



**Stantec Consulting Ltd.**  
100-300 Hagey Boulevard, Waterloo ON N2L 0A4

July 12, 2017  
File: 1609-60595

**Attention: Mr. Sean Fairfield, Director Project Planning and Permitting**

Algonquin Power Co.  
354 Davis Road  
Suite 100  
Oakville, ON L6J 2X1

Dear Mr. Fairfield,

**Reference: Amherst Island Wind Energy Project – Cataraqui Region Conservation Authority (CRCA)  
Culvert Sizing Design Brief – Phase 5**

In response to the Government of Ontario's recent promotion of renewable energy development, Algonquin Power Co. (Algonquin), on behalf of Windlectric Inc., is proposing to construct and operate the Amherst Island Wind Energy Project located in Loyalist Township, Ontario. Development, operation and maintenance of the turbines requires the construction of access roads to all turbine locations within the project area. Fifteen (15) locations were identified requiring Cataraqui Region Conservation Authority (CRCA) regulated watercourse culvert crossings for access roads to maintain existing drainage and provide vehicular access to the proposed infrastructure. Four (4) of the watercourses were determined to be fish habitat and thus also fall under the jurisdiction of the Fisheries and Oceans Canada (DFO) and are identified as such. Culvert crossings not located on conservation authority regulated watercourses (i.e., access roads crossing roadside ditches) will be sized according to municipal standards.

This technical memorandum ("Brief") focuses on Phase 5 of the project (Eleven (11) culvert crossings) and documents the methodology and assumptions, as discussed with the CRCA, used in determining the appropriate design flows and dimensions of the proposed culverts. This Brief should be read as a component of the larger Permit Application Package which documents the existing environmental conditions at each crossing location and details the proposed strategy for mitigating potential impacts.

All proposed crossings are sized to accommodate runoff from storms with up to a 1:100-year return period, without causing any flood elevation increases to upstream landowners. Under large/infrequent events flows are permitted to passively flow overtop the access roads at locations coincident with, or immediately adjacent to, the structures. These culverts will help minimize the potential hydrologic effects on downstream features which could arise. Further, by minimizing the amount of flow over the road, the culverts ensure a reasonable level of dry access to the site and reduce potential erosion of granular material.

The location of each proposed culvert is identified on the appended Figures, with a summary of sizing details provided herein. Site-specific refinement to the location / design of individual



July 12, 2017

Mr. Sean Fairfield, Director Project Planning and Permitting

Page 2 of 6

**Reference: Amherst Island Wind Energy Project – Cataraqui Region Conservation Authority (CRCA)  
Culvert Sizing Design Brief – Phase 5**

culverts may occur during the detailed design to ensure proper placement and sizing to convey flows, prevent pooling, and to maintain hydrology.

**Design Criteria and Assumptions**

Hydrologic Characterization

The hydrologic model SWMHYMO (Stormwater Management Hydrologic Model) was used to predict peak flows at each watercourse crossing and determine site specific culvert size requirements.

Inputs to the model included contributing drainage area, catchment slopes, land use, and soil types. Drainage areas, as illustrated in Figure Series 2, were delineated using GIS data and aerial imagery showing local drains and drainage patterns within the watersheds. Catchment slopes, land use and soil types were defined using GIS data, aerial photo interpretation, and observations made during in person site visits. Specific parameter considerations include:

- Surficial soil type information was obtained from GIS data provided by the Ontario Ministry of Natural Resources and Forestry (MNRF). The predominant surficial soil type in the project area is clay, corresponding to hydrologic soil group type 'CD' (Figure series 3)
- Active agriculture (cropland) was determined to be the dominant land use. Forest blocks and minimal impervious coverage in the forms of roads, structures, and driveways are also present. (Figure series 4). Land slope was assessed using Ontario Base Mapping (OBM) contour data.
- Reach lengths, necessary in the assessment of hydrograph time-to-peak, were estimated using OBM data, aerial photos, and direct measurement.

The storm file used in the hydrologic model employed a 1:5-, 1:10- and 1:100-year, 24-hour, Soil Conservation Service (SCS) Type II distribution and is based on data obtained using the Ministry of Transportation Ontario Intensity Duration Frequency (IDF) Curve Lookup tool for the site (44.154167 N, 76.712500 W). The SCS is mainly utilized in undeveloped rural watersheds and has been determined to be an appropriate method to use in Southern Ontario.

**Design Flow Estimation**

The SWMHYMO hydrologic model was used to determine 5-, 10- and 100-year runoff flow rates from each catchment using the parameters described previously. Summary tables of hydrologic model parameters as well as model input and output files are appended, while design flow rates are summarized in Table 1.



July 12, 2017

Mr. Sean Fairfield, Director Project Planning and Permitting

Page 3 of 6

**Reference: Amherst Island Wind Energy Project – Cataraqui Region Conservation Authority (CRCA)  
Culvert Sizing Design Brief – Phase 5**

**Table 1: Target Design Flows**

<b>Water Crossing ID</b>	<b>Catchment Area (ha)</b>	<b>SWMHYMO Peak 5-year Flow (m<sup>3</sup>/s)</b>	<b>SWMHYMO Peak 10-year Flow (m<sup>3</sup>/s)</b>	<b>SWMHYMO Peak 100-year Flow (m<sup>3</sup>/s)</b>
RA 4	2.4	0.21	0.26	0.44
RA 27	7.1	0.45	0.57	1.00
RA 31	10.1	0.45	0.56	0.93
RA 32	9.7	0.50	0.62	1.01
RA 33	16.5	0.66	0.82	1.39
RA 34	3.7	0.20	0.25	0.42
RA 35a	4.1	0.24	0.30	0.49
RA 35b	8.3	0.41	0.51	0.85
RA 42	67.5	2.42	3.02	5.02
DFO Culvert 3	124.8	2.27	2.83	4.67
DFO Culvert 4	259.3	3.14	3.93	6.57

### **HEC-RAS Hydraulic Analysis**

At the request of the Cataraqui Region Conservation Authority, the hydraulic analysis was completed using HEC-RAS v4.1.0 to estimate water levels at the proposed access road culvert locations to verify that backwater effects as a result of culvert installation would be minimal.

#### *Model Development*

The hydraulic model HEC-RAS v4.1.0 was used to estimate water levels at each crossing. This model is widely used to calculate water surface elevations and flow velocities throughout a watercourse based on channel cross section details and flow rates. The following parameters were used in model development.

- Culverts have been designed to convey the peak predicted flows under the 1:5-, 1:10- and 1:100 year storm events without increasing flood elevations on the neighboring properties
- The cross sections were obtained from topographic surveys of the area completed in November 2015. Additional site specific topographic information was collected in May 2017 to augment the model.
- The stream bed at the crossings are primarily earth with some grass. The channel morphology is consistent both upstream and downstream.



July 12, 2017

Mr. Sean Fairfield, Director Project Planning and Permitting

Page 4 of 6

**Reference: Amherst Island Wind Energy Project – Cataraqui Region Conservation Authority (CRCA)  
Culvert Sizing Design Brief – Phase 5**

- The Manning’s roughness coefficient values used in this analysis were selected based on a visual inspection of the existing channel. The channels were considered minor streams, with a regular section. The banks and floodplain are characterized as short grass and cultivated areas.
- To determine an appropriate downstream boundary for the model, the normal depth method was utilized where the slope of the channel was entered providing a normal depth computation for all profiles. The downstream channel slope was based on the slope of the channel through the study area.
- For ease of handling and potential for re-use, corrugated metal pipe (CMP) was the preferred material for the majority of the crossings.
- Culvert lengths were derived from Access Road Plan and Profile Drawings

**Table 2: Water Crossing Culvert Sizing**

<b>Water Crossing ID</b>	<b>Shape</b>	<b>Material</b>	<b># of Culverts - Dimensions (mm)</b>
RA 4	Circular	CMP	2 - 600
RA 27	Circular	CMP	3 - 600
RA 31	Circular	CMP	2 - 1000
RA 32	Circular	CMP	2 - 1000
RA 33	Box	Concrete	2 - 2440 x 1220
RA 34	Circular	CMP	3 - 1000
RA 35a	Circular	CMP	3 - 500
RA 35b	Arch	CMP	1 - 560 x 420
RA 42	Arch	CMP	3 - 1390 x 970
DFO Culvert 3	Circular	CMP	2 - 1800 x 1200
DFO Culvert 4	Circular	CMP	4 - 1000

*Model Results*

As shown in the attached model results, proposed water surface elevations remain equal to or below existing water surface elevations at the upstream end of the modeled channel under the 5-, 10-, and 100-year events. Velocities within the vicinity of the proposed culverts are low due to the broad flat nature of the floodplain. In addition, the following factors were considered in determining the level of service required for the proposed access road:

- No access to residential dwellings will be provided via the proposed access road.





July 12, 2017

Mr. Sean Fairfield, Director Project Planning and Permitting

Page 5 of 6

**Reference: Amherst Island Wind Energy Project – Cataraqui Region Conservation Authority (CRCA)  
Culvert Sizing Design Brief – Phase 5**

- Flow depths during the 1:5-year storm event at all proposed crossings are less than 0.3 m at the deepest point. Vehicle access is typically accommodated in depths in the range 0.3 m to 0.4 m (MNRF Technical Guide – River and Stream Systems: Flood Hazard Limit, 2002).
- During the operation phase of the project, access roads will be gated and used solely for maintenance purposes.
- Maintenance activities are not anticipated to be coincident with the peak flow timing of storm events
- Access roads are proposed to be at or near grade. It can be expected that minor roadway overtopping will occur at several locations throughout the project.

**Culvert Opening Erosion Protection**

Culverts will be constructed with a rip-rap apron installed at both the entrance and exit of the structure. The apron will be constructed of R-50 rip rap (OPSS 1004) with a minimum depth of 450 mm. Rip rap apron sizes for each culvert are shown in the attached drawings.



July 12, 2017

Mr. Sean Fairfield, Director Project Planning and Permitting

Page 6 of 6

**Reference: Amherst Island Wind Energy Project – Cataraqui Region Conservation Authority (CRCA)  
Culvert Sizing Design Brief – Phase 5**

**Conclusion**

Based on the preceding design brief the following conclusions can be drawn:

- The proposed culvert configurations are sufficient to pass flows during the 5-, 10- and 100-year rainfall events without causing an increase in water levels on neighboring properties
- Flow velocities overtopping the road are minimal. The recommended rip-rap sizing should be applied to the detailed culvert configurations.

We trust the enclosed is sufficient to address the culvert sizing requirements for the Amherst Island Wind Energy Project.

Should you have any questions or comments relating to this design, please do not hesitate to contact the undersigned at your convenience.

Regards,

**STANTEC CONSULTING LTD.**

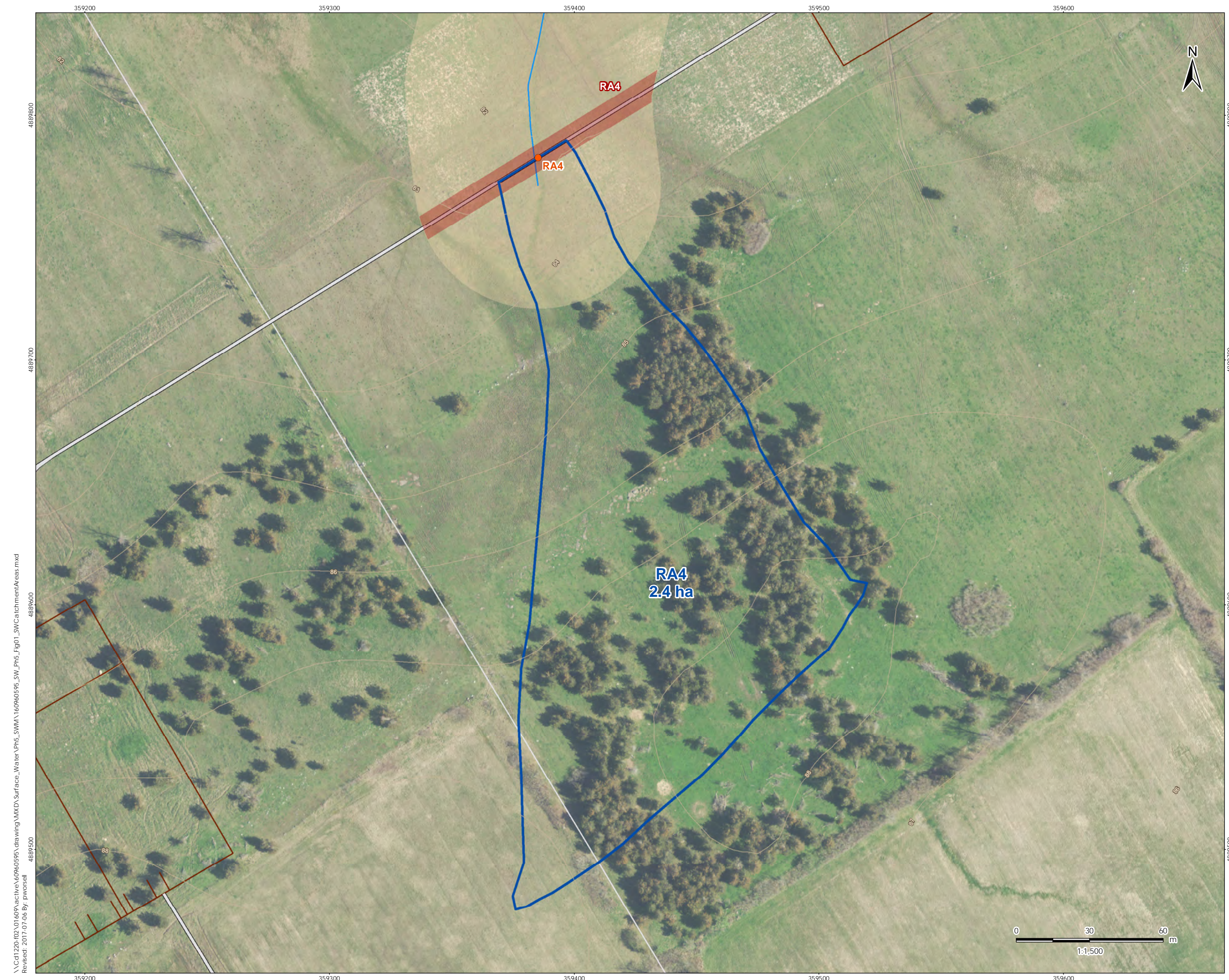
Dave Williams, P.Eng.  
Water Resources Engineer  
Phone: (519) 585-7320  
Fax: 519-579-6733  
david.williams@stantec.com

Attachment: Figure Series 1 – Surface Water Catchment Areas  
Figure Series 2 – Soils  
Figure Series 3 – Woodlots  
IDF Parameters – MTO IDF Curve Lookup for Amherst Island  
Hydrologic Input Parameters  
SWMHYMO Input and Summary Files  
HEC-RAS Modeling Results

wd w:\active\160960595\design\report\culvertsizing\phase1\_culvertsizing\_revised\000\_ltr\_culvertsizing\_20160113\_dw\_cacomment.docx

# HYDROLOGIC ANALYSIS





- Legend**
- Turbine
  - Access Road
  - Laydown Area and Crane Path
  - Culvert Location
- Existing Features**
- Road
  - Unopened Road Allowance
  - Railway
  - Watercourse
  - Property Line
  - Regulation Limit (CRCA)
  - CA Regulation Limit Project Encroachment

- Notes**
1. Coordinate System: NAD 1983 UTM Zone 18N
  2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017; © Cataraqui Region Conservation Authority, 2017.
  3. Orthoimagery © Cataraqui Region Conservation Authority, 2017. Imagery taken in 2014.

July 2017  
160960595

Client/Project  
Windlectric Inc.  
Amherst Island Wind Energy Project

Figure No.  
1-1

Title  
Surface Water Catchment Area -  
Culvert RA4

\\Cd1220-102\01609\active\160960595\drawing\MXD\Surface\_Water\Phs\_SWM\160960595\_SW\_Ph5\_Fig01\_SW\_CatchmentAreas.mxd  
 Revised: 2017-07-06 By: pwnorsell



- Legend**
- Turbine
  - Access Road
  - Laydown Area and Crane Path
  - Culvert Location
- Existing Features**
- Road
  - Unopened Road Allowance
  - Railway
  - Watercourse
  - Property Line
  - Regulation Limit (CRCA)
  - CA Regulation Limit Project Encroachment



\\Cd1220-102\01609\active\60960595\drawing\MXD\Surface\_Water\Phs\_SWM\160960595\_SW\_Ph5\_Fig01\_SW\_CatchmentAreas.mxd  
 Revised: 2017-07-06 By: pwnorsell

- Notes**
1. Coordinate System: NAD 1983 UTM Zone 18N
  2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017; © Cataraqui Region Conservation Authority, 2017.
  3. Orthoimagery © Cataraqui Region Conservation Authority, 2017. Imagery taken in 2014.

Client/Project  
 Windlectric Inc.  
 Amherst Island Wind Energy Project

---

Figure No.  
 1-2

---

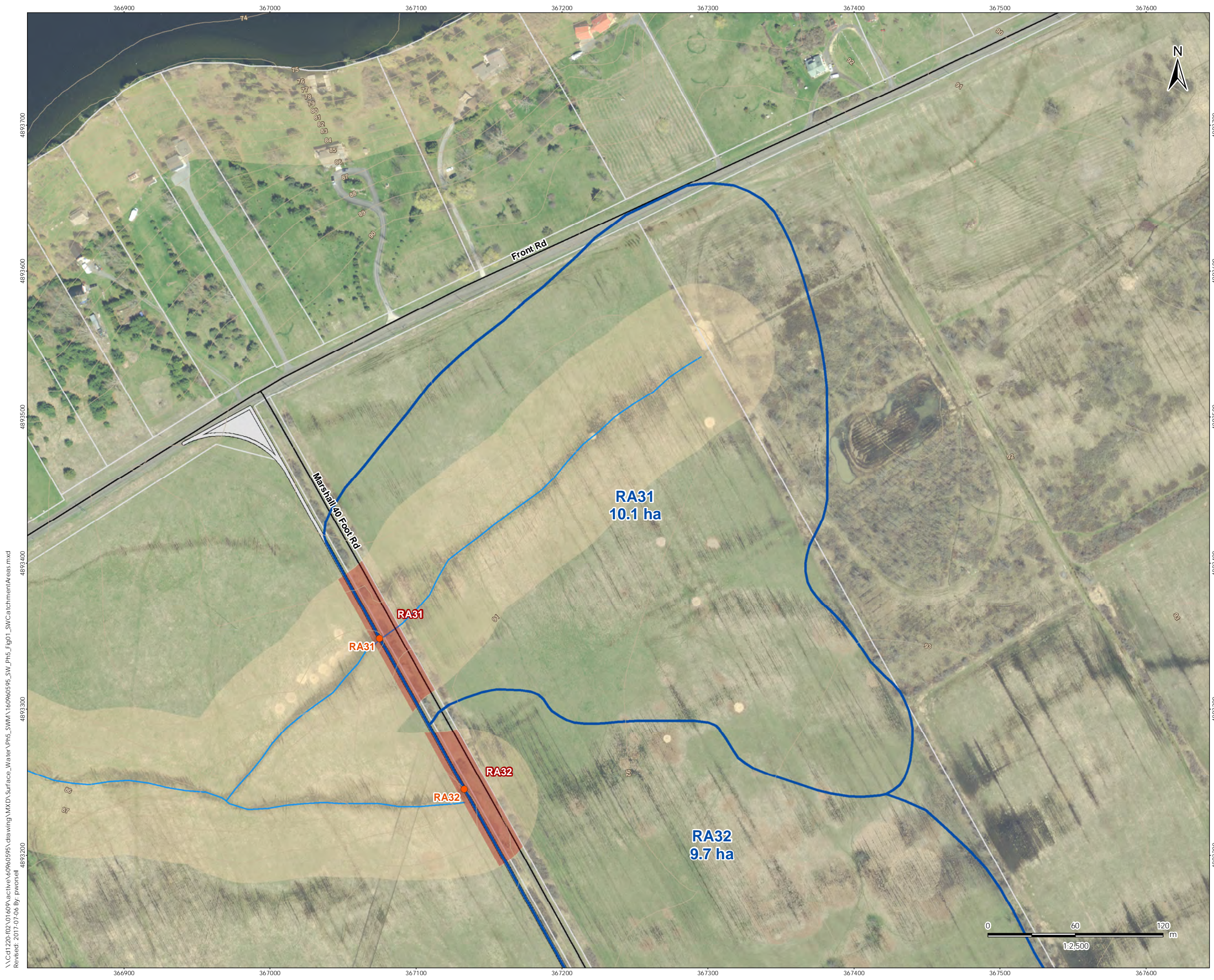
Title  
 Surface Water Catchment Area -  
 Culvert RA27

July 2017  
 160960595



Legend

- Turbine
- Access Road
- Laydown Area and Crane Path
- Culvert Location
- Existing Features
- Road
- Unopened Road Allowance
- Railway
- Watercourse
- Property Line
- Regulation Limit (CRCA)
- CA Regulation Limit Project Encroachment



Notes

1. Coordinate System: NAD 1983 UTM Zone 18N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017; © Cataraqui Region Conservation Authority, 2017.
3. Orthoimagery © Cataraqui Region Conservation Authority, 2017. Imagery taken in 2014.

July 2017  
160960595

Client/Project

Windlectric Inc.  
Amherst Island Wind Energy Project

Figure No.

1-3

Title

Surface Water Catchment Area -  
Culvert RA31

\\C01220-102-01609\active\60960595\drawing\MXD\Surface\_Water\Phs\_SWM\160960595\_SW\_PhS\_Fig01\_SW\_CatchmentAreas.mxd  
 Revised: 2017-07-06 By: pwnorsell



Legend

- Turbine
- Access Road
- Laydown Area and Crane Path
- Culvert Location
- Existing Features
- Road
- Unopened Road Allowance
- Railway
- Watercourse
- Property Line
- Regulation Limit (CRCA)
- CA Regulation Limit Project Encroachment



Notes

1. Coordinate System: NAD 1983 UTM Zone 18N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017; © Cataraqui Region Conservation Authority, 2017.
3. Orthoimagery © Cataraqui Region Conservation Authority, 2017. Imagery taken in 2014.

July 2017  
160960595

Client/Project

Windlectric Inc.  
Amherst Island Wind Energy Project

Figure No.

1-4

Title

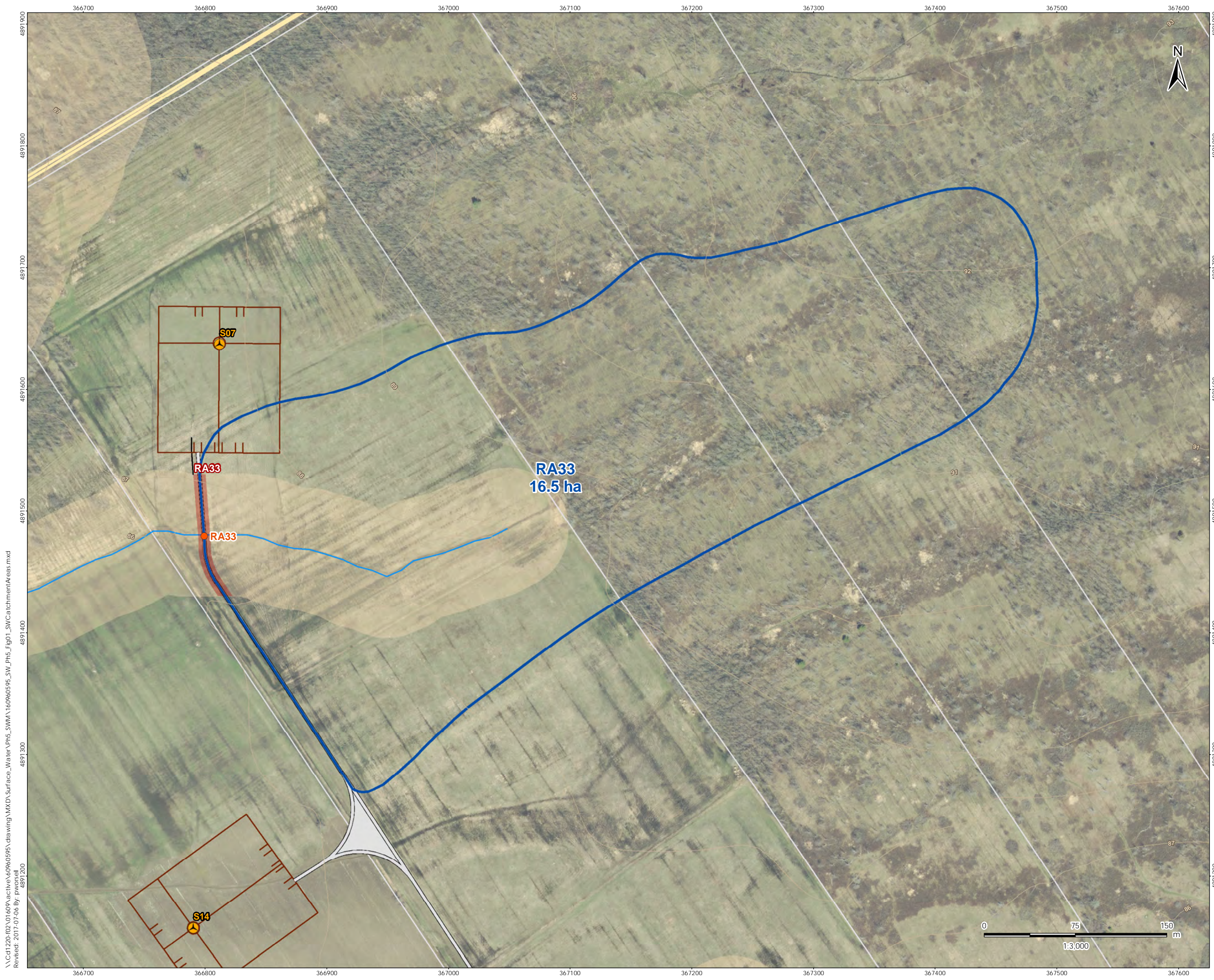
Surface Water Catchment Area -  
Culvert RA32

\\C:\1220-102\01609\active\160960595\drawing\MXD\Surface\_Water\_Phs\_SWM\160960595\_SW\_Phs\_Fig01\_SW\_CatchmentAreas.mxd  
 Revised: 2017-07-06 By: pwnorsell



Legend

- Turbine
- Access Road
- Laydown Area and Crane Path
- Culvert Location
- Existing Features
- Road
- Unopened Road Allowance
- Railway
- Watercourse
- Property Line
- Regulation Limit (CRCA)
- CA Regulation Limit Project Encroachment



\\C01220-102\01609\active\60960595\drawing\MXD\Surface\_Water\Phs\_SWM\160960595\_SW\_PhS\_Fig01\_SW\_CatchmentAreas.mxd  
 Revised: 2017-07-06 By: pwnorsell

Notes

1. Coordinate System: NAD 1983 UTM Zone 18N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017; © Cataraqui Region Conservation Authority, 2017.
3. Orthoimagery © Cataraqui Region Conservation Authority, 2017. Imagery taken in 2014.

July 2017  
160960595

Client/Project

Windlectric Inc.  
Amherst Island Wind Energy Project

Figure No.

1-5

Title

Surface Water Catchment Area -  
Culvert RA33



- Legend**
- Turbine
  - Access Road
  - Laydown Area and Crane Path
  - Culvert Location
- Existing Features**
- Road
  - Unopened Road Allowance
  - Railway
  - Watercourse
  - Property Line
  - Regulation Limit (CRCA)
  - CA Regulation Limit Project Encroachment



- Notes**
1. Coordinate System: NAD 1983 UTM Zone 18N
  2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017; © Cataraqui Region Conservation Authority, 2017.
  3. Orthoimagery © Cataraqui Region Conservation Authority, 2017. Imagery taken in 2014.

July 2017  
160960595

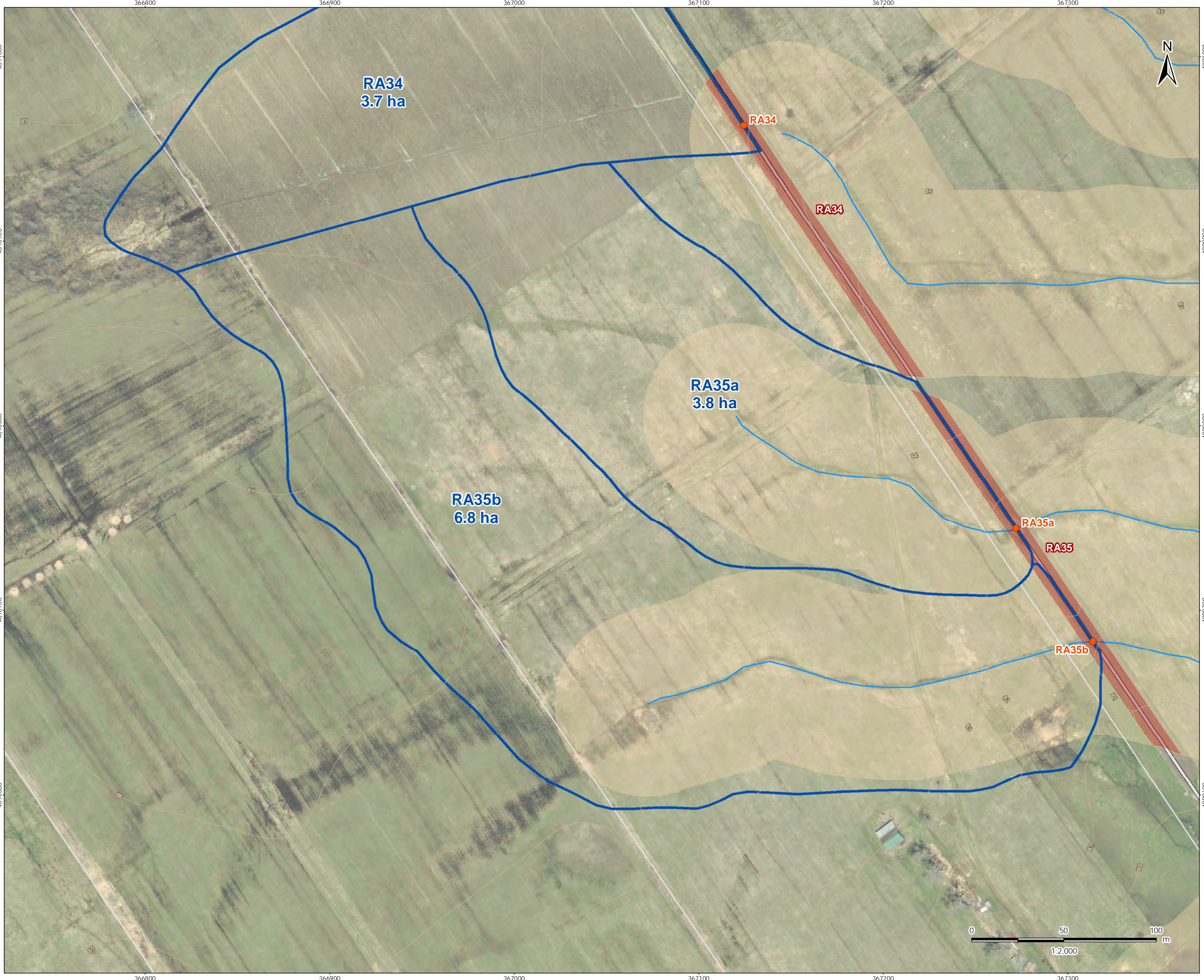
Client/Project  
Windlectric Inc.  
Amherst Island Wind Energy Project

Figure No.  
1-6

Title  
Surface Water Catchment Area -  
Culvert RA34

\\C01220-102\01609\active\60960595\drawing\MXD\Surface\_Water\Phs\_SWM\160960595\_SW\_Ph5\_Fig01\_SW\_CatchmentAreas.mxd  
 Revised: 2017-07-06 By: pwnorsell





- Legend**
- Turbine
  - Access Road
  - Laydown Area and Crane Path
  - Culvert Location
- Existing Features**
- Road
  - Unopened Road Allowance
  - Railway
  - Watercourse
  - Property Line
  - Regulation Limit (CRCA)
  - CA Regulation Limit Project Encroachment

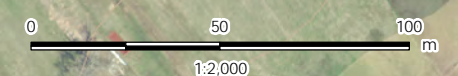
- Notes**
1. Coordinate System: NAD 1983 UTM Zone 18N
  2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017; © Cataraqui Region Conservation Authority, 2017.
  3. Orthoimagery © Cataraqui Region Conservation Authority, 2017. Imagery taken in 2014.

Client/Project

Windlectric Inc.  
Amherst Island Wind Energy Project

Figure No.  
**1-7**

Title  
**Surface Water Catchment Area -  
Culvert RA35**



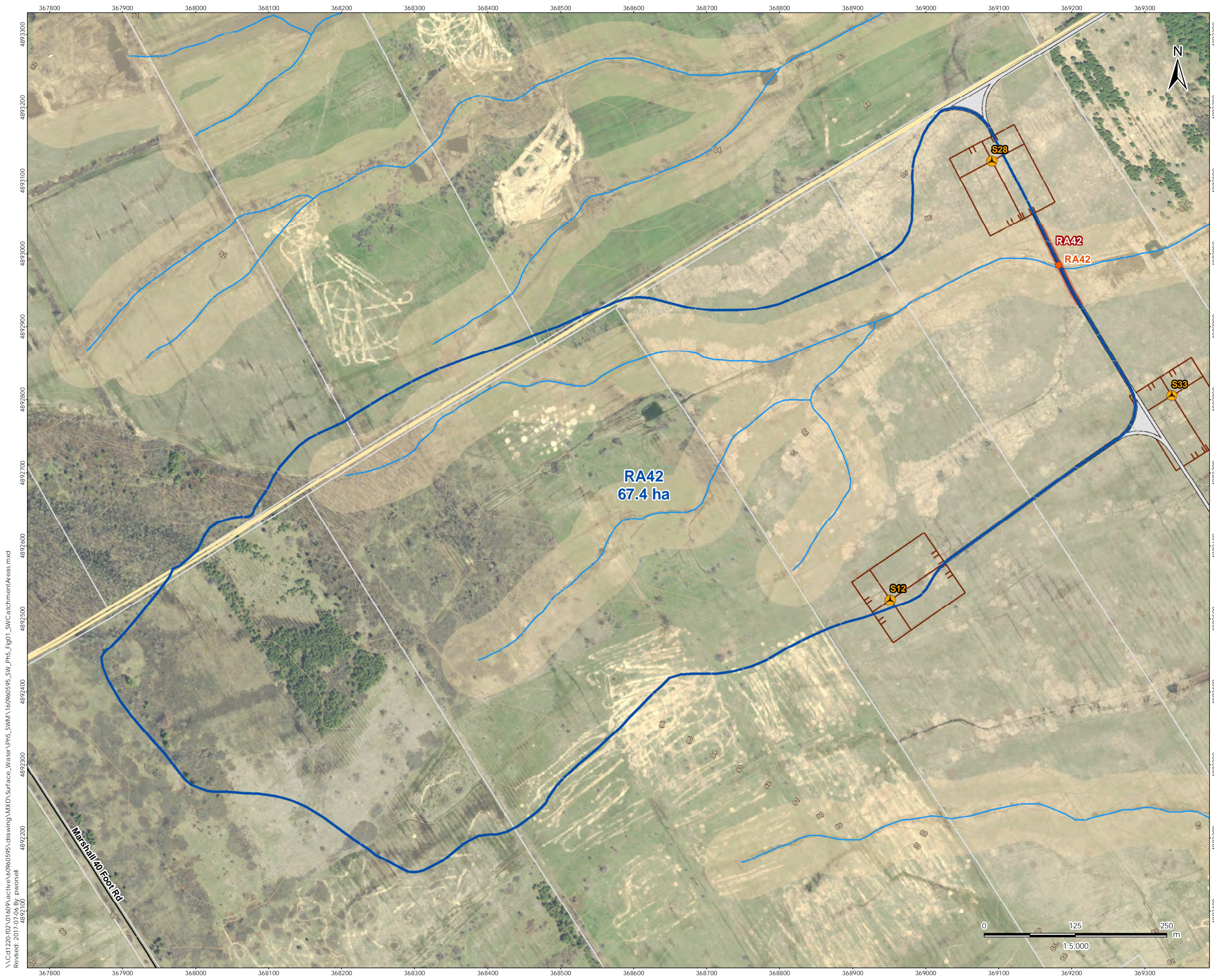
\\C01220-102\01609\active\60960595\drawing\MXD\Surface\_Water\Phs\_SWM\160960595\_SW\_Ph5\_Fig01\_SW\_CatchmentAreas.mxd  
 Revised: 2017-07-06 By: pworsell

July 2017  
160960595

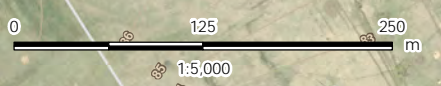


Legend

- Turbine
- Access Road
- Laydown Area and Crane Path
- Culvert Location
- Existing Features
- Road
- Unopened Road Allowance
- Railway
- Watercourse
- Property Line
- Regulation Limit (CRCA)
- CA Regulation Limit Project Encroachment



RA42  
67.4 ha



Notes

1. Coordinate System: NAD 1983 UTM Zone 18N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017; © Cataraqui Region Conservation Authority, 2017.
3. Orthoimagery © Cataraqui Region Conservation Authority, 2017. Imagery taken in 2014.

July 2017  
160960595

Client/Project

Windlectric Inc.  
Amherst Island Wind Energy Project

Figure No.

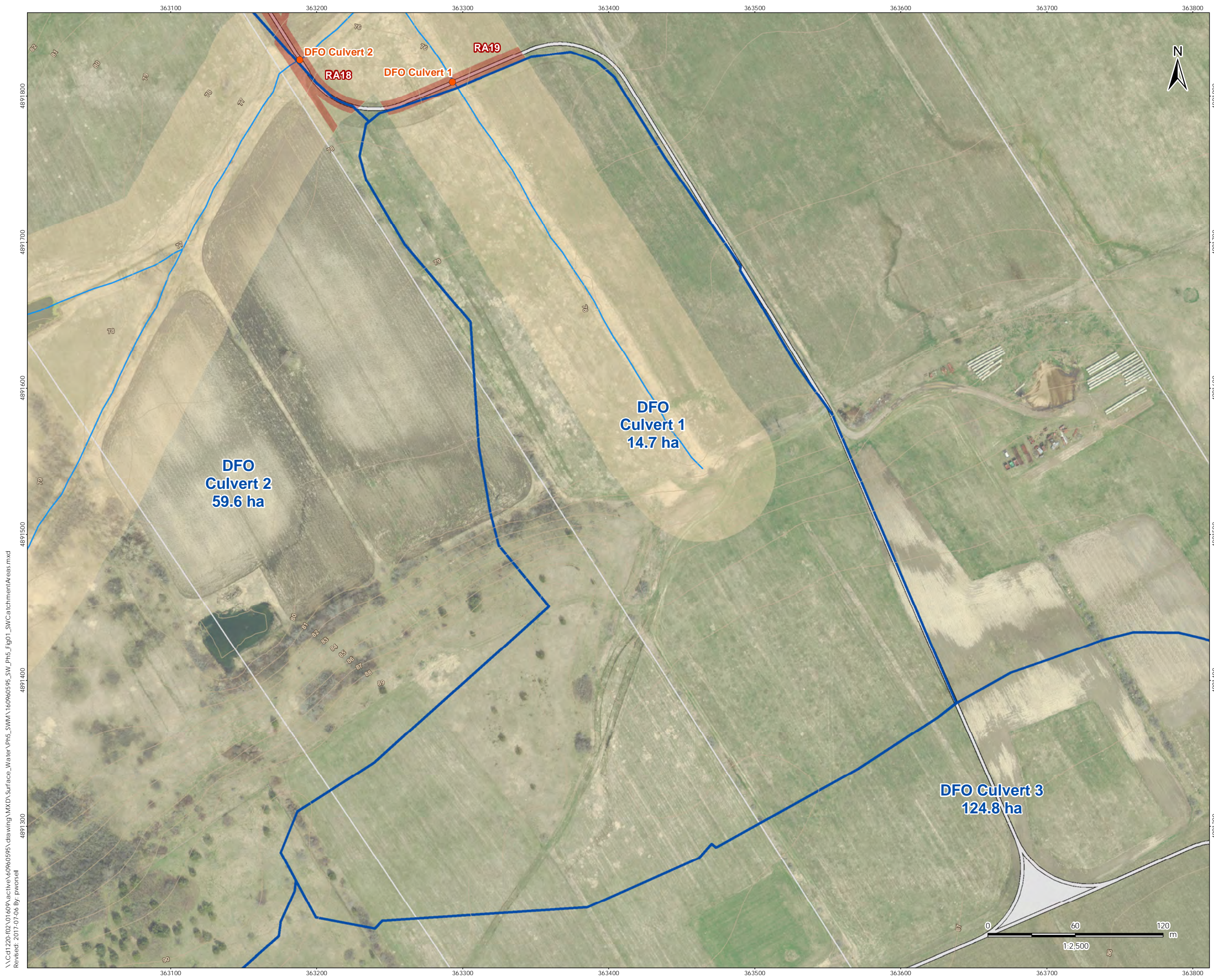
1-8

Title

Surface Water Catchment Area -  
Culvert RA42

\\Cd1220-102\01609\active\160960595\drawing\MXD\Surface\_Water\Phs\_SWM\160960595\_SW\_PhS\_Fig01\_SW\_CatchmentAreas.mxd  
Revised: 2017-07-06 By: pwnorsell





- Legend**
- Turbine
  - Access Road
  - Laydown Area and Crane Path
  - Culvert Location
- Existing Features**
- Road
  - Unopened Road Allowance
  - Railway
  - Watercourse
  - Property Line
  - Regulation Limit (CRCA)
  - CA Regulation Limit Project Encroachment

- Notes**
1. Coordinate System: NAD 1983 UTM Zone 18N
  2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017; © Cataraqui Region Conservation Authority, 2017.
  3. Orthoimagery © Cataraqui Region Conservation Authority, 2017. Imagery taken in 2014.

Client/Project  
 Windlectric Inc.  
 Amherst Island Wind Energy Project

Figure No.  
 1-9

Title  
 Surface Water Catchment Area -  
 Culvert DFO Culvert 1

\\C01220-102\01609\active\60960595\drawing\MXD\Surface\_Water\Phs\_SWM\160960595\_SW\_Ph5\_Fig01\_SW\_CatchmentAreas.mxd  
 Revised: 2017-07-06 By: pwnorsell





- Legend**
- Turbine
  - Access Road
  - Laydown Area and Crane Path
  - Culvert Location
- Existing Features**
- Road
  - Unopened Road Allowance
  - Railway
  - Watercourse
  - Property Line
  - Regulation Limit (CRCA)
  - CA Regulation Limit Project Encroachment

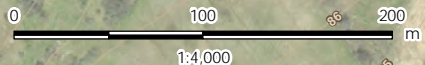
- Notes**
1. Coordinate System: NAD 1983 UTM Zone 18N
  2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017; © Cataraqui Region Conservation Authority, 2017.
  3. Orthoimagery © Cataraqui Region Conservation Authority, 2017. Imagery taken in 2014.

July 2017  
160960595

Client/Project  
Windlectric Inc.  
Amherst Island Wind Energy Project

Figure No.  
1-10

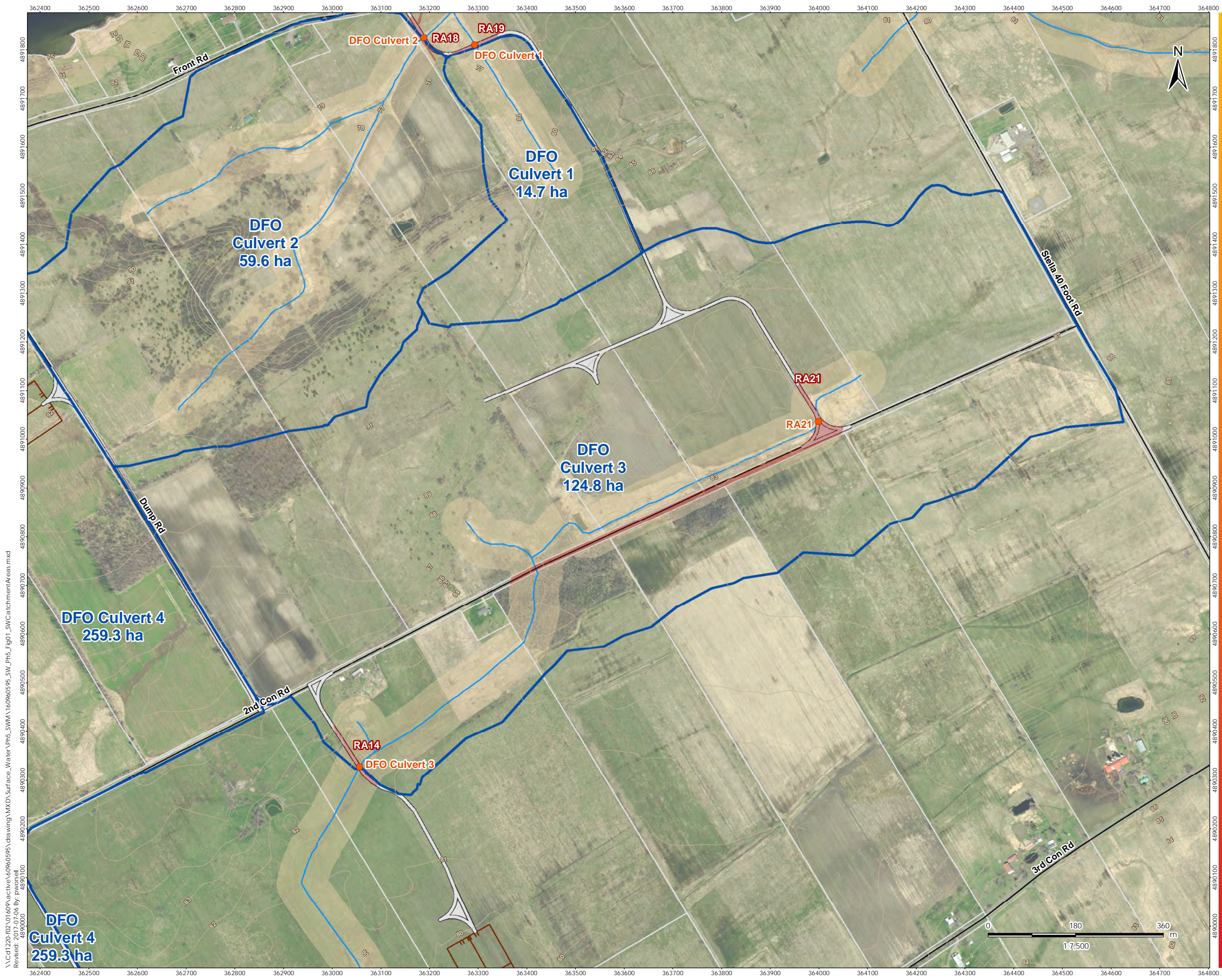
Title  
Surface Water Catchment Area -  
Culvert DFO Culvert 2



\\C01220-102\01609\active\160960595\drawing\MXD\Surface\_Water\Phs\_SWM\160960595\_SW\_PhS\_Fig01\_SW\_CatchmentAreas.mxd  
 Revised: 2017-07-06 By: pwnorsell



- Legend**
- Turbine
  - Access Road
  - Laydown Area and Crane Path
  - Culvert Location
- Existing Features**
- Road
  - Unopened Road Allowance
  - Railway
  - Watercourse
  - Property Line
  - Regulation Limit (CRCA)
  - CA Regulation Limit Project Encroachment



- Notes**
1. Coordinate System: NAD 1983 UTM Zone 18N
  2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017; © Cataraqui Region Conservation Authority, 2017.
  3. Orthoimagery © Cataraqui Region Conservation Authority, 2017. Imagery taken in 2014.

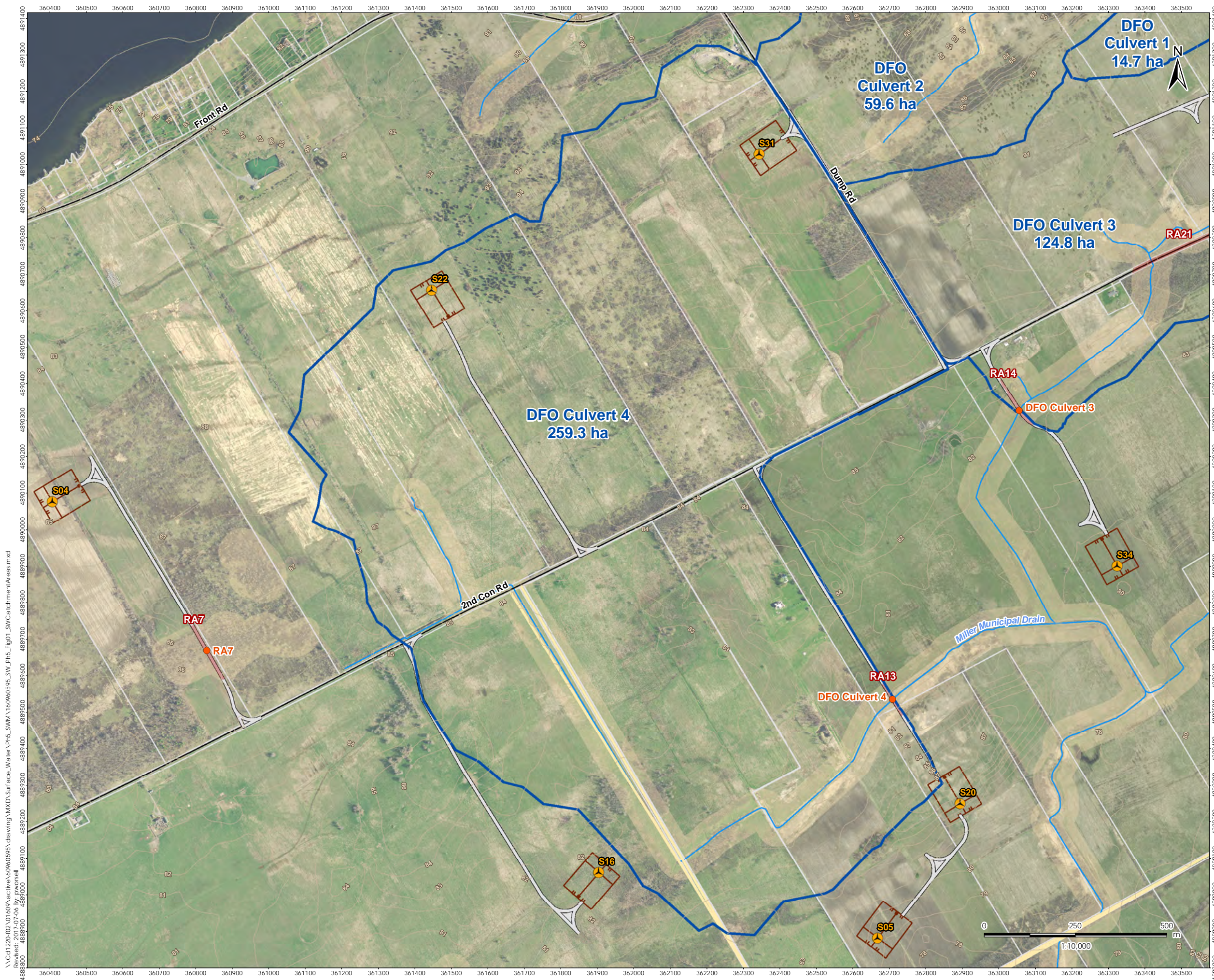
Client/Project  
 Windlectric Inc.  
 Amherst Island Wind Energy Project

Figure No.  
 1-11

Title  
 Surface Water Catchment Area -  
 Culvert DFO Culvert 3

\\C:\1220-102-01\609\active\60960595\drawing\MXD\Surface\_Water\Phs\_SWM\160960595\_SW\_Ph5\_Fig01\_SW\_CatchmentAreas.mxd  
 Revised: 2017-07-06 By: pwnorsell  
 4890000





- Legend**
- Turbine
  - Access Road
  - Laydown Area and Crane Path
  - Culvert Location
- Existing Features**
- Road
  - Unopened Road Allowance
  - Railway
  - Watercourse
  - Property Line
  - Regulation Limit (CRCA)
  - CA Regulation Limit Project Encroachment

- Notes**
1. Coordinate System: NAD 1983 UTM Zone 18N
  2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017; © Cataraqui Region Conservation Authority, 2017.
  3. Orthoimagery © Cataraqui Region Conservation Authority, 2017. Imagery taken in 2014.

July 2017  
160960595

Client/Project  
Windlectric Inc.  
Amherst Island Wind Energy Project

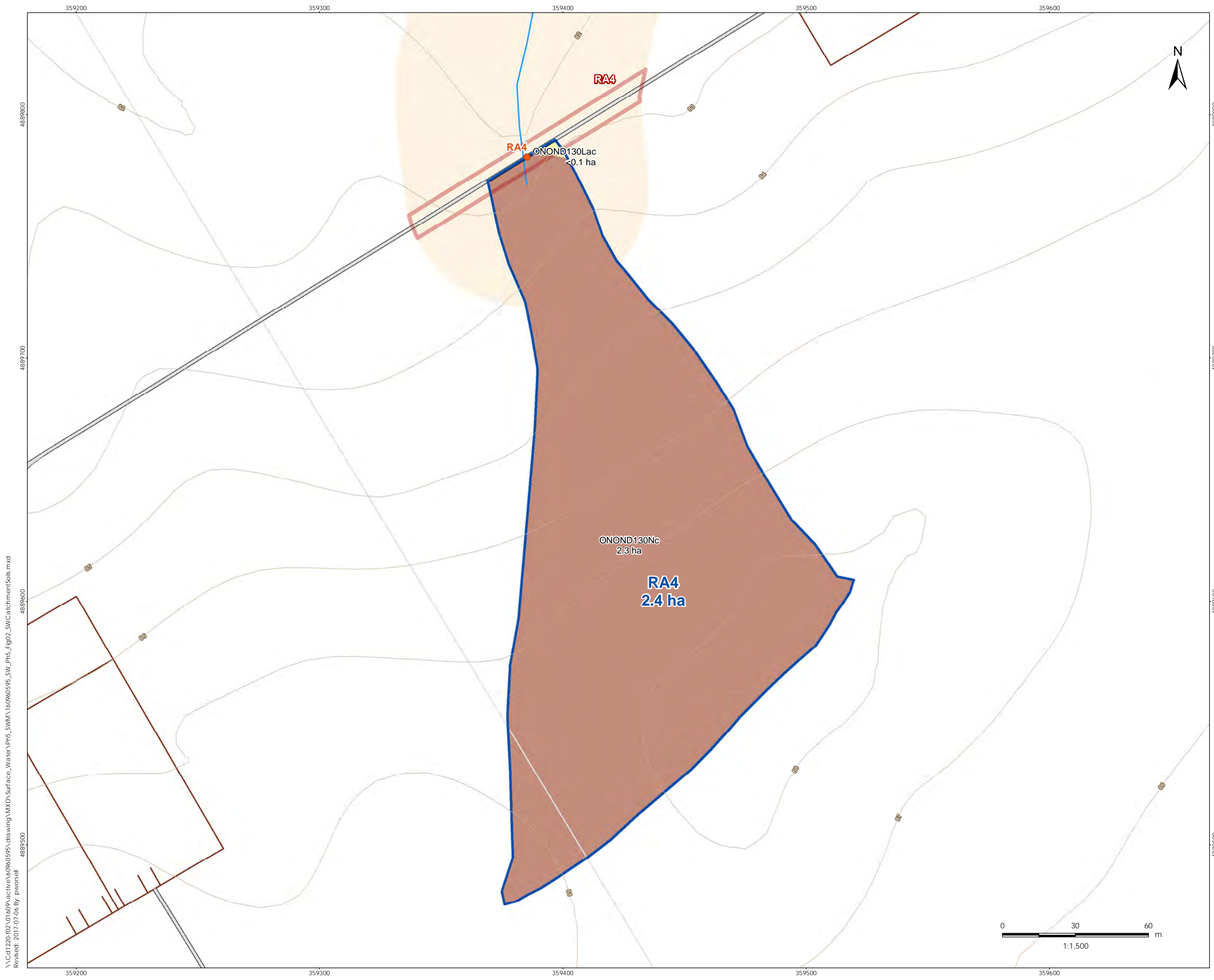
Figure No.  
1-12

Title  
Surface Water Catchment Area -  
Culvert DFO Culvert 4



\\C:\1220-102\01609\active\60960595\Surface\_Water\Phs\_SWM\160960595\_SW\_Ph5\_Fig01\_SW\_CatchmentAreas.mxd  
 Revised: 2017-07-06 By: pwnorsell  
 4888800 4888900 4889000 4889100 4889200 4889300 4889400 4889500 4889600 4889700 4889800 4889900 4890000 4890100 4890200 4890300 4890400 4890500 4890600 4890700 4890800 4890900 4891000 4891100 4891200 4891300 4891400





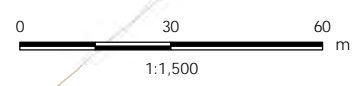
- Legend**
- Turbine
  - Culvert Location
  - Access Road
  - Laydown Area and Crane Path
  - Surface Water Catchment Area
  - Existing Features**
  - Road
  - Unopened Road Allowance
  - Railway
  - Watercourse
  - Property Line
  - Regulation Limit (CRCA)
  - CA Regulation Limit Project Encroachment
  - Waterbody
  - Soil Unit**
  - Lansdowne Clay
  - Napanee Clay

- Notes**
1. Coordinate System: NAD 1983 UTM Zone 18N
  2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017; © Cataraqui Region Conservation Authority, 2017.

Client/Project  
 Windlectric Inc.  
 Amherst Island Wind Energy Project

Figure No.  
 2-1

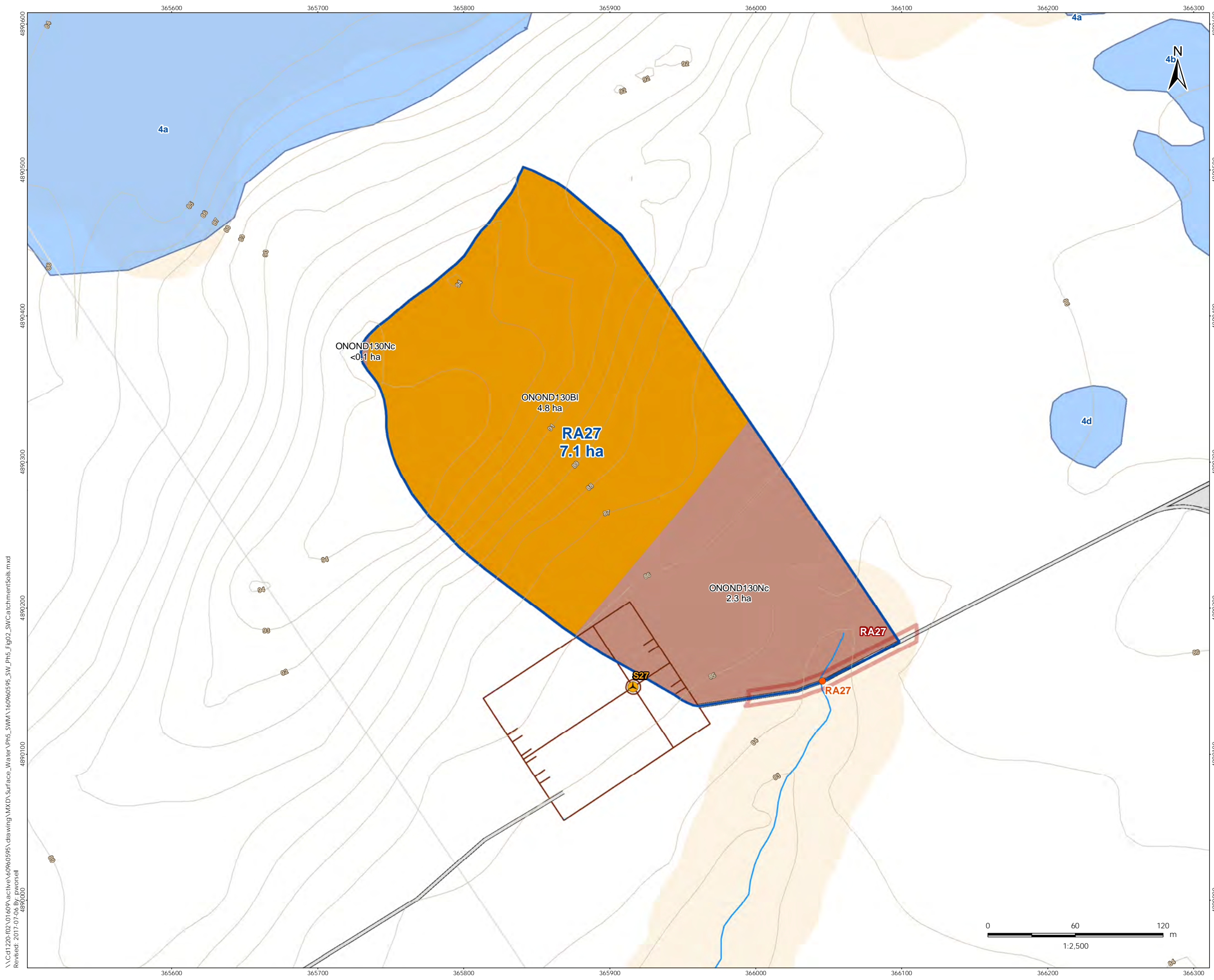
Title  
 Soils -  
 Culvert RA4



\\Cd1220-102\01609\active\60960595\drawing\MXD\Surface\_Water\Phs\_SWM\160960595\_SW\_Ph5\_Fig02\_SW\_CatchmentSoils.mxd  
 Revised: 2017-07-06 By: pworthell



- Legend**
- Turbine
  - Culvert Location
  - Access Road
  - Laydown Area and Crane Path
  - Surface Water Catchment Area
- Existing Features**
- Road
  - Unopened Road Allowance
  - Railway
  - Watercourse
  - Property Line
  - Regulation Limit (CRCA)
  - CA Regulation Limit Project Encroachment
  - Waterbody
- Soil Unit**
- Bonhead Loam
  - Napanees Clay



- Notes**
1. Coordinate System: NAD 1983 UTM Zone 18N
  2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017; © Cataraqui Region Conservation Authority, 2017.

Client/Project

Windlectric Inc.  
Amherst Island Wind Energy Project

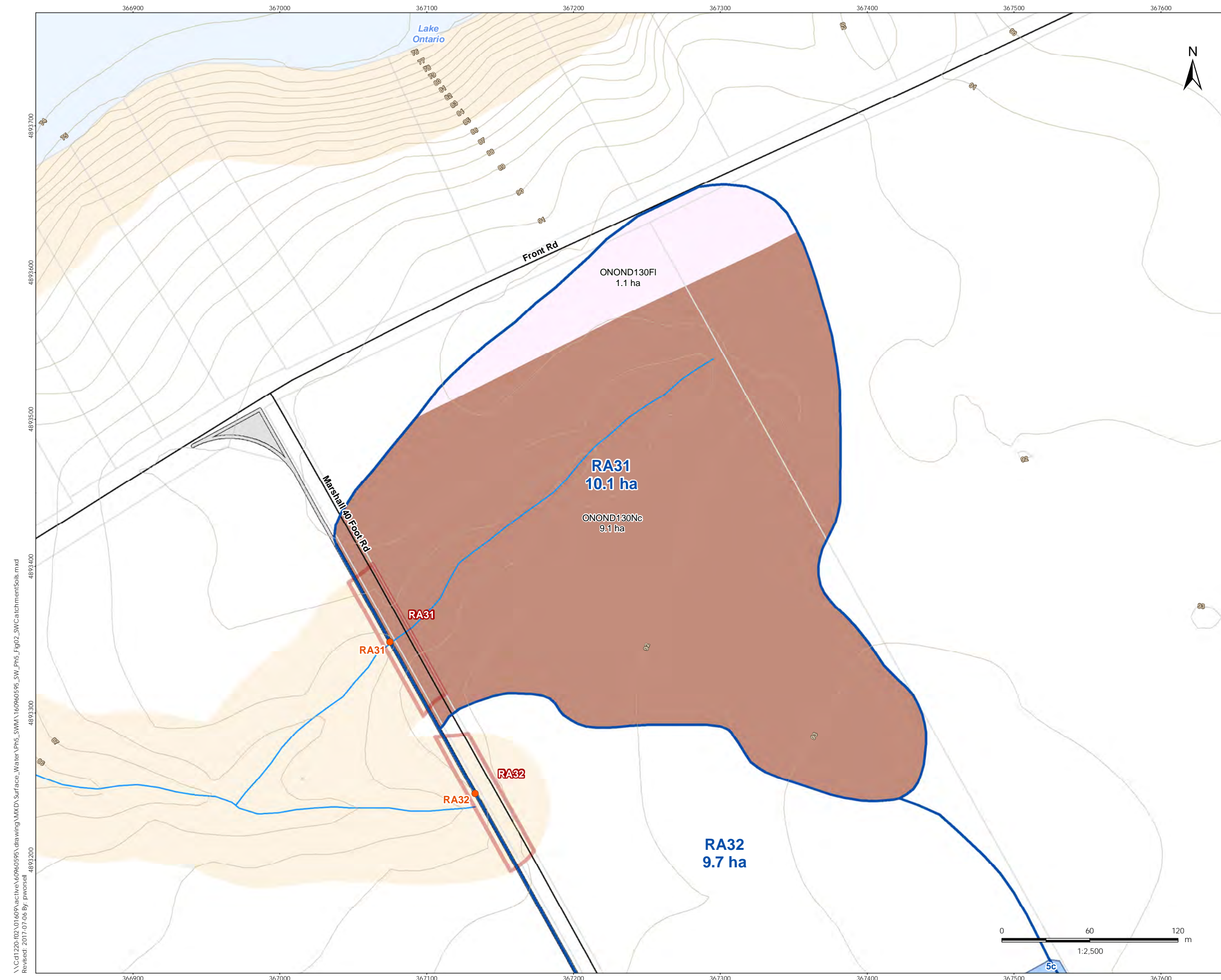
Figure No.  
2-2

Title  
Soils -  
Culvert RA27

\\C:\1220-102\01609\active\160960595\drawing\MXD\Surface\_Water\Phs\_SWM\160960595\_SW\_PhS\_Fig02\_SW\_CatchmentSoils.mxd  
 Revised: 2017-07-06 By: pwnorsell  
 4890000

July 2017  
160960595





- Legend**
- Turbine
  - Culvert Location
  - Access Road
  - Laydown Area and Crane Path
  - Surface Water Catchment Area
  - Existing Features**
  - Road
  - Unopened Road Allowance
  - Railway
  - Watercourse
  - Property Line
  - Regulation Limit (CRCA)
  - CA Regulation Limit Project Encroachment
  - Waterbody
  - Soil Unit**
  - Farmington Loam
  - Napanee Clay

- Notes**
1. Coordinate System: NAD 1983 UTM Zone 18N
  2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017; © Cataraqui Region Conservation Authority, 2017.

Client/Project

Windlectric Inc.  
Amherst Island Wind Energy Project

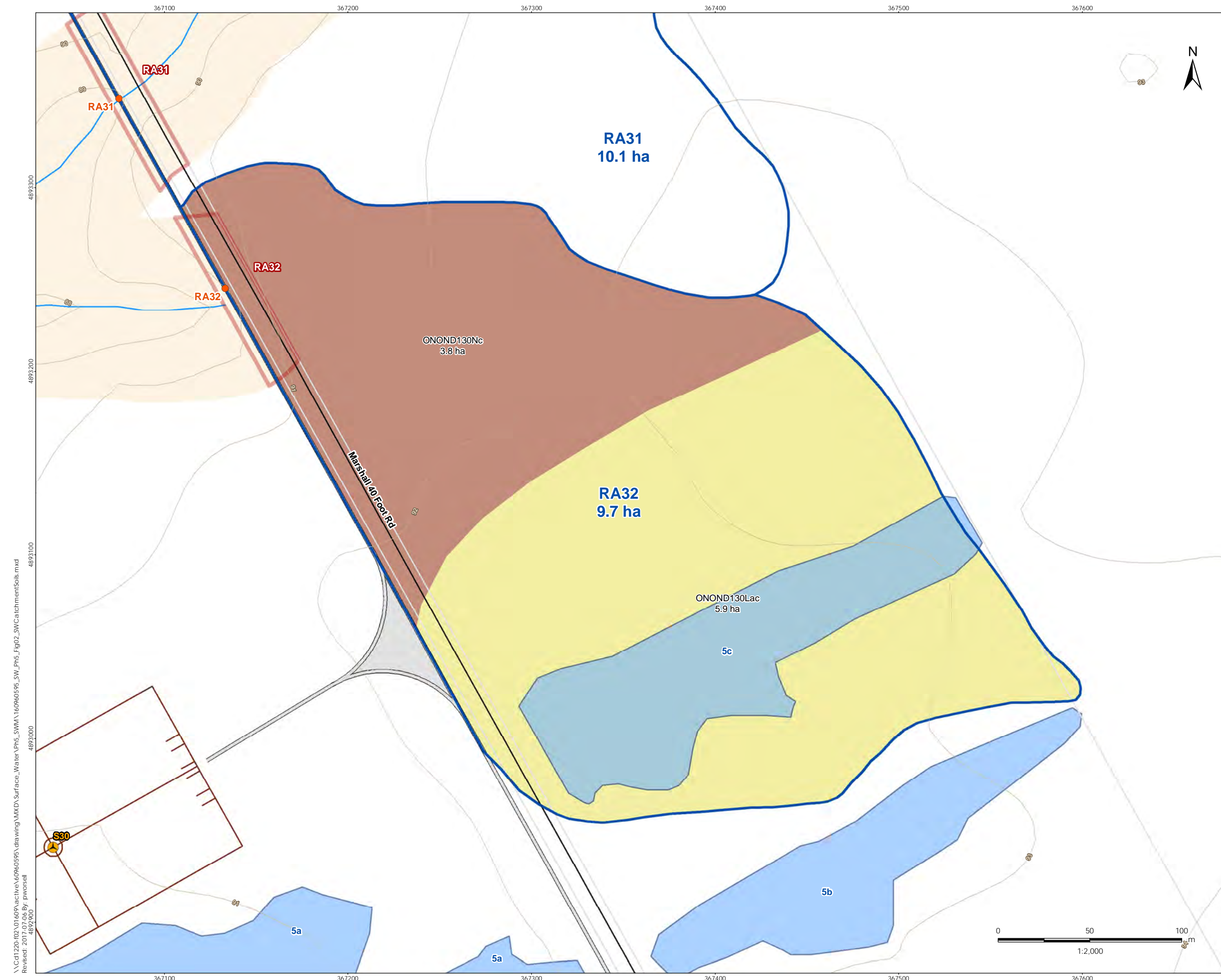
Figure No.  
2-3

Title  
Soils -  
Culvert RA31

\\Cd1220-102\01609\active\60960595\drawing\MXD\Surface\_Water\Phs\_SWM\160960595\_SW\_Ph5\_Fig02\_SW\_CatchmentSoils.mxd  
 Revised: 2017-07-06 By: pwnorsell

July 2017  
160960595





- Legend**
- Turbine
  - Culvert Location
  - Access Road
  - Laydown Area and Crane Path
  - Surface Water Catchment Area
- Existing Features**
- Road
  - Unopened Road Allowance
  - Railway
  - Watercourse
  - Property Line
  - Regulation Limit (CRCA)
  - CA Regulation Limit Project Encroachment
  - Waterbody
- Soil Unit**
- Lansdowne Clay
  - Napanee Clay

- Notes**
1. Coordinate System: NAD 1983 UTM Zone 18N
  2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017; © Cataraqui Region Conservation Authority, 2017.

