information at Dead Lake. 0° represents true north and accounts for declination.

Soil plot dimensions	5 m x 5 m
Soil array pattern	B
Distance between soil plots: x	40 m
Distance from tower to closest soil plot: y	20 m
Latitude and longitude of 1st soil plot OR direction from tower	32.541629°, -87.804075°
Direction of soil array	240°
Latitude and longitude of FIU soil pit 1	32.541010°, -87.803180° (primary location)
Latitude and longitude of FIU soil pit 2	32.54092, -87.80338 (alternate 1)
Latitude and longitude of FIU soil pit 3	32.541118, -87.803801 (alternate 2)
Dominant soil type	Leaf-Angie association
Expected soil depth	>2 m
Depth to water table	0.15-0.76 m

Expected depth of soil horizons	**Expected measurement depths***

0-0.23 m (Fine sandy loam)	0.12 m†
0.23-0.41 m (Clay)	0.32 m†
0.41-0.94 m (Clay)	0.68 m†
0.94-1.24 m (Sandy clay loam)	1.09 m
1.24-2.00 m (Sandy loam)	1.62 m
2.00 m	2 m

*Actual soil measurement depths will be determined based on measured soil horizon depths at the NEON FIU soil pit and may differ substantially from those shown here.
†Expected depths for soil CO_2 sensors

5.4 Information for ecosystem productivity plots.

The tower at Dead Lake alternative relocatable site has been positioned to optimize the collection of the air/wind signals both temporally and spatially over the desired ecosystem (hardwood deciduous forest). Airshed at this site is from 190° to 280° (starting clockwise from 190°, major air shed) and from 80° to 190° (starting clockwise from 80°, secondary airshed), and 90% signals for flux measurements are within a distance of 300 m from tower, and 80% within 200 m, except for the winter under max wind speed, 90% signals are within 800 m from tower and 80% signals are within 480 m. We suggest FSU Ecosystem Productivity plots be placed within the boundaries of 190° to 280° (starting clockwise from 190°) from tower.

