

Monitoring of Ludwigia Eradication the Stony Point Road Sediment Removal Site in the Laguna de Santa Rosa

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Sonoma State University GEP359: Water Research Methods



Sonoma Water
Flood Zone Meeting
December 9, 2019

Background

- The Laguna de Santa Rosa is impaired for temperature, mercury, dissolved oxygen, **sediment, nutrients**
- The NCRWQCB is setting the TMDL for phosphorus to zero
- City of Santa Rosa occasionally needs to discharge phosphorus
- Sonoma Water generated **Water Quality Credit Trading Units** by removing sediment (+phosphorus) from the Laguna



City of Santa Rosa Laguna Treatment Plant



Ludwigia







Stony Point Rd

Castagnasso Rd

Rohnert Park Expy

Bellevue-Wilfred Channel

1

2

5

4

Laguna de Santa Rosa

South Laguna Discovery Trail

Santa Rosa Pumpkin Patch

Rohnert Park Expy

Stony Point Rd

Five Creek

6

Ran

downstream upstream

Site 1



Site 1

Downstream of digging: no change expected



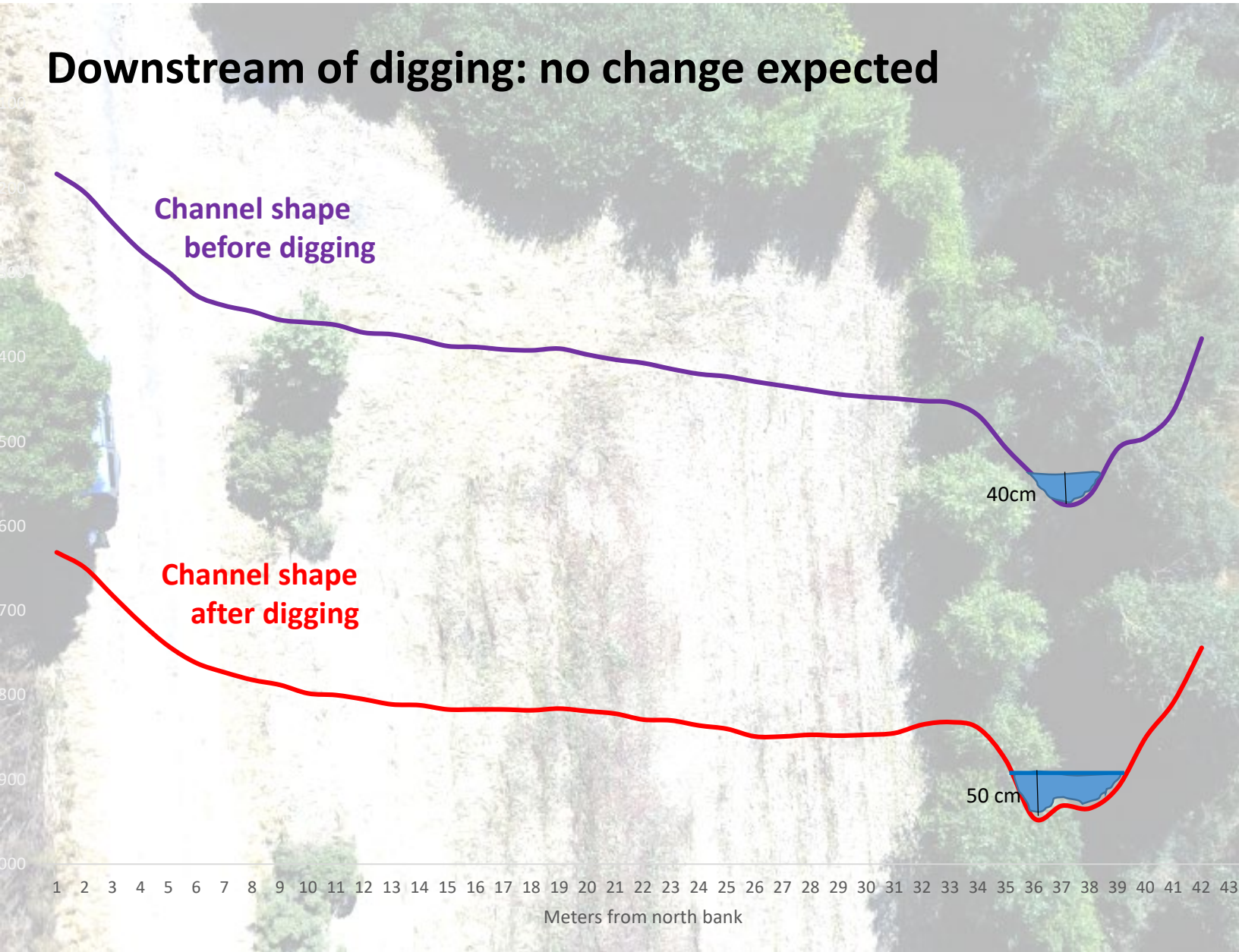
Site 1

Downstream of digging: no change expected



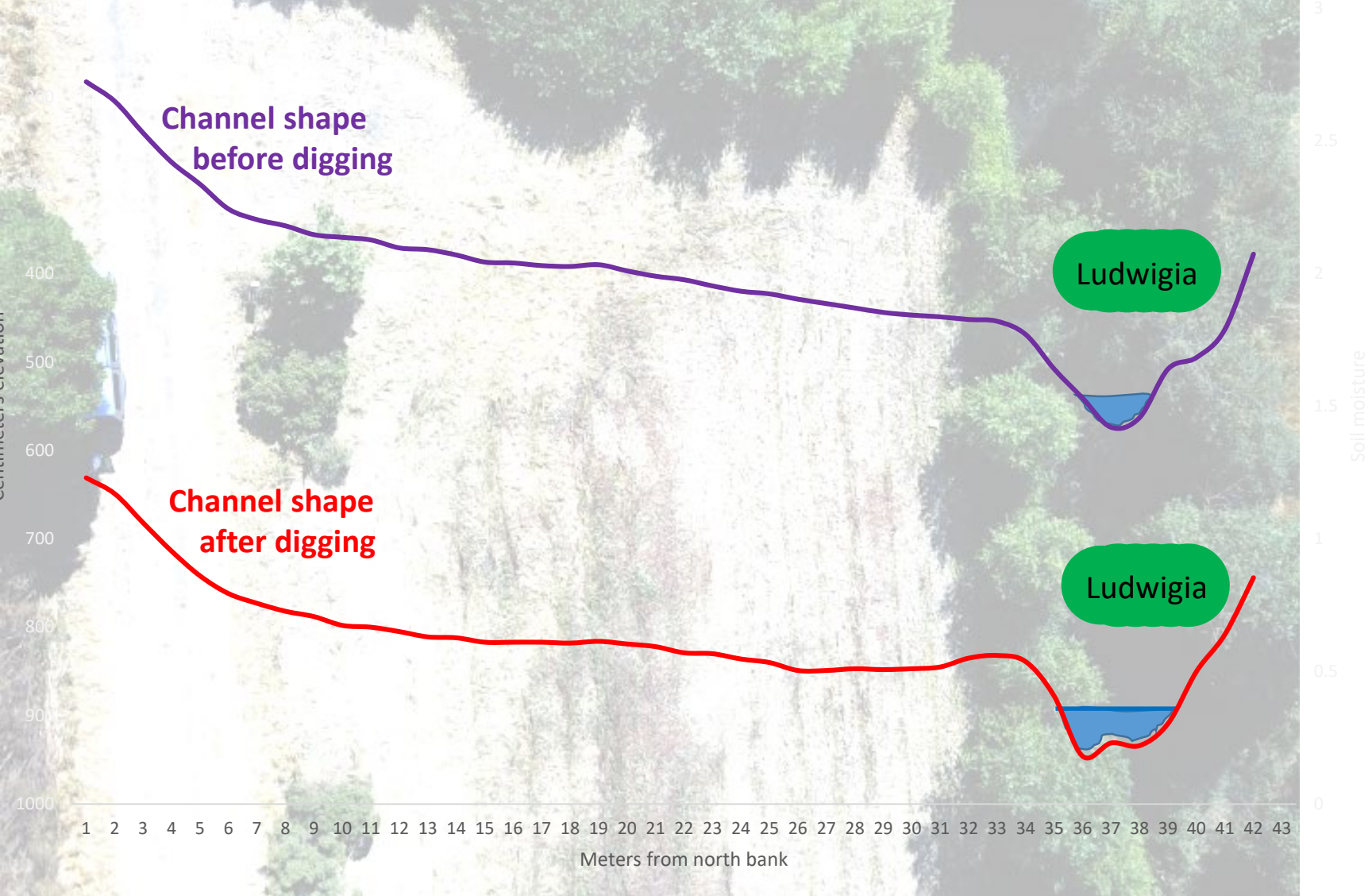
Site 1

Downstream of digging: no change expected



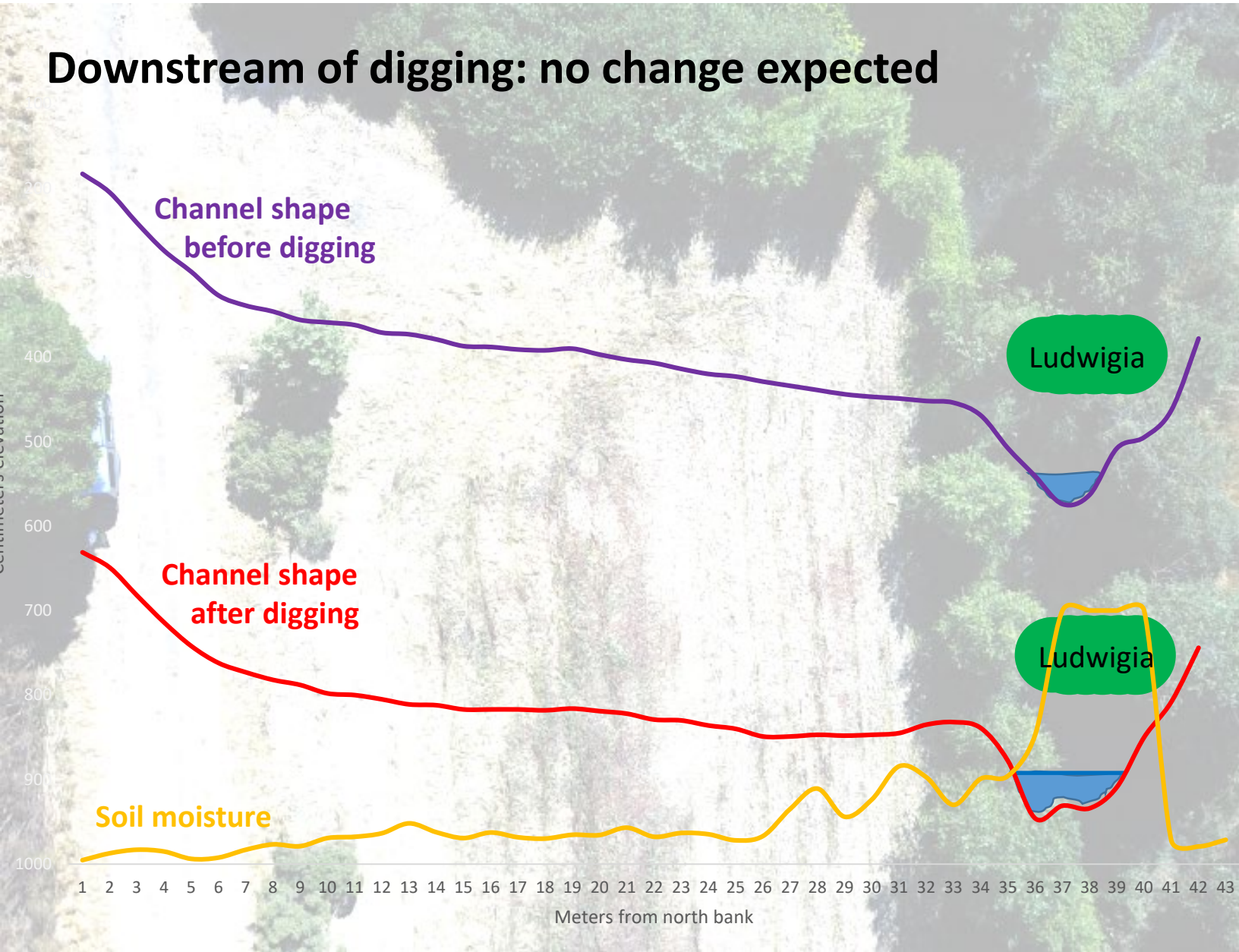
Site 1

Downstream of digging: no change expected



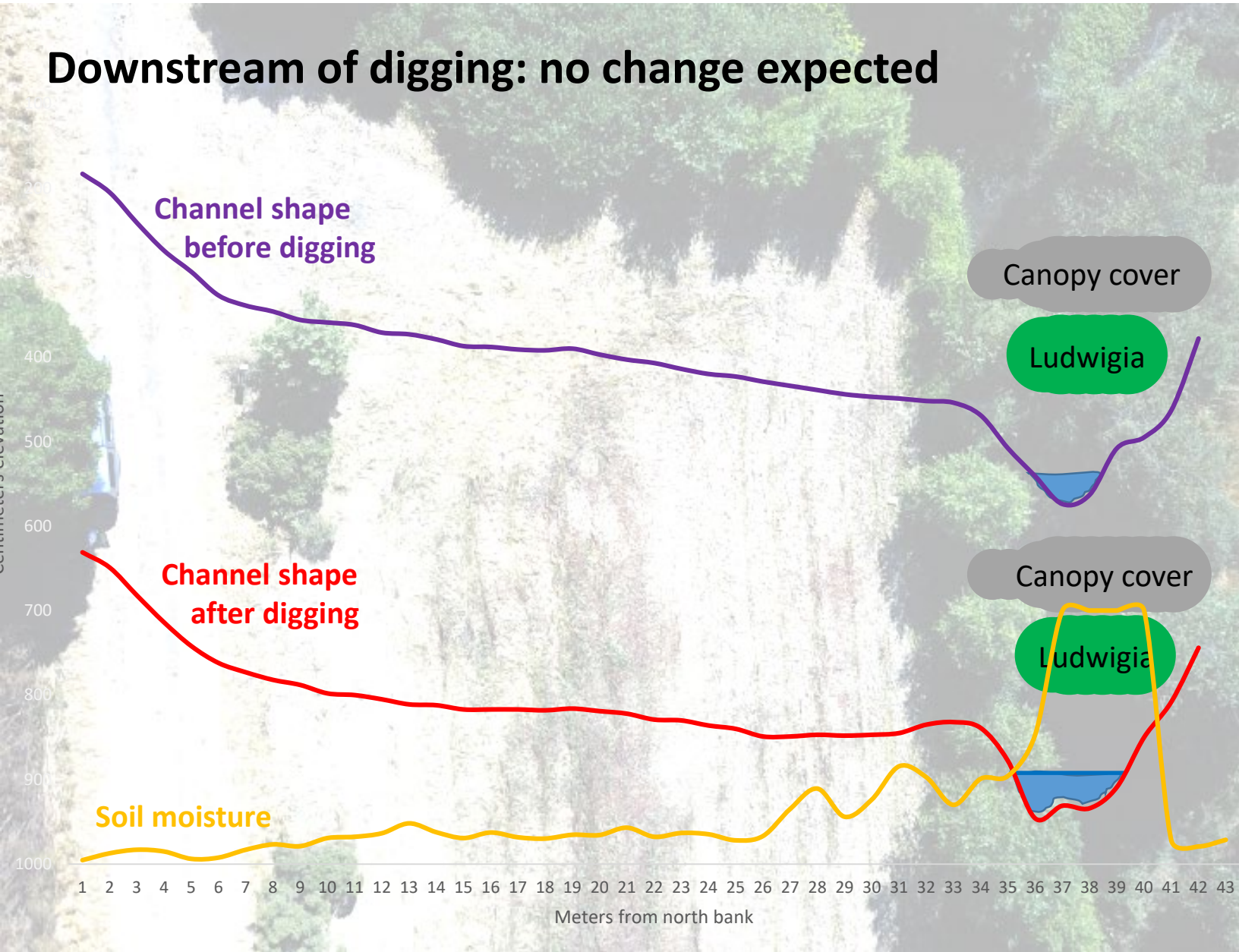
Site 1

Downstream of digging: no change expected



Site 1

Downstream of digging: no change expected





Stony Point Rd

Castagnasso Rd

Rohnert Park Expy

Bellevue-Wilfred Channel

Rosa

2

Laguna de Santa Rosa

South Laguna Discovery Trail

Santa Rosa Pumpkin Patch

Stony Point Rd

Rohnert Park Expy

Rohnert Park Expy

Five Creek

Ran

downstream upstream

Stony Point Rd

Site 2





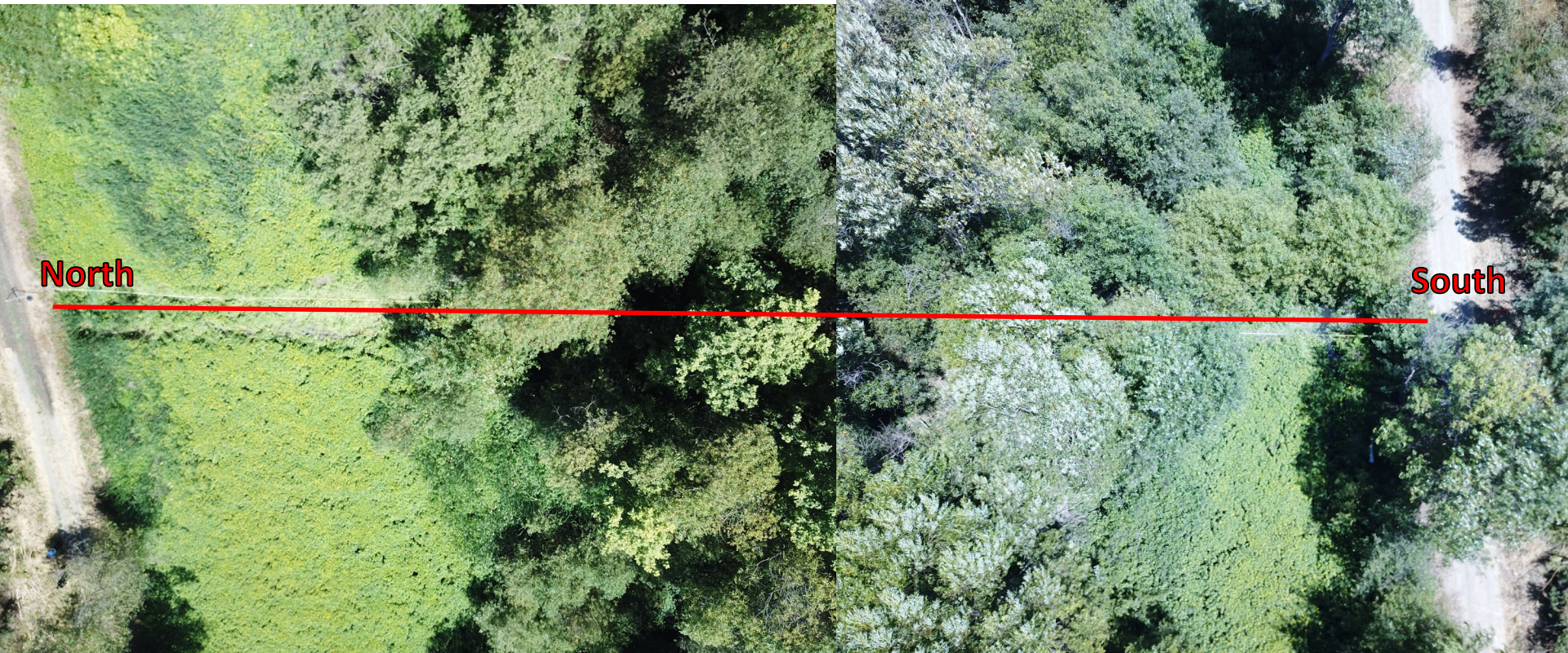
Site 2



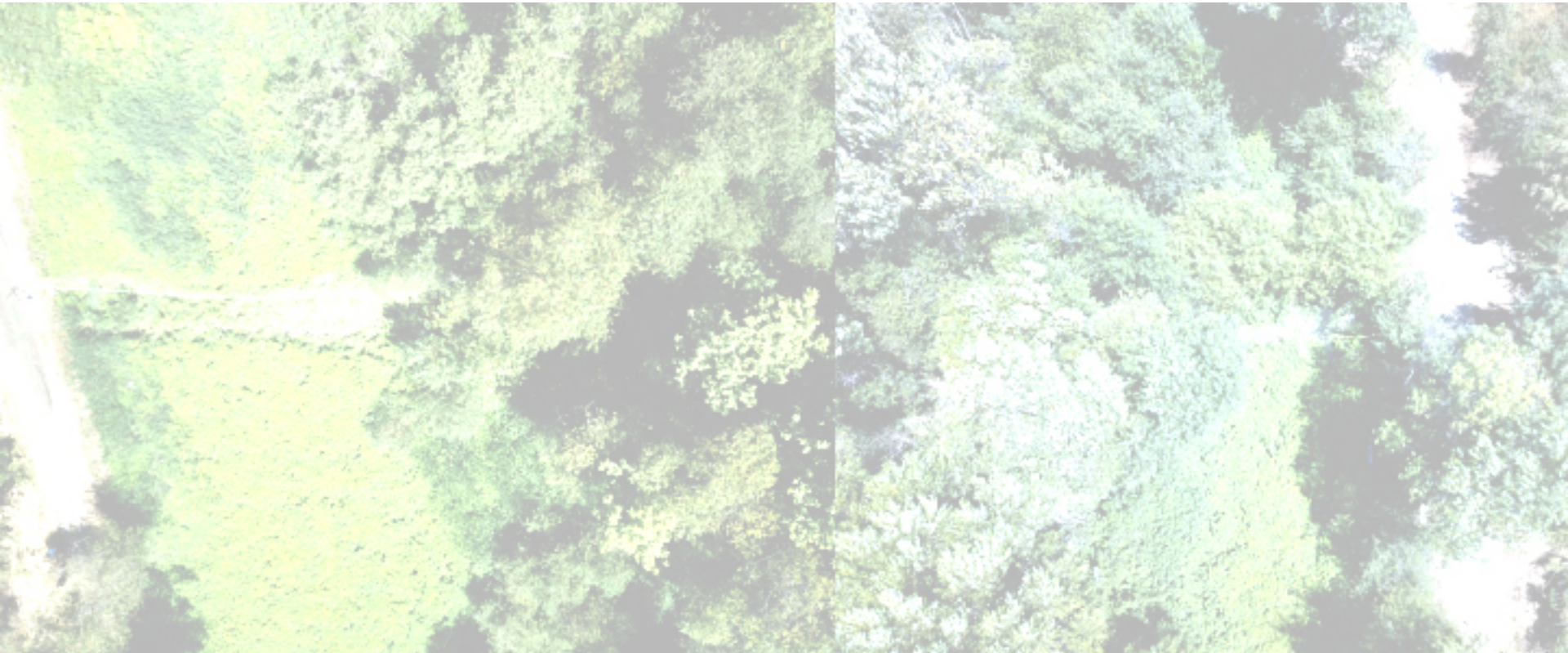
North



Site 2



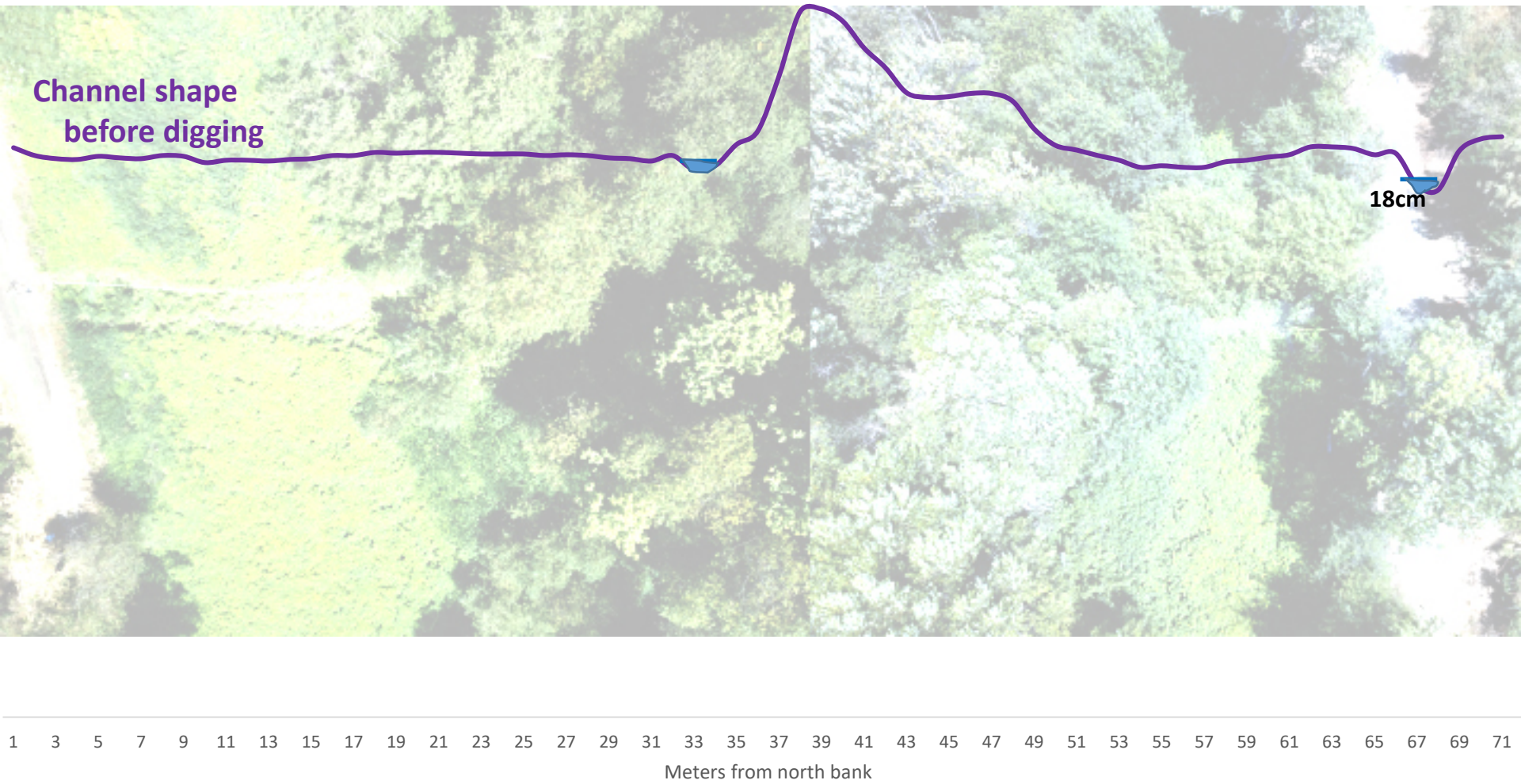
Site 2



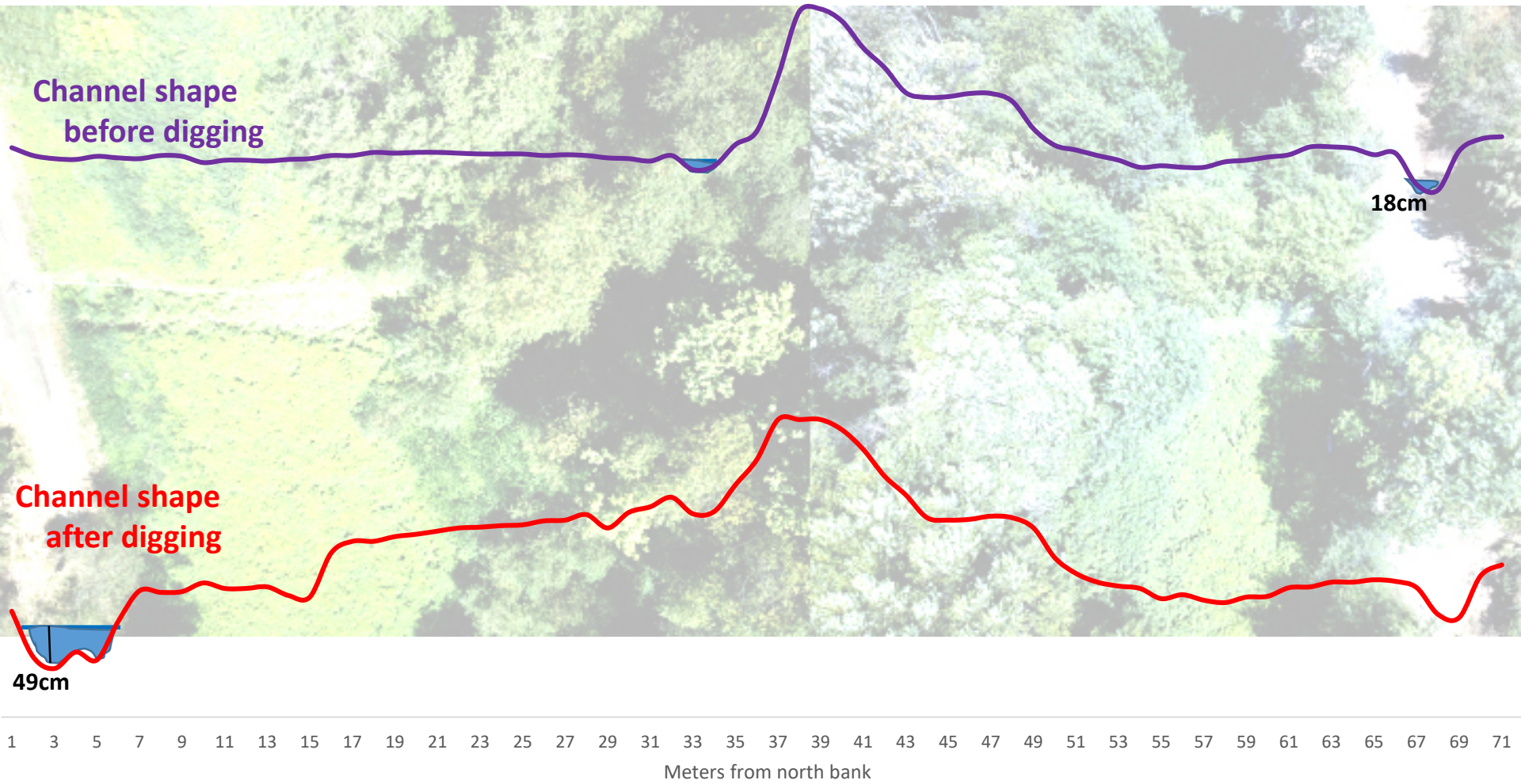
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Meters from north bank

