RIPPLE
Natural Resources LLC

FROM: Matt Murawski, PE
TO: Brett Grabowski
DATE: July 20, 2022

SUBJECT: **Hydraulic Evaluation Summary**
Proposed Patrick Brook Culvert

SUMMARY

Ripple evaluated the performance of a proposed culvert that would convey Patrick Brook under a new town road parallel to Rte 116, connecting the Hinesburg Center II (HCII) development with Haystack development on the other side.

The proposed culvert is a 20'-wide x 6'-high concrete box culvert with upstream and downstream headwalls and wingwalls. It would fully spans the 16'-wide natural bankfull channel width. It would be recessed into the channel to provide a natural bottom. As analyzed, the culvert is 59' long, which is sufficiently long to provide two vehicle lanes, generous shoulders for bicycle lanes, curbs, and at least one sidewalk.

The analysis shows that the proposed culvert (and associated roadway fill for the approaches on either side) does not raise the water surface elevation of Patrick Brook during the 100-year baseflood, and therefore complies with the hydraulic requirements of the National Flood Insurance Program (NFIP) and associated Town of Hinesburg regulations.

MODELING APPROACH

Overview. Hydraulic analysis was performed using the HEC-RAS version 5.0.70 computer program, developed by the US Army Corps of Engineers. The program computes a wide range of hydraulic variables for each peak discharge simulated including water surface elevation, velocity, and shear stress. We modeled the site in one dimensions (1D) to be consistent with most previous studies of Patrick Brook. The analysis extends from the LaPlatte River at the downstream end to Rte 116 at the upstream end.

Cross Sections. The cross sectional geometry of the channel and surrounding floodplain of the study area was based on LiDAR topography acquired 10/31/2014. This data was used to represent existing conditions. The data provide elevation values on a 0.7m grid. The geometry includes the HCI development and the Town water/sewer lines that are located downstream. Portions of selected cross sections in the model were blocked to represent future fill due to the proposed HCII development.

Roughness. Manning's n-values were assigned based on inspection of the channel and floodplain and standard reference values. The channel was assigned an n-value of 0.045 and the floodplain 0.06.

Hydraulic Structures. Under starting conditions, no structures are present in the study area (Rte 116 is just upstream).

Boundary Conditions. External boundary conditions were established at the downstream and upstream model limits. At the downstream limit, starting water surface elevations were based on the FEMA Flood Insurance Study of the brook. At the upstream limit, starting elevation was set to critical depth.

Flow. Flows for the 100-yr, 50-yr, and 10-yr events were taken from the FEMA FIS. Flow for the 2-year event was taken from USGS Streamstats (adjusted to reflect upstream diversions). The flows are as follows:

Event	Flow (cfs)
100-yr	271 cfs
50-yr	243
10-yr	178
2-yr	74

Computational Methods. The model was run in "Mixed" flow regime to allow calculation of both sub and supercritical flows.

RESULTS

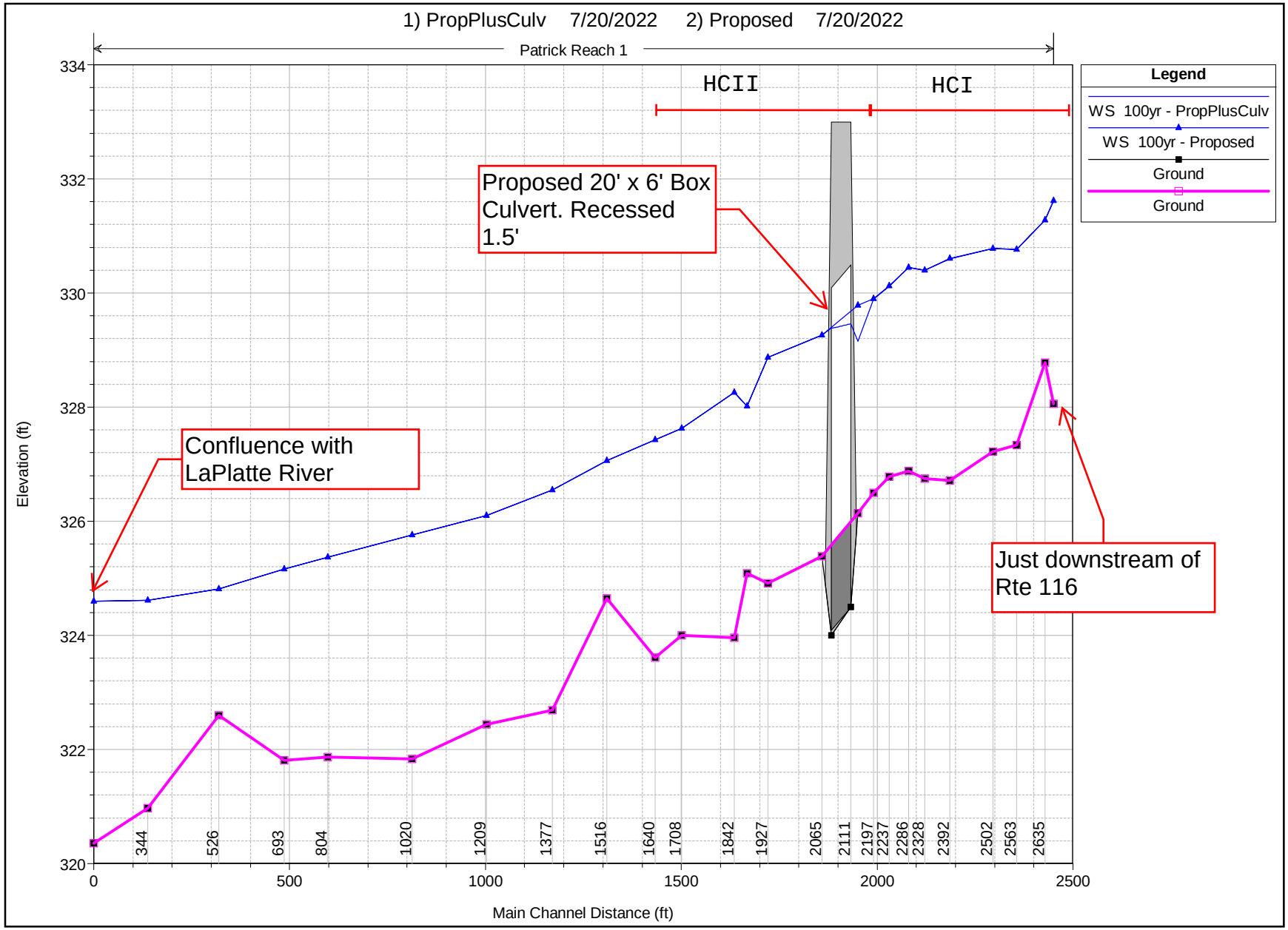
The addition of the culvert and the roadway approaches on either side do not raise the water surface elevation of Patrick Brook during the 100-year baseflood event (or any of the other flows analyzed). Due to an increase in velocity near the culvert entrance, there is in fact a minor reduction in flood elevation immediately upstream, and then no change further on. The water surface elevation upstream of the inlet is approximately 4.0 feet above the inlet.

DESIGN RECOMMENDATIONS

1. Culvert width should be 20' (as modeled), or greater
2. Culvert height should be 6' or greater.
3. The culvert should be recessed to provide a natural bottom consistent with Vermont Agency of Natural Resources permit requirements. It was recessed 1.5' in the model, leaving 4.5' clear.
4. Headwalls and wingwalls should be included upstream and down to provide the modeled hydraulic conditions.
5. Culvert slope should approximate natural channel (0.008 ft/ft, as modeled)
6. If the road over the culvert is to include a sag, it should be located to the side of the culvert so that overflow in the event of an extreme flood event is not concentrated on the structure.

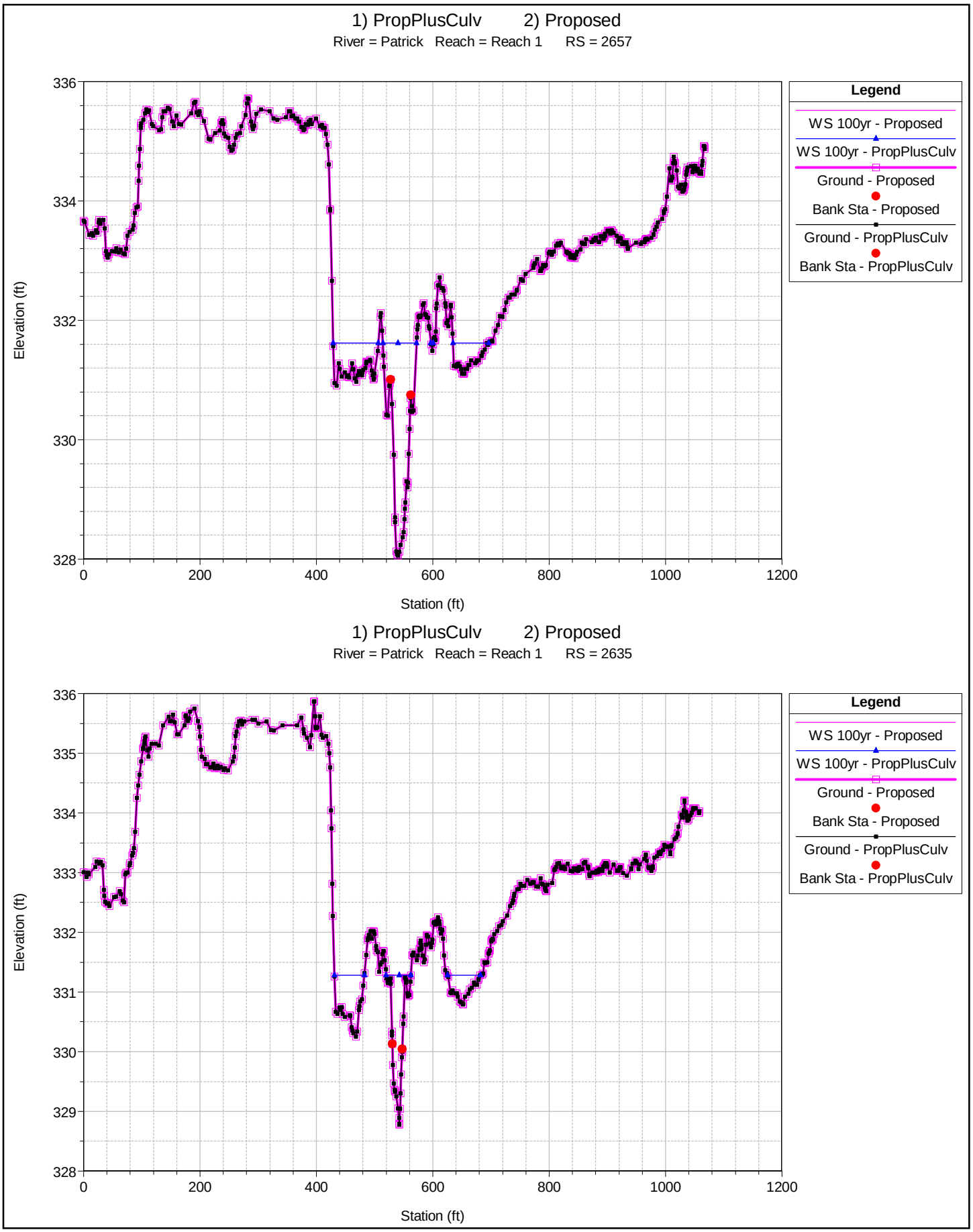
ATTACHMENTS

HEC-RAS model output (profile, cross sections, and summary table) are attached.