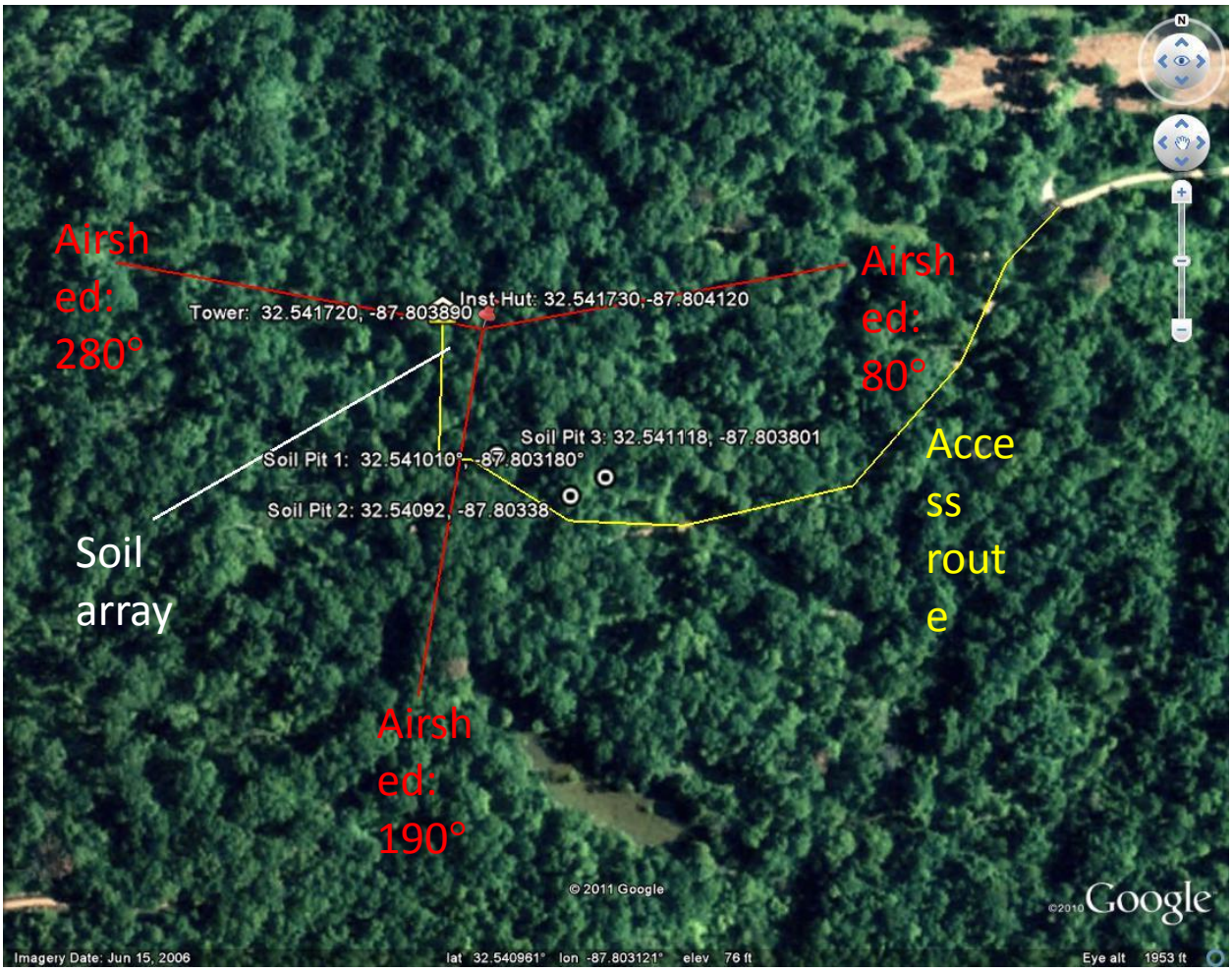


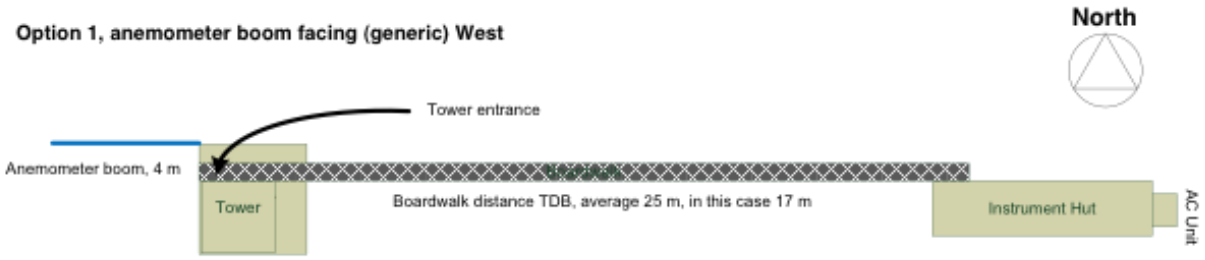
Figure 3. Site layout for D08 Dead Lake alternative Relocatable site

i) new tower location is presented (Red pin), ii) red lines indicate the airshed boundaries. Vectors 190° and 280° (starting clockwise from 190°, major airshed) and vectors 80° and 190° (starting clockwise from 80°, secondary airshed) are the airshed areas that would have quality wind data without causing flow distortions, respectively. iii) Yellow line is the suggested access route to instrument hut.

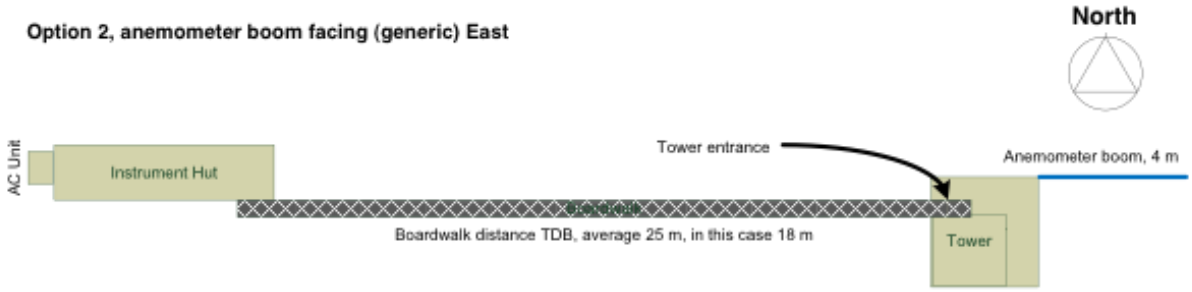
5.5 Issues and attentions

This site is periodically and seasonally flooded site. Elevation of instrument hut may be required.

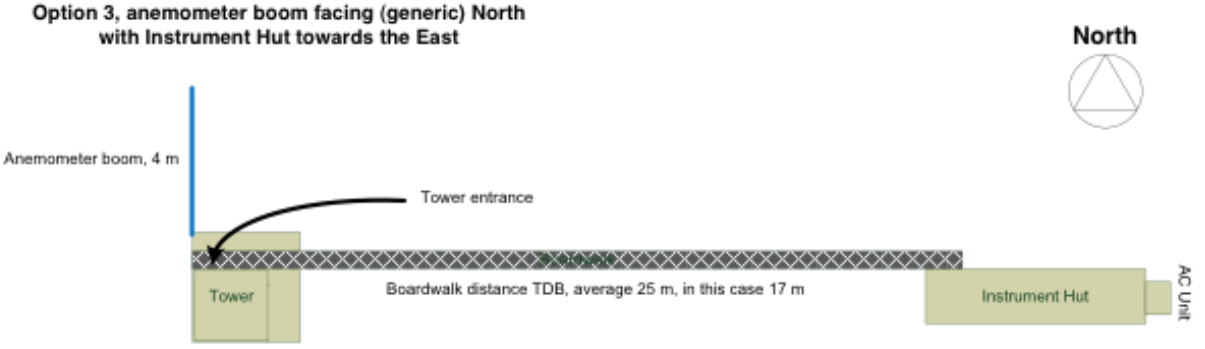
Option 1, anemometer boom facing (generic) West



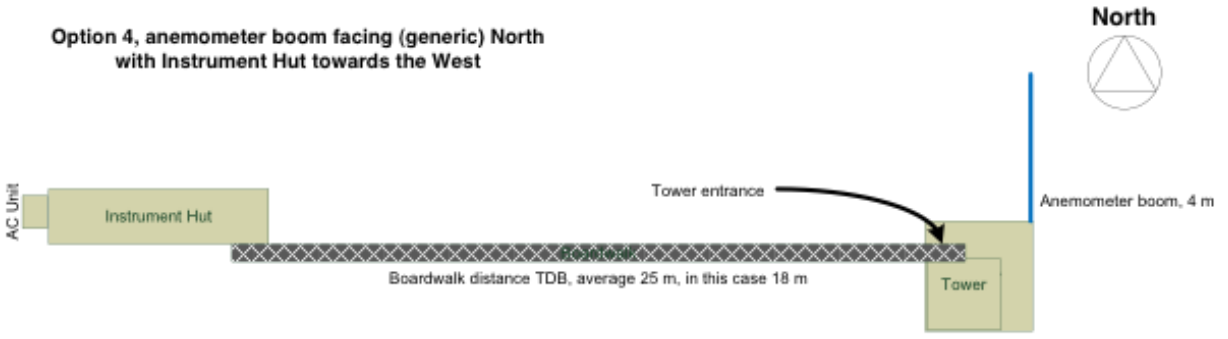
Option 2, anemometer boom facing (generic) East