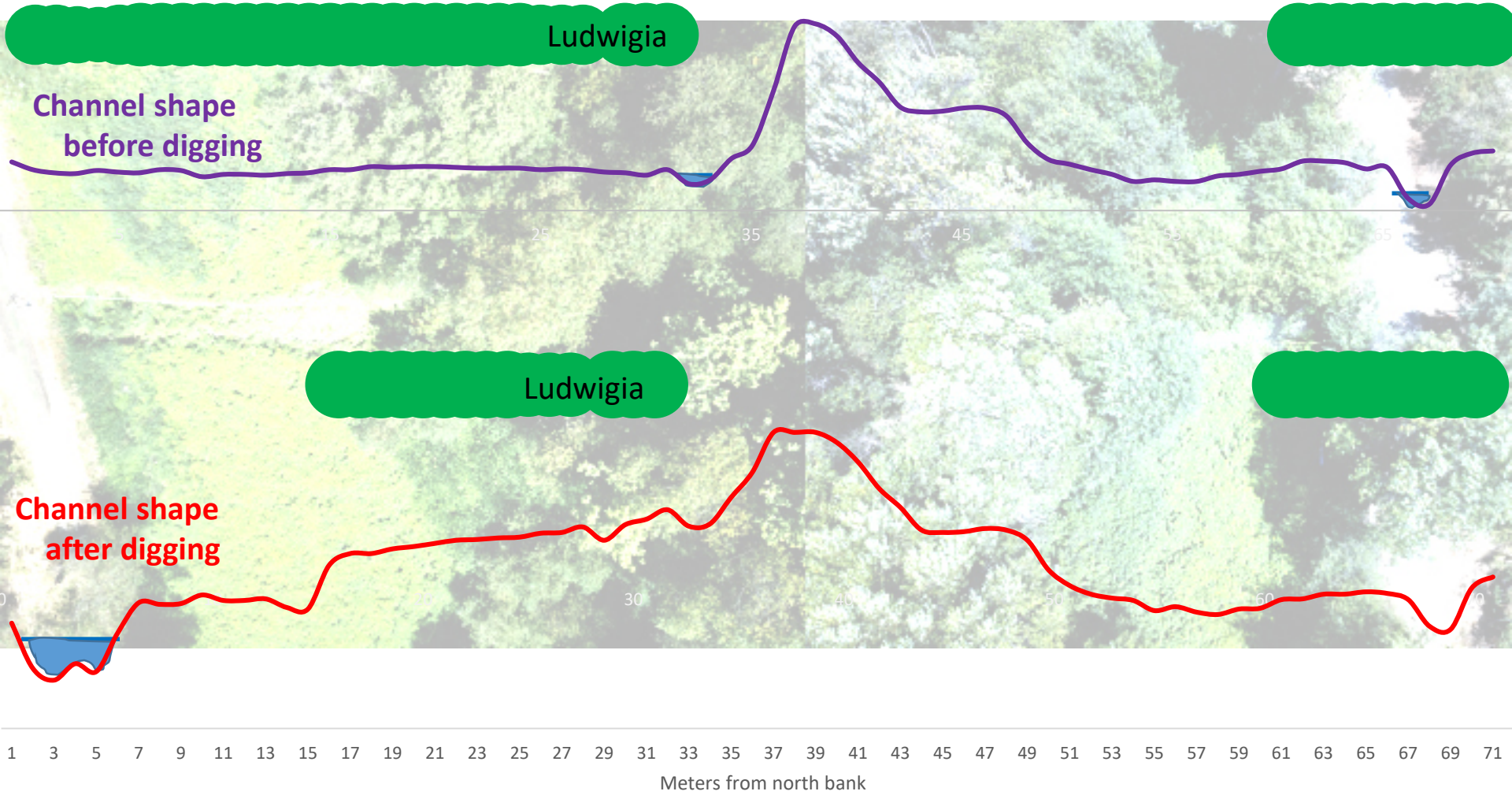
Site 2



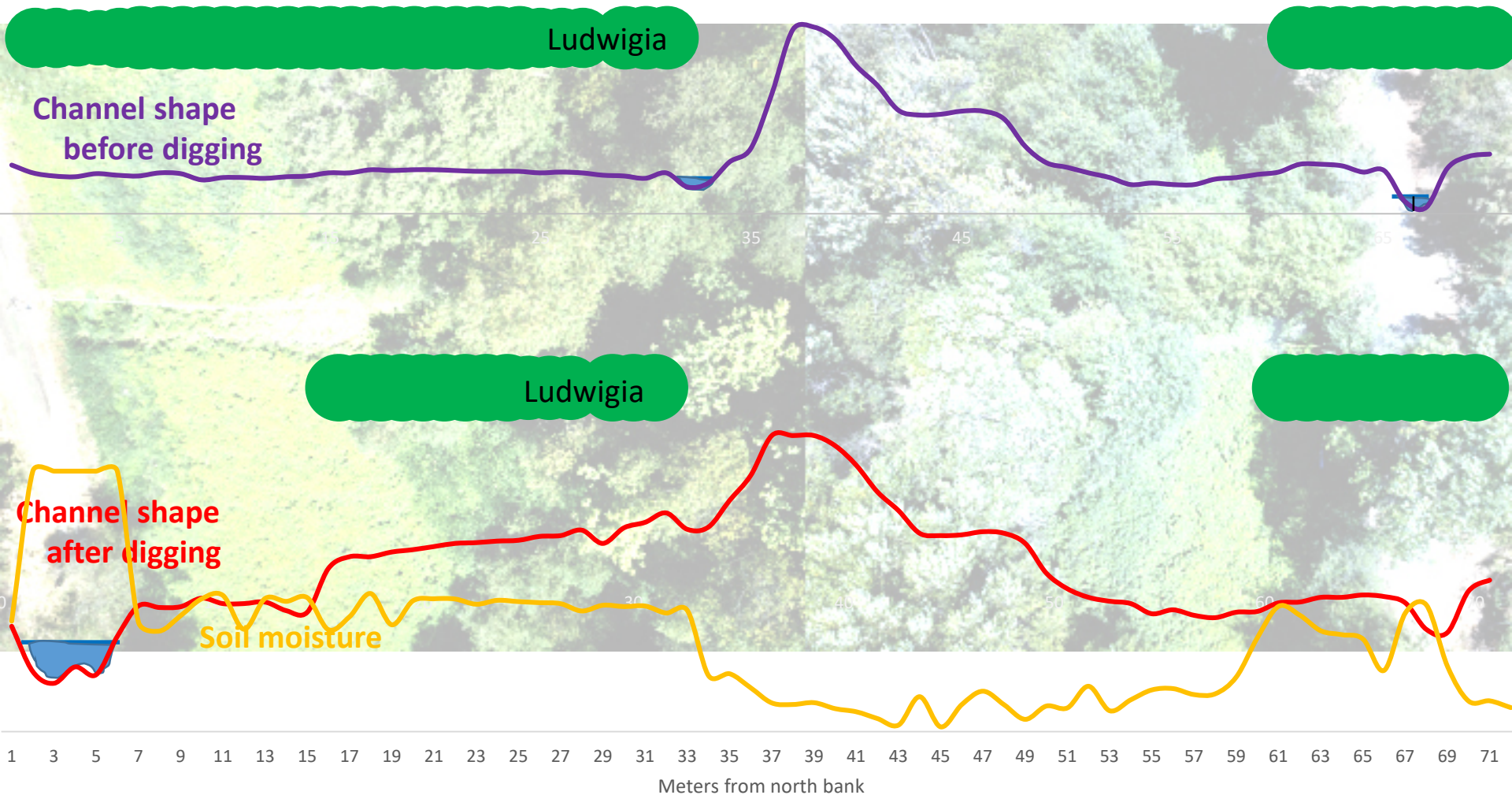
Site 2



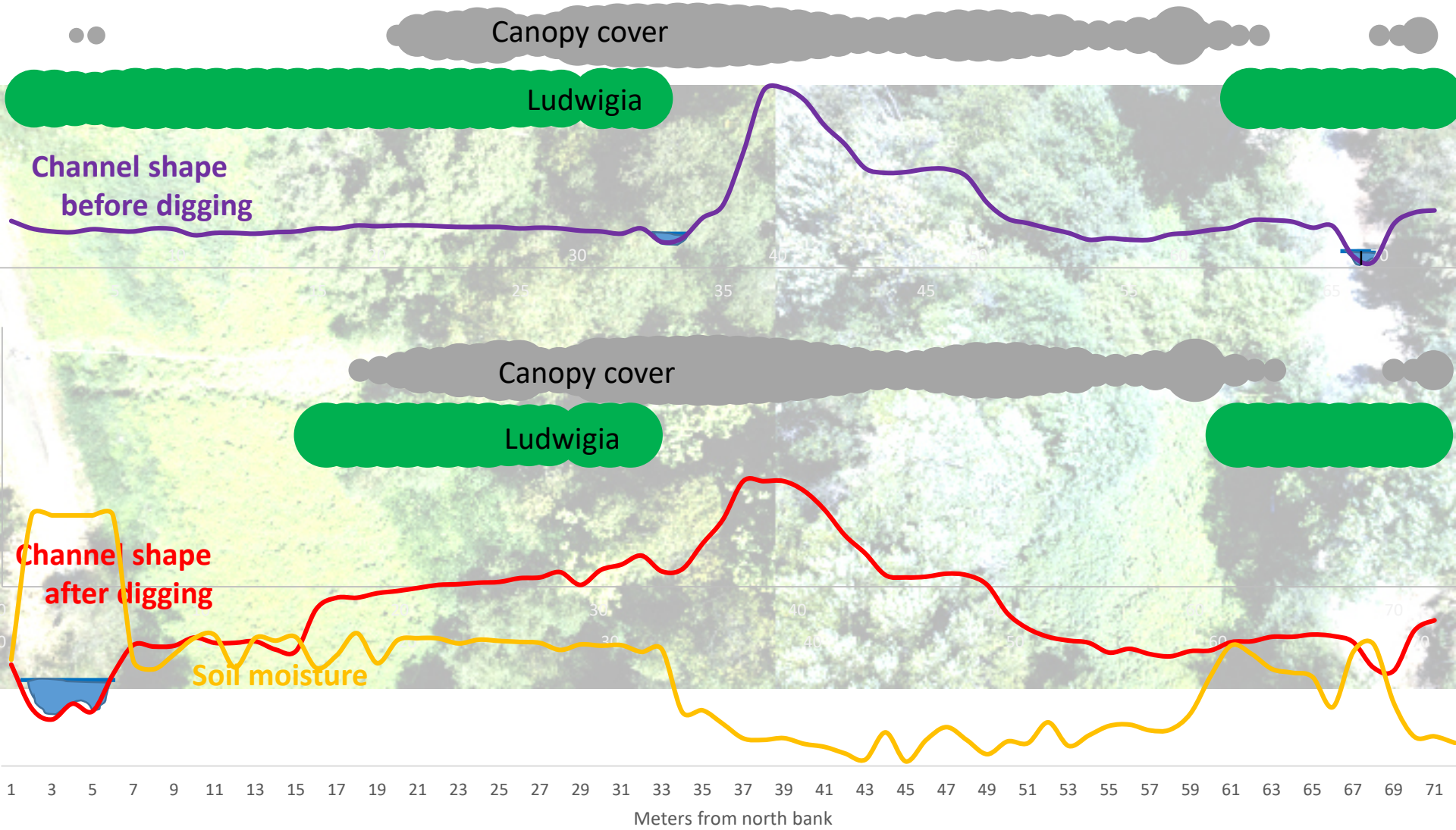
Site 2



Site 2



Site 2





Stony Point Rd

Castagnasso Rd

Rohnert Park Expy

Bellevue-Wilfred Channel

Rosa

4

Laguna de Santa Rosa

Rohnert Park Expy

Santa Rosa
Pumpkin Patch

South Laguna
Discovery Trail

Stony Point Rd

Rohnert Park Expy

Five Creek

Ran

downstream

upstream

Stony Point Rd

Site 4





Site 4



South

North

Site 4



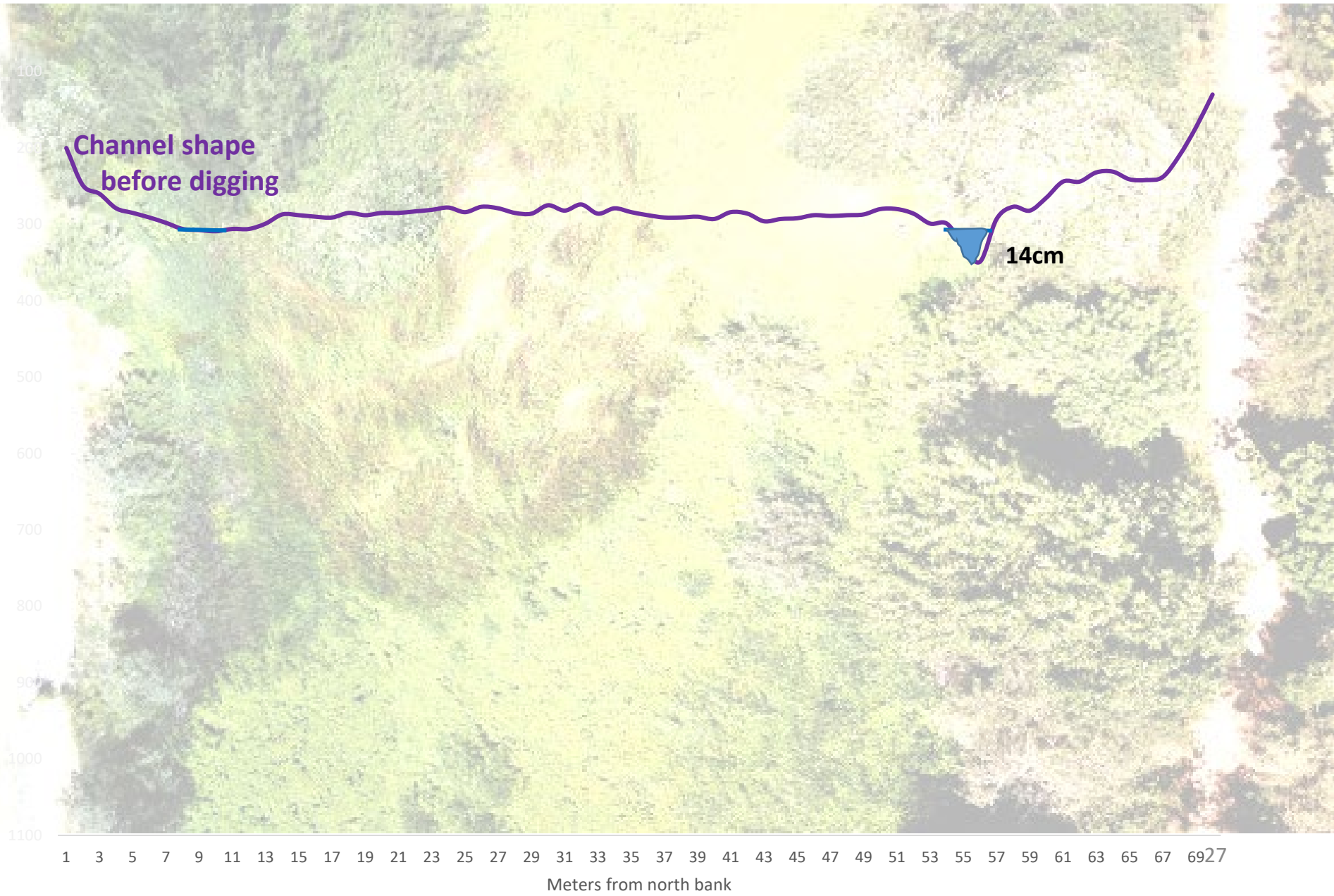
1100

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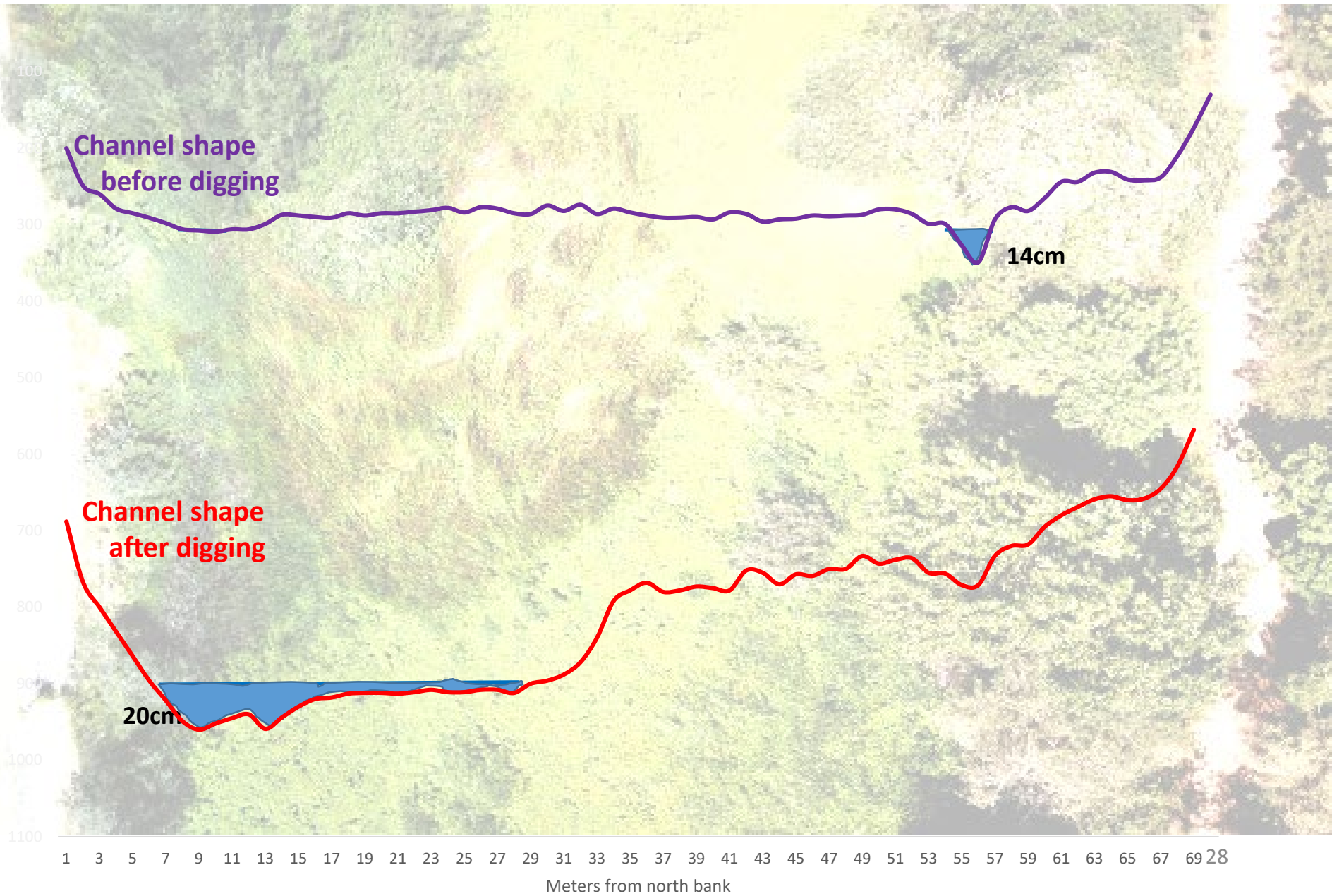
Meters from north bank