Client/Project

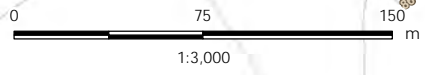
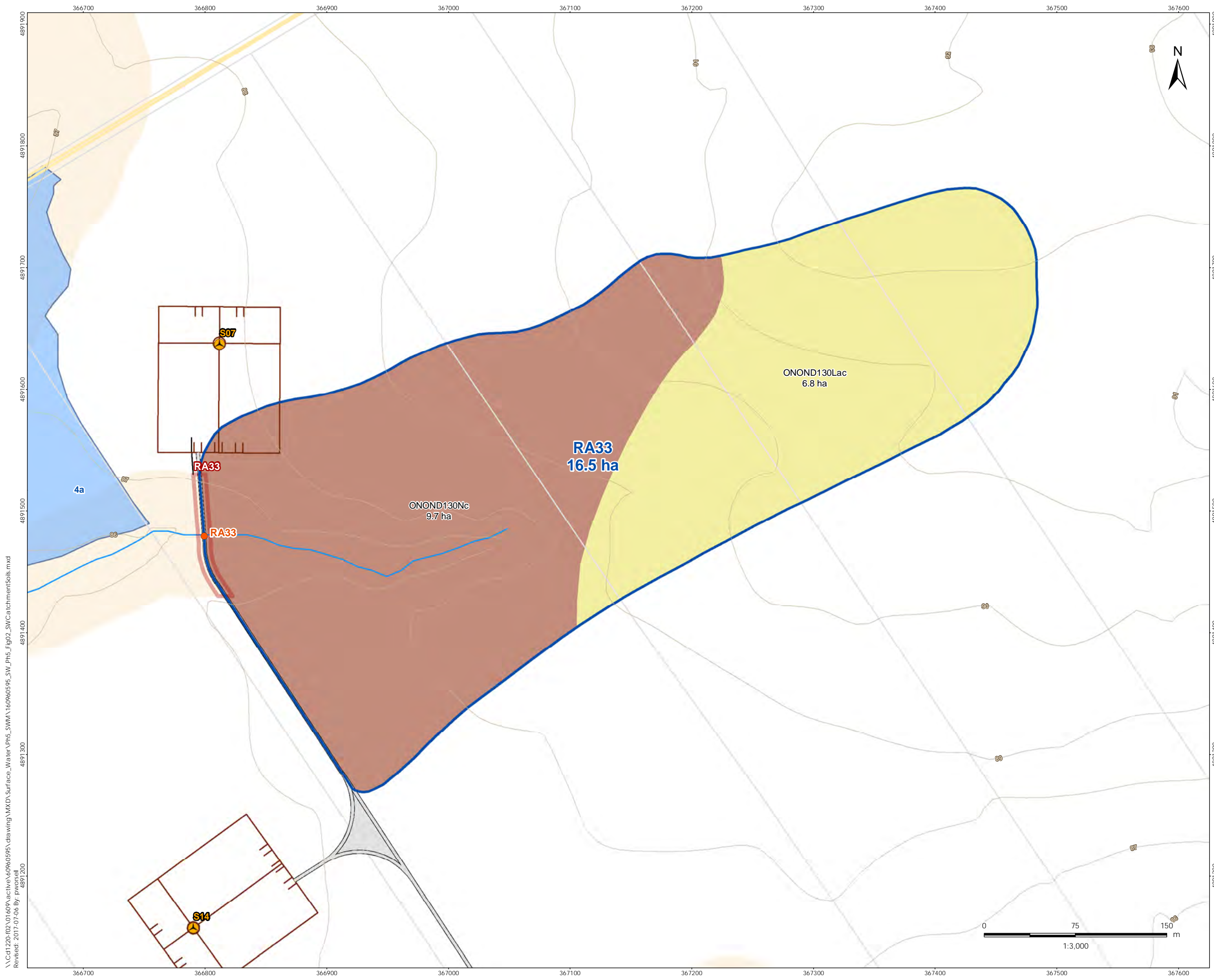
Windlectric Inc.  
Amherst Island Wind Energy Project

Figure No.  
2-4

Title  
Soils -  
Culvert RA32

\\C01220-102-011609\active\6960595\drawing\MXD\Surface\_Water\Phs\_SWM\160960595\_SW\_PhS\_Fig02\_SW\_CatchmentSoils.mxd  
 Revised: 2017-07-06 By: pwnorsell

- Legend**
- Turbine
  - Culvert Location
  - Access Road
  - Laydown Area and Crane Path
  - Surface Water Catchment Area
  - Existing Features**
  - Road
  - Unopened Road Allowance
  - Railway
  - Watercourse
  - Property Line
  - Regulation Limit (CRCA)
  - CA Regulation Limit Project Encroachment
  - Waterbody
  - Soil Unit**
  - Lansdowne Clay
  - Napanees Clay



- Notes**
1. Coordinate System: NAD 1983 UTM Zone 18N
  2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017; © Cataraqui Region Conservation Authority, 2017.

Client/Project  
Windlectric Inc.  
Amherst Island Wind Energy Project

Figure No.  
2-5

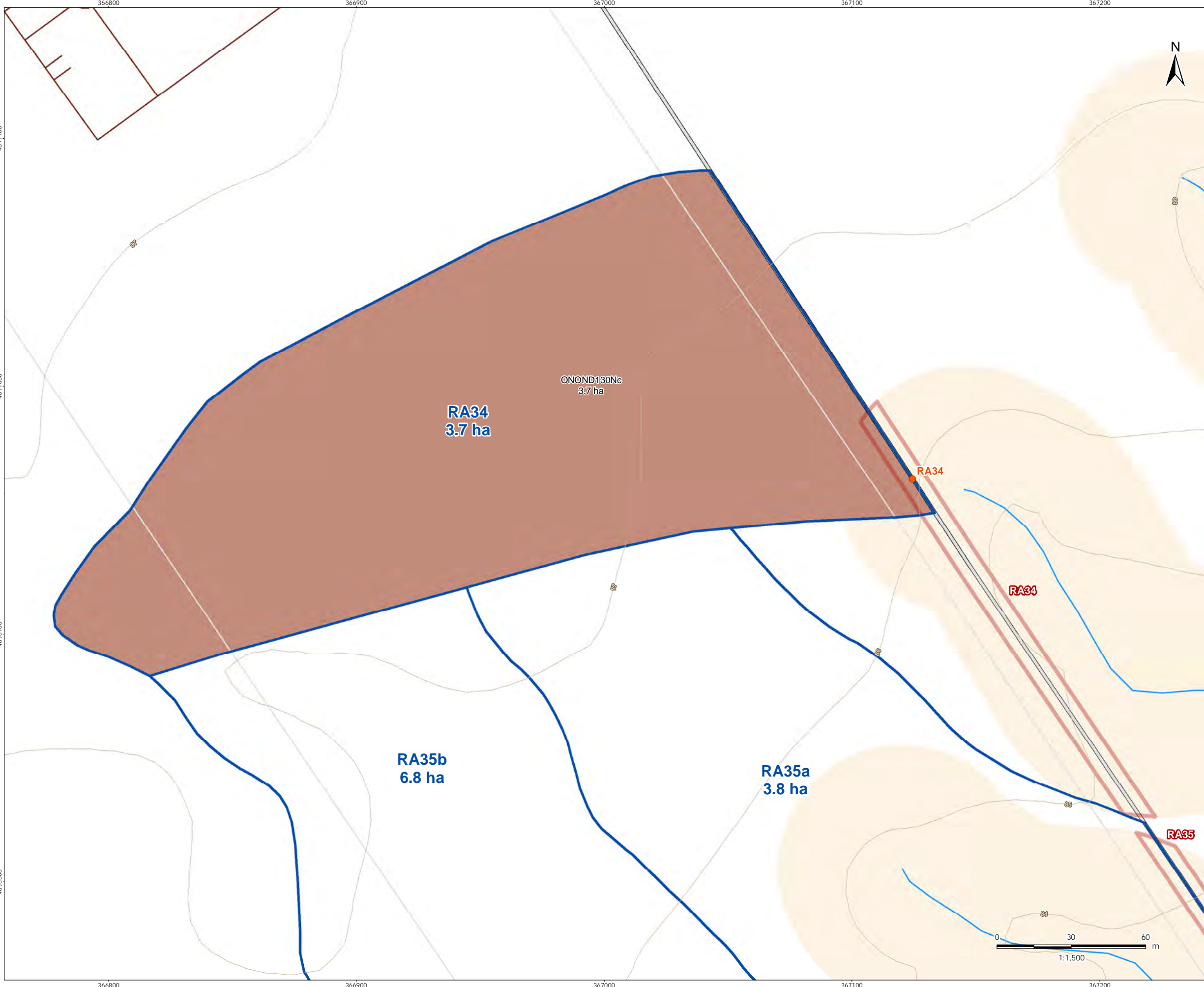
Title  
Soils -  
Culvert RA33

\\C01220-102\01609\active\60960595\drawing\MXD\Surface\_Water\Phs\_SWM\160960595\_SW\_PhS\_Fig02\_SW\_CatchmentSoils.mxd  
 Revised: 2017-07-06 By: pwnorsell

July 2017  
160960595



- Legend**
- Turbine
  - Culvert Location
  - Access Road
  - Laydown Area and Crane Path
  - Surface Water Catchment Area
  - Existing Features**
  - Road
  - Unopened Road Allowance
  - Railway
  - Watercourse
  - Property Line
  - Regulation Limit (CRCA)
  - CA Regulation Limit Project Encroachment
  - Waterbody
  - Soil Unit**
  - Napanea Clay



- Notes**
1. Coordinate System: NAD 1983 UTM Zone 18N
  2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017; © Cataraqui Region Conservation Authority, 2017.

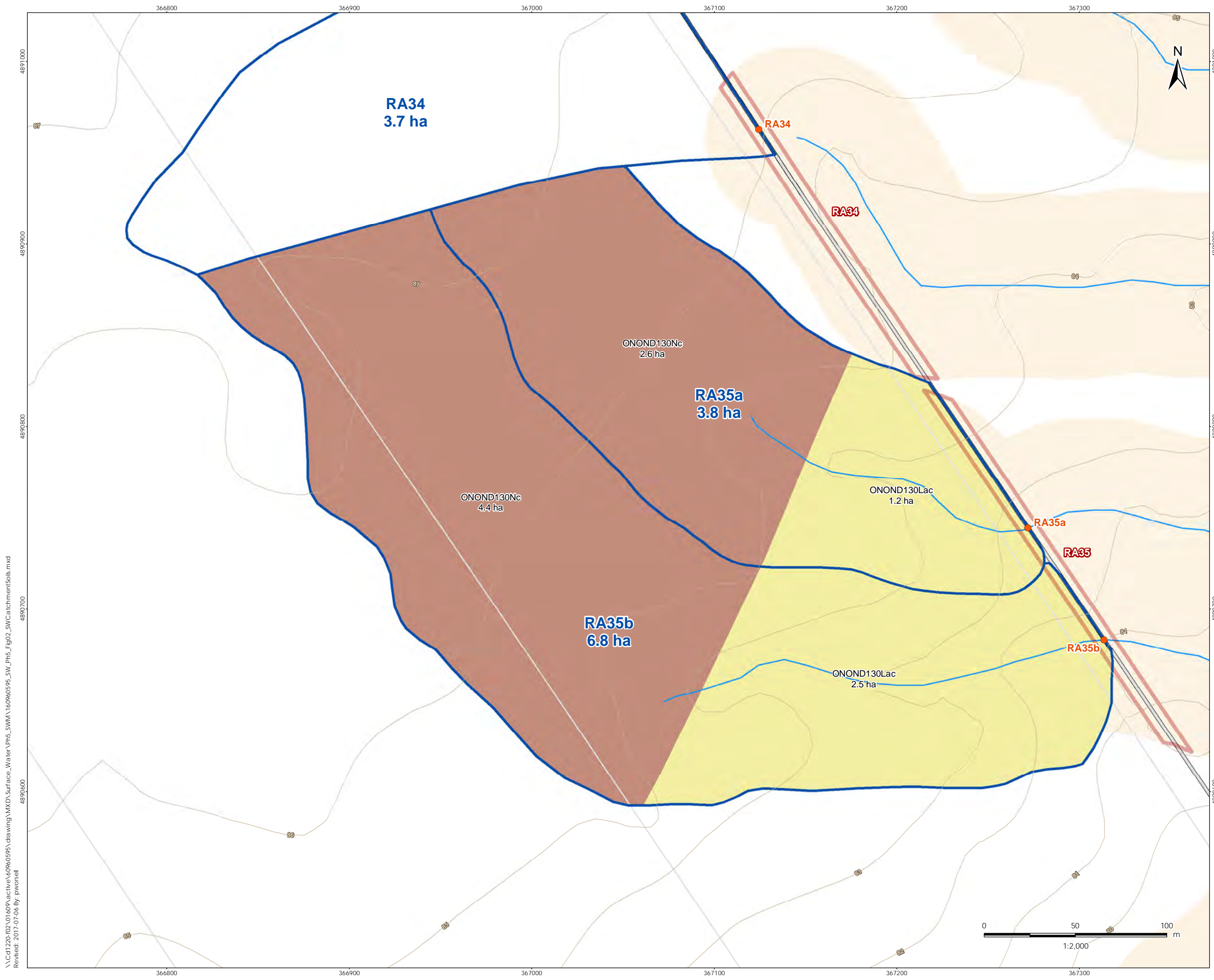
July 2017  
160960595

Client/Project  
Windelectric Inc.  
Amherst Island Wind Energy Project

Figure No.  
2-6

Title  
Soils -  
Culvert RA34

\\Cd1220-102\01609\active\160960595\drawing\MXD\Surface\_Water\Phs\_SWM\160960595\_SW\_Ph5\_Fig02\_SW\_CatchmentSoils.mxd  
 Revised: 2017-07-06 By: pworsell



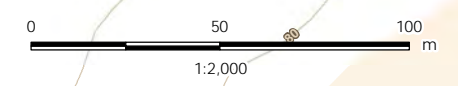
- Legend**
- Turbine
  - Culvert Location
  - Access Road
  - Laydown Area and Crane Path
  - Surface Water Catchment Area
  - Existing Features**
  - Road
  - Unopened Road Allowance
  - Railway
  - Watercourse
  - Property Line
  - Regulation Limit (CRCA)
  - CA Regulation Limit Project Encroachment
  - Waterbody
  - Soil Unit**
  - Lansdowne Clay
  - Napanee Clay

- Notes**
1. Coordinate System: NAD 1983 UTM Zone 18N
  2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017; © Cataraqui Region Conservation Authority, 2017.

Client/Project  
 Windelectric Inc.  
 Amherst Island Wind Energy Project

Figure No.  
 2-7

Title  
 Soils -  
 Culvert RA35

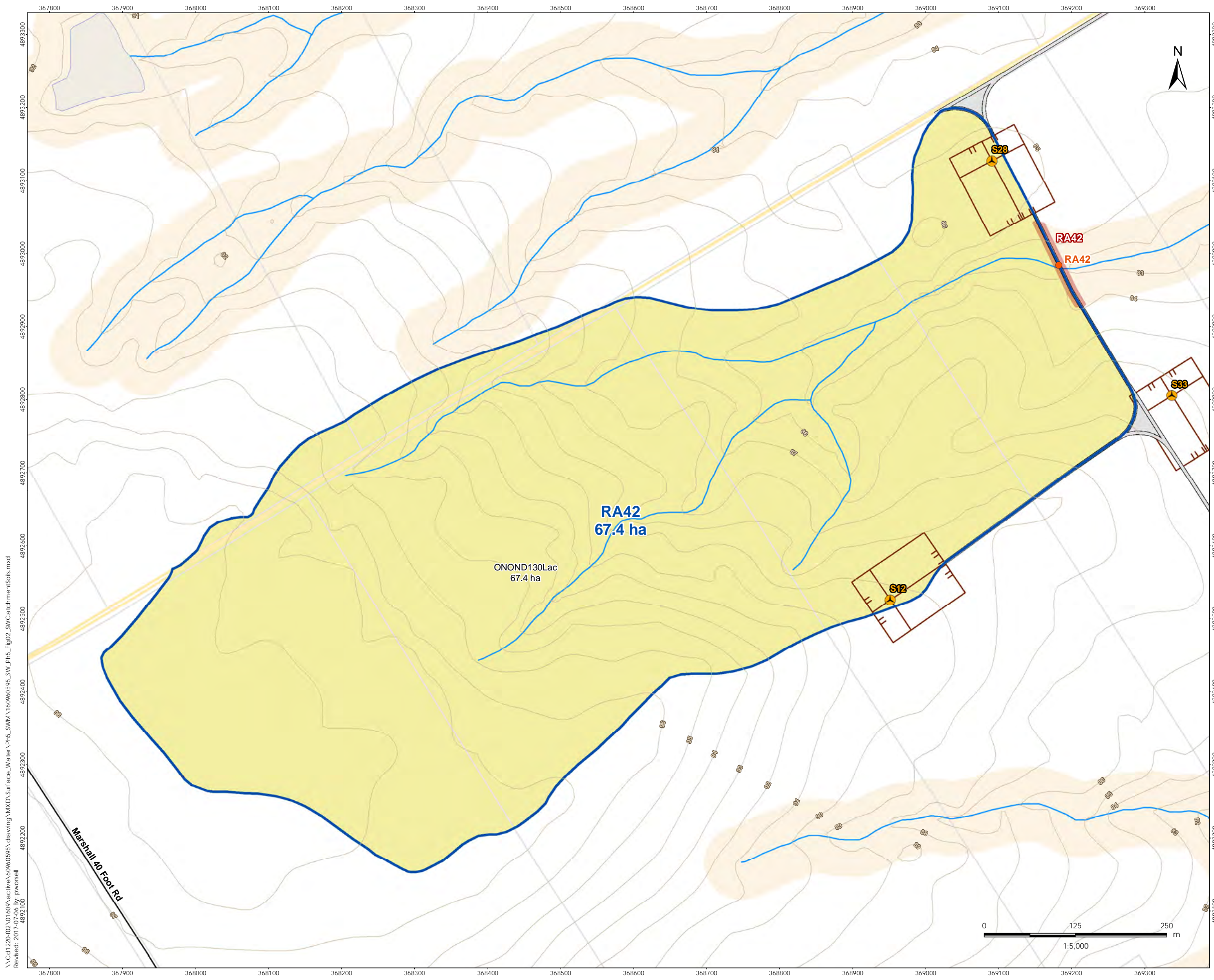


\\C01220-102\01609\active\60960595\drawing\MXD\Surface\_Water\Phs\_SWM\160960595\_SW\_Ph5\_Fig02\_SW\_CatchmentSoils.mxd  
 Revised: 2017-07-06 By: pworsell

July 2017  
 160960595



- Legend**
- Turbine
  - Culvert Location
  - Access Road
  - Laydown Area and Crane Path
  - Surface Water Catchment Area
- Existing Features**
- Road
  - Unopened Road Allowance
  - Railway
  - Watercourse
  - Property Line
  - Regulation Limit (CRCA)
  - CA Regulation Limit Project Encroachment
  - Waterbody
- Soil Unit**
- Lansdowne Clay



- Notes**
1. Coordinate System: NAD 1983 UTM Zone 18N
  2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017; © Cataraqui Region Conservation Authority, 2017.

July 2017  
160960595

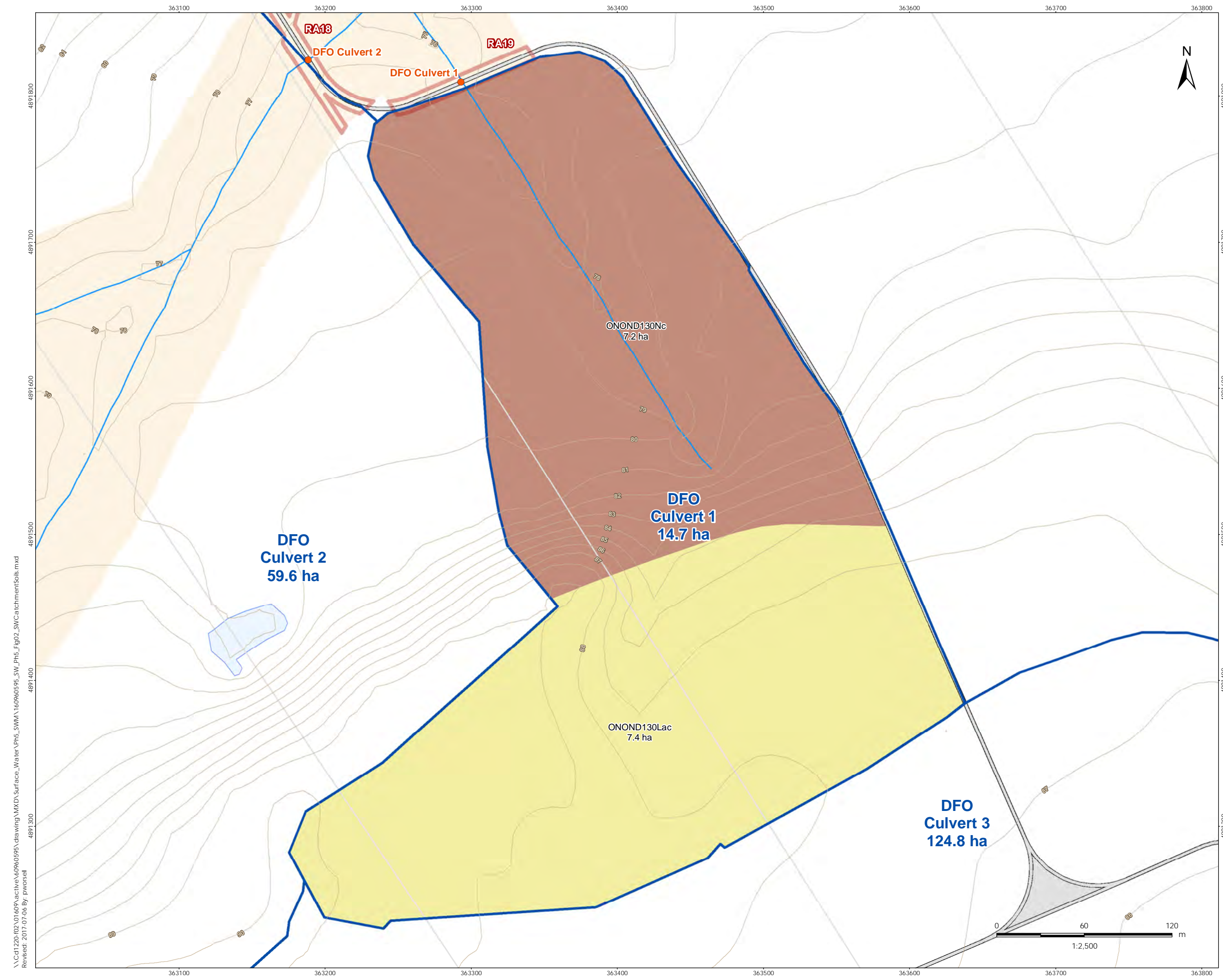
Client/Project  
Windlectric Inc.  
Amherst Island Wind Energy Project

Figure No.  
2-8

Title  
Soils -  
Culvert RA42

\\C01220-102\01609\active\60960595\drawing\MXD\Surface\_Water\Phs\_SWM\160960595\_SW\_PhS\_Fig02\_SW\_CatchmentSoils.mxd  
 Revised: 2017-07-06 By: pwnorsell





- Legend**
- Turbine
  - Culvert Location
  - Access Road
  - Laydown Area and Crane Path
  - Surface Water Catchment Area
- Existing Features**
- Road
  - Unopened Road Allowance
  - Railway
  - Watercourse
  - Property Line
  - Regulation Limit (CRCA)
  - CA Regulation Limit Project Encroachment
  - Waterbody
- Soil Unit**
- Lansdowne Clay
  - Napanee Clay



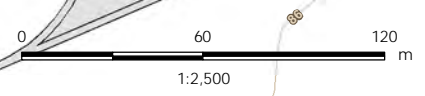
- Notes**
1. Coordinate System: NAD 1983 UTM Zone 18N
  2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017; © Cataraqui Region Conservation Authority, 2017.

July 2017  
160960595

Client/Project  
Windlectric Inc.  
Amherst Island Wind Energy Project

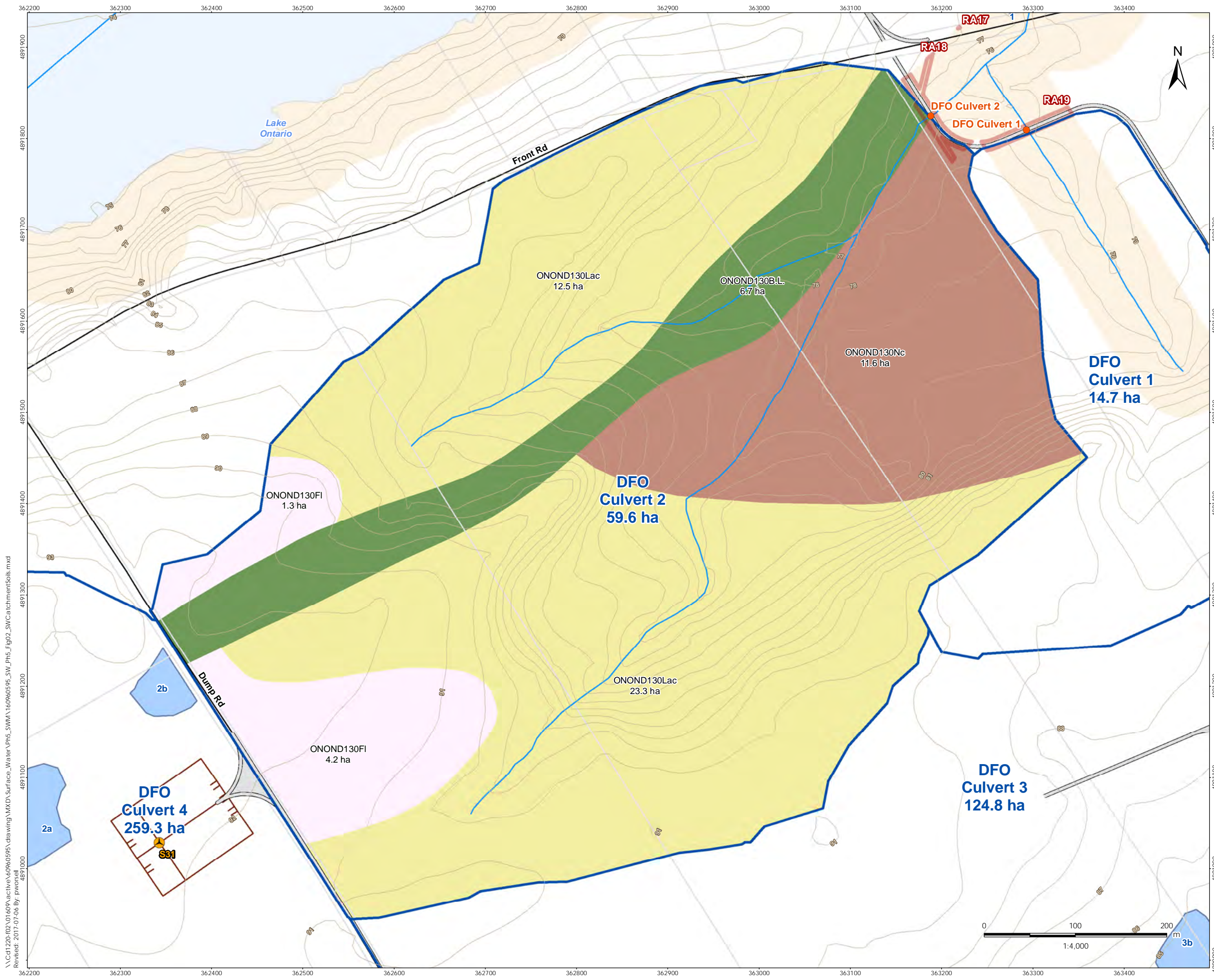
Figure No.  
2-9

Title  
Soils -  
Culvert DFO Culvert 1



\\C01220-102\01609\active\160960595\drawing\MXD\Surface\_Water\Phs\_SWM\160960595\_SW\_PhS\_Fig02\_SW\_CatchmentSoils.mxd  
 Revised: 2017-07-06 By: pworsell





- Legend**
- Turbine
  - Culvert Location
  - Access Road
  - Laydown Area and Crane Path
  - Surface Water Catchment Area
- Existing Features**
- Road
  - Unopened Road Allowance
  - Railway
  - Watercourse
  - Property Line
  - Regulation Limit (CRCA)
  - CA Regulation Limit Project Encroachment
  - Waterbody
- Soil Unit**
- Bottom Land
  - Farmington Loam
  - Lansdowne Clay
  - Napanee Clay

- Notes**
1. Coordinate System: NAD 1983 UTM Zone 18N
  2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017; © Cataraqui Region Conservation Authority, 2017.

Client/Project

Windlectric Inc.  
Amherst Island Wind Energy Project

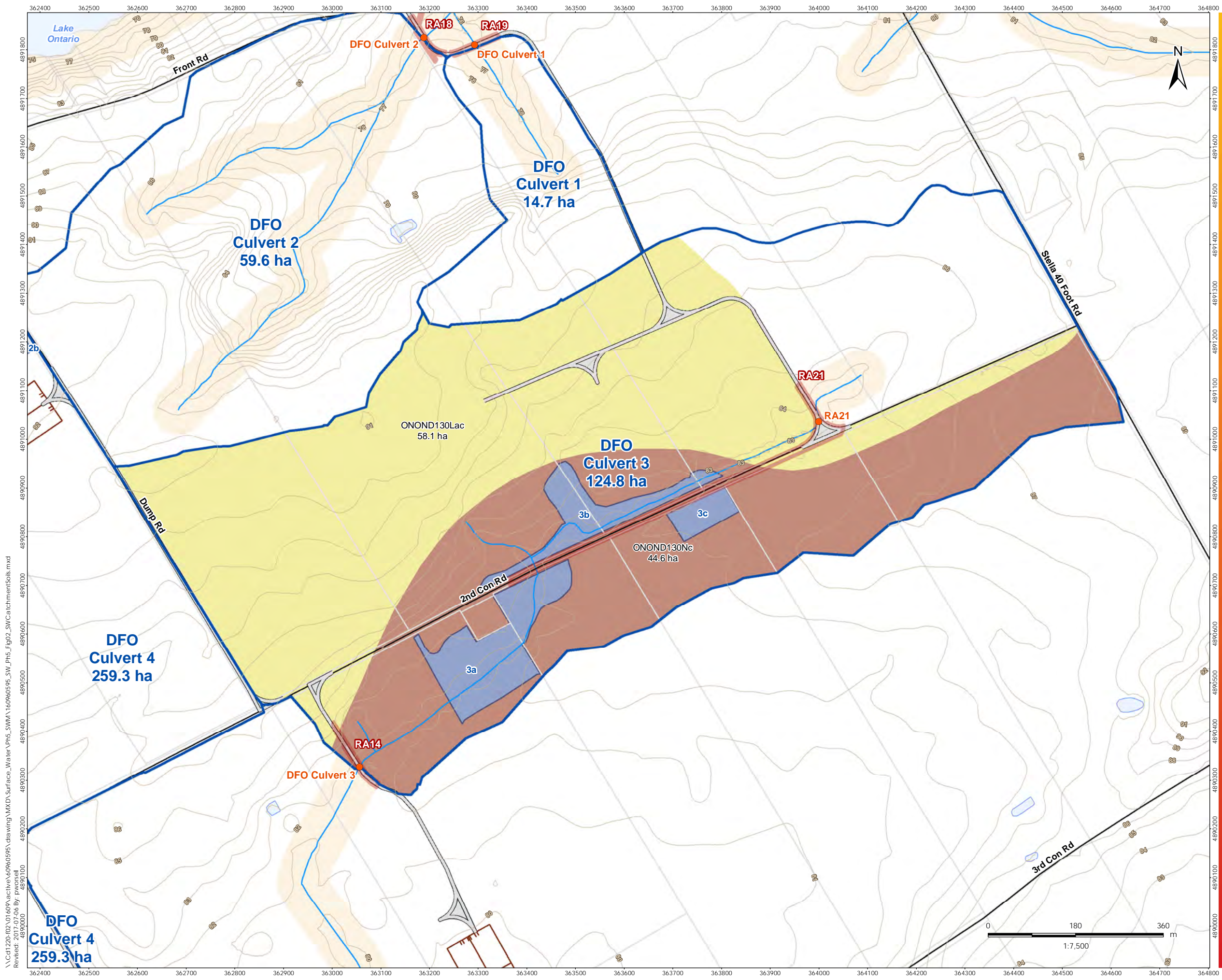
Figure No.  
2-10

Title  
Soils -  
Culvert DFO Culvert 2

\\C01220-102\01609\active\6960595\drawing\MXD\Surface\_Water\Phs\_SWM\160960595\_SW\_Ph5\_Fig02\_SW\_CatchmentSoils.mxd  
 Revised: 2017-07-06 By: pwnorsell

July 2017  
160960595





- Legend**
- Turbine
  - Culvert Location
  - Access Road
  - Laydown Area and Crane Path
  - Surface Water Catchment Area
- Existing Features**
- Road
  - Unopened Road Allowance
  - Railway
  - Watercourse
  - Property Line
  - Regulation Limit (CRCA)
  - CA Regulation Limit Project Encroachment
  - Waterbody
- Soil Unit**
- Lansdowne Clay
  - Napanee Clay

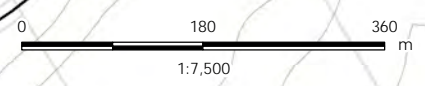
- Notes**
1. Coordinate System: NAD 1983 UTM Zone 18N
  2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017; © Cataraqui Region Conservation Authority, 2017.

Client/Project

Windlectric Inc.  
Amherst Island Wind Energy Project

Figure No.  
2-11

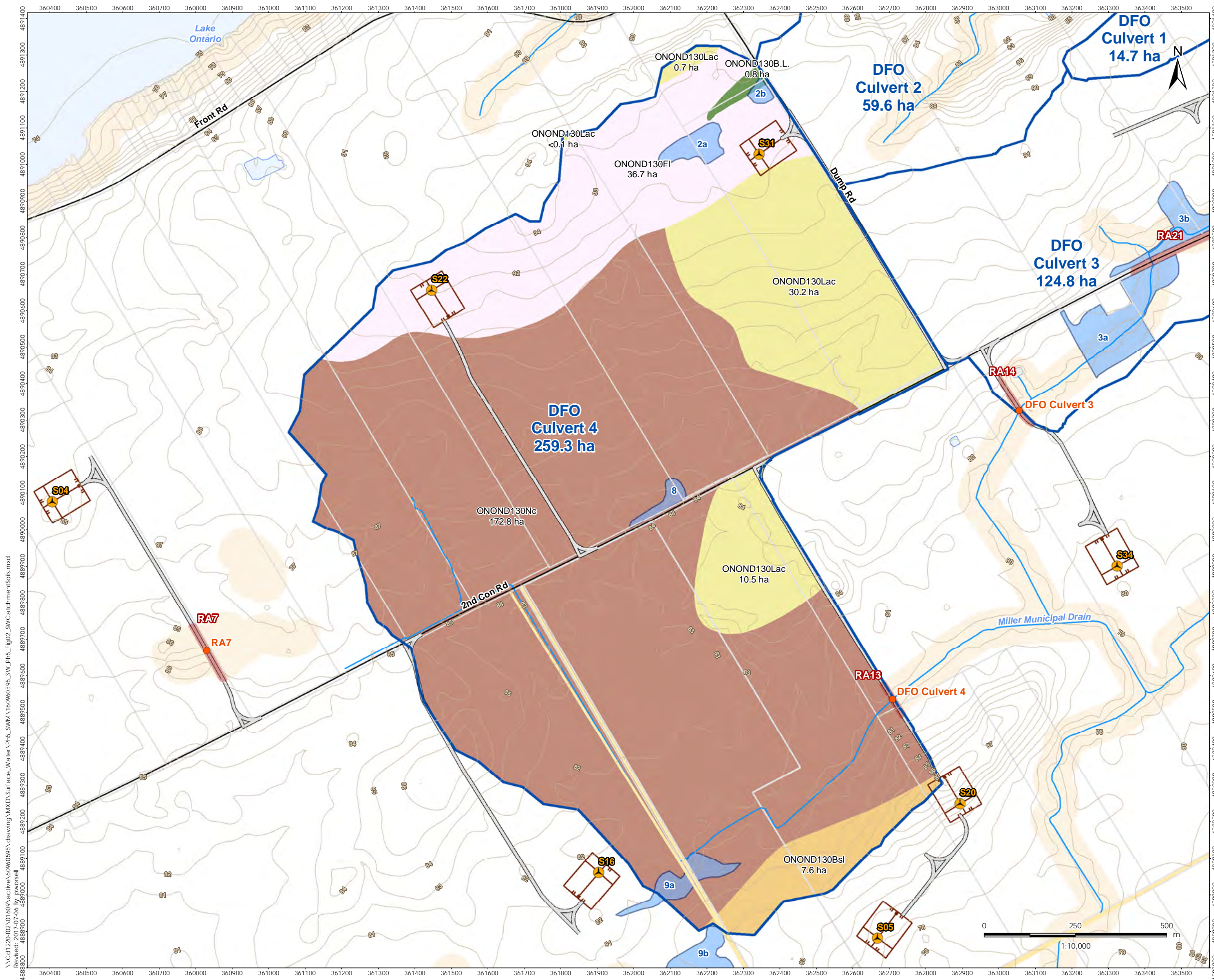
Title  
Soils -  
Culvert DFO Culvert 3



\\C01220-102\01609\active\6960595\drawing\MXD\Surface\_Water\Phs\_SWM\160960595\_SW\_Ph5\_Fig02\_SW\_CatchmentSoils.mxd  
 Revised: 2017-07-06 By: pwnorsell

July 2017  
160960595





- Legend**
- Turbine
  - Culvert Location
  - Access Road
  - Laydown Area and Crane Path
  - Surface Water Catchment Area
- Existing Features**
- Road
  - Unopened Road Allowance
  - Railway
  - Watercourse
  - Property Line
  - Regulation Limit (CRCA)
  - CA Regulation Limit Project Encroachment
  - Waterbody
- Soil Unit**
- Bonhead Sandy Loam
  - Bottom Land
  - Farmington Loam
  - Lansdowne Clay
  - Napanee Clay

- Notes**
1. Coordinate System: NAD 1983 UTM Zone 18N
  2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017; © Cataraqui Region Conservation Authority, 2017.

Client/Project

Windlectric Inc.  
Amherst Island Wind Energy Project

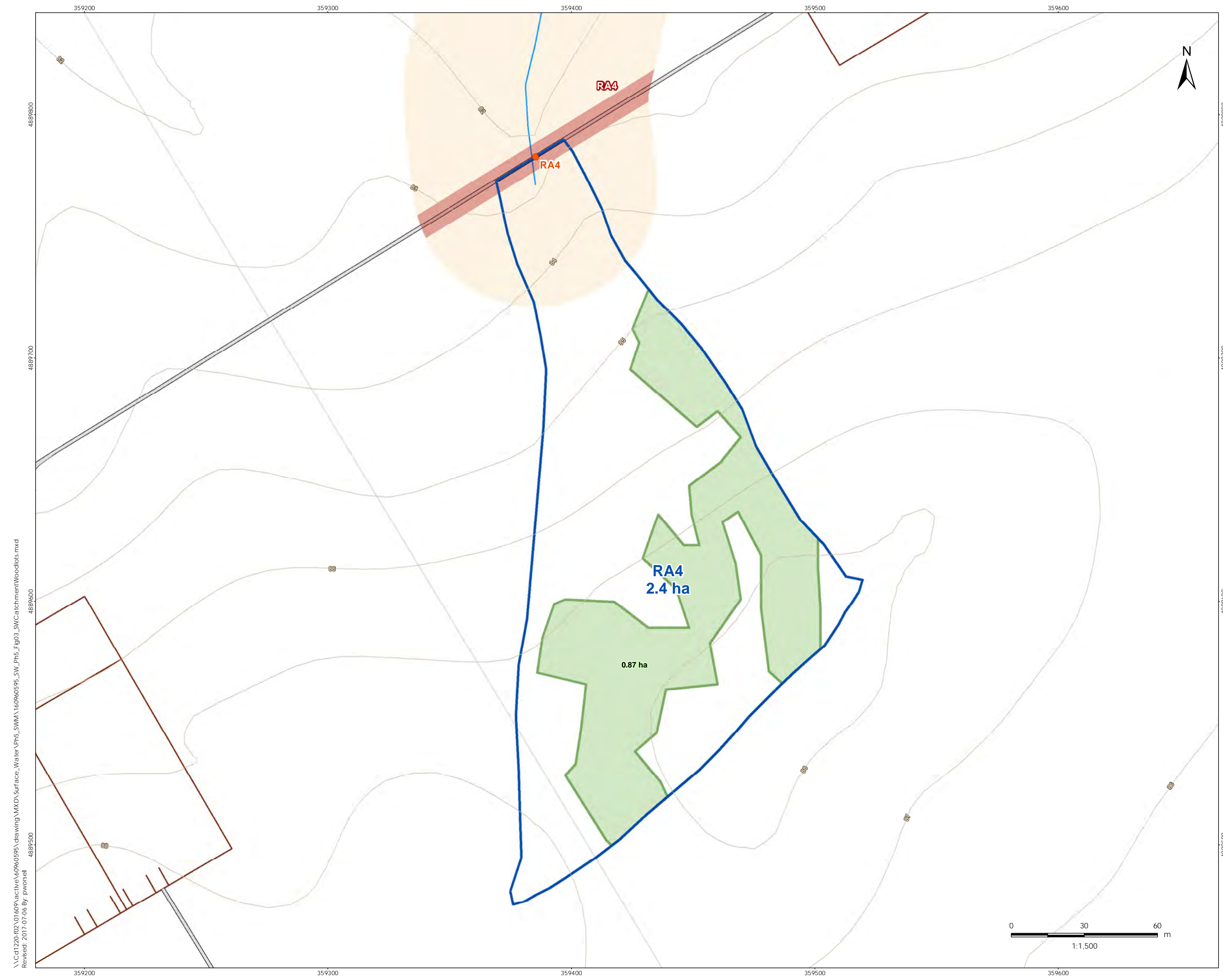
Figure No.  
2-12















Title  
Soils -  
Culvert DFO Culvert 4

\\C:\1220-102-01\01609\active\60960595\drawing\MXD\Surface\_Water\Phs\_SWM\160960595\_SW\_Ph5\_Fig02\_SW\_CatchmentSoils.mxd  
 Revised: 2017-07-06 By: pwnorsell  
 4888800 4888900 4889000

July 2017  
160960595





- Legend**
-  Turbine
  -  Access Road
  -  Laydown Area and Crane Path
  -  Culvert Location
  -  Surface Water Catchment Area
  - Existing Features**
  -  Road
  -  Unopened Road Allowance
  -  Railway
  -  Watercourse
  -  Property Line
  -  Regulation Limit (CRCA)
  -  CA Regulation Limit Project Encroachment
  -  Wooded Area
  -  Waterbody

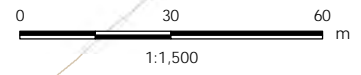


- Notes**
1. Coordinate System: NAD 1983 UTM Zone 18N
  2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017; © Cataraqui Region Conservation Authority, 2017.

Client/Project  
 Windelectric Inc.  
 Amherst Island Wind Energy Project

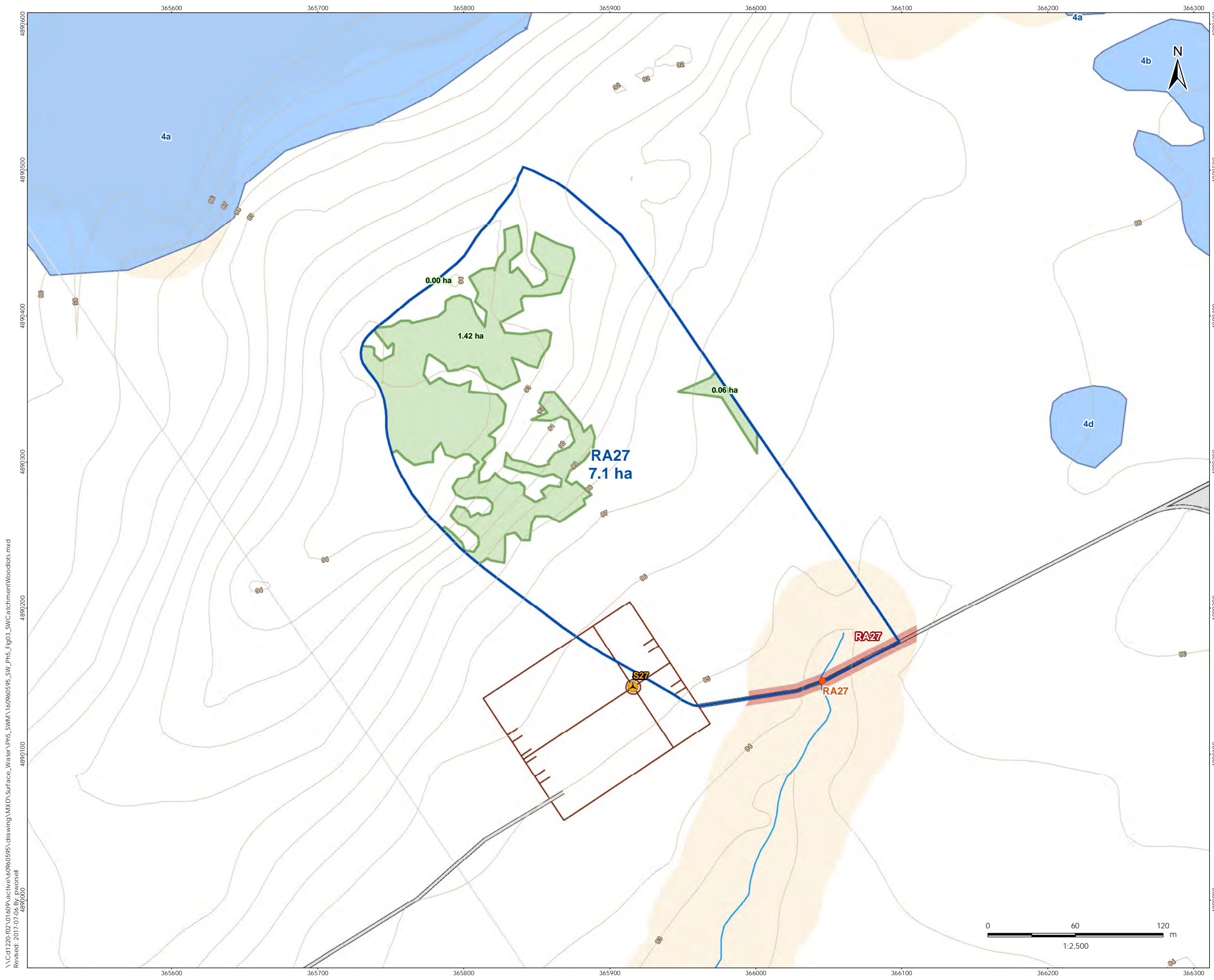
Figure No.  
 3-1

Title  
 Woodlots -  
 Culvert RA4



\\Cd1220-102\01609\active\60960595\drawing\MXD\Surface\_Water\Phs\_SWM\160960595\_SW\_Ph5\_Fig03\_SW\_CatchmentWoodlots.mxd  
 Revised: 2017-07-06 By: pworsell

- Legend**
- Turbine
  - Access Road
  - Laydown Area and Crane Path
  - Culvert Location
  - Surface Water Catchment Area
- Existing Features**
- Road
  - Unopened Road Allowance
  - Railway
  - Watercourse
  - Property Line
  - Regulation Limit (CRCA)
  - CA Regulation Limit Project Encroachment
  - Wooded Area
  - Waterbody



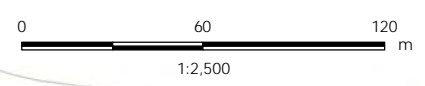
- Notes**
1. Coordinate System: NAD 1983 UTM Zone 18N
  2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017; © Cataraqui Region Conservation Authority, 2017.

Client/Project

Windlectric Inc.  
Amherst Island Wind Energy Project

Figure No.  
3-2

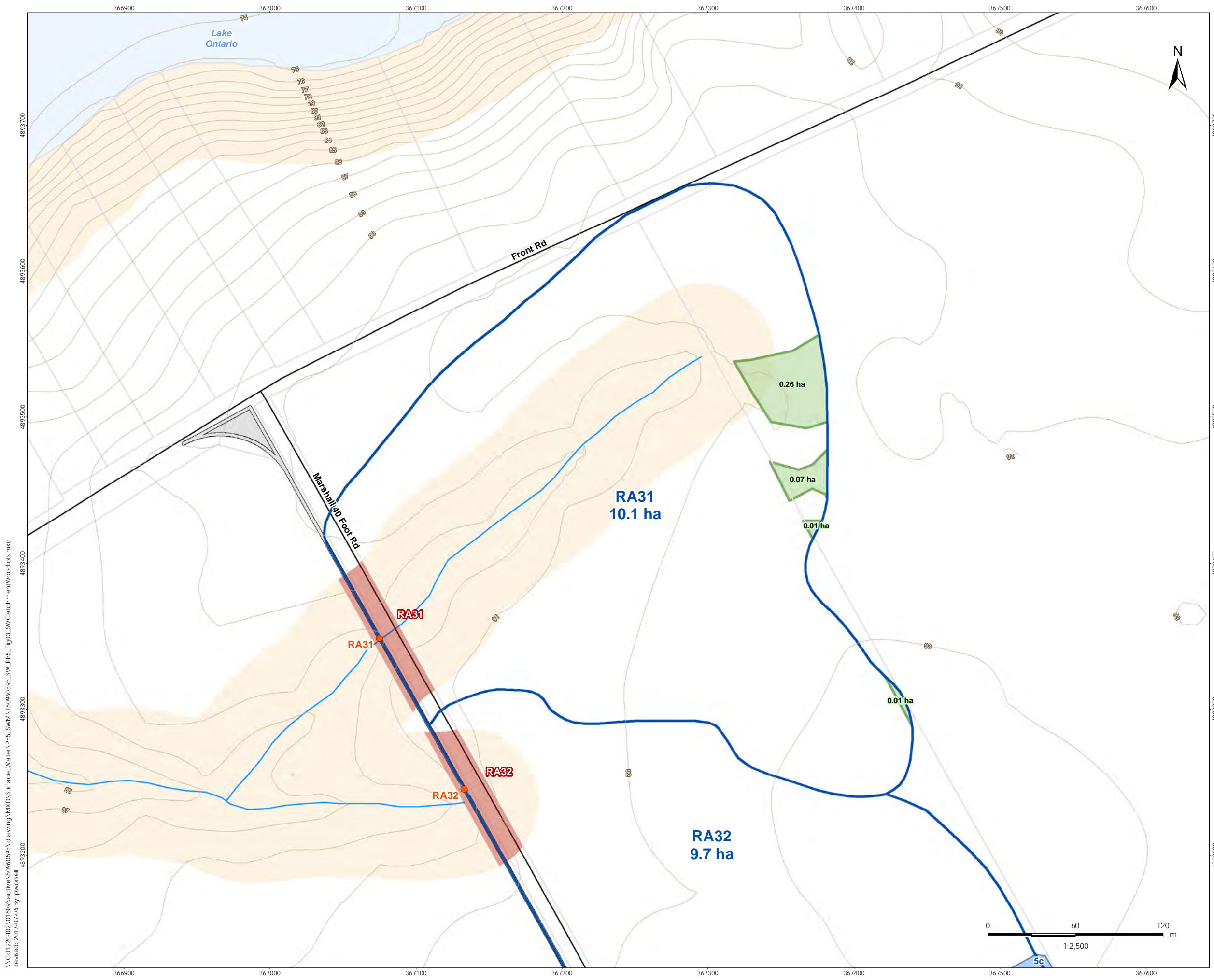
Title  
Woodlots -  
Culvert RA27



\\Cd1220-102\01609\active\60960595\drawing\MXD\Surface\_Water\Phs\_SWM\160960595\_SW\_PhS\_Fig03\_SW\_CatchmentWoodlots.mxd  
 Revised: 2017-07-06 By: pwnorsell



- Legend**
- Turbine
  - Access Road
  - Laydown Area and Crane Path
  - Culvert Location
  - Surface Water Catchment Area
- Existing Features**
- Road
  - Unopened Road Allowance
  - Railway
  - Watercourse
  - Property Line
  - Regulation Limit (CRCA)
  - CA Regulation Limit Project Encroachment
  - Wooded Area
  - Waterbody



- Notes**
1. Coordinate System: NAD 1983 UTM Zone 18N
  2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017; © Cataraqui Region Conservation Authority, 2017.

Client/Project  
 Windlectric Inc.  
 Amherst Island Wind Energy Project

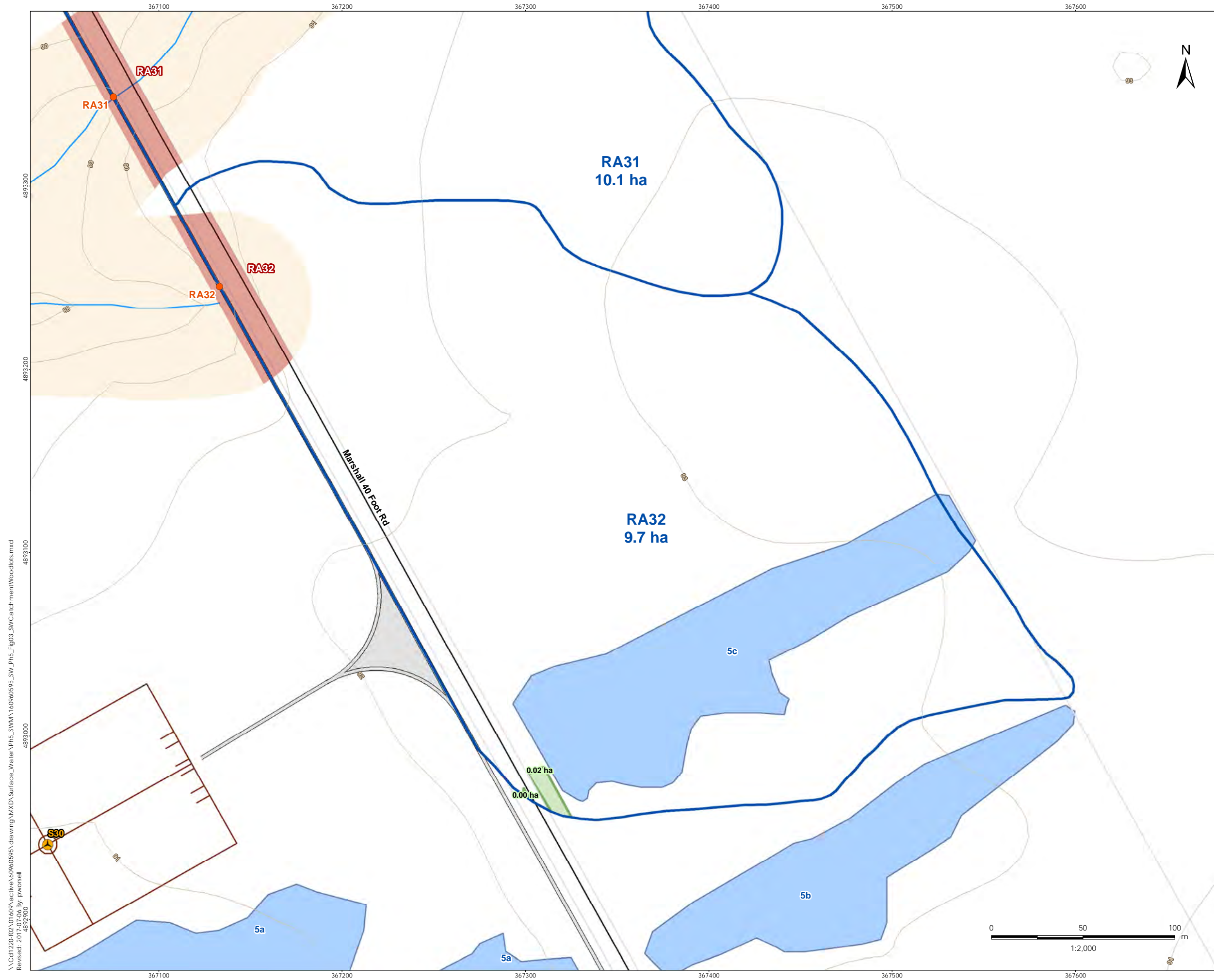
Figure No.  
 3-3

Title  
 Woodlots -  
 Culvert RA31

\\Cd1220-102\01609\active\60960595\drawing\MXD\Surface\_Water\Phs\_SWM\160960595\_SW\_Phs\_Fig03\_SW\_CatchmentWoodlots.mxd  
 Revised: 2017-07-06 By: pworthell

July 2017  
 160960595





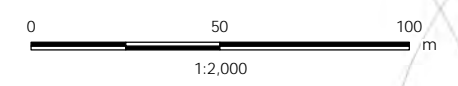
- Legend**
- Turbine
  - Access Road
  - Laydown Area and Crane Path
  - Culvert Location
  - Surface Water Catchment Area
- Existing Features**
- Road
  - Unopened Road Allowance
  - Railway
  - Watercourse
  - Property Line
  - Regulation Limit (CRCA)
  - CA Regulation Limit Project Encroachment
  - Wooded Area
  - Waterbody

- Notes**
1. Coordinate System: NAD 1983 UTM Zone 18N
  2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017; © Cataraqui Region Conservation Authority, 2017.

Client/Project  
 Windlectric Inc.  
 Amherst Island Wind Energy Project

Figure No.  
 3-4

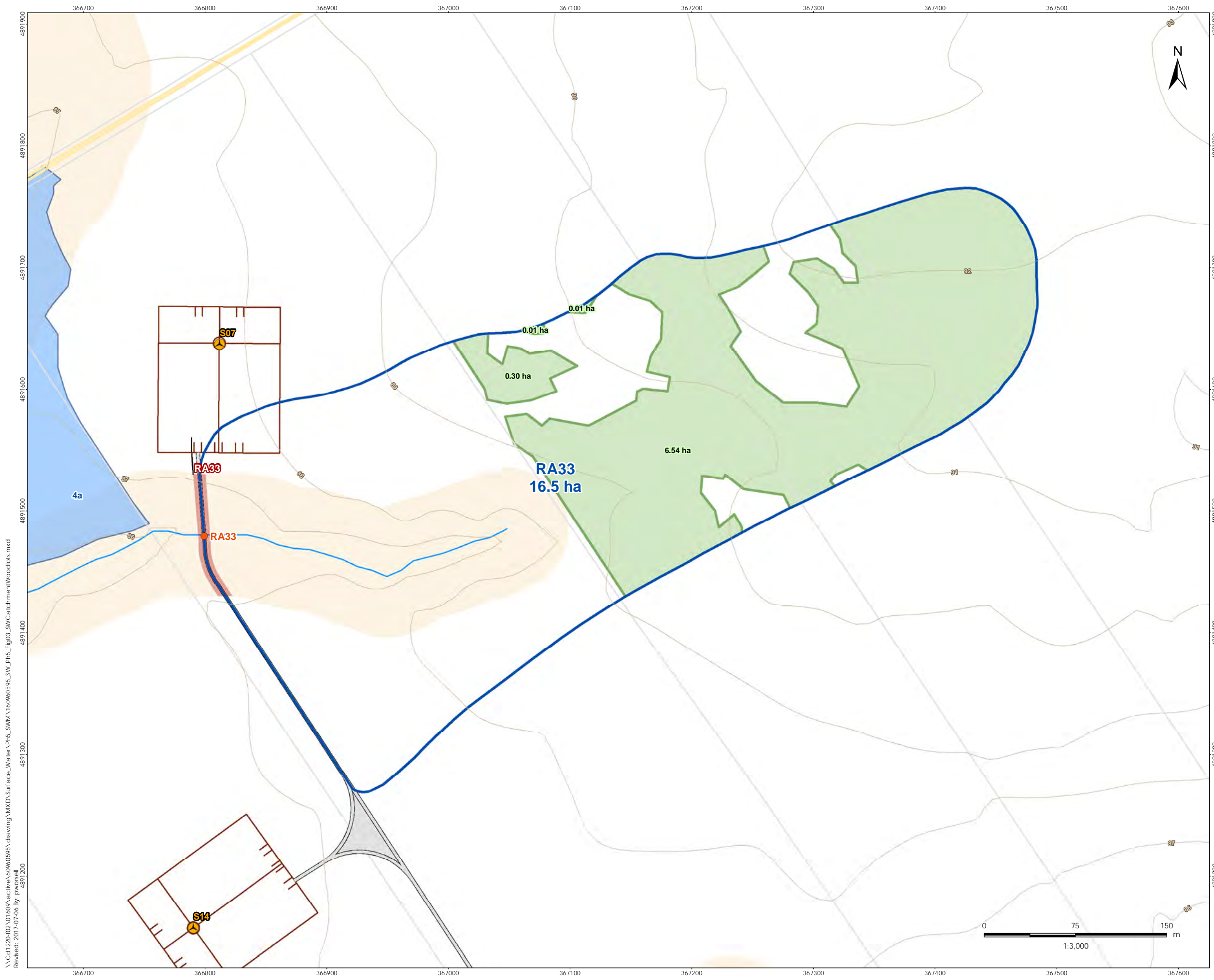
Title  
 Woodlots -  
 Culvert RA32



\\C01220-102-01609A\active\6960595\drawing\MXD\Surface\_Water\PHS\_SWM\160960595\_SW\_PHS\_Fig03\_SW\_CatchmentWoodlots.mxd  
 Revised: 2017-07-06 By: pworsell



- Legend**
- Turbine
  - Access Road
  - Laydown Area and Crane Path
  - Culvert Location
  - Surface Water Catchment Area
  - Existing Features**
  - Road
  - Unopened Road Allowance
  - Railway
  - Watercourse
  - Property Line
  - Regulation Limit (CRCA)
  - CA Regulation Limit Project Encroachment
  - Wooded Area
  - Waterbody



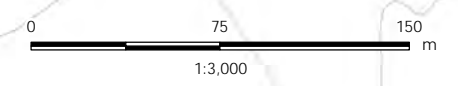
- Notes**
1. Coordinate System: NAD 1983 UTM Zone 18N
  2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017; © Cataraqui Region Conservation Authority, 2017.

July 2017  
160960595

Client/Project  
Windelectric Inc.  
Amherst Island Wind Energy Project

Figure No.  
3-5

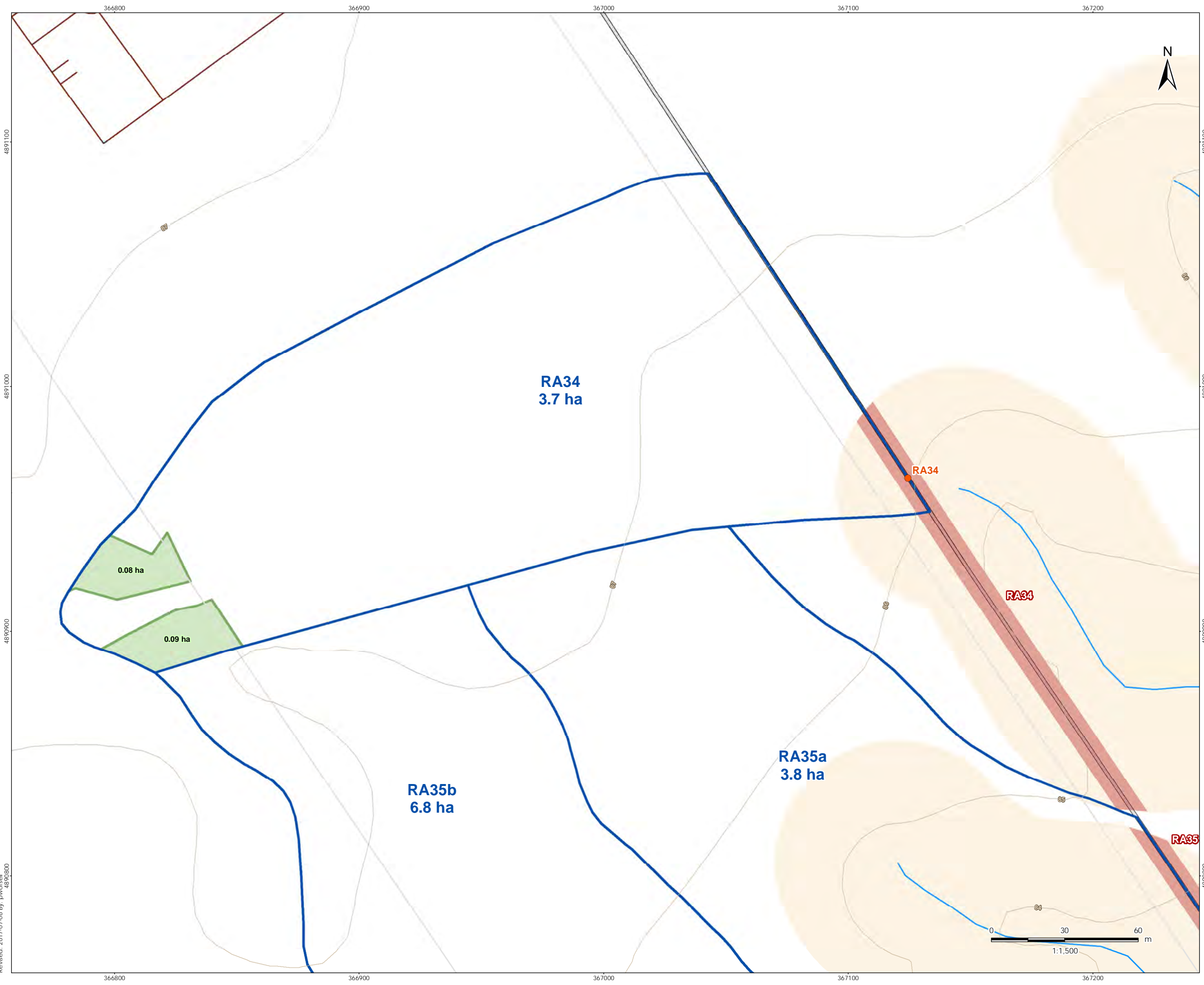
Title  
Woodlots -  
Culvert RA33



\\C01220-102\01609\active\60960595\drawing\MXD\Surface\_Water\Phs\_SWM\160960595\_SW\_PhS\_Fig03\_SW\_CatchmentWoodlots.mxd  
 Revised: 2017-07-06 By: pwnorsell



- Legend**
- Turbine
  - Access Road
  - Laydown Area and Crane Path
  - Culvert Location
  - Surface Water Catchment Area
  - Existing Features**
  - Road
  - Unopened Road Allowance
  - Railway
  - Watercourse
  - Property Line
  - Regulation Limit (CRCA)
  - CA Regulation Limit Project Encroachment
  - Wooded Area
  - Waterbody



- Notes**
1. Coordinate System: NAD 1983 UTM Zone 18N
  2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017; © Cataraqui Region Conservation Authority, 2017.

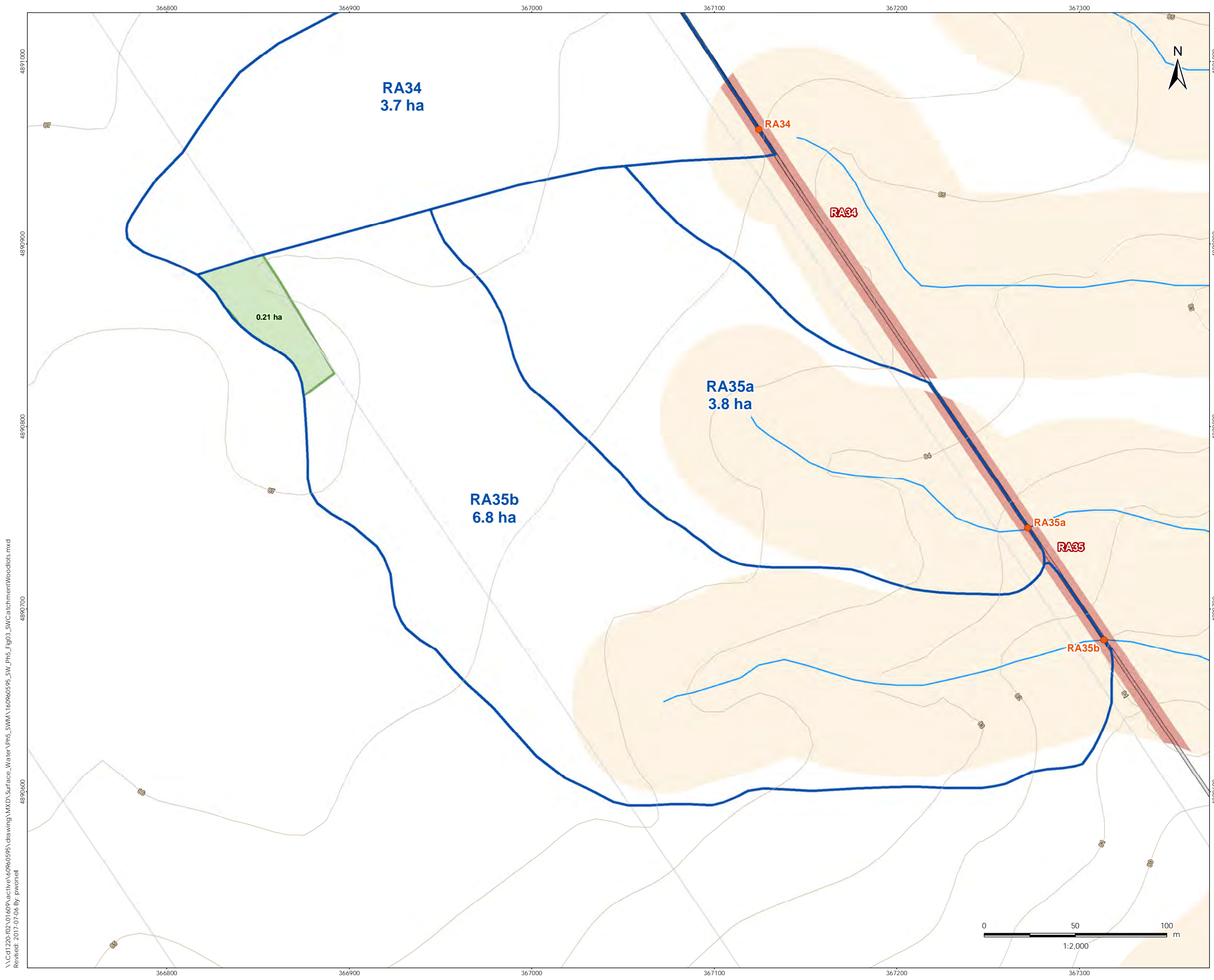
Client/Project  
 Windelectric Inc.  
 Amherst Island Wind Energy Project

Figure No.  
 3-6

Title  
 Woodlots -  
 Culvert RA34



\\Cd1220-102\01609\active\60960595\drawing\MXD\Surface\_Water\Phs\_SWM\160960595\_SW\_Ph5\_Fig03\_SW\_CatchmentWoodlots.mxd  
 Revised: 2017-07-06 By: pworsell



- Legend**
- Turbine
  - Access Road
  - Laydown Area and Crane Path
  - Culvert Location
  - Surface Water Catchment Area
- Existing Features**
- Road
  - Unopened Road Allowance
  - Railway
  - Watercourse
  - Property Line
  - Regulation Limit (CRCA)
  - CA Regulation Limit Project Encroachment
  - Wooded Area
  - Waterbody

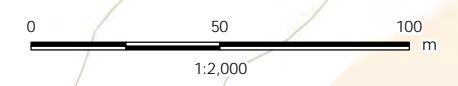
- Notes**
1. Coordinate System: NAD 1983 UTM Zone 18N
  2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017; © Cataraqui Region Conservation Authority, 2017.