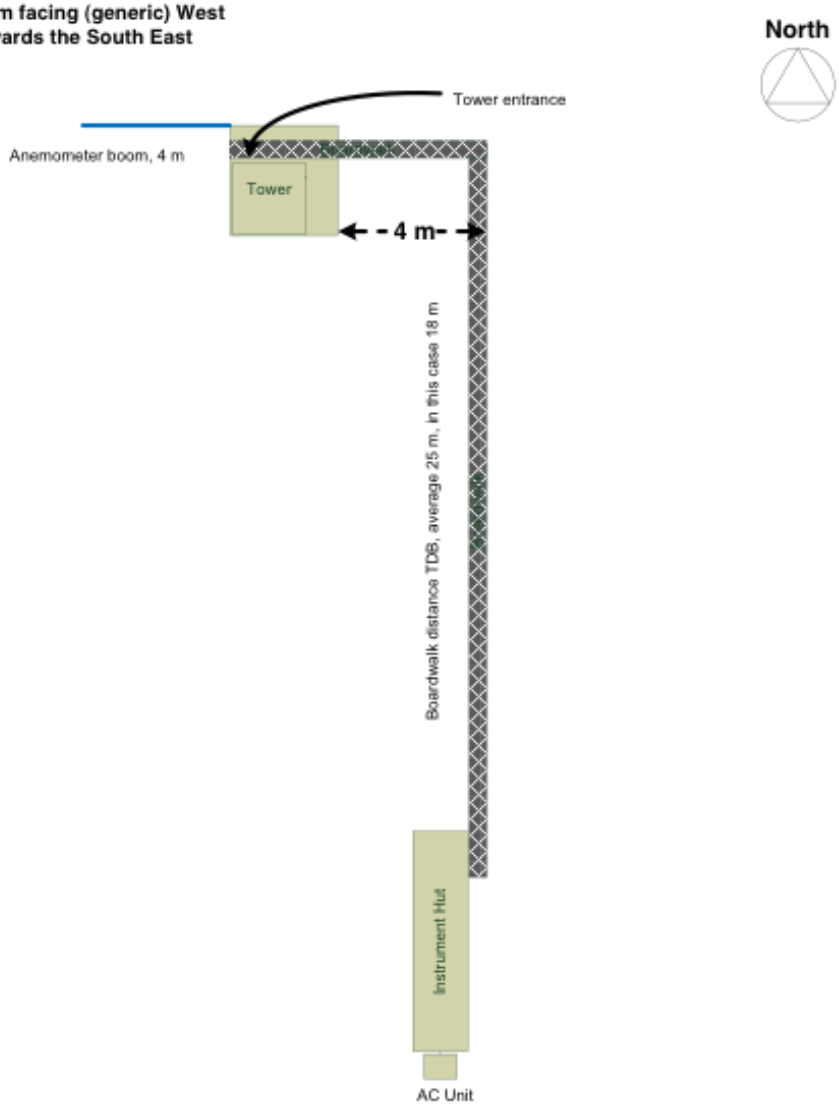
Option 3, anemometer boom facing (generic) North with Instrument Hut towards the East