-0.5

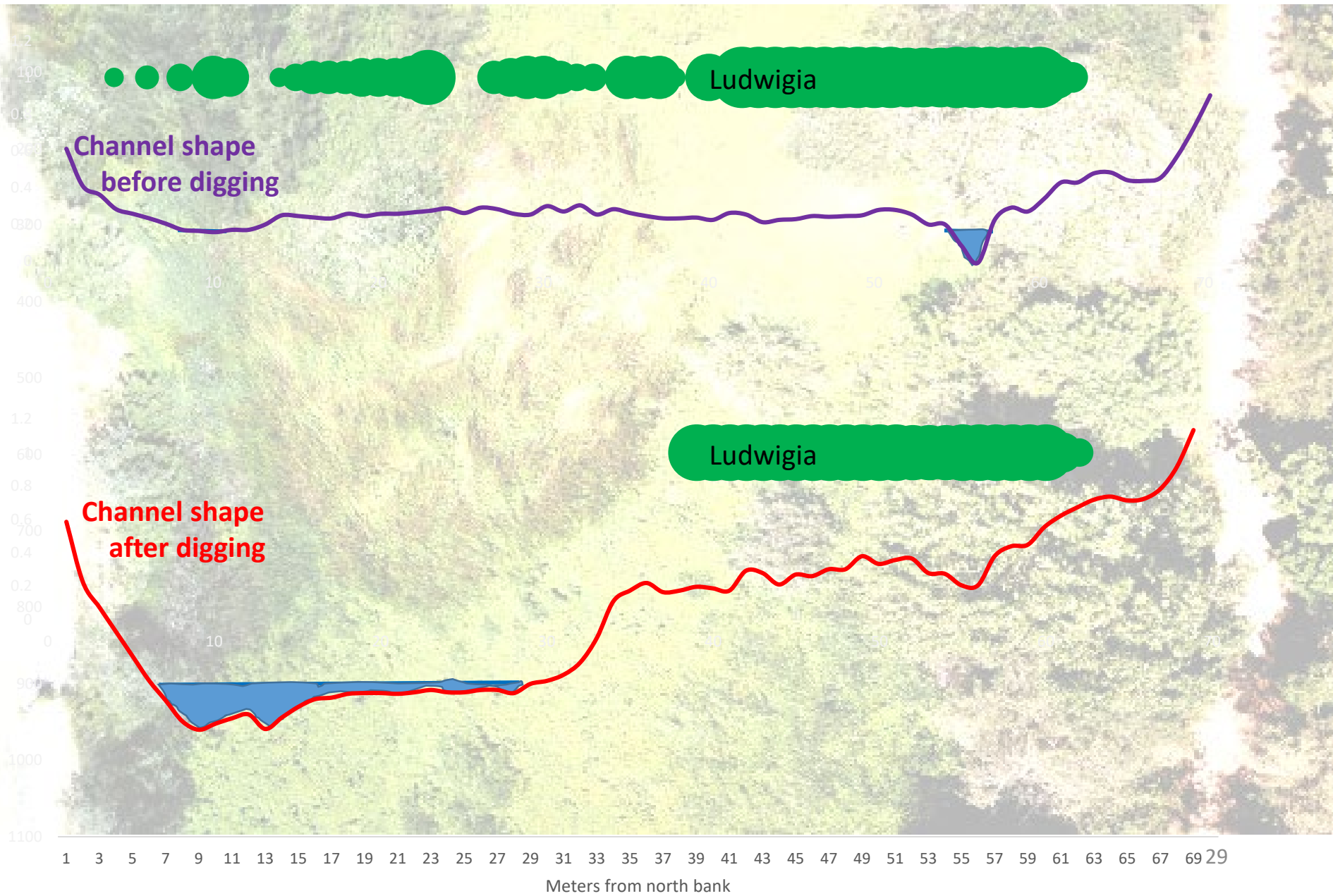
Site 4



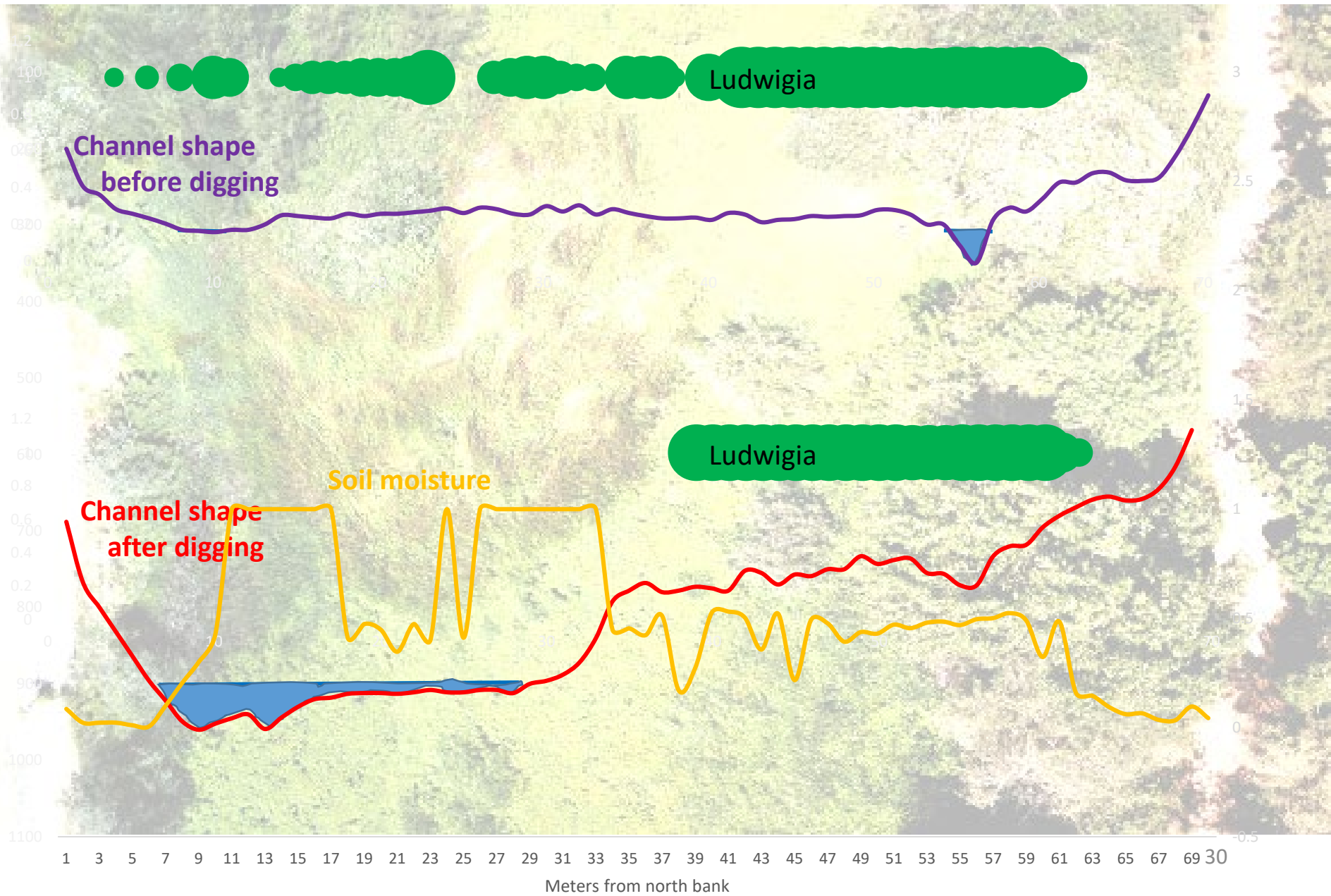
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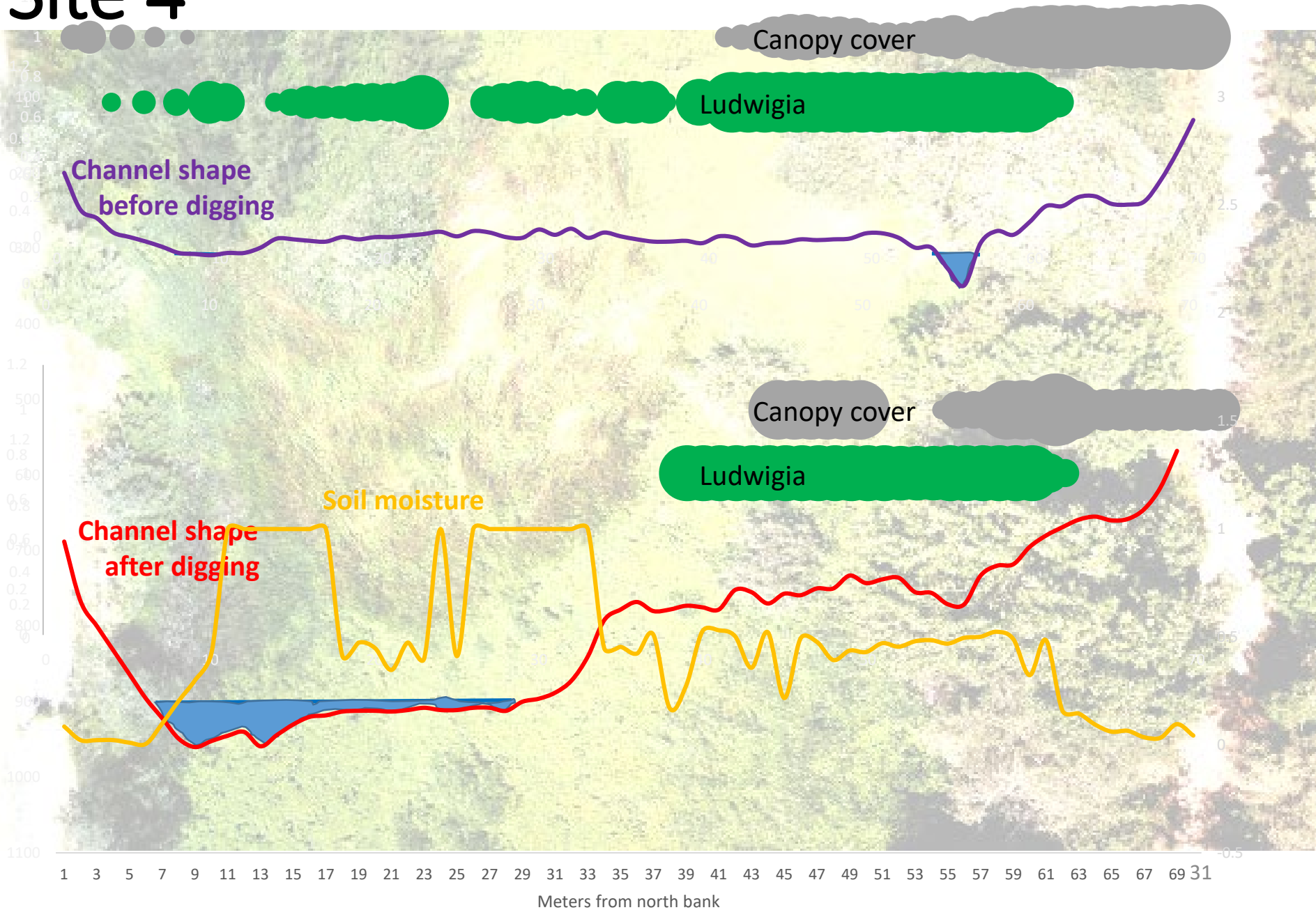
Site 4