Client/Project

Windlectric Inc.  
Amherst Island Wind Energy Project

Figure No.  
**3-7**

Title  
**Woodlots -  
Culvert RA35**

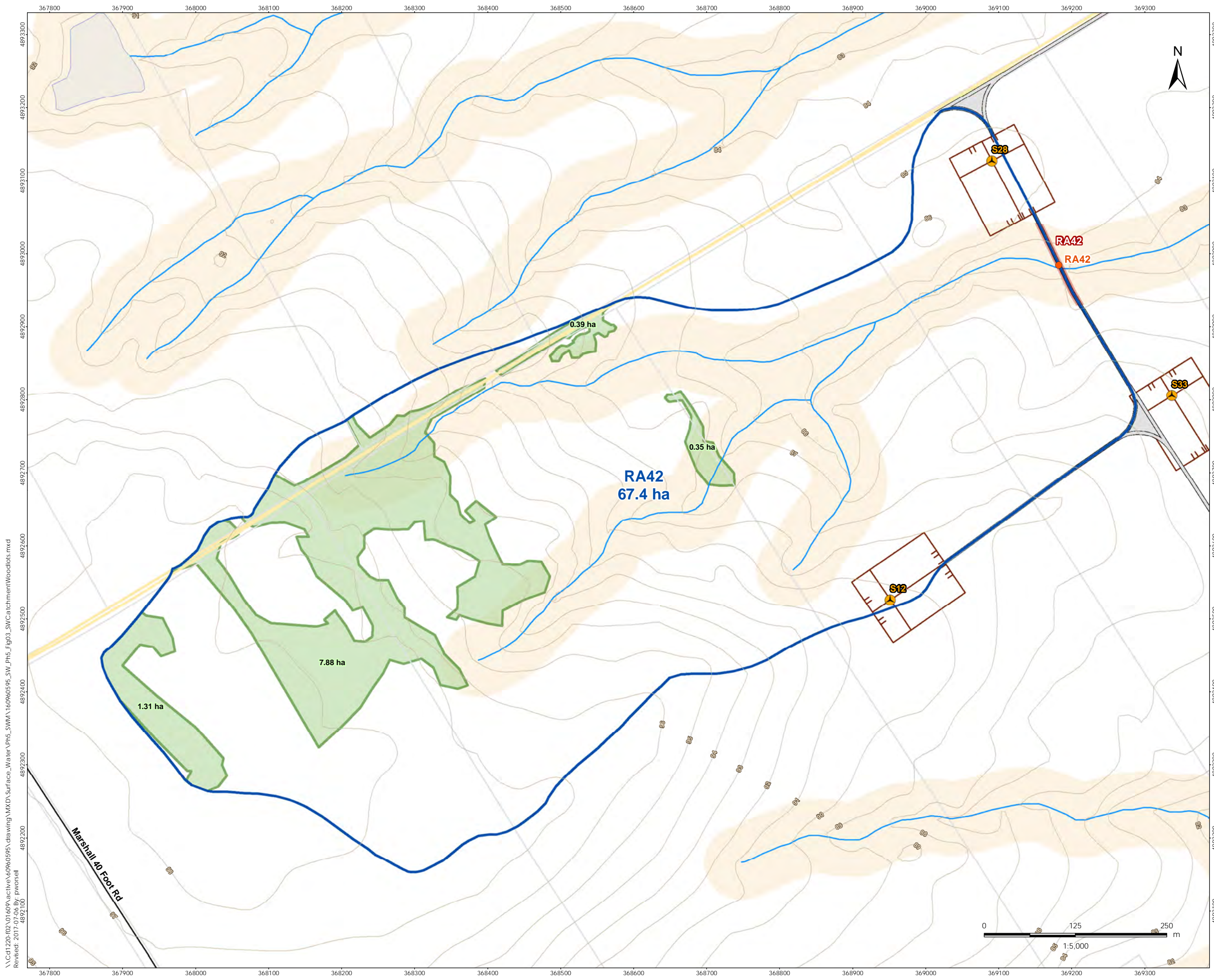


\\C01220-102\01609\active\60960595\Surface\_Water\PHS\_SWM\160960595\_SW\_PHS\_Fig03\_SW\_CatchmentWoodlots.mxd  
 Revised: 2017-07-06 By: pworsell

July 2017  
160960595



- Legend**
- Turbine
  - Access Road
  - Laydown Area and Crane Path
  - Culvert Location
  - Surface Water Catchment Area
- Existing Features**
- Road
  - Unopened Road Allowance
  - Railway
  - Watercourse
  - Property Line
  - Regulation Limit (CRCA)
  - CA Regulation Limit Project Encroachment
  - Wooded Area
  - Waterbody



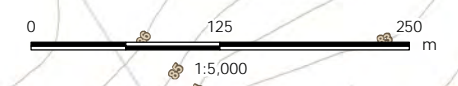
- Notes**
1. Coordinate System: NAD 1983 UTM Zone 18N
  2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017; © Cataraqui Region Conservation Authority, 2017.

July 2017  
160960595

Client/Project  
Windlectric Inc.  
Amherst Island Wind Energy Project

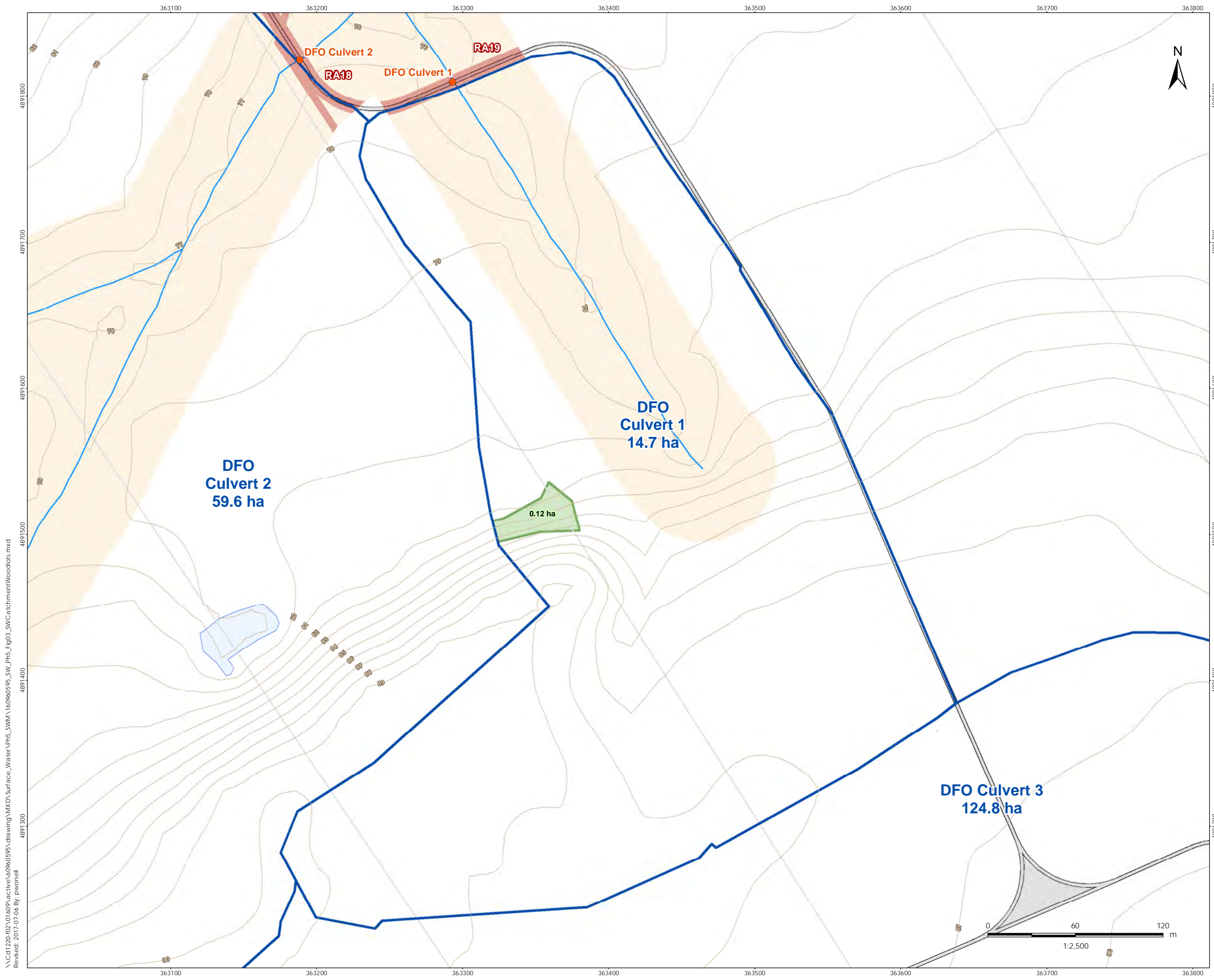
Figure No.  
3-8

Title  
Woodlots -  
Culvert RA42



\\C01220-102\01609\active\160960595\drawing\MXD\Surface\_Water\Phs\_SWM\160960595\_SW\_Ph5\_Fig03\_SW\_CatchmentWoodlots.mxd  
 Revised: 2017-07-06 By: pwnorsell





- Legend**
- Turbine
  - Access Road
  - Laydown Area and Crane Path
  - Culvert Location
  - Surface Water Catchment Area
- Existing Features**
- Road
  - Unopened Road Allowance
  - Railway
  - Watercourse
  - Property Line
  - Regulation Limit (CRCA)
  - CA Regulation Limit Project Encroachment
  - Wooded Area
  - Waterbody

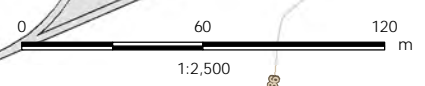


- Notes**
1. Coordinate System: NAD 1983 UTM Zone 18N
  2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017; © Cataraqui Region Conservation Authority, 2017.

Client/Project  
 Windlectric Inc.  
 Amherst Island Wind Energy Project

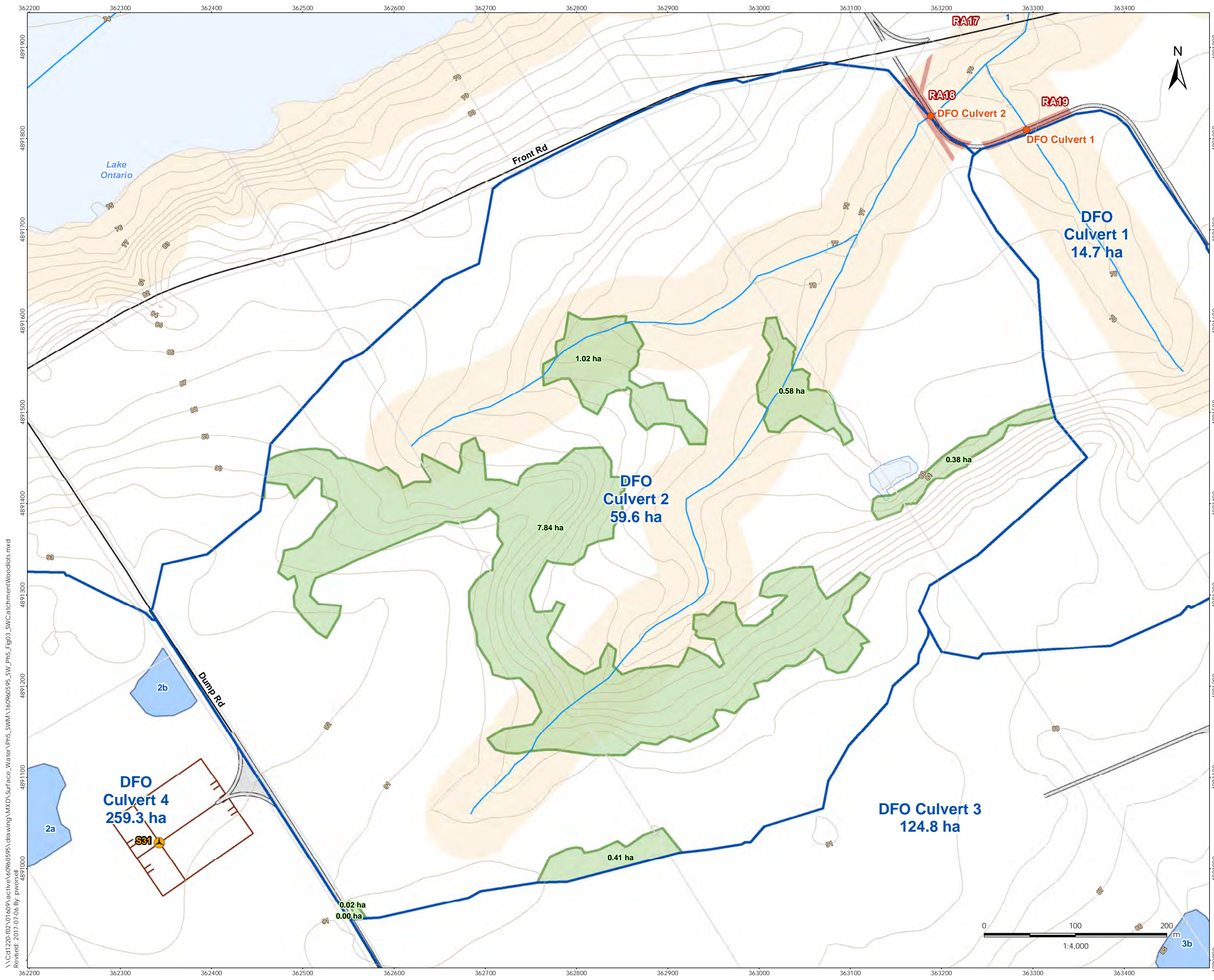
Figure No.  
 3-9

Title  
 Woodlots -  
 Culvert DFO Culvert 1



\\C01220-102\01609\active\60960595\drawing\MXD\Surface\_Water\Phs\_SWM\160960595\_SW\_Ph5\_Fig03\_SW\_CatchmentWoodlots.mxd  
 Revised: 2017-07-06 By: pworsell





- Legend**
- Turbine
  - Access Road
  - Laydown Area and Crane Path
  - Culvert Location
  - Surface Water Catchment Area
  - Existing Features**
  - Road
  - Unopened Road Allowance
  - Railway
  - Watercourse
  - Property Line
  - Regulation Limit (CRCA)
  - CA Regulation Limit Project Encroachment
  - Wooded Area
  - Waterbody

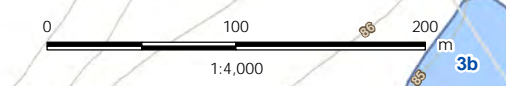
- Notes**
1. Coordinate System: NAD 1983 UTM Zone 18N
  2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017; © Cataraqui Region Conservation Authority, 2017.

Client/Project

Windlectric Inc.  
Amherst Island Wind Energy Project

Figure No.  
3-10

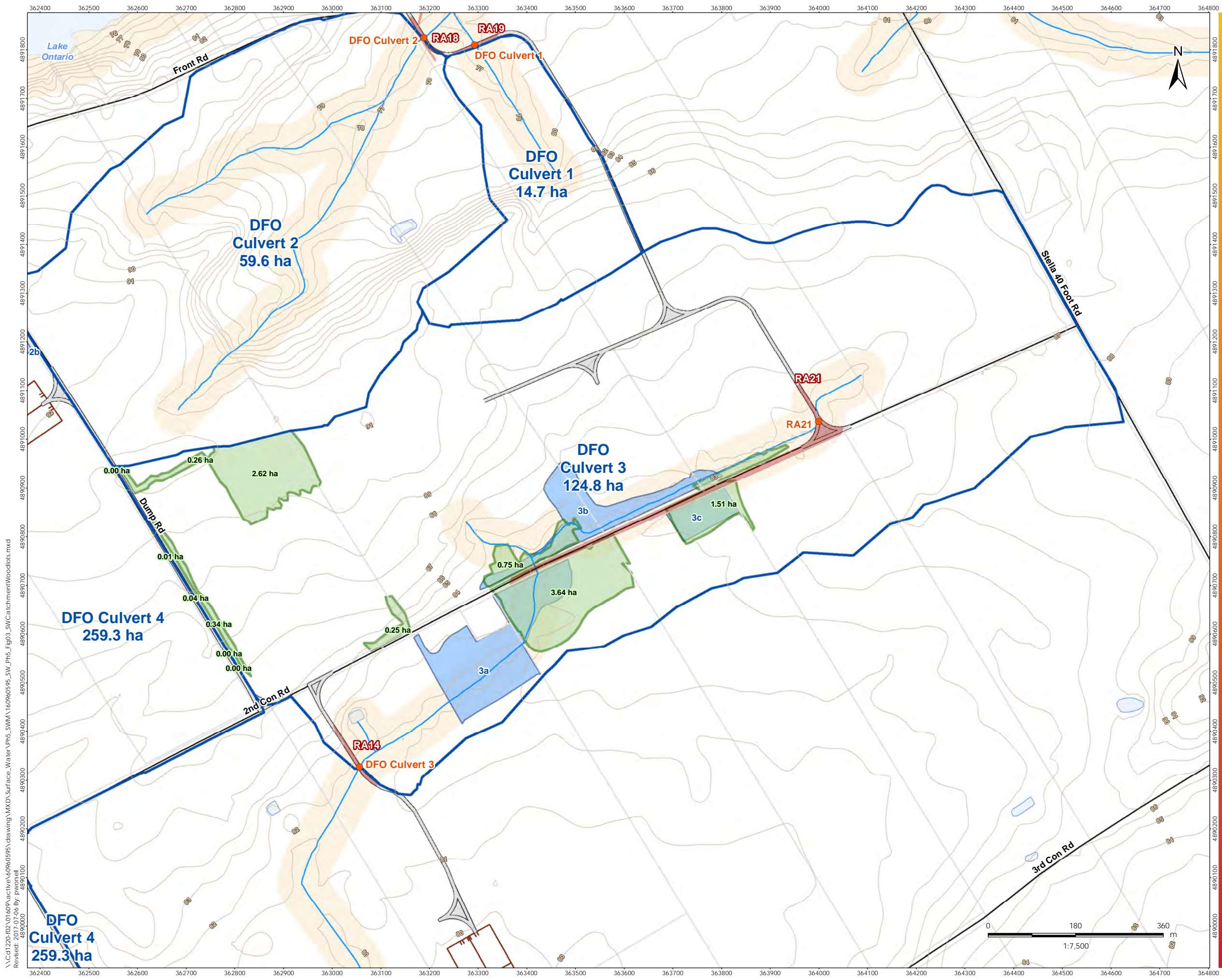
Title  
Woodlots -  
Culvert DFO Culvert 2



\\C:\1220-102\01609\active\160960595\drawing\MXD\Surface\_Water\Phs\_SWM\160960595\_SW\_PhS\_Fig03\_SW\_CatchmentWoodlots.mxd  
 Revised: 2017-07-06 By: pworsell

July 2017  
160960595





- Legend**
- Turbine
  - Access Road
  - Laydown Area and Crane Path
  - Culvert Location
  - Surface Water Catchment Area
- Existing Features**
- Road
  - Unopened Road Allowance
  - Railway
  - Watercourse
  - Property Line
  - Regulation Limit (CRCA)
  - CA Regulation Limit Project Encroachment
  - Wooded Area
  - Waterbody

- Notes**
1. Coordinate System: NAD 1983 UTM Zone 18N
  2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017; © Cataraqui Region Conservation Authority, 2017.

Client/Project  
 Windlectric Inc.  
 Amherst Island Wind Energy Project

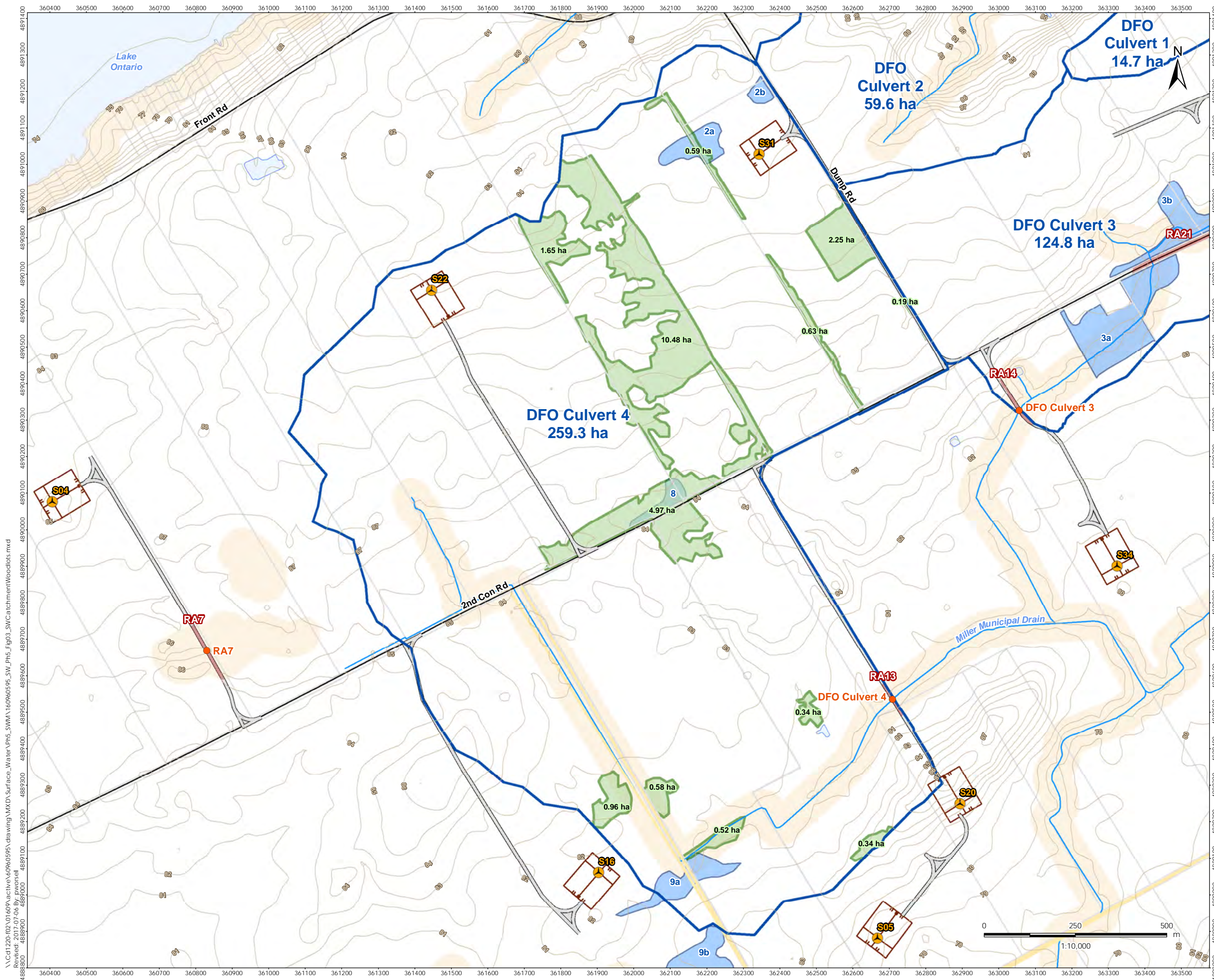
Figure No.  
 3-11

Title  
 Woodlots -  
 Culvert DFO Culvert 3

\\C01220-102-01609\active\6960595\drawing\MXD\Surface\_Water\Phs\_SWM\160960595\_SW\_PhS\_Fig03\_SW\_CatchmentWoodlots.mxd  
 Revised: 2017-07-06 By: pwnorsell  
 4890000

July 2017  
 160960595





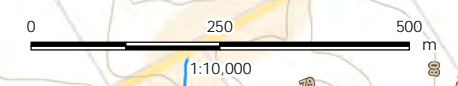
- Legend**
- Turbine
  - Access Road
  - Laydown Area and Crane Path
  - Culvert Location
  - Surface Water Catchment Area
- Existing Features**
- Road
  - Unopened Road Allowance
  - Railway
  - Watercourse
  - Property Line
  - Regulation Limit (CRCA)
  - CA Regulation Limit Project Encroachment
  - Wooded Area
  - Waterbody

- Notes**
1. Coordinate System: NAD 1983 UTM Zone 18N
  2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017; © Cataraqui Region Conservation Authority, 2017.

Client/Project  
 Windlectric Inc.  
 Amherst Island Wind Energy Project

Figure No.  
 3-12

Title  
 Woodlots -  
 Culvert DFO Culvert 4



\\C01220-102-0101609\active\60960595\drawing\MXD\Surface\_Water\Phs\_SWM\160960595\_SW\_PhS\_Fig03\_SW\_CatchmentWoodlots.mxd  
 Revised: 2017-07-06 By: pwnorsell  
 4888800 4888900 4889000

July 2017  
 160960595



## Active coordinate

44° 9' 15" N, 76° 42' 45" W (44.154167,-76.712500) [Modify selection](#)

Retrieved: Thu, 04 Dec 2014 15:34:56 GMT



Map options: [Modify selection](#) | [Show/hide gauging stations](#) | [Re-center selection](#)

### Coordinate summary

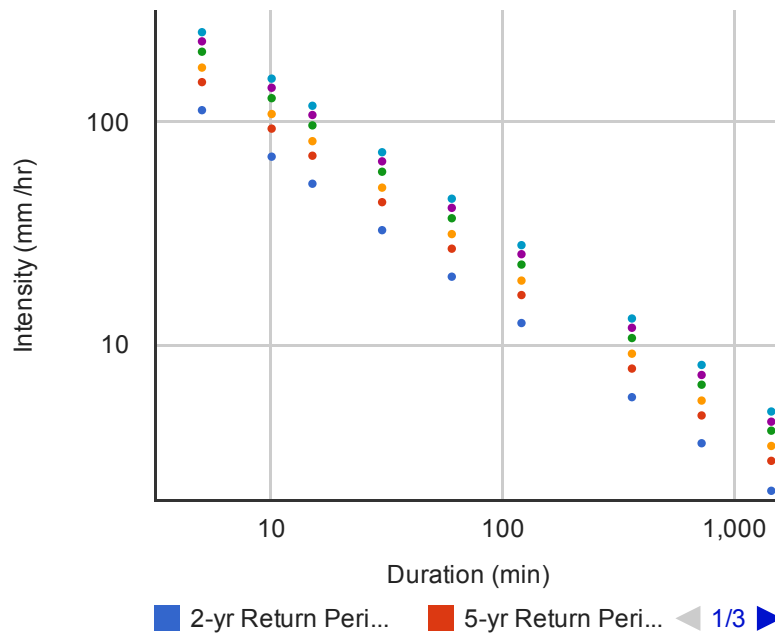
These are the coordinates in the selection.

IDF Curve: 44° 9' 15" N, 76° 42' 45" W (44.154167,-76.712500)

### Results

An IDF curve was found for this set of coordinates.

Coordinate: 44.154167,-76.712500





[Coefficient summary](#)   [Notes](#)

Click a return period in the table header for more detail.

Return period	<a href="#">2-yr</a>	<a href="#">5-yr</a>	<a href="#">10-yr</a>	<a href="#">25-yr</a>	<a href="#">50-yr</a>	<a href="#">100-yr</a>
A	20.2	27.0	31.4	37.0	41.2	45.3
B	-0.694	-0.694	-0.694	-0.694	-0.694	-0.694

### Statistics

#### Rainfall intensity (mm hr<sup>-1</sup>)

Duration	5-min	10-min	15-min	30-min	1-hr	2-hr	6-hr	12-hr	24-hr
<a href="#">2-yr</a>	113.3	70.0	52.9	32.7	20.2	12.5	5.8	3.6	2.2
<a href="#">5-yr</a>	151.5	93.6	70.7	43.7	27.0	16.7	7.8	4.8	3.0
<a href="#">10-yr</a>	176.1	108.9	82.2	50.8	31.4	19.4	9.1	5.6	3.5
<a href="#">25-yr</a>	207.6	128.3	96.8	59.9	37.0	22.9	10.7	6.6	4.1
<a href="#">50-yr</a>	231.1	142.9	107.8	66.7	41.2	25.5	11.9	7.3	4.5
<a href="#">100-yr</a>	254.1	157.1	118.6	73.3	45.3	28.0	13.1	8.1	5.0

### Terms of Use

You have agreed to the [Terms of Use](#) of this site by reviewing, using or otherwise interpreting this data.

[Exit](#)

[Ontario Ministry of Transportation](#) | [Terms and Conditions](#) | [About](#)



Last Modified: September 11, 2013



**Amherst Island Wind Energy Project - 160960595**  
**Culvert Sizing - NRCS (SCS) Curve Number Determination**

**Soil Type**  
 Loam, Sandy Loam  
 Clay

**Hydrologic Soil Group**  
 B  
 CD

Land Use		TABLE OF CURVE NUMBERS (CN's)							Source
		Hydrologic Soil Type							
		A	AB	B	BC	C	CD	D	
Meadow	"Good"	30	44	58	64.5	71	74.5	78	MTO
Woodlot	"Fair"	36	48	60	66.5	73	76	79	MTO
Lawns	"Good"	39	50	61	67.5	74	77	80	USDA
Pasture/Range		58	61.5	65	70.5	76	78.5	81	MTO
Crop		66	70	74	78	82	84	86	MTO
Bare Soil (Fallow)		77	82	86	89	91	93	94	MTO
Impervious		98	98	98	98	98	98	98	MTO

MTO - Ministry of Transportation Ontario Drainage Manual (1997), Design Chart 1.09-Soil/Land Use Curve Numbers  
 USDA - United States Department of Agriculture (2004), National Engineering Handbook, Part 630 Hydrology,  
 Chapter 9 Hydrologic Soil Cover Complexes

HYDROLOGIC SOIL TYPE (%) - Existing Conditions								
Catchment	Hydrologic Soil Type							TOTAL
	A	AB	B	BC	C	CD	D	
RA 4	0	0	0	0	0	100	0	100
RA 27	0	0	68	0	0	32	0	100
RA 31	0	0	11	0	0	89	0	100
RA 32	0	0	0	0	0	100	0	100
RA 33	0	0	0	0	0	100	0	100
RA 34	0	0	0	0	0	100	0	100
RA 35a	0	0	0	0	0	100	0	100
RA 35b	0	0	0	0	0	100	0	100
RA 42	0	0	0	0	0	100	0	100
DFO Culvert 3	0	0	0	0	0	100	0	100
DFO Culvert 4	0	0	17	0	0	83	0	100



LAND USE (%) - Existing Conditions									
Catchment	Meadow	Woodlot	Lawns	Pasture Range	Crop	Bare Soil	Lakes and Wetlands	Impervious	Total
RA 4		36			62		0	2	100
RA 27		21			77		0	2	100
RA 31		3			95		0	2	100
RA 32		0			83		14	2	100
RA 33		41			57		0	2	100
RA 34		5			93		0	2	100
RA 35a		0			98		0	2	100
RA 35b		5			93		0	2	100
RA 42		15			83		0	2	100
DFO Culvert 3		8			90		0	2	100
DFO Culvert 4		9			89		0	2	100

CURVE NUMBER (CN) - Existing Conditions										
Catchment	Meadow	Woodlot	Lawns	Pasture Range	Crop	Bare Soil	Lakes and Wetlands	Impervious	Weighted CN w/ imp area	Weighted CN w/o imp area
RA 4		27			52			2	81	81
RA 27		14			59			2	75	75
RA 31		3			78			2	83	83
RA 32		0			70		13	2	86	85
RA 33		32			47			2	81	81
RA 34		4			78			2	84	84
RA 35a					82			2	84	84
RA 35b		3			78			2	84	84
RA 42		11			70			2	83	83
DFO Culvert 3		6			76			2	84	83
DFO Culvert 4		7			73			2	82	81

Notes:

AMC II assumed

Hydrological Soil Groups taken from MTO Drainage Manual

<sup>1</sup> Catchments with impervious greater than 20% - only pervious portions used for CN calculation



**Amherst Island Wind Energy Project - 160960595**  
**SWMHYMO Parameters**

**Existing Conditions**

Airport Method

Catchment Number	SWMHYMO Command	Area (ha)	CN	TIMP (%)	XIMP (%)	Rise (m)	Length (m)	Slope (%)	Tc (hrs)	Tp (hrs)
RA 4	DESIGN NASHYD	2.4	81			4	170	2.4	0.37	0.22
RA 27	DESIGN NASHYD	7.1	75			10	300	3.3	0.44	0.27
RA 31	DESIGN NASHYD	10.1	83			3	550	0.5	1.09	0.65
RA 32	DESIGN NASHYD	9.7	86			3	500	0.6	1.01	0.60
RA 33	DESIGN NASHYD	16.5	81			6	780	0.8	1.16	0.69
RA 34	DESIGN NASHYD	3.7	84			2	300	0.5	0.83	0.50
RA 35a	DESIGN NASHYD	4.1	84			4	400	1.0	0.76	0.46
RA 35b	DESIGN NASHYD	8.3	84			6	630	1.0	0.97	0.58
RA 42	DESIGN NASHYD	67.5	83			15	1480	1.0	1.46	0.87
DFO Culvert 3	DESIGN NASHYD	124.8	84			5	1800	0.3	3.66	2.19
DFO Culvert 4	DESIGN NASHYD	259.3	82			13	3500	0.4	5.75	3.45

**SWMHYMO Parameter Notes:**

Time of Concentration calculated using the Airport Method  
 (For areas less than 100 ha)

$$T_c = [ 3.26 (1.1-C) L^{0.5} ] / S^{0.33}$$

Where: C = Runoff Coefficient = 0.4 for undeveloped areas  
 L = Length of Overland Flow (m)  
 S = Slope (%)

Time of Concentration calculated using the SCS Lag Equation  
 (For areas greater than 100 ha)

$$T_c = [259L^{0.8} [(1000 / CN) - 9]^{0.7}] / [1900S^{0.5}]$$

Where: L = Length of Overland Flow (m)  
 CN = SCS Curve Number  
 S = Slope (%)



```

00001> 2      Metric units
00002> *#*****
00003> *# Project Name: [Amherst Island Wind Energy Project]
00004> *# Project Number:[1609-60595]
00005> *# Date       : July 12, 2017
00006> *#           Hydrologic Modeling for Access Road Culvert Sizing
00007> *#           CA Permitting
00008> *#
00009> *# Company    : Stantec Consulting Ltd. (Kitchener)
00010> *# Modeller   : D. Williams
00011> *# License #  : 4730904
00012> *#*****
00013> START      TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[1]
00014> *%          ["25mm.4hr"] <--storm filename, one per line for NSTORM time
00015> *%-----|-----
00016> READ STORM  STORM_FILENAME=["STORM.001"]
00017> *#-----|-----
00018> *#*****
00019> *# RA 4
00020> *#*****
00021> DESIGN NASHYD ID=[1], NHYD=["RA 4"], DT=[1]min, AREA=[2.4](ha),
00022> DWF=[0](cms), CN/C=[81], TP=[0.22]hrs,
00023> RAINFALL=[ , , , , ](mm/hr), END=-1
00024> *#-----|-----
00025> *#*****
00026> *# RA 27
00027> *#*****
00028> DESIGN NASHYD ID=[1], NHYD=["RA 27"], DT=[1]min, AREA=[7.1](ha),
00029> DWF=[0](cms), CN/C=[75], TP=[0.27]hrs,
00030> RAINFALL=[ , , , , ](mm/hr), END=-1
00031> *#-----|-----
00032> *#*****
00033> *# RA 31
00034> *#*****
00035> DESIGN NASHYD ID=[1], NHYD=["RA 31"], DT=[1]min, AREA=[10.1](ha),
00036> DWF=[0](cms), CN/C=[83], TP=[0.65]hrs,
00037> RAINFALL=[ , , , , ](mm/hr), END=-1
00038> *#-----|-----
00039> *#*****
00040> *# RA 32
00041> *#*****
00042> DESIGN NASHYD ID=[1], NHYD=["RA 32"], DT=[1]min, AREA=[9.7](ha),
00043> DWF=[0](cms), CN/C=[86], TP=[0.60]hrs,
00044> RAINFALL=[ , , , , ](mm/hr), END=-1
00045> *#-----|-----
00046> *#*****
00047> *# RA 33
00048> *#*****
00049> DESIGN NASHYD ID=[1], NHYD=["RA 33"], DT=[1]min, AREA=[16.5](ha),
00050> DWF=[0](cms), CN/C=[81], TP=[0.69]hrs,
00051> RAINFALL=[ , , , , ](mm/hr), END=-1
00052> *#-----|-----
00053> *#*****
00054> *# RA 34
00055> *#*****
00056> DESIGN NASHYD ID=[1], NHYD=["RA 34a"], DT=[1]min, AREA=[3.7](ha),
00057> DWF=[0](cms), CN/C=[84], TP=[0.5]hrs,
00058> RAINFALL=[ , , , , ](mm/hr), END=-1
00059> *#-----|-----
00060> *#*****
00061> *# RA 35a
00062> *#*****
00063> DESIGN NASHYD ID=[1], NHYD=["RA 35a"], DT=[1]min, AREA=[4.1](ha),
00064> DWF=[0](cms), CN/C=[84], TP=[0.46]hrs,
00065> RAINFALL=[ , , , , ](mm/hr), END=-1
00066> *#-----|-----
00067> *#*****
00068> *# RA 35b
00069> *#*****
00070> DESIGN NASHYD ID=[1], NHYD=["RA 35b"], DT=[1]min, AREA=[8.3](ha),
00071> DWF=[0](cms), CN/C=[84], TP=[0.58]hrs,
00072> RAINFALL=[ , , , , ](mm/hr), END=-1
00073> *#-----|-----

```



```

00074> *#*****
00075> *# RA 42
00076> *#*****
00077> DESIGN NASHYD ID=[1], NHYD=["RA 42"], DT=[1]min, AREA=[67.5](ha),
00078> DWF=[0](cms), CN/C=[83], TP=[0.87]hrs,
00079> RAINFALL=[ , , , ](mm/hr), END=-1
00080> *#-----|-----
00081> *#*****
00082> *# DFO Culvert 3
00083> *#*****
00084> DESIGN NASHYD ID=[1], NHYD=["DFO_3"], DT=[1]min, AREA=[124.8](ha),
00085> DWF=[0](cms), CN/C=[84], TP=[2.19]hrs,
00086> RAINFALL=[ , , , ](mm/hr), END=-1
00087> *#-----|-----
00088> *#*****
00089> *# DFO Culvert 4
00090> *#*****
00091> DESIGN NASHYD ID=[1], NHYD=["DFO_3"], DT=[1]min, AREA=[259.3](ha),
00092> DWF=[0](cms), CN/C=[82], TP=[3.45]hrs,
00093> RAINFALL=[ , , , ](mm/hr), END=-1
00094> *#-----|-----
00095> START TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[5]
00096> *% ["AI5SCS.24h"] <--storm filename, one per line for NSTORM time
00097> *#-----|-----
00098> START TZERO=[0.0]hrs or date, METOUT=[2], NSTORM=[1], NRUN=[10]
00099> * ["AI10SCS.24h"] <--storm filename, one per line for NSTORM time
00100> *%-----|-----
00101> START TZERO=[0.0]hrs or date, METOUT=[2], NSTORM=[1], NRUN=[100]
00102> * ["AI100SCS.24h"] <--storm filename, one per line for NSTORM time
00103> *%-----|-----
00104>
00105> FINISH
00106>
00107>
00108>
00109>
00110>
00111>
00112>
00113>
00114>
00115>
00116>
00117>
00118>
00119>

```



```

00001> =====
00002>
00003> SSSSS W W M M H H Y Y M M OOO 999 999 =====
00004> S W W W MM MM H H Y Y MM MM O O 9 9 9 9
00005> SSSSS W W W M M M HHHHH Y M M M O O ## 9 9 9 9 Ver 4.05
00006> S W W M M H H Y M M O O 9999 9999 Sept 2011
00007> SSSSS W W M M H H Y M M OOO 9 9 9 =====
00008> 9 9 9 9 # 4730904
00009> StormWater Management HYdrologic Model 999 999 =====
00010>
00011> *****
00012> ***** SWMHYMO Ver/4.05 *****
00013> ***** A single event and continuous hydrologic simulation model *****
00014> ***** based on the principles of HYMO and its successors *****
00015> ***** OTTHYMO-83 and OTTHYMO-89. *****
00016> *****
00017> ***** Distributed by: J.F. Sabourin and Associates Inc. *****
00018> ***** Ottawa, Ontario: (613) 836-3884 *****
00019> ***** Gatineau, Quebec: (819) 243-6858 *****
00020> ***** E-Mail: swmhymo@jfsa.Com *****
00021> *****
00022>
00023> ++++++
00024> ++++++ Licensed user: Stantec Consulting Ltd. (Kitchener) ++++++
00025> ++++++ Kitchener SERIAL#:4730904 ++++++
00026> ++++++
00027>
00028> *****
00029> ***** ++++++ PROGRAM ARRAY DIMENSIONS ++++++ *****
00030> ***** Maximum value for ID numbers : 10 *****
00031> ***** Max. number of rainfall points: 105408 *****
00032> ***** Max. number of flow points : 105408 *****
00033> *****
00034>
00035> ***** DESCRIPTION SUMMARY TABLE HEADERS (units depend on METOUT in START) *****
00036> *****-----*****
00037> ***** ID: Hydrograph IDentification numbers, (1-10). *****
00038> ***** NHYD: Hydrograph reference numbers, (6 digits or characters). *****
00039> ***** AREA: Drainage area associated with hydrograph, (ac.) or (ha.). *****
00040> ***** QPEAK: Peak flow of simulated hydrograph, (ft^3/s) or (m^3/s). *****
00041> ***** TpeakDate_hh:mm is the date and time of the peak flow. *****
00042> ***** R.V.: Runoff Volume of simulated hydrograph, (in) or (mm). *****
00043> ***** R.C.: Runoff Coefficient of simulated hydrograph, (ratio). *****
00044> ***** *: see WARNING or NOTE message printed at end of run. *****
00045> ***** **: see ERROR message printed at end of run. *****
00046> *****
00047> *****
00048>
00049> ::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
00050>
00051> *****
00052>
00053> ***** S U M M A R Y O U T P U T *****
00054> *****
00055> * DATE: 2017-07-12 TIME: 14:28:19 RUN COUNTER: 001525 *
00056> *****
00057> * Input filename: C:\usr\_AIWEP\AI_ph5.dat *
00058> * Output filename: C:\usr\_AIWEP\AI_ph5.out *
00059> * Summary filename: C:\usr\_AIWEP\AI_ph5.sum *
00060> * User comments: *
00061> * 1:_____ *
00062> * 2:_____ *
00063> * 3:_____ *
00064> *****
00065>
00066>
00067> #*****
00068> # Project Name: [Amherst Island Wind Energy Project]
00069> # Project Number:[1609-60595]
00070> # Date : July 12, 2017
00071> # Hydrologic Modeling for Access Road Culvert Sizing
00072> # CA Permitting
00073> #

```



```

00074> # Company      : Stantec Consulting Ltd. (Kitchener)
00075> # Modeller      : D. Williams
00076> # License #     : 4730904
00077> #*****
00078> RUN:COMMAND#
00079> 001:0001-----
00080> START
00081> [TZERO = .00 hrs on 0]
00082> [METOUT= 2 (1=imperial, 2=metric output)]
00083> [NSTORM= 1 ]
00084> [NRUN = 1 ]
00085> 001:0002-----
00086> READ STORM
00087> Filename = STORM.001
00088> Comment =
00089> [SDT= 5.00:SDUR= 4.00:PTOT= 25.00]
00090> #-----|-----
00091> #*****
00092> # RA 4
00093> #*****
00094> 001:0003-----ID:NHYD-----AREA----QPEAK-TpeakDate_hh:mm---R.V.-R.C.-
00095> DESIGN NASHYD 01:RA 4 2.40 .050 No_date 1:51 6.65 .266
00096> [CN= 81.0: N= 3.00]
00097> [Tp= .22:DT= 1.00]
00098> #-----|-----
00099> #*****
00100> # RA 27
00101> #*****
00102> 001:0004-----ID:NHYD-----AREA----QPEAK-TpeakDate_hh:mm---R.V.-R.C.-
00103> DESIGN NASHYD 01:RA 27 7.10 .098 No_date 1:55 5.11 .204
00104> [CN= 75.0: N= 3.00]
00105> [Tp= .27:DT= 1.00]
00106> #-----|-----
00107> #*****
00108> # RA 31
00109> #*****
00110> 001:0005-----ID:NHYD-----AREA----QPEAK-TpeakDate_hh:mm---R.V.-R.C.-
00111> DESIGN NASHYD 01:RA 31 10.10 .113 No_date 2:24 7.31 .292
00112> [CN= 83.0: N= 3.00]
00113> [Tp= .65:DT= 1.00]
00114> #-----|-----
00115> #*****
00116> # RA 32
00117> #*****
00118> 001:0006-----ID:NHYD-----AREA----QPEAK-TpeakDate_hh:mm---R.V.-R.C.-
00119> DESIGN NASHYD 01:RA 32 9.70 .135 No_date 2:20 8.52 .341
00120> [CN= 86.0: N= 3.00]
00121> [Tp= .60:DT= 1.00]
00122> #-----|-----
00123> #*****
00124> # RA 33
00125> #*****
00126> 001:0007-----ID:NHYD-----AREA----QPEAK-TpeakDate_hh:mm---R.V.-R.C.-
00127> DESIGN NASHYD 01:RA 33 16.50 .160 No_date 2:28 6.65 .266
00128> [CN= 81.0: N= 3.00]
00129> [Tp= .69:DT= 1.00]
00130> #-----|-----
00131> #*****
00132> # RA 34
00133> #*****
00134> 001:0008-----ID:NHYD-----AREA----QPEAK-TpeakDate_hh:mm---R.V.-R.C.-
00135> DESIGN NASHYD 01:RA 34a 3.70 .053 No_date 2:13 7.68 .307
00136> [CN= 84.0: N= 3.00]
00137> [Tp= .50:DT= 1.00]
00138> #-----|-----
00139> #*****
00140> # RA 35a
00141> #*****
00142> 001:0009-----ID:NHYD-----AREA----QPEAK-TpeakDate_hh:mm---R.V.-R.C.-
00143> DESIGN NASHYD 01:RA 35a 4.10 .062 No_date 2:09 7.68 .307
00144> [CN= 84.0: N= 3.00]
00145> [Tp= .46:DT= 1.00]
00146> #-----|-----

```



```

00147> #*****
00148> # RA 35b
00149> #*****
00150> 001:0010-----ID:NHYD-----AREA---QPEAK-TpeakDate_hh:mm---R.V.-R.C.-
00151> DESIGN NASHYD 01:RA 35b 8.30 .106 No_date 2:19 7.68 .307
00152> [CN= 84.0: N= 3.00]
00153> [Tp= .58:DT= 1.00]
00154> #-----|-----
00155> #*****
00156> # RA 42
00157> #*****
00158> 001:0011-----ID:NHYD-----AREA---QPEAK-TpeakDate_hh:mm---R.V.-R.C.-
00159> DESIGN NASHYD 01:RA 42 67.50 .612 No_date 2:42 7.31 .292
00160> [CN= 83.0: N= 3.00]
00161> [Tp= .87:DT= 1.00]
00162> #-----|-----
00163> #*****
00164> # DFO Culvert 3
00165> #*****
00166> 001:0012-----ID:NHYD-----AREA---QPEAK-TpeakDate_hh:mm---R.V.-R.C.-
00167> DESIGN NASHYD 01:DFO_3 124.80 .598 No_date 4:20 7.68 .307
00168> [CN= 84.0: N= 3.00]
00169> [Tp= 2.19:DT= 1.00]
00170> #-----|-----
00171> #*****
00172> # DFO Culvert 4
00173> #*****
00174> 001:0013-----ID:NHYD-----AREA---QPEAK-TpeakDate_hh:mm---R.V.-R.C.-
00175> DESIGN NASHYD 01:DFO_3 259.30 .766 No_date 5:35 6.97 .279
00176> [CN= 82.0: N= 3.00]
00177> [Tp= 3.45:DT= 1.00]
00178> #-----|-----
00179> ** END OF RUN : 4
00180>
00181> *****
00182>
00183>
00184>
00185>
00186>
00187> RUN:COMMAND#
00188> 005:0001-----
00189> START
00190> [TZERO = .00 hrs on 0]
00191> [METOUT= 2 (1=imperial, 2=metric output)]
00192> [NSTORM= 1 ]
00193> [NRUN = 5 ]
00194> #*****
00195> # Project Name: [Amherst Island Wind Energy Project]
00196> # Project Number:[1609-60595]
00197> # Date : July 12, 2017
00198> # Hydrologic Modeling for Access Road Culvert Sizing
00199> # CA Permitting
00200> #
00201> # Company : Stantec Consulting Ltd. (Kitchener)
00202> # Modeller : D. Williams
00203> # License # : 4730904
00204> #*****
00205> 005:0002-----
00206> READ STORM
00207> Filename = STORM.001
00208> Comment =
00209> [SDT=15.00:SDUR= 24.00:PTOT= 71.40]
00210> #-----|-----
00211> #*****
00212> # RA 4
00213> #*****
00214> 005:0003-----ID:NHYD-----AREA---QPEAK-TpeakDate_hh:mm---R.V.-R.C.-
00215> DESIGN NASHYD 01:RA 4 2.40 .209 No_date 12:06 37.74 .529
00216> [CN= 81.0: N= 3.00]
00217> [Tp= .22:DT= 1.00]
00218> #-----|-----
00219> #*****

```



```

00220> # RA 27
00221> #*****
00222> 005:0004-----ID:NHYD-----AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
00223> DESIGN NASHYD 01:RA 27 7.10 .449 No_date 12:09 31.61 .443
00224> [CN= 75.0: N= 3.00]
00225> [Tp= .27:DT= 1.00]
00226> #-----|-----|
00227> #*****
00228> # RA 31
00229> #*****
00230> 005:0005-----ID:NHYD-----AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
00231> DESIGN NASHYD 01:RA 31 10.10 .448 No_date 12:34 40.07 .561
00232> [CN= 83.0: N= 3.00]
00233> [Tp= .65:DT= 1.00]
00234> #-----|-----|
00235> #*****
00236> # RA 32
00237> #*****
00238> 005:0006-----ID:NHYD-----AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
00239> DESIGN NASHYD 01:RA 32 9.70 .503 No_date 12:31 43.92 .615
00240> [CN= 86.0: N= 3.00]
00241> [Tp= .60:DT= 1.00]
00242> #-----|-----|
00243> #*****
00244> # RA 33
00245> #*****
00246> 005:0007-----ID:NHYD-----AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
00247> DESIGN NASHYD 01:RA 33 16.50 .657 No_date 12:37 37.74 .529
00248> [CN= 81.0: N= 3.00]
00249> [Tp= .69:DT= 1.00]
00250> #-----|-----|
00251> #*****
00252> # RA 34
00253> #*****
00254> 005:0008-----ID:NHYD-----AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
00255> DESIGN NASHYD 01:RA 34a 3.70 .204 No_date 12:24 41.31 .579
00256> [CN= 84.0: N= 3.00]
00257> [Tp= .50:DT= 1.00]
00258> #-----|-----|
00259> #*****
00260> # RA 35a
00261> #*****
00262> 005:0009-----ID:NHYD-----AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
00263> DESIGN NASHYD 01:RA 35a 4.10 .240 No_date 12:21 41.31 .579
00264> [CN= 84.0: N= 3.00]
00265> [Tp= .46:DT= 1.00]
00266> #-----|-----|
00267> #*****
00268> # RA 35b
00269> #*****
00270> 005:0010-----ID:NHYD-----AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
00271> DESIGN NASHYD 01:RA 35b 8.30 .412 No_date 12:29 41.31 .579
00272> [CN= 84.0: N= 3.00]
00273> [Tp= .58:DT= 1.00]
00274> #-----|-----|
00275> #*****
00276> # RA 42
00277> #*****
00278> 005:0011-----ID:NHYD-----AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
00279> DESIGN NASHYD 01:RA 42 67.50 2.423 No_date 12:49 40.07 .561
00280> [CN= 83.0: N= 3.00]
00281> [Tp= .87:DT= 1.00]
00282> #-----|-----|
00283> #*****
00284> # DFO Culvert 3
00285> #*****
00286> 005:0012-----ID:NHYD-----AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
00287> DESIGN NASHYD 01:DFO_3 124.80 2.273 No_date 14:20 41.31 .579
00288> [CN= 84.0: N= 3.00]
00289> [Tp= 2.19:DT= 1.00]
00290> #-----|-----|
00291> #*****
00292> # DFO Culvert 4

```



```

00293> #*****
00294> 005:0013-----ID:NHYD-----AREA---QPEAK-TpeakDate_hh:mm---R.V.-R.C.-
00295> DESIGN NASHYD 01:DFO_3 259.30 3.143 No_date 15:51 38.88 .545
00296> [CN= 82.0: N= 3.00]
00297> [Tp= 3.45:DT= 1.00]
00298> #-----|-----|
00299> #-----|-----|
00300> ** END OF RUN : 9
00301>
00302> *****
00303>
00304>
00305>
00306>
00307>
00308> RUN:COMMAND#
00309> 010:0001-----|-----|
00310> START
00311> [TZERO = .00 hrs on 0]
00312> [METOUT= 2 (1=imperial, 2=metric output)]
00313> [NSTORM= 1 ]
00314> [NRUN = 10 ]
00315> #*****
00316> # Project Name: [Amherst Island Wind Energy Project]
00317> # Project Number:[1609-60595]
00318> # Date : July 12, 2017
00319> # Hydrologic Modeling for Access Road Culvert Sizing
00320> # CA Permitting
00321> #
00322> # Company : Stantec Consulting Ltd. (Kitchener)
00323> # Modeller : D. Williams
00324> # License # : 4730904
00325> #*****
00326> 010:0002-----|-----|
00327> READ STORM
00328> Filename = STORM.001
00329> Comment =
00330> [SDT=15.00:SDUR= 24.00:PTOT= 83.00]
00331> #-----|-----|
00332> #*****
00333> # RA 4
00334> #*****
00335> 010:0003-----ID:NHYD-----AREA---QPEAK-TpeakDate_hh:mm---R.V.-R.C.-
00336> DESIGN NASHYD 01:RA 4 2.40 .262 No_date 12:06 47.08 .567
00337> [CN= 81.0: N= 3.00]
00338> [Tp= .22:DT= 1.00]
00339> #-----|-----|
00340> #*****
00341> # RA 27
00342> #*****
00343> 010:0004-----ID:NHYD-----AREA---QPEAK-TpeakDate_hh:mm---R.V.-R.C.-
00344> DESIGN NASHYD 01:RA 27 7.10 .572 No_date 12:09 39.97 .482
00345> [CN= 75.0: N= 3.00]
00346> [Tp= .27:DT= 1.00]
00347> #-----|-----|
00348> #*****
00349> # RA 31
00350> #*****
00351> 010:0005-----ID:NHYD-----AREA---QPEAK-TpeakDate_hh:mm---R.V.-R.C.-
00352> DESIGN NASHYD 01:RA 31 10.10 .558 No_date 12:34 49.75 .599
00353> [CN= 83.0: N= 3.00]
00354> [Tp= .65:DT= 1.00]
00355> #-----|-----|
00356> #*****
00357> # RA 32
00358> #*****
00359> 010:0006-----ID:NHYD-----AREA---QPEAK-TpeakDate_hh:mm---R.V.-R.C.-
00360> DESIGN NASHYD 01:RA 32 9.70 .620 No_date 12:30 54.07 .651
00361> [CN= 86.0: N= 3.00]
00362> [Tp= .60:DT= 1.00]
00363> #-----|-----|
00364> #*****
00365> # RA 33

```



```

00366> #*****
00367> 010:0007-----ID:NHYD-----AREA---QPEAK-TpeakDate_hh:mm---R.V.-R.C.-
00368> DESIGN NASHYD 01:RA 33 16.50 .824 No_date 12:37 47.08 .567
00369> [CN= 81.0: N= 3.00]
00370> [Tp= .69:DT= 1.00]
00371> #-----|-----
00372> #*****
00373> # RA 34
00374> #*****
00375> 010:0008-----ID:NHYD-----AREA---QPEAK-TpeakDate_hh:mm---R.V.-R.C.-
00376> DESIGN NASHYD 01:RA 34a 3.70 .254 No_date 12:24 51.14 .616
00377> [CN= 84.0: N= 3.00]
00378> [Tp= .50:DT= 1.00]
00379> #-----|-----
00380> #*****
00381> # RA 35a
00382> #*****
00383> 010:0009-----ID:NHYD-----AREA---QPEAK-TpeakDate_hh:mm---R.V.-R.C.-
00384> DESIGN NASHYD 01:RA 35a 4.10 .298 No_date 12:21 51.14 .616
00385> [CN= 84.0: N= 3.00]
00386> [Tp= .46:DT= 1.00]
00387> #-----|-----
00388> #*****
00389> # RA 35b
00390> #*****
00391> 010:0010-----ID:NHYD-----AREA---QPEAK-TpeakDate_hh:mm---R.V.-R.C.-
00392> DESIGN NASHYD 01:RA 35b 8.30 .512 No_date 12:29 51.14 .616
00393> [CN= 84.0: N= 3.00]
00394> [Tp= .58:DT= 1.00]
00395> #-----|-----
00396> #*****
00397> # RA 42
00398> #*****
00399> 010:0011-----ID:NHYD-----AREA---QPEAK-TpeakDate_hh:mm---R.V.-R.C.-
00400> DESIGN NASHYD 01:RA 42 67.50 3.020 No_date 12:49 49.75 .599
00401> [CN= 83.0: N= 3.00]
00402> [Tp= .87:DT= 1.00]
00403> #-----|-----
00404> #*****
00405> # DFO Culvert 3
00406> #*****
00407> 010:0012-----ID:NHYD-----AREA---QPEAK-TpeakDate_hh:mm---R.V.-R.C.-
00408> DESIGN NASHYD 01:DFO_3 124.80 2.825 No_date 14:19 51.14 .616
00409> [CN= 84.0: N= 3.00]
00410> [Tp= 2.19:DT= 1.00]
00411> #-----|-----
00412> #*****
00413> # DFO Culvert 4
00414> #*****
00415> 010:0013-----ID:NHYD-----AREA---QPEAK-TpeakDate_hh:mm---R.V.-R.C.-
00416> DESIGN NASHYD 01:DFO_3 259.30 3.927 No_date 15:49 48.39 .583
00417> [CN= 82.0: N= 3.00]
00418> [Tp= 3.45:DT= 1.00]
00419> #-----|-----
00420> #-----|-----
00421> ** END OF RUN : 99
00422>
00423> *****
00424>
00425>
00426>
00427>
00428>
00429> RUN:COMMAND#
00430> 100:0001-----
00431> START
00432> [TZERO = .00 hrs on 0]
00433> [METOUT= 2 (1=imperial, 2=metric output)]
00434> [NSTORM= 1 ]
00435> [NRUN = 100 ]
00436> #*****
00437> # Project Name: [Amherst Island Wind Energy Project]
00438> # Project Number:[1609-60595]

```







```

00512> 100:0010-----ID:NHYD-----AREA---QPEAK-TpeakDate_hh:mm---R.V.-R.C.-
00513> DESIGN NASHYD      01:RA 35b      8.30      .845 No_date  12:29  83.96 .701
00514> [CN= 84.0: N= 3.00]
00515> [Tp= .58:DT= 1.00]
00516> #-----|-----|
00517> #*****|*****|
00518> # RA 42
00519> #*****|*****|
00520> 100:0011-----ID:NHYD-----AREA---QPEAK-TpeakDate_hh:mm---R.V.-R.C.-
00521> DESIGN NASHYD      01:RA 42      67.50     5.018 No_date  12:48  82.17 .686
00522> [CN= 83.0: N= 3.00]
00523> [Tp= .87:DT= 1.00]
00524> #-----|-----|
00525> #*****|*****|
00526> # DFO Culvert 3
00527> #*****|*****|
00528> 100:0012-----ID:NHYD-----AREA---QPEAK-TpeakDate_hh:mm---R.V.-R.C.-
00529> DESIGN NASHYD      01:DFO_3     124.80     4.668 No_date  14:16  83.96 .701
00530> [CN= 84.0: N= 3.00]
00531> [Tp= 2.19:DT= 1.00]
00532> #-----|-----|
00533> #*****|*****|
00534> # DFO Culvert 4
00535> #*****|*****|
00536> 100:0013-----ID:NHYD-----AREA---QPEAK-TpeakDate_hh:mm---R.V.-R.C.-
00537> DESIGN NASHYD      01:DFO_3     259.30     6.571 No_date  15:45  80.41 .671
00538> [CN= 82.0: N= 3.00]
00539> [Tp= 3.45:DT= 1.00]
00540> #-----|-----|
00541> #-----|-----|
00542> 100:0002-----
00543> FINISH
00544> -----
00545> *****
00546> WARNINGS / ERRORS / NOTES
00547> -----
00548> Simulation ended on 2017-07-12 at 14:28:20
00549> =====
00550>
00551>

```

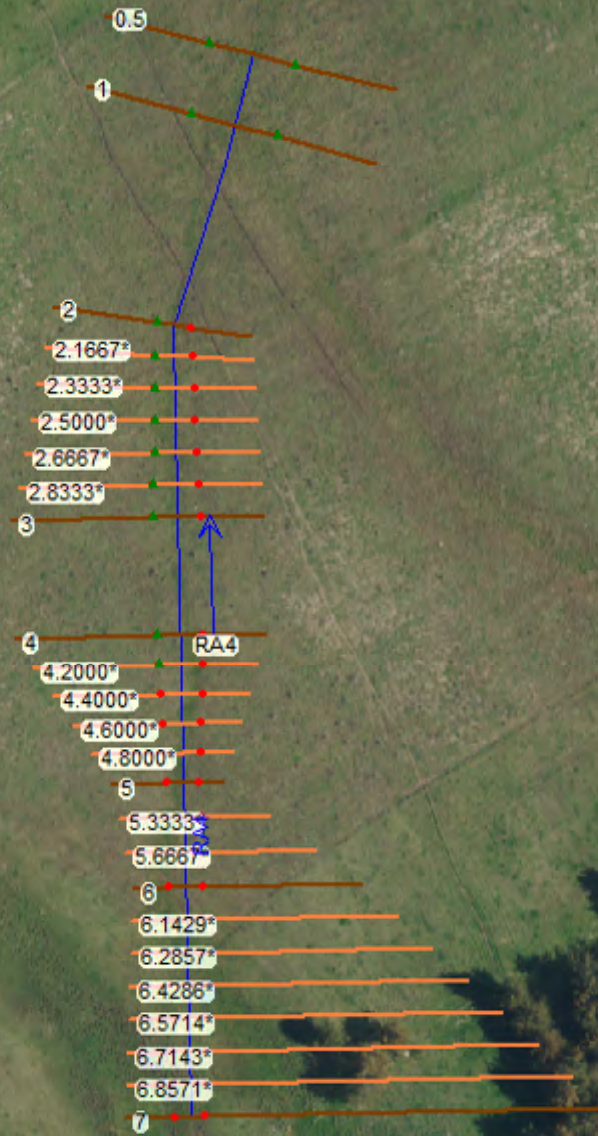


# RA4 – HYDRAULIC MODELING











HEC-RAS Plan: Plan 06 River: RA4 Reach: RA4

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Vel Total (m/s)	Vel Left (m/s)	Vel Right (m/s)
RA4	7	5yr	0.21	83.10	83.24		83.25	0.017444	0.53	0.44	8.44	0.56	0.48	0.25	0.12
RA4	7	10yr	0.26	83.10	83.25		83.27	0.017362	0.57	0.54	10.34	0.57	0.49	0.28	0.16
RA4	7	100yr	0.44	83.10	83.28		83.29	0.017307	0.66	0.87	14.96	0.59	0.51	0.35	0.24
RA4	6.8571*	5yr	0.21	83.03	83.16		83.18	0.017643	0.53	0.45	9.06	0.57	0.47	0.24	0.14
RA4	6.8571*	10yr	0.26	83.03	83.17		83.19	0.018357	0.57	0.54	10.63	0.59	0.49	0.27	0.18
RA4	6.8571*	100yr	0.44	83.03	83.20		83.22	0.017748	0.66	0.87	15.02	0.60	0.50	0.34	0.26
RA4	6.7143*	5yr	0.21	82.95	83.08		83.10	0.018253	0.53	0.45	9.36	0.57	0.46	0.23	0.16
RA4	6.7143*	10yr	0.26	82.95	83.09		83.11	0.018586	0.57	0.55	10.86	0.59	0.48	0.26	0.20
RA4	6.7143*	100yr	0.44	82.95	83.12		83.14	0.018632	0.67	0.86	14.76	0.61	0.51	0.33	0.27
RA4	6.5714*	5yr	0.21	82.88	83.01		83.02	0.016809	0.51	0.48	10.00	0.55	0.43	0.21	0.18
RA4	6.5714*	10yr	0.26	82.88	83.02		83.03	0.016627	0.54	0.59	11.48	0.56	0.45	0.24	0.21
RA4	6.5714*	100yr	0.44	82.88	83.04		83.06	0.017168	0.64	0.90	15.02	0.59	0.49	0.31	0.28
RA4	6.4286*	5yr	0.21	82.80	82.93		82.94	0.020087	0.53	0.46	9.69	0.60	0.46	0.20	0.20
RA4	6.4286*	10yr	0.26	82.80	82.94		82.95	0.020881	0.58	0.54	10.86	0.62	0.48	0.24	0.24
RA4	6.4286*	100yr	0.44	82.80	82.96		82.98	0.019715	0.66	0.86	14.35	0.62	0.51	0.31	0.31
RA4	6.2857*	5yr	0.21	82.73	82.86	82.83	82.87	0.012825	0.45	0.56	10.96	0.48	0.37	0.18	0.20
RA4	6.2857*	10yr	0.26	82.73	82.87	82.84	82.88	0.013455	0.49	0.66	12.08	0.50	0.40	0.20	0.23
RA4	6.2857*	100yr	0.44	82.73	82.89		82.90	0.015397	0.60	0.95	14.85	0.56	0.46	0.27	0.30
RA4	6.1429*	5yr	0.21	82.65	82.76	82.76	82.78	0.031680	0.60	0.39	8.70	0.73	0.53	0.17	0.27
RA4	6.1429*	10yr	0.26	82.65	82.77	82.77	82.79	0.029976	0.64	0.48	9.78	0.72	0.55	0.21	0.30
RA4	6.1429*	100yr	0.44	82.65	82.80		82.82	0.025523	0.71	0.77	12.75	0.70	0.57	0.29	0.36
RA4	6	5yr	0.21	82.58	82.72		82.72	0.006391	0.35	0.74	11.92	0.35	0.28	0.14	0.19
RA4	6	10yr	0.26	82.58	82.73		82.74	0.006315	0.37	0.88	13.10	0.35	0.30	0.16	0.20
RA4	6	100yr	0.44	82.58	82.76		82.77	0.006033	0.43	1.34	16.27	0.36	0.33	0.20	0.24
RA4	5.6667*	5yr	0.21	82.56	82.69		82.70	0.005965	0.34	0.75	11.54	0.34	0.28	0.16	0.19
RA4	5.6667*	10yr	0.26	82.56	82.71		82.71	0.005890	0.36	0.89	12.59	0.34	0.29	0.18	0.20
RA4	5.6667*	100yr	0.44	82.56	82.74		82.75	0.005579	0.42	1.36	15.90	0.35	0.32	0.20	0.24
RA4	5.3333*	5yr	0.21	82.55	82.67		82.67	0.006033	0.34	0.73	10.50	0.34	0.29	0.18	0.20
RA4	5.3333*	10yr	0.26	82.55	82.68		82.69	0.005933	0.37	0.86	11.38	0.34	0.30	0.20	0.21
RA4	5.3333*	100yr	0.44	82.55	82.71		82.72	0.005955	0.43	1.30	15.40	0.36	0.34	0.20	0.26
RA4	5	5yr	0.21	82.53	82.62		82.63	0.015873	0.48	0.49	7.62	0.53	0.43	0.28	0.28
RA4	5	10yr	0.26	82.53	82.63		82.64	0.015195	0.51	0.58	8.11	0.53	0.45	0.30	0.30
RA4	5	100yr	0.44	82.53	82.66		82.68	0.016297	0.63	0.85	12.50	0.58	0.51	0.25	0.38
RA4	4.8000*	5yr	0.21	82.46	82.56		82.57	0.015615	0.46	0.51	8.54	0.52	0.41	0.26	0.24
RA4	4.8000*	10yr	0.26	82.46	82.57		82.58	0.016053	0.51	0.59	9.13	0.54	0.45	0.29	0.26
RA4	4.8000*	100yr	0.44	82.46	82.60		82.61	0.015760	0.61	0.91	14.17	0.56	0.48	0.25	0.32



HEC-RAS Plan: Plan 06 River: RA4 Reach: RA4 (Continued)

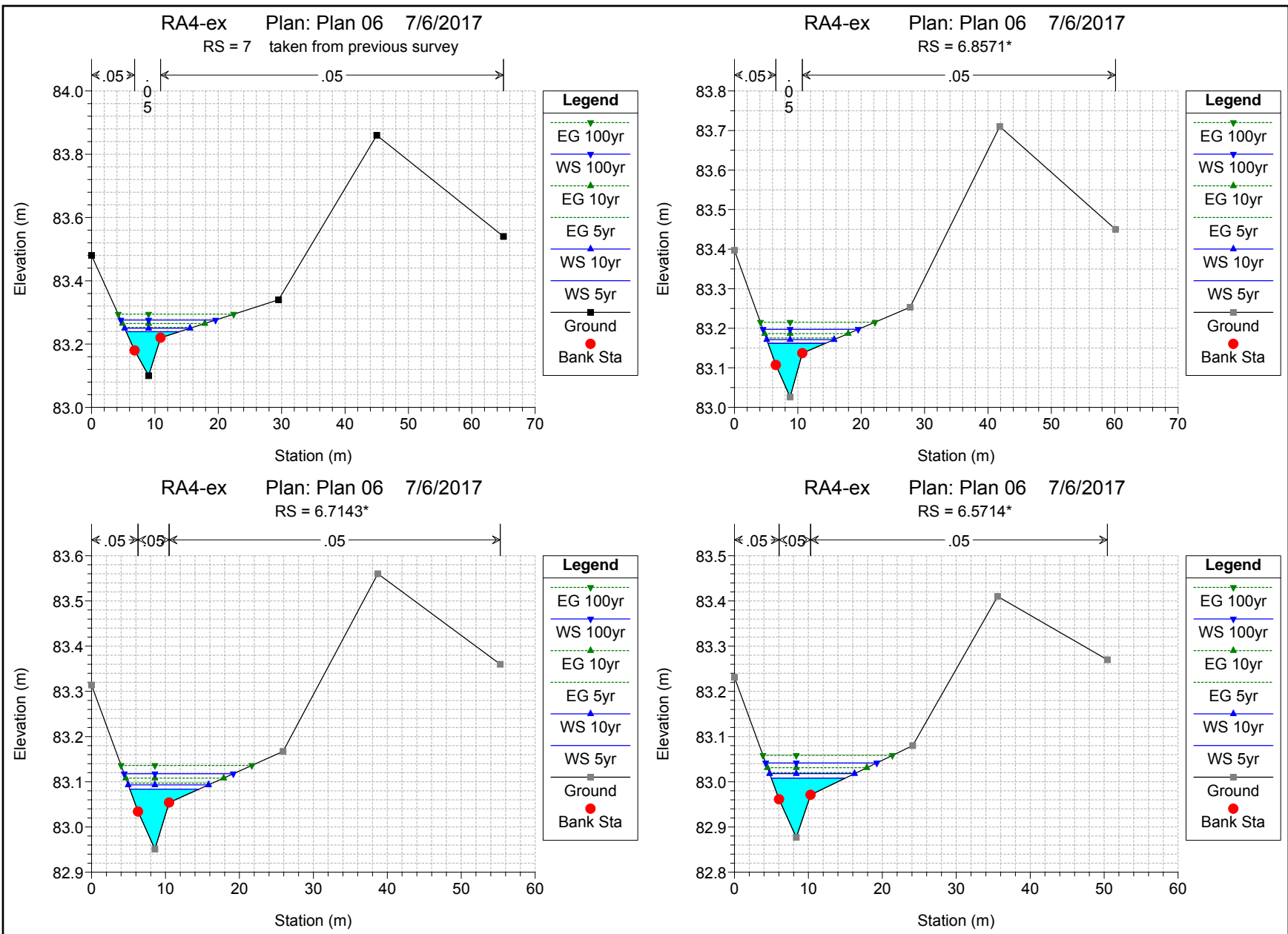
Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Vel Total (m/s)	Vel Left (m/s)	Vel Right (m/s)
RA4	4.6000*	5yr	0.21	82.40	82.49		82.50	0.015563	0.45	0.53	9.50	0.52	0.40	0.24	0.22
RA4	4.6000*	10yr	0.26	82.40	82.50		82.51	0.014873	0.48	0.63	10.09	0.52	0.42	0.27	0.24
RA4	4.6000*	100yr	0.44	82.40	82.53		82.54	0.017578	0.61	0.90	15.04	0.59	0.49	0.27	0.29
RA4	4.4000*	5yr	0.21	82.33	82.43		82.44	0.016000	0.44	0.54	10.53	0.52	0.39	0.23	0.19
RA4	4.4000*	10yr	0.26	82.33	82.44		82.45	0.016135	0.47	0.63	11.06	0.53	0.41	0.27	0.22
RA4	4.4000*	100yr	0.44	82.33	82.46		82.48	0.016113	0.56	0.92	13.17	0.56	0.48	0.32	0.28
RA4	4.2000*	5yr	0.21	82.26	82.37	82.35	82.38	0.014848	0.41	0.58	11.78	0.50	0.36	0.22	0.16
RA4	4.2000*	10yr	0.26	82.26	82.38	82.36	82.39	0.014667	0.44	0.68	12.42	0.51	0.39	0.25	0.18
RA4	4.2000*	100yr	0.44	82.26	82.40	82.38	82.41	0.015388	0.54	0.97	14.21	0.54	0.45	0.32	0.25
RA4	4	5yr	0.21	82.20	82.30	82.29	82.31	0.018485	0.43	0.56	12.77	0.55	0.38	0.23	0.12
RA4	4	10yr	0.26	82.20	82.31	82.30	82.32	0.018768	0.47	0.65	13.31	0.56	0.40	0.26	0.15
RA4	4	100yr	0.44	82.20	82.33	82.31	82.35	0.018285	0.55	0.94	14.89	0.58	0.47	0.34	0.22
RA4	3	5yr	0.21	81.91	82.02	82.01	82.03	0.017772	0.43	0.56	12.82	0.54	0.37	0.23	0.12
RA4	3	10yr	0.26	81.91	82.03	82.01	82.03	0.017103	0.45	0.67	13.44	0.54	0.39	0.26	0.15
RA4	3	100yr	0.44	81.91	82.05	82.02	82.06	0.017752	0.54	0.95	14.95	0.57	0.46	0.34	0.22
RA4	2.8333*	5yr	0.21	81.82	81.94	81.92	81.95	0.018290	0.44	0.54	11.89	0.55	0.39	0.22	0.05
RA4	2.8333*	10yr	0.26	81.82	81.95	81.93	81.96	0.017547	0.47	0.64	12.57	0.55	0.41	0.25	0.09
RA4	2.8333*	100yr	0.44	81.82	81.97	81.95	81.98	0.017587	0.56	0.93	14.27	0.57	0.47	0.33	0.18
RA4	2.6667*	5yr	0.21	81.74	81.86	81.84	81.87	0.018608	0.47	0.51	10.78	0.56	0.41	0.21	
RA4	2.6667*	10yr	0.26	81.74	81.87	81.85	81.88	0.019037	0.50	0.60	11.43	0.57	0.43	0.26	
RA4	2.6667*	100yr	0.44	81.74	81.89	81.87	81.91	0.017784	0.57	0.90	13.50	0.58	0.49	0.33	0.13
RA4	2.5000*	5yr	0.21	81.65	81.78	81.75	81.79	0.017894	0.48	0.49	9.86	0.56	0.43	0.20	
RA4	2.5000*	10yr	0.26	81.65	81.79	81.77	81.80	0.016568	0.50	0.60	10.66	0.54	0.43	0.24	
RA4	2.5000*	100yr	0.44	81.65	81.82	81.80	81.83	0.017249	0.58	0.89	12.75	0.58	0.50	0.33	0.07
RA4	2.3333*	5yr	0.21	81.56	81.70	81.67	81.71	0.018673	0.51	0.45	8.92	0.57	0.46	0.18	
RA4	2.3333*	10yr	0.26	81.56	81.71	81.68	81.72	0.022064	0.58	0.51	9.35	0.63	0.51	0.23	
RA4	2.3333*	100yr	0.44	81.56	81.74	81.72	81.76	0.018105	0.62	0.84	11.81	0.59	0.52	0.32	
RA4	2.1667*	5yr	0.21	81.48	81.62	81.59	81.64	0.017543	0.52	0.44	8.19	0.56	0.47	0.16	
RA4	2.1667*	10yr	0.26	81.48	81.65	81.60	81.66	0.010759	0.46	0.65	9.70	0.46	0.40	0.21	
RA4	2.1667*	100yr	0.44	81.48	81.67	81.64	81.68	0.016162	0.62	0.85	11.51	0.57	0.52	0.30	
RA4	2	5yr	0.21	81.39	81.54	81.51	81.56	0.017526	0.55	0.38	7.45	0.57	0.55		
RA4	2	10yr	0.26	81.39	81.52	81.52	81.56	0.054278	0.88	0.30	4.55	0.98	0.88		
RA4	2	100yr	0.44	81.39	81.58	81.56	81.60	0.019898	0.69	0.75	10.11	0.63	0.59	0.31	
RA4	1	5yr	0.21	81.03	81.12	81.10	81.13	0.013325	0.33	0.65	18.99	0.45	0.32	0.07	
RA4	1	10yr	0.26	81.03	81.14	81.10	81.15	0.006557	0.28	1.07	23.12	0.33	0.24	0.12	0.11
RA4	1	100yr	0.44	81.03	81.15	81.13	81.16	0.012913	0.41	1.23	23.96	0.47	0.36	0.20	0.19