1) PropPlusCulv 7/20/2022 2) Proposed 7/20/2022
Patrick Reach 1
HCII
HCI
Legend
WS 100yr - PropPlusCulv
WS 100yr - Proposed
Ground
Ground
Proposed 20' x 6' Box Culvert. Recessed 1.5'
Confluence with LaPlatte River
Just downstream of Rte 116
Elevation (ft)
Main Channel Distance (ft)
334
332
330
328
326
324
322
320
0
500
1000
1500
2000
2500
344
526
693
804
1020
1209
1377
1516
1640
1708
1842
1927
2065
2111
2197
2237
2286
2328
2392
2502
2563
2635

HEC-RAS River: Patrick Reach: Reach 1 Profile: 100yr

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	2657	100yr	PropPlusCulv	271.0	328.1	331.62	330.1	331.7	0.001691	2.5	163.4	201.8	0.3
Reach 1	2657	100yr	Proposed	271.0	328.1	331.62	330.1	331.7	0.001691	2.5	163.4	201.8	0.3
Reach 1	2635	100yr	PropPlusCulv	271.0	328.8	331.28	331.3	331.6	0.011210	5.4	89.2	150.9	0.7
Reach 1	2635	100yr	Proposed	271.0	328.8	331.28	331.3	331.6	0.011210	5.4	89.2	150.9	0.7
Reach 1	2563	100yr	PropPlusCulv	271.0	327.3	330.77	329.4	330.9	0.002728	3.4	96.4	143.1	0.4
Reach 1	2563	100yr	Proposed	271.0	327.3	330.77	329.4	330.9	0.002720	3.4	96.5	143.4	0.4
Reach 1	2502	100yr	PropPlusCulv	271.0	327.2	330.78	328.6	330.8	0.000625	1.7	167.8	187.5	0.2
Reach 1	2502	100yr	Proposed	271.0	327.2	330.78	328.6	330.8	0.000624	1.7	167.9	188.1	0.2
Reach 1	2392	100yr	PropPlusCulv	271.0	326.7	330.60	329.3	330.7	0.002139	2.9	124.0	195.1	0.3
Reach 1	2392	100yr	Proposed	271.0	326.7	330.60	329.3	330.7	0.002133	2.9	124.2	195.3	0.3
Reach 1	2328	100yr	PropPlusCulv	271.0	326.8	330.40	329.4	330.5	0.003116	3.3	113.4	276.3	0.4
Reach 1	2328	100yr	Proposed	271.0	326.8	330.40	329.4	330.5	0.003095	3.3	113.7	276.6	0.4
Reach 1	2286	100yr	PropPlusCulv	271.0	326.9	330.45	328.6	330.5	0.000466	1.4	268.3	329.4	0.1
Reach 1	2286	100yr	Proposed	271.0	326.9	330.45	328.6	330.5	0.000464	1.4	268.6	329.6	0.1
Reach 1	2237	100yr	PropPlusCulv	271.0	326.8	330.12	329.3	330.4	0.005249	4.3	78.4	206.8	0.5
Reach 1	2237	100yr	Proposed	271.0	326.8	330.12	329.3	330.4	0.005200	4.3	78.8	208.0	0.5
Reach 1	2197	100yr	PropPlusCulv	271.0	326.5	329.89	329.5	330.2	0.006183	4.7	88.5	326.1	0.5
Reach 1	2197	100yr	Proposed	271.0	326.5	329.90	329.5	330.2	0.006033	4.7	89.6	328.0	0.5
Reach 1	2156 Br US	100yr	PropPlusCulv	271.0	326.1	329.15	328.8	329.8	0.013804	6.3	45.0	74.6	0.8
Reach 1	2156 Br US	100yr	Proposed	271.0	326.1	329.79	328.9	330.0	0.003451	3.8	113.7	107.1	0.4