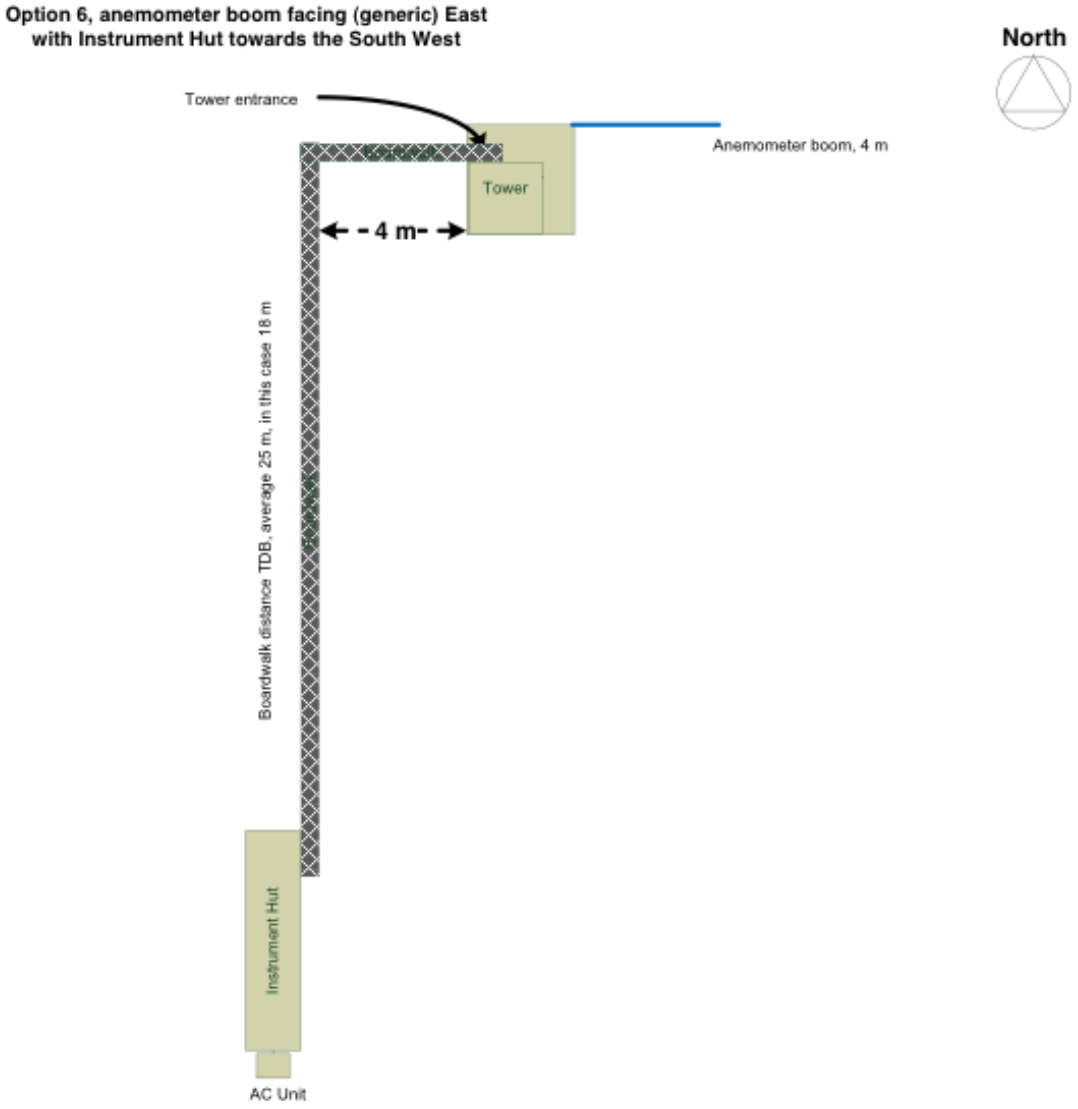


Option 4, anemometer boom facing (generic) North with Instrument Hut towards the West

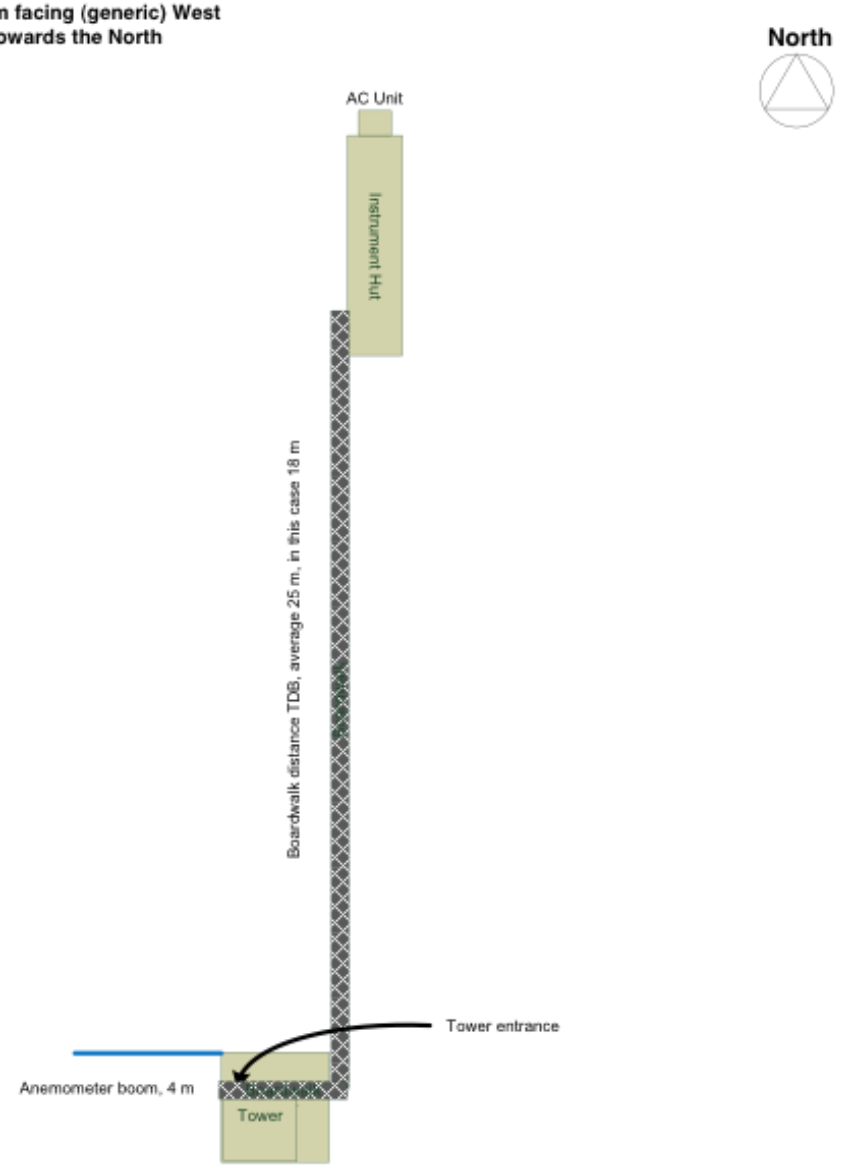


Option 5, anemometer boom facing (generic) West with Instrument Hut towards the South East




Option 6, anemometer boom facing (generic) East
with Instrument Hut towards the South West
North
Tower entrance
Anemometer boom, 4 m
Tower
- 4 m-
Boardwalk distance TDB, average 25 m, in this case 18 m
Instrument Hut
AC Unit