Site 4



Site 4





Stony Point Rd

Castagnasso Rd

Rohnert Park Expy

Bellevue-Wilfred Channel

Rosa

Santa Rosa
Pumpkin Patch

South Laguna
Discovery Trail

Laguna de Santa Rosa

Rohnert Park Expy

Rohnert Park Expy

Five Creek

Ran

downstream

upstream

Stony Point Rd

Stony Point Rd

Site 5

Rohnert Park Expressway

East

West



Site 5



Site 5



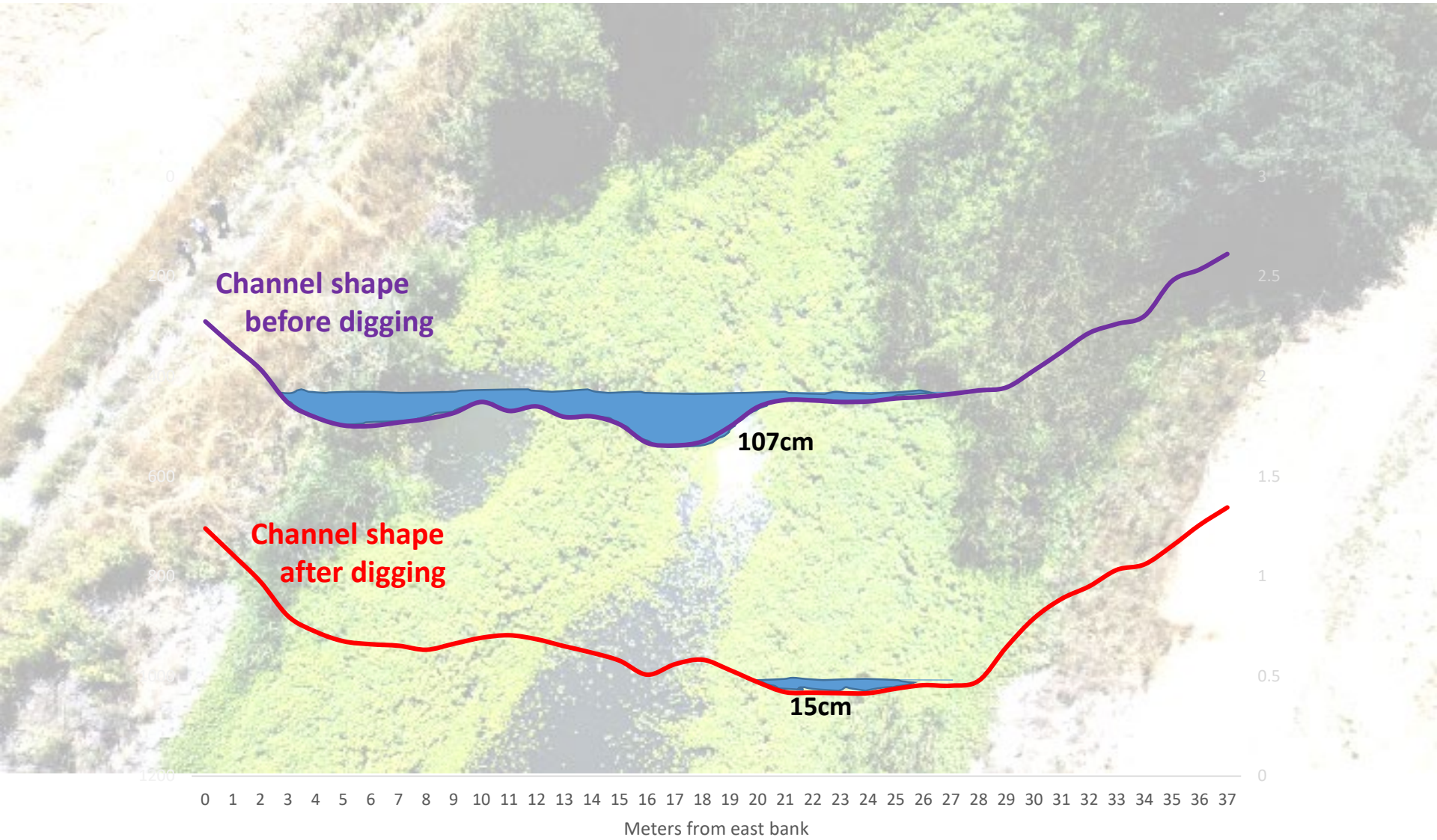
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Meters from east bank