Reach 1	2111			Culvert									
Reach 1	2065 Br DS	100yr	PropPlusCulv	271.0	325.4	329.26	328.1	329.6	0.004712	4.6	68.9	76.7	0.5
Reach 1	2065 Br DS	100yr	Proposed	271.0	325.4	329.26	328.1	329.6	0.004712	4.6	68.9	76.7	0.5
Reach 1	1927	100yr	PropPlusCulv	271.0	324.9	328.87		329.0	0.002849	3.5	114.5	137.7	0.4
Reach 1	1927	100yr	Proposed	271.0	324.9	328.87		329.0	0.002849	3.5	114.5	137.7	0.4
Reach 1	1875	100yr	PropPlusCulv	271.0	325.1	328.02	327.7	328.7	0.015323	6.7	43.9	61.1	0.8
Reach 1	1875	100yr	Proposed	271.0	325.1	328.02	327.7	328.7	0.015323	6.7	43.9	61.1	0.8
Reach 1	1842	100yr	PropPlusCulv	271.0	324.0	328.26	326.8	328.4	0.002252	3.0	124.3	121.8	0.3
Reach 1	1842	100yr	Proposed	271.0	324.0	328.26	326.8	328.4	0.002252	3.0	124.3	121.8	0.3
Reach 1	1708	100yr	PropPlusCulv	271.0	324.0	327.63	327.4	327.9	0.007095	4.8	90.6	98.1	0.5
Reach 1	1708	100yr	Proposed	271.0	324.0	327.63	327.4	327.9	0.007095	4.8	90.6	98.1	0.5
Reach 1	1640	100yr	PropPlusCulv	271.0	323.6	327.43	326.8	327.5	0.003135	3.1	126.1	106.7	0.4
Reach 1	1640	100yr	Proposed	271.0	323.6	327.43	326.8	327.5	0.003135	3.1	126.1	106.7	0.4
Reach 1	1516	100yr	PropPlusCulv	271.0	324.7	327.06	326.8	327.1	0.003908	3.1	184.6	754.8	0.4
Reach 1	1516	100yr	Proposed	271.0	324.7	327.06	326.8	327.1	0.003908	3.1	184.6	754.8	0.4
Reach 1	1377	100yr	PropPlusCulv	271.0	322.7	326.55	326.3	326.6	0.003268	3.2	188.7	759.2	0.4
Reach 1	1377	100yr	Proposed	271.0	322.7	326.55	326.3	326.6	0.003268	3.2	188.7	759.2	0.4
Reach 1	1209	100yr	PropPlusCulv	271.0	322.4	326.10	325.8	326.2	0.002485	2.8	215.6	893.7	0.3
Reach 1	1209	100yr	Proposed	271.0	322.4	326.10	325.8	326.2	0.002485	2.8	215.6	893.7	0.3
Reach 1	1020	100yr	PropPlusCulv	271.0	321.8	325.76	324.6	325.8	0.001517	2.4	233.5	527.4	0.3
Reach 1	1020	100yr	Proposed	271.0	321.8	325.76	324.6	325.8	0.001517	2.4	233.5	527.4	0.3
Reach 1	804	100yr	PropPlusCulv	271.0	321.9	325.37	324.3	325.5	0.002285	2.8	188.3	583.0	0.3
Reach 1	804	100yr	Proposed	271.0	321.9	325.37	324.3	325.5	0.002285	2.8	188.3	583.0	0.3
Reach 1	693	100yr	PropPlusCulv	271.0	321.8	325.17	324.6	325.2	0.001993	2.2	220.4	636.8	0.3
Reach 1	693	100yr	Proposed	271.0	321.8	325.17	324.6	325.2	0.001993	2.2	220.4	636.8	0.3
Reach 1	526	100yr	PropPlusCulv	271.0	322.6	324.81	324.5	324.9	0.003964	2.6	221.2	746.8	0.4