Option 7, anemometer boom facing (generic) West with Instrument Hut towards the North



Option 8, anemometer boom facing (generic) South with Instrument Hut towards the North

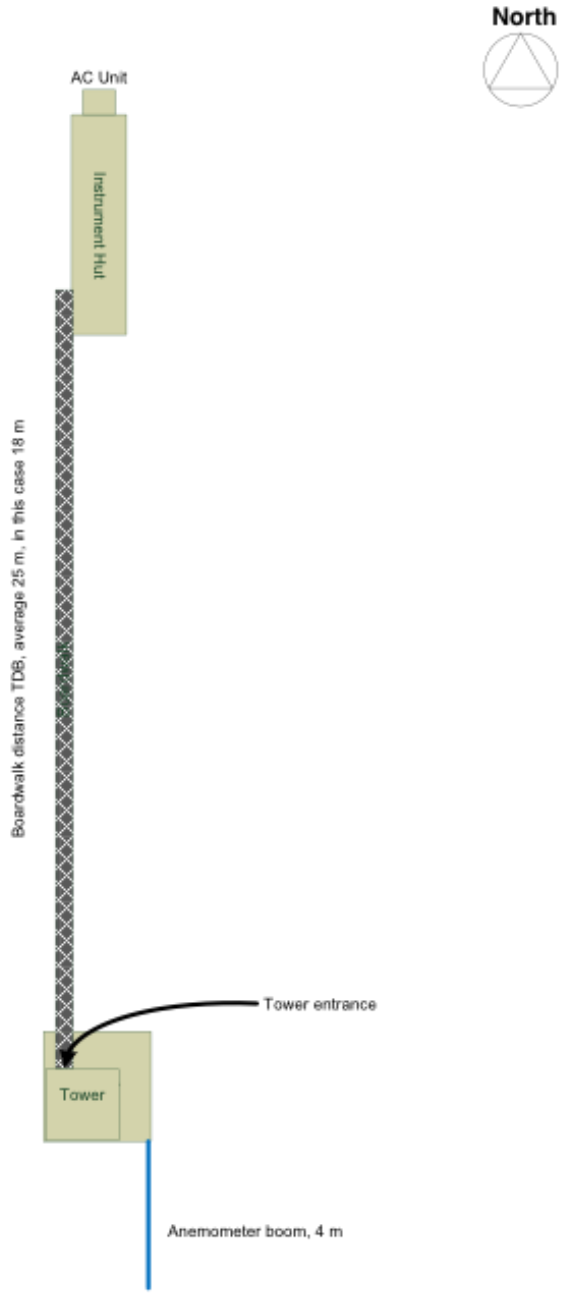
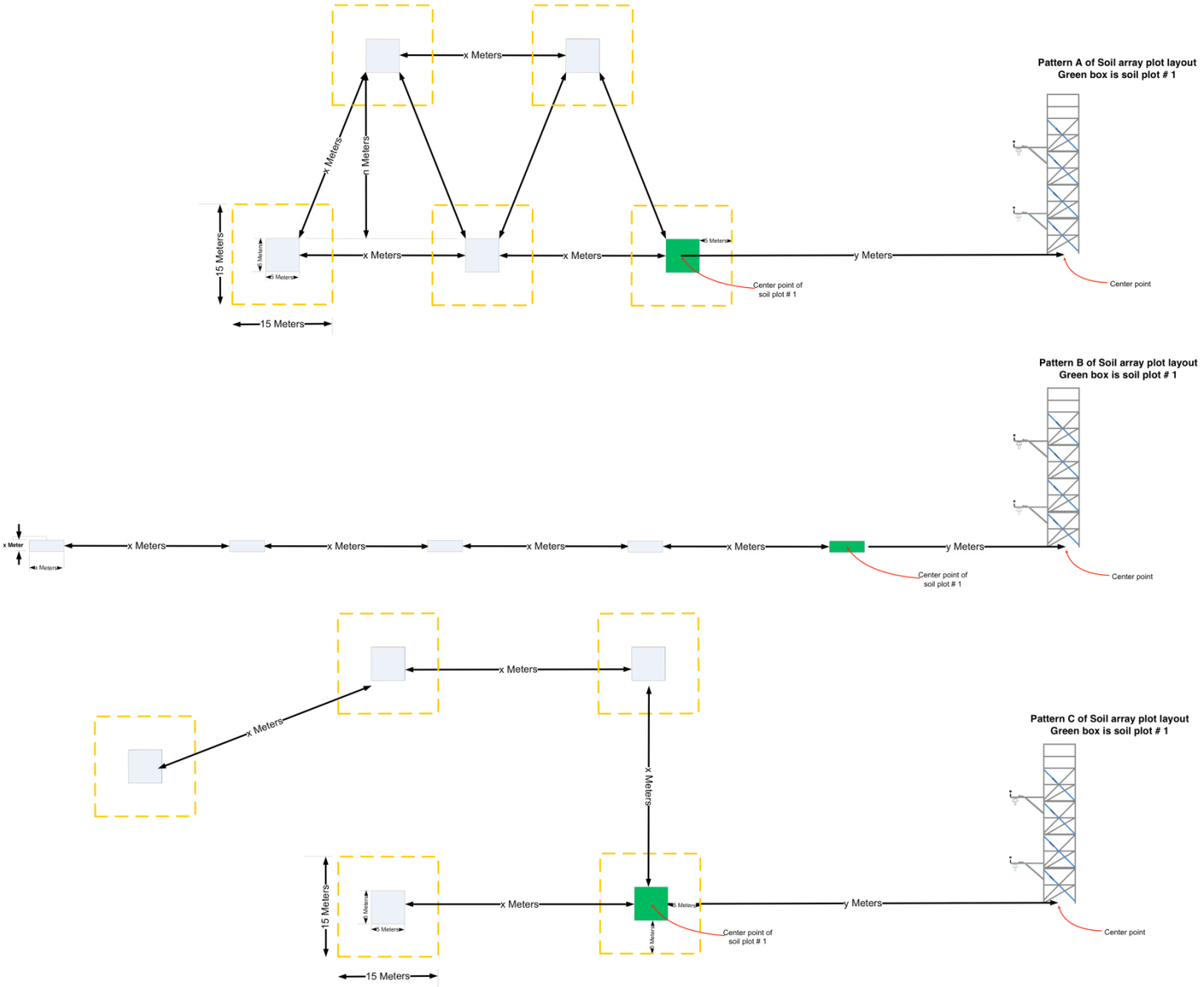