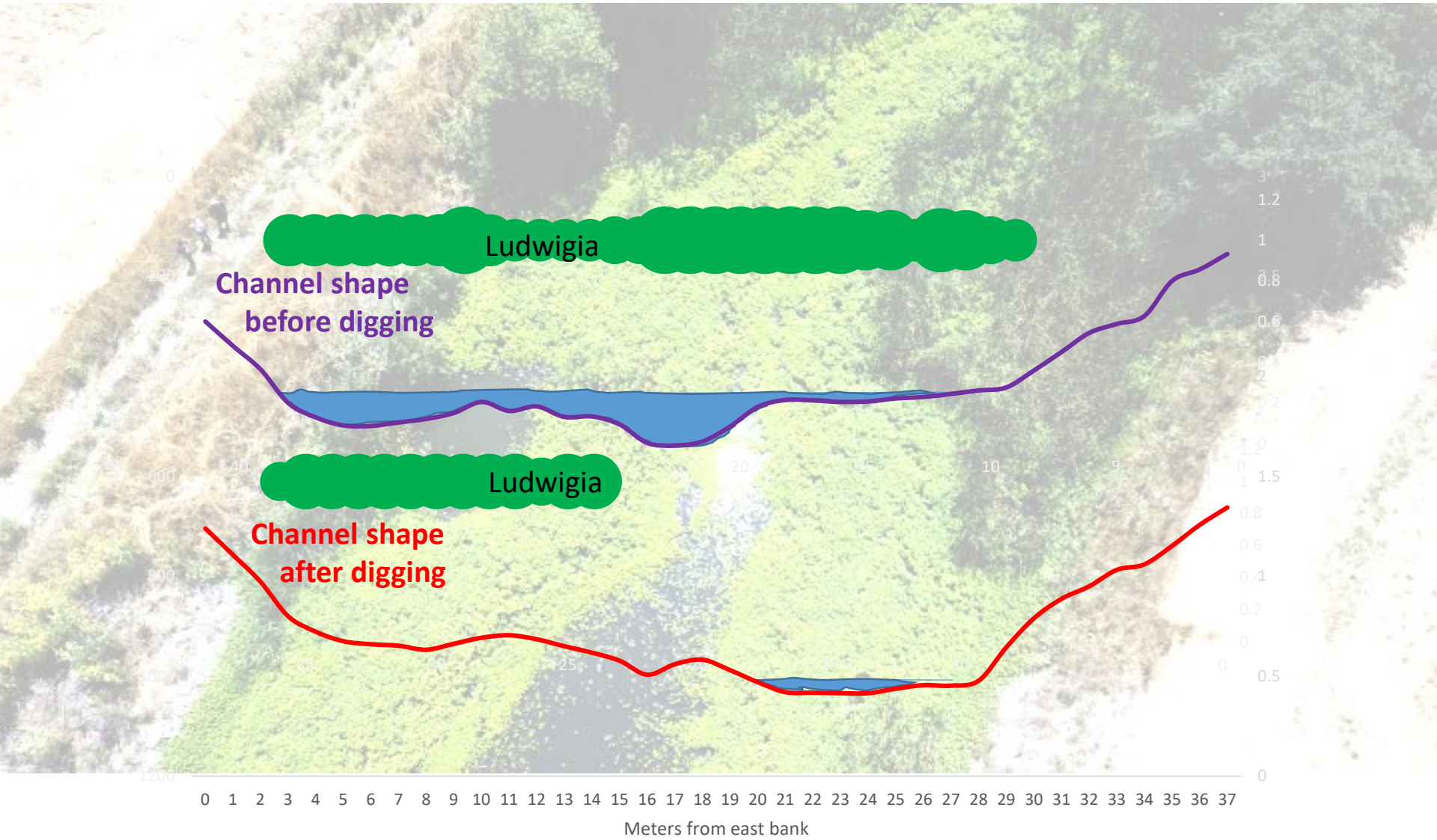
Site 5



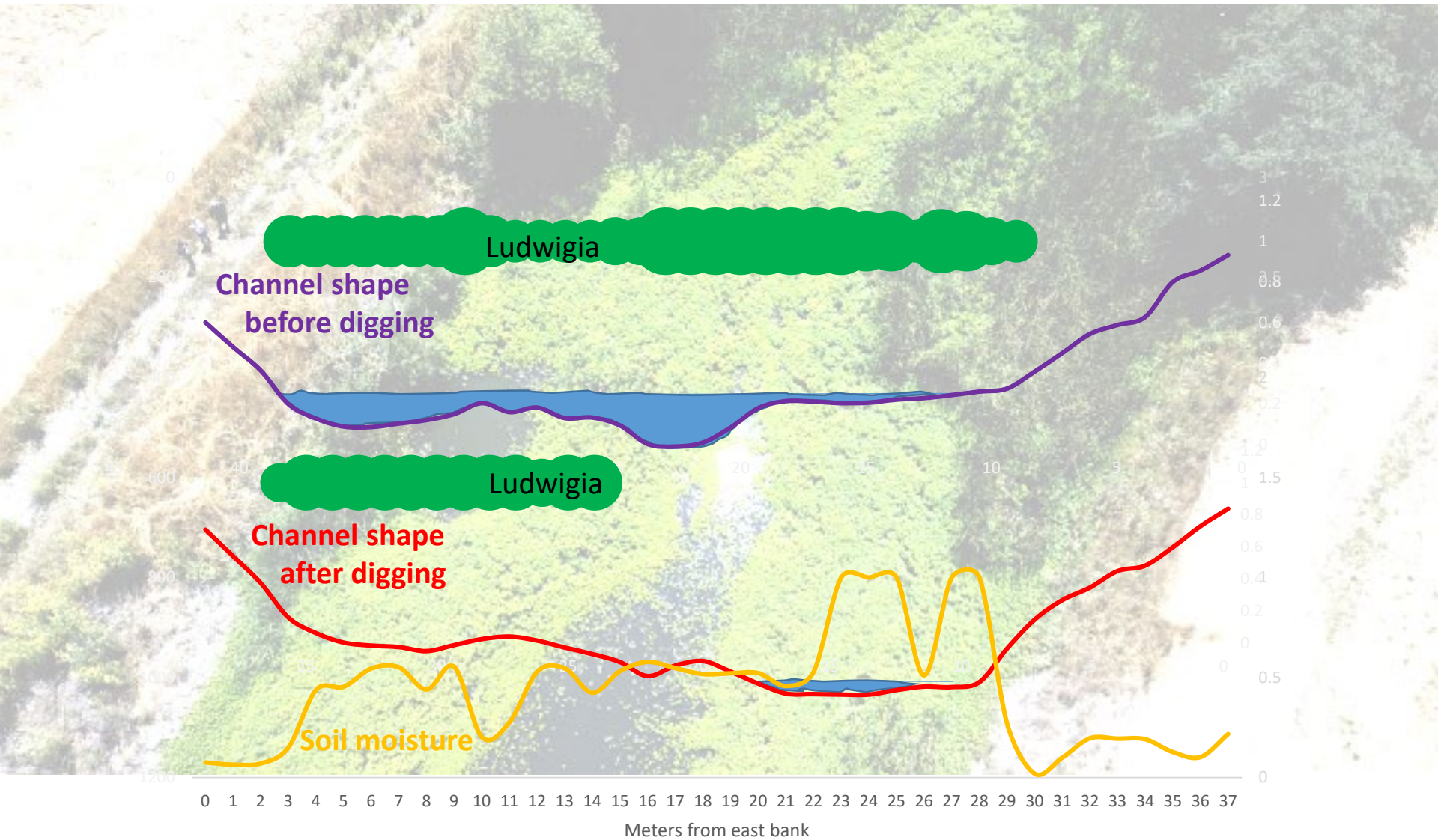
Site 5



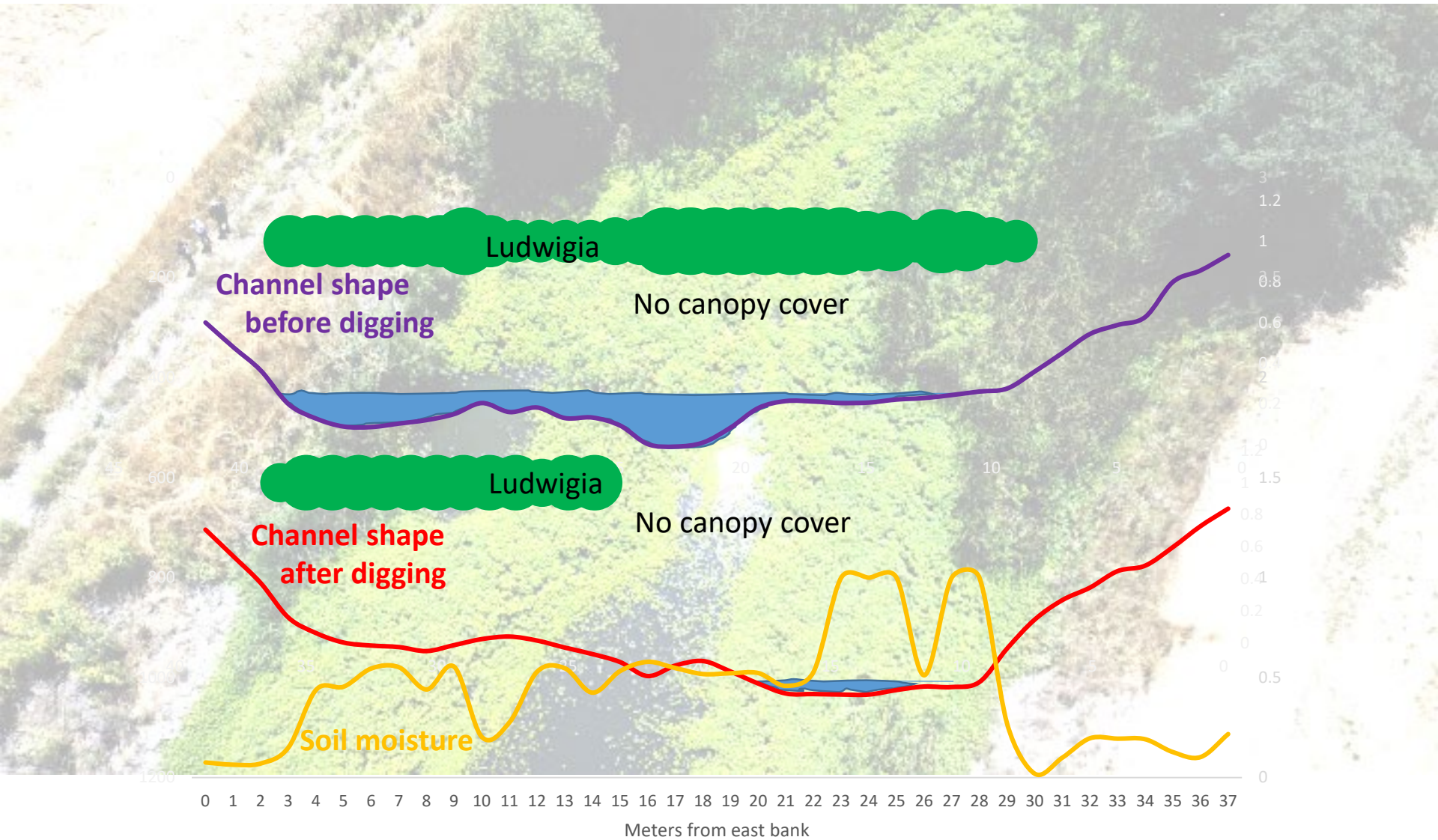
Site 5



Site 5



Site 5





Stony Point Rd

Castagnasso Rd

Rohnert Park Expy

Bellevue-Wilfred Channel

Rosa

Santa Rosa
Pumpkin Patch

Southern Laguna
Discovery Trail

Laguna de Santa Rosa

Rohnert Park Expy

Rohnert Park Expy

Five Creek

Ran

6

downstream

upstream

Stony Point Rd

Stony Point Rd

Site 6



Site 6

Upstream of digging: no change expected



1100

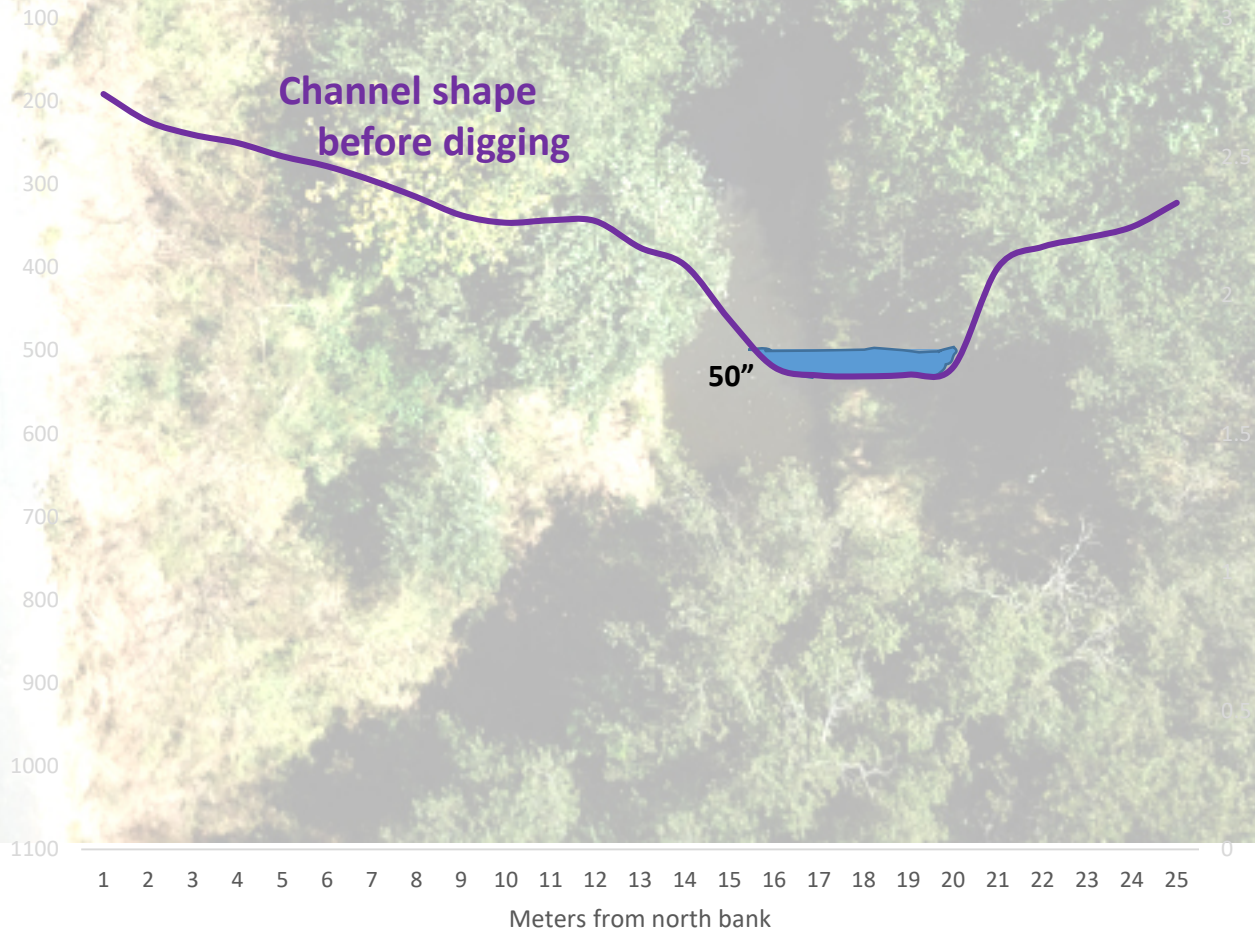
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