Reach 1	526	100yr	Proposed	271.0	322.6	324.81	324.5	324.9	0.003964	2.6	221.2	746.8	0.4
Reach 1	344	100yr	PropPlusCulv	271.0	321.0	324.62	323.4	324.6	0.000606	1.4	419.7	1103.9	0.2
Reach 1	344	100yr	Proposed	271.0	321.0	324.62	323.4	324.6	0.000606	1.4	419.7	1103.9	0.2
Reach 1	206	100yr	PropPlusCulv	271.0	320.4	324.60	323.3	324.6	0.000112	0.6	935.0	995.6	0.1
Reach 1	206	100yr	Proposed	271.0	320.4	324.60	323.3	324.6	0.000112	0.6	935.0	995.6	0.1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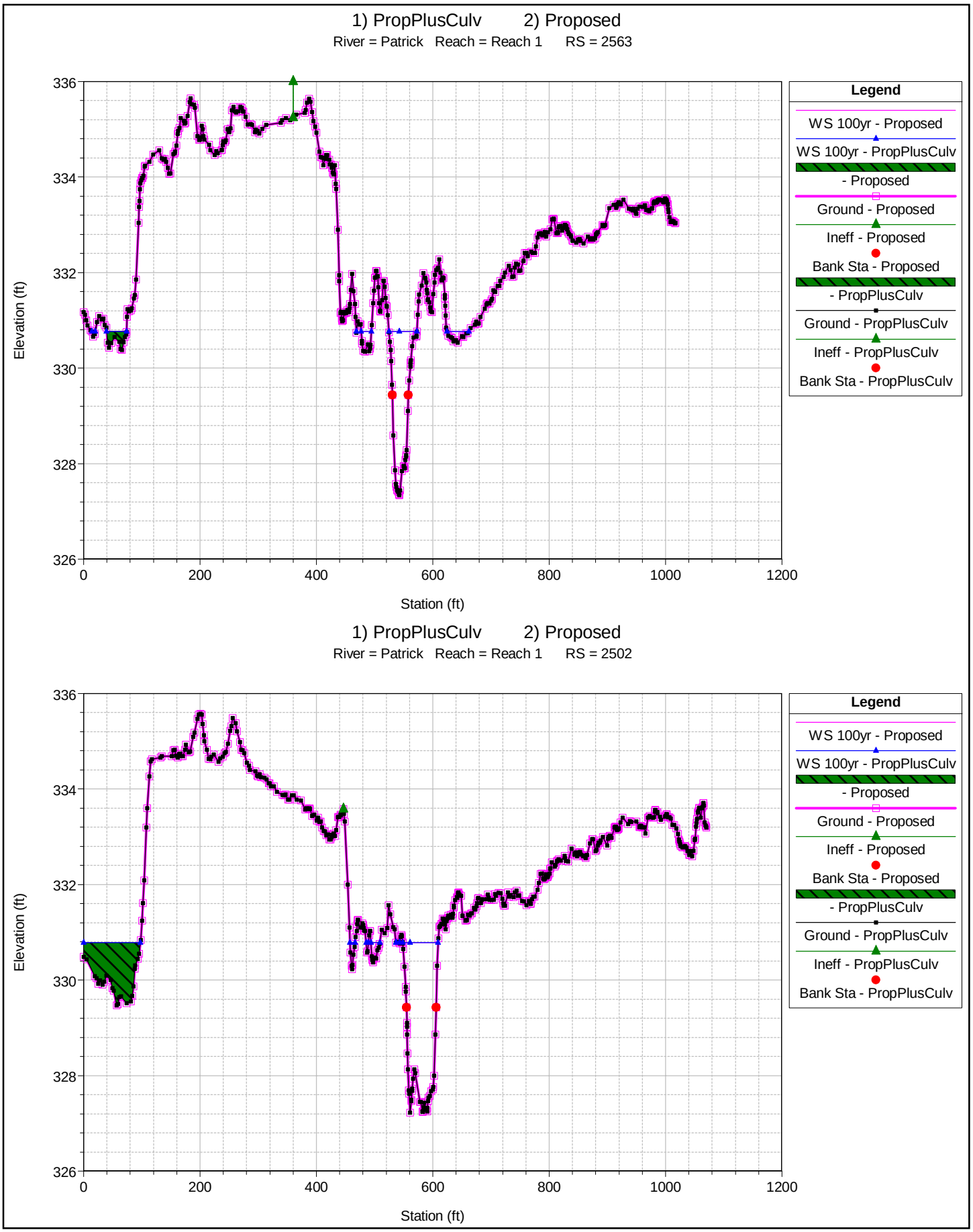
River = Patrick Reach = Reach 1 RS = 2657
Elevation (ft)
Station (ft)
Legend
WS 100yr - Proposed
WS 100yr - PropPlusCulv
Ground - Proposed
Bank Sta - Proposed
Ground - PropPlusCulv
Bank Sta - PropPlusCulv
1) PropPlusCulv 2) Proposed
River = Patrick Reach = Reach 1 RS = 2635
Elevation (ft)
Station (ft)
Legend
WS 100yr - Proposed
WS 100yr - PropPlusCulv
Ground - Proposed
Bank Sta - Proposed
Ground - PropPlusCulv
Bank Sta - PropPlusCulv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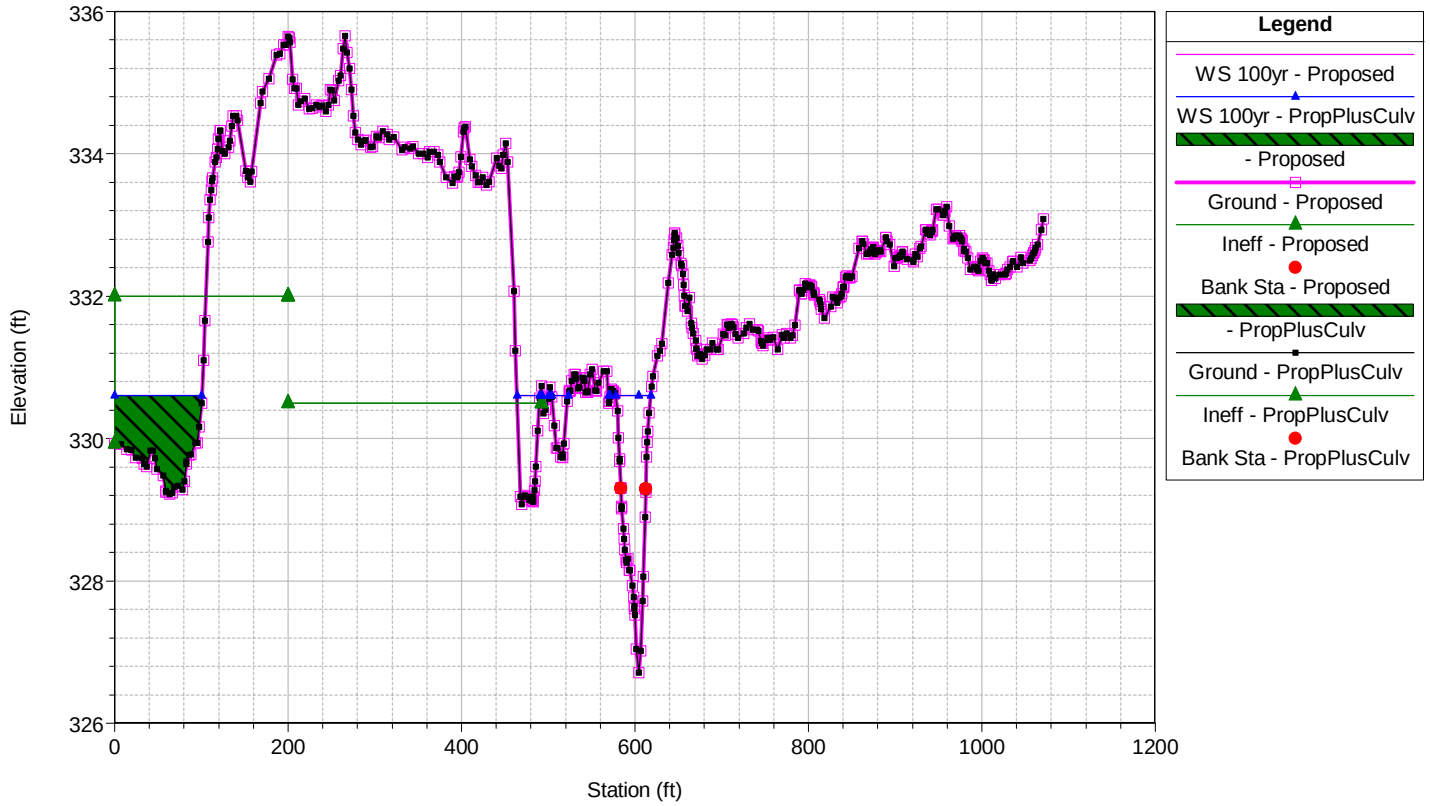
River = Patrick Reach = Reach 1 RS = 2563
Elevation (ft)
336
334
332
330
328
326
0
200
400
600
800
1000
1200
Station (ft)
Legend
WS 100yr - Proposed
WS 100yr - PropPlusCulv
- Proposed
Ground - Proposed
Ineff - Proposed
Bank Sta - Proposed
- PropPlusCulv
Ground - PropPlusCulv
Ineff - PropPlusCulv
Bank Sta - PropPlusCulv
1) PropPlusCulv 2) Proposed
River = Patrick Reach = Reach 1 RS = 2502
Elevation (ft)
336
334
332
330
328
326
0
200
400
600
800
1000
1200
Station (ft)
Legend
WS 100yr - Proposed
WS 100yr - PropPlusCulv
- Proposed
Ground - Proposed
Ineff - Proposed
Bank Sta - Proposed
- PropPlusCulv
Ground - PropPlusCulv
Ineff - PropPlusCulv
Bank Sta - PropPlusCulv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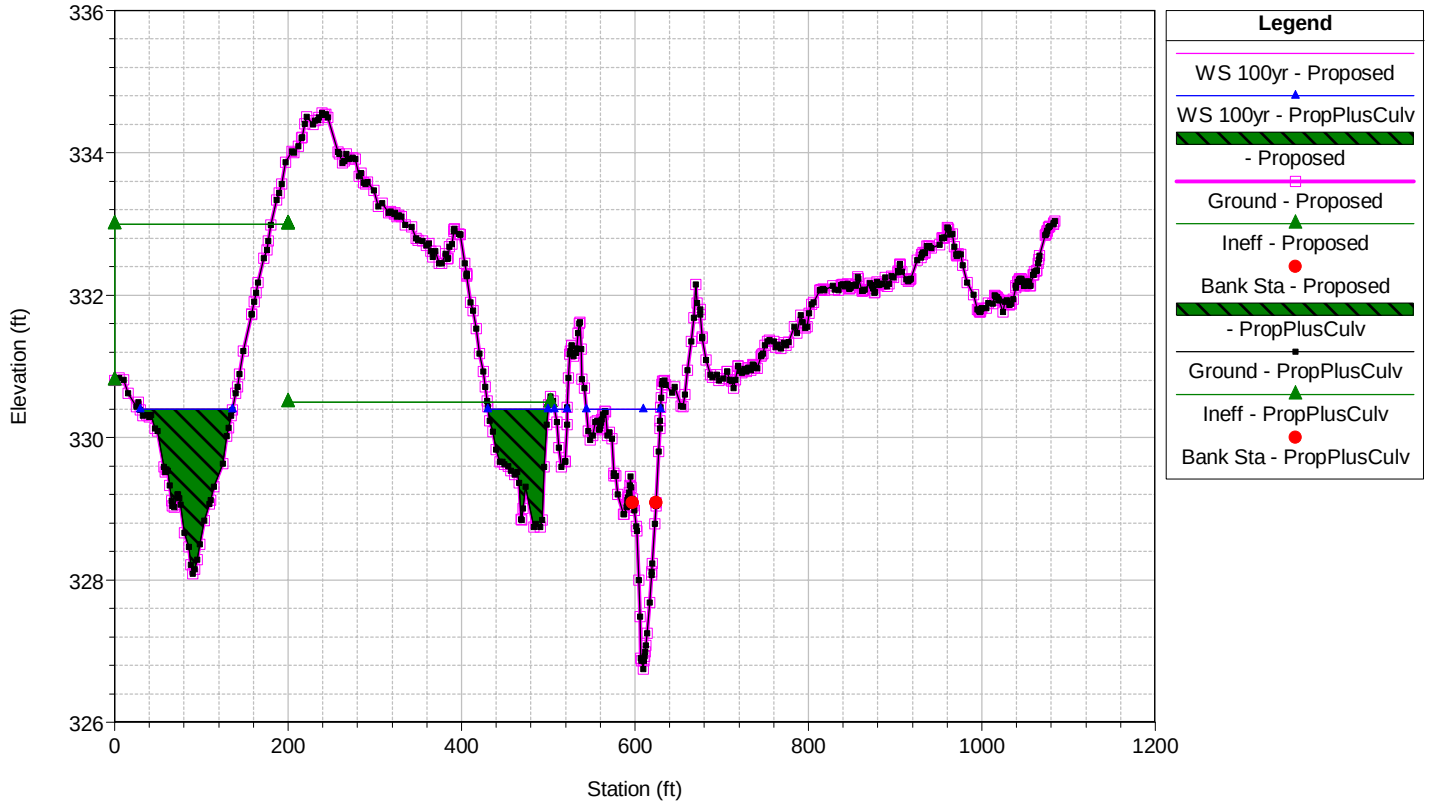
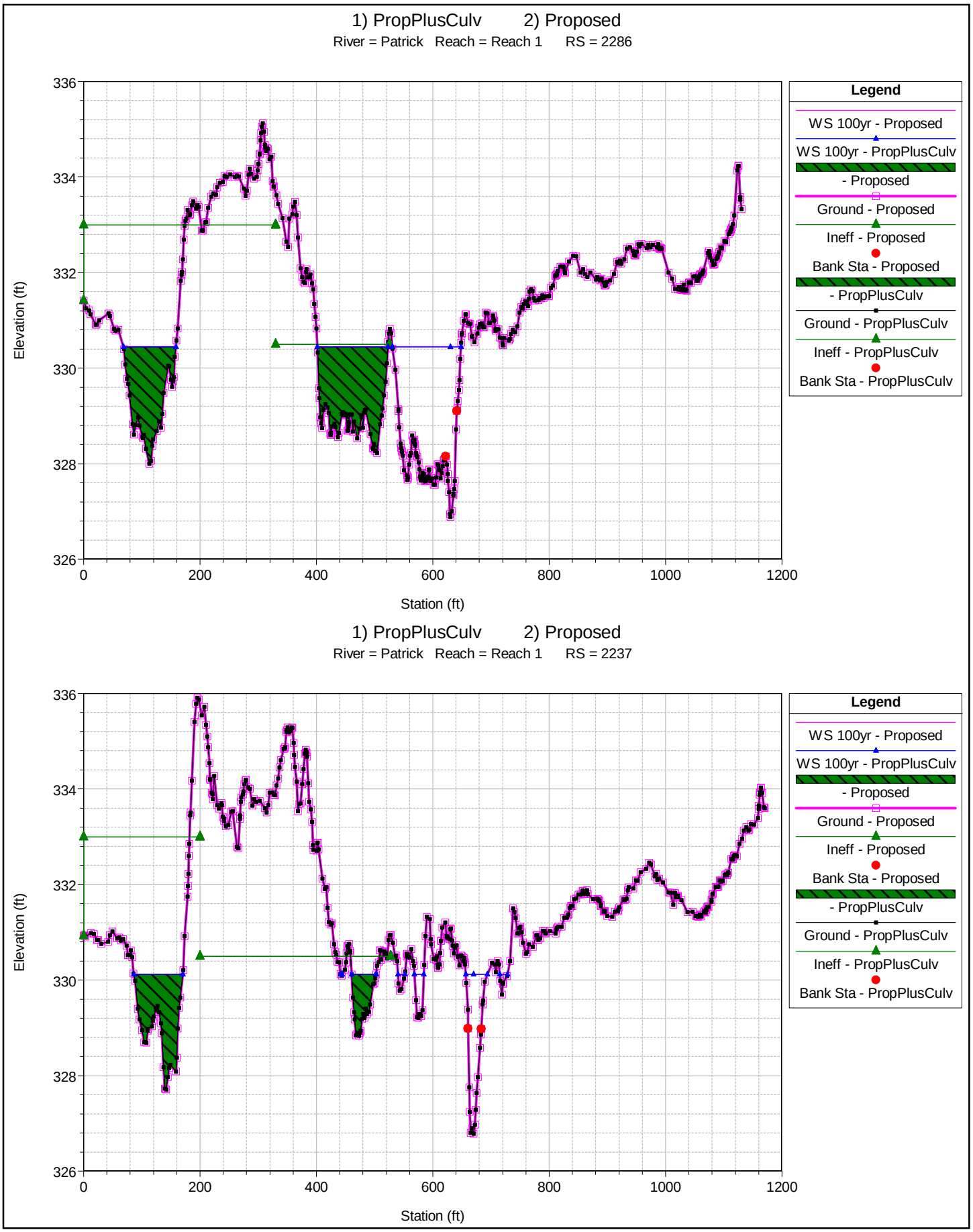
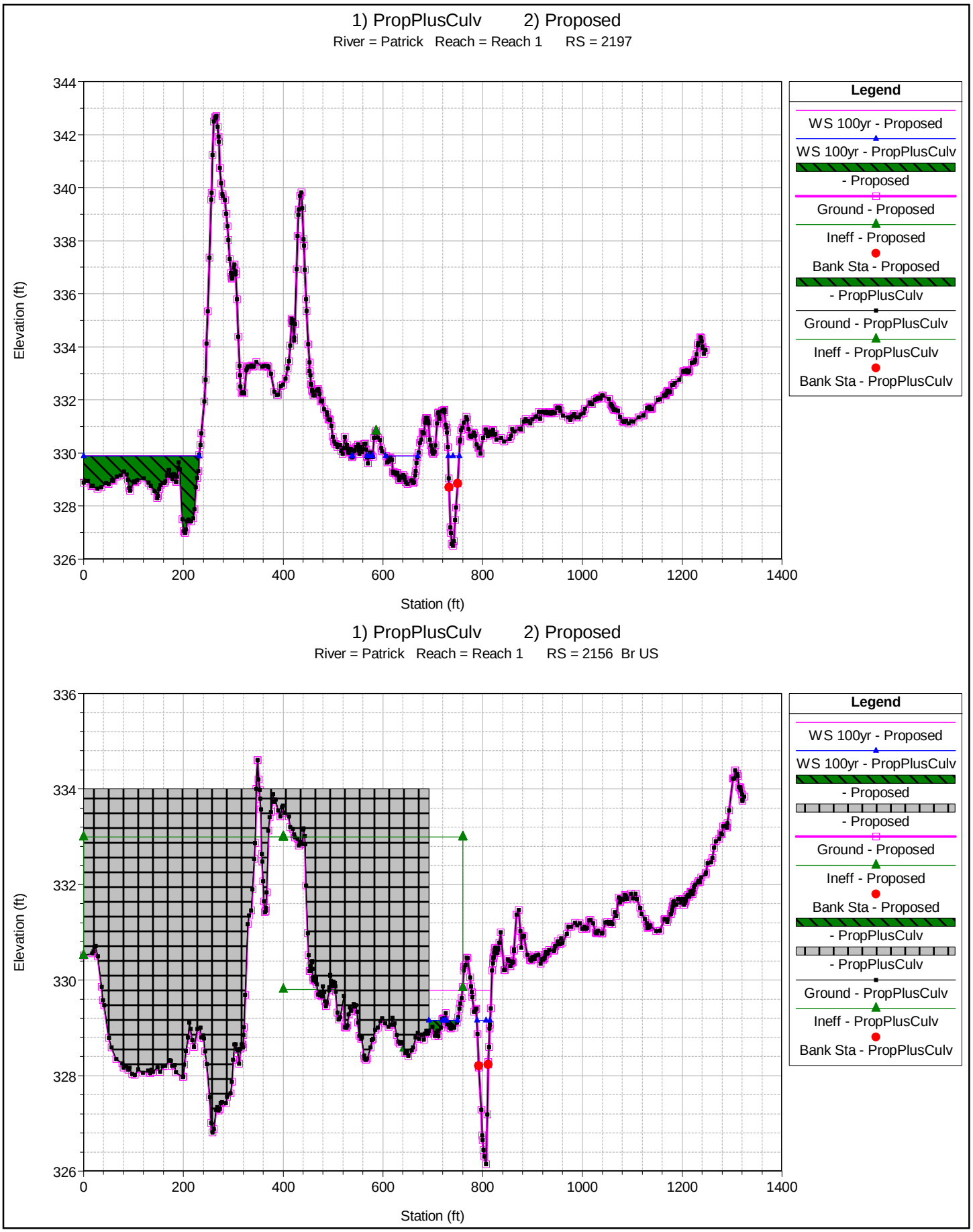
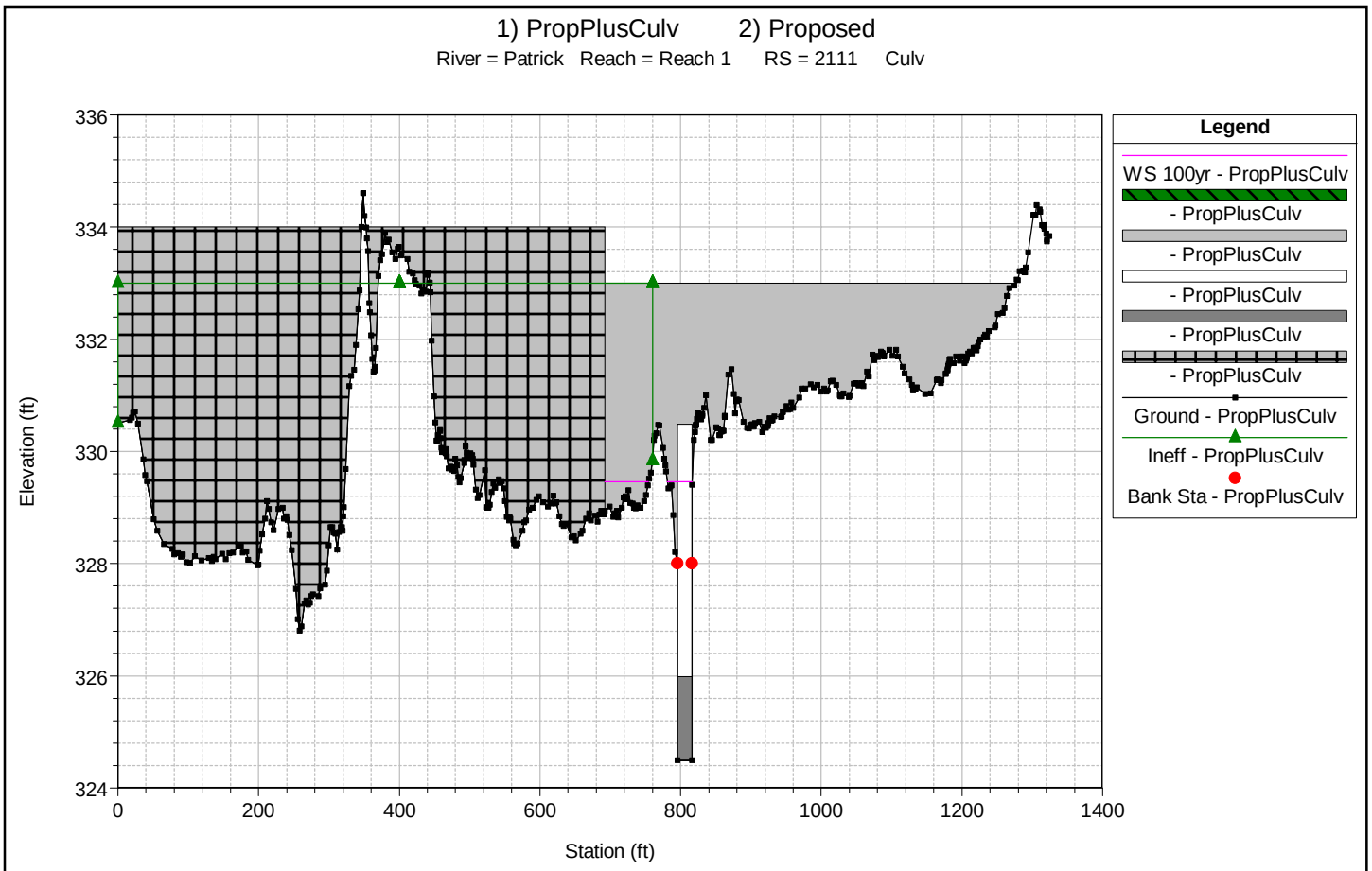
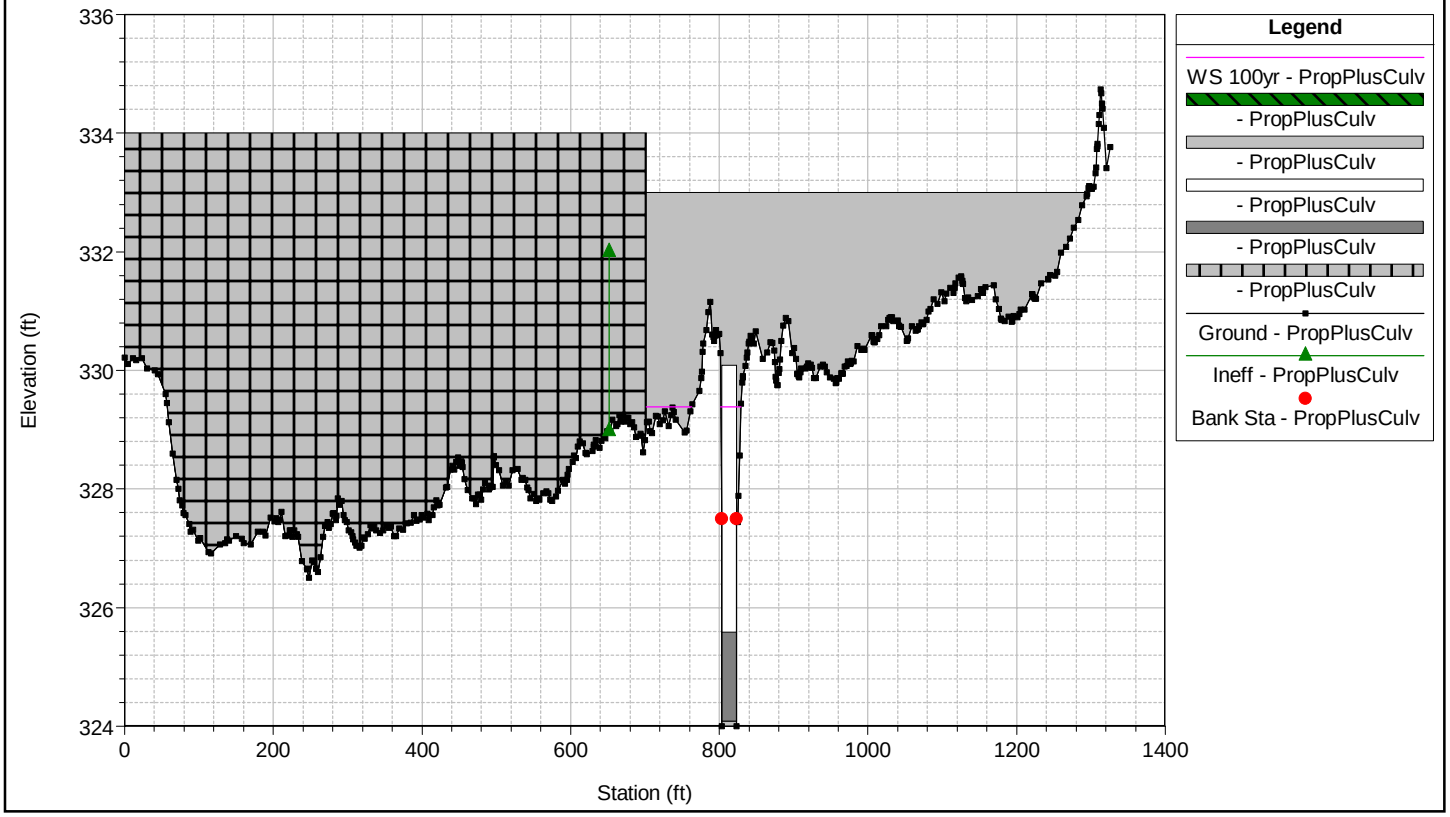
River = Patrick Reach = Reach 1 RS = 2392
Elevation (ft)
336
334
332
330
328
326
0
200
400
600
800
1000
1200
Station (ft)
Legend
WS 100yr - Proposed
WS 100yr - PropPlusCulv
- Proposed
Ground - Proposed
Ineff - Proposed
Bank Sta - Proposed
- PropPlusCulv
Ground - PropPlusCulv
Ineff - PropPlusCulv
Bank Sta - PropPlusCulv