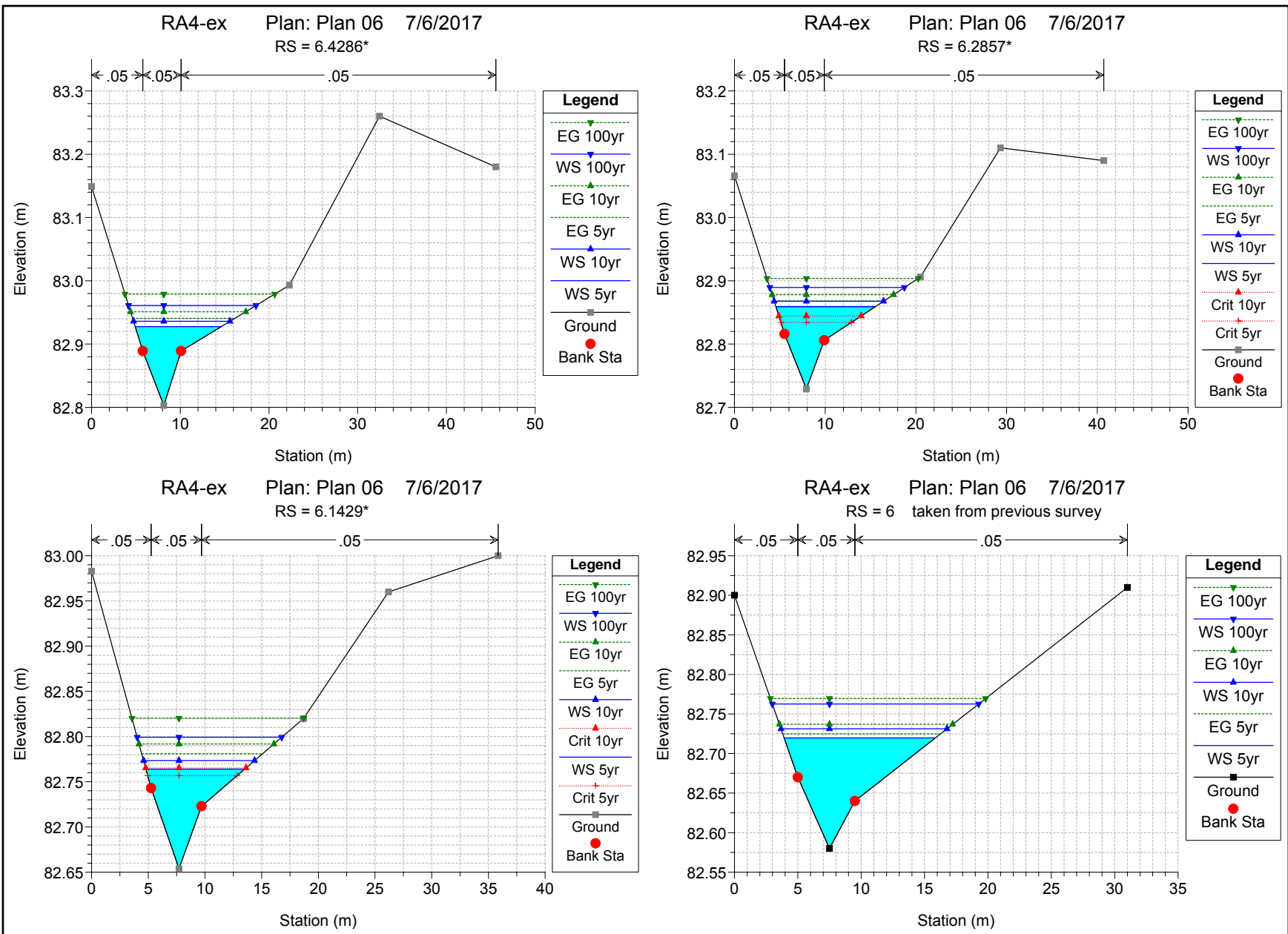
HEC-RAS Plan: Plan 06 River: RA4 Reach: RA4 (Continued)

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Vel Total (m/s)	Vel Left (m/s)	Vel Right (m/s)
RA4	0.5	5yr	0.21	80.90	80.99	80.97	81.00	0.013006	0.33	0.66	19.09	0.45	0.32	0.07	
RA4	0.5	10yr	0.26	80.90	80.98	80.98	80.99	0.065143	0.62	0.42	9.80	0.96	0.62		
RA4	0.5	100yr	0.44	80.90	81.02	81.00	81.03	0.013005	0.41	1.22	23.94	0.48	0.36	0.20	0.19



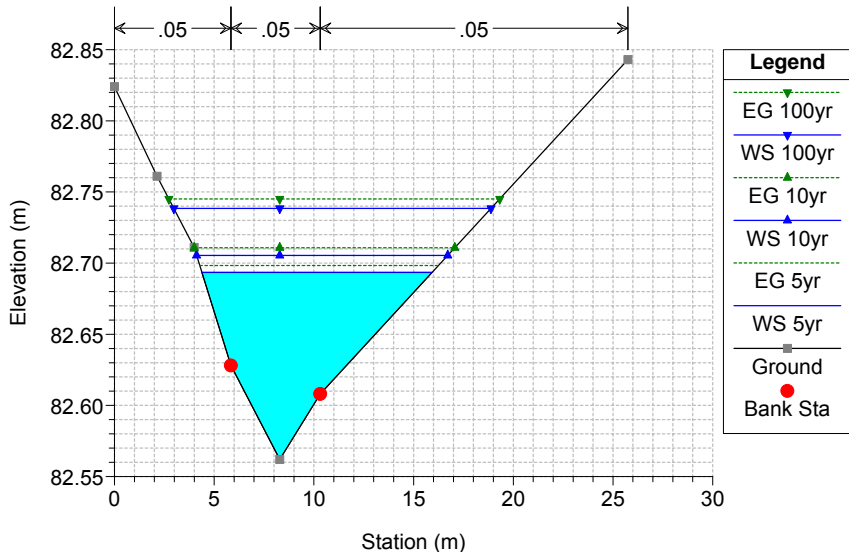




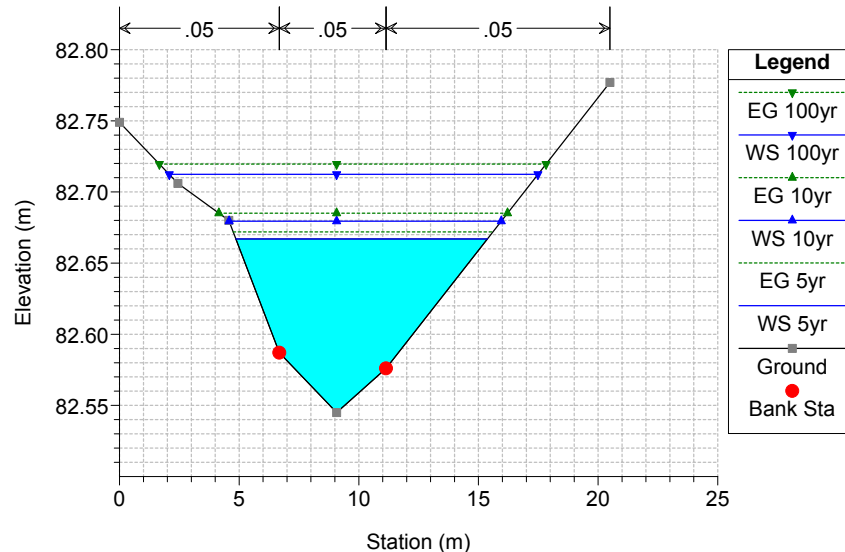




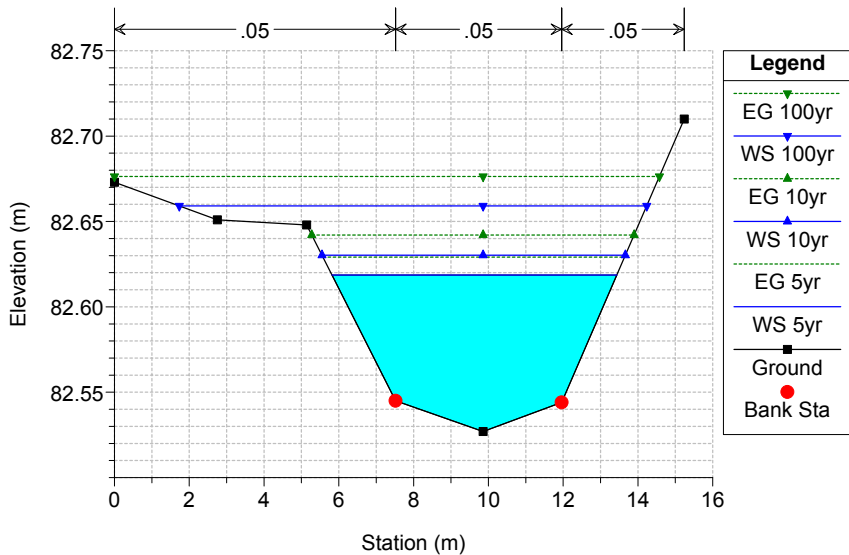
RA4-ex Plan: Plan 06 7/6/2017  
RS = 5.6667\*



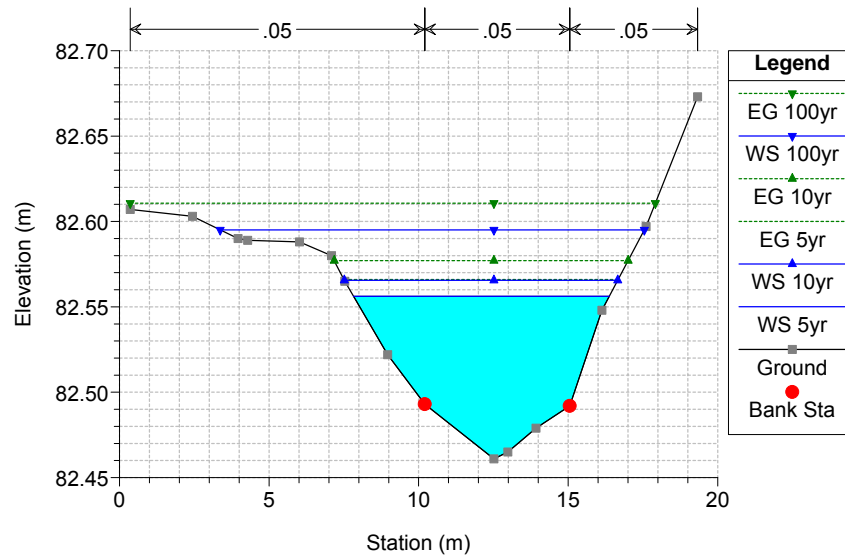
RA4-ex Plan: Plan 06 7/6/2017  
RS = 5.3333\*



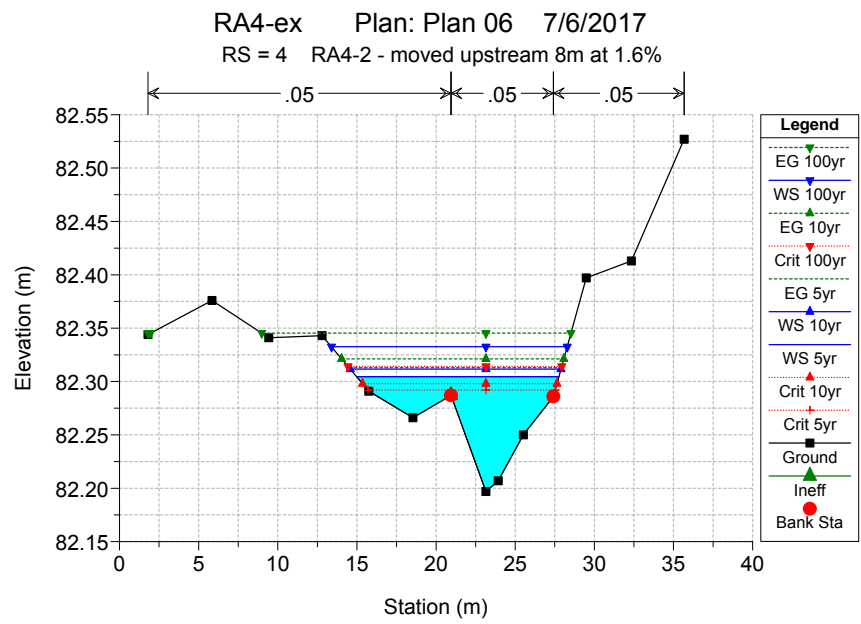
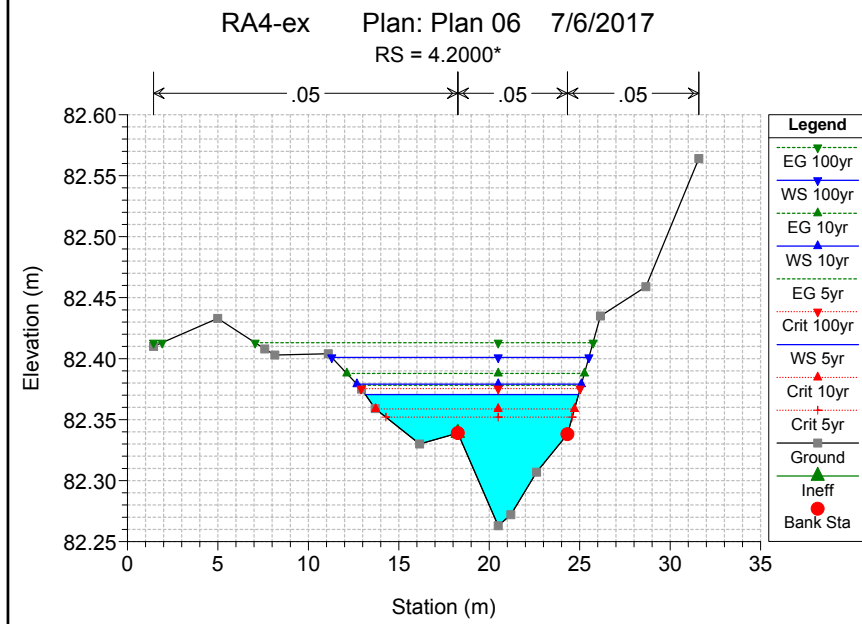
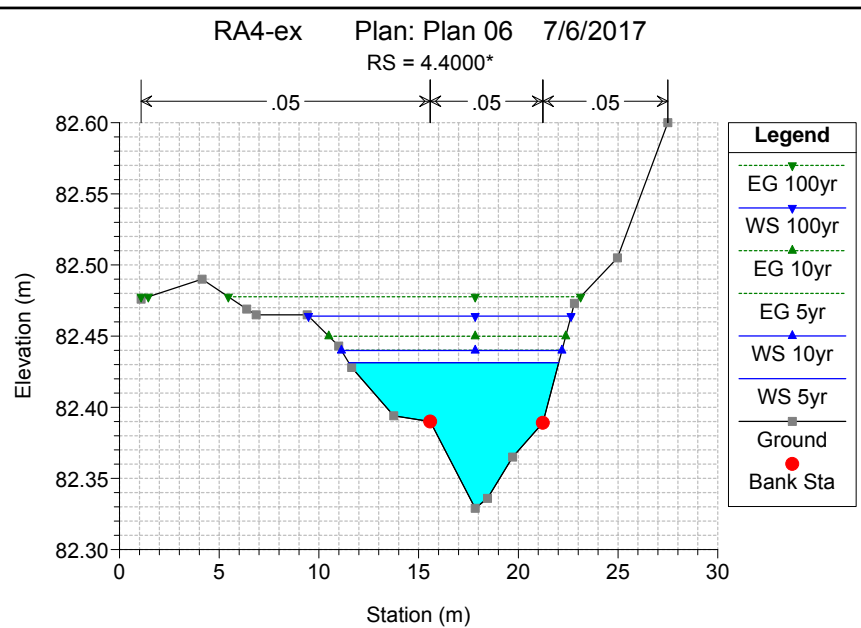
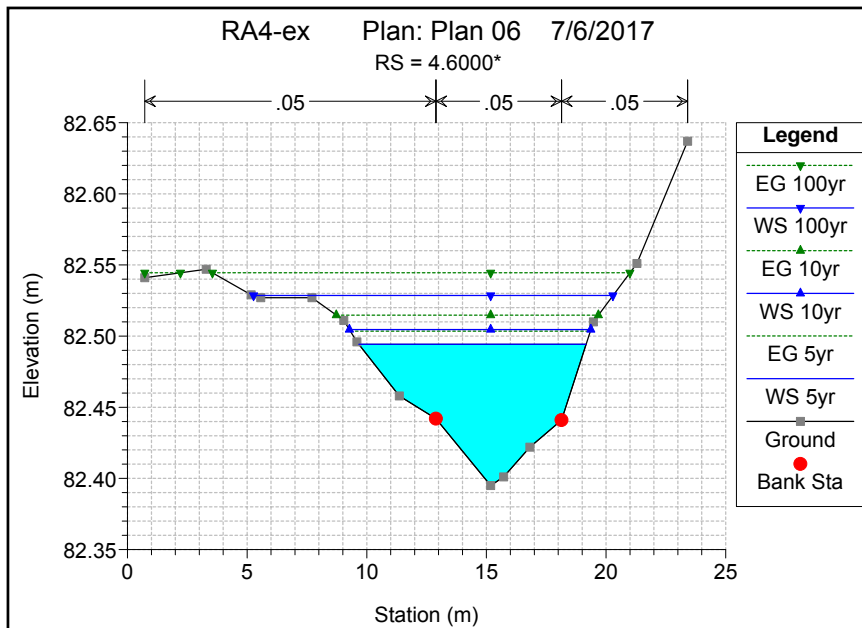
RA4-ex Plan: Plan 06 7/6/2017  
RS = 5 RA4-1



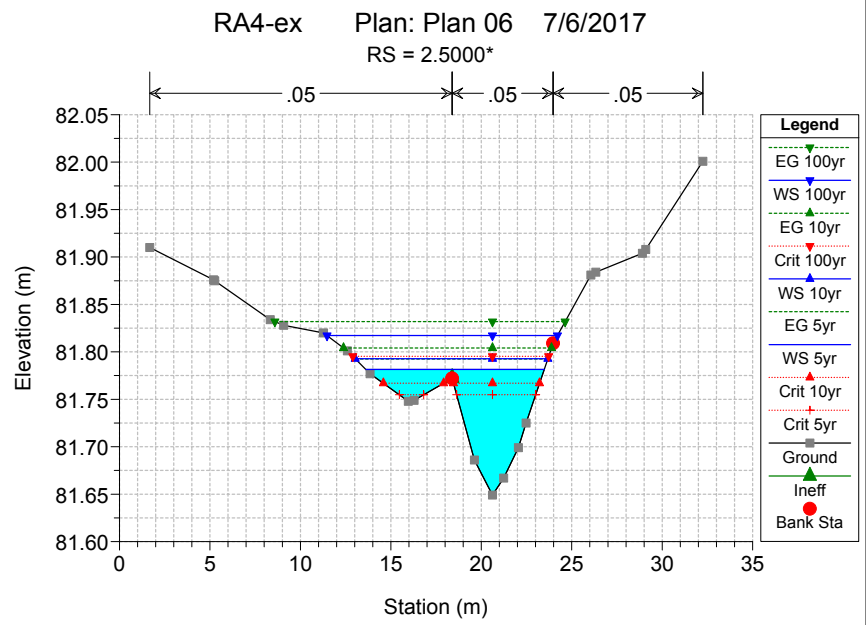
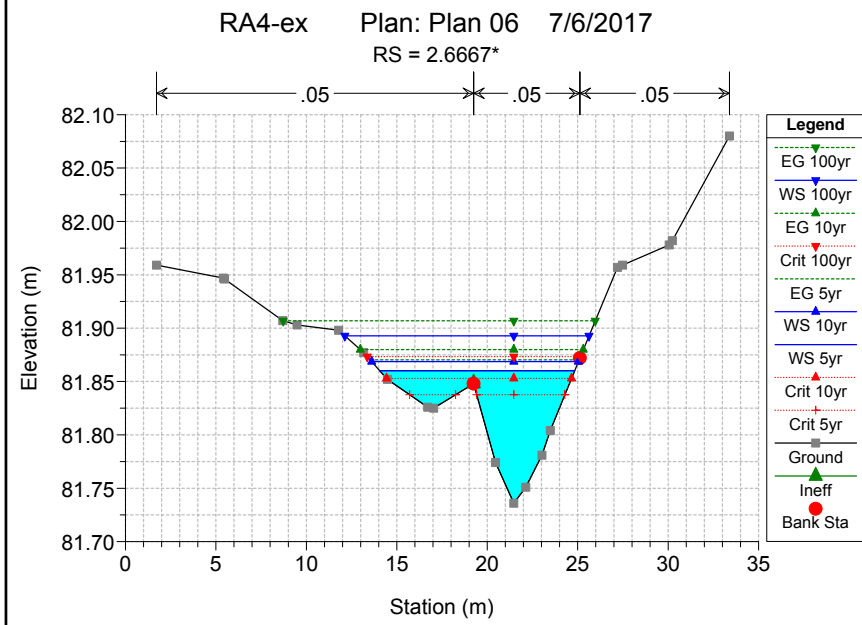
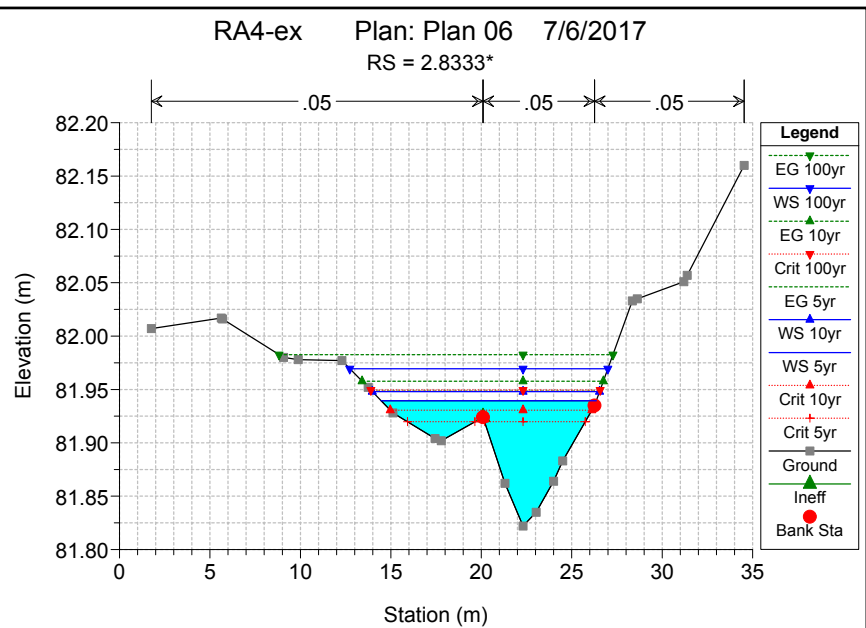
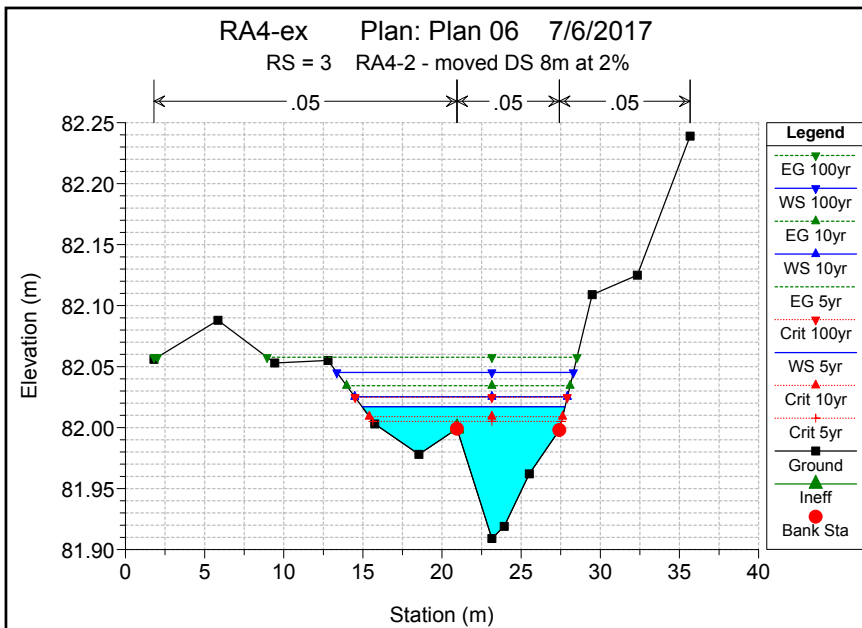
RA4-ex Plan: Plan 06 7/6/2017  
RS = 4.8000\*



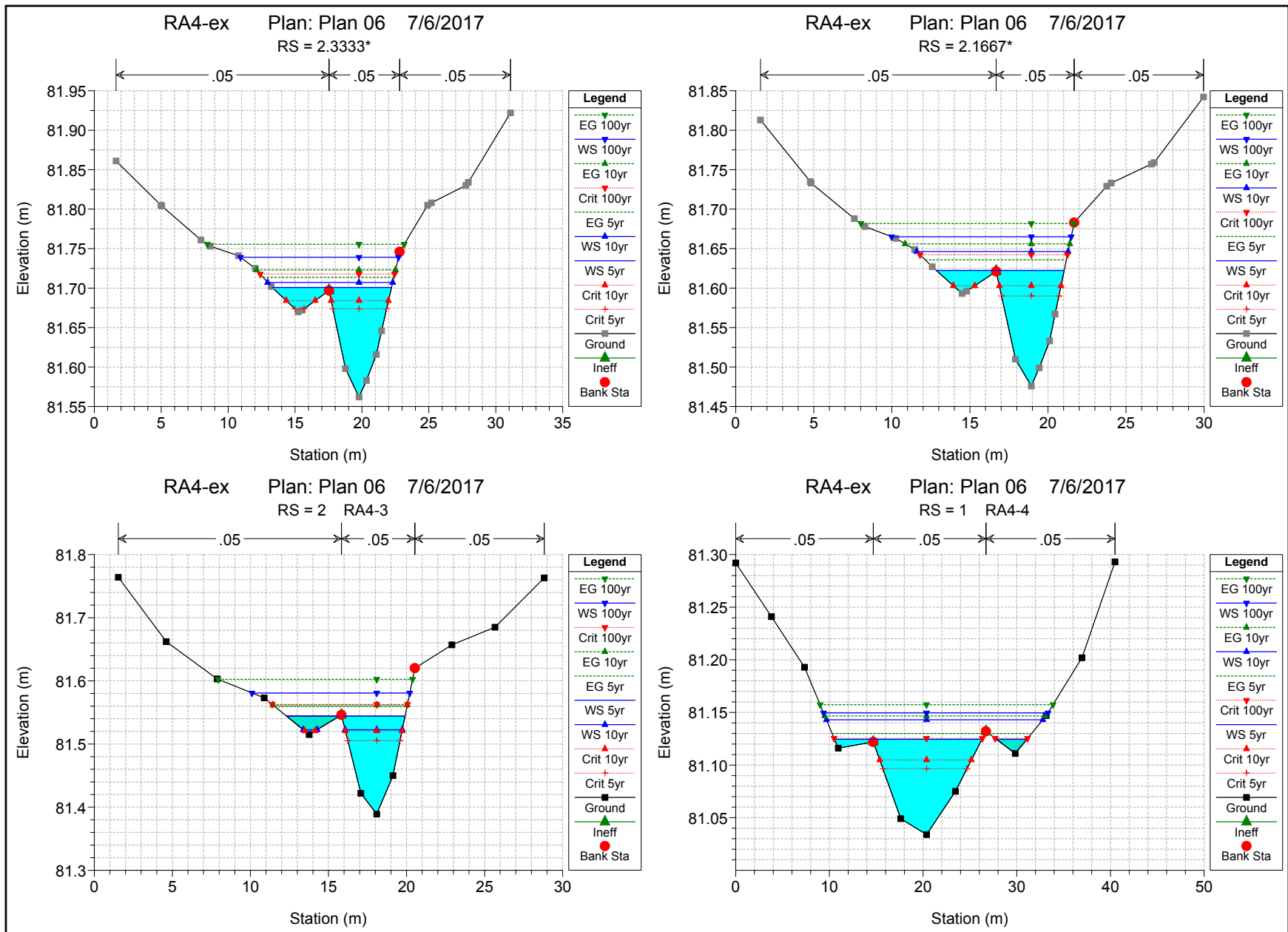








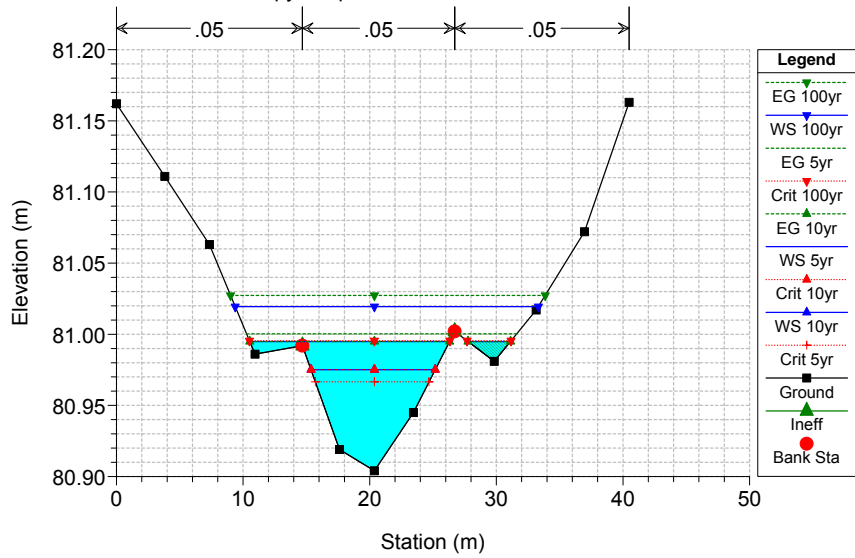




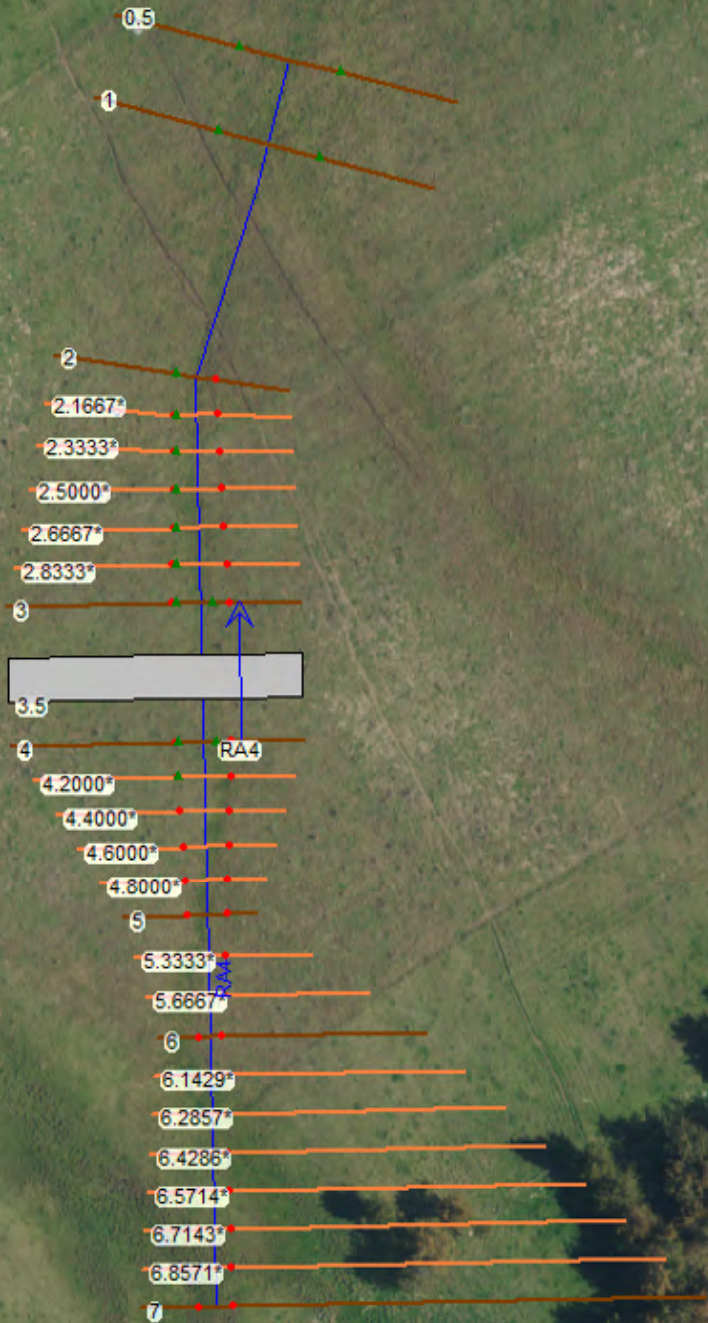


RA4-ex Plan: Plan 06 7/6/2017

RS = 0.5 copy of upstream CS moved down at 1.3% for 10m









HEC-RAS Plan: Plan 06 River: RA4 Reach: RA4

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Vel Total (m/s)	Vel Left (m/s)	Vel Right (m/s)
RA4	7	5yr	0.21	83.10	83.24		83.25	0.017508	0.53	0.44	8.43	0.57	0.48	0.25	0.12
RA4	7	10yr	0.26	83.10	83.25		83.27	0.017355	0.57	0.54	10.34	0.57	0.49	0.28	0.16
RA4	7	100yr	0.44	83.10	83.28		83.29	0.017204	0.66	0.87	14.99	0.59	0.51	0.35	0.24
RA4	6.8571*	5yr	0.21	83.03	83.16		83.18	0.017559	0.54	0.46	9.27	0.57	0.46	0.24	0.17
RA4	6.8571*	10yr	0.26	83.03	83.17		83.19	0.018364	0.58	0.55	10.79	0.59	0.48	0.27	0.20
RA4	6.8571*	100yr	0.44	83.03	83.20		83.21	0.018373	0.68	0.87	15.00	0.61	0.51	0.34	0.28
RA4	6.7143*	5yr	0.21	82.95	83.08		83.10	0.018842	0.55	0.46	9.55	0.59	0.45	0.23	0.21
RA4	6.7143*	10yr	0.26	82.95	83.09		83.11	0.018600	0.59	0.56	11.14	0.59	0.47	0.26	0.24
RA4	6.7143*	100yr	0.44	82.95	83.12		83.14	0.018465	0.68	0.89	15.06	0.61	0.50	0.33	0.30
RA4	6.5714*	5yr	0.21	82.88	83.01		83.02	0.016731	0.52	0.50	10.46	0.55	0.41	0.21	0.24
RA4	6.5714*	10yr	0.26	82.88	83.02		83.03	0.017484	0.57	0.60	11.72	0.57	0.44	0.24	0.27
RA4	6.5714*	100yr	0.44	82.88	83.04		83.06	0.018808	0.68	0.90	15.00	0.62	0.49	0.31	0.33
RA4	6.4286*	5yr	0.21	82.80	82.93		82.94	0.021144	0.56	0.47	10.01	0.62	0.44	0.20	0.29
RA4	6.4286*	10yr	0.26	82.80	82.94		82.95	0.019932	0.59	0.58	11.41	0.61	0.45	0.23	0.31
RA4	6.4286*	100yr	0.44	82.80	82.96		82.98	0.019528	0.68	0.90	14.69	0.63	0.49	0.30	0.36
RA4	6.2857*	5yr	0.21	82.73	82.86		82.86	0.015235	0.49	0.55	10.90	0.53	0.38	0.18	0.28
RA4	6.2857*	10yr	0.26	82.73	82.86		82.87	0.015839	0.53	0.65	11.98	0.54	0.40	0.21	0.31
RA4	6.2857*	100yr	0.44	82.73	82.89		82.90	0.016934	0.63	0.96	14.81	0.58	0.46	0.28	0.37
RA4	6.1429*	5yr	0.21	82.65	82.77		82.78	0.028562	0.59	0.44	9.36	0.70	0.47	0.18	0.39
RA4	6.1429*	10yr	0.26	82.65	82.78		82.79	0.027173	0.62	0.53	10.44	0.69	0.49	0.22	0.40
RA4	6.1429*	100yr	0.44	82.65	82.80		82.82	0.023562	0.69	0.84	13.39	0.68	0.52	0.29	0.44
RA4	6	5yr	0.21	82.58	82.72		82.73	0.007116	0.35	0.75	12.04	0.36	0.28	0.15	0.25
RA4	6	10yr	0.26	82.58	82.73		82.74	0.007010	0.38	0.89	13.20	0.37	0.29	0.17	0.26
RA4	6	100yr	0.44	82.58	82.76		82.77	0.006426	0.43	1.37	16.46	0.37	0.32	0.21	0.29
RA4	5.6667*	5yr	0.21	82.56	82.69		82.70	0.006303	0.36	0.75	11.44	0.35	0.28	0.16	0.23
RA4	5.6667*	10yr	0.26	82.56	82.71		82.71	0.006240	0.38	0.89	12.51	0.35	0.29	0.18	0.24
RA4	5.6667*	100yr	0.44	82.56	82.74		82.75	0.005875	0.43	1.36	15.88	0.36	0.32	0.21	0.27
RA4	5.3333*	5yr	0.21	82.55	82.67		82.67	0.005905	0.35	0.73	10.46	0.34	0.29	0.18	0.21
RA4	5.3333*	10yr	0.26	82.55	82.68		82.69	0.006040	0.38	0.86	11.29	0.35	0.30	0.20	0.23
RA4	5.3333*	100yr	0.44	82.55	82.71		82.72	0.006083	0.45	1.30	15.38	0.36	0.34	0.20	0.27
RA4	5	5yr	0.21	82.53	82.62		82.63	0.016370	0.48	0.48	7.59	0.54	0.44	0.28	0.28
RA4	5	10yr	0.26	82.53	82.63		82.64	0.014559	0.50	0.59	8.16	0.52	0.45	0.30	0.30
RA4	5	100yr	0.44	82.53	82.66		82.68	0.016868	0.64	0.84	12.35	0.58	0.52	0.25	0.38
RA4	4.8000*	5yr	0.21	82.46	82.56		82.57	0.014246	0.45	0.52	8.67	0.50	0.40	0.25	0.23
RA4	4.8000*	10yr	0.26	82.46	82.56		82.58	0.018110	0.53	0.56	8.96	0.57	0.46	0.30	0.27
RA4	4.8000*	100yr	0.44	82.46	82.64		82.65	0.002937	0.33	1.75	18.31	0.26	0.25	0.18	0.19



HEC-RAS Plan: Plan 06 River: RA4 Reach: RA4 (Continued)

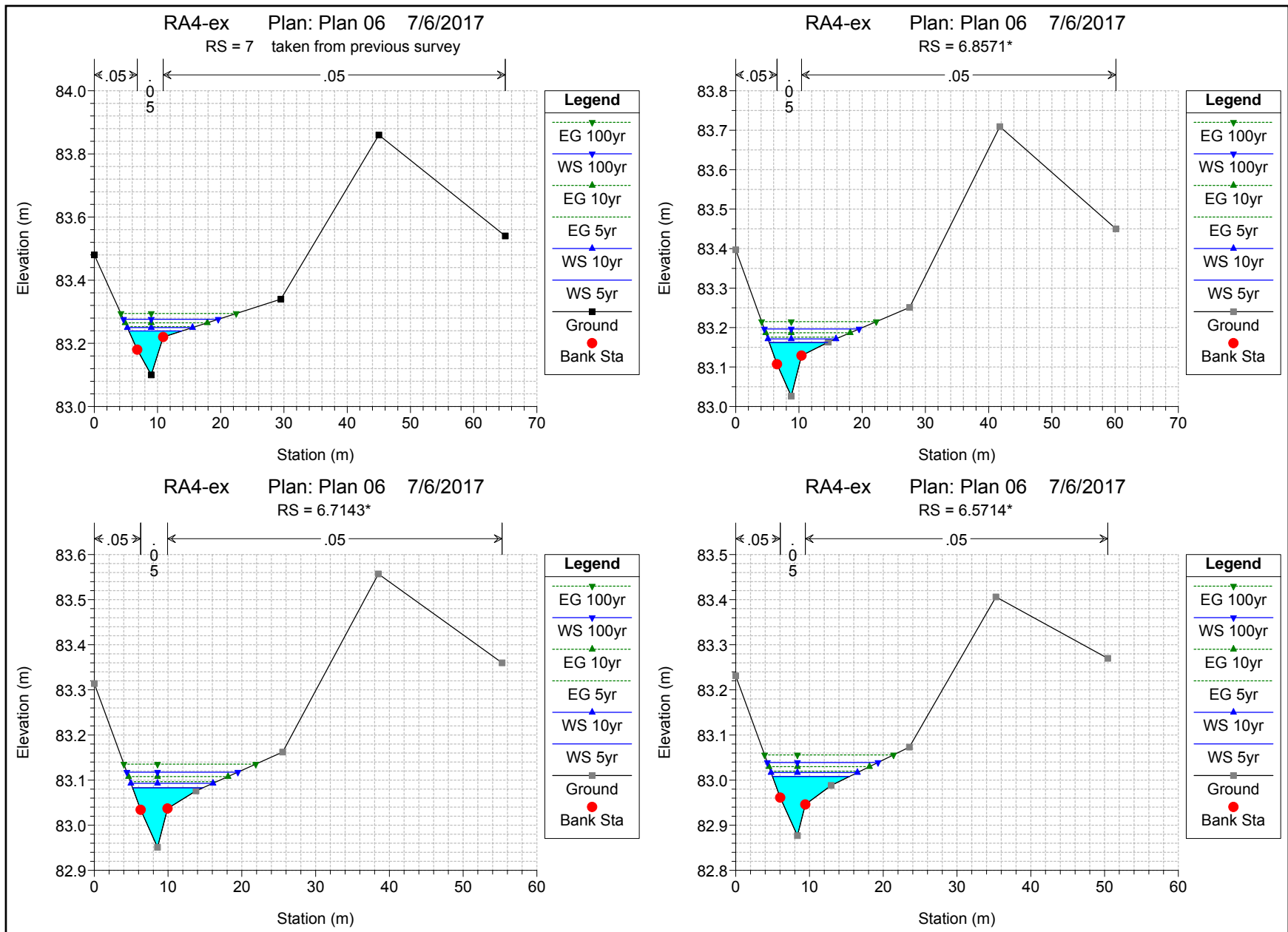
Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Vel Total (m/s)	Vel Left (m/s)	Vel Right (m/s)
RA4	4.6000*	5yr	0.21	82.40	82.49		82.50	0.019661	0.48	0.48	9.20	0.58	0.43	0.26	0.24
RA4	4.6000*	10yr	0.26	82.40	82.52		82.52	0.008943	0.40	0.76	11.23	0.41	0.35	0.23	0.20
RA4	4.6000*	100yr	0.44	82.40	82.64		82.64	0.000547	0.17	3.26	22.69	0.12	0.13	0.12	0.10
RA4	4.4000*	5yr	0.21	82.33	82.47		82.47	0.003327	0.26	0.99	16.25	0.25	0.21	0.12	0.13
RA4	4.4000*	10yr	0.26	82.33	82.51		82.51	0.001072	0.19	1.90	24.06	0.15	0.14	0.10	0.08
RA4	4.4000*	100yr	0.44	82.33	82.64		82.64	0.000145	0.10	5.23	26.42	0.06	0.08	0.08	0.07
RA4	4.2000*	5yr	0.21	82.26	82.47	82.35	82.47	0.000342	0.11	2.51	27.43	0.09	0.08	0.07	0.05
RA4	4.2000*	10yr	0.26	82.26	82.51	82.36	82.51	0.000164	0.09	3.74	28.66	0.06	0.07	0.06	0.04
RA4	4.2000*	100yr	0.44	82.26	82.64	82.38	82.64	0.000050	0.07	7.63	30.14	0.04	0.06	0.06	0.05
RA4	4	5yr	0.21	82.20	82.46	82.29	82.46	0.000760	0.21	0.99	31.99	0.14	0.21		
RA4	4	10yr	0.26	82.20	82.51	82.30	82.51	0.000675	0.22	1.18	33.27	0.13	0.22		
RA4	4	100yr	0.44	82.20	82.64	82.33	82.64	0.000535	0.26	1.72	33.87	0.13	0.26		
RA4	3.5		Culvert												
RA4	3	5yr	0.21	81.91	82.03	82.00	82.04	0.020341	0.56	0.37	13.52	0.61	0.56		
RA4	3	10yr	0.26	81.91	82.04	82.01	82.06	0.021334	0.63	0.42	14.38	0.63	0.63		
RA4	3	100yr	0.44	81.91	82.07	82.04	82.10	0.023342	0.79	0.56	22.93	0.70	0.79		
RA4	2.8333*	5yr	0.21	81.82	81.95	81.92	81.96	0.018228	0.48	0.44	12.39	0.56	0.48		0.08
RA4	2.8333*	10yr	0.26	81.82	81.96	81.93	81.97	0.017666	0.52	0.51	13.30	0.56	0.51		0.13
RA4	2.8333*	100yr	0.44	81.82	81.99	81.95	82.01	0.017008	0.63	0.72	19.19	0.58	0.61		0.23
RA4	2.6667*	5yr	0.21	81.74	81.87	81.84	81.88	0.018425	0.49	0.42	11.25	0.57	0.49		
RA4	2.6667*	10yr	0.26	81.74	81.88	81.85	81.89	0.018658	0.54	0.49	12.14	0.58	0.53		0.06
RA4	2.6667*	100yr	0.44	81.74	81.91	81.88	81.93	0.017075	0.64	0.70	17.80	0.59	0.63		0.19
RA4	2.5000*	5yr	0.21	81.65	81.78	81.76	81.80	0.018652	0.51	0.41	10.10	0.57	0.51		
RA4	2.5000*	10yr	0.26	81.65	81.80	81.77	81.82	0.017291	0.54	0.49	11.20	0.56	0.54		
RA4	2.5000*	100yr	0.44	81.65	81.83	81.80	81.86	0.017319	0.65	0.68	16.43	0.59	0.65		0.14
RA4	2.3333*	5yr	0.21	81.56	81.70	81.67	81.72	0.018255	0.53	0.40	9.16	0.57	0.53		
RA4	2.3333*	10yr	0.26	81.56	81.72	81.68	81.73	0.019288	0.58	0.45	9.94	0.60	0.58		
RA4	2.3333*	100yr	0.44	81.56	81.76	81.72	81.78	0.016559	0.66	0.67	15.16	0.58	0.65		0.09
RA4	2.1667*	5yr	0.21	81.48	81.62	81.59	81.64	0.018868	0.55	0.38	8.20	0.59	0.55		
RA4	2.1667*	10yr	0.26	81.48	81.65	81.60	81.66	0.012318	0.51	0.51	10.12	0.49	0.51		
RA4	2.1667*	100yr	0.44	81.48	81.67	81.64	81.70	0.022677	0.75	0.59	11.98	0.68	0.75		
RA4	2	5yr	0.21	81.39	81.54	81.51	81.56	0.017526	0.55	0.38	7.45	0.57	0.55		
RA4	2	10yr	0.26	81.39	81.52	81.52	81.56	0.054278	0.88	0.30	4.55	0.98	0.88		
RA4	2	100yr	0.44	81.39	81.58	81.56	81.60	0.019898	0.69	0.75	10.11	0.63	0.59	0.31	
RA4	1	5yr	0.21	81.03	81.12	81.10	81.13	0.013325	0.33	0.65	18.99	0.45	0.32	0.07	
RA4	1	10yr	0.26	81.03	81.14	81.10	81.15	0.006557	0.28	1.07	23.12	0.33	0.24	0.12	0.11



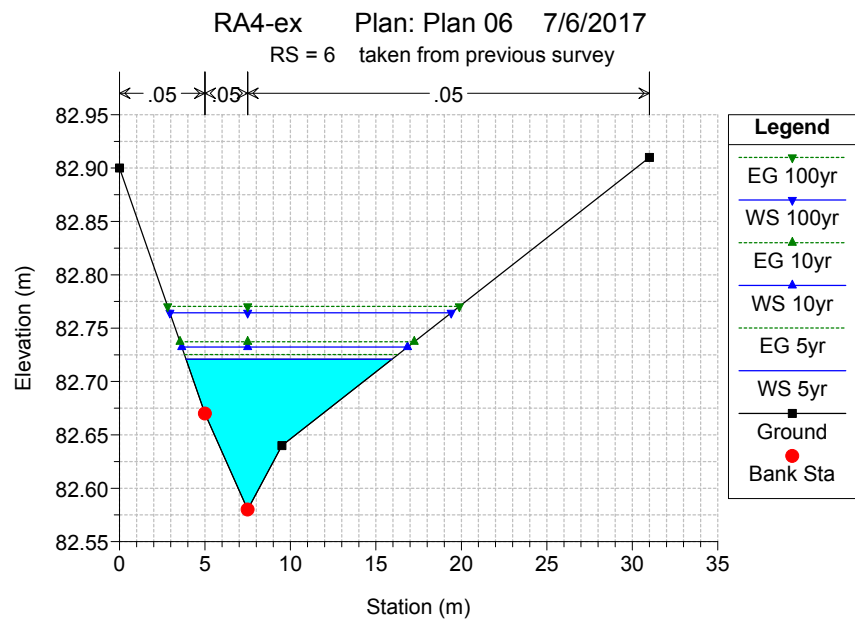
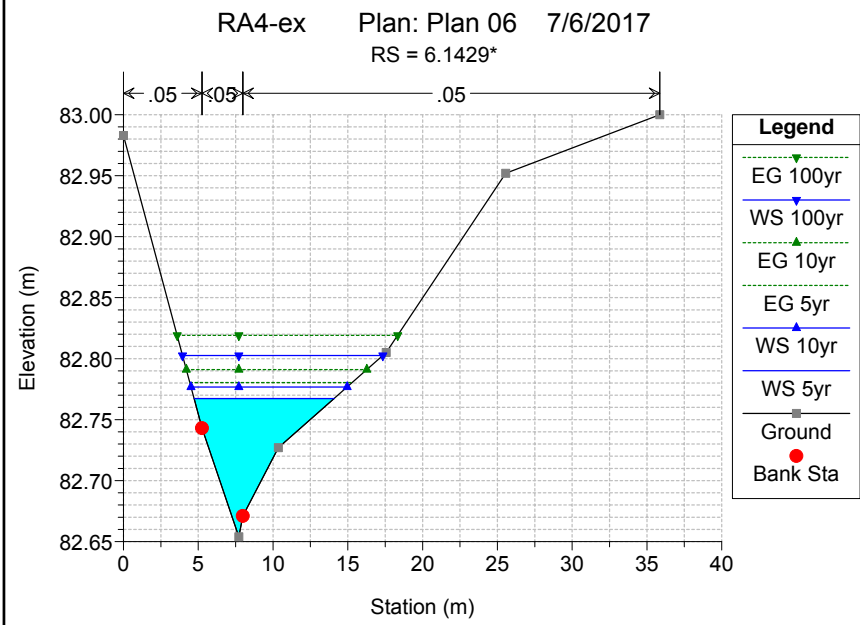
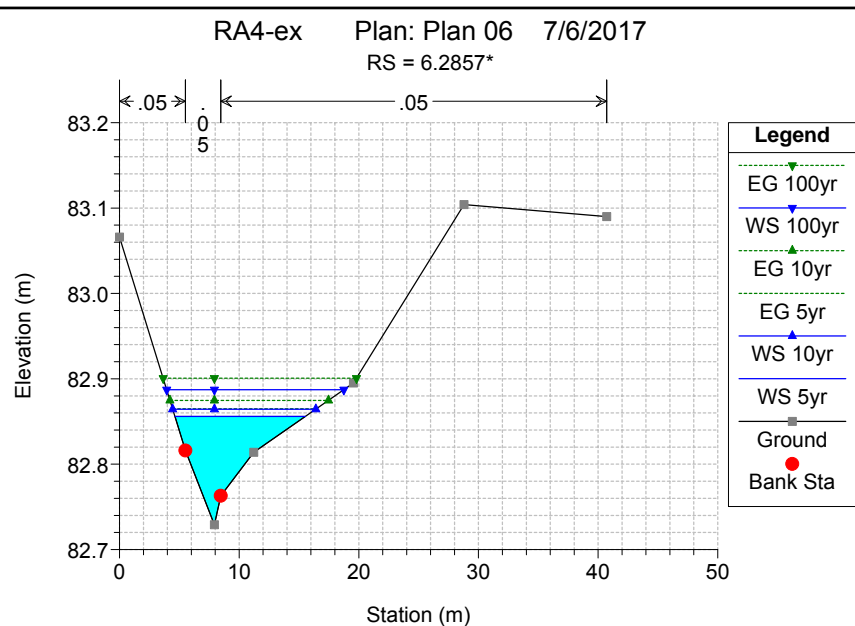
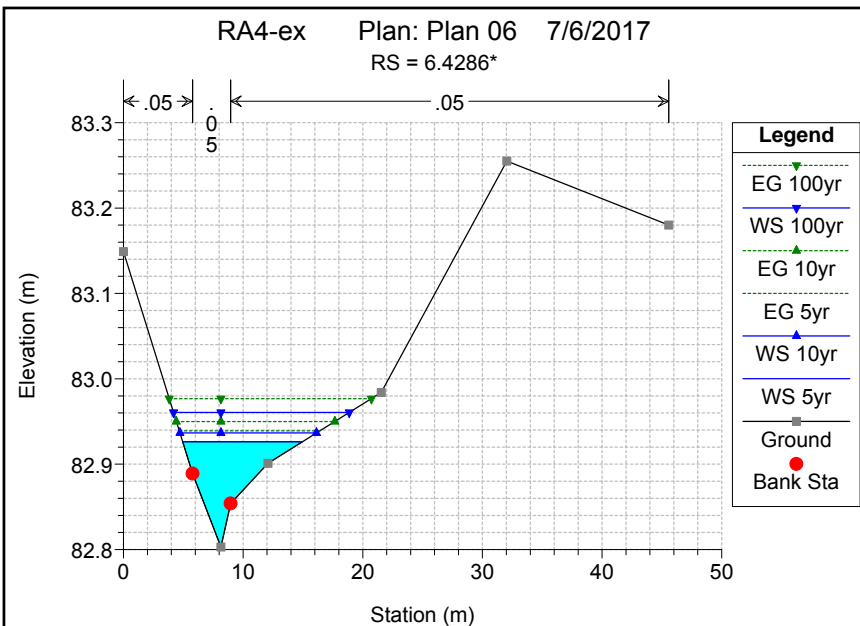
HEC-RAS Plan: Plan 06 River: RA4 Reach: RA4 (Continued)

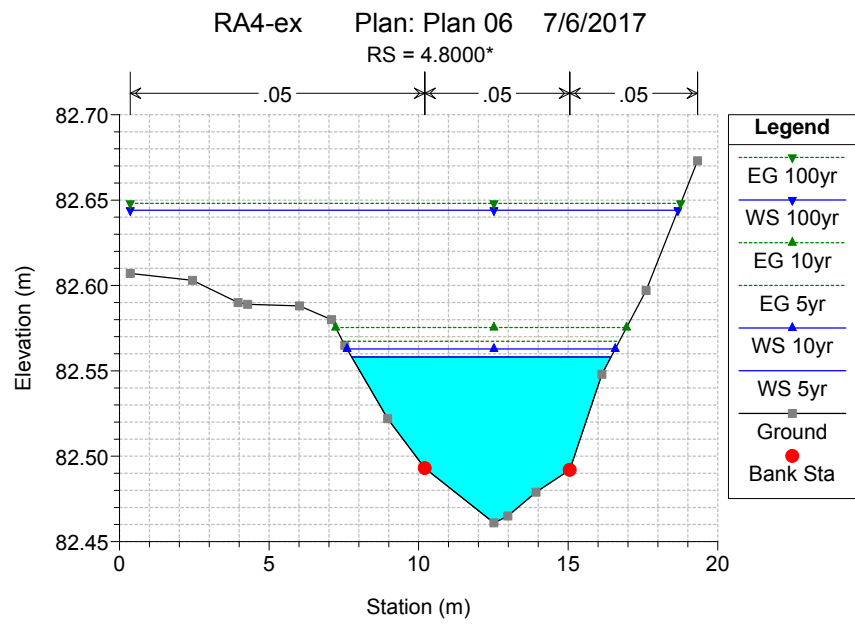
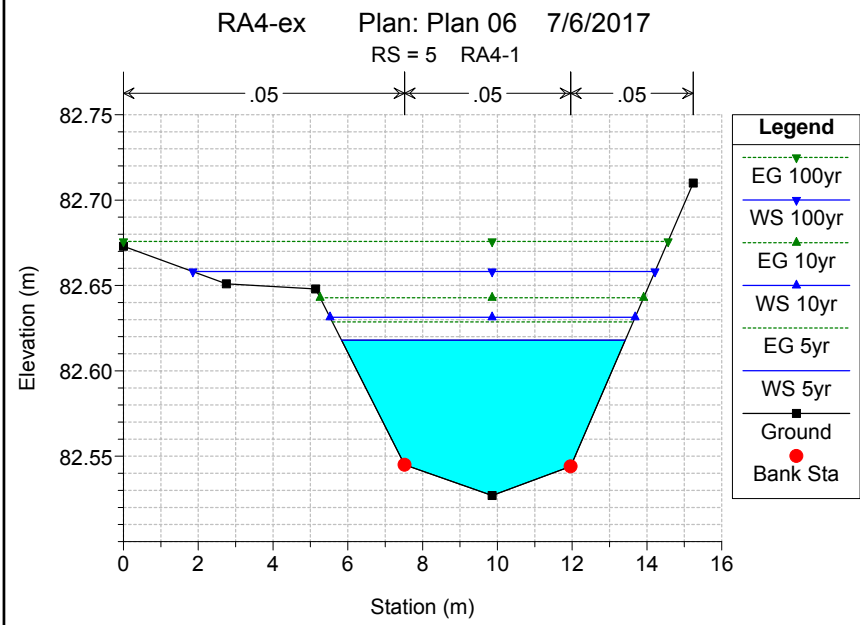
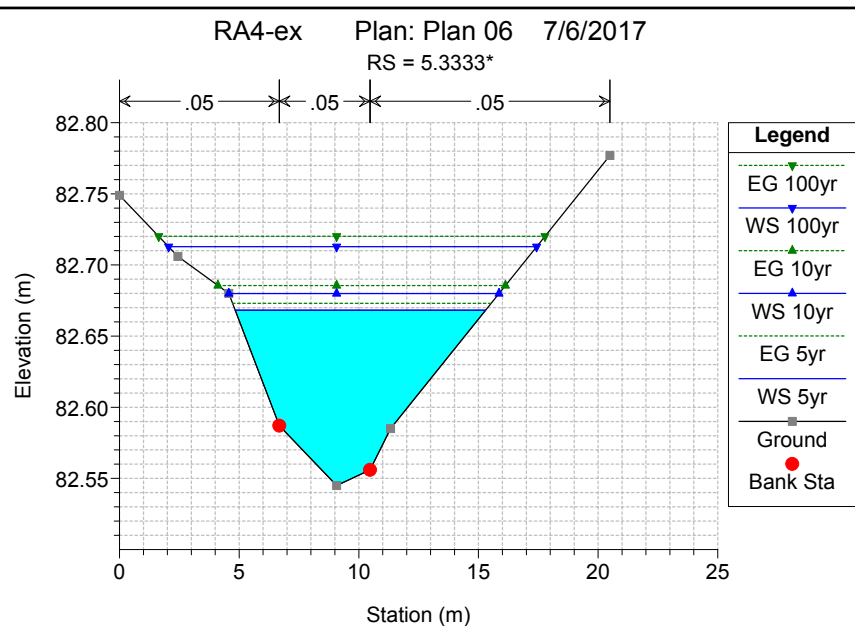
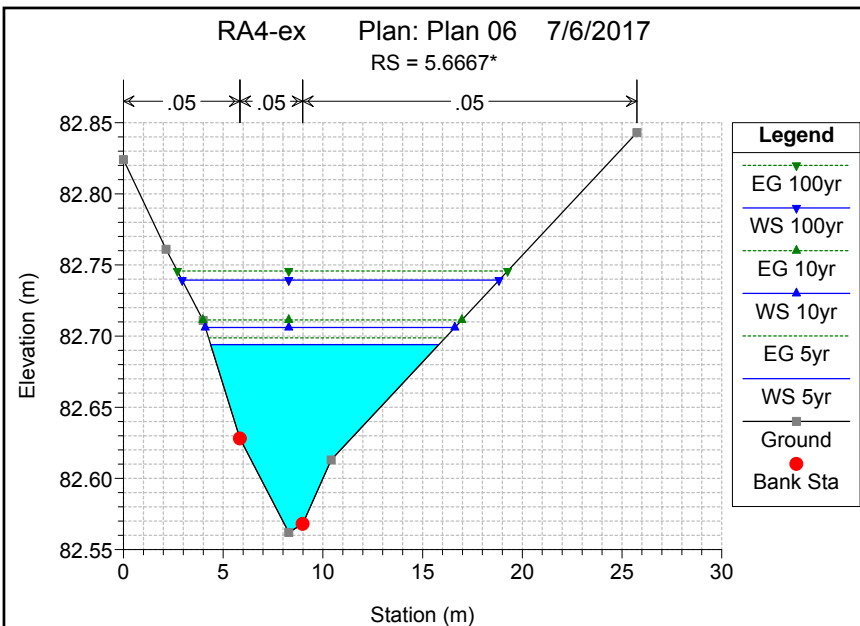
Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Vel Total (m/s)	Vel Left (m/s)	Vel Right (m/s)
RA4	1	100yr	0.44	81.03	81.15	81.13	81.16	0.012913	0.41	1.23	23.96	0.47	0.36	0.20	0.19
RA4	0.5	5yr	0.21	80.90	80.99	80.97	81.00	0.013006	0.33	0.66	19.09	0.45	0.32	0.07	
RA4	0.5	10yr	0.26	80.90	80.98	80.98	80.99	0.065143	0.62	0.42	9.80	0.96	0.62		
RA4	0.5	100yr	0.44	80.90	81.02	81.00	81.03	0.013005	0.41	1.22	23.94	0.48	0.36	0.20	0.19



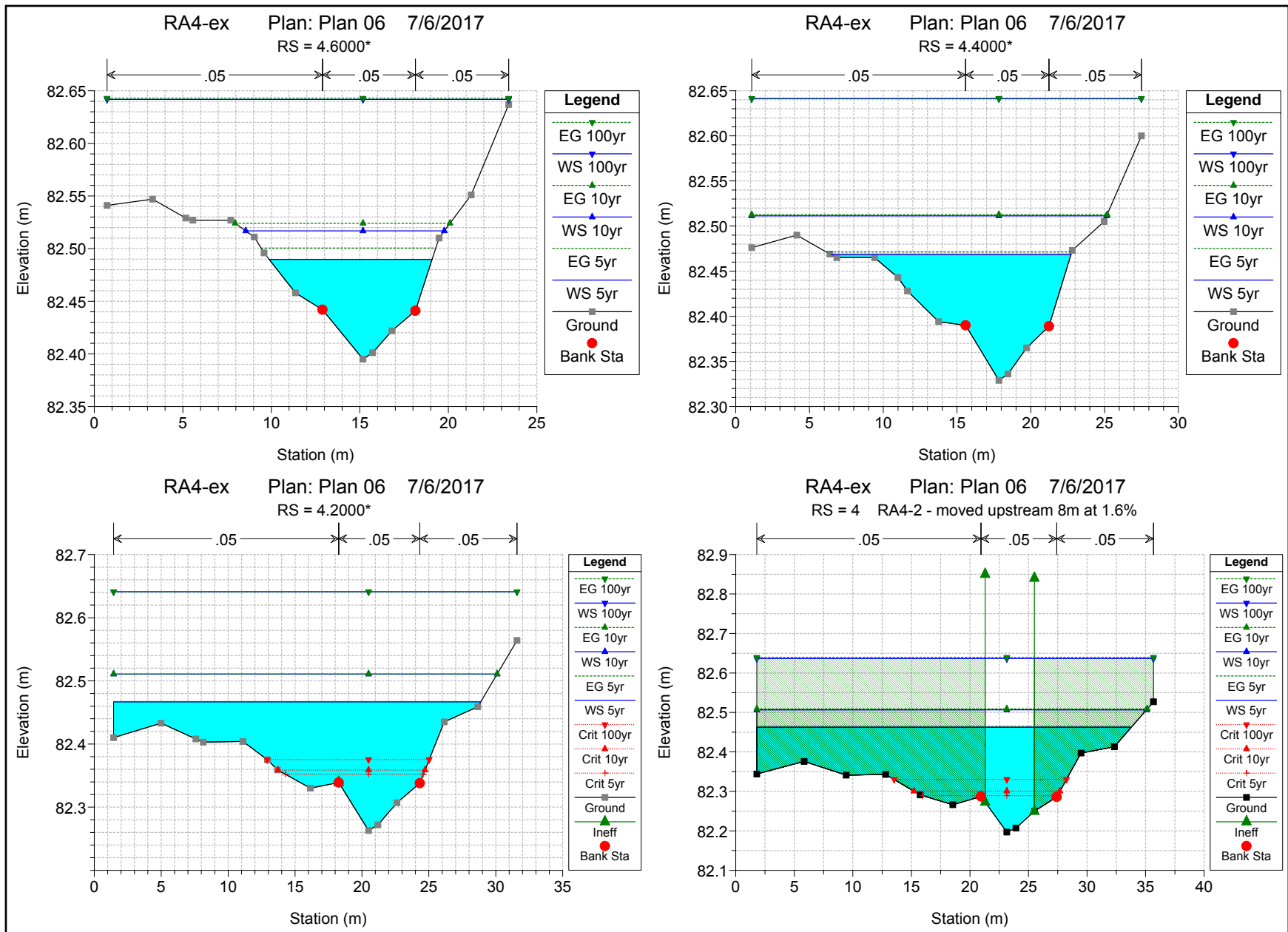


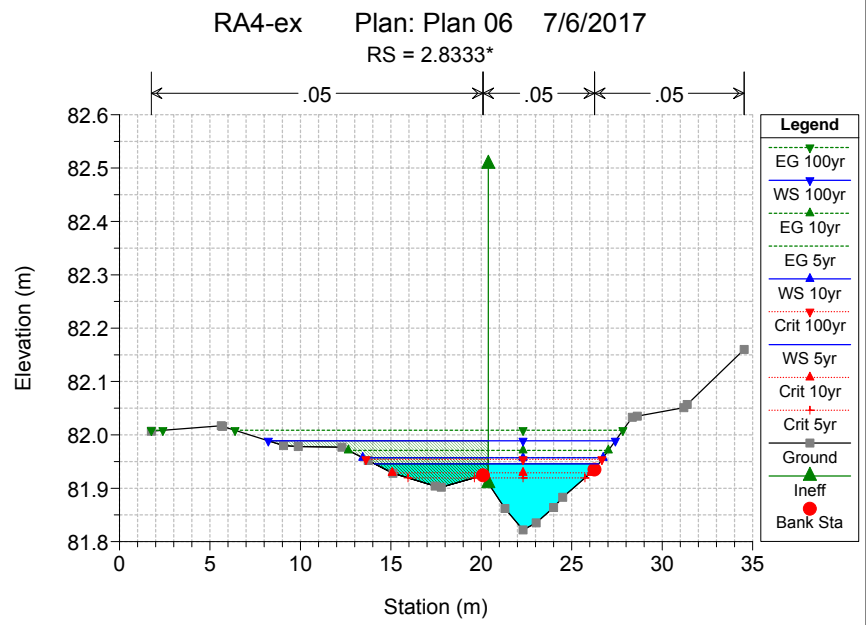
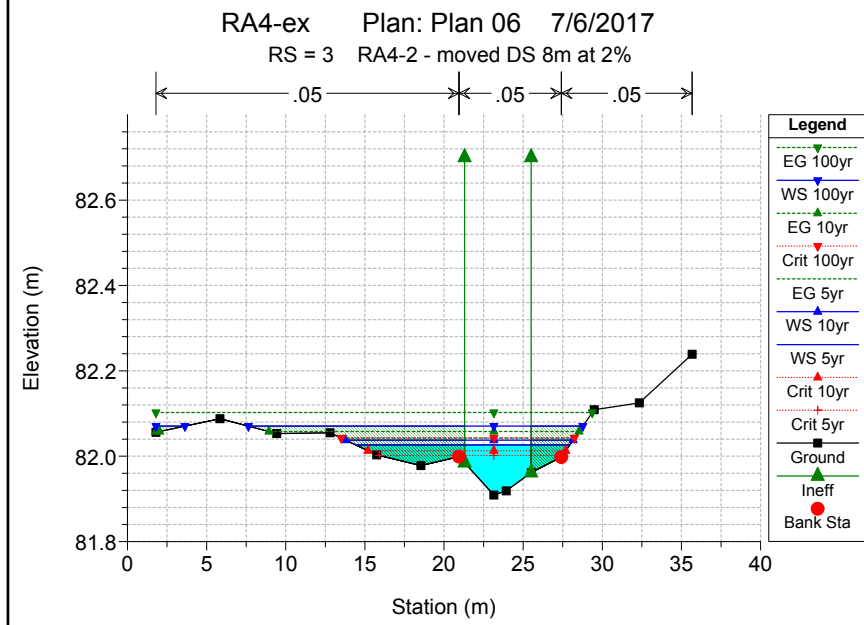
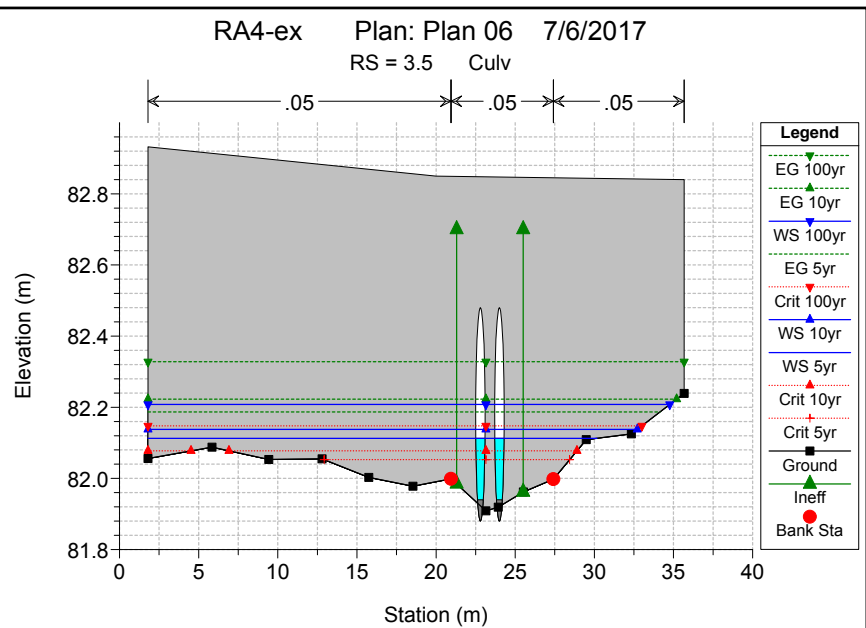
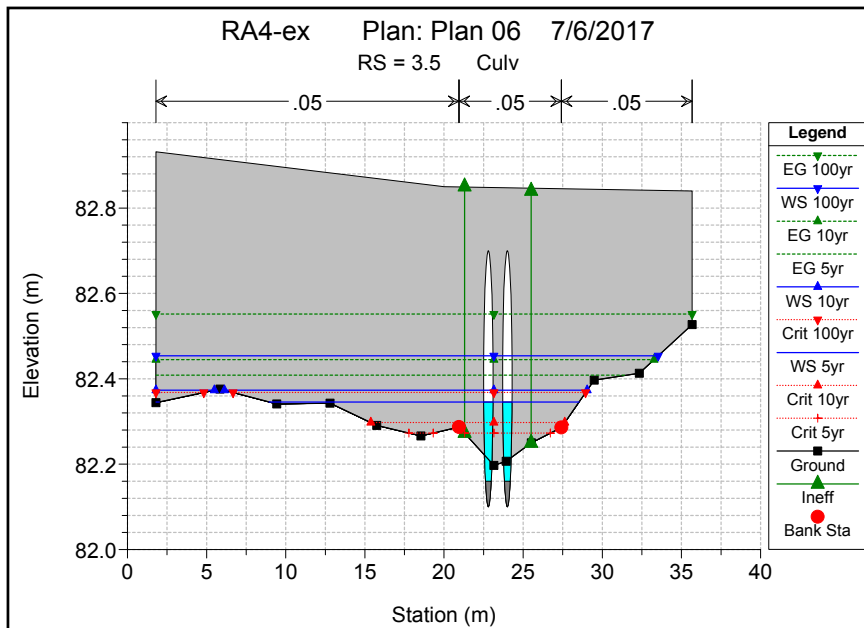