Meters from north bank

-0.5

Site 6

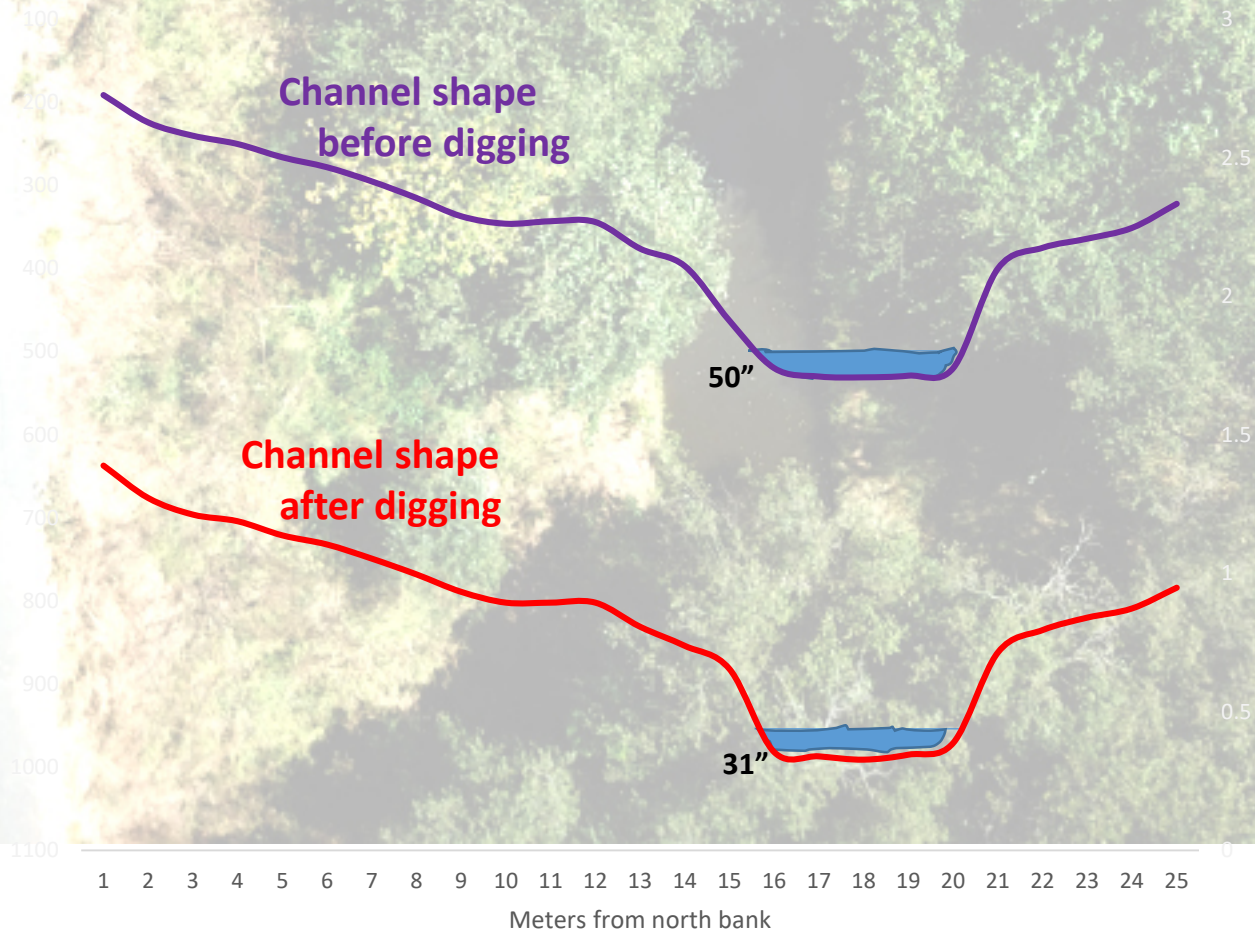
Upstream of digging: no change expected



Site 6

Upstream of digging: no change expected

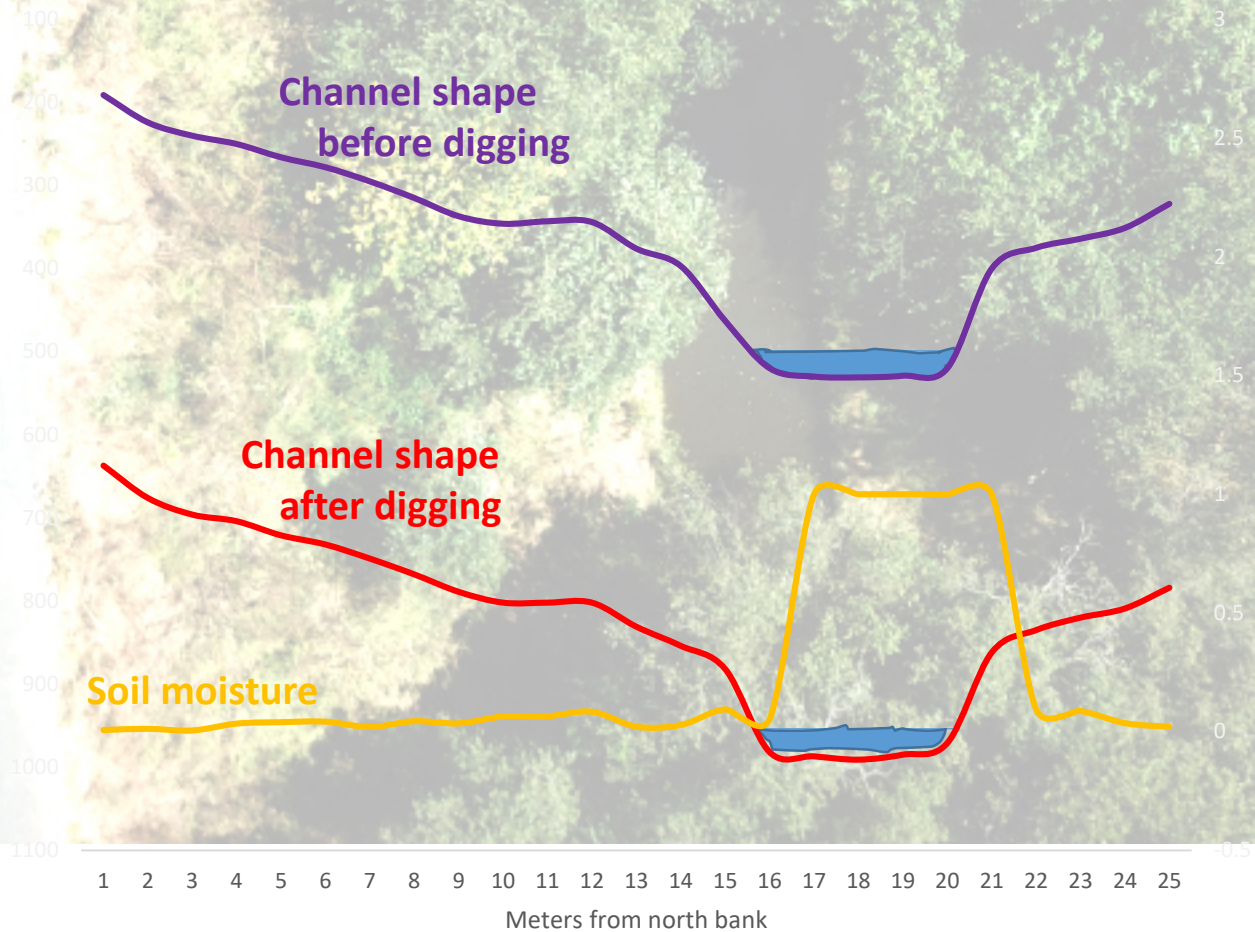
No Ludwigia



Site 6

Upstream of digging: no change expected

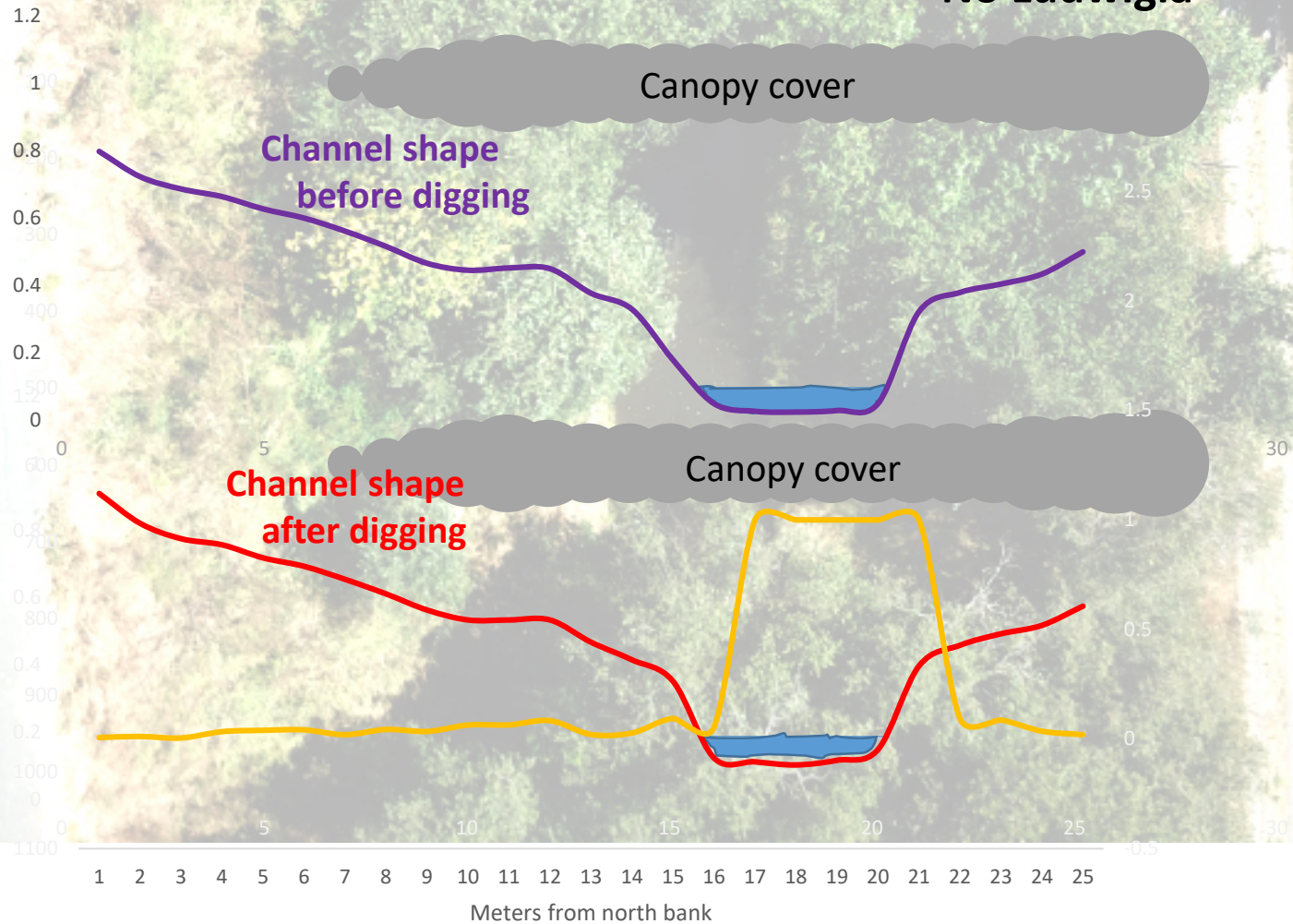
No Ludwigia



Site 6

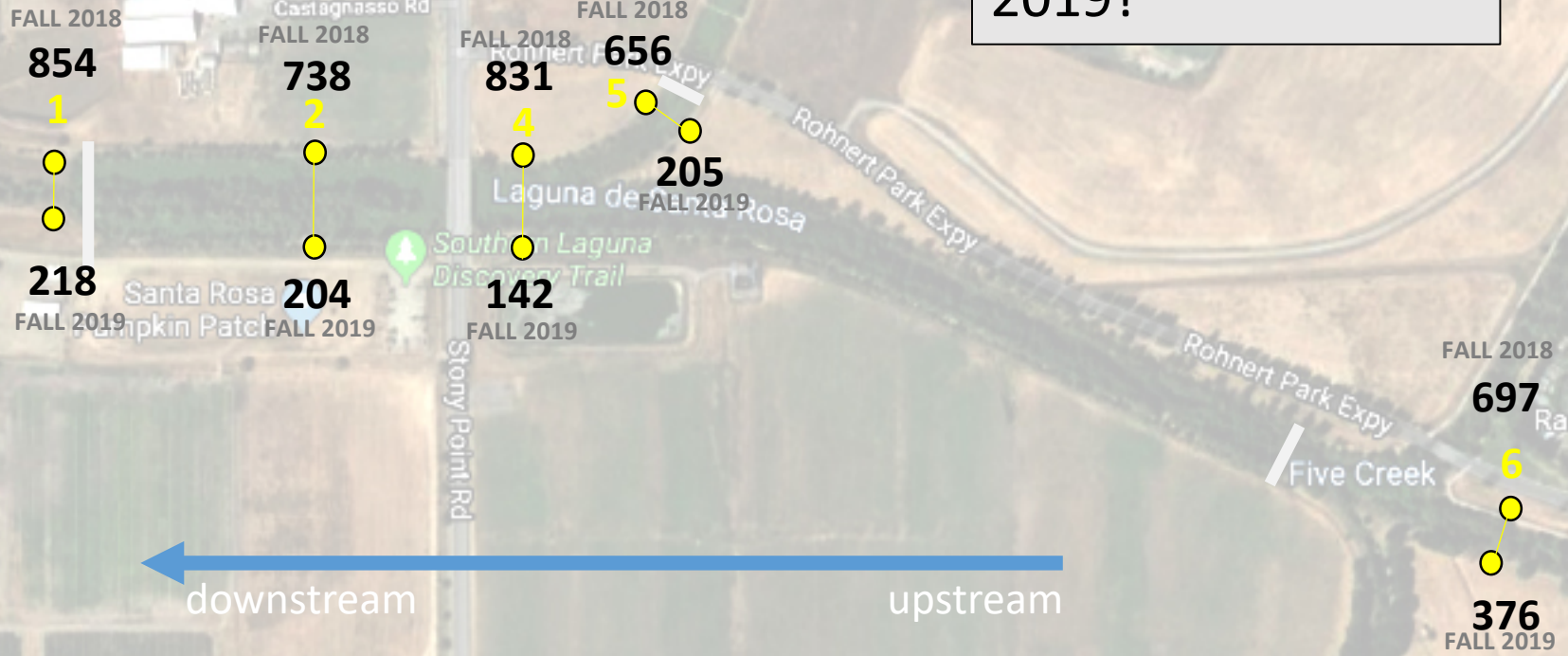
Upstream of digging: no change expected

No Ludwigia



Phosphorus Levels

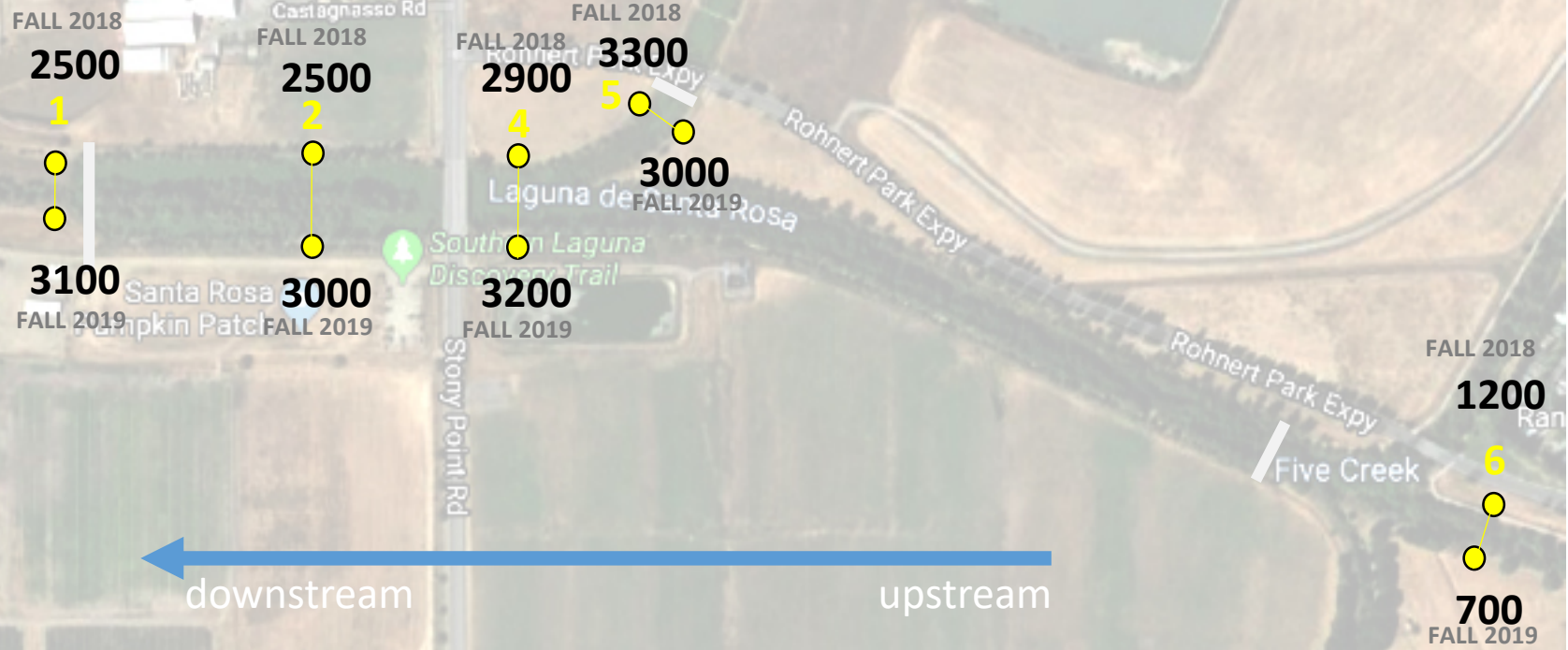
Phosphorus levels were consistently higher in 2018 than 2019?



all units mg/kg

Nitrogen Levels

Phosphorus levels were consistently lower upstream (site 6)



all units mg/kg

Ongoing Work

- Observe if flooding during the rainy season changes the shape of the channel
- Every semester
 - Drone flights over the transects
 - Monitor levels of nitrogen and phosphorus in sediment
 - Channel topography, water depth, soil moisture, canopy cover, plant identification
 - Water temperature and flow velocity?