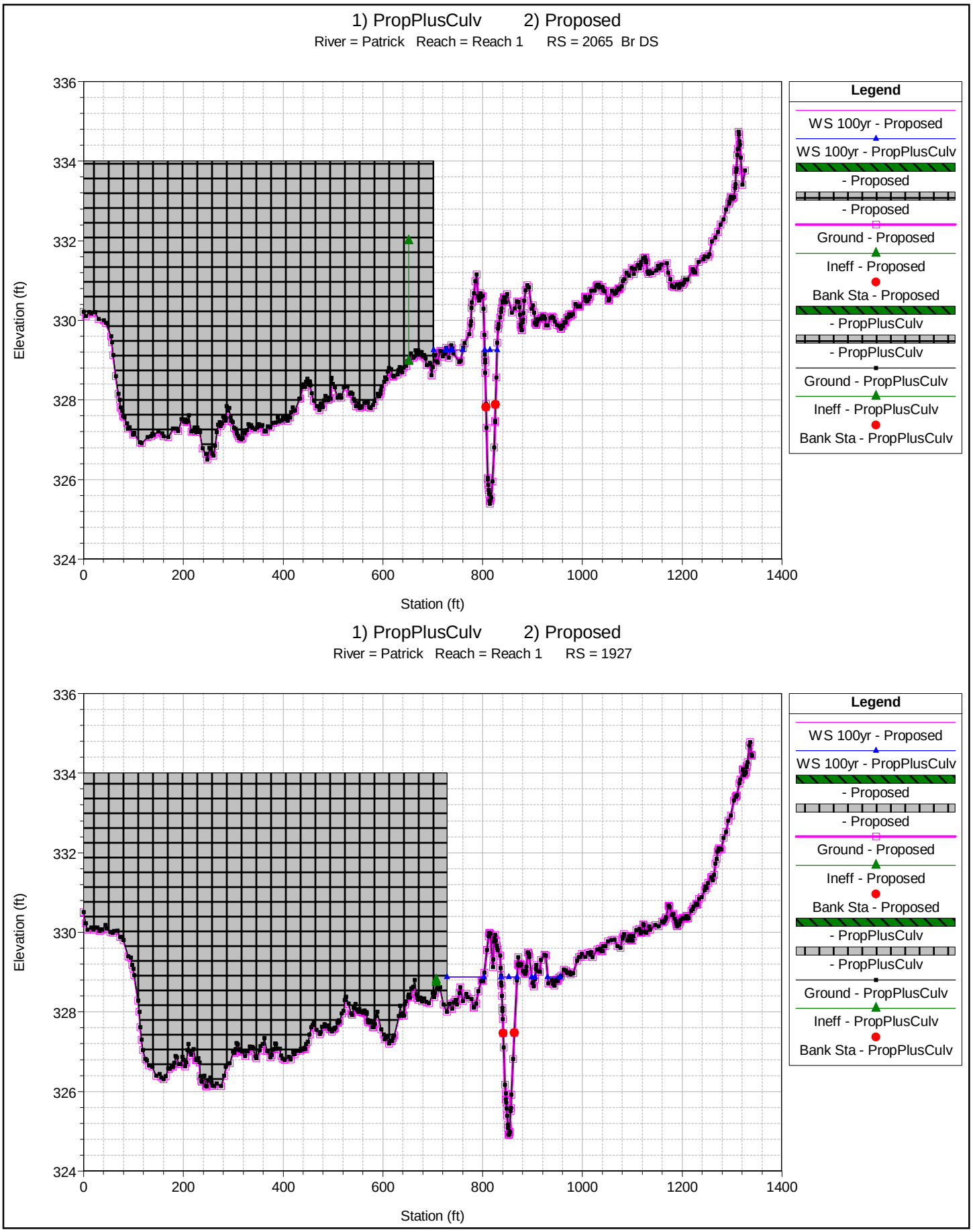

1) PropPlusCulv 2) Proposed
River = Patrick Reach = Reach 1 RS = 2328
Elevation (ft)
336
334
332
330
328
326
0
200
400
600
800
1000
1200
Station (ft)
Legend
WS 100yr - Proposed
WS 100yr - PropPlusCulv
- Proposed
Ground - Proposed
Ineff - Proposed
Bank Sta - Proposed
- PropPlusCulv
Ground - PropPlusCulv
Ineff - PropPlusCulv
Bank Sta - PropPlusCulv


1) PropPlusCulv 2) Proposed
River = Patrick Reach = Reach 1 RS = 2286
Elevation (ft)
336
334
332
330
328
326
0
200
400
600
800
1000
1200
Station (ft)
Legend
WS 100yr - Proposed
WS 100yr - PropPlusCulv
- Proposed
Ground - Proposed
Ineff - Proposed
Bank Sta - Proposed
- PropPlusCulv
Ground - PropPlusCulv
Ineff - PropPlusCulv
Bank Sta - PropPlusCulv
1) PropPlusCulv 2) Proposed
River = Patrick Reach = Reach 1 RS = 2237
Elevation (ft)
336
334
332
330
328
326
0
200
400
600
800
1000
1200
Station (ft)
Legend
WS 100yr - Proposed
WS 100yr - PropPlusCulv
- Proposed
Ground - Proposed
Ineff - Proposed
Bank Sta - Proposed
- PropPlusCulv
Ground - PropPlusCulv
Ineff - PropPlusCulv
Bank Sta - PropPlusCulv


1) PropPlusCulv 2) Proposed
River = Patrick Reach = Reach 1 RS = 2197
Elevation (ft)
Station (ft)
Legend
WS 100yr - Proposed
WS 100yr - PropPlusCulv
- Proposed
Ground - Proposed
Ineff - Proposed
Bank Sta - Proposed
- PropPlusCulv
Ground - PropPlusCulv
Ineff - PropPlusCulv
Bank Sta - PropPlusCulv
1) PropPlusCulv 2) Proposed
River = Patrick Reach = Reach 1 RS = 2156 Br US
Elevation (ft)
Station (ft)
Legend
WS 100yr - Proposed
WS 100yr - PropPlusCulv
- Proposed
- Proposed
Ground - Proposed
Ineff - Proposed
Bank Sta - Proposed
- PropPlusCulv
- PropPlusCulv
Ground - PropPlusCulv
Ineff - PropPlusCulv
Bank Sta - PropPlusCulv


1) PropPlusCulv 2) Proposed
River = Patrick Reach = Reach 1 RS = 2111 Culv
Elevation (ft)
336
334
332
330
328
326
324
0
200
400
600
800
1000
1200
1400
Station (ft)
Legend
WS 100yr - PropPlusCulv
- PropPlusCulv
- PropPlusCulv
- PropPlusCulv
- PropPlusCulv
- PropPlusCulv
Ground - PropPlusCulv
Ineff - PropPlusCulv
Bank Sta - PropPlusCulv