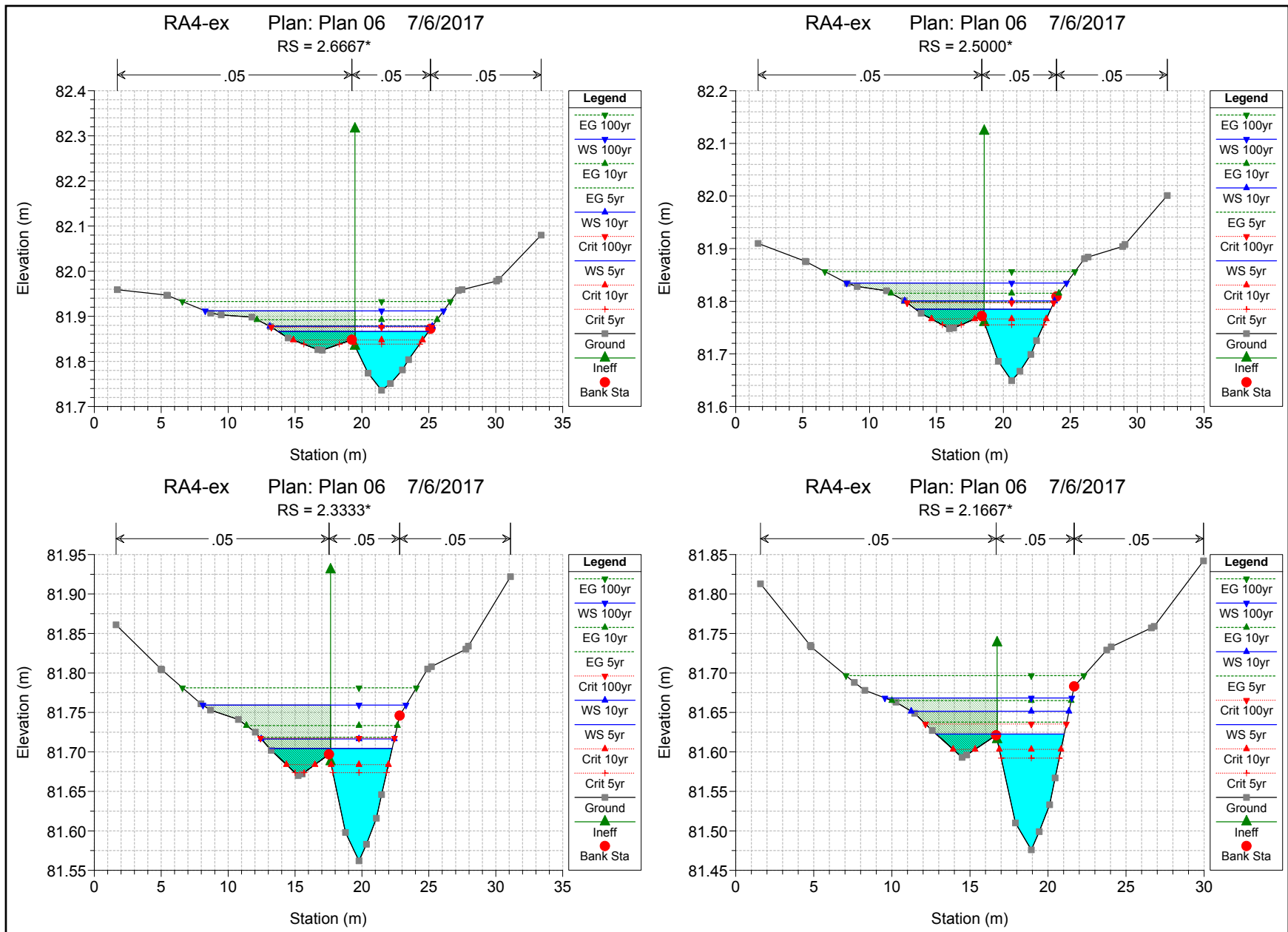


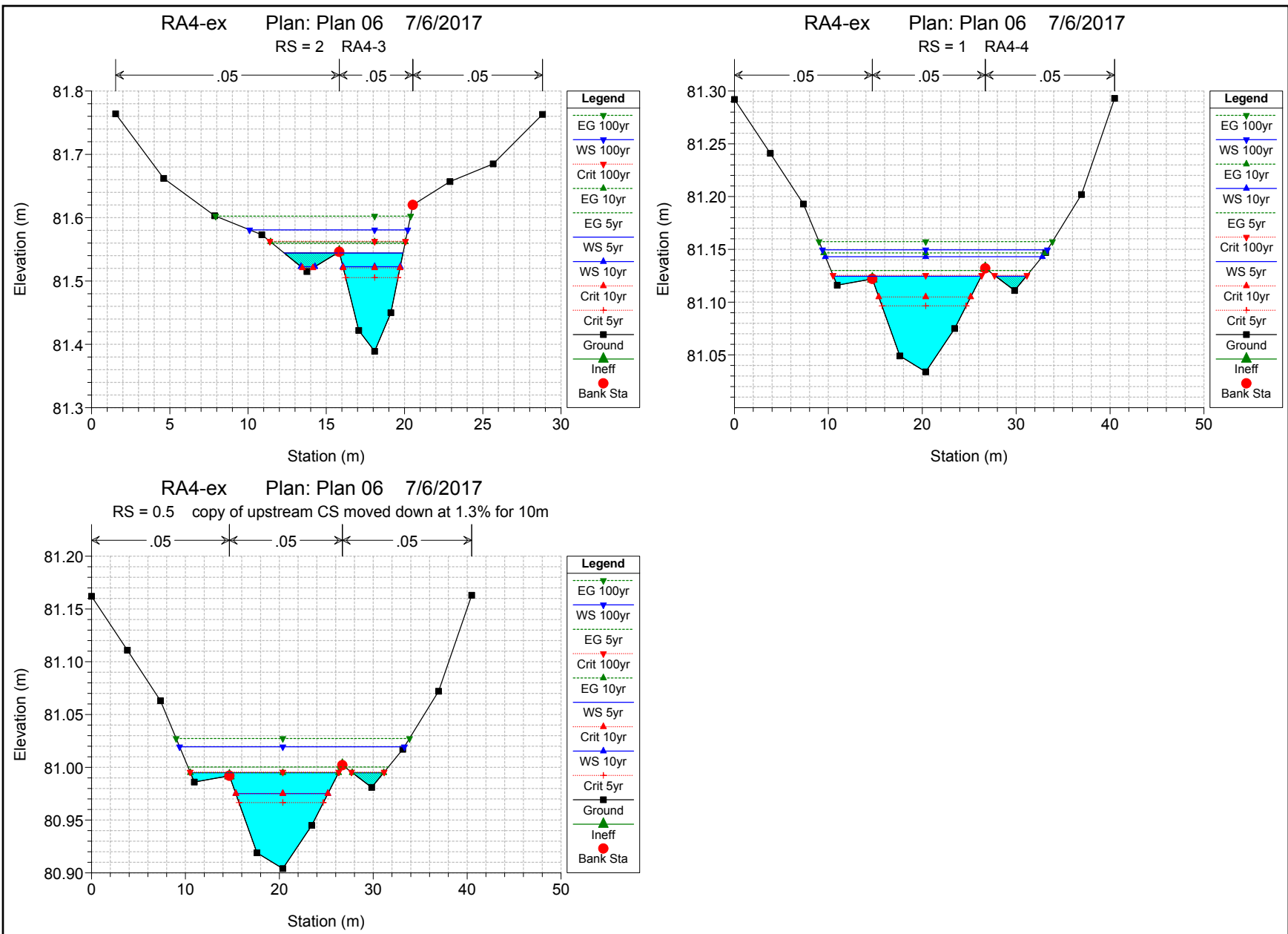














# RA27 – HYDRAULIC MODELING

- UNDER GROUND AND ABOVE GROUND UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON THE DRAWINGS AND WHERE SHOWN, THE ACCURACY OF POSITION IS NOT GUARANTEED. THE CONTRACTOR SHALL INFORM THEMSELVES OF THE EXACT LOCATION OF ALL UTILITY PLANTS PRIOR TO STARTING WORK.
- SEE DRAWING "CIVIL ACCESS ROAD DETAILS" (DRAWING C302) FOR ADDITIONAL CONSTRUCTION AND CULVERT NOTES.
- UTILITY AND OTHER CONFLICTS HAVE NOT BEEN ADDRESSED IN THESE DRAWINGS, AND WILL BE RESOLVED IN THE FIELD USING VERIFIED UTILITY LOCATIONS AND OTHER SITE INFORMATION.
- TOPOGRAPHICAL SURVEY COMPLETED BY MINTOSH PERRY CONSULTING ENGINEERS, DATED 2015. (UTM ZONE 18 NAD83 (CRS) 1997.0)
- SEE DRAWING "CIVIL ACCESS ROAD DETAILS" (DRAWING C301) FOR ADDITIONAL EROSION AND SEDIMENTATION CONTROL NOTES AND DETAILS.
- ACCESS ROAD ALIGNMENTS MAY REQUIRE FIELD MODIFICATIONS TO ACCOMMODATE EXISTING CONDITIONS.
- CONTRACTOR TO ADHERE TO ALL CONSERVATION AUTHORITY PERMITS AND CONDITIONS OF APPROVAL.
- CONTRACTOR TO CONSTRUCT OVERBUILD (ADDITIONAL COMPACTED AREA) AT ALL BENDS AND CURVES IN ACCORDANCE WITH SIEMENS SPECIFICATIONS "GENERAL SITE REQUIREMENTS, AMHERST ISLAND, EQUIPMENT ONLY AM" REV 6.31, DATED 2016-09-23.

Legend

- SILT FENCE
- LIMIT OF CONSTRUCTIBLE AREA
- EXISTING OVERLAND FLOW/DITCH DIRECTION
- PROPOSED DITCH FLOW
- EXISTING GROUND CONTOURS (AS PER NOTE 4 ABOVE)
- EXISTING GROUND CONTOURS (FROM LIDAR MAPPING)
- PROPOSED PAD ELEVATION

CRANE PAD REQUIREMENTS:

- CRANE PADS TO BE CONSTRUCTED OF CRANE MATS OR GRANULAR MATERIAL AS FOLLOWS:
  - 500mm GRANULAR 'B' TYPE II, PLACED IN 2 LIFTS, COMPACTED TO 100% SPMD, WITH REINFORCEMENT LAYER (NAUE COMBIRID 40/40 Q1 151 GRK3 OR APPROVED EQUIVALENT).
  - SEPARATION LAYER (TERRAFIX 200R GEOTEXTILE).
  - SUBGRADE TO BE INSPECTED, PROOF ROLLED, AND COMPACTED TO 100% SPMD.
  - CRANE PAD MUST BE EXTENDED 1.5m (MIN.) BEYOND OUTRIGGER MATS.

****For PHCL and WindElectric Use Only****	
Reviewed - No comments	Date [dd-mm-yy]
Reviewed - Incorporate comments and resubmit	Date [dd-mm-yy]
Reviewed - Not accepted	Date [dd-mm-yy]
Reviewed By	Date [dd-mm-yy]
Project Manager - PHCL	Date [dd-mm-yy]
Project Manager - WindElectric	Date [dd-mm-yy]
Owner:	

B	ISSUED FOR CRCA PERMITTING	RCL	MPG	17.06.16
A	ISSUED FOR CLIENT REVIEW	RCL	MPG	17.01.17

Revision	By	Appd.	YY/MM/DD
----------	----	-------	----------

File Name:	C211_133560100-Turbine S02-S37.DWG	RCL/DH	MPG	RCL	15.12.03
		Dwn.	Chkd.	Dsgn.	YY/MM/DD

Permit/Seal

NOT FOR CONSTRUCTION

Client/Project



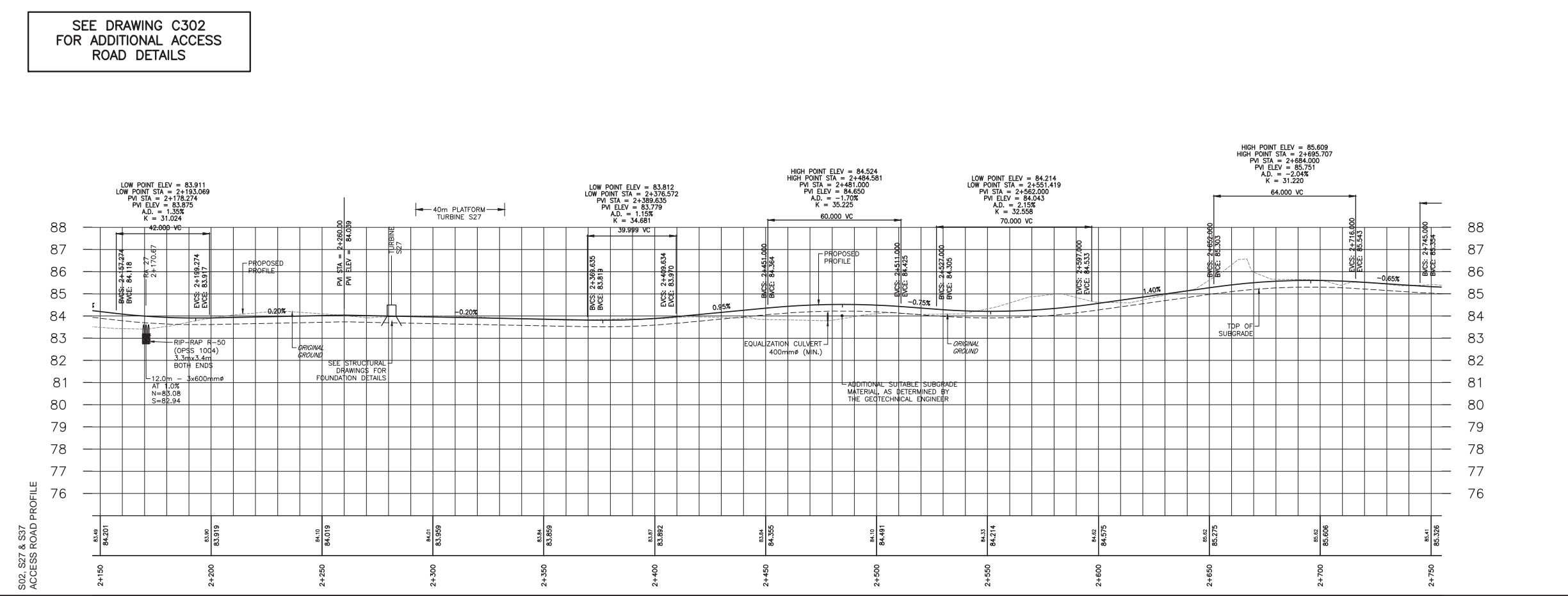
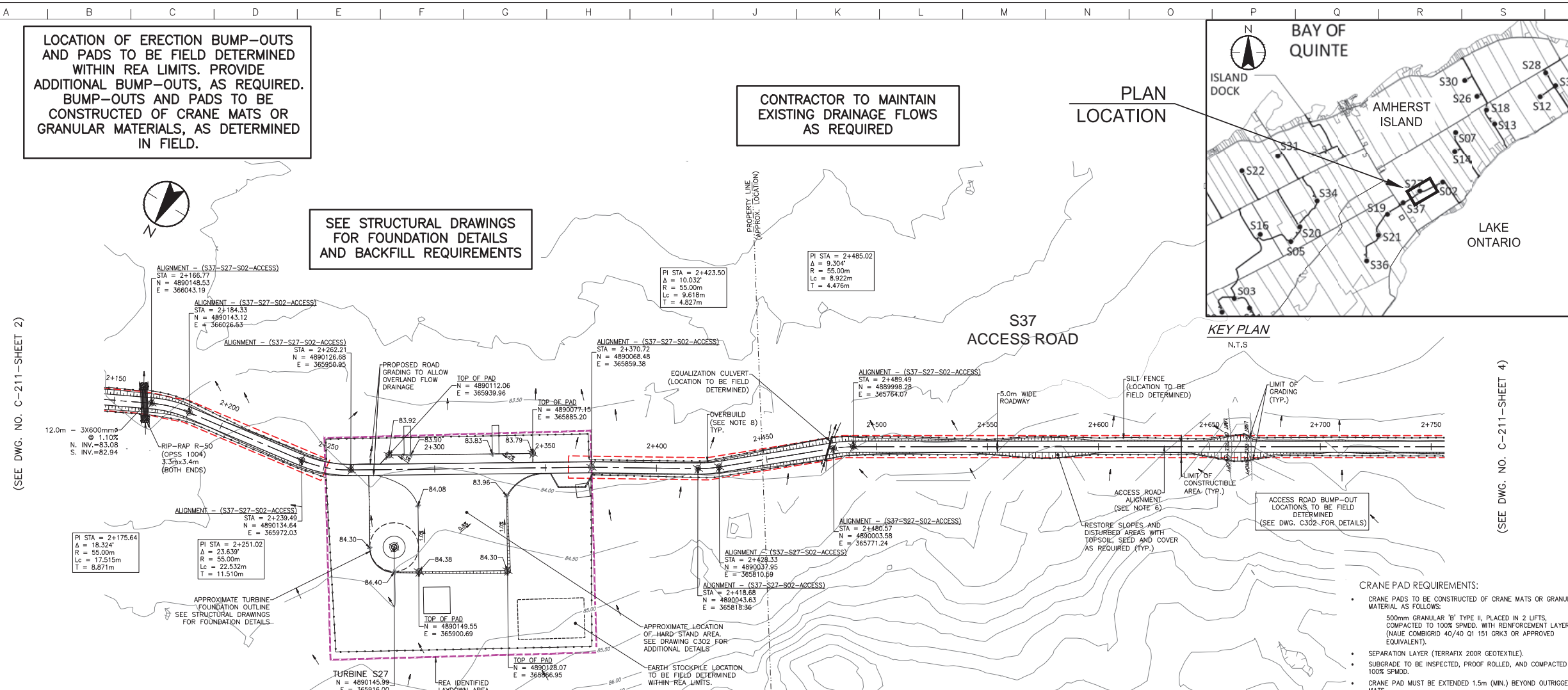
AMHERST ISLAND WIND PROJECT  
75MW WIND FARM  
Amherst Island, Loyalist Township, Ontario

Title

ACCESS ROAD  
TURBINE S02, S27 AND S37  
PLAN AND PROFILE

Project No. 133560100 Scale 1:1000H 1:100V

Drawing No. Sheet Revision



S:\016502\c211\133560100\Drawings\10\_Lines\Drawings\10\_Lines\133560100-Turbine S02-S37.dwg  
2017/04/22 2:57:14 PM J. [unclear]





RA27

RA27

7

6.5°

6

5.5°

5

4

3

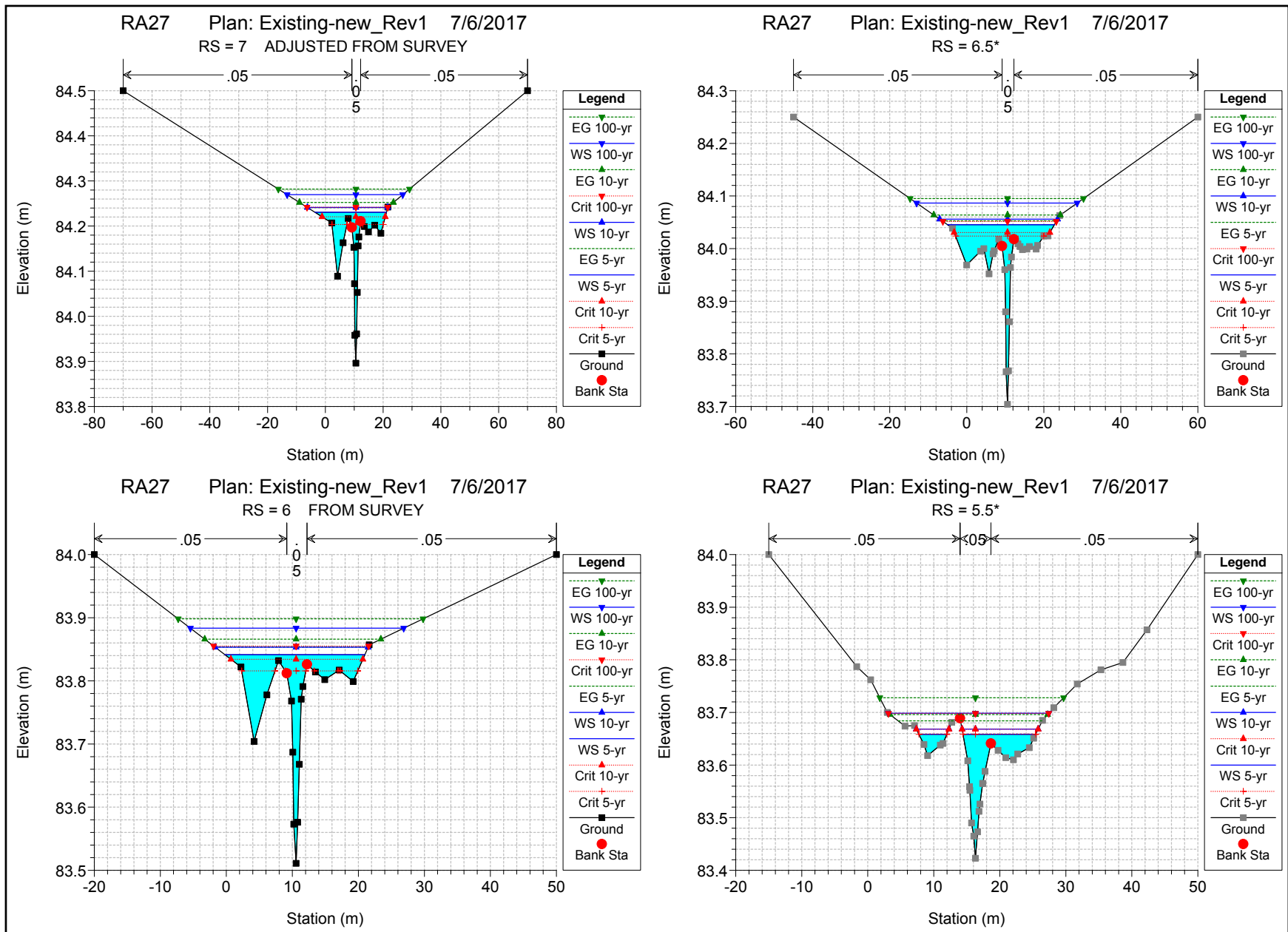
2

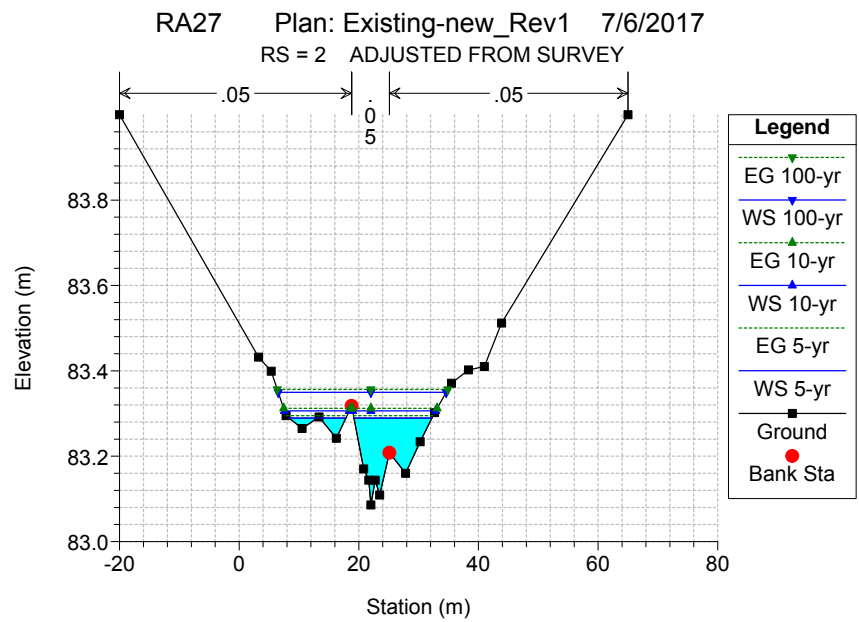
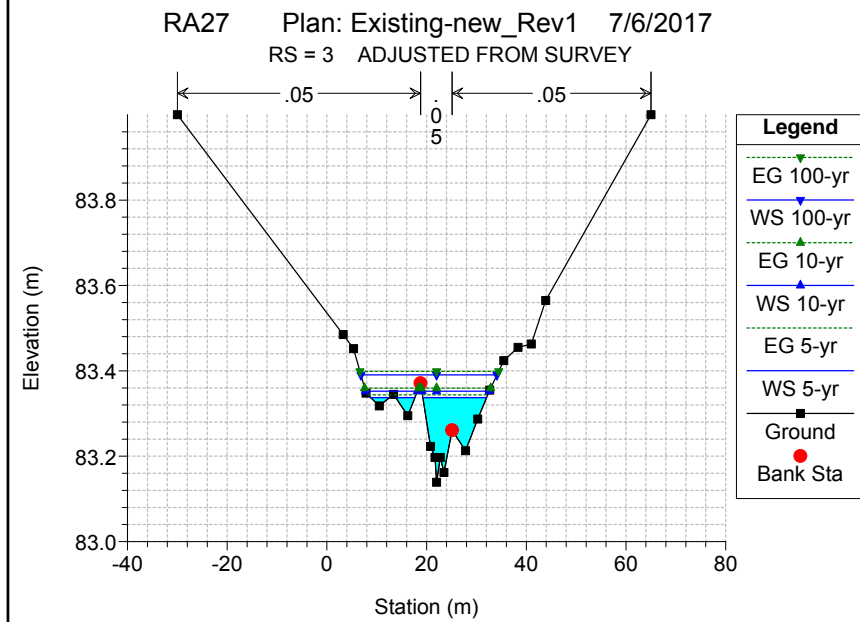
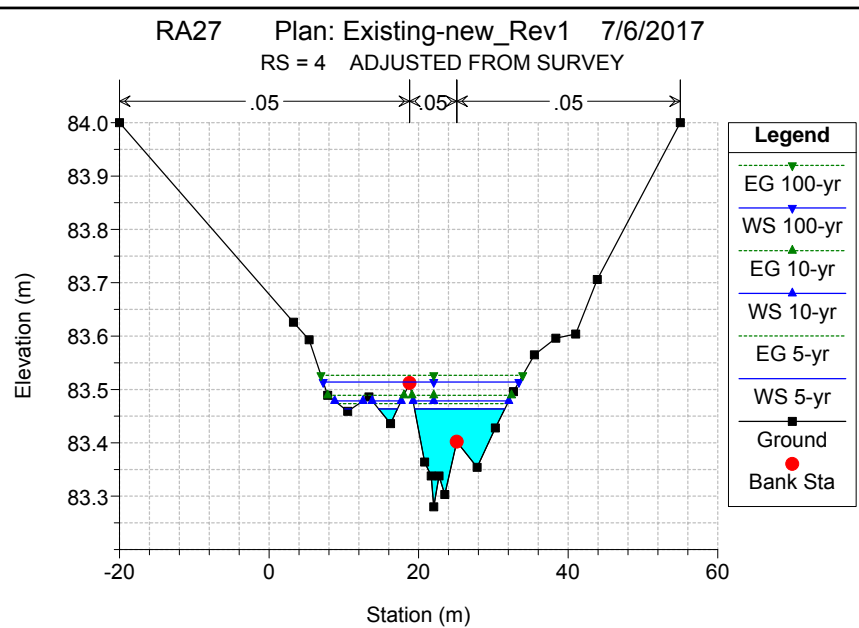
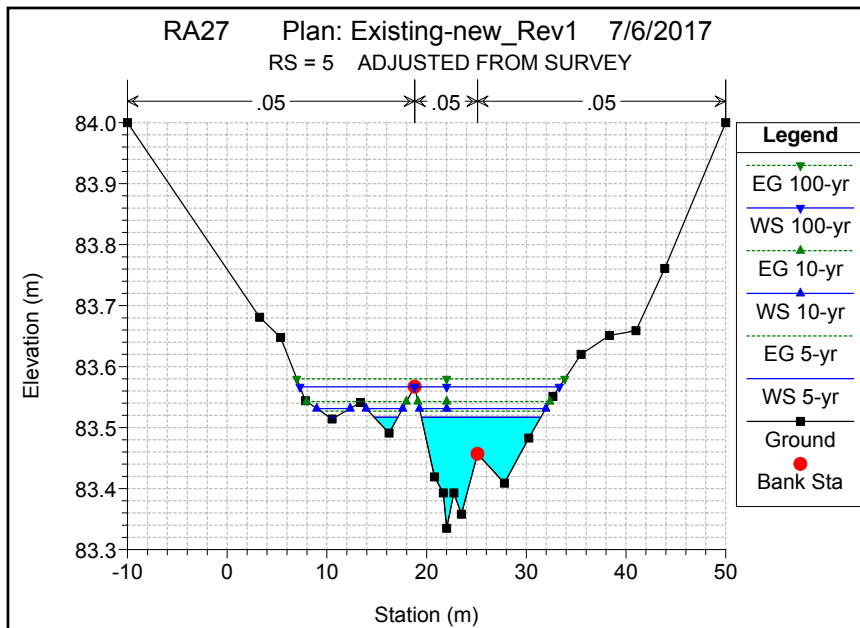
0

HEC-RAS Plan: Existing-New\_1 River: RA27 Reach: RA27

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Vel Total (m/s)	Vel Left (m/s)	Vel Right (m/s)
RA27	7	5-yr	0.45	83.90	84.23	84.20	84.24	0.012996	0.58	1.23	24.71	0.51	0.37	0.28	0.23
RA27	7	10-yr	0.57	83.90	84.24	84.22	84.25	0.013114	0.61	1.51	27.81	0.52	0.38	0.29	0.27
RA27	7	100-yr	1.00	83.90	84.27	84.24	84.28	0.013284	0.70	2.47	40.04	0.54	0.40	0.33	0.31
RA27	6.5*	5-yr	0.45	83.70	84.05	84.02	84.05	0.008714	0.49	1.47	27.72	0.42	0.31	0.25	0.19
RA27	6.5*	10-yr	0.57	83.70	84.06	84.03	84.06	0.009058	0.53	1.77	30.59	0.43	0.32	0.27	0.23
RA27	6.5*	100-yr	1.00	83.70	84.09	84.05	84.10	0.008890	0.59	2.87	41.64	0.44	0.35	0.30	0.27
RA27	6	5-yr	0.45	83.51	83.84	83.82	83.85	0.014966	0.61	1.11	21.16	0.54	0.41	0.33	0.23
RA27	6	10-yr	0.57	83.51	83.85	83.83	83.87	0.014496	0.64	1.37	23.16	0.54	0.42	0.34	0.28
RA27	6	100-yr	1.00	83.51	83.88	83.86	83.90	0.014856	0.73	2.20	32.30	0.57	0.45	0.40	0.32
RA27	5.5*	5-yr	0.45	83.42	83.66	83.66	83.68	0.032774	0.79	0.75	15.25	0.79	0.60	0.29	0.37
RA27	5.5*	10-yr	0.57	83.42	83.67	83.67	83.70	0.034185	0.84	0.90	16.50	0.81	0.63	0.34	0.43
RA27	5.5*	100-yr	1.00	83.42	83.70	83.70	83.73	0.031587	0.91	1.53	24.33	0.81	0.65	0.39	0.54
RA27	5	5-yr	0.45	83.34	83.52		83.53	0.011676	0.49	1.06	14.90	0.48	0.42	0.12	0.35
RA27	5	10-yr	0.57	83.34	83.53		83.54	0.011704	0.52	1.31	19.72	0.48	0.44	0.14	0.38
RA27	5	100-yr	1.00	83.34	83.57		83.58	0.011520	0.59	2.15	26.01	0.50	0.46	0.25	0.45
RA27	4	5-yr	0.45	83.28	83.46		83.47	0.011020	0.48	1.08	15.46	0.46	0.41	0.12	0.35
RA27	4	10-yr	0.57	83.28	83.48		83.49	0.010889	0.51	1.35	20.47	0.47	0.42	0.14	0.38
RA27	4	100-yr	1.00	83.28	83.51		83.53	0.010731	0.57	2.21	26.17	0.48	0.45	0.25	0.44
RA27	3	5-yr	0.45	83.14	83.34		83.34	0.006770	0.40	1.35	20.36	0.37	0.33	0.11	0.30
RA27	3	10-yr	0.57	83.14	83.35		83.36	0.006735	0.42	1.69	23.96	0.37	0.34	0.14	0.32
RA27	3	100-yr	1.00	83.14	83.39		83.40	0.006397	0.48	2.67	27.30	0.38	0.37	0.24	0.36
RA27	2	5-yr	0.45	83.09	83.29		83.30	0.005713	0.37	1.46	22.07	0.34	0.31	0.11	0.28
RA27	2	10-yr	0.57	83.09	83.31		83.31	0.005366	0.39	1.86	24.72	0.33	0.31	0.14	0.29
RA27	2	100-yr	1.00	83.09	83.35		83.36	0.004609	0.42	3.01	28.08	0.32	0.33	0.23	0.32
RA27	1	5-yr	0.45	82.98	83.19	83.11	83.19	0.007014	0.37	1.22	11.76	0.37	0.37		
RA27	1	10-yr	0.57	82.98	83.21	83.13	83.21	0.007007	0.39	1.46	12.83	0.37	0.39		
RA27	1	100-yr	1.00	82.98	83.26	83.17	83.27	0.007004	0.46	2.29	23.00	0.39	0.44	0.12	



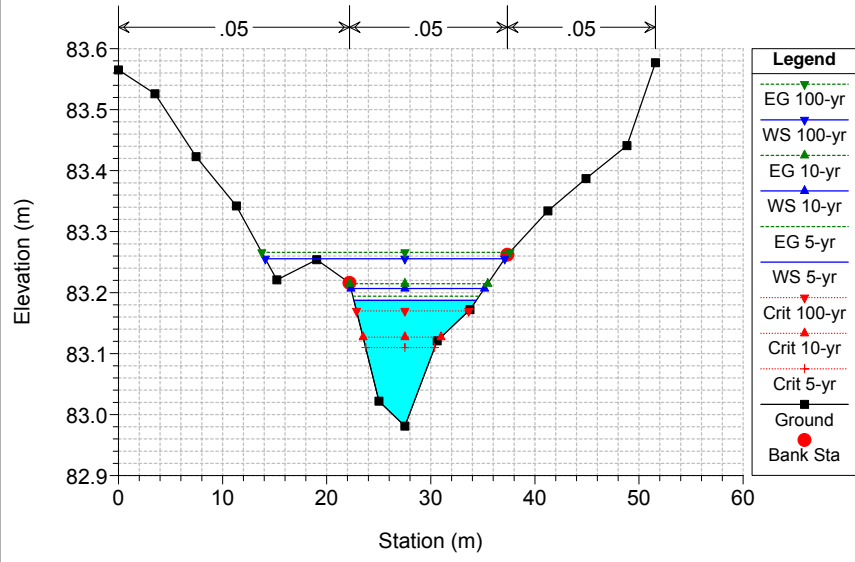






RA27 Plan: Existing-new\_Rev1 7/6/2017

RS = 1 FROM SURVEY





RA27

RA27

7

6.5°

6

5.5°

5

4

3.5

3

2

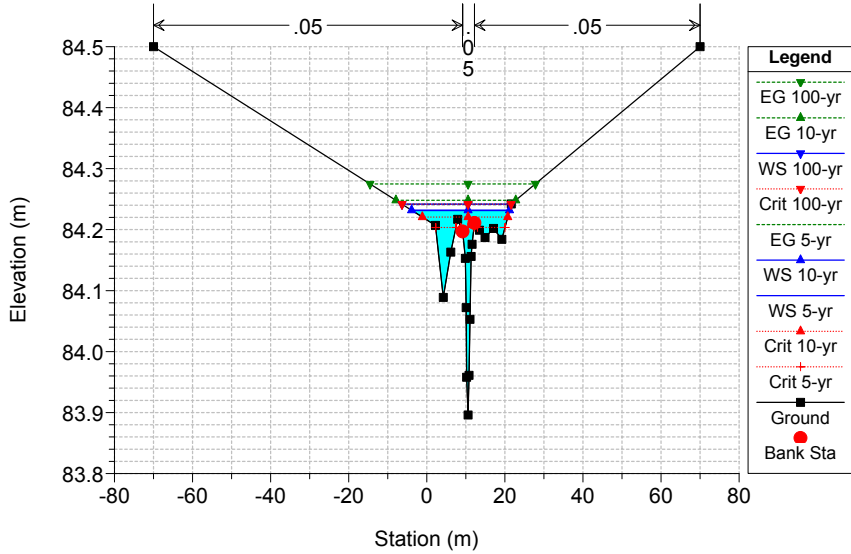
1



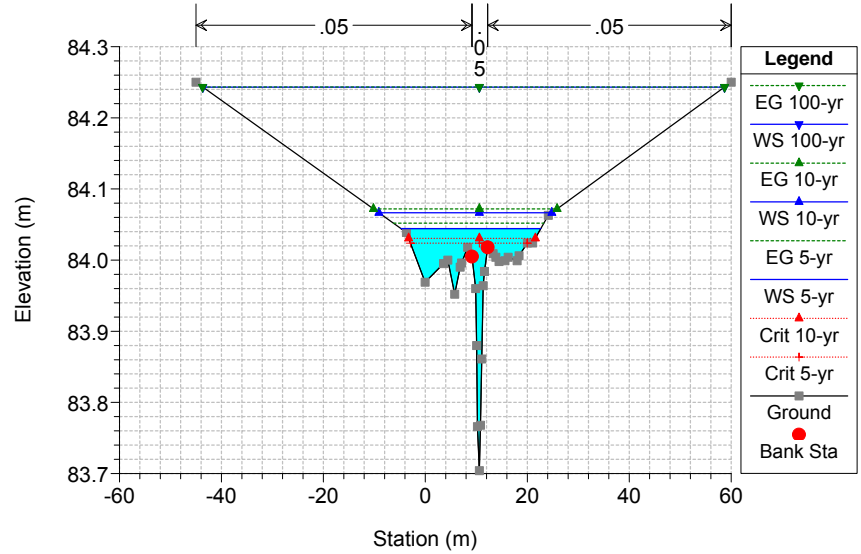
HEC-RAS Plan: Proposed-New River: RA27 Reach: RA27

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Vel Total (m/s)	Vel Left (m/s)	Vel Right (m/s)
RA27	7	5-yr	0.45	83.90	84.23	84.20	84.24	0.012594	0.57	1.25	24.91	0.50	0.36	0.27	0.23
RA27	7	10-yr	0.57	83.90	84.23	84.22	84.25	0.019866	0.72	1.26	25.10	0.63	0.45	0.34	0.29
RA27	7	100-yr	1.00	83.90	84.24	84.24	84.28	0.039098	1.06	1.52	27.94	0.89	0.65	0.50	0.48
RA27	6.5*	5-yr	0.45	83.70	84.04	84.02	84.05	0.009141	0.50	1.44	27.42	0.43	0.31	0.25	0.19
RA27	6.5*	10-yr	0.57	83.70	84.07	84.03	84.07	0.005967	0.45	2.11	33.91	0.36	0.27	0.23	0.20
RA27	6.5*	100-yr	1.00	83.70	84.24		84.24	0.000164	0.12	14.13	102.28	0.07	0.07	0.07	0.06
RA27	6	5-yr	0.45	83.51	83.84	83.82	83.85	0.014345	0.60	1.13	21.32	0.53	0.40	0.32	0.23
RA27	6	10-yr	0.57	83.51	83.83	83.83	83.86	0.033711	0.88	0.96	19.97	0.81	0.60	0.48	0.29
RA27	6	100-yr	1.00	83.51	84.24		84.24	0.000015	0.05	25.14	70.00	0.02	0.04	0.04	0.04
RA27	5.5*	5-yr	0.45	83.42	83.66	83.66	83.68	0.032774	0.79	0.75	15.25	0.79	0.60	0.29	0.37
RA27	5.5*	10-yr	0.57	83.42	83.72		83.73	0.004650	0.39	2.09	26.93	0.32	0.27	0.19	0.23
RA27	5.5*	100-yr	1.00	83.42	84.24		84.24	0.000007	0.04	31.14	65.00	0.02	0.03	0.03	0.03
RA27	5	5-yr	0.45	83.34	83.64		83.64	0.000343	0.14	4.37	32.25	0.09	0.10	0.08	0.09
RA27	5	10-yr	0.57	83.34	83.72		83.72	0.000145	0.11	7.24	41.09	0.06	0.08	0.07	0.07
RA27	5	100-yr	1.00	83.34	84.24		84.24	0.000004	0.03	35.96	60.00	0.01	0.03	0.03	0.03
RA27	4	5-yr	0.45	83.28	83.64	83.44	83.64	0.001140	0.29	1.56	39.31	0.17	0.29		
RA27	4	10-yr	0.57	83.28	83.71	83.46	83.72	0.000821	0.29	1.99	46.35	0.15	0.29		
RA27	4	100-yr	1.00	83.28	84.24	83.50	84.24	0.000121	0.20	4.94	75.00	0.07	0.20		
RA27	3.5		Culvert												
RA27	3	5-yr	0.45	83.14	83.35		83.37	0.013747	0.61	0.74	23.59	0.53	0.61		
RA27	3	10-yr	0.57	83.14	83.36		83.39	0.015508	0.69	0.82	25.26	0.58	0.69		
RA27	3	100-yr	1.00	83.14	83.40		83.45	0.023279	0.98	1.02	27.83	0.73	0.98		
RA27	2	5-yr	0.45	83.09	83.29		83.30	0.005713	0.37	1.46	22.07	0.34	0.31	0.11	0.28
RA27	2	10-yr	0.57	83.09	83.31		83.31	0.005371	0.39	1.86	24.72	0.33	0.31	0.14	0.29
RA27	2	100-yr	1.00	83.09	83.35		83.36	0.004692	0.43	2.99	28.04	0.33	0.33	0.23	0.32
RA27	1	5-yr	0.45	82.98	83.19	83.11	83.19	0.007014	0.37	1.22	11.76	0.37	0.37		
RA27	1	10-yr	0.57	82.98	83.21	83.13	83.21	0.007007	0.39	1.46	12.83	0.37	0.39		
RA27	1	100-yr	1.00	82.98	83.26	83.17	83.27	0.007004	0.46	2.29	23.00	0.39	0.44	0.12	

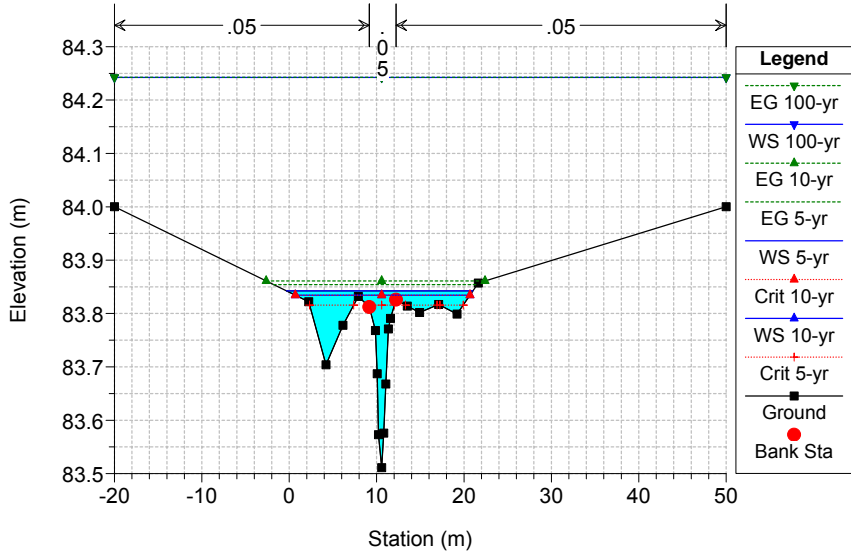
RA27 Plan: Proposed-New\_Rev1 7/6/2017  
RS = 7 FROM SURVEY



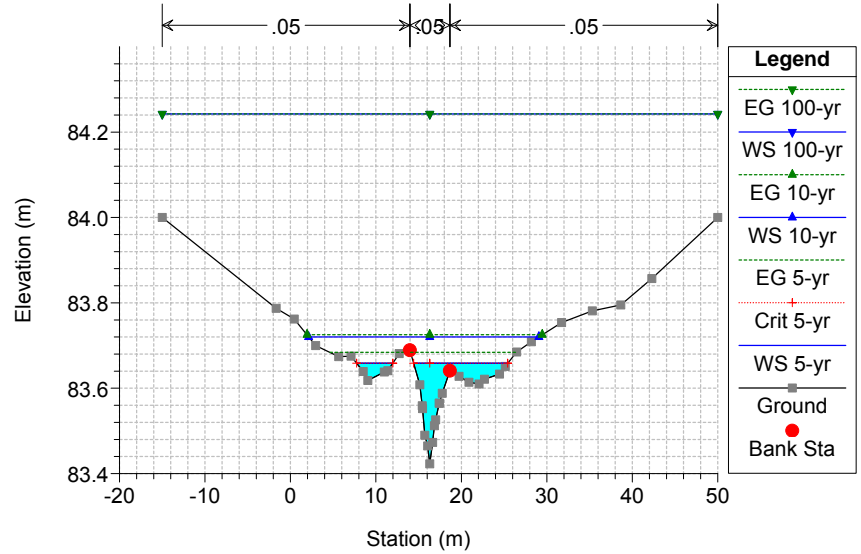
RA27 Plan: Proposed-New\_Rev1 7/6/2017  
RS = 6.5\*



RA27 Plan: Proposed-New\_Rev1 7/6/2017  
RS = 6 FROM SURVEY

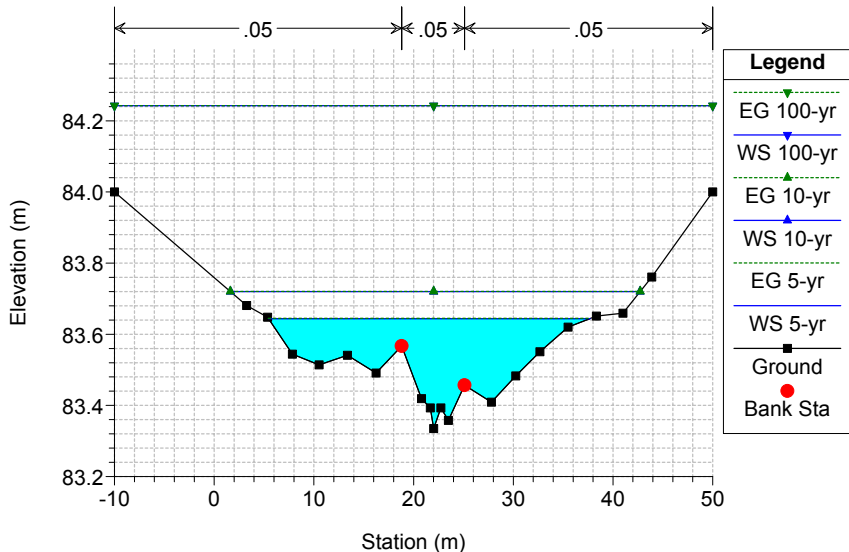


RA27 Plan: Proposed-New\_Rev1 7/6/2017  
RS = 5.5\*

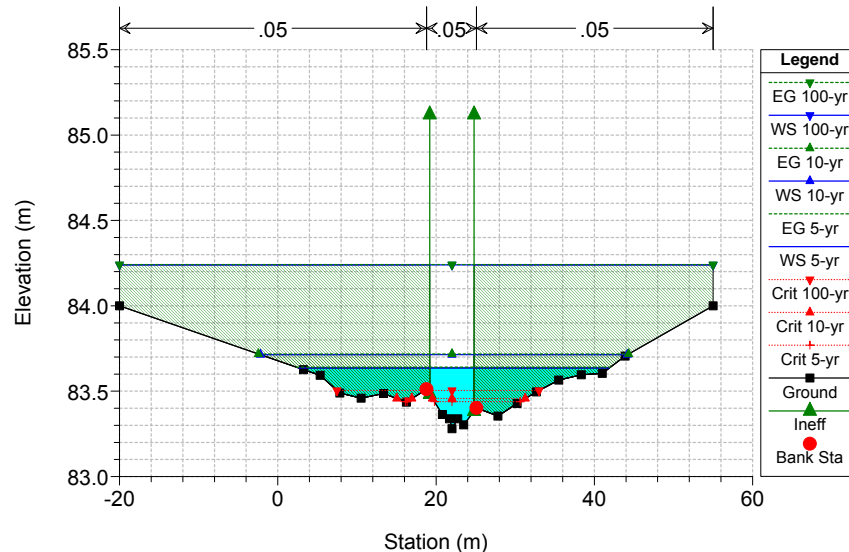




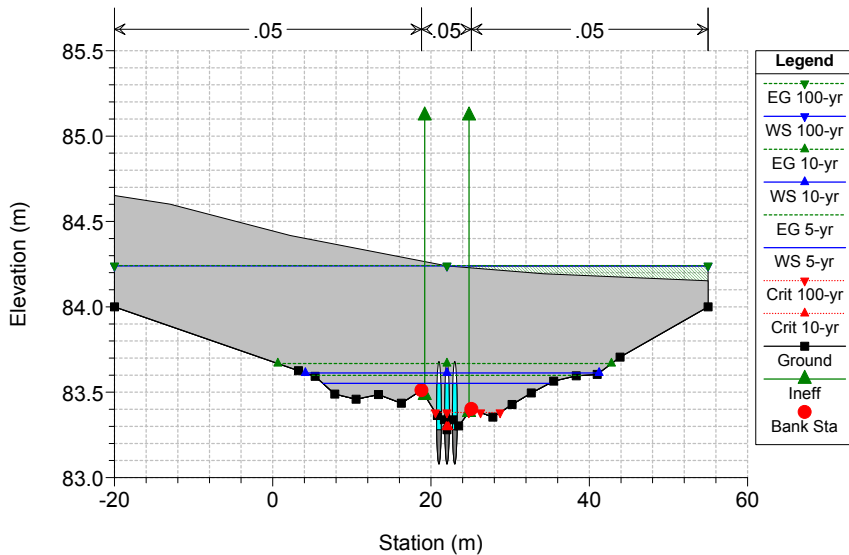
RA27 Plan: Proposed-New\_Rev1 7/6/2017  
RS = 5 ADJUSTED FROM SURVEY



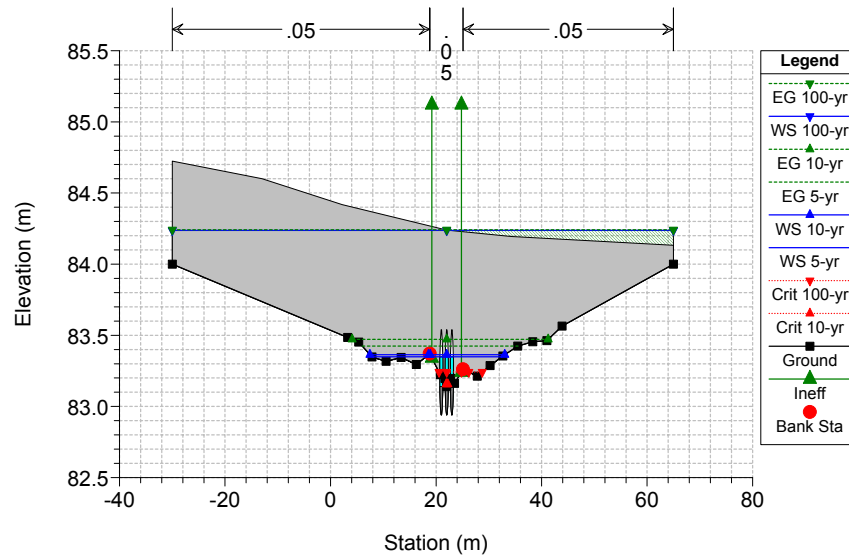
RA27 Plan: Proposed-New\_Rev1 7/6/2017  
RS = 4 ADJUSTED FROM SURVEY



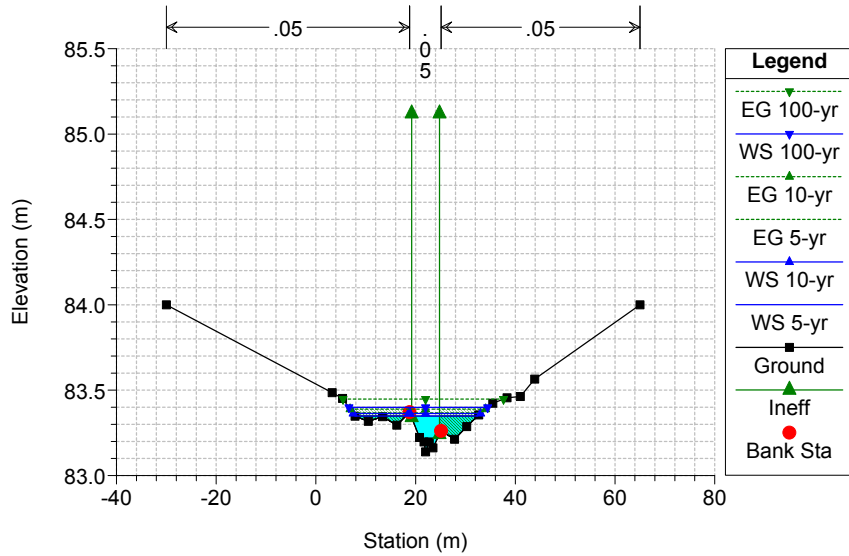
RA27 Plan: Proposed-New\_Rev1 7/6/2017  
RS = 3.5 Culv



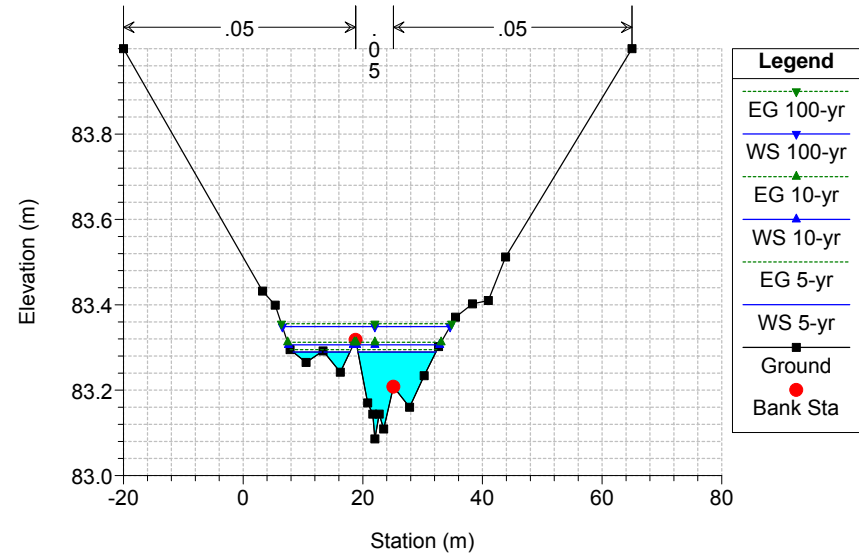
RA27 Plan: Proposed-New\_Rev1 7/6/2017  
RS = 3.5 Culv



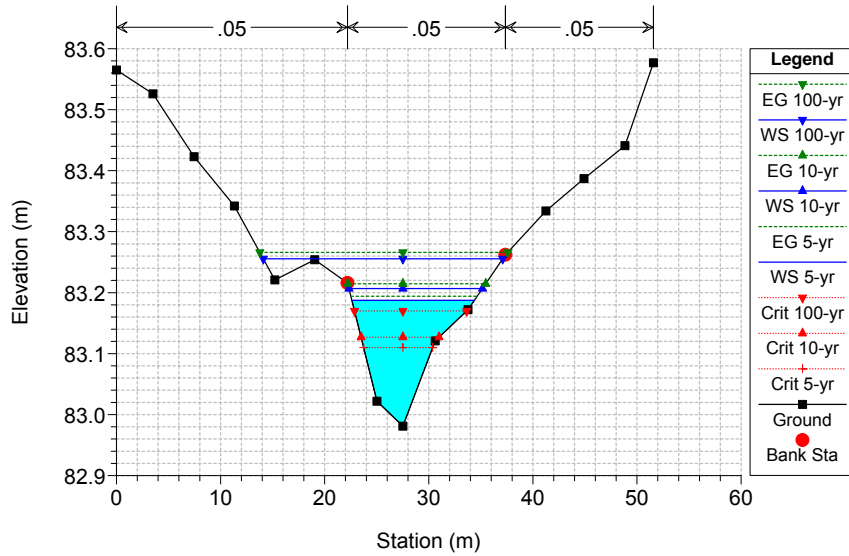
RA27 Plan: Proposed-New\_Rev1 7/6/2017  
RS = 3 ADJUSTED FROM SURVEY



RA27 Plan: Proposed-New\_Rev1 7/6/2017  
RS = 2 ADJUSTED FROM SURVEY



RA27 Plan: Proposed-New\_Rev1 7/6/2017  
RS = 1 FROM SURVEY





# RA31 & RA32 – HYDRAULIC MODELING







31321.2° 31321.6° 31322

RA31+32

RA31+32 RA31+32

321

311

312

RA31

322

RA32

313

RA32

314

323

315.09°

324

315.36°

325

315.64°

325.17°

316

325.33°

315.82°

325.50°

325.67°

325.83°

326

324.5

327

317

HEC-RAS Plan: RA3132-exV4

River	Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Vel Total (m/s)	Vel Left (m/s)	Vel Right (m/s)
RA32	RA32	327	5yr	0.50	90.85	90.91	90.91	90.92	0.059731	0.48	1.05	34.57	0.87	0.48		
RA32	RA32	327	10yr	0.62	90.85	90.91	90.91	90.93	0.076827	0.55	1.12	35.67	0.99	0.55		
RA32	RA32	327	100yr	1.01	90.85	90.93	90.93	90.95	0.078278	0.63	1.60	42.63	1.03	0.63		
RA32	RA32	326	5yr	0.50	89.97	90.07		90.07	0.002215	0.18	3.05	46.68	0.20	0.16	0.10	0.10
RA32	RA32	326	10yr	0.62	89.97	90.08		90.08	0.002269	0.20	3.50	49.07	0.20	0.18	0.11	0.11
RA32	RA32	326	100yr	1.01	89.97	90.10		90.11	0.002416	0.24	4.82	55.52	0.22	0.21	0.14	0.14
RA32	RA32	325.83*	5yr	0.50	89.94	90.06		90.06	0.002551	0.20	2.86	46.45	0.21	0.18	0.10	0.10
RA32	RA32	325.83*	10yr	0.62	89.94	90.07		90.07	0.002637	0.22	3.29	49.05	0.22	0.19	0.11	0.11
RA32	RA32	325.83*	100yr	1.01	89.94	90.09		90.09	0.002831	0.26	4.56	55.84	0.24	0.22	0.14	0.15
RA32	RA32	325.67*	5yr	0.50	89.92	90.04		90.05	0.003103	0.22	2.69	47.41	0.24	0.19	0.09	0.12
RA32	RA32	325.67*	10yr	0.62	89.92	90.05		90.05	0.003206	0.24	3.10	49.99	0.24	0.20	0.11	0.13
RA32	RA32	325.67*	100yr	1.01	89.92	90.08		90.08	0.003397	0.28	4.34	57.07	0.26	0.23	0.14	0.17
RA32	RA32	325.50*	5yr	0.50	89.89	90.03		90.03	0.003789	0.23	2.57	48.28	0.26	0.20	0.08	0.14
RA32	RA32	325.50*	10yr	0.62	89.89	90.03		90.04	0.003922	0.25	2.96	50.89	0.27	0.21	0.09	0.16
RA32	RA32	325.50*	100yr	1.01	89.89	90.06		90.06	0.004036	0.30	4.18	58.35	0.28	0.24	0.13	0.20
RA32	RA32	325.33*	5yr	0.50	89.87	90.01		90.01	0.004587	0.24	2.49	48.51	0.28	0.20	0.05	0.17
RA32	RA32	325.33*	10yr	0.62	89.87	90.01		90.02	0.004877	0.27	2.83	51.50	0.29	0.22	0.06	0.19
RA32	RA32	325.33*	100yr	1.01	89.87	90.04		90.04	0.004566	0.30	4.11	59.91	0.30	0.25	0.11	0.22
RA32	RA32	325.17*	5yr	0.50	89.84	89.98		89.99	0.004269	0.22	2.67	49.57	0.27	0.19		0.18
RA32	RA32	325.17*	10yr	0.62	89.84	89.99		89.99	0.005012	0.25	2.91	50.85	0.29	0.21		0.20
RA32	RA32	325.17*	100yr	1.01	89.84	90.01		90.02	0.004121	0.27	4.38	62.86	0.28	0.23	0.07	0.22
RA32	RA32	325	5yr	0.50	89.82	89.97		89.97	0.001861	0.15	3.65	57.44	0.18	0.14		0.14
RA32	RA32	325	10yr	0.62	89.82	89.97		89.97	0.002925	0.18	3.61	57.24	0.22	0.17		0.17
RA32	RA32	325	100yr	1.01	89.82	90.00		90.00	0.002344	0.20	5.46	69.59	0.21	0.18	0.04	0.18
RA32	RA32	324.9	5yr	0.50	89.46	89.97	89.70	89.97	0.000281	0.15	5.81	75.58	0.09	0.09		0.06
RA32	RA32	324.9	10yr	0.62	89.46	89.97	89.72	89.97	0.000454	0.19	5.67	74.74	0.11	0.11		0.08
RA32	RA32	324.9	100yr	1.01	89.46	90.00	89.79	90.00	0.000608	0.24	7.37	82.11	0.13	0.14		0.11
RA32	RA32	324.8		Culvert												
RA32	RA32	324.5	5yr	0.50	89.35	89.52	89.52	89.60	0.045764	1.28	0.39	35.76	1.01	1.28		
RA32	RA32	324.5	10yr	0.62	89.35	89.54	89.54	89.64	0.043670	1.37	0.45	39.46	1.01	1.37		
RA32	RA32	324.5	100yr	1.01	89.35	89.61	89.61	89.74	0.038106	1.60	0.63	51.26	1.00	1.60		
RA32	RA32	324	5yr	0.50	89.29	89.40		89.41	0.012037	0.45	1.42	22.61	0.47	0.35	0.34	0.33
RA32	RA32	324	10yr	0.62	89.29	89.41		89.42	0.011554	0.48	1.66	23.51	0.47	0.37	0.35	0.35
RA32	RA32	324	100yr	1.01	89.29	89.44		89.45	0.011096	0.55	2.49	30.89	0.48	0.40	0.41	0.36
RA32	RA32	323	5yr	0.50	89.13	89.25		89.25	0.007852	0.39	1.64	23.45	0.39	0.31	0.29	0.28
RA32	RA32	323	10yr	0.62	89.13	89.26		89.27	0.008158	0.42	1.87	24.28	0.40	0.33	0.31	0.31
RA32	RA32	323	100yr	1.01	89.13	89.29		89.30	0.008460	0.50	2.73	31.69	0.42	0.37	0.37	0.33



HEC-RAS Plan: RA3132-exV4 (Continued)

River	Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Vel Total (m/s)	Vel Left (m/s)	Vel Right (m/s)
RA32	RA32	322.89*	5yr	0.50	89.08	89.21		89.22	0.006683	0.39	1.80	27.36	0.36	0.28	0.27	0.24
RA32	RA32	322.89*	10yr	0.62	89.08	89.23		89.23	0.006408	0.40	2.11	28.53	0.36	0.29	0.28	0.26
RA32	RA32	322.89*	100yr	1.01	89.08	89.26		89.26	0.006068	0.45	3.01	31.55	0.37	0.33	0.32	0.30
RA32	RA32	322	5yr	0.50	88.68	88.84		88.85	0.013501	0.54	1.05	14.78	0.52	0.48	0.14	0.34
RA32	RA32	322	10yr	0.62	88.68	88.85		88.86	0.014099	0.59	1.22	16.06	0.53	0.51	0.18	0.37
RA32	RA32	322	100yr	1.01	88.68	88.88	88.85	88.90	0.015214	0.70	1.73	18.50	0.58	0.58	0.30	0.45
RA32	RA32	321	5yr	0.50	87.84	87.98		87.99	0.008273	0.44	1.25	15.50	0.41	0.40	0.17	0.17
RA32	RA32	321	10yr	0.62	87.84	88.00		88.01	0.007974	0.47	1.51	17.92	0.41	0.41	0.18	0.20
RA32	RA32	321	100yr	1.01	87.84	88.04		88.05	0.007394	0.53	2.28	22.13	0.41	0.44	0.25	0.26
RA31+32	RA31+32	31322	5yr	0.95	87.26	87.51		87.53	0.009969	0.60	1.74	15.65	0.47	0.55	0.26	0.18
RA31+32	RA31+32	31322	10yr	1.18	87.26	87.53		87.55	0.009982	0.65	2.07	18.02	0.48	0.57	0.28	0.22
RA31+32	RA31+32	31322	100yr	1.93	87.26	87.58		87.60	0.010002	0.76	3.04	21.41	0.50	0.64	0.39	0.31
RA31+32	RA31+32	31321.8*	5yr	0.95	87.16	87.41		87.42	0.010026	0.60	1.74	15.61	0.47	0.55	0.26	0.18
RA31+32	RA31+32	31321.8*	10yr	1.18	87.16	87.43		87.45	0.010014	0.65	2.07	17.99	0.48	0.57	0.28	0.22
RA31+32	RA31+32	31321.8*	100yr	1.93	87.16	87.48		87.50	0.009997	0.76	3.04	21.41	0.50	0.64	0.39	0.31
RA31+32	RA31+32	31321.6*	5yr	0.95	87.06	87.31		87.33	0.009975	0.60	1.74	15.64	0.47	0.55	0.26	0.18
RA31+32	RA31+32	31321.6*	10yr	1.18	87.06	87.33		87.35	0.009984	0.65	2.07	18.01	0.48	0.57	0.28	0.22
RA31+32	RA31+32	31321.6*	100yr	1.93	87.06	87.38		87.40	0.009997	0.76	3.04	21.41	0.50	0.64	0.39	0.31
RA31+32	RA31+32	31321.4*	5yr	0.95	86.96	87.21		87.23	0.010017	0.60	1.74	15.62	0.47	0.55	0.26	0.18
RA31+32	RA31+32	31321.4*	10yr	1.18	86.96	87.23		87.25	0.010012	0.65	2.07	17.99	0.48	0.57	0.28	0.22
RA31+32	RA31+32	31321.4*	100yr	1.93	86.96	87.28		87.30	0.010001	0.76	3.04	21.41	0.50	0.64	0.39	0.31
RA31+32	RA31+32	31321.2*	5yr	0.95	86.86	87.11		87.13	0.009982	0.60	1.74	15.63	0.47	0.55	0.26	0.18
RA31+32	RA31+32	31321.2*	10yr	1.18	86.86	87.13		87.15	0.009986	0.65	2.07	18.01	0.48	0.57	0.28	0.22
RA31+32	RA31+32	31321.2*	100yr	1.93	86.86	87.18		87.20	0.009996	0.76	3.04	21.41	0.50	0.64	0.39	0.31
RA31+32	RA31+32	31321	5yr	0.95	86.76	87.01	86.95	87.03	0.010009	0.60	1.74	15.62	0.47	0.55	0.26	0.18
RA31+32	RA31+32	31321	10yr	1.18	86.76	87.03	86.96	87.05	0.010010	0.65	2.07	17.99	0.48	0.57	0.28	0.22
RA31+32	RA31+32	31321	100yr	1.93	86.76	87.08	87.01	87.10	0.010001	0.76	3.04	21.40	0.50	0.64	0.39	0.31
RA31	RA31	317	5yr	0.45	90.00	90.13		90.14	0.008822	0.30	1.47	22.49	0.38	0.30		
RA31	RA31	317	10yr	0.56	90.00	90.14		90.15	0.008742	0.32	1.74	24.46	0.38	0.32		
RA31	RA31	317	100yr	0.93	90.00	90.17		90.18	0.008707	0.36	2.55	29.61	0.40	0.36		
RA31	RA31	316	5yr	0.45	89.76	89.90		89.91	0.005838	0.26	1.69	23.44	0.31	0.26		
RA31	RA31	316	10yr	0.56	89.76	89.92		89.92	0.005847	0.28	1.99	25.44	0.32	0.28		
RA31	RA31	316	100yr	0.93	89.76	89.95		89.95	0.005896	0.32	2.91	30.73	0.33	0.32		
RA31	RA31	315.91*	5yr	0.45	89.73	89.87		89.87	0.005785	0.26	1.70	23.50	0.31	0.26		
RA31	RA31	315.91*	10yr	0.56	89.73	89.88		89.89	0.005816	0.28	2.00	25.50	0.32	0.28		
RA31	RA31	315.91*	100yr	0.93	89.73	89.91		89.92	0.005940	0.32	2.90	30.72	0.33	0.32		