Figure 4. Generic patterns for the boardwalk configuration

These generic configurations are from the instrument hut to the tower based on 8 generic scenarios. The five options are based on anemometer boom orientation and the leeward side of the tower where the instrument hut is located. The tower entrance is always on the North side of the tower. Exact tower and instrument hut location and orientation will be specified at each location and presented in the site characterization document.


Pattern A of Soil array plot layout
Green box is soil plot # 1
x Meters
x Meters
n Meters
15 Meters
x Meters
x Meters
y Meters
Center point of soil plot # 1
Center point
15 Meters
Pattern B of Soil array plot layout
Green box is soil plot # 1
x Meter
x Meters
x Meters
x Meters
x Meters
y Meters
Center point of soil plot # 1
Center point
Pattern C of Soil array plot layout
Green box is soil plot # 1
x Meters
x Meters
x Meters
15 Meters
x Meters
y Meters
Center point of soil plot # 1
Center point
15 Meters

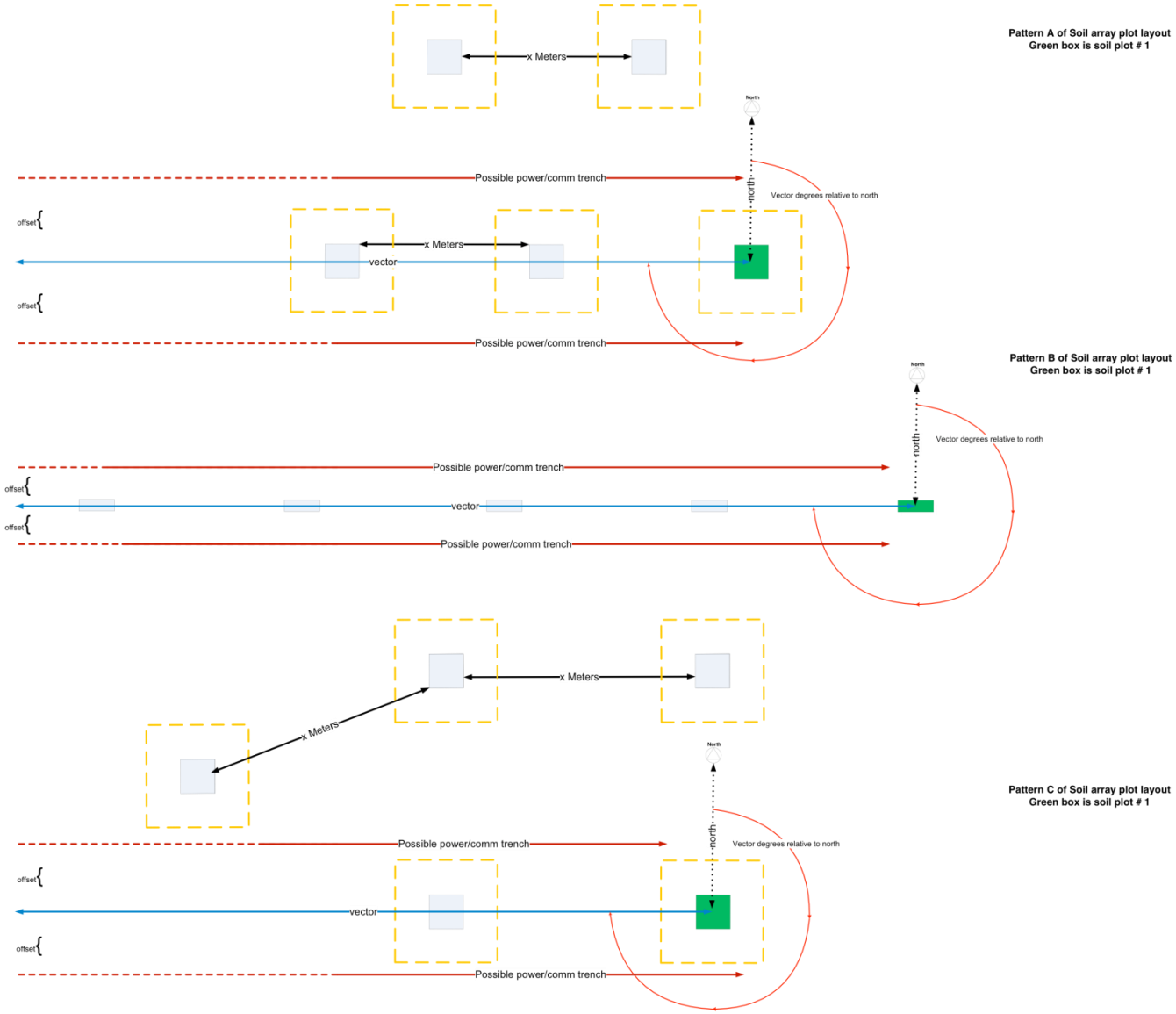

Pattern A of Soil array plot layout
Green box is soil plot # 1
x Meters
North
Possible power/comm trench
north
Vector degrees relative to north
offset
x Meters
vector
offset
Possible power/comm trench
Pattern B of Soil array plot layout
Green box is soil plot # 1
North
north
Vector degrees relative to north
Possible power/comm trench
offset
vector
offset
Possible power/comm trench
x Meters
x Meters
North
Pattern C of Soil array plot layout
Green box is soil plot # 1
Possible power/comm trench
north
Vector degrees relative to north
offset
vector
offset
Possible power/comm trench