1) PropPlusCulv 2) Proposed
River = Patrick Reach = Reach 1 RS = 2111 Culv
Elevation (ft)
336
334
332
330
328
326
324
0
200
400
600
800
1000
1200
1400
Station (ft)
Legend
WS 100yr - PropPlusCulv
- PropPlusCulv
- PropPlusCulv
- PropPlusCulv
- PropPlusCulv
- PropPlusCulv
Ground - PropPlusCulv
Ineff - PropPlusCulv
Bank Sta - PropPlusCulv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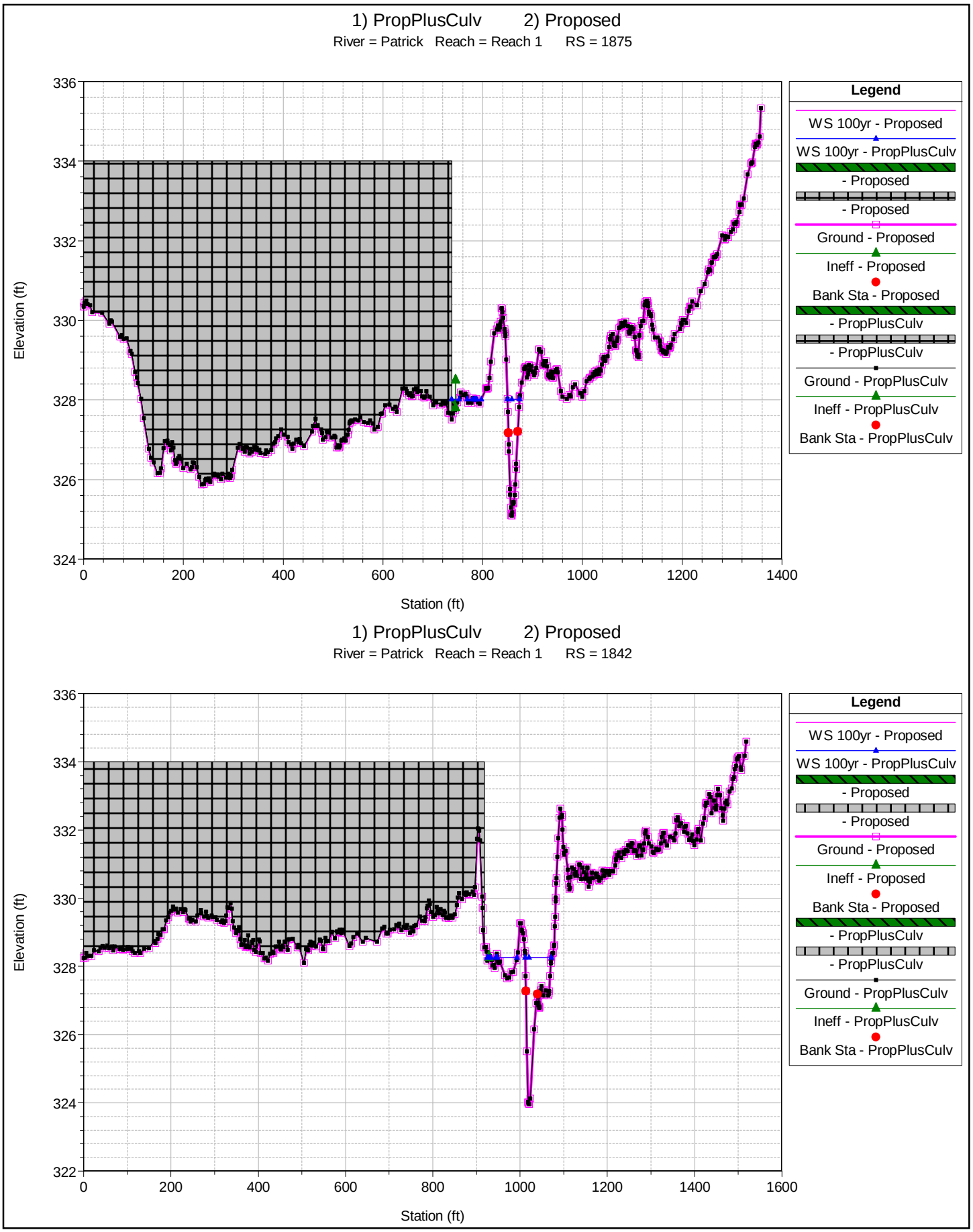
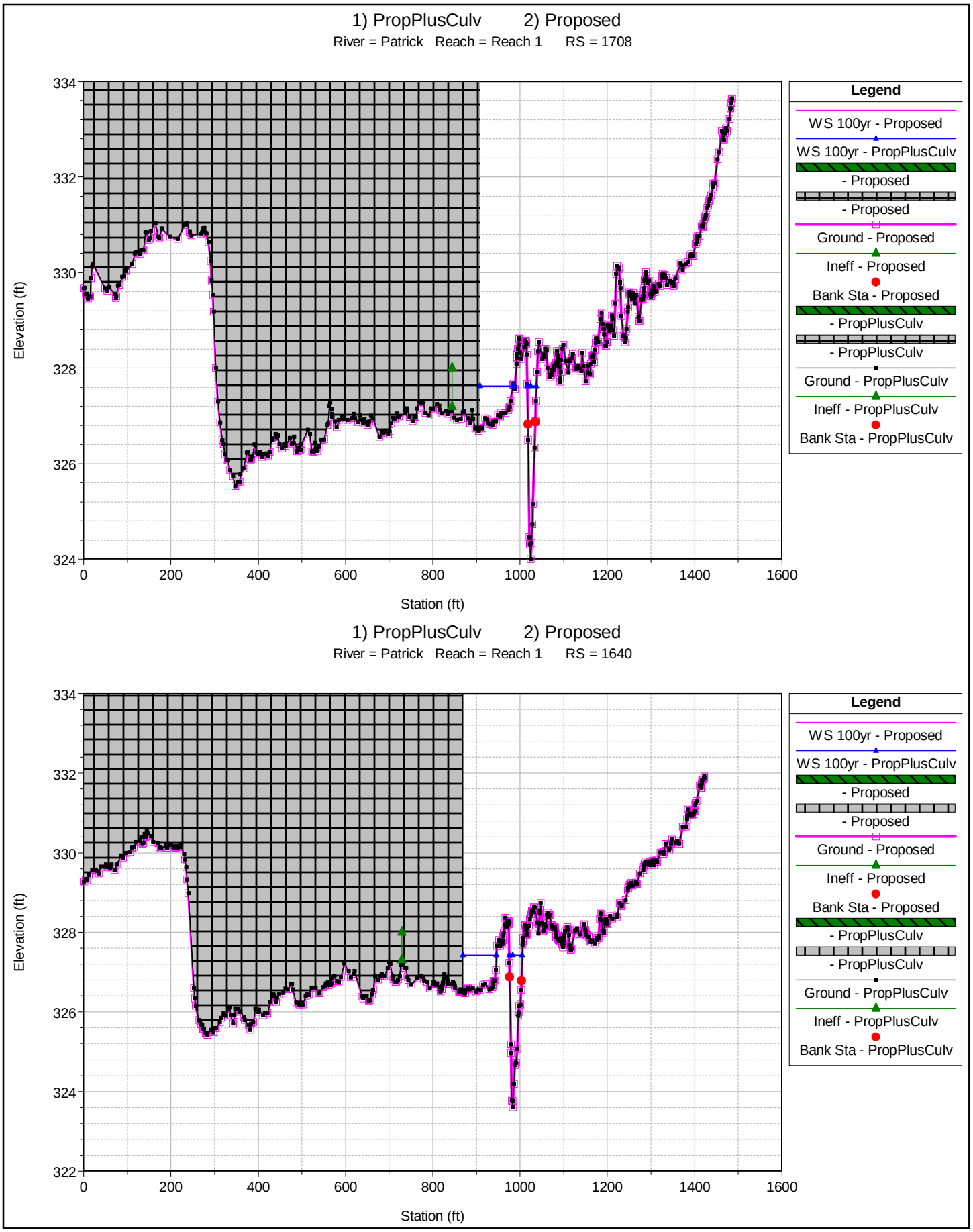
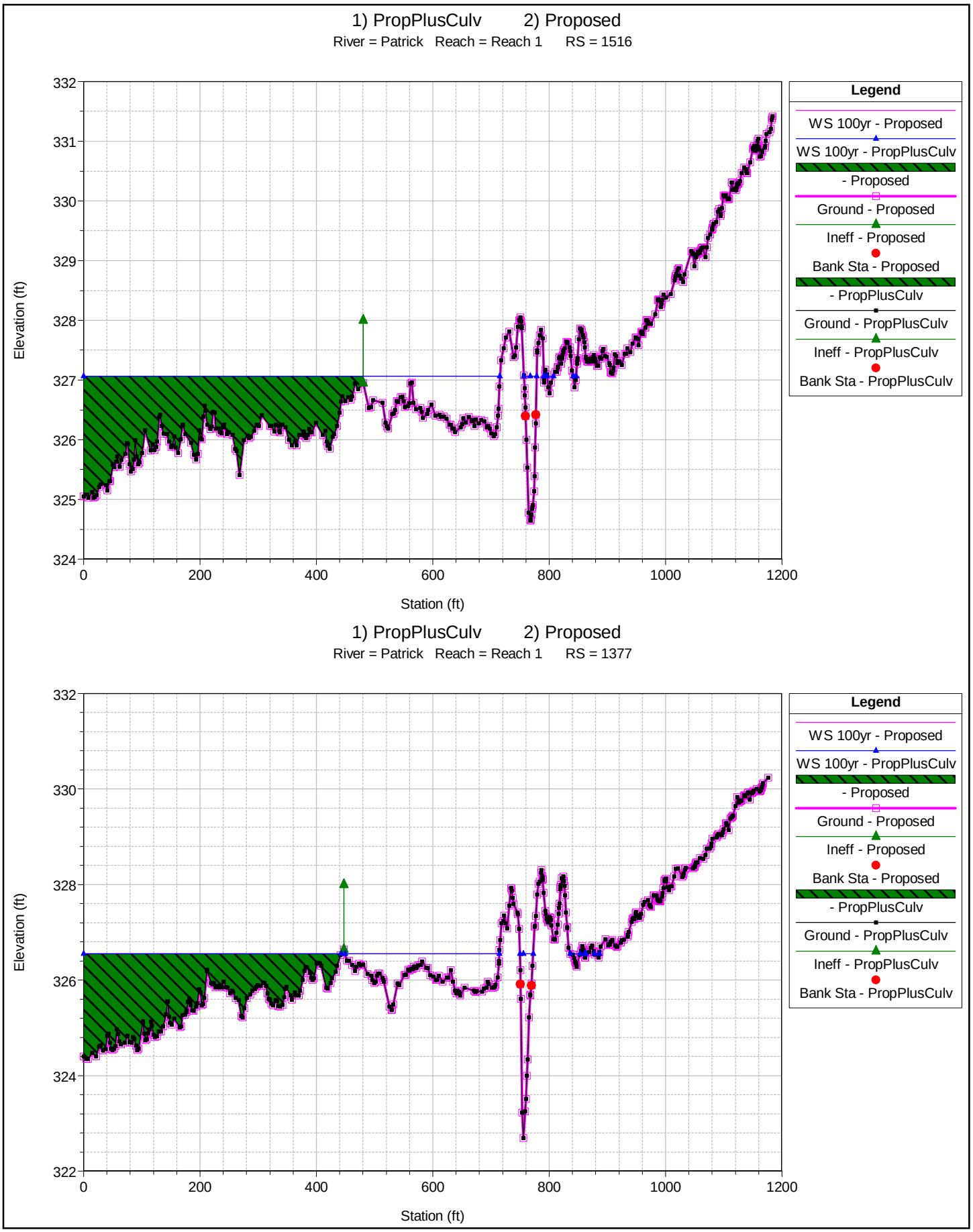
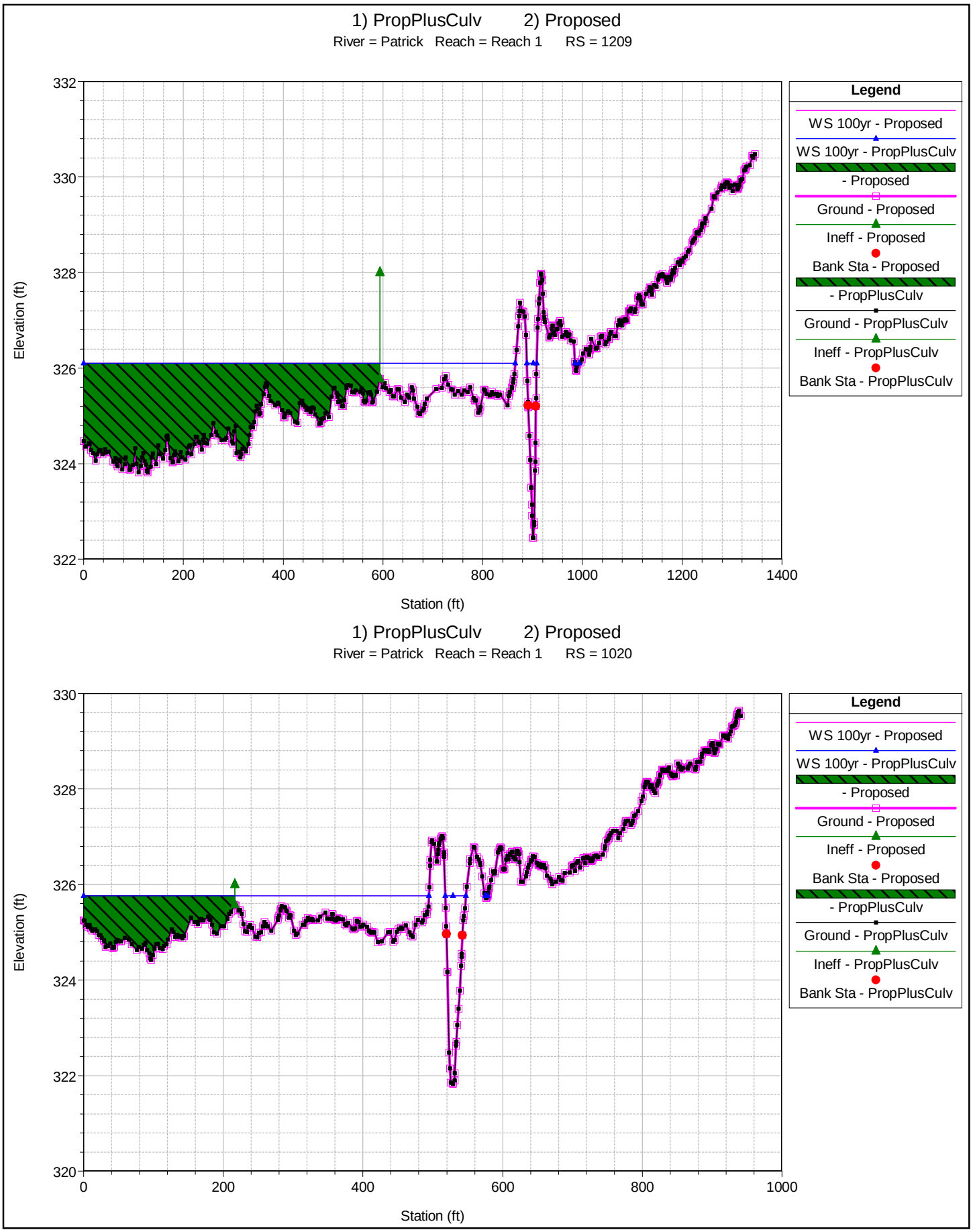
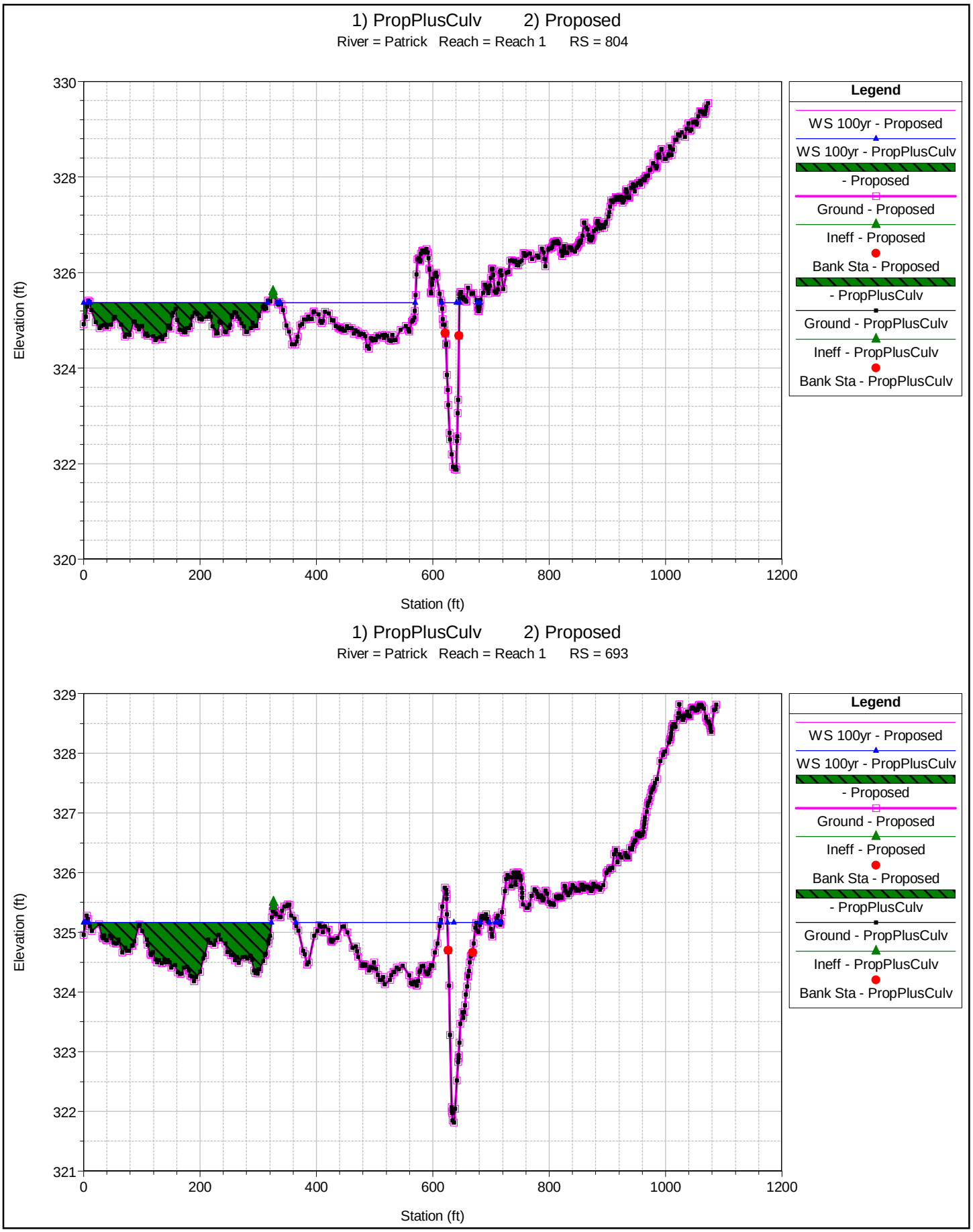
River = Patrick Reach = Reach 1 RS = 2065 Br DS
Elevation (ft)
336
334
332
330
328
326
324
0
200
400
600
800
1000
1200
1400
Station (ft)
Legend
WS 100yr - Proposed
WS 100yr - PropPlusCulv
- Proposed
- Proposed
Ground - Proposed
Ineff - Proposed
Bank Sta - Proposed
- PropPlusCulv
- PropPlusCulv
Ground - PropPlusCulv
Ineff - PropPlusCulv
Bank Sta - PropPlusCulv
1) PropPlusCulv 2) Proposed
River = Patrick Reach = Reach 1 RS = 1927
Elevation (ft)
336
334
332
330
328
326
324
0
200
400
600
800
1000
1200
1400
Station (ft)
Legend
WS 100yr - Proposed
WS 100yr - PropPlusCulv
- Proposed
- Proposed
Ground - Proposed
Ineff - Proposed
Bank Sta - Proposed
- PropPlusCulv
- PropPlusCulv
Ground - PropPlusCulv
Ineff - PropPlusCulv
Bank Sta - PropPlusCulv