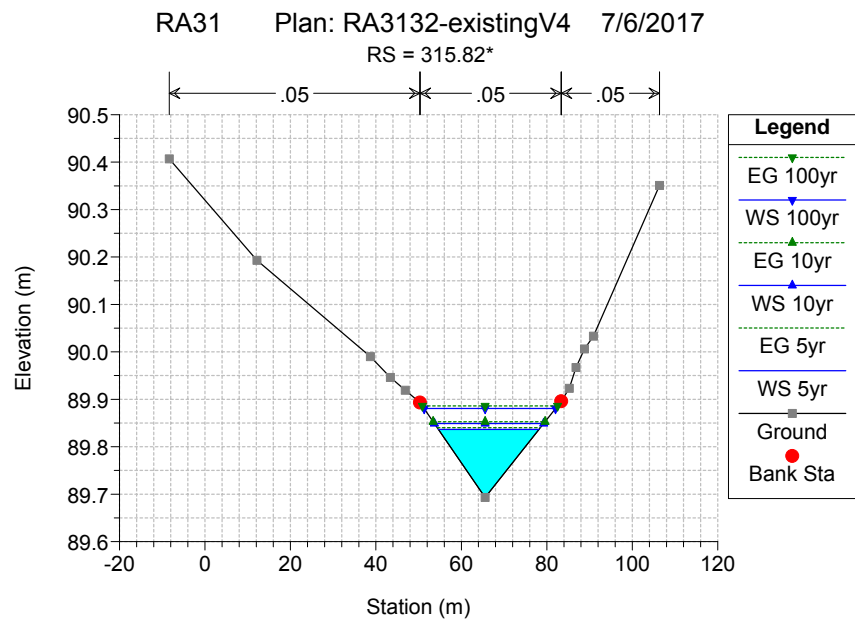
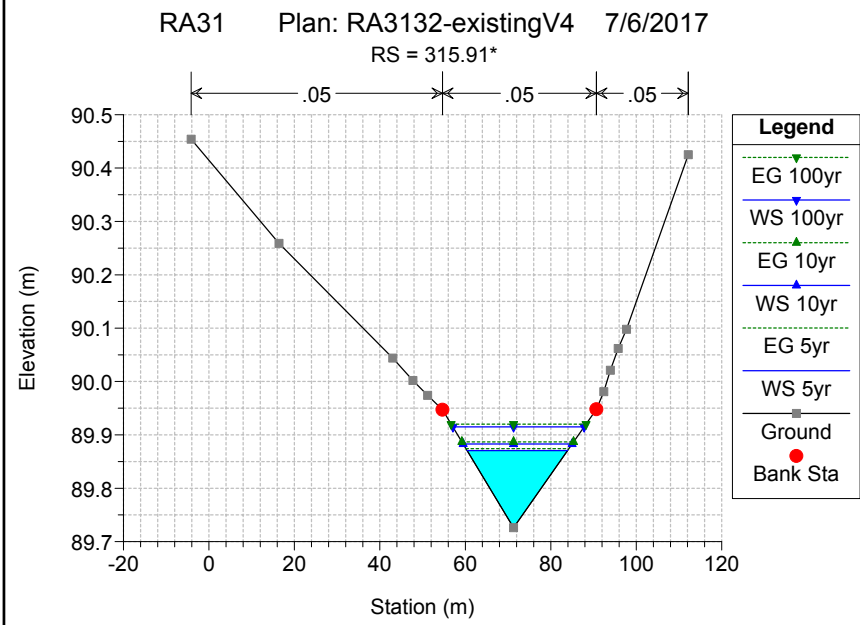
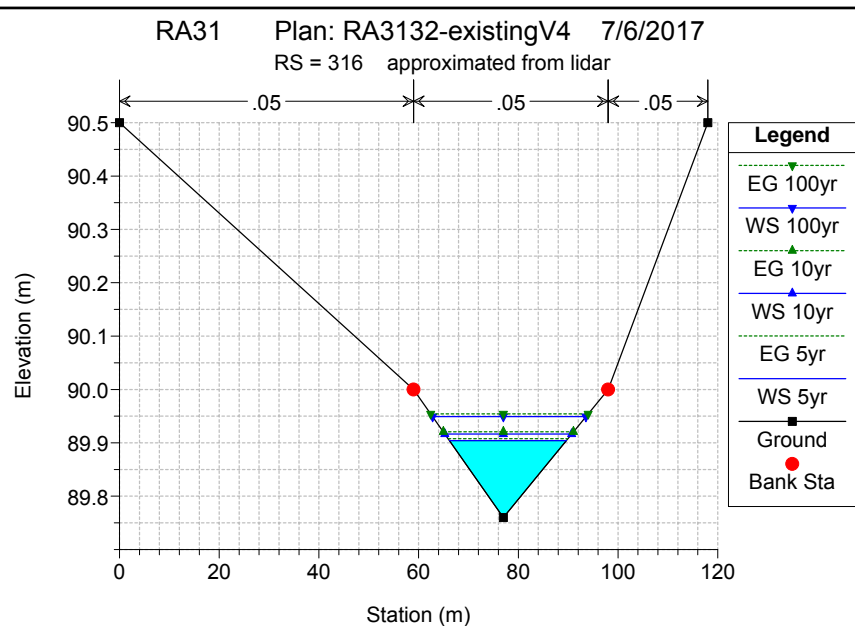
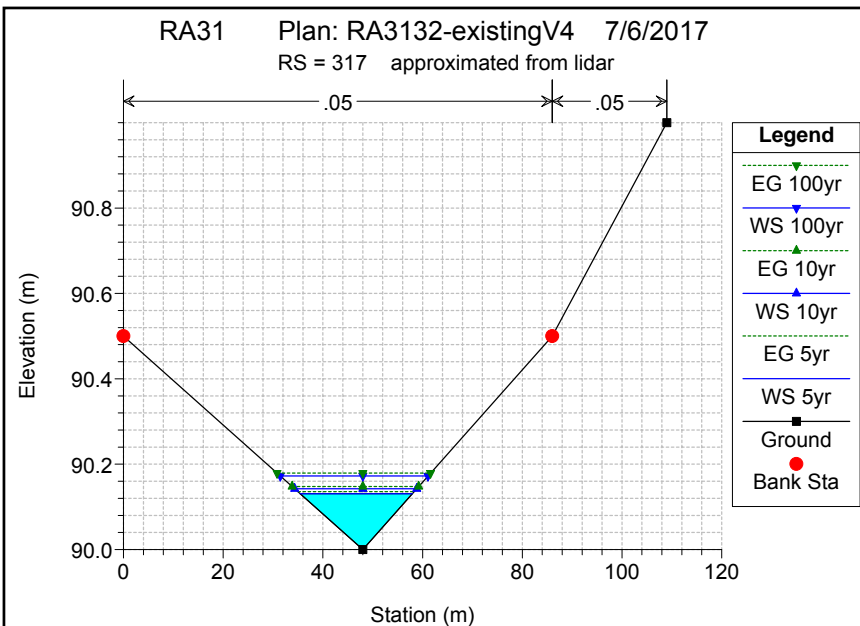
HEC-RAS Plan: RA3132-exV4 (Continued)

River	Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Vel Total (m/s)	Vel Left (m/s)	Vel Right (m/s)
RA31	RA31	315.82*	5yr	0.45	89.69	89.84		89.84	0.005863	0.26	1.69	23.55	0.32	0.26		
RA31	RA31	315.82*	10yr	0.56	89.69	89.85		89.85	0.005890	0.28	1.99	25.55	0.32	0.28		
RA31	RA31	315.82*	100yr	0.93	89.69	89.88		89.89	0.006037	0.32	2.89	30.77	0.33	0.32		
RA31	RA31	315.73*	5yr	0.45	89.66	89.80		89.81	0.005771	0.26	1.70	23.66	0.31	0.26		
RA31	RA31	315.73*	10yr	0.56	89.66	89.82		89.82	0.005847	0.28	2.00	25.62	0.32	0.28		
RA31	RA31	315.73*	100yr	0.93	89.66	89.84		89.85	0.006301	0.33	2.83	30.81	0.34	0.33	0.03	
RA31	RA31	315.64*	5yr	0.45	89.63	89.77		89.77	0.005938	0.26	1.69	23.72	0.32	0.26		
RA31	RA31	315.64*	10yr	0.56	89.63	89.78		89.78	0.006029	0.28	1.98	25.68	0.32	0.28		
RA31	RA31	315.64*	100yr	0.93	89.63	89.81		89.81	0.006171	0.34	2.78	32.73	0.34	0.33	0.08	0.07
RA31	RA31	315.55*	5yr	0.45	89.59	89.74		89.74	0.005714	0.26	1.71	24.10	0.31	0.26	0.02	
RA31	RA31	315.55*	10yr	0.56	89.59	89.75		89.75	0.005887	0.29	1.96	27.87	0.32	0.28	0.05	0.03
RA31	RA31	315.55*	100yr	0.93	89.59	89.77		89.78	0.005712	0.34	2.83	33.65	0.33	0.33	0.12	0.13
RA31	RA31	315.45*	5yr	0.45	89.56	89.71		89.71	0.003278	0.23	2.06	29.92	0.24	0.22	0.08	0.08
RA31	RA31	315.45*	10yr	0.56	89.56	89.72		89.72	0.003933	0.26	2.26	31.14	0.27	0.25	0.09	0.11
RA31	RA31	315.45*	100yr	0.93	89.56	89.75		89.75	0.004177	0.32	3.17	34.62	0.29	0.29	0.15	0.16
RA31	RA31	315.36*	5yr	0.45	89.52	89.70		89.70	0.001205	0.17	2.95	33.44	0.16	0.15	0.09	0.09
RA31	RA31	315.36*	10yr	0.56	89.52	89.70		89.71	0.001695	0.21	3.06	33.99	0.19	0.18	0.11	0.11
RA31	RA31	315.36*	100yr	0.93	89.52	89.73		89.73	0.002420	0.28	3.98	43.34	0.23	0.23	0.15	0.12
RA31	RA31	315.27*	5yr	0.45	89.49	89.70		89.70	0.000452	0.13	4.52	48.59	0.10	0.10	0.07	0.06
RA31	RA31	315.27*	10yr	0.56	89.49	89.70		89.70	0.000672	0.16	4.59	49.01	0.12	0.12	0.08	0.08
RA31	RA31	315.27*	100yr	0.93	89.49	89.72		89.72	0.001064	0.21	5.71	54.89	0.16	0.16	0.11	0.11
RA31	RA31	315.18*	5yr	0.45	89.46	89.70		89.70	0.000161	0.09	7.04	63.94	0.06	0.06	0.05	0.05
RA31	RA31	315.18*	10yr	0.56	89.46	89.70		89.70	0.000245	0.11	7.10	64.21	0.08	0.08	0.06	0.06
RA31	RA31	315.18*	100yr	0.93	89.46	89.72		89.72	0.000428	0.15	8.46	70.24	0.10	0.11	0.08	0.09
RA31	RA31	315.09*	5yr	0.45	89.42	89.70		89.70	0.000058	0.06	10.59	77.48	0.04	0.04	0.04	0.04
RA31	RA31	315.09*	10yr	0.56	89.42	89.70		89.70	0.000089	0.07	10.64	77.58	0.05	0.05	0.05	0.05
RA31	RA31	315.09*	100yr	0.93	89.42	89.72		89.72	0.000165	0.11	12.20	80.58	0.07	0.08	0.07	0.07
RA31	RA31	315	5yr	0.45	89.39	89.70		89.70	0.000022	0.04	14.89	84.93	0.02	0.03	0.03	0.03
RA31	RA31	315	10yr	0.56	89.39	89.70		89.70	0.000034	0.05	14.94	84.96	0.03	0.04	0.04	0.04
RA31	RA31	315	100yr	0.93	89.39	89.72		89.72	0.000068	0.08	16.61	85.96	0.04	0.06	0.05	0.05
RA31	RA31	314.9	5yr	0.45	89.18	89.70	89.39	89.70	0.000019	0.05	15.44	84.92	0.02	0.03	0.03	0.03
RA31	RA31	314.9	10yr	0.56	89.18	89.70	89.41	89.70	0.000028	0.06	15.49	84.95	0.03	0.04	0.03	0.03
RA31	RA31	314.9	100yr	0.93	89.18	89.72	89.48	89.72	0.000058	0.08	17.15	85.95	0.04	0.05	0.05	0.05
RA31	RA31	314.8		Culvert												
RA31	RA31	314.5	5yr	0.45	89.24	89.41	89.41	89.49	0.047409	1.22	0.37	72.35	1.01	1.22		
RA31	RA31	314.5	10yr	0.56	89.24	89.44	89.44	89.53	0.043507	1.30	0.43	75.83	1.00	1.30		
RA31	RA31	314.5	100yr	0.93	89.24	89.51	89.51	89.63	0.039907	1.56	0.60	85.20	1.01	1.56		

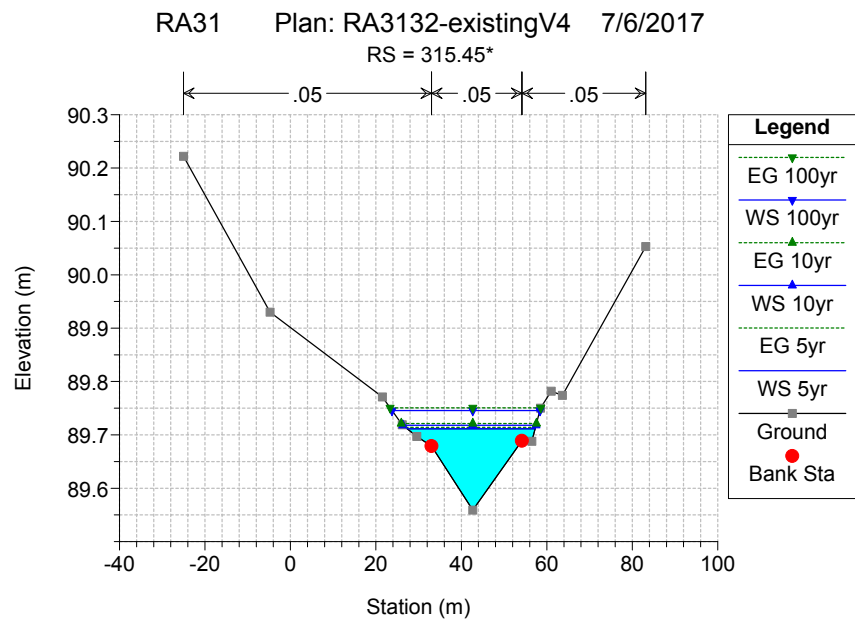
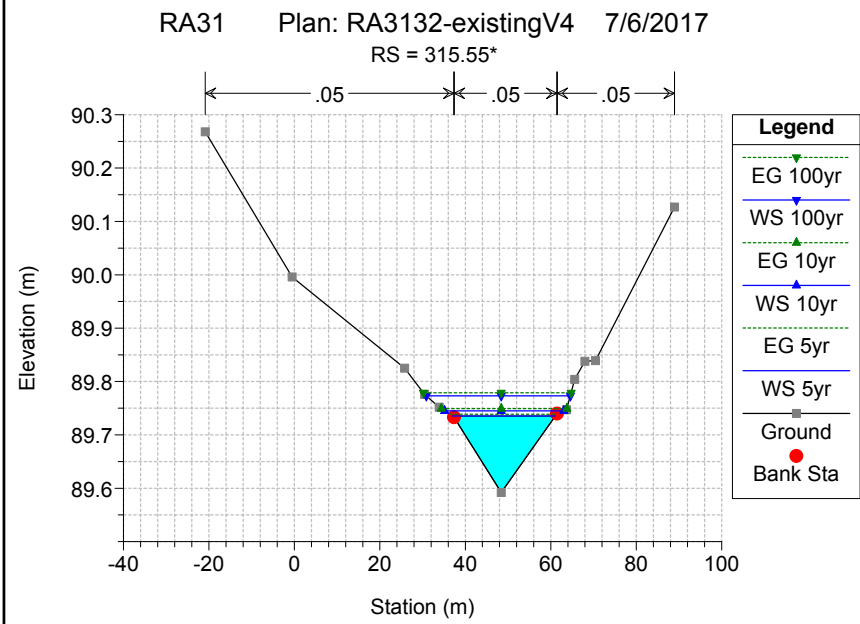
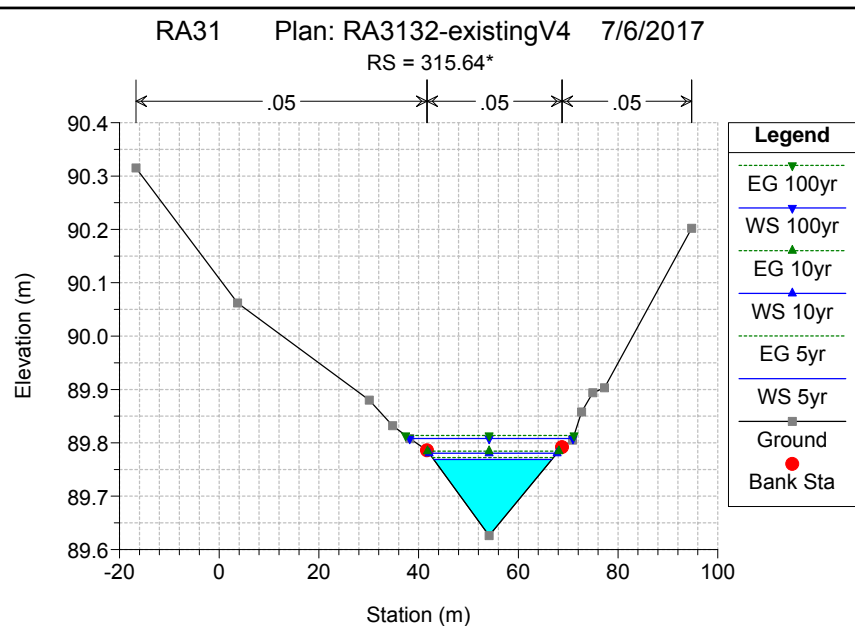
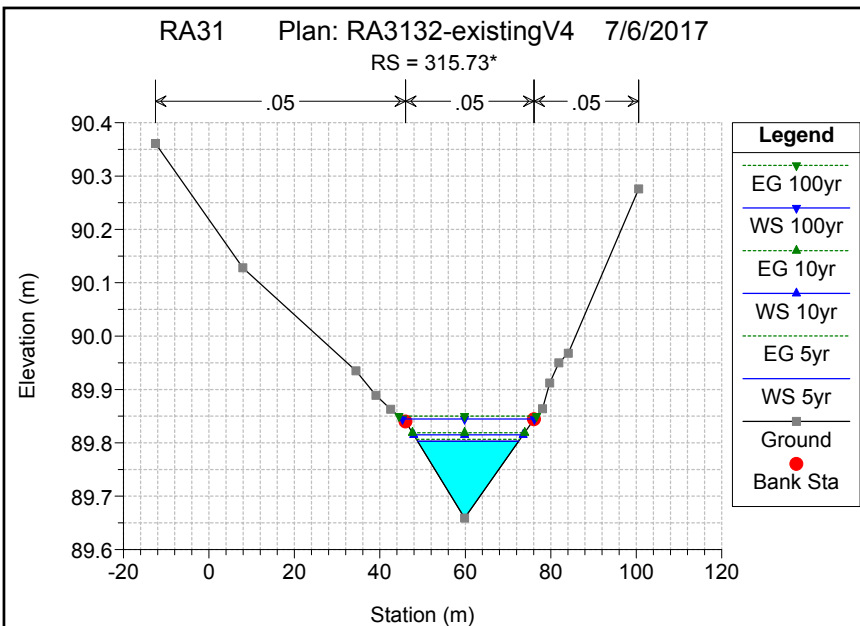


HEC-RAS Plan: RA3132-exV4 (Continued)

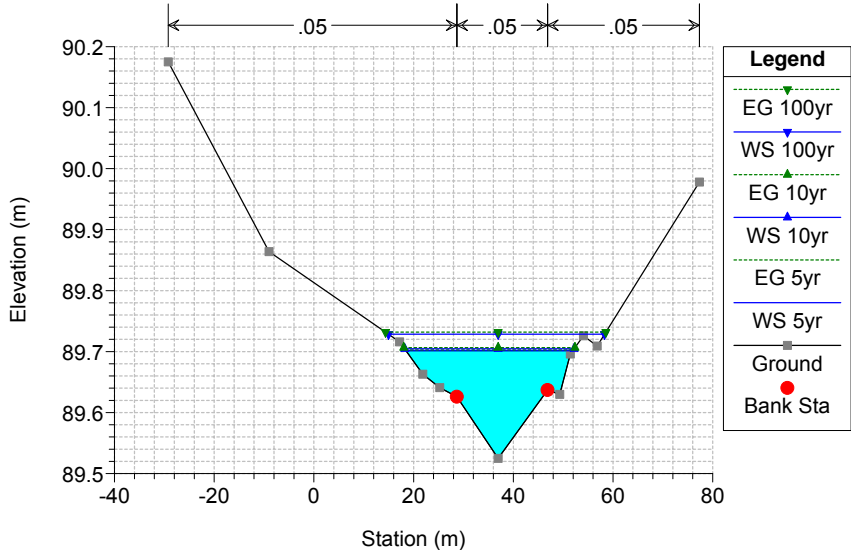
River	Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Vel Total (m/s)	Vel Left (m/s)	Vel Right (m/s)
RA31	RA31	314	5yr	0.45	89.01	89.14		89.15	0.012805	0.46	0.97	10.45	0.49	0.46		
RA31	RA31	314	10yr	0.56	89.01	89.16		89.17	0.012640	0.49	1.13	10.94	0.49	0.49		
RA31	RA31	314	100yr	0.93	89.01	89.20		89.22	0.012351	0.58	1.60	12.79	0.51	0.58	0.11	
RA31	RA31	313	5yr	0.45	88.85	89.01		89.02	0.005954	0.36	1.26	11.32	0.34	0.36		
RA31	RA31	313	10yr	0.56	88.85	89.03		89.03	0.005945	0.38	1.46	12.11	0.35	0.38	0.04	
RA31	RA31	313	100yr	0.93	88.85	89.07		89.08	0.005901	0.46	2.06	15.42	0.36	0.45	0.14	0.09
RA31	RA31	312.90*	5yr	0.45	88.81	88.98		88.99	0.005474	0.35	1.28	11.29	0.33	0.35	0.03	
RA31	RA31	312.90*	10yr	0.56	88.81	89.00		89.01	0.005475	0.38	1.48	12.35	0.34	0.38	0.07	0.01
RA31	RA31	312.90*	100yr	0.93	88.81	89.04		89.05	0.005433	0.46	2.12	16.13	0.35	0.44	0.15	0.12
RA31	RA31	312	5yr	0.45	88.48	88.66		88.67	0.008971	0.48	1.13	13.79	0.43	0.40	0.29	0.24
RA31	RA31	312	10yr	0.56	88.48	88.68		88.69	0.008995	0.51	1.32	14.58	0.44	0.42	0.32	0.27
RA31	RA31	312	100yr	0.93	88.48	88.71		88.73	0.009398	0.62	1.97	21.18	0.46	0.47	0.40	0.26
RA31	RA31	311	5yr	0.45	87.81	88.00	87.97	88.03	0.015357	0.73	0.74	8.14	0.58	0.60	0.32	0.30
RA31	RA31	311	10yr	0.56	87.81	88.02	87.99	88.04	0.014998	0.77	0.93	11.12	0.58	0.60	0.37	0.24
RA31	RA31	311	100yr	0.93	87.81	88.06	88.04	88.09	0.014033	0.86	1.44	12.99	0.59	0.64	0.47	0.38



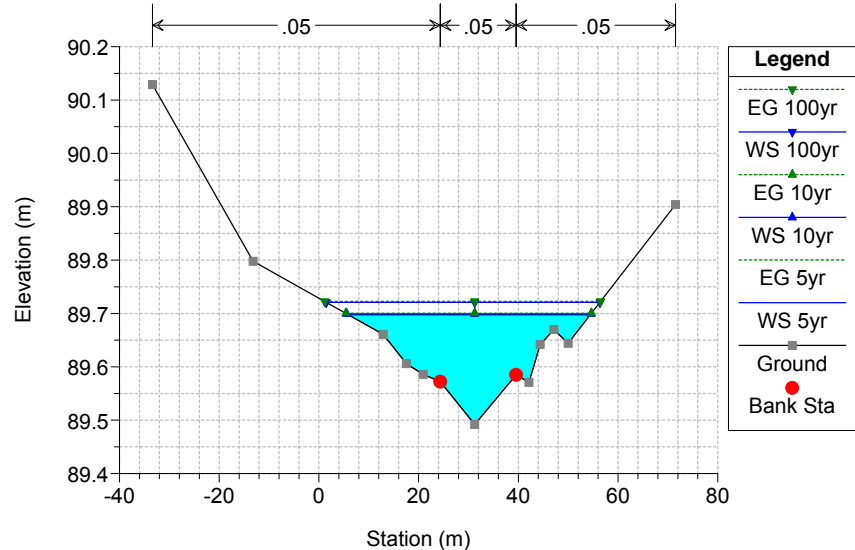




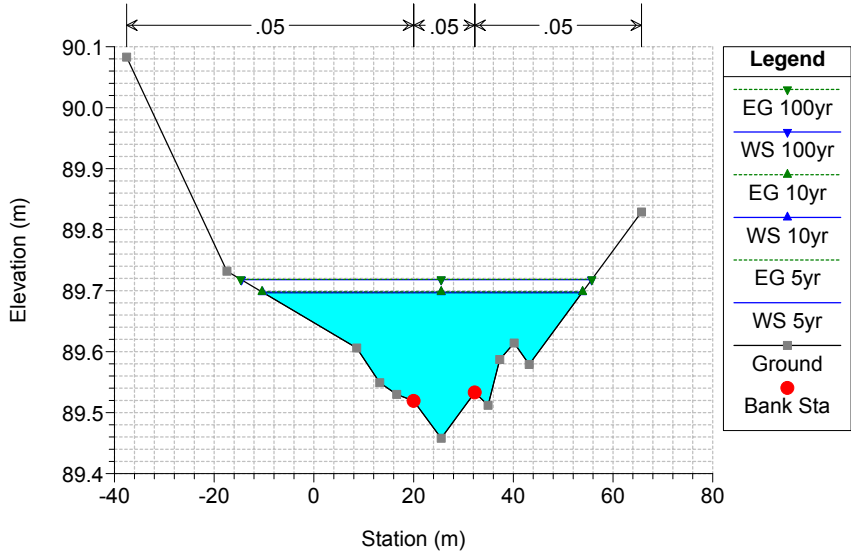
RA31 Plan: RA3132-existingV4 7/6/2017  
RS = 315.36\*



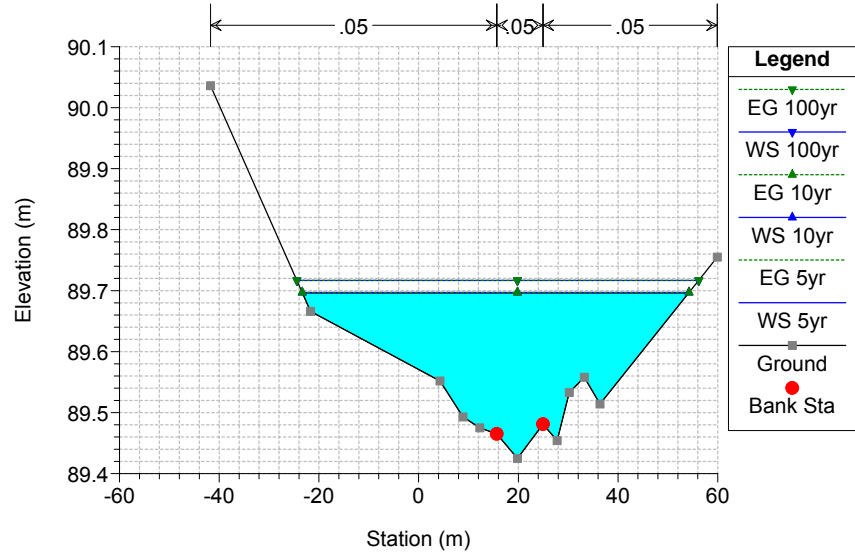
RA31 Plan: RA3132-existingV4 7/6/2017  
RS = 315.27\*



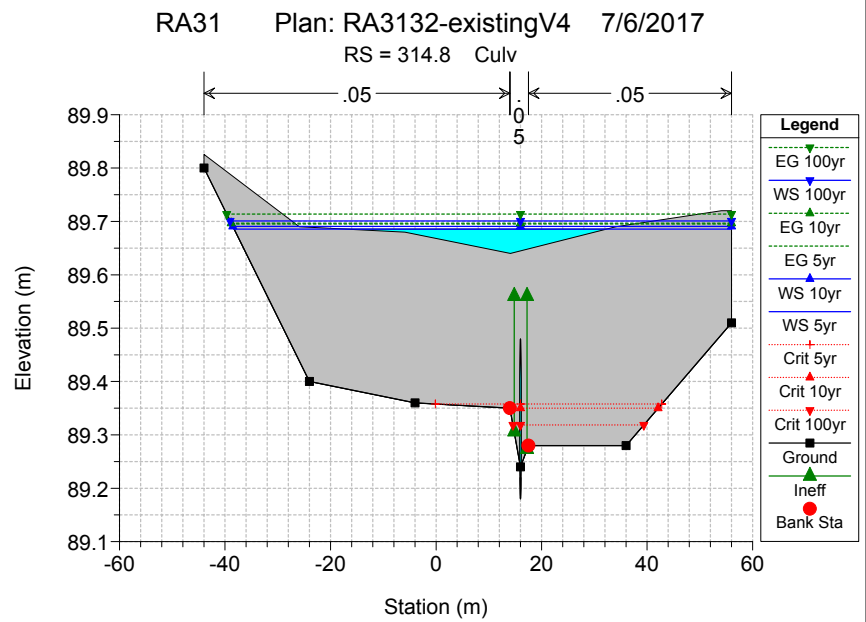
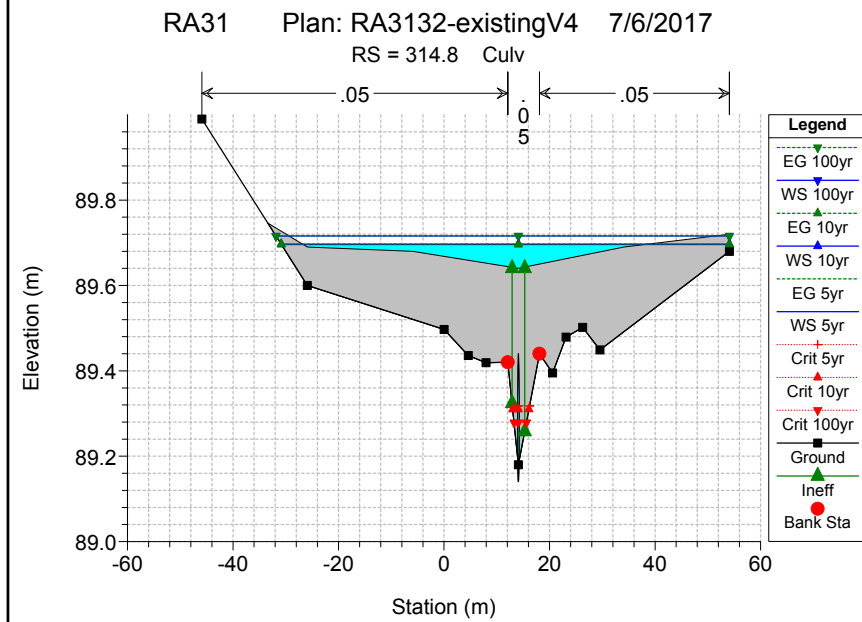
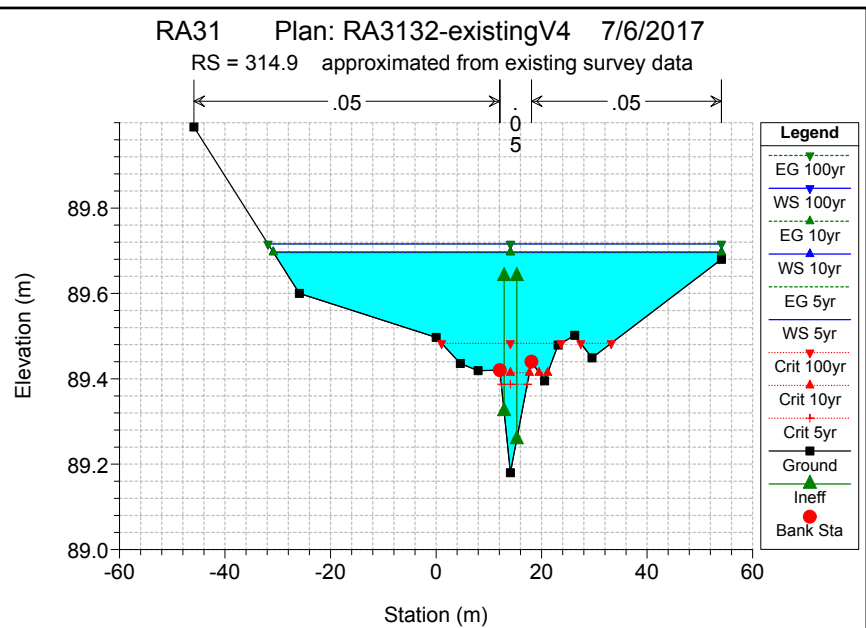
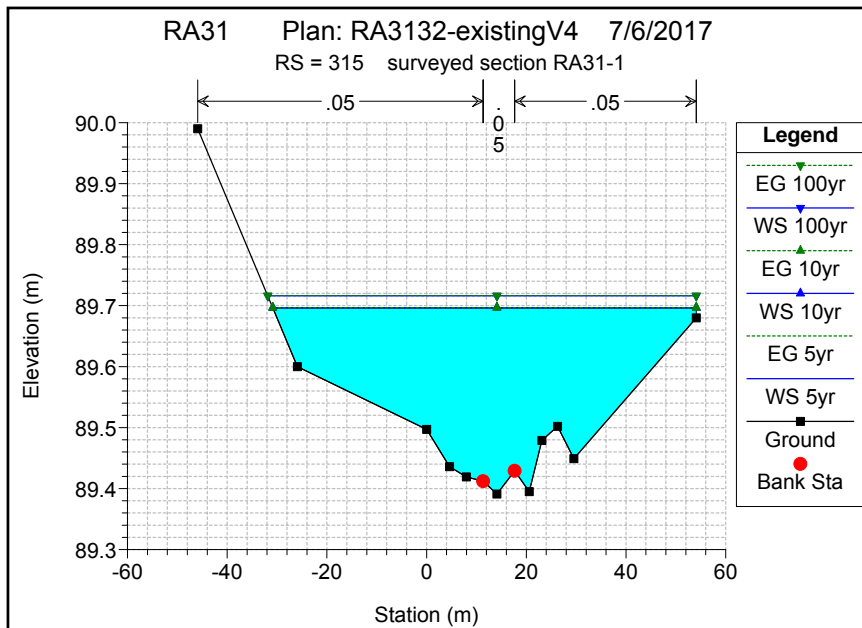
RA31 Plan: RA3132-existingV4 7/6/2017  
RS = 315.18\*



RA31 Plan: RA3132-existingV4 7/6/2017  
RS = 315.09\*

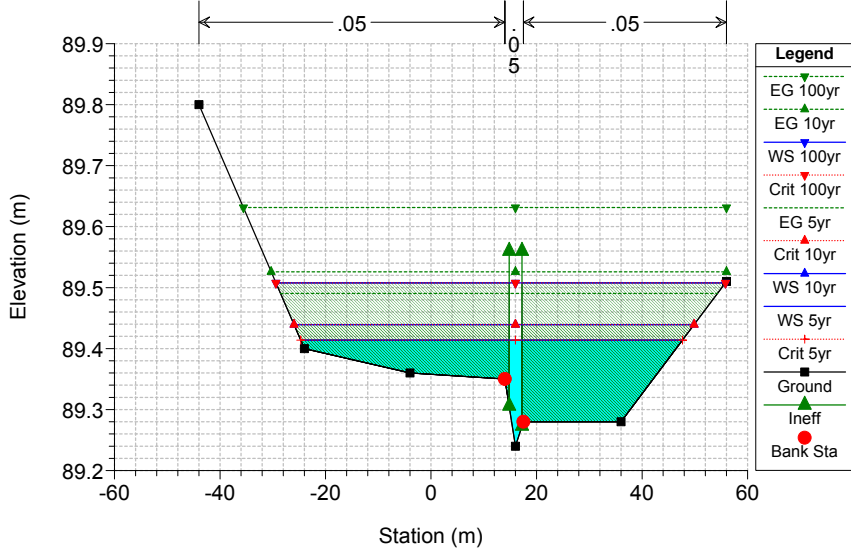






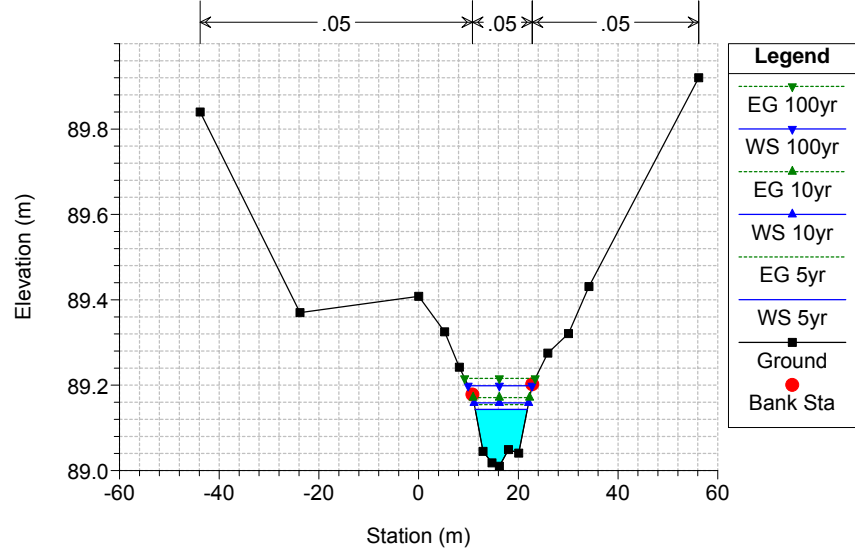
RA31 Plan: RA3132-existingV4 7/6/2017

RS = 314.5 approximated from existing survey data



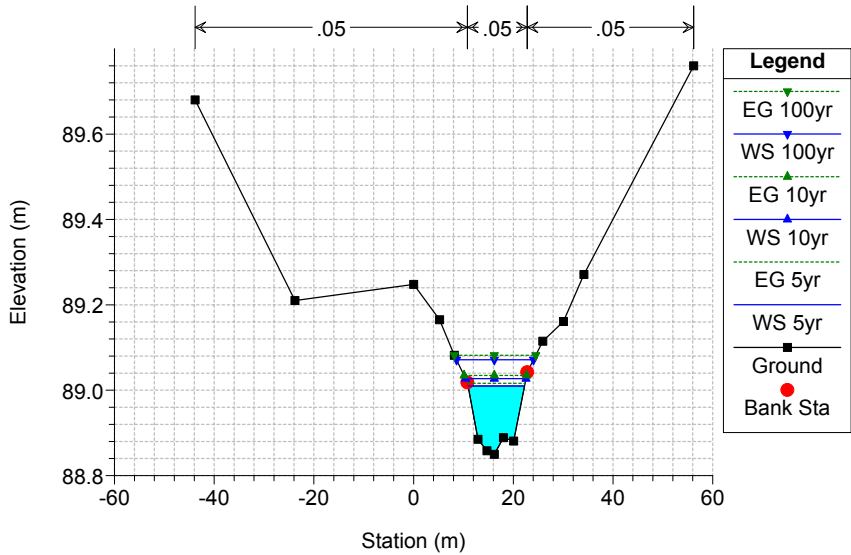
RA31 Plan: RA3132-existingV4 7/6/2017

RS = 314



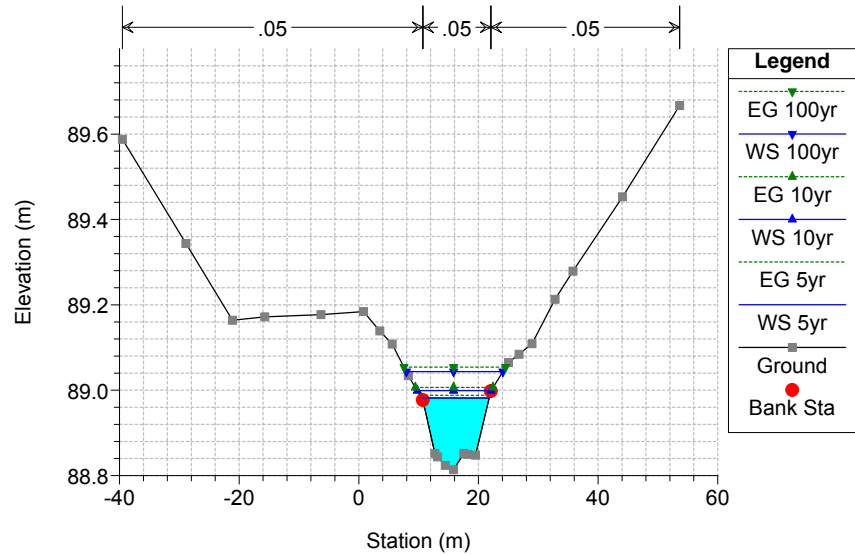
RA31 Plan: RA3132-existingV4 7/6/2017

RS = 313

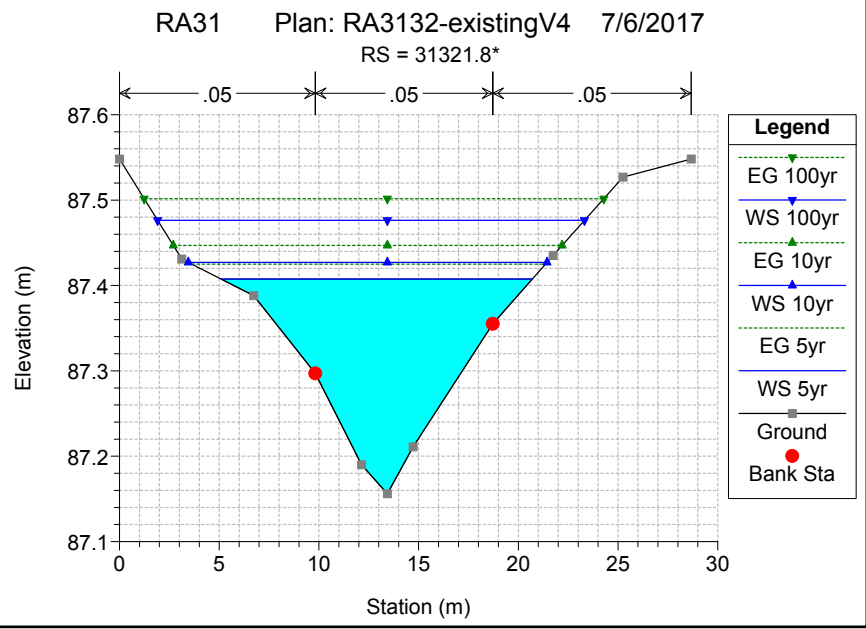
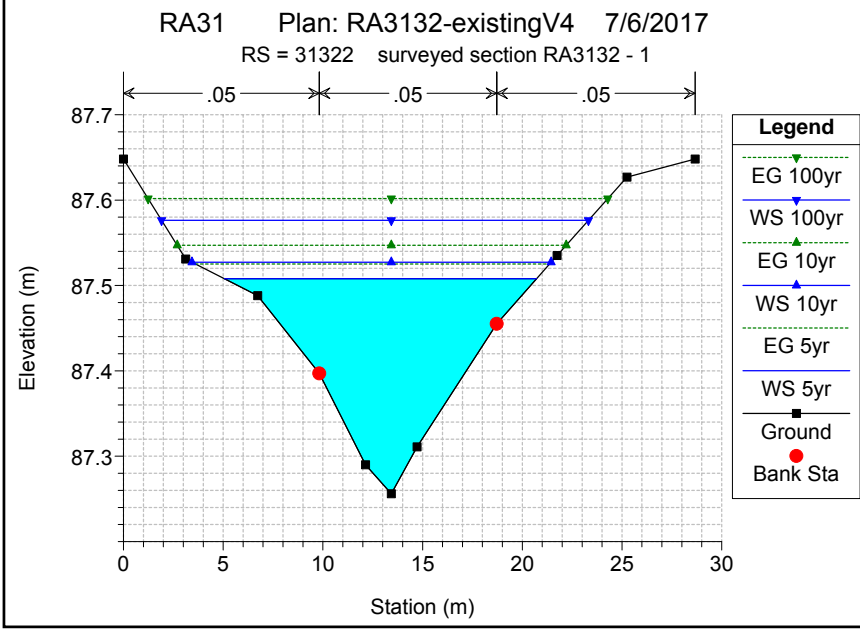
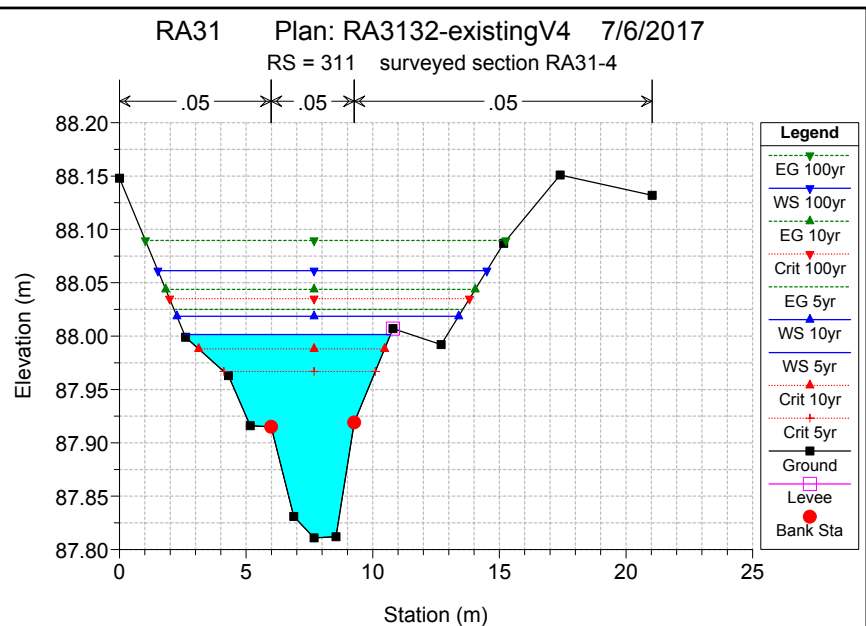
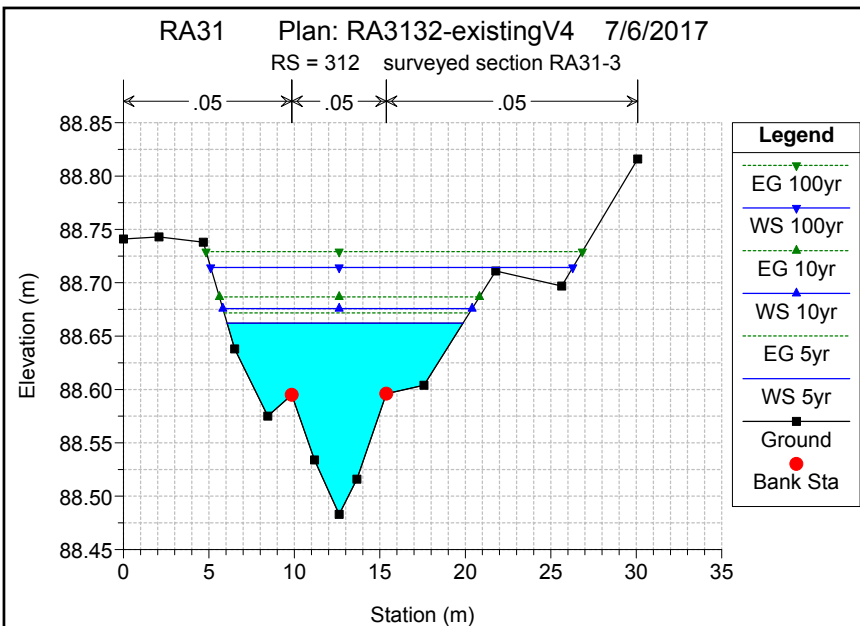


RA31 Plan: RA3132-existingV4 7/6/2017

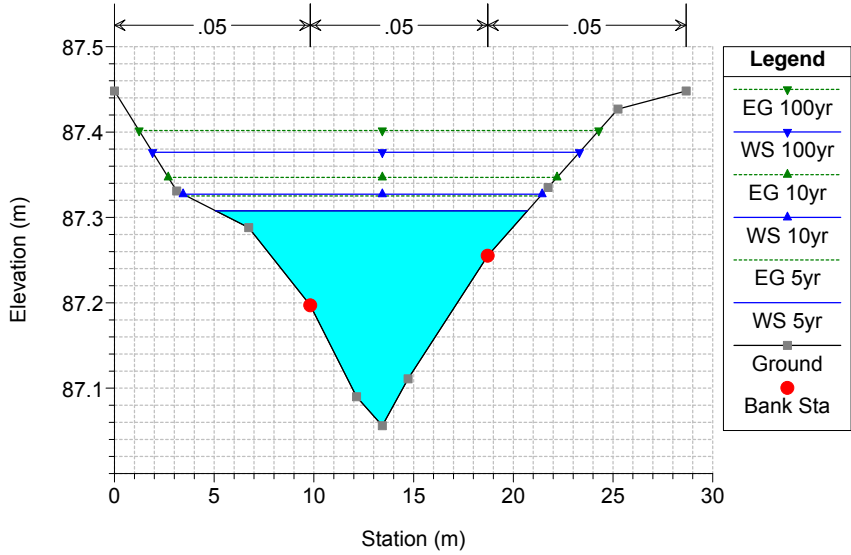
RS = 312.90\*



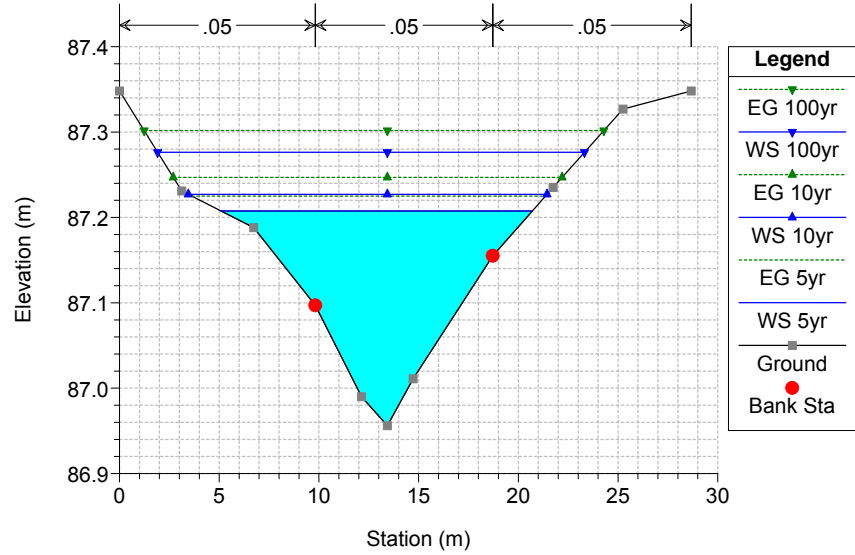




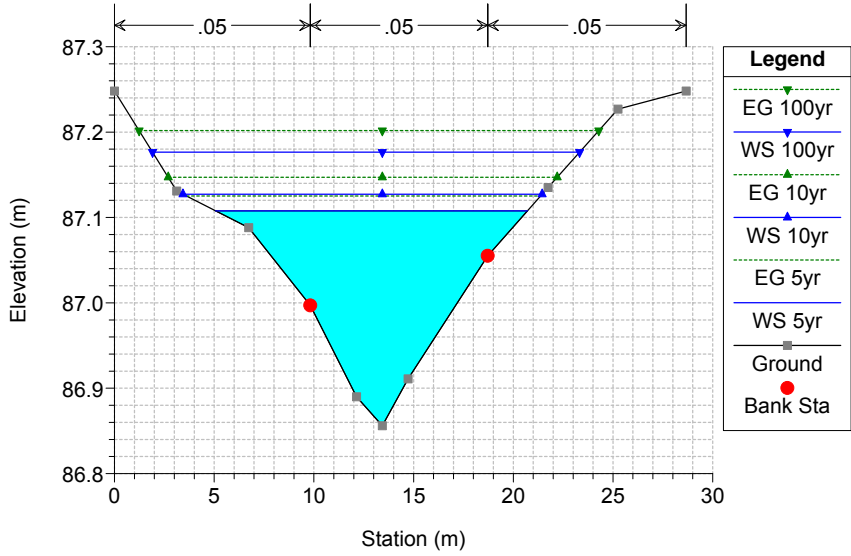
RA31 Plan: RA3132-existingV4 7/6/2017  
RS = 31321.6\*



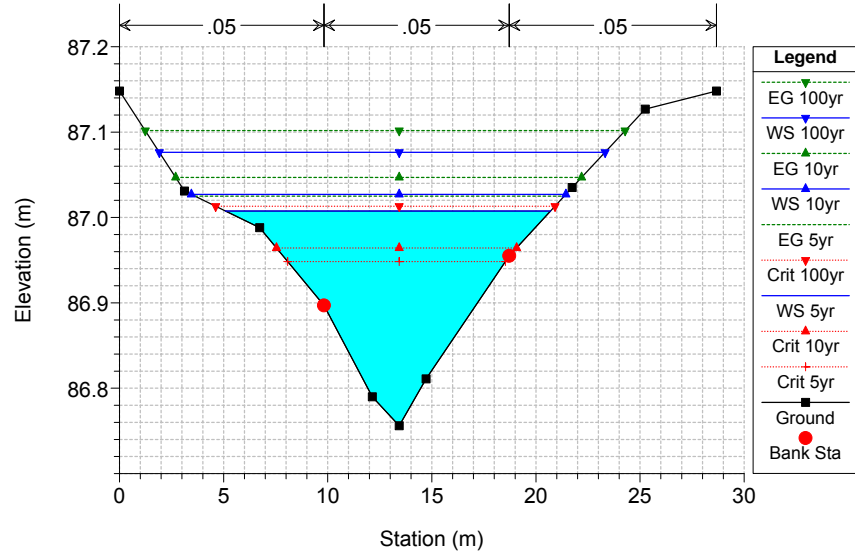
RA31 Plan: RA3132-existingV4 7/6/2017  
RS = 31321.4\*



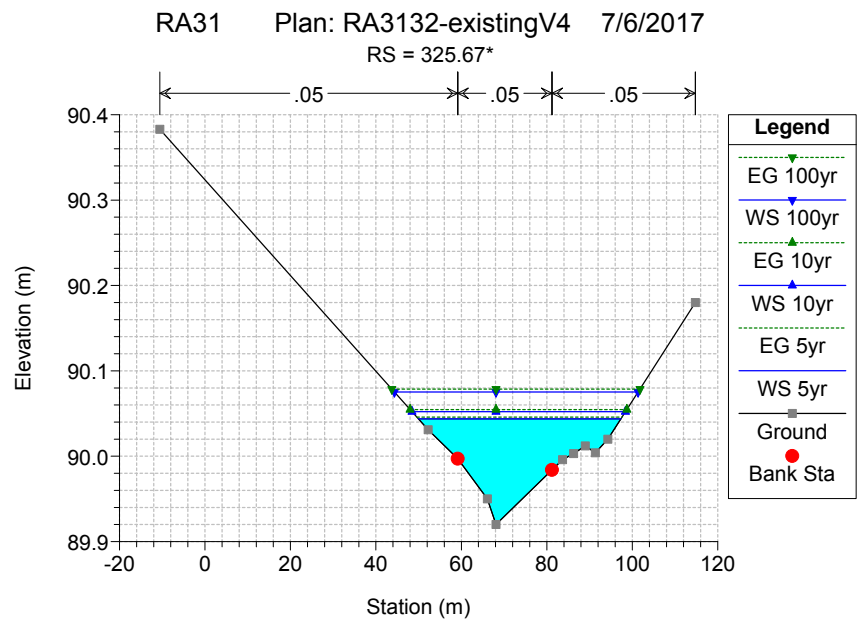
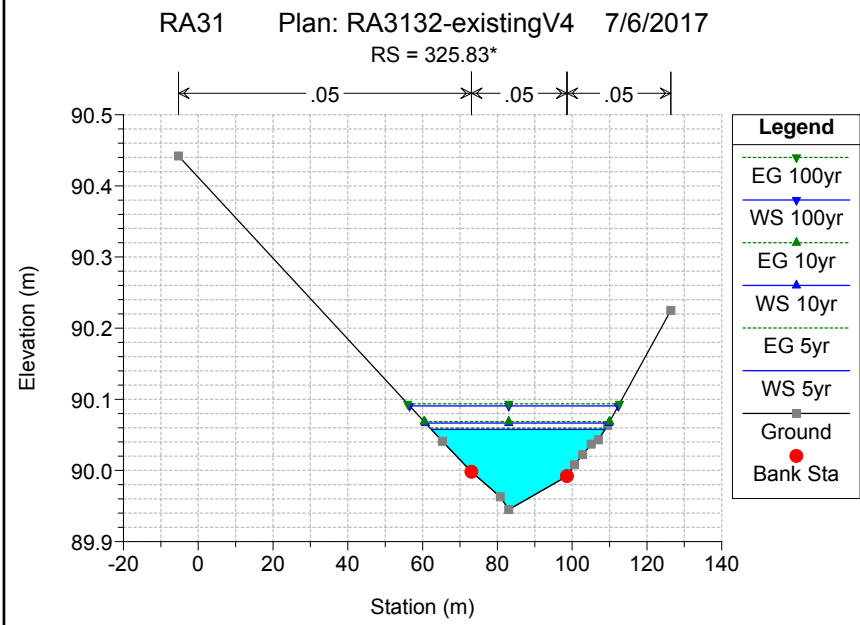
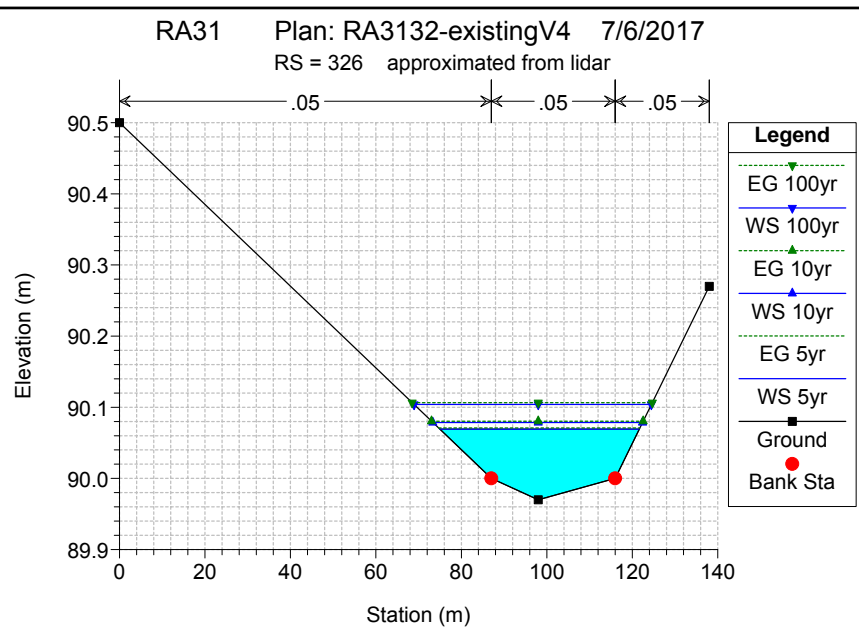
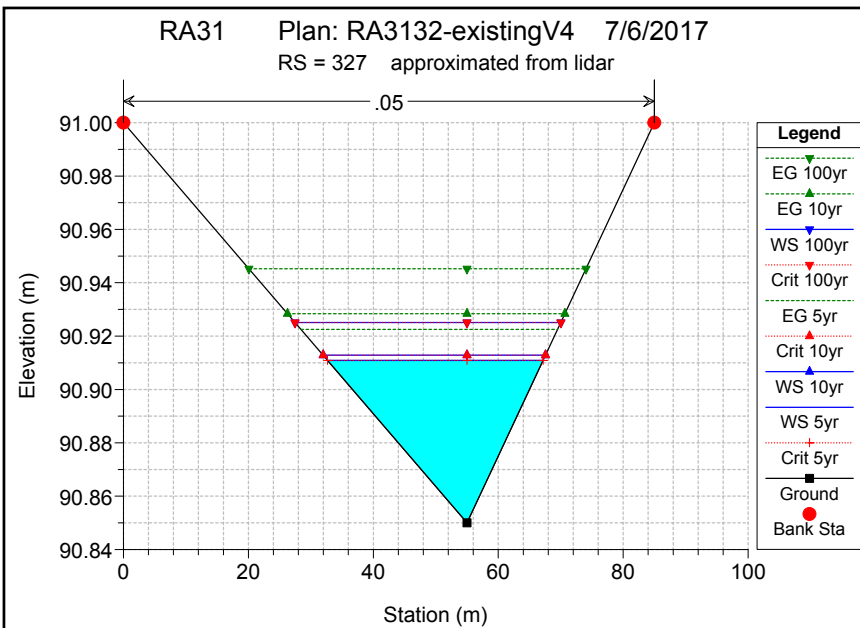
RA31 Plan: RA3132-existingV4 7/6/2017  
RS = 31321.2\*

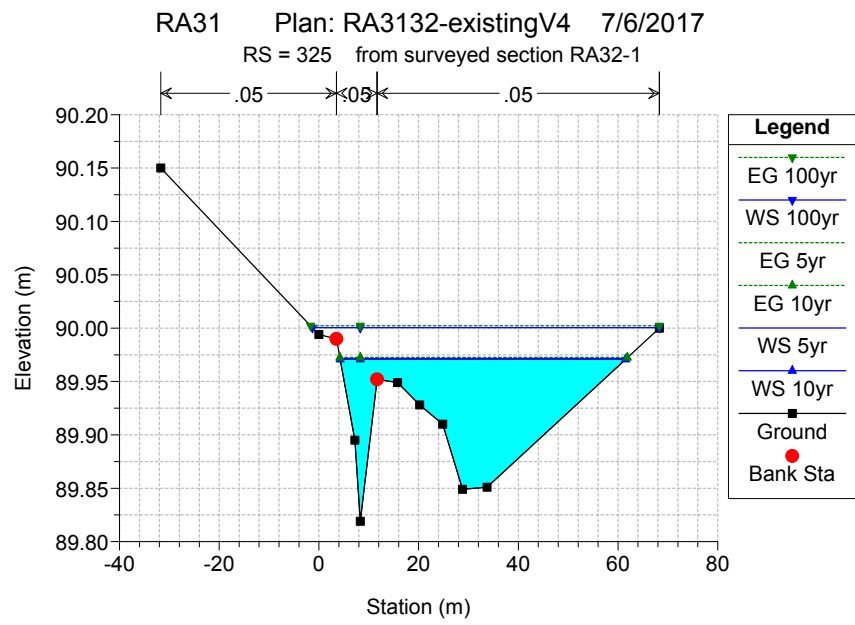
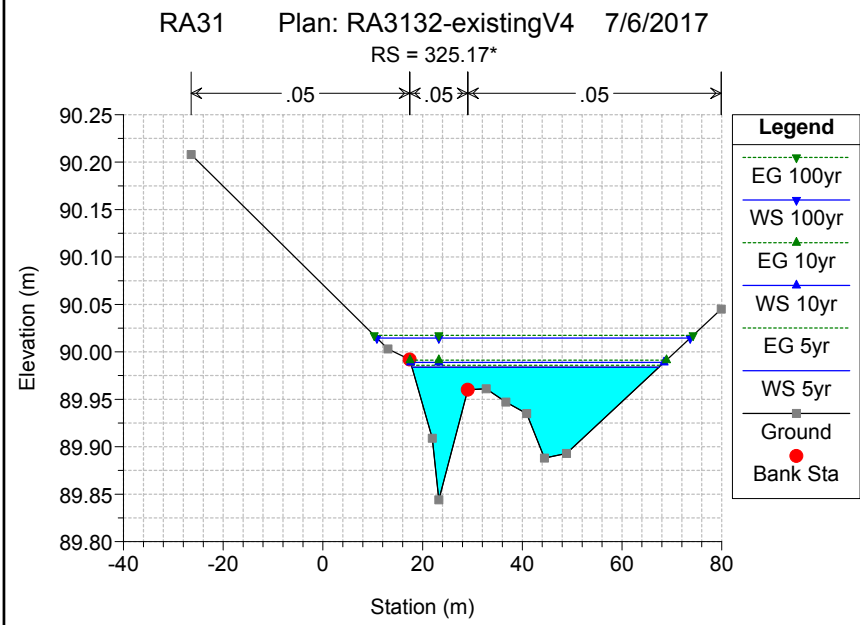
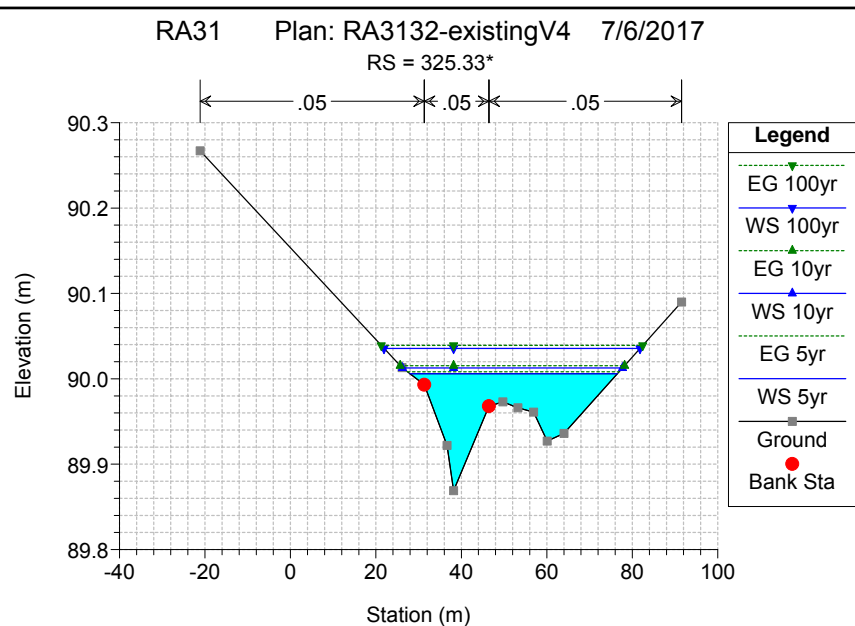
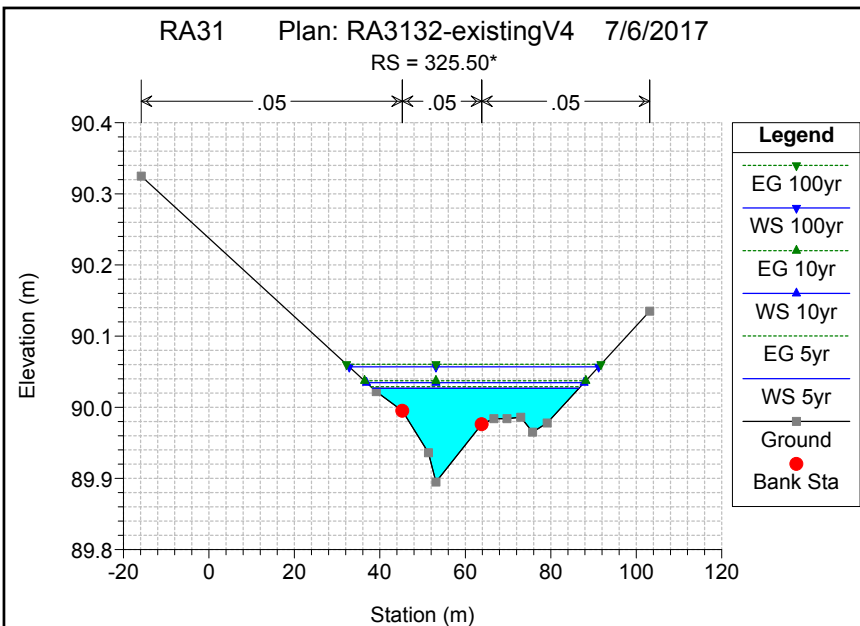


RA31 Plan: RA3132-existingV4 7/6/2017  
RS = 31321 interpolated from US cross section using 1% slope

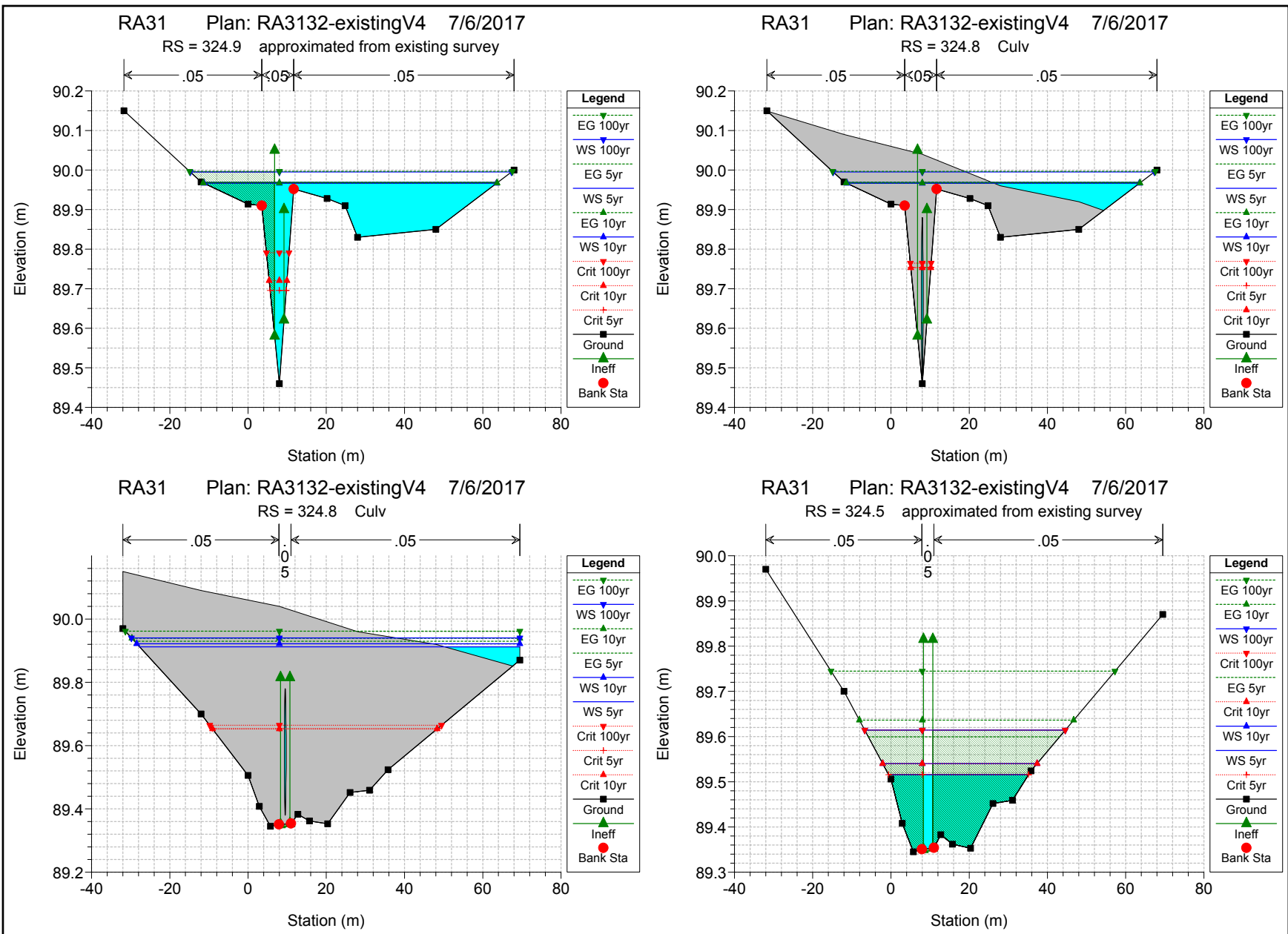




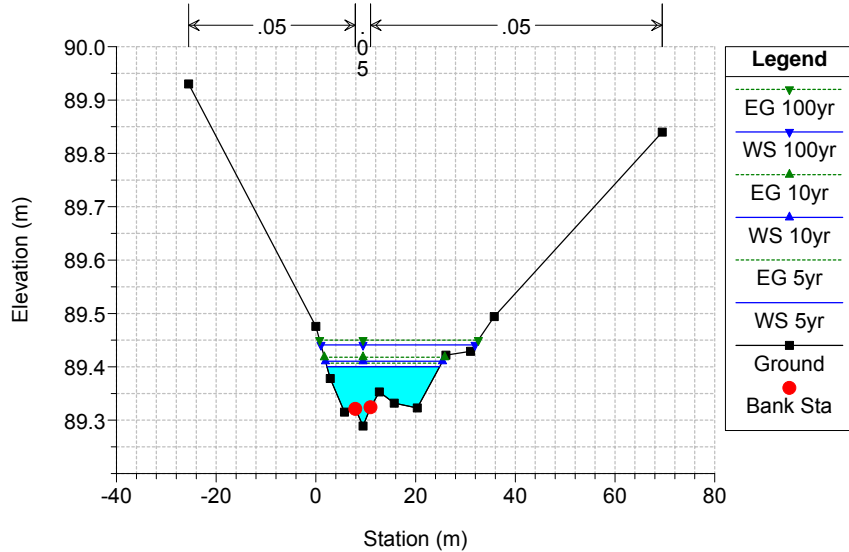




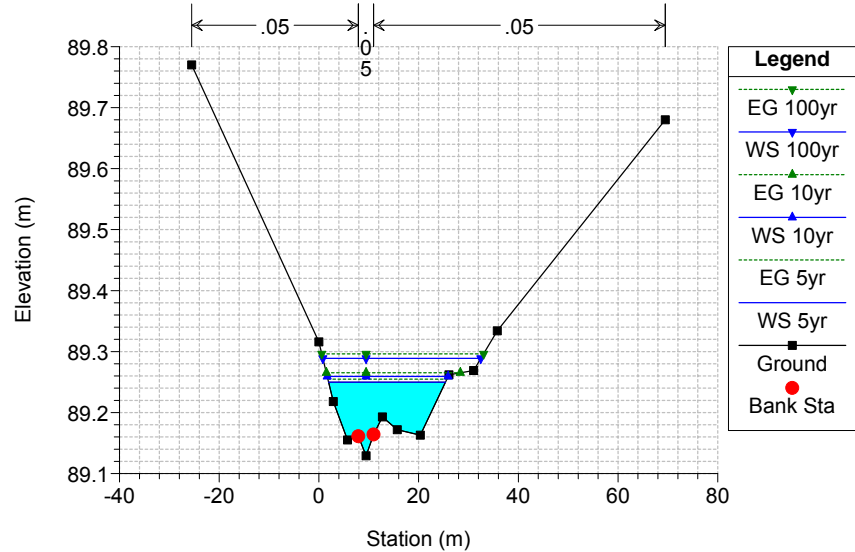




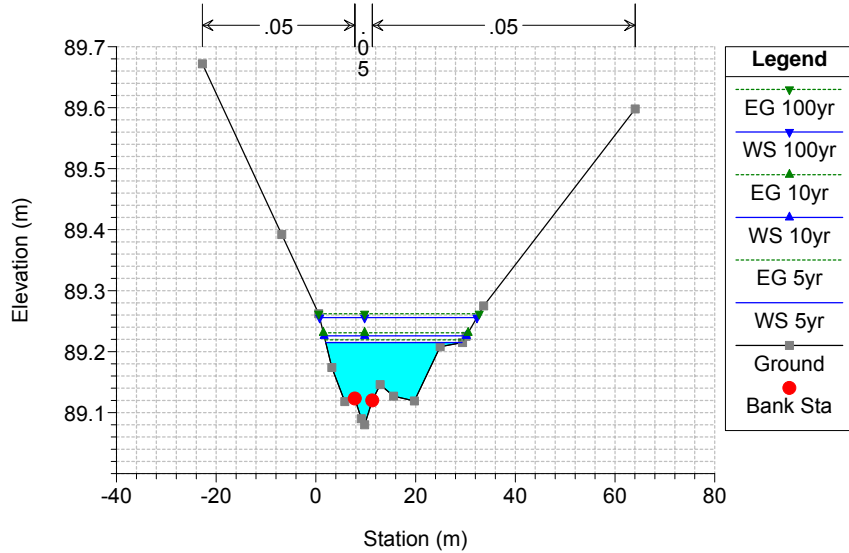
RA31 Plan: RA3132-existingV4 7/6/2017  
RS = 324 from surveyed section RA32-2