- Predict where *Ludwigia* will and will not be able to grow back

Acknowledgements

- Chase Takajo and Mike Thompson, Sonoma Water
- Matt Clarke, GEP
- Denise Cadman and Rachel McCormick, Laguna Treatment Plant
- Funding provided by the SSU WATERS Collaborative and the Koret Foundation



nitrogen	Site 1	Site 2	Site 4	Site 5	Site 6	
Fall 2019	3100	3000	3200	3000	700	
Fall 2018	2500	2500	2900	3300	1200	
Fall 2017		1600, 2700, 4400, 2100, 1900, 2200, 2100, 2000, 4400, 3300, 2100, 2200, 5000, 2800, 3100, 2400, 2100, 1277, 3300, 1800, 2400, 2300, 2100, 4900, 1500, 3200, 2500, 3000				
Spring 2017		5100, 3700				
Fall 2016		910, 1400				
phosphorus	Site 1	Site 2	Site 4	Site 5	Site 6	
Fall 2019	218	204	142	205	376	
Fall 2018	854	738	831	656	697	
Fall 2017		445, 294, 654, 657, 739, 878, 716, 734, 724, 863, 784, 927, 1160, 902, 776, 707, 931, 773, 866, 767, 860, 1010, 1050, 833, 775, 727, 678, 835, 1070, 861, 818				
Spring 2017		807, 787				
Fall 2016		400, 517				