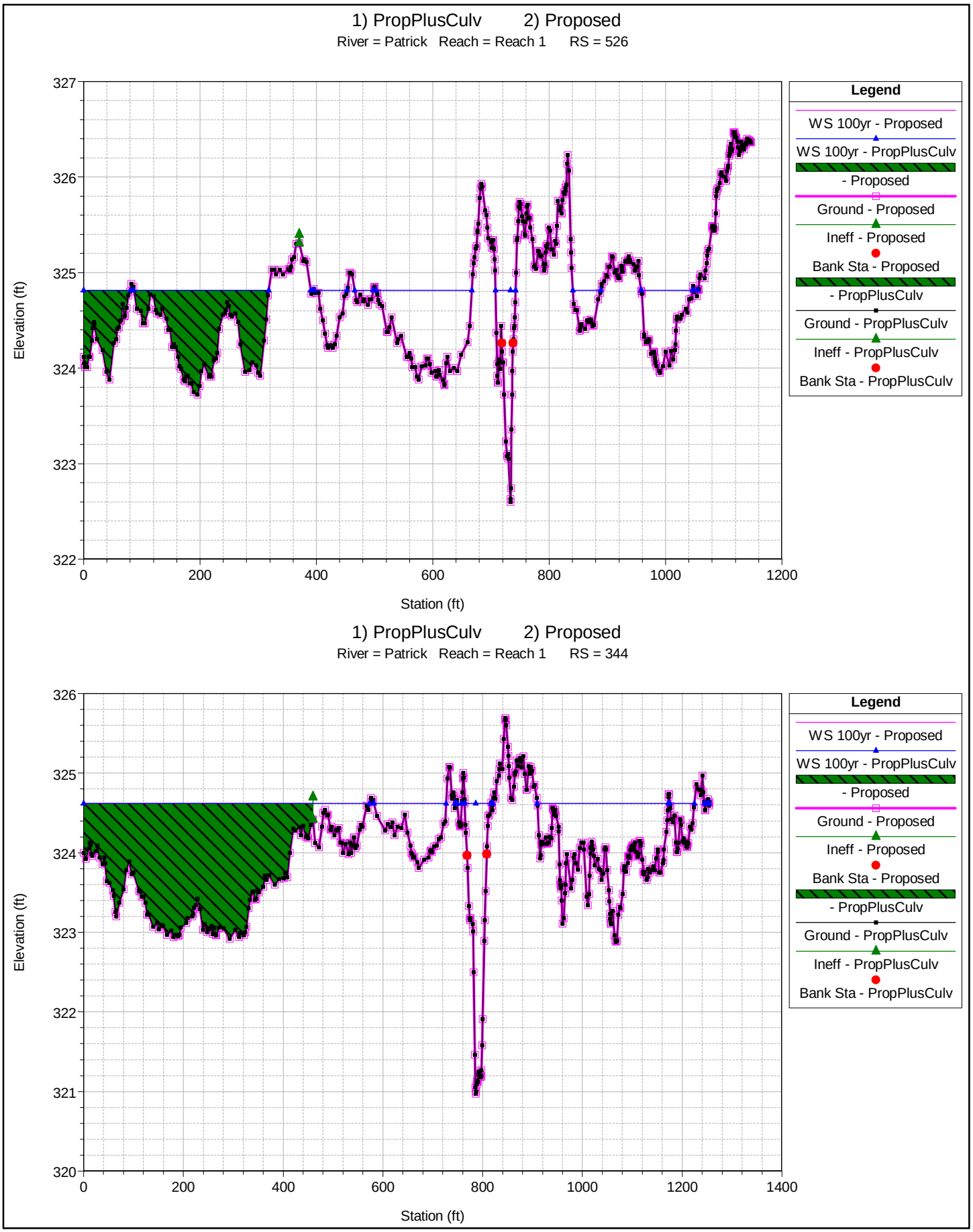

1) PropPlusCulv 2) Proposed
River = Patrick Reach = Reach 1 RS = 1875
Elevation (ft)
Station (ft)
Legend
WS 100yr - Proposed
WS 100yr - PropPlusCulv
- Proposed
- Proposed
Ground - Proposed
Ineff - Proposed
Bank Sta - Proposed
- PropPlusCulv
- PropPlusCulv
Ground - PropPlusCulv
Ineff - PropPlusCulv
Bank Sta - PropPlusCulv
1) PropPlusCulv 2) Proposed
River = Patrick Reach = Reach 1 RS = 1842
Elevation (ft)
Station (ft)
Legend
WS 100yr - Proposed
WS 100yr - PropPlusCulv
- Proposed
- Proposed
Ground - Proposed
Ineff - Proposed
Bank Sta - Proposed
- PropPlusCulv
- PropPlusCulv
Ground - PropPlusCulv
Ineff - PropPlusCulv
Bank Sta - PropPlusCulv

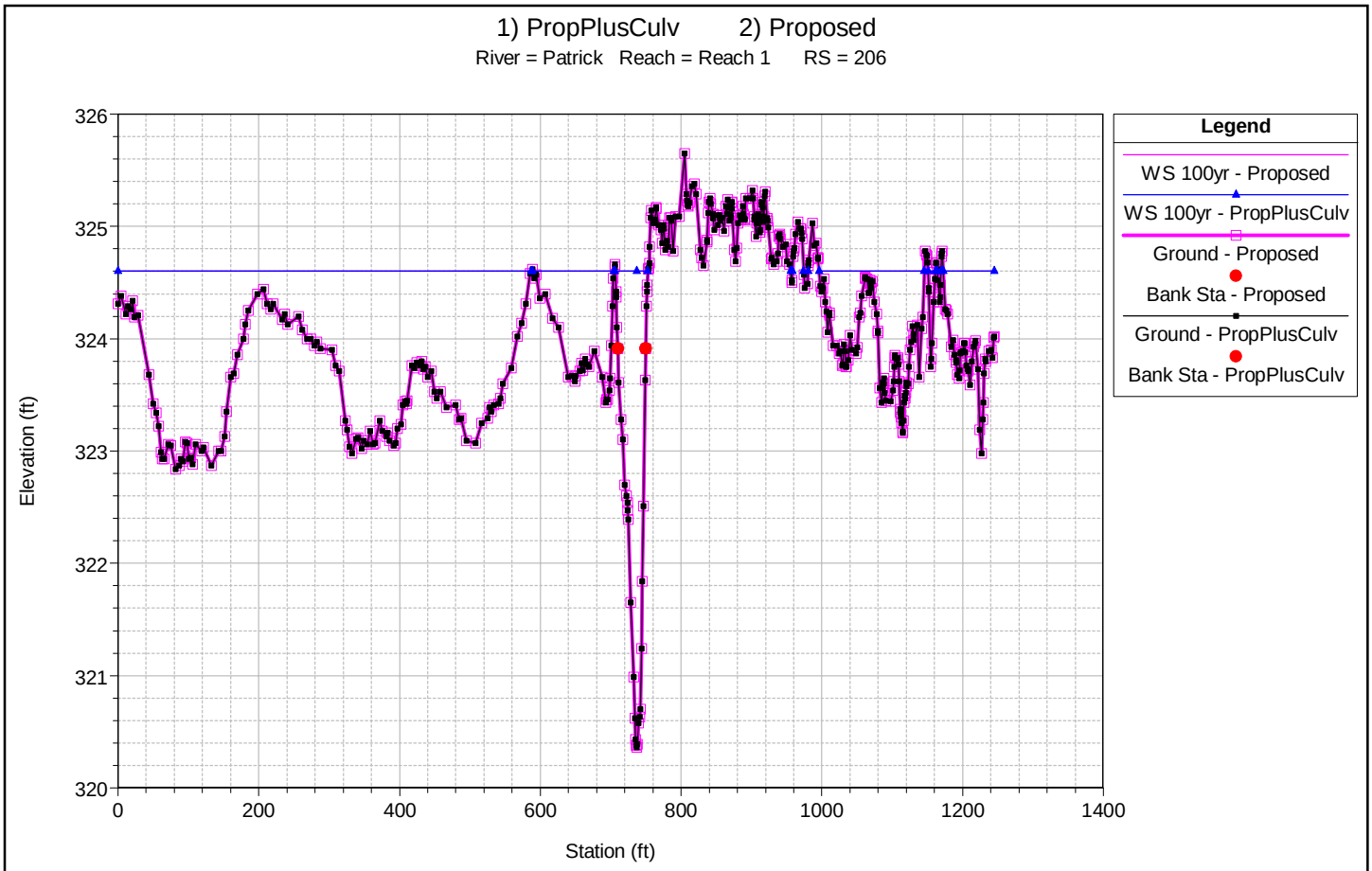

1) PropPlusCulv 2) Proposed
River = Patrick Reach = Reach 1 RS = 1708
Elevation (ft)
334
332
330
328
326
324
0
200
400
600
800
1000
1200
1400
1600
Station (ft)
Legend
WS 100yr - Proposed
WS 100yr - PropPlusCulv
- Proposed
- Proposed
Ground - Proposed
Ineff - Proposed
Bank Sta - Proposed
- PropPlusCulv
- PropPlusCulv
Ground - PropPlusCulv
Ineff - PropPlusCulv
Bank Sta - PropPlusCulv
1) PropPlusCulv 2) Proposed
River = Patrick Reach = Reach 1 RS = 1640
Elevation (ft)
334
332
330
328
326
324
322
0
200
400
600
800
1000
1200
1400
1600
Station (ft)
Legend
WS 100yr - Proposed
WS 100yr - PropPlusCulv
- Proposed
- Proposed
Ground - Proposed
Ineff - Proposed
Bank Sta - Proposed
- PropPlusCulv
- PropPlusCulv
Ground - PropPlusCulv
Ineff - PropPlusCulv
Bank Sta - PropPlusCulv


1) PropPlusCulv 2) Proposed
River = Patrick Reach = Reach 1 RS = 1516
Elevation (ft)
Station (ft)
Legend
WS 100yr - Proposed
WS 100yr - PropPlusCulv
- Proposed
Ground - Proposed
Ineff - Proposed
Bank Sta - Proposed
- PropPlusCulv
Ground - PropPlusCulv
Ineff - PropPlusCulv
Bank Sta - PropPlusCulv
1) PropPlusCulv 2) Proposed
River = Patrick Reach = Reach 1 RS = 1377
Elevation (ft)
Station (ft)
Legend
WS 100yr - Proposed
WS 100yr - PropPlusCulv
- Proposed
Ground - Proposed
Ineff - Proposed
Bank Sta - Proposed
- PropPlusCulv
Ground - PropPlusCulv
Ineff - PropPlusCulv
Bank Sta - PropPlusCulv


1) PropPlusCulv 2) Proposed
River = Patrick Reach = Reach 1 RS = 1209
Elevation (ft)
Station (ft)
Legend
WS 100yr - Proposed
WS 100yr - PropPlusCulv
- Proposed
Ground - Proposed
Ineff - Proposed
Bank Sta - Proposed
- PropPlusCulv
Ground - PropPlusCulv
Ineff - PropPlusCulv
Bank Sta - PropPlusCulv
1) PropPlusCulv 2) Proposed
River = Patrick Reach = Reach 1 RS = 1020
Elevation (ft)
Station (ft)
Legend
WS 100yr - Proposed
WS 100yr - PropPlusCulv
- Proposed
Ground - Proposed
Ineff - Proposed
Bank Sta - Proposed
- PropPlusCulv
Ground - PropPlusCulv
Ineff - PropPlusCulv
Bank Sta - PropPlusCulv


1) PropPlusCulv 2) Proposed
River = Patrick Reach = Reach 1 RS = 804
Elevation (ft)
330
328
326
324
322
320
0
200
400
600
800
1000
1200
Station (ft)
Legend
WS 100yr - Proposed
WS 100yr - PropPlusCulv
- Proposed
Ground - Proposed
Ineff - Proposed
Bank Sta - Proposed
- PropPlusCulv
Ground - PropPlusCulv
Ineff - PropPlusCulv
Bank Sta - PropPlusCulv
1) PropPlusCulv 2) Proposed
River = Patrick Reach = Reach 1 RS = 693
Elevation (ft)
329
328
327
326
325
324
323
322
321
0
200
400
600
800
1000
1200
Station (ft)
Legend
WS 100yr - Proposed
WS 100yr - PropPlusCulv
- Proposed
Ground - Proposed
Ineff - Proposed
Bank Sta - Proposed
- PropPlusCulv
Ground - PropPlusCulv
Ineff - PropPlusCulv
Bank Sta - PropPlusCulv


1) PropPlusCulv 2) Proposed
River = Patrick Reach = Reach 1 RS = 526
Elevation (ft)
Station (ft)
Legend
WS 100yr - Proposed
WS 100yr - PropPlusCulv
- Proposed
Ground - Proposed
Ineff - Proposed
Bank Sta - Proposed
- PropPlusCulv
Ground - PropPlusCulv
Ineff - PropPlusCulv
Bank Sta - PropPlusCulv
1) PropPlusCulv 2) Proposed
River = Patrick Reach = Reach 1 RS = 344
Elevation (ft)
Station (ft)
Legend
WS 100yr - Proposed
WS 100yr - PropPlusCulv
- Proposed
Ground - Proposed
Ineff - Proposed
Bank Sta - Proposed
- PropPlusCulv
Ground - PropPlusCulv
Ineff - PropPlusCulv
Bank Sta - PropPlusCulv


1) PropPlusCulv 2) Proposed
River = Patrick Reach = Reach 1 RS = 206
Elevation (ft)
Station (ft)
326
325
324
323
322
321
320
0
200
400
600
800
1000
1200
1400
Legend
WS 100yr - Proposed
WS 100yr - PropPlusCulv
Ground - Proposed
Bank Sta - Proposed
Ground - PropPlusCulv
Bank Sta - PropPlusCulv