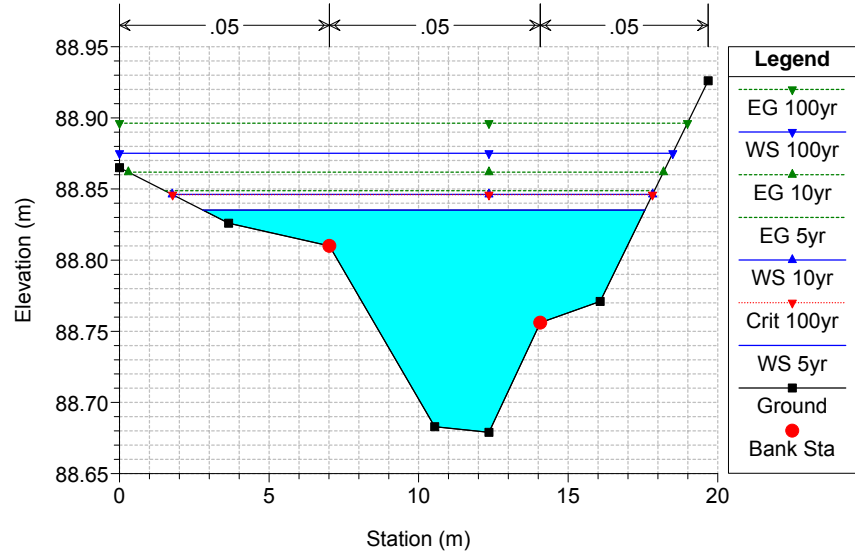
RA31 Plan: RA3132-existingV4 7/6/2017  
RS = 323 from surveyed section RA32-2



RA31 Plan: RA3132-existingV4 7/6/2017  
RS = 322.89\*



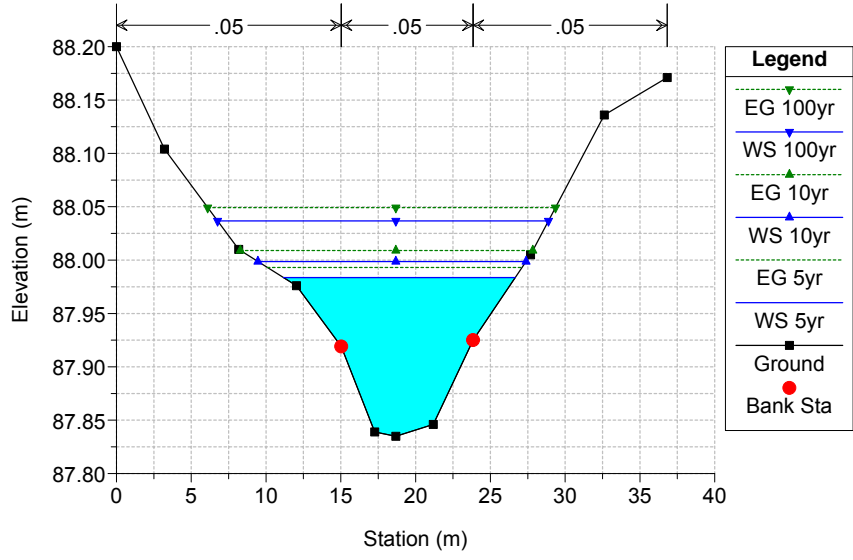
RA31 Plan: RA3132-existingV4 7/6/2017  
RS = 322 from surveyed section RA32-3





RA31 Plan: RA3132-existingV4 7/6/2017

RS = 321 from surveyed section RA32-3





31321.2°  
31321.6°  
31322

RA31+32

RA31+32

311

321

312

RA31

313

322

314

RA32

323

314.9

324

315.09°

324.5

315.36°

325

315.64°

315.82°

316

317

318

319

320

321

322

323

324

325

326

327

328

329

330

331

332

333

334

335

336

337

338

339

340

341

342

343

344

345

346

347

348

349

350

351

352

353

354

355

356

357

358

359

360

361

362

363

364

365

366

367

368

369

370

371

372

373

374

375

376

377

378

379

380

381

382

383

384

385

386

387

388

389

390

391

392

393

394

395

396

397

398

399

400

401

402

403

404

405

406

407

408

409

410

411

412

413

414

415

416

417

418

419

420

421

422

423

424

425

426

427

428

429

430

431

432

433

434

435

436

437

438

439

440

441

442

443

444

445

446

447

448

449

450

451

452

453

454

455

456

457

458

459

460

461

462

463

464

465

466

467

468

469

470

471

472

473

474

475

476

477

478

479

480

481

482

483

484

485

486

487

488

489

490

491

492

493

494

495

496

497

498

499

500

501

502

503

504

505

506

507

508

509

510

511

512

513

514

515

516

517

518

519

520

521

522

523

524

525

526

527

528

529

530

531

532

533

534

535

536

537

538

539

540

541

542

543

544

545

546

547

548

549

550

551

552

553

554

555

556

557

558

559

560

561

562

563

564

565

566

567

568

569

570

571

572

573

574

575

576

577

578

579

580

581

582

583

584

585

586

587

588

589

590

591

592

593

594

595

596

597

598

599

600

601

602

603

604

605

606

607

608

609

610

611

612

613

614

615

616

617

618

619

620

621

622

623

624

625

626

627

628

629

630

631

632

633

634

635

636

637

638

639

640

641

642

643

644

645

646

647

648

649

650

651

652



HEC-RAS Plan: Proposed V4

River	Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Vel Total (m/s)	Vel Left (m/s)	Vel Right (m/s)
RA32	RA32	327	5yr	0.50	90.85	90.91	90.91	90.92	0.059731	0.48	1.05	34.57	0.87	0.48		
RA32	RA32	327	10yr	0.62	90.85	90.91	90.91	90.93	0.076827	0.55	1.12	35.67	0.99	0.55		
RA32	RA32	327	100yr	1.01	90.85	90.93	90.93	90.95	0.078278	0.63	1.60	42.63	1.03	0.63		
RA32	RA32	326	5yr	0.50	89.97	90.07		90.07	0.002217	0.18	3.05	46.67	0.20	0.16	0.10	0.10
RA32	RA32	326	10yr	0.62	89.97	90.08		90.08	0.002262	0.20	3.51	49.09	0.20	0.18	0.11	0.11
RA32	RA32	326	100yr	1.01	89.97	90.10		90.11	0.002414	0.24	4.82	55.53	0.22	0.21	0.14	0.14
RA32	RA32	325.83*	5yr	0.50	89.94	90.06		90.06	0.002554	0.20	2.86	46.44	0.21	0.18	0.10	0.10
RA32	RA32	325.83*	10yr	0.62	89.94	90.07		90.07	0.002623	0.21	3.29	49.09	0.22	0.19	0.11	0.11
RA32	RA32	325.83*	100yr	1.01	89.94	90.09		90.09	0.002827	0.26	4.56	55.85	0.24	0.22	0.14	0.15
RA32	RA32	325.67*	5yr	0.50	89.92	90.04		90.05	0.003111	0.22	2.69	47.39	0.24	0.19	0.09	0.12
RA32	RA32	325.67*	10yr	0.62	89.92	90.05		90.05	0.003166	0.23	3.12	50.08	0.24	0.20	0.11	0.13
RA32	RA32	325.67*	100yr	1.01	89.92	90.08		90.08	0.003389	0.28	4.34	57.09	0.26	0.23	0.14	0.17
RA32	RA32	325.50*	5yr	0.50	89.89	90.03		90.03	0.003820	0.24	2.56	48.23	0.26	0.20	0.08	0.14
RA32	RA32	325.50*	10yr	0.62	89.89	90.04		90.04	0.003777	0.25	3.00	51.16	0.26	0.21	0.09	0.16
RA32	RA32	325.50*	100yr	1.01	89.89	90.06		90.06	0.004015	0.30	4.18	58.40	0.28	0.24	0.13	0.20
RA32	RA32	325.33*	5yr	0.50	89.87	90.01		90.01	0.004803	0.25	2.45	48.15	0.29	0.21	0.05	0.17
RA32	RA32	325.33*	10yr	0.62	89.87	90.02		90.02	0.004167	0.25	2.99	52.67	0.27	0.21	0.07	0.18
RA32	RA32	325.33*	100yr	1.01	89.87	90.04		90.04	0.004494	0.30	4.13	60.05	0.29	0.24	0.11	0.22
RA32	RA32	325.17*	5yr	0.50	89.84	89.98		89.98	0.005259	0.24	2.48	48.60	0.29	0.20		0.19
RA32	RA32	325.17*	10yr	0.62	89.84	90.00		90.00	0.003092	0.21	3.44	55.74	0.23	0.18	0.03	0.17
RA32	RA32	325.17*	100yr	1.01	89.84	90.02		90.02	0.003944	0.27	4.45	63.30	0.27	0.23	0.07	0.22
RA32	RA32	325	5yr	0.50	89.82	89.96		89.96	0.003233	0.18	3.03	54.41	0.23	0.17		0.16
RA32	RA32	325	10yr	0.62	89.82	89.99		89.99	0.001334	0.14	4.73	62.31	0.15	0.13		0.13
RA32	RA32	325	100yr	1.01	89.82	90.00		90.00	0.002155	0.19	5.60	70.02	0.20	0.18	0.04	0.18
RA32	RA32	324.9	5yr	0.50	89.46	89.96	89.70	89.96	0.000388	0.17	5.11	71.25	0.10	0.10		0.07
RA32	RA32	324.9	10yr	0.62	89.46	89.99	89.72	89.99	0.000276	0.16	6.88	80.13	0.09	0.09		0.07
RA32	RA32	324.9	100yr	1.01	89.46	90.00	89.79	90.00	0.000576	0.23	7.51	82.70	0.13	0.13		0.11
RA32	RA32	324.8		Culvert												
RA32	RA32	324.5	5yr	0.50	89.35	89.69	89.52	89.71	0.004279	0.63	0.80	62.57	0.35	0.63		
RA32	RA32	324.5	10yr	0.62	89.35	89.74	89.54	89.76	0.004060	0.67	0.92	71.06	0.35	0.67		
RA32	RA32	324.5	100yr	1.01	89.35	89.90	89.61	89.90	0.000014	0.05	29.55	96.29	0.02	0.03	0.03	0.03
RA32	RA32	324	5yr	0.50	89.29	89.69	89.43	89.69	0.000830	0.30	1.68	66.61	0.16	0.30	0.30	0.29
RA32	RA32	324	10yr	0.62	89.29	89.74	89.44	89.75	0.000818	0.33	1.91	74.57	0.16	0.32	0.32	0.31
RA32	RA32	324	100yr	1.01	89.29	89.89	89.49	89.90	0.000790	0.39	2.59	92.75	0.16	0.39	0.39	0.38
RA32	RA32	323.5		Culvert												
RA32	RA32	323	5yr	0.50	89.13	89.26	89.26	89.32	0.050118	1.07	0.49	25.46	1.00	1.03	0.98	0.89

HEC-RAS Plan: Proposed V4 (Continued)

River	Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Vel Total (m/s)	Vel Left (m/s)	Vel Right (m/s)
RA32	RA32	323	10yr	0.62	89.13	89.28	89.28	89.34	0.048383	1.15	0.56	30.71	1.00	1.10	1.06	0.98
RA32	RA32	323	100yr	1.01	89.13	89.33	89.33	89.41	0.043860	1.34	0.77	35.83	1.01	1.30	1.26	1.19
RA32	RA32	322.89*	5yr	0.50	89.08	89.21		89.22	0.006683	0.39	1.80	27.36	0.36	0.28	0.27	0.24
RA32	RA32	322.89*	10yr	0.62	89.08	89.23		89.23	0.006408	0.40	2.11	28.53	0.36	0.29	0.28	0.26
RA32	RA32	322.89*	100yr	1.01	89.08	89.26		89.26	0.006068	0.45	3.01	31.55	0.37	0.33	0.32	0.30
RA32	RA32	322	5yr	0.50	88.68	88.84		88.85	0.013501	0.54	1.05	14.78	0.52	0.48	0.14	0.34
RA32	RA32	322	10yr	0.62	88.68	88.85		88.86	0.014099	0.59	1.22	16.06	0.53	0.51	0.18	0.37
RA32	RA32	322	100yr	1.01	88.68	88.88	88.85	88.90	0.015214	0.70	1.73	18.50	0.58	0.58	0.30	0.45
RA32	RA32	321	5yr	0.50	87.84	87.98		87.99	0.008273	0.44	1.25	15.50	0.41	0.40	0.17	0.17
RA32	RA32	321	10yr	0.62	87.84	88.00		88.01	0.007974	0.47	1.51	17.92	0.41	0.41	0.18	0.20
RA32	RA32	321	100yr	1.01	87.84	88.04		88.05	0.007394	0.53	2.28	22.13	0.41	0.44	0.25	0.26
RA31+32	RA31+32	31322	5yr	0.95	87.26	87.51		87.53	0.009969	0.60	1.74	15.65	0.47	0.55	0.26	0.18
RA31+32	RA31+32	31322	10yr	1.18	87.26	87.53		87.55	0.009982	0.65	2.07	18.02	0.48	0.57	0.28	0.22
RA31+32	RA31+32	31322	100yr	1.93	87.26	87.58		87.60	0.010002	0.76	3.04	21.41	0.50	0.64	0.39	0.31
RA31+32	RA31+32	31321.8*	5yr	0.95	87.16	87.41		87.42	0.010026	0.60	1.74	15.61	0.47	0.55	0.26	0.18
RA31+32	RA31+32	31321.8*	10yr	1.18	87.16	87.43		87.45	0.010014	0.65	2.07	17.99	0.48	0.57	0.28	0.22
RA31+32	RA31+32	31321.8*	100yr	1.93	87.16	87.48		87.50	0.009997	0.76	3.04	21.41	0.50	0.64	0.39	0.31
RA31+32	RA31+32	31321.6*	5yr	0.95	87.06	87.31		87.33	0.009975	0.60	1.74	15.64	0.47	0.55	0.26	0.18
RA31+32	RA31+32	31321.6*	10yr	1.18	87.06	87.33		87.35	0.009984	0.65	2.07	18.01	0.48	0.57	0.28	0.22
RA31+32	RA31+32	31321.6*	100yr	1.93	87.06	87.38		87.40	0.009997	0.76	3.04	21.41	0.50	0.64	0.39	0.31
RA31+32	RA31+32	31321.4*	5yr	0.95	86.96	87.21		87.23	0.010017	0.60	1.74	15.62	0.47	0.55	0.26	0.18
RA31+32	RA31+32	31321.4*	10yr	1.18	86.96	87.23		87.25	0.010012	0.65	2.07	17.99	0.48	0.57	0.28	0.22
RA31+32	RA31+32	31321.4*	100yr	1.93	86.96	87.28		87.30	0.010001	0.76	3.04	21.41	0.50	0.64	0.39	0.31
RA31+32	RA31+32	31321.2*	5yr	0.95	86.86	87.11		87.13	0.009982	0.60	1.74	15.63	0.47	0.55	0.26	0.18
RA31+32	RA31+32	31321.2*	10yr	1.18	86.86	87.13		87.15	0.009986	0.65	2.07	18.01	0.48	0.57	0.28	0.22
RA31+32	RA31+32	31321.2*	100yr	1.93	86.86	87.18		87.20	0.009996	0.76	3.04	21.41	0.50	0.64	0.39	0.31
RA31+32	RA31+32	31321	5yr	0.95	86.76	87.01	86.95	87.03	0.010009	0.60	1.74	15.62	0.47	0.55	0.26	0.18
RA31+32	RA31+32	31321	10yr	1.18	86.76	87.03	86.96	87.05	0.010010	0.65	2.07	17.99	0.48	0.57	0.28	0.22
RA31+32	RA31+32	31321	100yr	1.93	86.76	87.08	87.01	87.10	0.010001	0.76	3.04	21.40	0.50	0.64	0.39	0.31
RA31	RA31	317	5yr	0.45	90.00	90.13		90.14	0.008825	0.30	1.47	22.49	0.38	0.30		
RA31	RA31	317	10yr	0.56	90.00	90.14		90.15	0.008742	0.32	1.74	24.46	0.38	0.32		
RA31	RA31	317	100yr	0.93	90.00	90.17		90.18	0.008707	0.36	2.55	29.61	0.40	0.36		
RA31	RA31	316	5yr	0.45	89.76	89.90		89.91	0.005840	0.26	1.69	23.44	0.31	0.26		
RA31	RA31	316	10yr	0.56	89.76	89.92		89.92	0.005847	0.28	1.99	25.44	0.32	0.28		
RA31	RA31	316	100yr	0.93	89.76	89.95		89.95	0.005896	0.32	2.91	30.73	0.33	0.32		
RA31	RA31	315.91*	5yr	0.45	89.73	89.87		89.87	0.005783	0.26	1.70	23.51	0.31	0.26		
RA31	RA31	315.91*	10yr	0.56	89.73	89.88		89.89	0.005801	0.28	2.00	25.51	0.32	0.28		



HEC-RAS Plan: Proposed V4 (Continued)

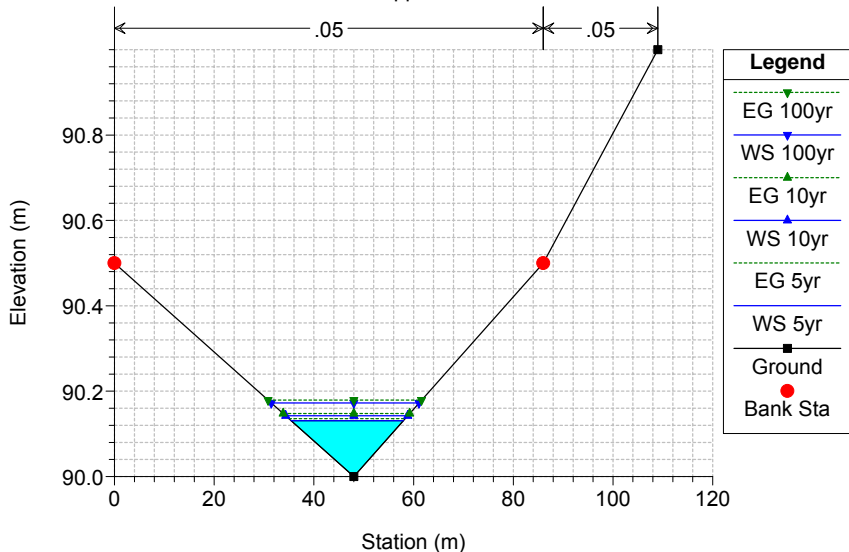
River	Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Vel Total (m/s)	Vel Left (m/s)	Vel Right (m/s)
RA31	RA31	315.91*	100yr	0.93	89.73	89.91		89.92	0.005940	0.32	2.90	30.72	0.33	0.32		
RA31	RA31	315.82*	5yr	0.45	89.69	89.84		89.84	0.005865	0.26	1.69	23.55	0.32	0.26		
RA31	RA31	315.82*	10yr	0.56	89.69	89.85		89.85	0.005899	0.28	1.99	25.54	0.32	0.28		
RA31	RA31	315.82*	100yr	0.93	89.69	89.88		89.89	0.006037	0.32	2.89	30.77	0.33	0.32		
RA31	RA31	315.73*	5yr	0.45	89.66	89.80		89.81	0.005765	0.26	1.70	23.66	0.31	0.26		
RA31	RA31	315.73*	10yr	0.56	89.66	89.82		89.82	0.005789	0.28	2.01	25.67	0.32	0.28		
RA31	RA31	315.73*	100yr	0.93	89.66	89.84		89.85	0.006299	0.33	2.83	30.82	0.34	0.33	0.03	
RA31	RA31	315.64*	5yr	0.45	89.63	89.77		89.77	0.005946	0.27	1.69	23.72	0.32	0.27		
RA31	RA31	315.64*	10yr	0.56	89.63	89.78		89.78	0.006089	0.28	1.97	25.64	0.33	0.28		
RA31	RA31	315.64*	100yr	0.93	89.63	89.81		89.81	0.006169	0.34	2.78	32.73	0.34	0.33	0.08	0.07
RA31	RA31	315.55*	5yr	0.45	89.59	89.74		89.74	0.005695	0.26	1.71	24.12	0.31	0.26	0.02	
RA31	RA31	315.55*	10yr	0.56	89.59	89.75		89.75	0.005680	0.28	1.99	28.30	0.32	0.28	0.05	0.03
RA31	RA31	315.55*	100yr	0.93	89.59	89.77		89.78	0.005719	0.34	2.83	33.64	0.33	0.33	0.12	0.13
RA31	RA31	315.45*	5yr	0.45	89.56	89.71		89.71	0.003235	0.23	2.07	29.98	0.24	0.22	0.08	0.08
RA31	RA31	315.45*	10yr	0.56	89.56	89.72		89.72	0.003423	0.25	2.37	31.66	0.25	0.24	0.09	0.11
RA31	RA31	315.45*	100yr	0.93	89.56	89.75		89.75	0.004191	0.32	3.17	34.61	0.29	0.29	0.15	0.16
RA31	RA31	315.36*	5yr	0.45	89.52	89.70		89.70	0.001187	0.17	2.97	33.52	0.16	0.15	0.09	0.09
RA31	RA31	315.36*	10yr	0.56	89.52	89.71		89.71	0.001427	0.20	3.25	35.29	0.17	0.17	0.10	0.10
RA31	RA31	315.36*	100yr	0.93	89.52	89.73		89.73	0.002434	0.28	3.97	43.29	0.23	0.23	0.15	0.12
RA31	RA31	315.27*	5yr	0.45	89.49	89.70		89.70	0.000445	0.13	4.54	48.73	0.10	0.10	0.07	0.06
RA31	RA31	315.27*	10yr	0.56	89.49	89.71		89.71	0.000563	0.15	4.92	50.81	0.11	0.11	0.08	0.08
RA31	RA31	315.27*	100yr	0.93	89.49	89.72		89.72	0.001071	0.21	5.70	54.82	0.16	0.16	0.11	0.11
RA31	RA31	315.18*	5yr	0.45	89.46	89.70		89.70	0.000159	0.09	7.07	64.10	0.06	0.06	0.05	0.05
RA31	RA31	315.18*	10yr	0.56	89.46	89.70		89.70	0.000209	0.10	7.55	66.26	0.07	0.07	0.06	0.06
RA31	RA31	315.18*	100yr	0.93	89.46	89.72		89.72	0.000431	0.15	8.44	70.15	0.10	0.11	0.08	0.09
RA31	RA31	315.09*	5yr	0.45	89.42	89.70		89.70	0.000057	0.06	10.63	77.56	0.04	0.04	0.04	0.04
RA31	RA31	315.09*	10yr	0.56	89.42	89.70		89.70	0.000077	0.07	11.18	78.64	0.04	0.05	0.04	0.05
RA31	RA31	315.09*	100yr	0.93	89.42	89.72		89.72	0.000166	0.11	12.18	80.54	0.07	0.08	0.07	0.07
RA31	RA31	315	5yr	0.45	89.39	89.70		89.70	0.000022	0.04	14.94	84.96	0.02	0.03	0.03	0.03
RA31	RA31	315	10yr	0.56	89.39	89.70		89.70	0.000030	0.05	15.54	85.32	0.03	0.04	0.03	0.03
RA31	RA31	315	100yr	0.93	89.39	89.72		89.72	0.000068	0.08	16.59	85.95	0.04	0.06	0.05	0.05
RA31	RA31	314.9	5yr	0.45	89.18	89.70	89.39	89.70	0.000018	0.05	15.49	84.95	0.02	0.03	0.03	0.03
RA31	RA31	314.9	10yr	0.56	89.18	89.70	89.41	89.70	0.000025	0.05	16.09	85.31	0.03	0.03	0.03	0.03
RA31	RA31	314.9	100yr	0.93	89.18	89.72	89.48	89.72	0.000058	0.08	17.12	85.93	0.04	0.05	0.05	0.05
RA31	RA31	314.8														
RA31	RA31	314.5	5yr	0.45	89.24	89.42	89.42	89.49	0.044704	1.21	0.37	72.95	0.99	1.21		

HEC-RAS Plan: Proposed V4 (Continued)

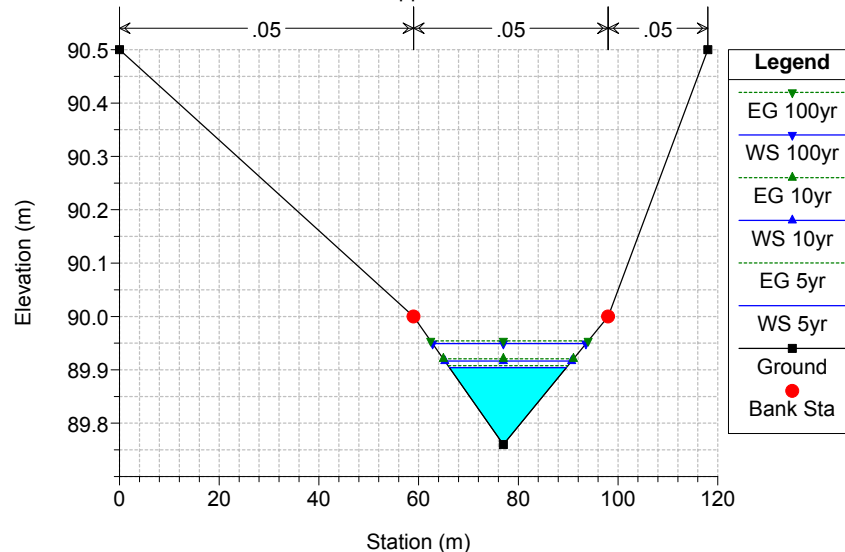
River	Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Vel Total (m/s)	Vel Left (m/s)	Vel Right (m/s)
RA31	RA31	314.5	10yr	0.56	89.24	89.44	89.44	89.53	0.044264	1.32	0.42	75.98	1.01	1.32		
RA31	RA31	314.5	100yr	0.93	89.24	89.57	89.51	89.57	0.000051	0.06	18.32	88.53	0.04	0.05	0.05	0.05
RA31	RA31	314	5yr	0.45	89.01	89.36	89.12	89.37	0.000926	0.29	1.52	28.71	0.16	0.29		
RA31	RA31	314	10yr	0.56	89.01	89.41	89.14	89.42	0.000901	0.32	1.75	59.11	0.16	0.32		
RA31	RA31	314	100yr	0.93	89.01	89.56	89.19	89.57	0.000849	0.38	2.41	71.91	0.17	0.38		
RA31	RA31	313.5		Culvert												
RA31	RA31	313	5yr	0.45	88.85	89.01	88.96	89.04	0.013742	0.66	0.68	11.48	0.55	0.66		
RA31	RA31	313	10yr	0.56	88.85	89.03	88.98	89.06	0.015125	0.74	0.75	12.34	0.58	0.74		
RA31	RA31	313	100yr	0.93	88.85	89.07	89.03	89.12	0.020552	1.00	0.93	15.37	0.70	1.00		
RA31	RA31	312.90*	5yr	0.45	88.81	88.98		88.99	0.005474	0.35	1.28	11.29	0.33	0.35	0.03	
RA31	RA31	312.90*	10yr	0.56	88.81	89.00		89.01	0.005475	0.38	1.48	12.35	0.34	0.38	0.07	0.01
RA31	RA31	312.90*	100yr	0.93	88.81	89.04		89.05	0.005433	0.46	2.12	16.13	0.35	0.44	0.15	0.12
RA31	RA31	312	5yr	0.45	88.48	88.66		88.67	0.008971	0.48	1.13	13.79	0.43	0.40	0.29	0.24
RA31	RA31	312	10yr	0.56	88.48	88.68		88.69	0.008995	0.51	1.32	14.58	0.44	0.42	0.32	0.27
RA31	RA31	312	100yr	0.93	88.48	88.71		88.73	0.009398	0.62	1.97	21.18	0.46	0.47	0.40	0.26
RA31	RA31	311	5yr	0.45	87.81	88.00	87.97	88.03	0.015357	0.73	0.74	8.14	0.58	0.60	0.32	0.30
RA31	RA31	311	10yr	0.56	87.81	88.02	87.99	88.04	0.014998	0.77	0.93	11.12	0.58	0.60	0.37	0.24
RA31	RA31	311	100yr	0.93	87.81	88.06	88.04	88.09	0.014033	0.86	1.44	12.99	0.59	0.64	0.47	0.38



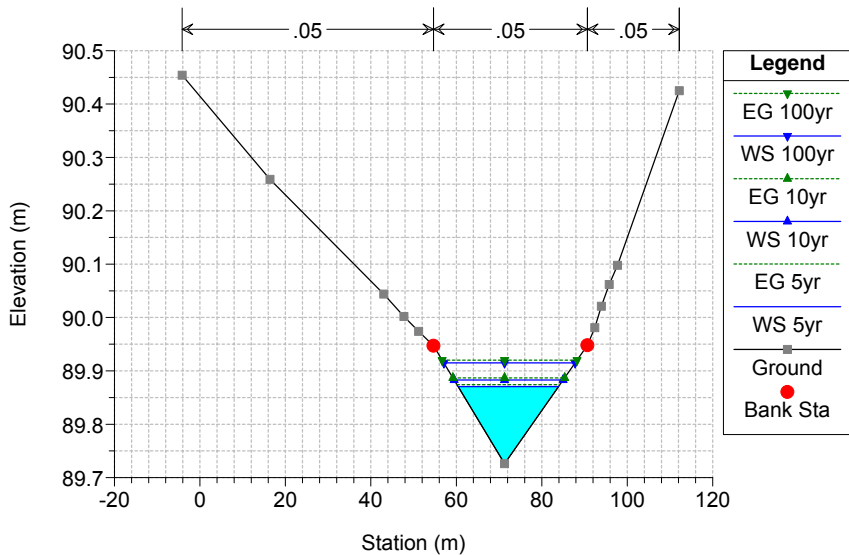
RA31 Plan: RA3132-proposedV4 7/6/2017  
RS = 317 approximated from lidar



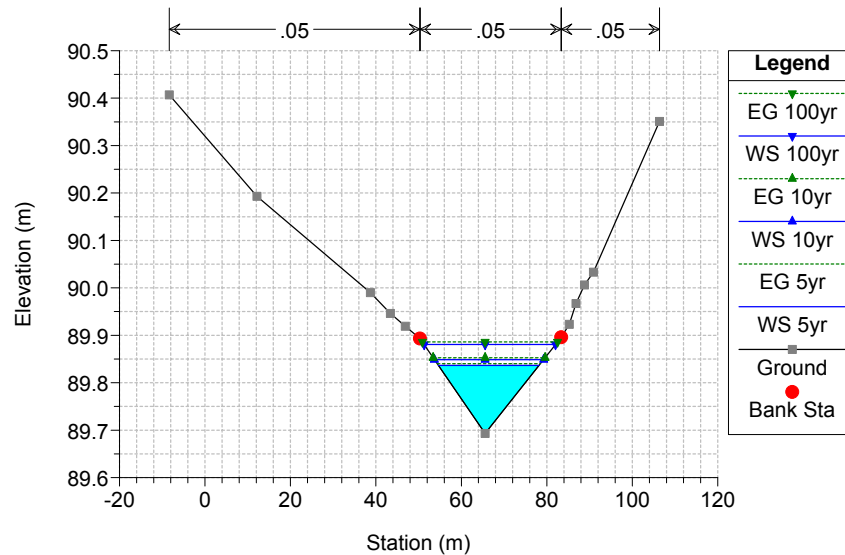
RA31 Plan: RA3132-proposedV4 7/6/2017  
RS = 316 approximated from lidar



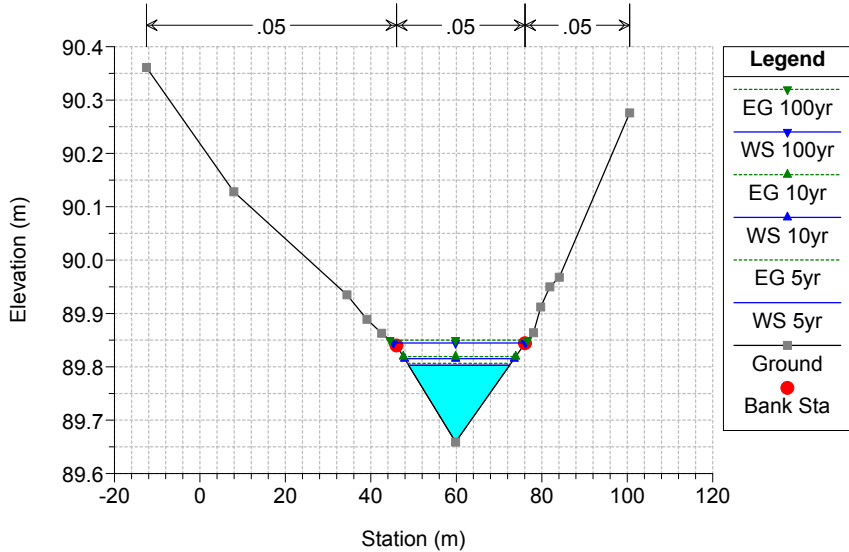
RA31 Plan: RA3132-proposedV4 7/6/2017  
RS = 315.91\*



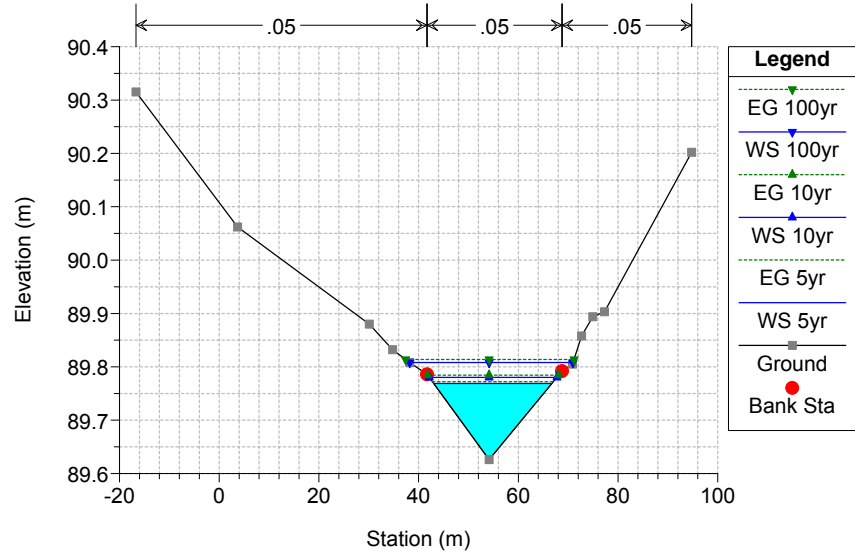
RA31 Plan: RA3132-proposedV4 7/6/2017  
RS = 315.82\*



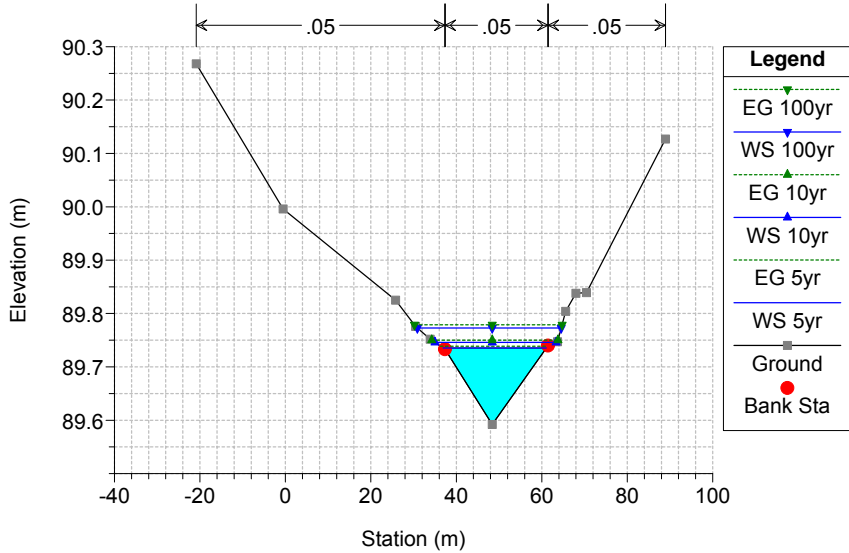
RA31 Plan: RA3132-proposedV4 7/6/2017  
RS = 315.73\*



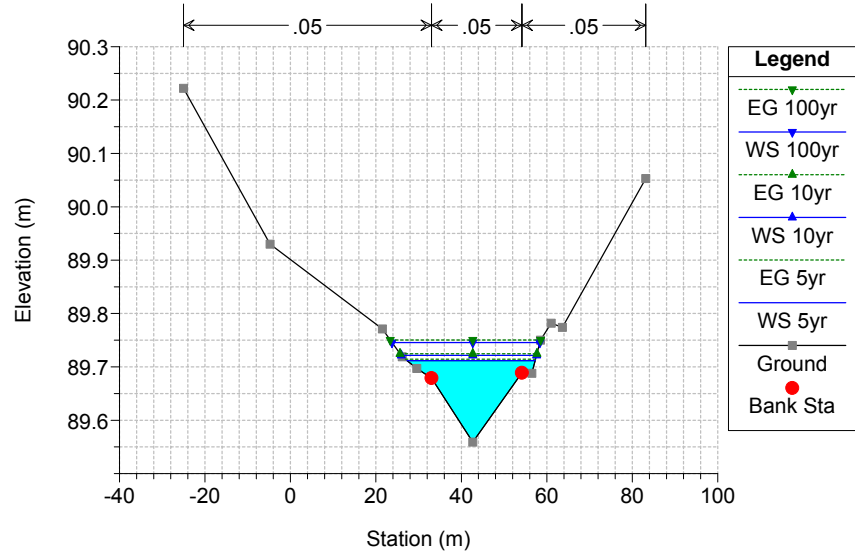
RA31 Plan: RA3132-proposedV4 7/6/2017  
RS = 315.64\*



RA31 Plan: RA3132-proposedV4 7/6/2017  
RS = 315.55\*

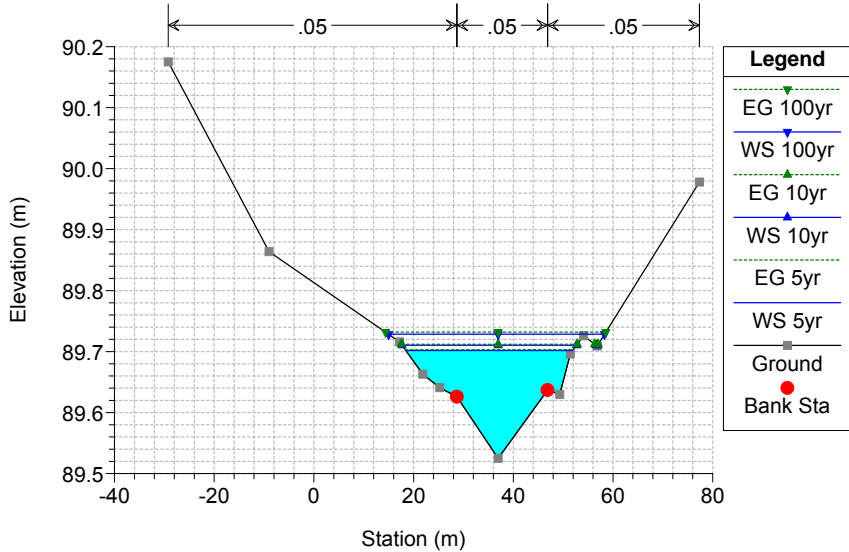


RA31 Plan: RA3132-proposedV4 7/6/2017  
RS = 315.45\*

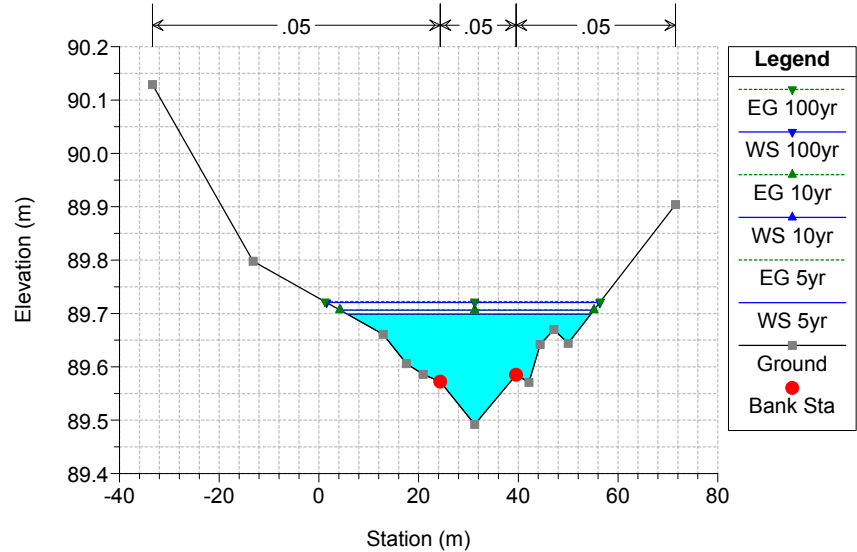




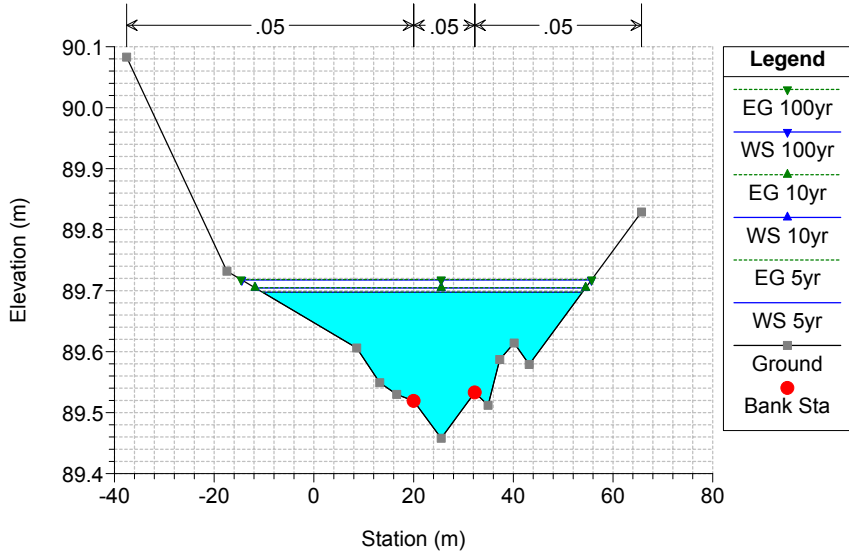
RA31 Plan: RA3132-proposedV4 7/6/2017  
RS = 315.36\*



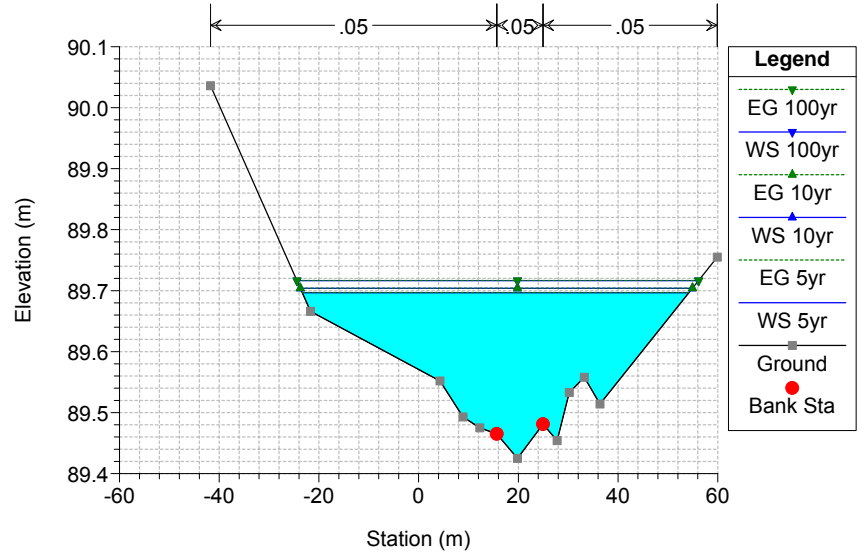
RA31 Plan: RA3132-proposedV4 7/6/2017  
RS = 315.27\*

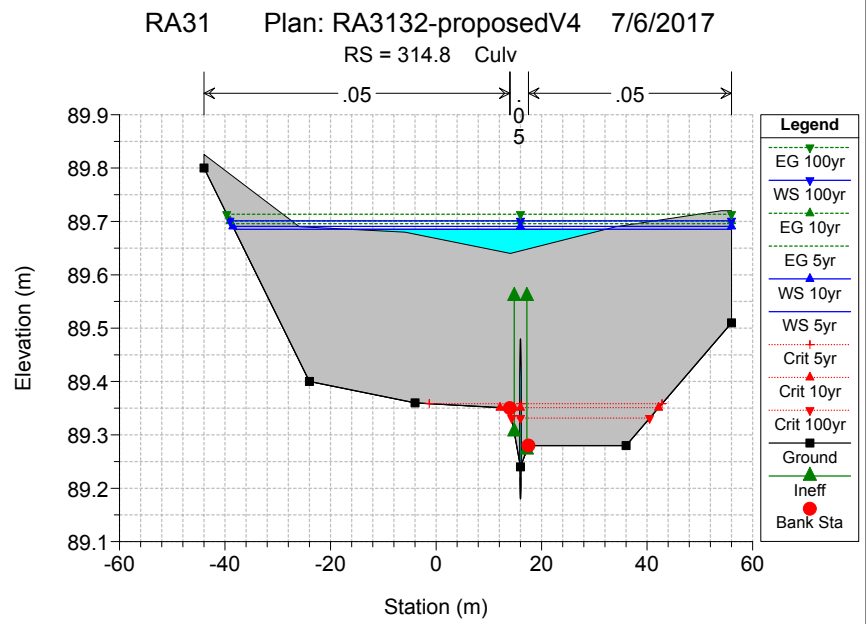
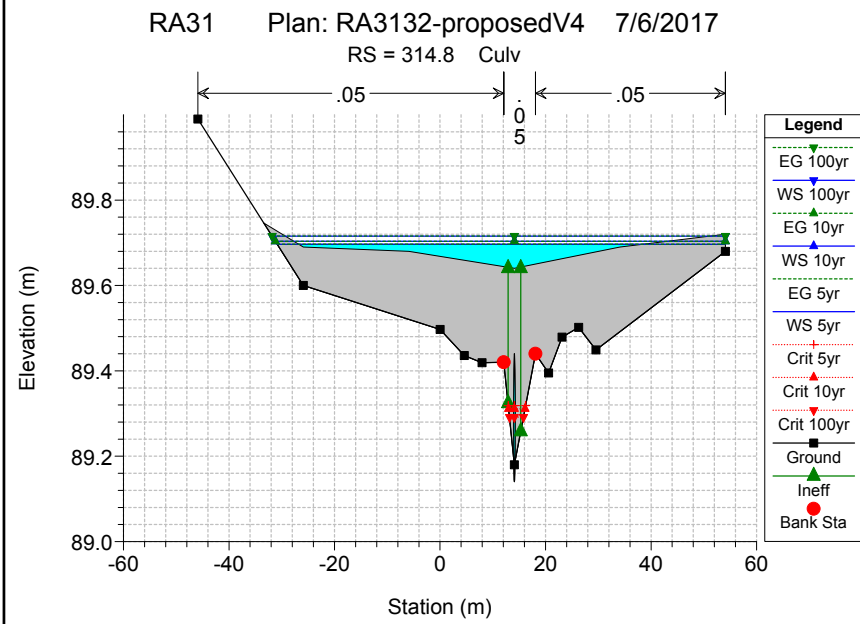
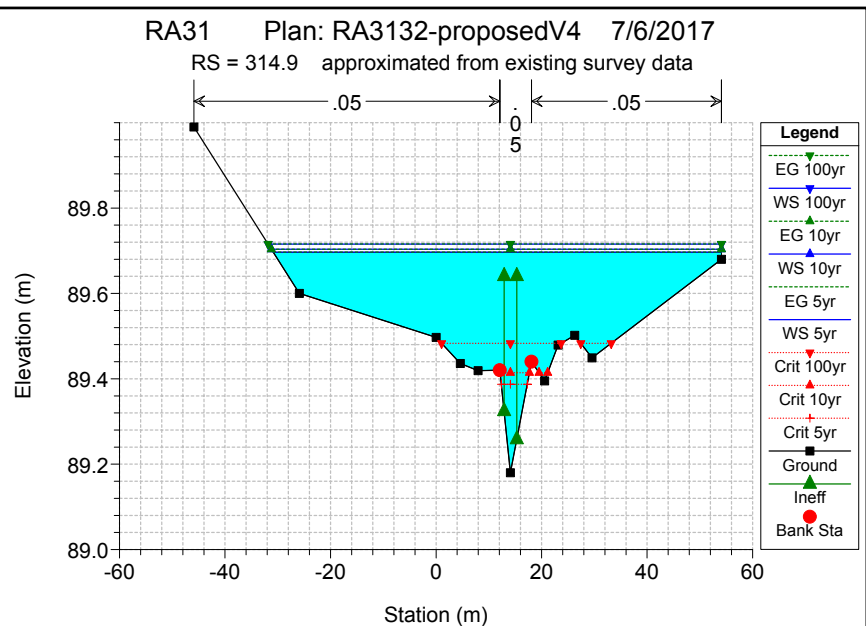
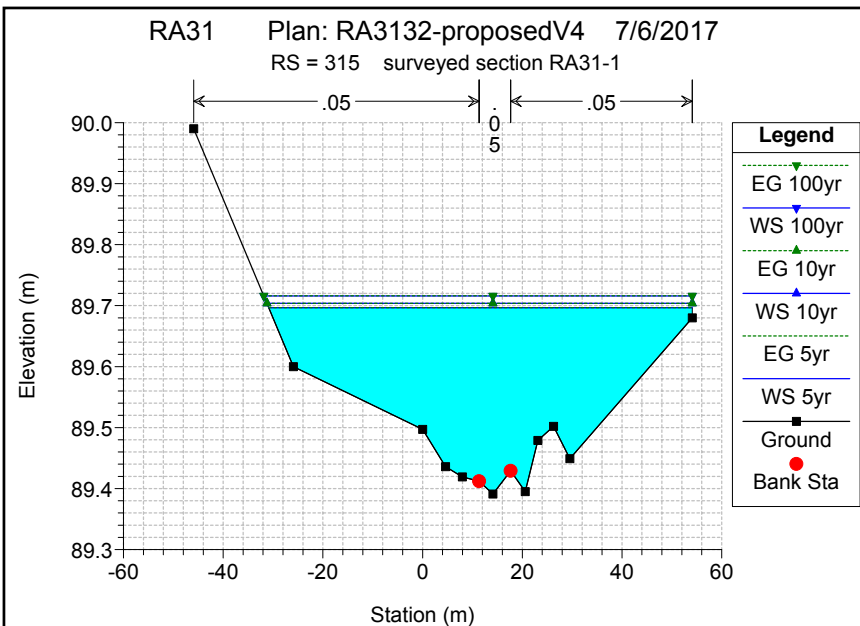


RA31 Plan: RA3132-proposedV4 7/6/2017  
RS = 315.18\*



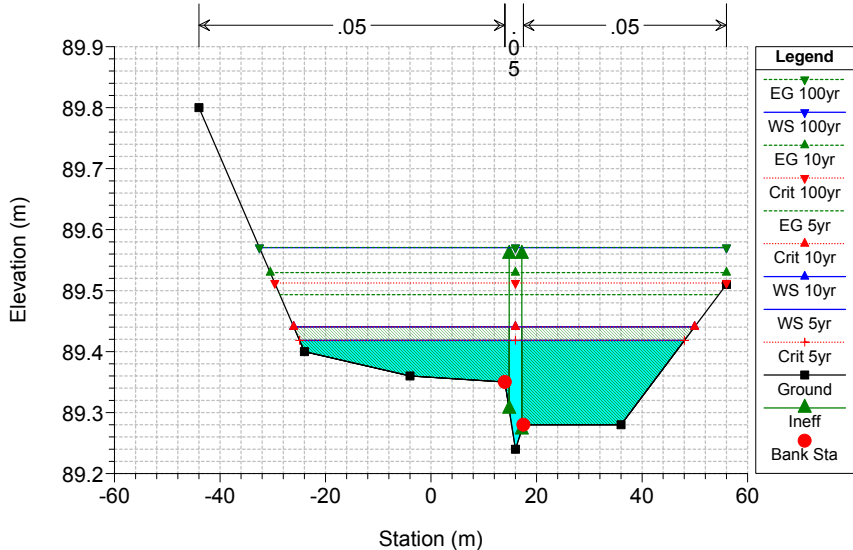
RA31 Plan: RA3132-proposedV4 7/6/2017  
RS = 315.09\*



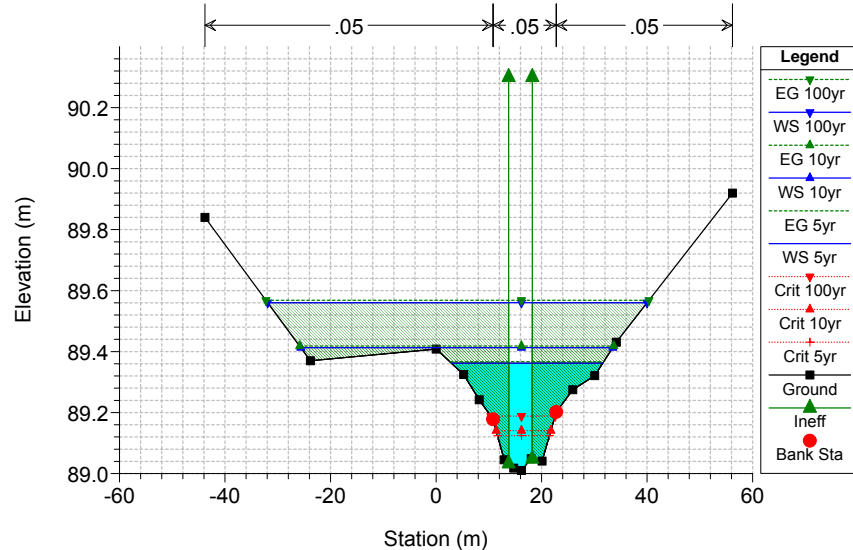




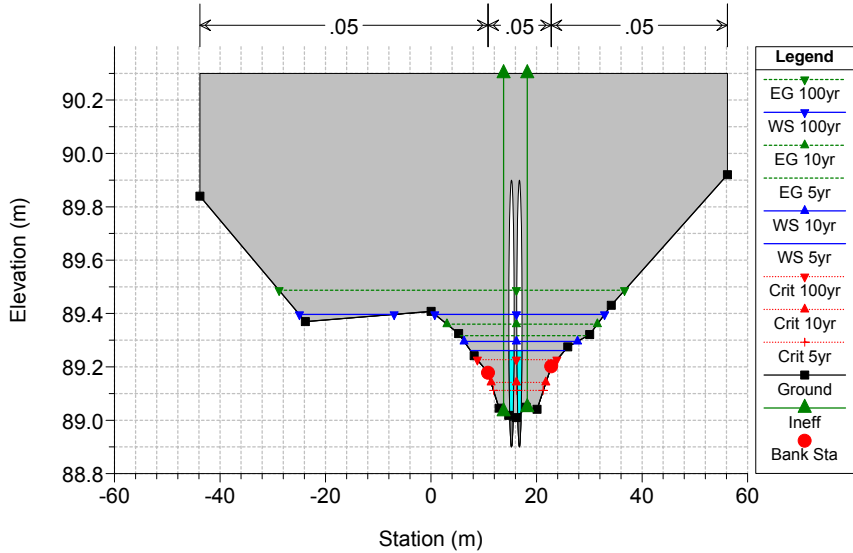
RA31 Plan: RA3132-proposedV4 7/6/2017  
 RS = 314.5 approximated from existing survey data



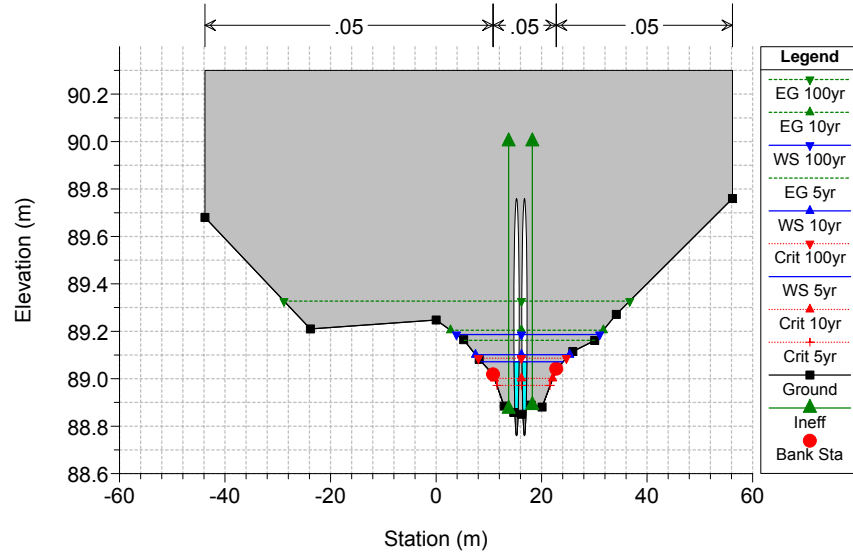
RA31 Plan: RA3132-proposedV4 7/6/2017  
 RS = 314

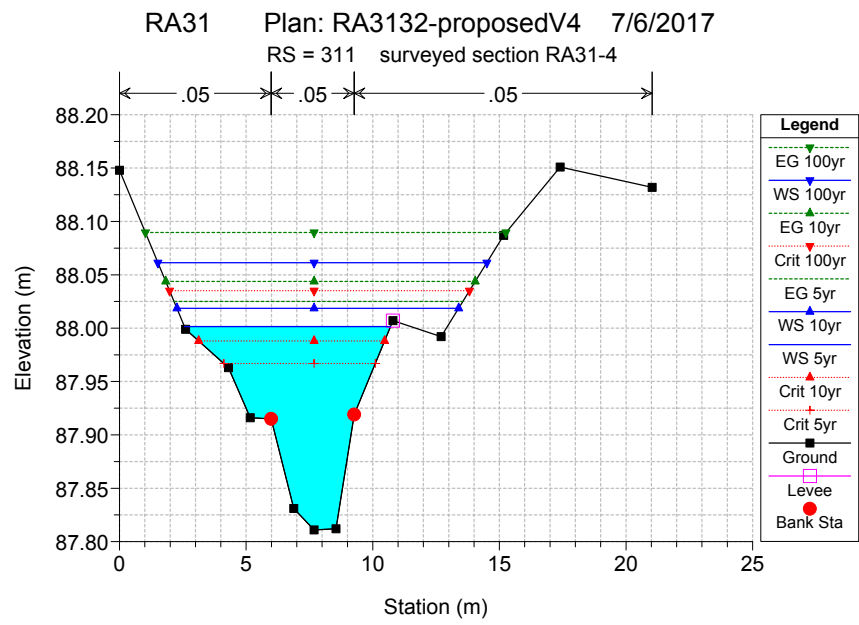
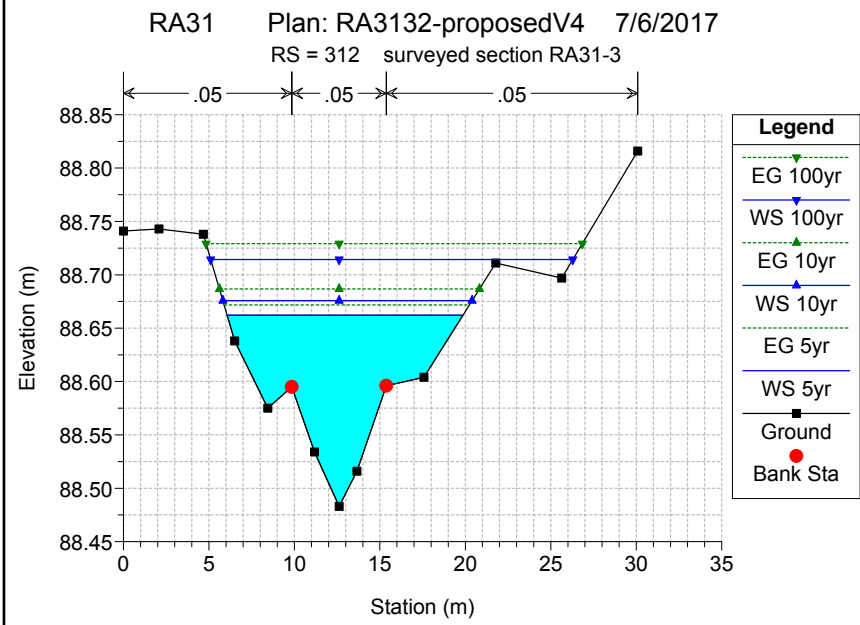
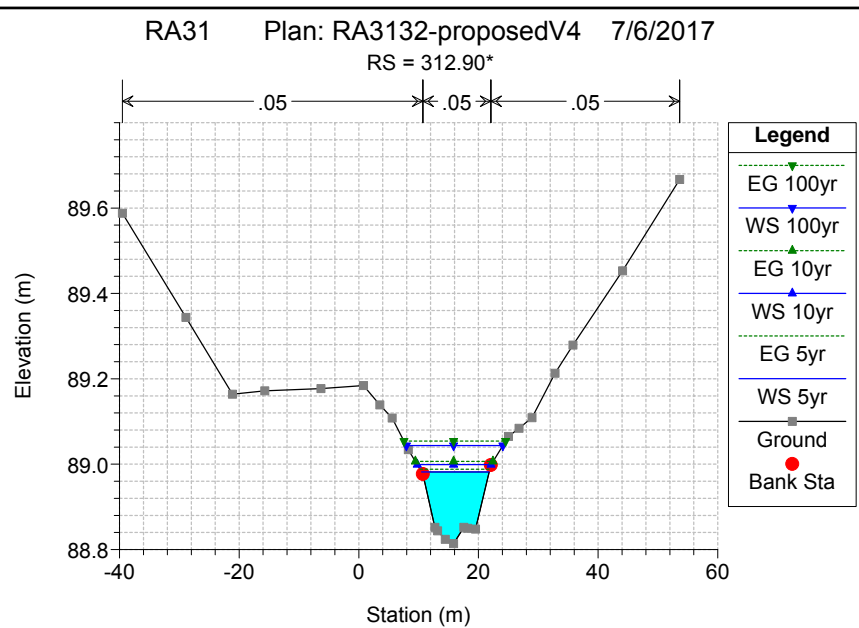
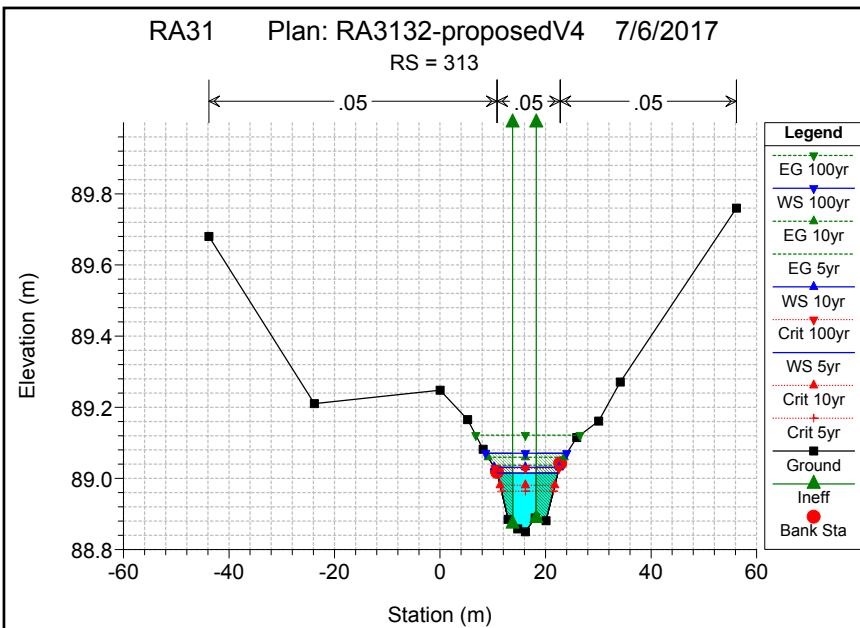


RA31 Plan: RA3132-proposedV4 7/6/2017  
 RS = 313.5 Culv



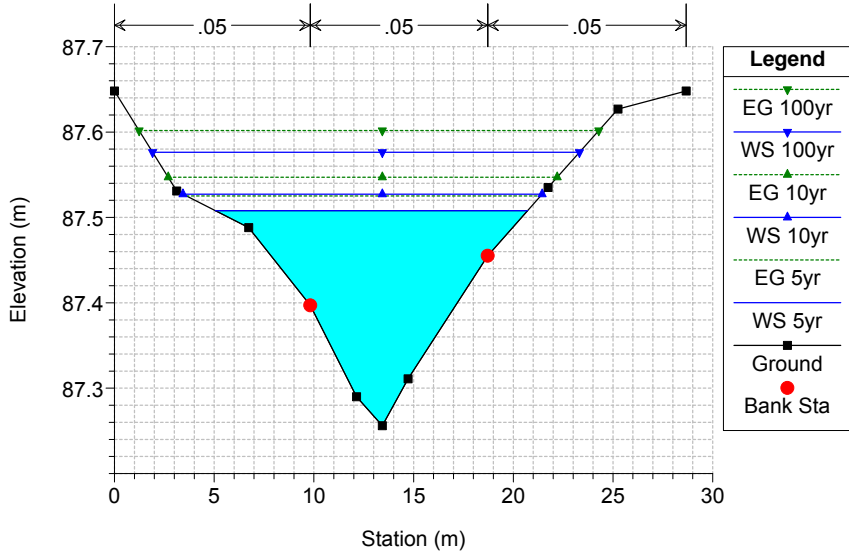
RA31 Plan: RA3132-proposedV4 7/6/2017  
 RS = 313.5 Culv



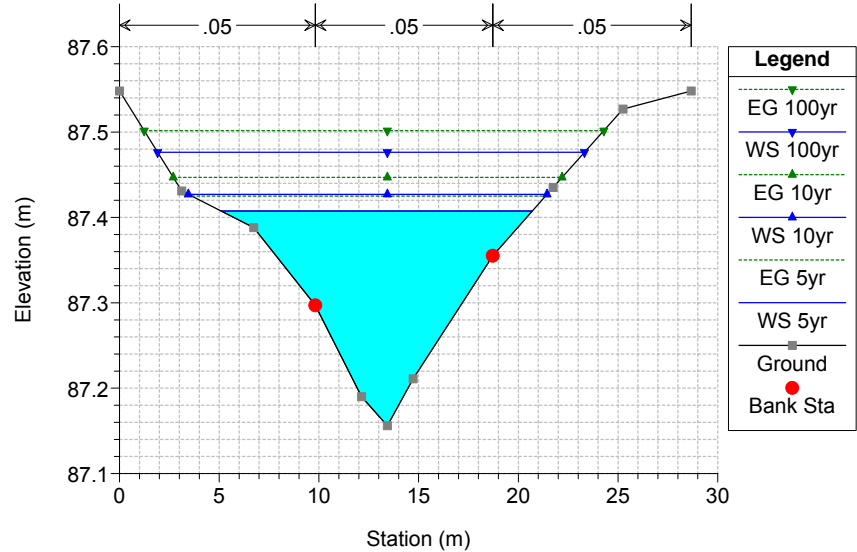




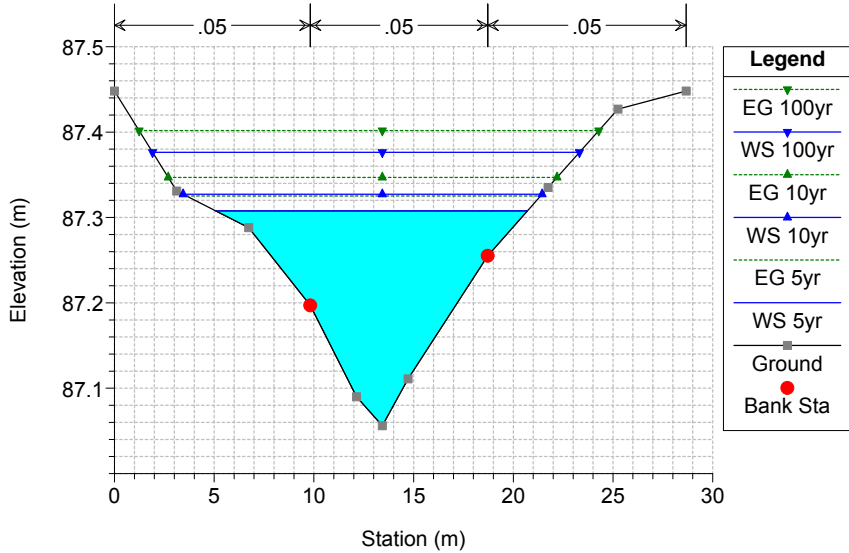
RA31 Plan: RA3132-proposedV4 7/6/2017  
RS = 31322 surveyed section RA3132 - 1