Figure 5. Conceptual diagram of Soil Array Patterns

Outlines the orientation for the soil array and instrument hut from the center point of the tower. The x, y, z distances are i) the distance between soil plots, ii) distance between the tower centerpoint and the closest edge of soil plot, and iii) the distance between the tower centerpoint and the closest edge of the instrument hut, respectively. The yellow outline around each soil plot is the 5 m perimeter keep out zone.

6 APPENDIX A. FCC SUMMARY TABLES

Table A1. FCC Summary Table for FIU site components at D08 Talladega Nat'l Forest Core

Site Component				**units**
Tower location	32.95046°	-87.39327°		Lat, Long
Tower location	32° 57' 1.6554"	-87° 23' 35.772"		Lat, Long in deg min sec
Tower height	35			meters
Tower guying	yes			yes/none, notes
Instrument Hut location	32.95047°	-87.39312°		Lat, Long,
Instrument Hut location	32° 57' 1.692"	-87° 23' 35.2314"		Lat, Long in deg min sec
IH orientation[a]	90° - 270°		°	Orientation vector
boom orientation[b]	270°			degrees
distance from center of tower to IH CPiont	°	14	Option 1	vector, distance (m), option #
how the Bwalk intersects the tower access	Boardwalk intersects the north-side of the tower from the east.			description
how the Bwalk intersects the tower access	Straight section of Boardwalk from the tower to IH			description
Air shed vector(s)[c]	185° to 330°	Clockwise from 185°		vector, notes
Boardwalk from AP to IH	yes			yes/none, notes
Boardwalk to soil array	yes			yes/none, notes
Boardwalk needed to DFIR	no			yes/none
DFIR location	32.97813°	-87.41145°		Lat, Long
DFIR location	32° 58' 41.268"	-87° 24' 41.22"		Lat, Long in deg min sec
DFIR power supply	power			description
Power and Communication line	10 m from edge of plot to the centerline of power/comms line	whichever side is easiest[e], line is above ground		offset, notes
Soil plot 1st location	32.95064°	-87.39329°		Lat, Long (center point)
Soil plot 1st location	32° 57' 2.3034"	-87° 23' 35.8434"		Lat, Long in deg min sec
Soil plot distance between plots (x)	40		19	X, Y (Meters)
Soil array pattern and vector[d]	B	330°		A, B, or C, vector
Soil plot dimensions	5 m x 5 m			L x W (meters)
Soil profile pit primary	32.95058°	-87.39308°	>2 m	Lat, Long, and expected depth

Soil profile pit primary	32° 57' 2.088"	-87° 23' 35.0874"		Lat, Long in deg min sec
Soil profile pit alternative 1	32.950157°	-87.393909°	>2 m	Lat, Long, and expected depth
Soil profile pit alternative 1	32° 57' 0.5646"	-87° 23' 38.0718"		Lat, Long in deg min sec
Soil profile pit alternative 2	32.95132°	-87.39417°	>2 m	Lat, Long, and expected depth
Soil profile pit alternative 2	32° 57' 4.752"	-87° 23' 39.012"		Lat, Long in deg min sec
Fencing needs	none			IH, Soil Arrays, Guy anchors
Presence of large grazing animals	none			description
Site management*	Longleaf-pine forest, Controlled burns			description
Any additional site specific information	Closed pine forest canopy, uniform			description
Magnetic declination	2° 14' W			At time of site visit

Table A2. FCC Summary Table for FIU site components at D08 Lenoir Landing Relocable

Site Component				**units**
Tower location	31.85388°,	-88.16122°		Lat, Long
Tower location	31° 51' 13.968"	-88° 9' 40.392"		Lat, Long in deg min sec
Tower height	45			meters
Tower guying	yes			yes/none, notes
Instrument Hut location	31.85377°,	-88.16116°		Lat, Long,
Instrument Hut location	31° 51' 13.572"	-88° 9' 40.1754"		Lat, Long in deg min sec
IH orientation[a]	135° - 315°			Long side of IH
boom orientation[b]	315°			degrees
distance from center of tower to IH CPiont		14*	Option 1	vector, distance (m), option #
how the Bwalk intersects the tower access	Boardwalk from tower to IH. Boardwalk intersects the north-side of the tower			description
Air shed vector(s)[c]	240° to 30°	Clockwise from 240°		vector, notes
Boardwalk from AP to IH	yes			yes/none, notes
Boardwalk to soil array	yes	BW to individual soil plots		yes/none, notes
Boardwalk needed to DFIR	na.			yes/none
DFIR location	na			Lat, Long
DFIR power supply	na			description
Power and Communication line	10 m from edge of plot to the centerline of power/comms line	whichever side is easiest[e], line above ground		offset, notes
Soil plot 1st location	31.85388,	-88.16137°		Lat, Long (center point)
Soil plot 1st location	31° 51' 13.968"	-88° 9' 40.932"		Lat, Long in deg min sec
Soil plot 2nd location	31.85410	-88.16180		Lat, Long (center point)
Soil plot 2nd location	31° 51' 14.7594"	-88° 9' 42.4794"		Lat, Long in deg min sec
Soil plot 3rd location	31.85452	-88.16177		Lat, Long (center point)
Soil plot 3rd location	31° 51' 16.272"	-88° 9' 42.372"		Lat, Long in deg min sec
Soil plot 4th location	31.85431	-88.16111		Lat, Long (center point)
Soil plot 4th location	31° 51' 15.516"	-88° 9' 39.9954"		Lat, Long in deg min sec
Soil plot 5th location	31.85469	-88.16082		Lat, Long (center point)

Soil plot 5th location	31° 51' 16.884"	-88° 9' 38.952"		Lat, Long in deg min sec
Soil plot distance between plots (x)	Varies (approximately ~45 m)		14	(meters) x, y
Soil array pattern and vector[d]	Non-standard pattern			A, B, or C, vector
Soil plot dimensions	5 m x 5 m			L x W (meters)
Soil profile pit primary	31.85305,	-88.16090	> 2 m	Lat, Long, and expected depth
Soil profile pit primary	31° 51' 10.9794"	-88° 9' 39.2394"		Lat, Long in deg min sec
Soil profile pit alternative 1	31.85330,	-88.16064	> 2 m	Lat, Long, and expected depth
Soil profile pit alternative 1	31° 51' 11.88"	-88° 9' 38.304"		Lat, Long in deg min sec
Soil profile pit alternative 2	31.85316,	-88.16079	> 2 m	Lat, Long, and expected depth
Soil profile pit alternative 2	31° 51' 11.3754"	-88° 9' 38.844"		Lat, Long in deg min sec
Fencing needs	none			IH, Soil Arrays, Guy anchors
Presence of large grazing animals	none			description
Site management*	Oak-dominant closed-canopy hardwood forest			description
Any additional site specific information	No active management, FLOODING			description
Magnetic declination	1° 32' W			At time of site visit

*Although the distance calculated from tower and IH instrument hut is 14 m, the actual distance measured at field is 18 m. Wooden stakes were placed on the ground to mark the exact locations FIU identified.

Table A3. FCC Summary Table for FIU site components at D08 Dead Lake Relocable site

Site Component				**units**
Tower location	32.54172,	-87.80389		Lat, Long
Tower location	32° 32' 30.1914"	-87° 48' 14.0034"		Lat, Long in deg min sec
Tower height	42			meters
Tower guying	yes			yes/none, notes
Instrument Hut location	32.541730,	-87.804120		Lat, Long,
Instrument Hut location	32° 32' 30.228"	-87° 48' 14.8314"		Lat, Long in deg min sec
IH orientation[a]	235° - 55°			Orientation vector
boom orientation[b]	190°			degrees
distance from center of tower to IH CPiont		22	Option 8	vector, distance (m), option #
how the Bwalk intersects the tower access	Boardwalk intersects the north-side of the tower			description
Air shed vector(s)[c]	190° to 280° (major)	80° to 190° (secondary)		Clockwise from first angle
Boardwalk from AP to IH	yes			yes/none, notes
Boardwalk to soil array	BW to soil array and to individual soil plots due to the very muddy conditions and periodic flooding that often occur at this site.			yes/none, notes
Boardwalk needed to DFIR	na.			yes/none
DFIR location	na			Lat, Long
DFIR power supply	na			description
Power and Communication line	10 m from edge of plot to the centerline of power/comms line	whichever side is easiest[e], line above ground		offset, notes
Soil plot 1st location	32.541629°,	-87.804075°		Lat, Long (center point)
Soil plot 1st location	32° 32' 29.8644"	-87° 48' 14.6694"		Lat, Long in deg min sec
Soil plot distance between plots (x)	40		20	(meters) x, y
Soil array pattern and vector[d]	B	240°		A, B, or C, vector
Soil plot dimensions	5 m x 5 m			L x W (meters)
Soil profile pit primary	32.541010°,	-87.803180°	> 2 m	Lat, Long, and expected depth
Soil profile pit primary	32° 32' 27.6354"	-87° 48' 11.4474"		Lat, Long in deg min sec
Soil profile pit alternative 1	32.54092,	-87.80338	> 2 m	Lat, Long, and expected depth
Soil profile pit alternative 1	32° 32' 27.3114"	-87° 48' 12.168"		Lat, Long in deg min sec

Soil profile pit alternative 2	32.541118,	-87.803801	> 2 m	Lat, Long, and expected depth
Soil profile pit alternative 2	32° 32' 28.0242"	-87° 48' 13.6836"		Lat, Long in deg min sec
Fencing needs	none			IH, Soil Arrays, Guy anchors
Presence of large grazing animals	none			description
Site management*	mixed closed-canopy deciduous hardwood forest			description
Any additional site specific information	No active management, periodical hunting allowed, FLOODING			description
Magnetic declination	1° 59' W changing by 0° 6' W/year			At time of site visit

Notes;
[a]parallel to the long side of the IH
[b]From tower point to this direction
[c]Clockwise from first angle, recommend reviewing FIU site characterization summary
[d]From 1st plot toward other plots if pattern B, from 1st plot toward nearest neighbor (see diagram of the patterns)
[e]see Figure 4..
Tower Height is for FIU requirements; actual tower height will increase toward the next section height
IH = instrument hut
AP = auxillary portal
*burn information that may affect boardwalk, IH, or tower infrastructure, or other management activities