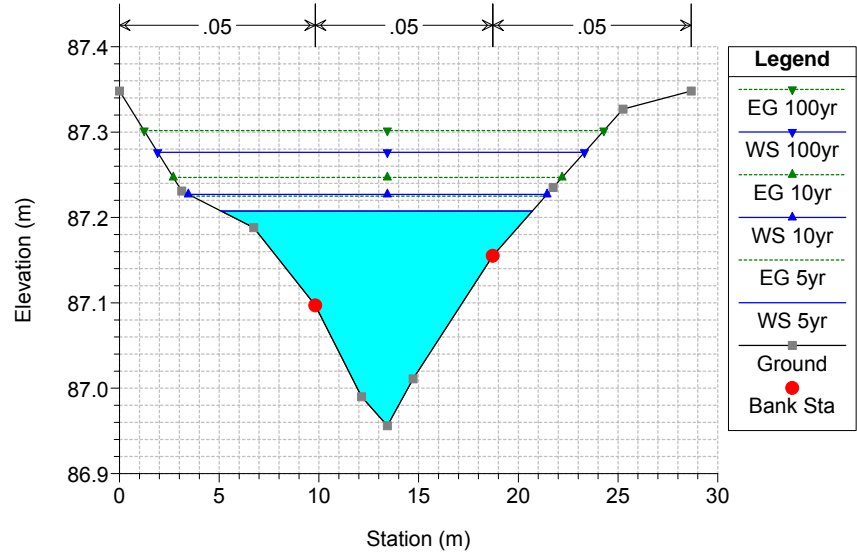
RA31 Plan: RA3132-proposedV4 7/6/2017  
RS = 31321.8\*

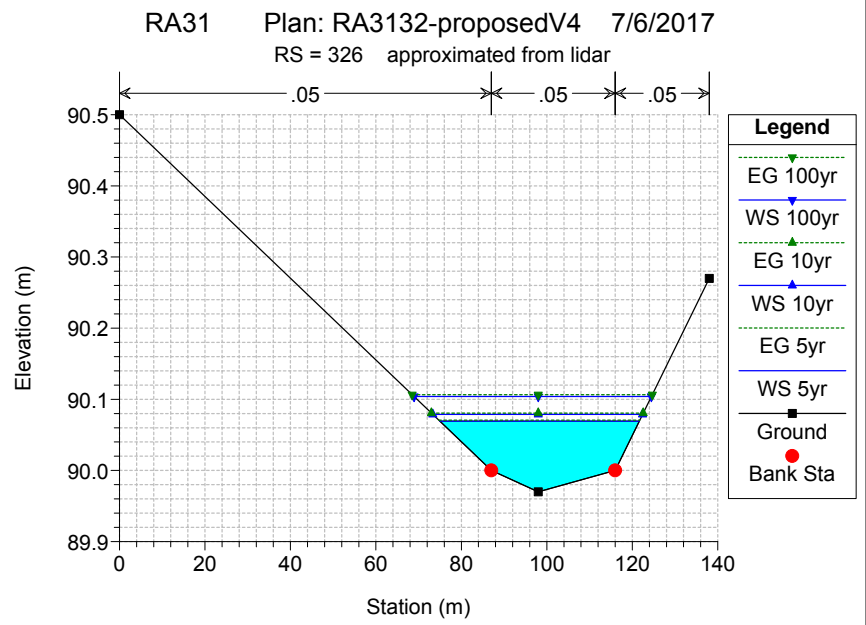
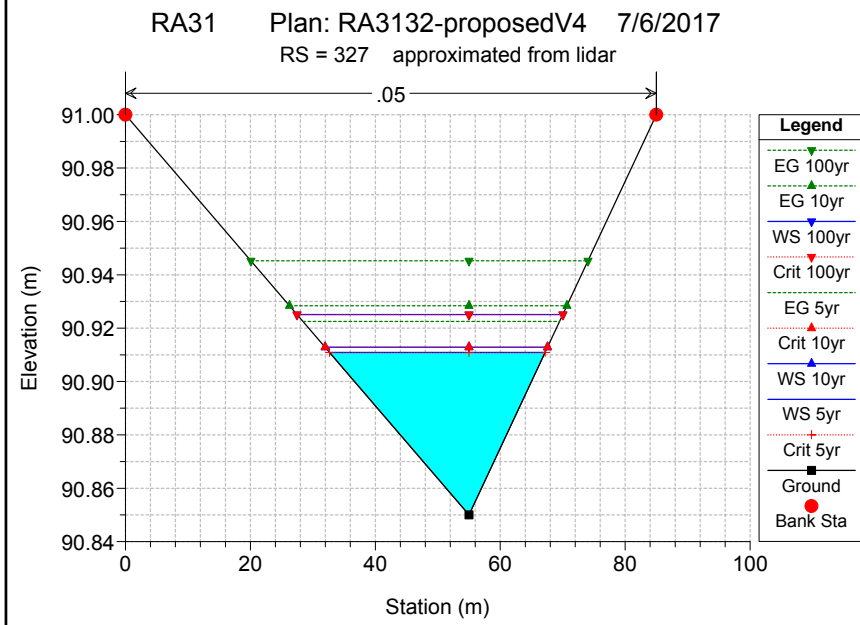
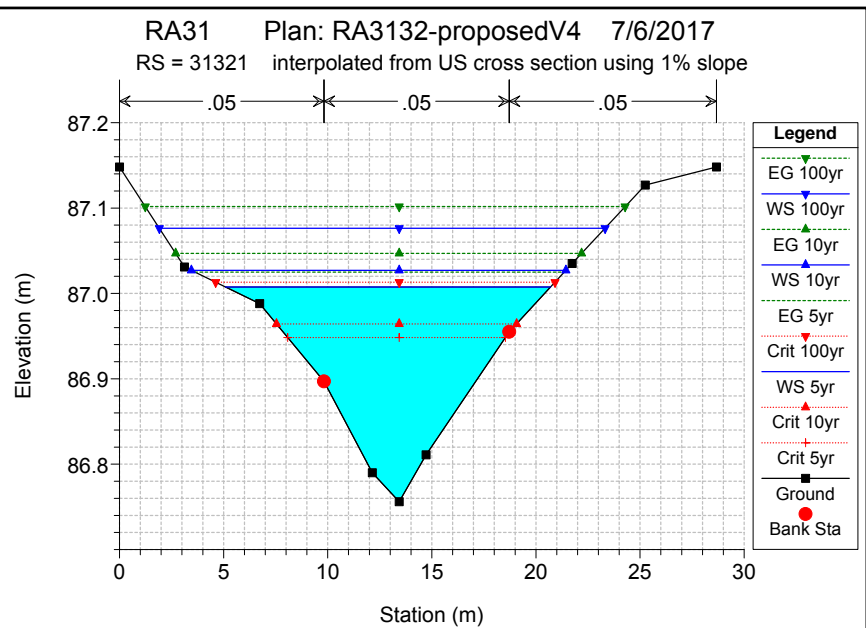
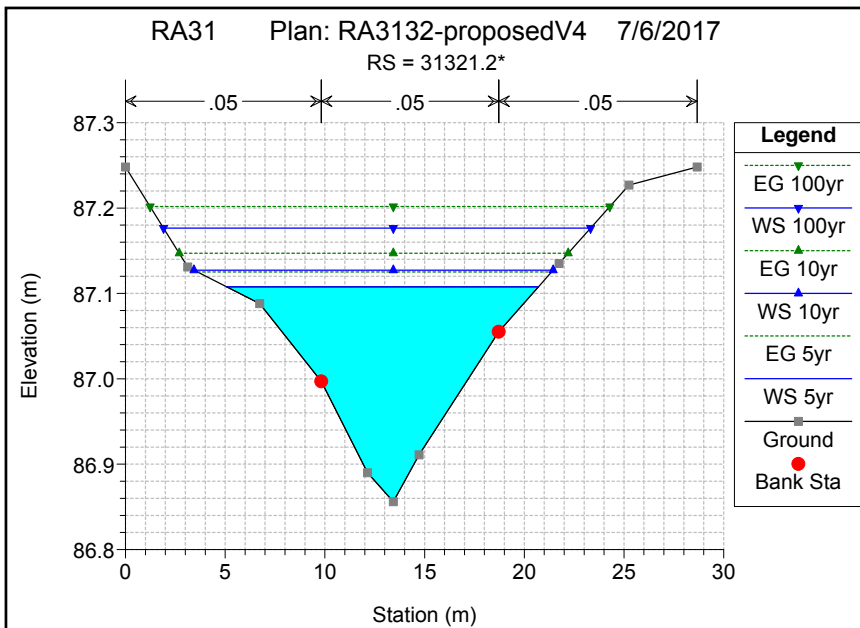


RA31 Plan: RA3132-proposedV4 7/6/2017  
RS = 31321.6\*



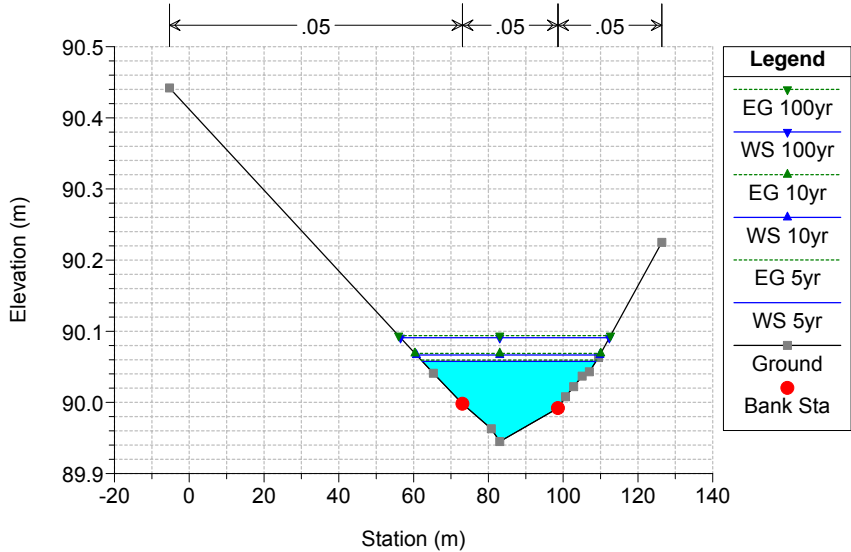
RA31 Plan: RA3132-proposedV4 7/6/2017  
RS = 31321.4\*



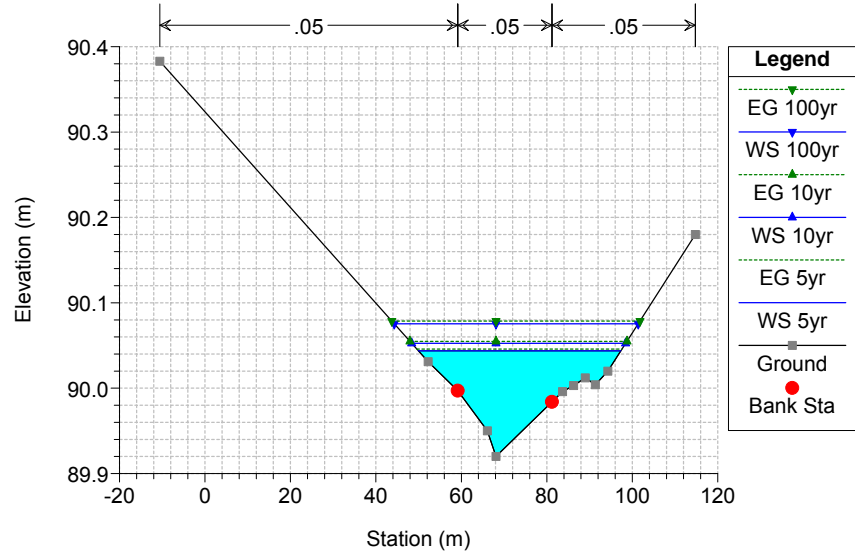




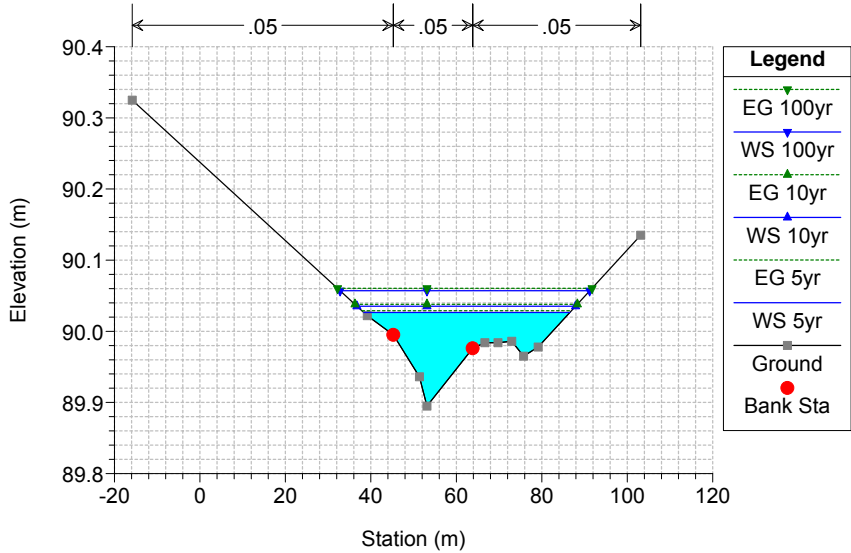
RA31 Plan: RA3132-proposedV4 7/6/2017  
RS = 325.83\*



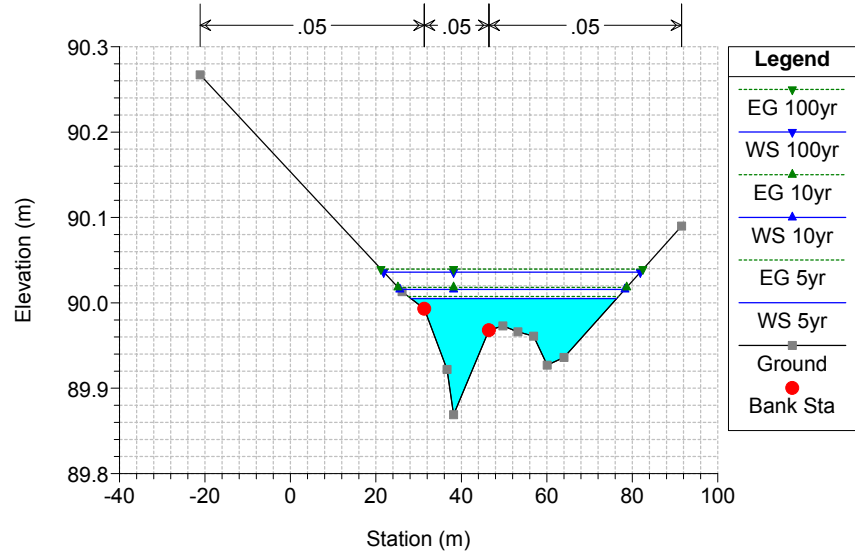
RA31 Plan: RA3132-proposedV4 7/6/2017  
RS = 325.67\*



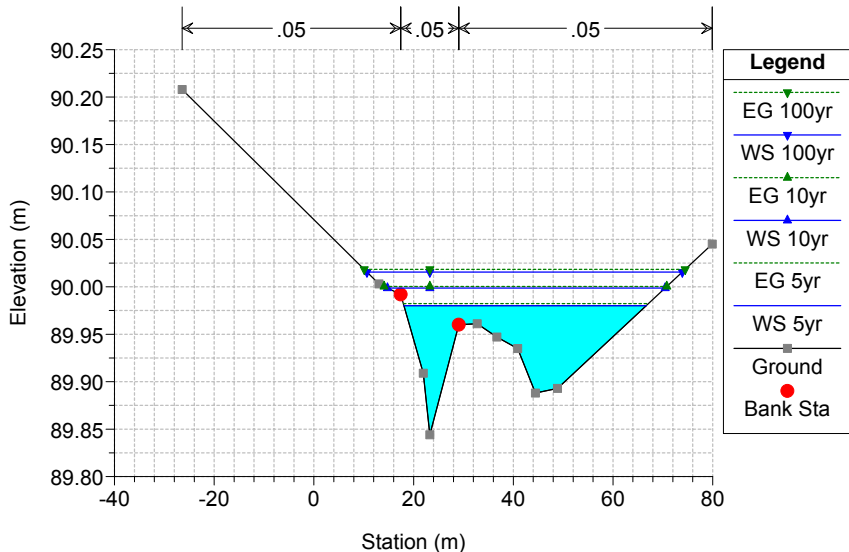
RA31 Plan: RA3132-proposedV4 7/6/2017  
RS = 325.50\*



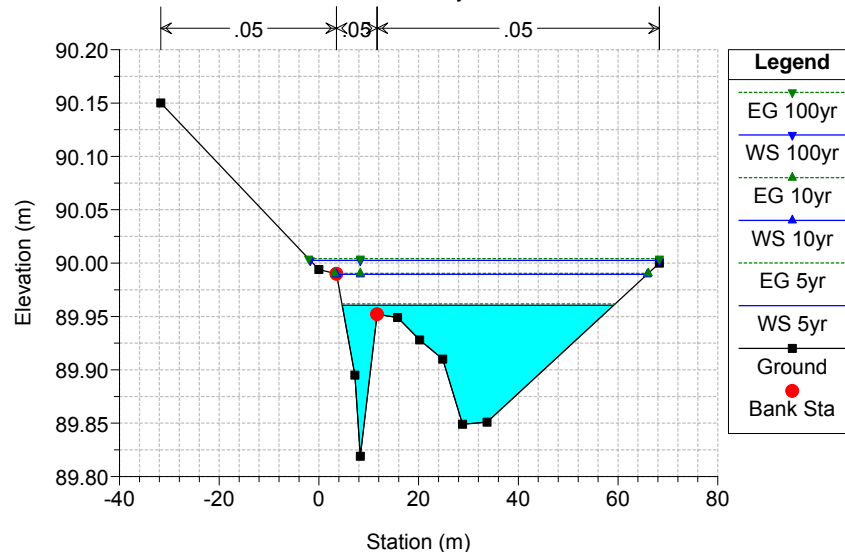
RA31 Plan: RA3132-proposedV4 7/6/2017  
RS = 325.33\*



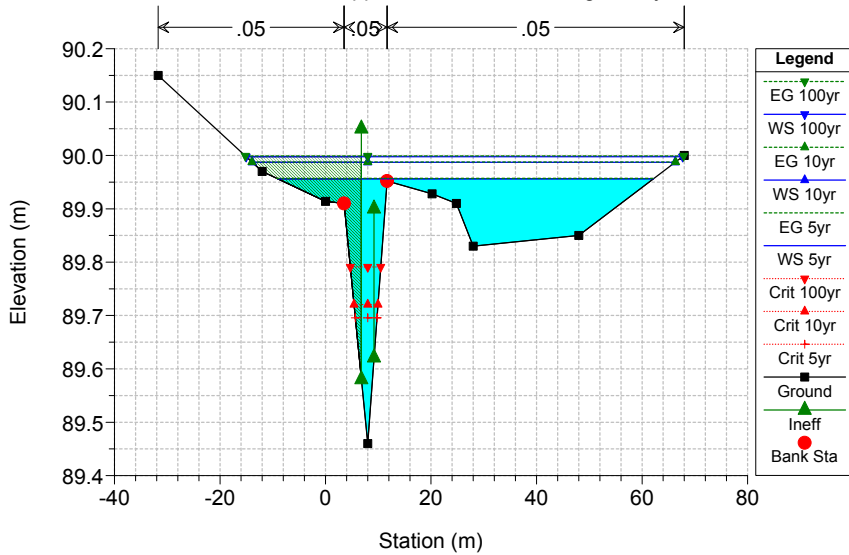
RA31 Plan: RA3132-proposedV4 7/6/2017  
RS = 325.17\*



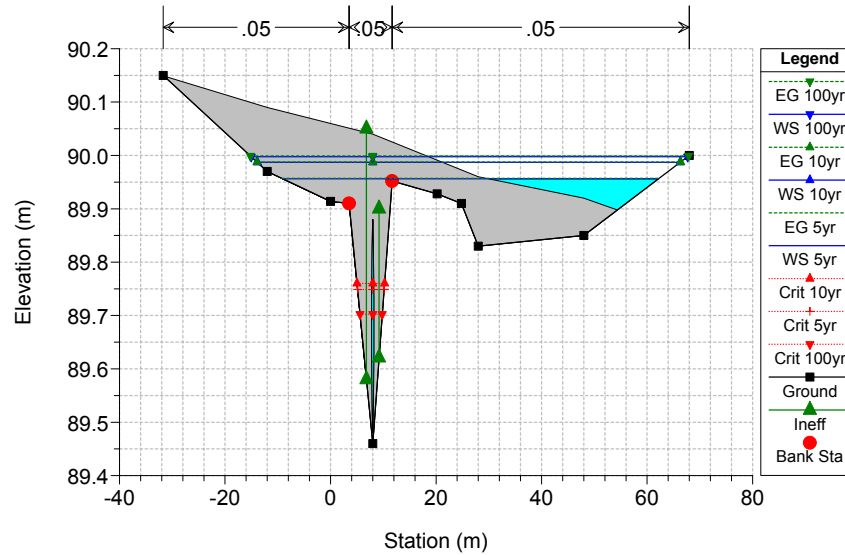
RA31 Plan: RA3132-proposedV4 7/6/2017  
RS = 325 from surveyed section RA32-1



RA31 Plan: RA3132-proposedV4 7/6/2017  
RS = 324.9 approximated from existing survey



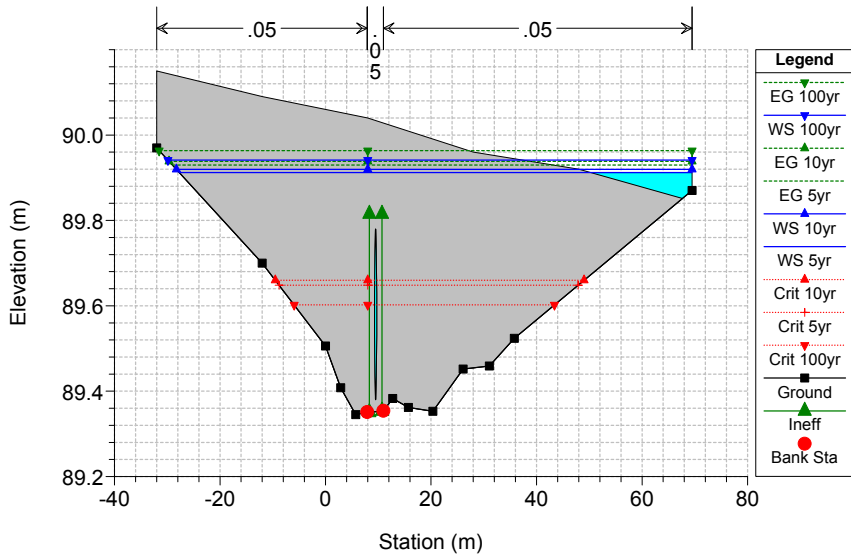
RA31 Plan: RA3132-proposedV4 7/6/2017  
RS = 324.8 Culv





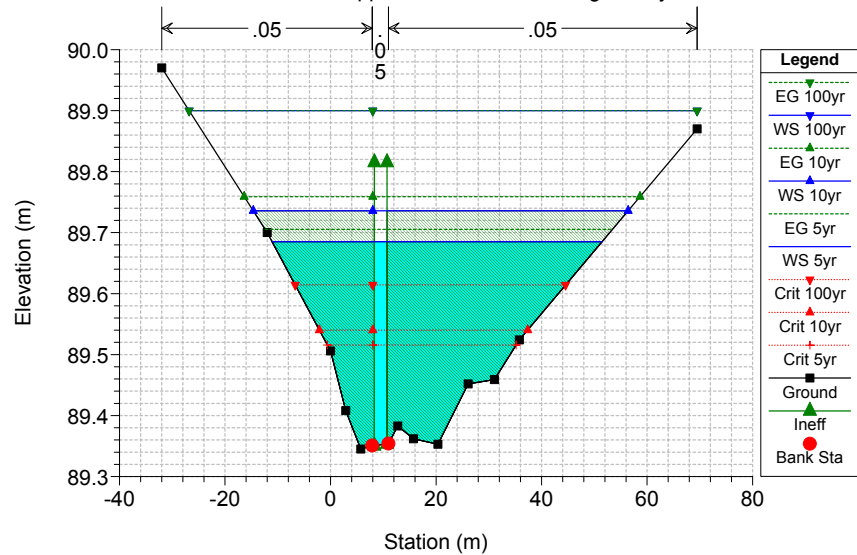
RA31 Plan: RA3132-proposedV4 7/6/2017

RS = 324.8 Culv



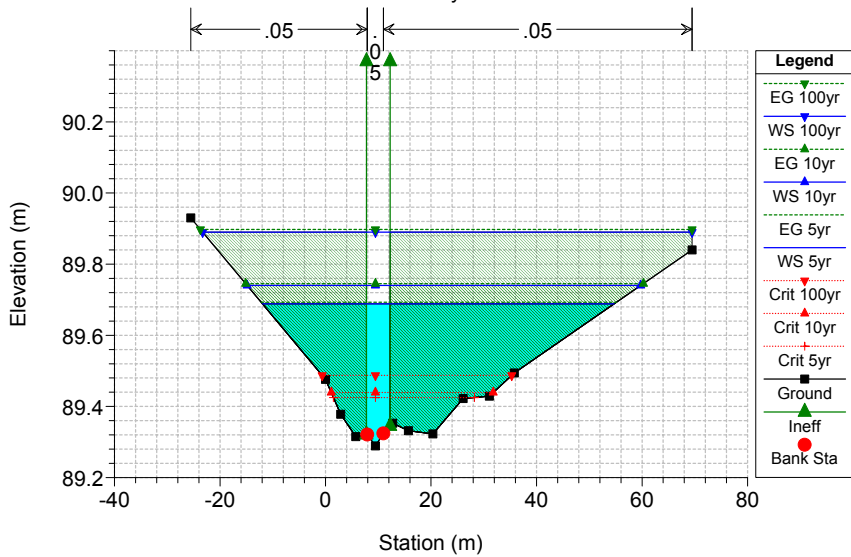
RA31 Plan: RA3132-proposedV4 7/6/2017

RS = 324.5 approximated from existing survey



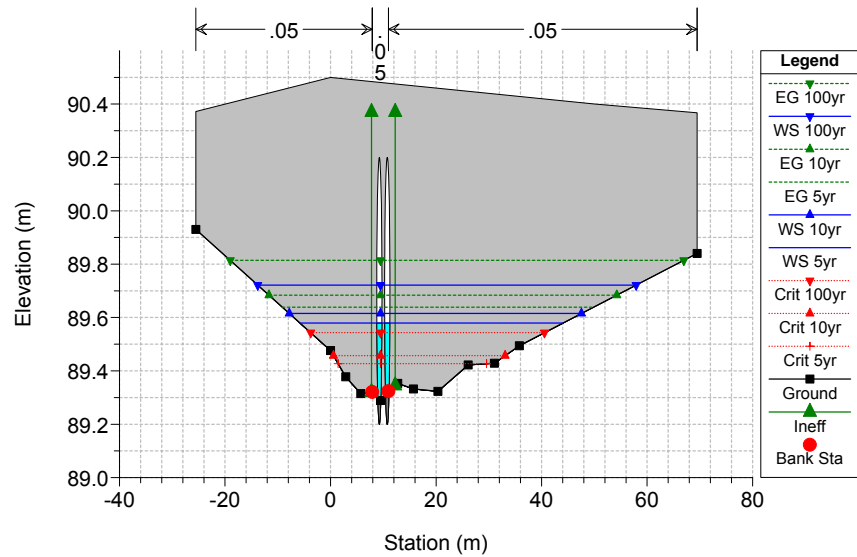
RA31 Plan: RA3132-proposedV4 7/6/2017

RS = 324 from surveyed section RA32-2



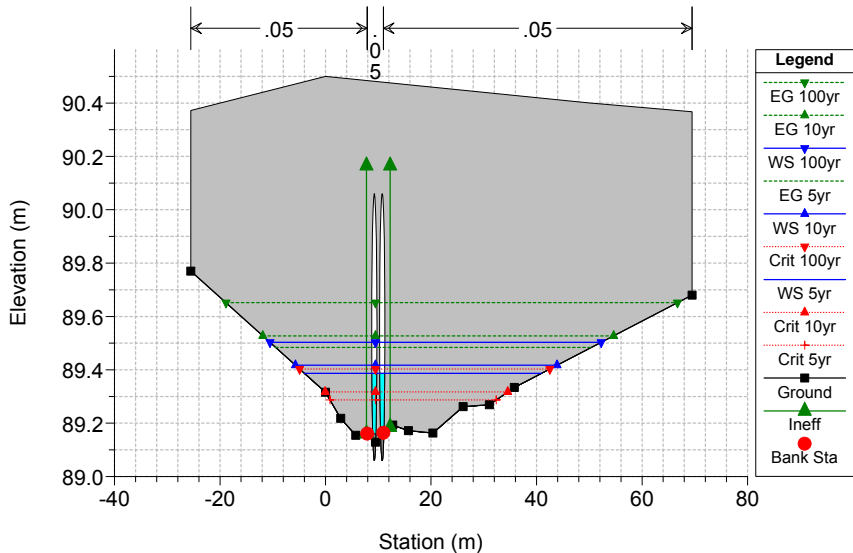
RA31 Plan: RA3132-proposedV4 7/6/2017

RS = 323.5 Culv



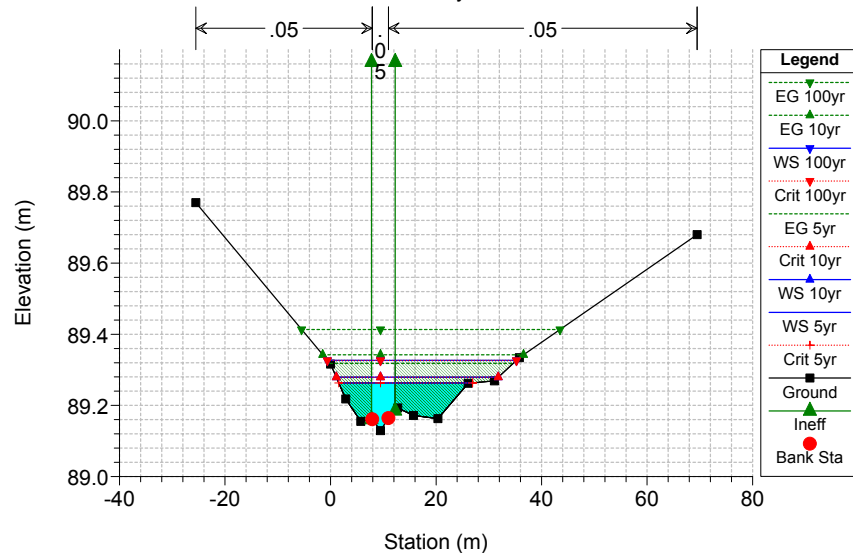
RA31 Plan: RA3132-proposedV4 7/6/2017

RS = 323.5 Culv



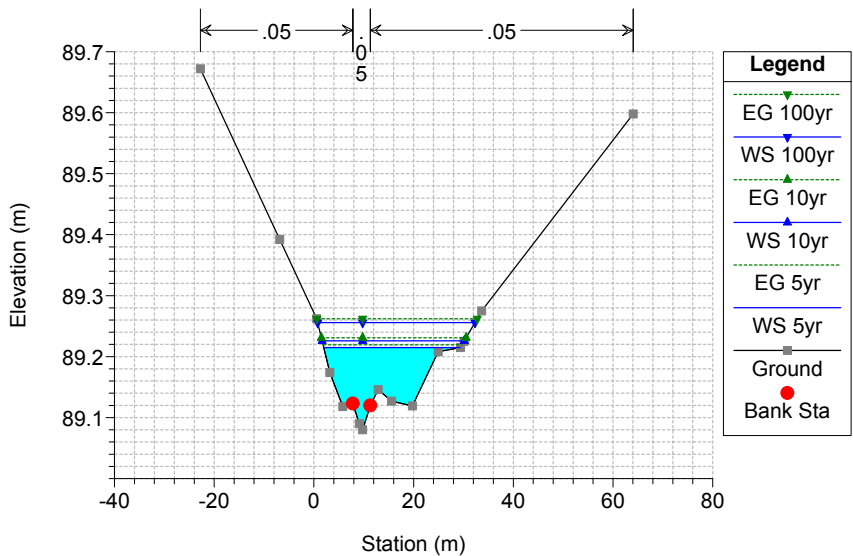
RA31 Plan: RA3132-proposedV4 7/6/2017

RS = 323 from surveyed section RA32-2



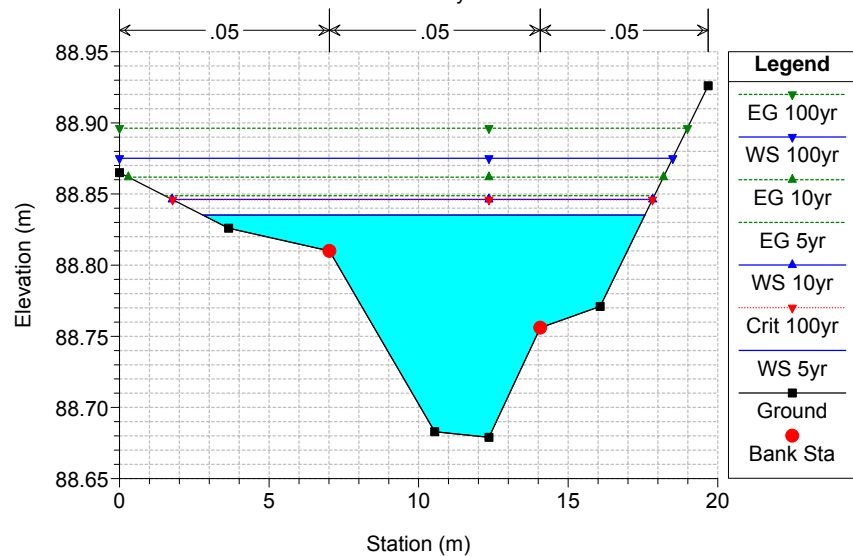
RA31 Plan: RA3132-proposedV4 7/6/2017

RS = 322.89\*



RA31 Plan: RA3132-proposedV4 7/6/2017

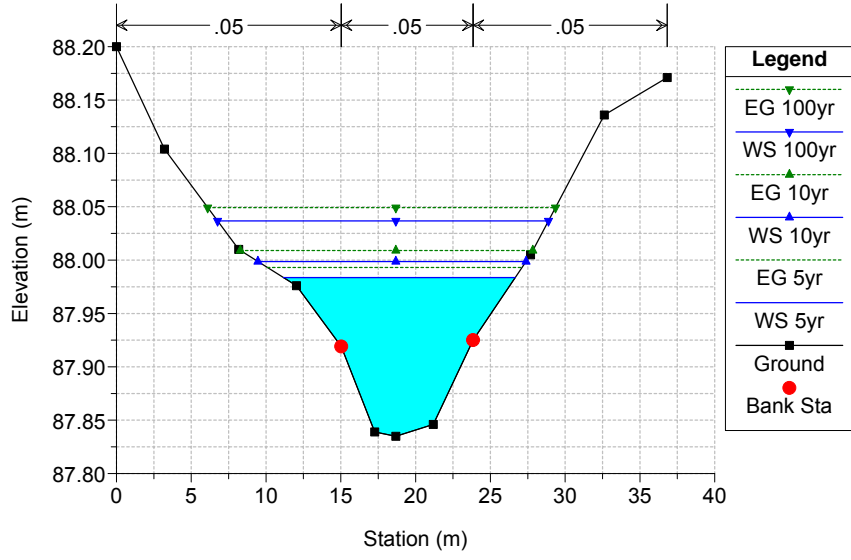
RS = 322 from surveyed section RA32-3





RA31 Plan: RA3132-proposedV4 7/6/2017

RS = 321 from surveyed section RA32-3



# RA33 – HYDRAULIC MODELING



- General Notes**
- UNDER GROUND AND ABOVE GROUND UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON THE DRAWINGS AND WHERE SHOWN, THE ACCURACY OF POSITION IS NOT GUARANTEED. THE CONTRACTOR SHALL INFORM THEMSELVES OF THE EXACT LOCATION OF ALL UTILITY PLANTS PRIOR TO STARTING WORK.
  - SEE DRAWING "CIVIL ACCESS ROAD DETAILS" (DRAWING C302) FOR ADDITIONAL CONSTRUCTION AND CULVERT NOTES.
  - UTILITY AND OTHER CONFLICTS HAVE NOT BEEN ADDRESSED IN THESE DRAWINGS, AND WILL BE RESOLVED IN THE FIELD USING VERIFIED UTILITY LOCATIONS AND OTHER SITE INFORMATION.
  - TOPOGRAPHICAL SURVEY COMPLETED BY MINTOSH PERRY CONSULTING ENGINEERS, DATED 2015. (UTM ZONE 18 NAD83 (CRSR) 1997.0)
  - SEE DRAWING "CIVIL ACCESS ROAD - EROSION AND SEDIMENTATION CONTROL NOTES AND DETAILS" (DRAWING C301) FOR ADDITIONAL EROSION AND SEDIMENTATION CONTROL NOTES AND DETAILS.
  - ACCESS ROAD ALIGNMENTS MAY REQUIRE FIELD MODIFICATIONS TO ACCOMMODATE EXISTING CONDITIONS.
  - CONTRACTOR TO ADHERE TO ALL CONSERVATION AUTHORITY PERMITS AND CONDITIONS OF APPROVAL.
  - CONTRACTOR TO CONSTRUCT OVERBUILD (ADDITIONAL COMPACTED AREA) AT ALL BENDS AND CURVES IN ACCORDANCE WITH SIEMENS SPECIFICATIONS "GENERAL SITE REQUIREMENTS, AMHERST ISLAND, EQUIPMENT ONLY AM" REV.6.31, DATED 2016-09-23.

- Legend**
- SILT FENCE
  - LIMIT OF CONSTRUCTIBLE AREA
  - EXISTING OVERLAND FLOW/DITCH DIRECTION
  - PROPOSED DITCH FLOW
  - EXISTING GROUND CONTOURS (AS PER NOTE 4 ABOVE)
  - EXISTING GROUND CONTOURS (FROM LIDAR MAPPING)
  - PROPOSED PAD ELEVATION

\*\*\*\*For PHCL and WindElectric Use Only\*\*\*\*

Review with no comments does not constitute approval of design details, calculations or methods. It is the responsibility of the consultant to ensure all information contained within the drawings are in full compliance with contractual obligations.

Reviewed - No comments	Date [dd-mm-YYYY]
Reviewed - Incorporate comments and resubmit	Date [dd-mm-YYYY]
Reviewed - Not accepted	Date [dd-mm-YYYY]
Project Manager - PHCL	Date [dd-mm-YYYY]
Project Manager - WindElectric	Date [dd-mm-YYYY]

Owner:

ISSUED FOR CRCA PERMITTING	RCL	MPG	17.06.22
ISSUED FOR CLIENT REVIEW	RCL/DH	MPG	16.02.02

Revision

By	Appd.	YY.MM.DD
----	-------	----------

File Name: C212\_133560100-Turbine S07-S14.DWG RCL/DH MPG RCL 15.12.03  
Dwn. Chkd. Dsgn. YY.MM.DD

Permit-Seal

NOT FOR CONSTRUCTION

Client/Project

**AMHERST ISLAND WIND PROJECT**  
75MW WIND FARM  
Amherst Island, Loyalist Township, Ontario

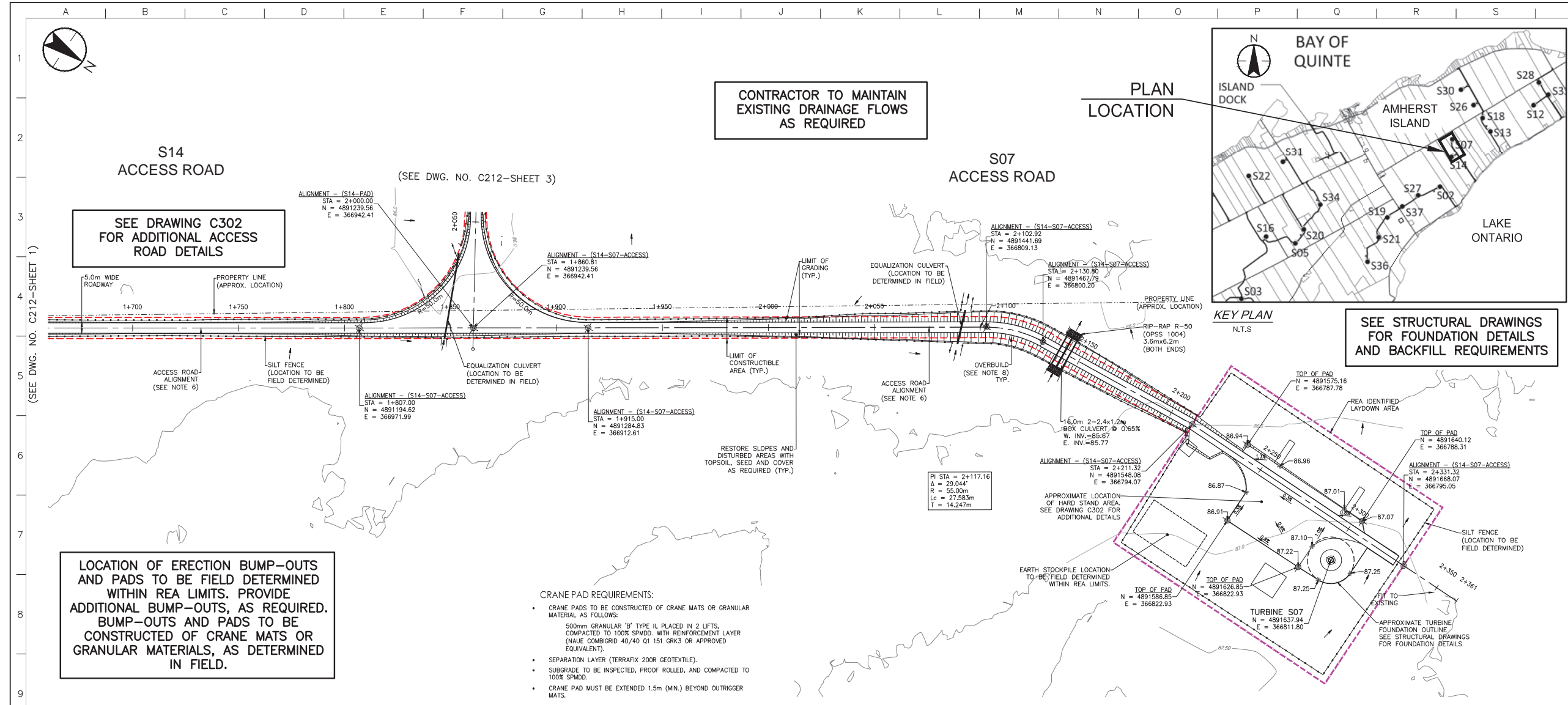
Title

**ACCESS ROAD**  
**TURBINE S07 AND S14**  
**PLAN AND PROFILE**

Project No. 133560100 Scale 1:1000H / 1:100V

Drawing No. Sheet 0 of 5 Revision

C212 2 of 3 B



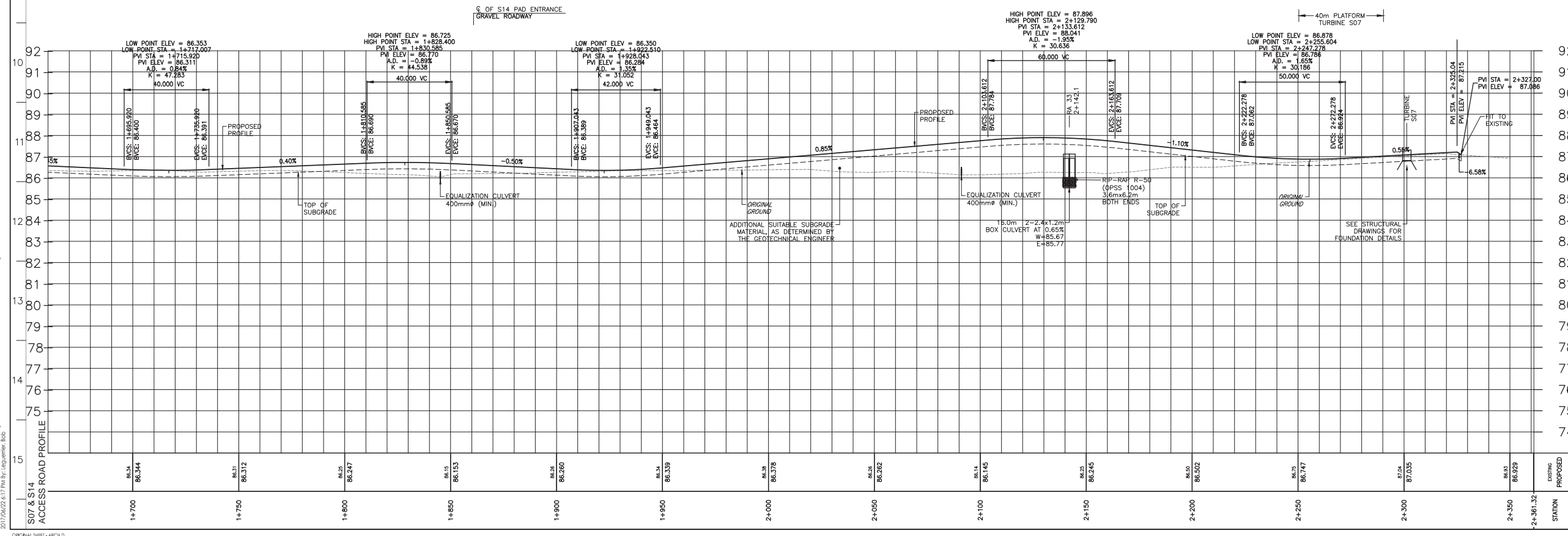
**CONTRACTOR TO MAINTAIN EXISTING DRAINAGE FLOWS AS REQUIRED**

**SEE DRAWING C302 FOR ADDITIONAL ACCESS ROAD DETAILS**

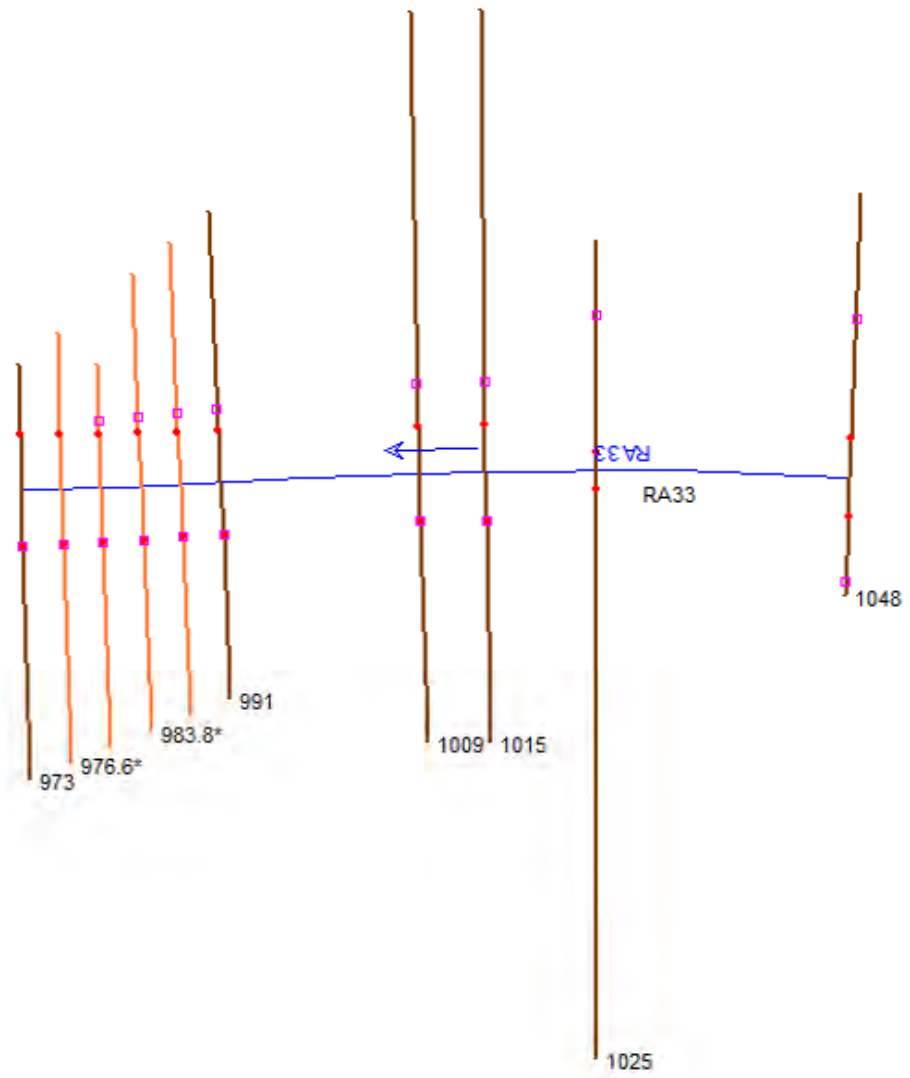
**SEE STRUCTURAL DRAWINGS FOR FOUNDATION DETAILS AND BACKFILL REQUIREMENTS**

**LOCATION OF ERECTION BUMP-OUTS AND PADS TO BE FIELD DETERMINED WITHIN REA LIMITS. PROVIDE ADDITIONAL BUMP-OUTS, AS REQUIRED. BUMP-OUTS AND PADS TO BE CONSTRUCTED OF CRANE MATS OR GRANULAR MATERIALS, AS DETERMINED IN FIELD.**

- CRANE PAD REQUIREMENTS:**
- CRANE PADS TO BE CONSTRUCTED OF CRANE MATS OR GRANULAR MATERIAL AS FOLLOWS:
    - 500mm GRANULAR "B" TYPE II, PLACED IN 2 LIFTS, COMPACTED TO 100% SPMD. WITH REINFORCEMENT LAYER (MADE COMBIRD 40/40 Q1 151 GRK3 OR APPROVED EQUIVALENT).
    - SEPARATION LAYER (TERRAFIX 200R GEOTEXTILE).
    - SUBGRADE TO BE INSPECTED, PROOF ROLLED, AND COMPACTED TO 100% SPMD.
    - CRANE PAD MUST BE EXTENDED 1.5m (MIN.) BEYOND OUTRIGGER MATS.



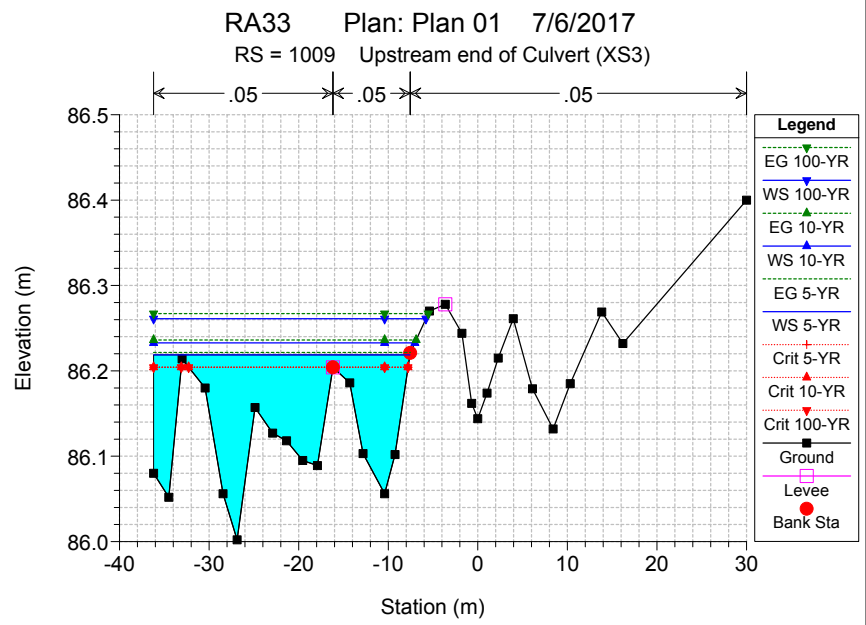
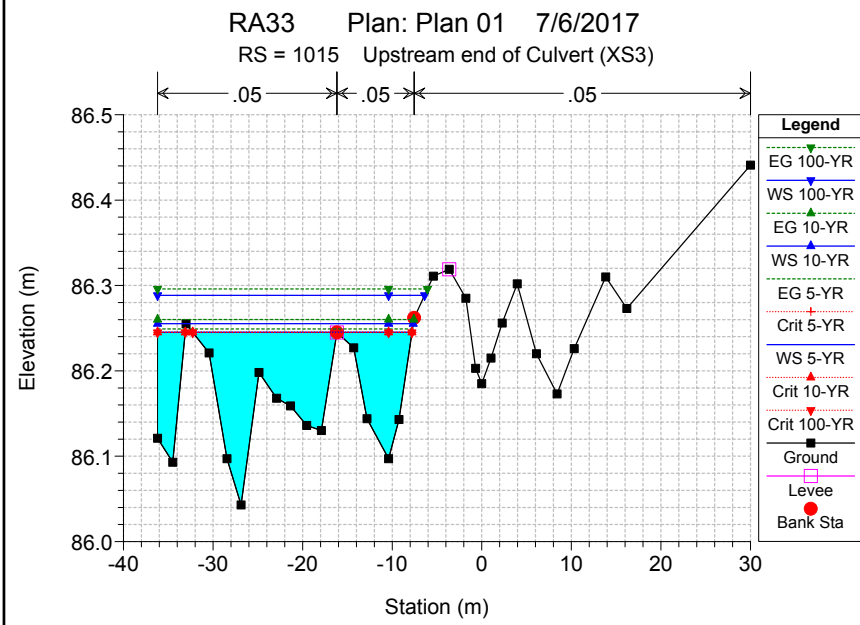
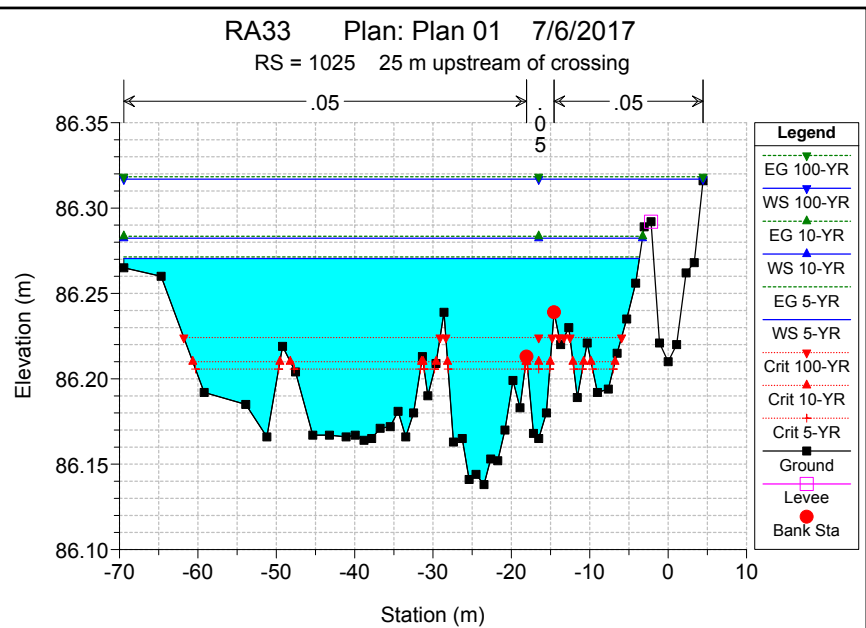
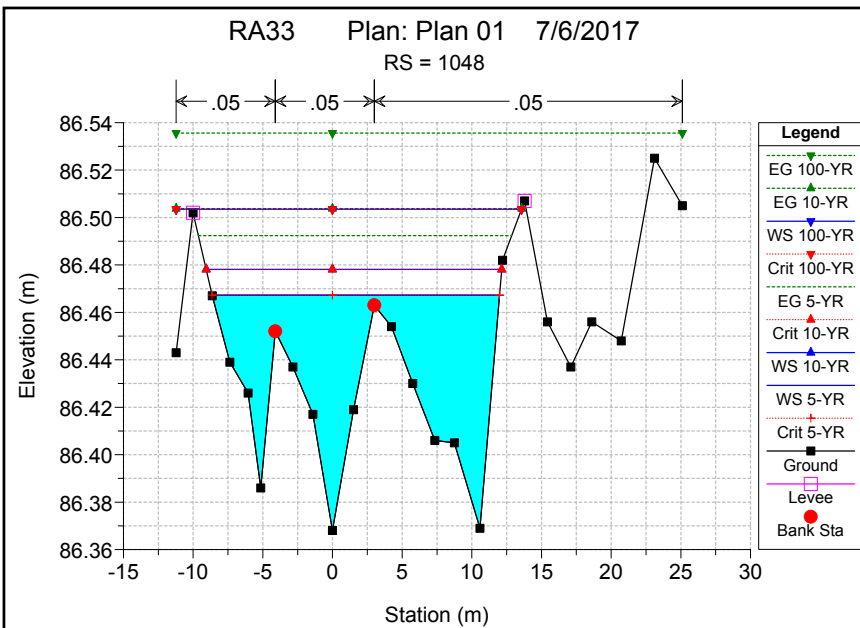
X:\016502\c212\_133560100\Drawings\10\_Lines\Drawings\C212\_133560100-Turbine S07-S14.dwg  
20/10/2022 6:17:47 AM [unpublished].dwg



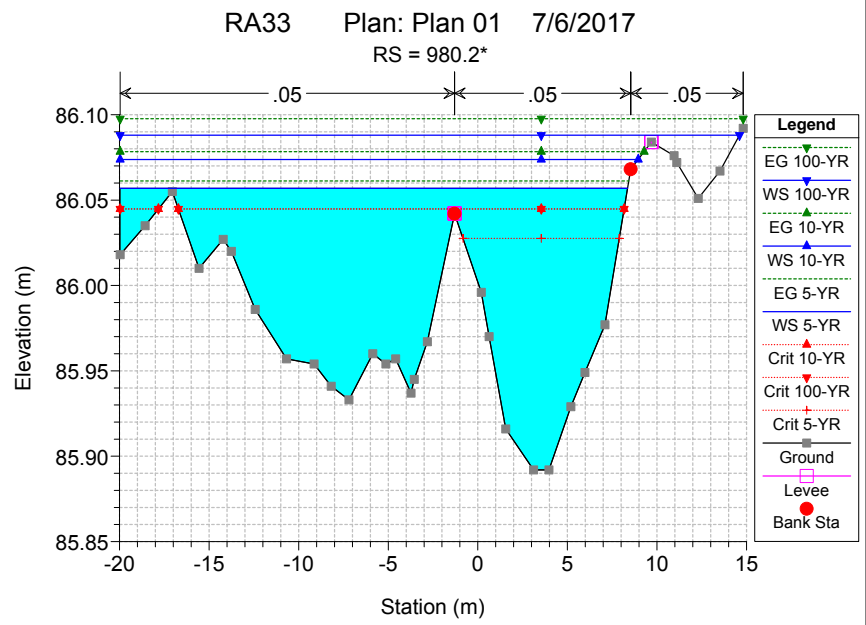
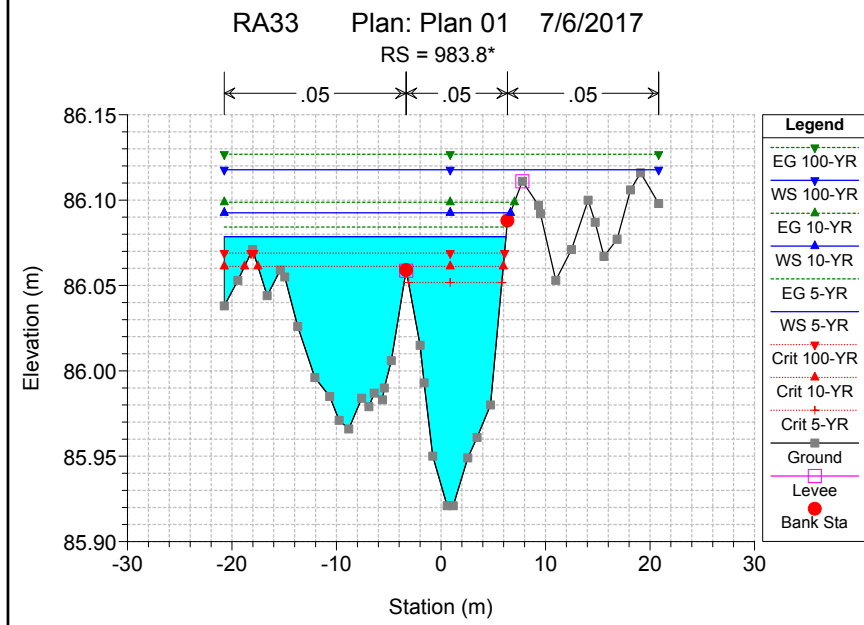
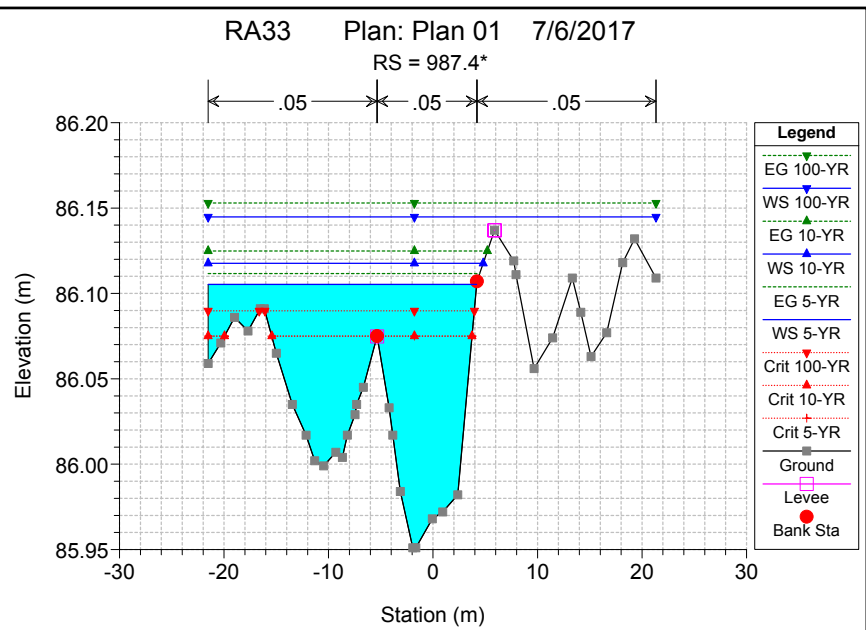
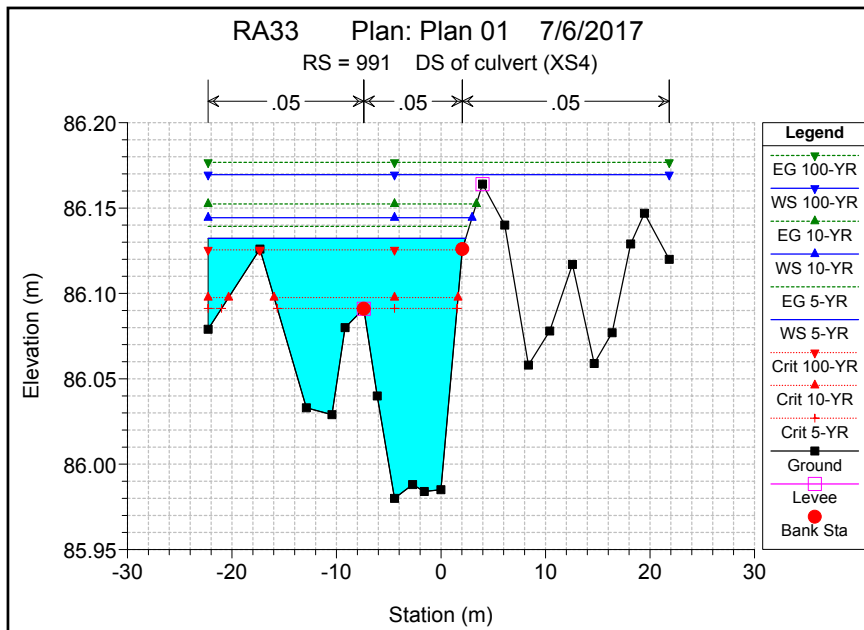


HEC-RAS Plan: Existing River: RA33 Reach: RA33

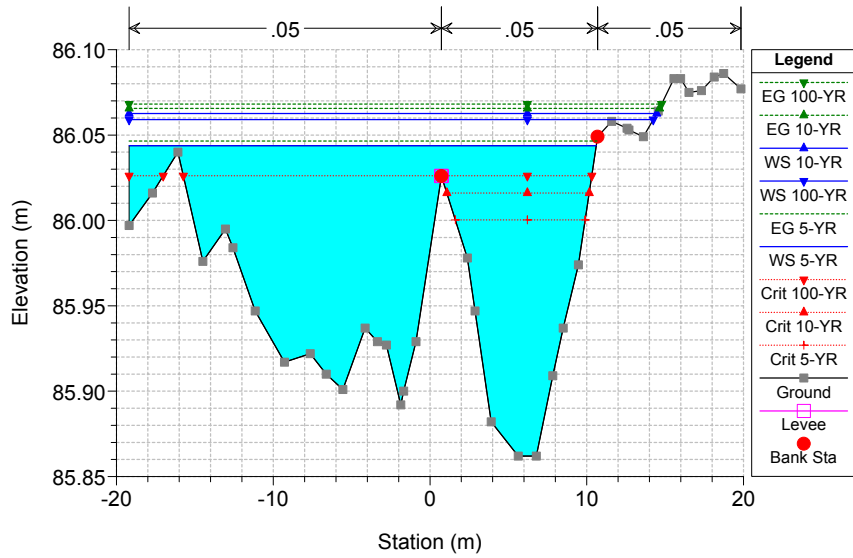
Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Vel Total (m/s)	Vel Left (m/s)	Vel Right (m/s)
RA33	1048	5-YR	0.66	86.37	86.47	86.47	86.49	0.073872	0.72	0.94	20.63	1.05	0.70	0.61	0.72
RA33	1048	10-YR	0.82	86.37	86.48	86.48	86.50	0.058363	0.73	1.17	21.21	0.96	0.70	0.61	0.72
RA33	1048	100-YR	1.39	86.37	86.50	86.50	86.54	0.050226	0.86	1.77	24.78	0.95	0.78	0.65	0.79
RA33	1025	5-YR	0.66	86.17	86.27	86.21	86.27	0.001373	0.14	4.94	65.78	0.16	0.13	0.14	0.11
RA33	1025	10-YR	0.82	86.17	86.28	86.21	86.28	0.001334	0.15	5.72	66.17	0.16	0.14	0.15	0.12
RA33	1025	100-YR	1.39	86.17	86.32	86.22	86.32	0.001157	0.18	8.50	73.90	0.15	0.16	0.17	0.13
RA33	1015	5-YR	0.66	86.10	86.25	86.25	86.25	0.004849	0.25	2.40	27.57	0.29	0.27	0.28	
RA33	1015	10-YR	0.82	86.10	86.26	86.25	86.26	0.005561	0.28	2.68	28.55	0.31	0.31	0.32	
RA33	1015	100-YR	1.39	86.10	86.29	86.25	86.30	0.005753	0.36	3.65	29.81	0.34	0.38	0.39	0.08
RA33	1009	5-YR	0.66	86.06	86.22	86.20	86.22	0.003044	0.22	2.80	28.62	0.23	0.23	0.24	
RA33	1009	10-YR	0.82	86.06	86.23	86.20	86.24	0.003062	0.24	3.21	29.17	0.24	0.26	0.26	0.04
RA33	1009	100-YR	1.39	86.06	86.26	86.20	86.27	0.004086	0.33	4.06	30.41	0.29	0.34	0.35	0.09
RA33	991	5-YR	0.66	85.98	86.13	86.09	86.14	0.007519	0.41	1.91	24.64	0.39	0.34	0.25	0.04
RA33	991	10-YR	0.82	85.98	86.14	86.10	86.15	0.007608	0.44	2.21	25.27	0.40	0.37	0.29	0.08
RA33	991	100-YR	1.39	85.98	86.17	86.13	86.18	0.006246	0.45	4.01	44.13	0.37	0.35	0.32	0.24
RA33	987.4*	5-YR	0.66	85.95	86.11	86.07	86.11	0.007715	0.40	1.97	25.70	0.39	0.33	0.26	
RA33	987.4*	10-YR	0.82	85.95	86.12	86.07	86.12	0.007592	0.42	2.29	26.31	0.39	0.36	0.30	0.05
RA33	987.4*	100-YR	1.39	85.95	86.14	86.09	86.15	0.007059	0.47	3.77	42.85	0.39	0.37	0.35	0.21
RA33	983.8*	5-YR	0.66	85.92	86.08	86.05	86.08	0.007420	0.38	2.05	26.97	0.38	0.32	0.27	
RA33	983.8*	10-YR	0.82	85.92	86.09	86.06	86.10	0.006849	0.39	2.43	27.39	0.37	0.34	0.29	0.03
RA33	983.8*	100-YR	1.39	85.92	86.12	86.07	86.13	0.007806	0.48	3.53	41.58	0.41	0.39	0.38	0.17
RA33	980.2*	5-YR	0.66	85.89	86.06	86.03	86.06	0.005516	0.33	2.31	28.33	0.32	0.28	0.25	
RA33	980.2*	10-YR	0.82	85.89	86.07	86.04	86.08	0.004726	0.33	2.79	28.92	0.31	0.30	0.27	0.03
RA33	980.2*	100-YR	1.39	85.89	86.09	86.04	86.10	0.008412	0.48	3.30	34.58	0.42	0.42	0.40	0.12
RA33	976.6*	5-YR	0.66	85.86	86.04	86.00	86.05	0.002959	0.25	2.86	29.80	0.24	0.23	0.21	
RA33	976.6*	10-YR	0.82	85.86	86.06	86.02	86.07	0.002574	0.26	3.46	33.67	0.23	0.24	0.23	0.04
RA33	976.6*	100-YR	1.39	85.86	86.06	86.03	86.07	0.008117	0.46	3.34	33.44	0.41	0.42	0.39	0.06
RA33	973	5-YR	0.66	85.83	85.97	85.97	86.01	0.055314	0.96	0.69	7.50	1.01	0.96		
RA33	973	10-YR	0.82	85.83	85.99	85.99	86.04	0.051920	0.97	0.85	8.55	0.99	0.97		
RA33	973	100-YR	1.39	85.83	86.03	86.01	86.04	0.007004	0.42	3.54	32.69	0.38	0.39	0.38	0.02



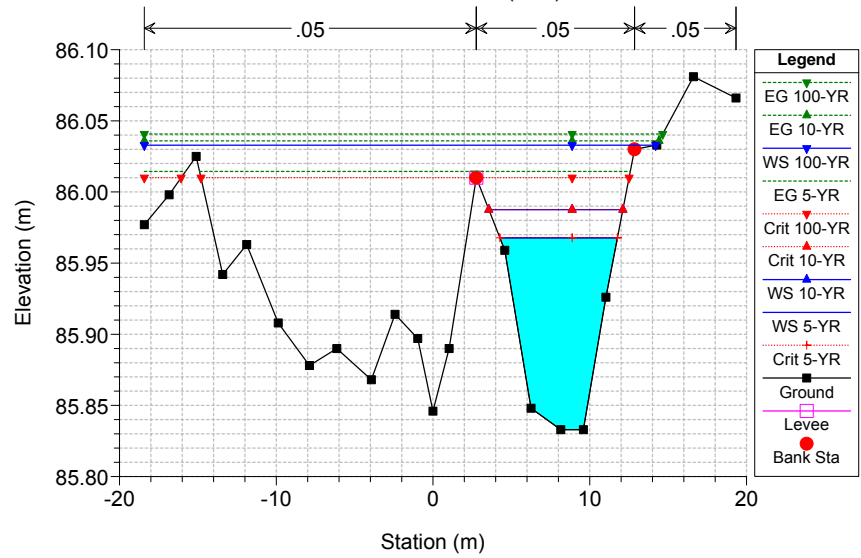




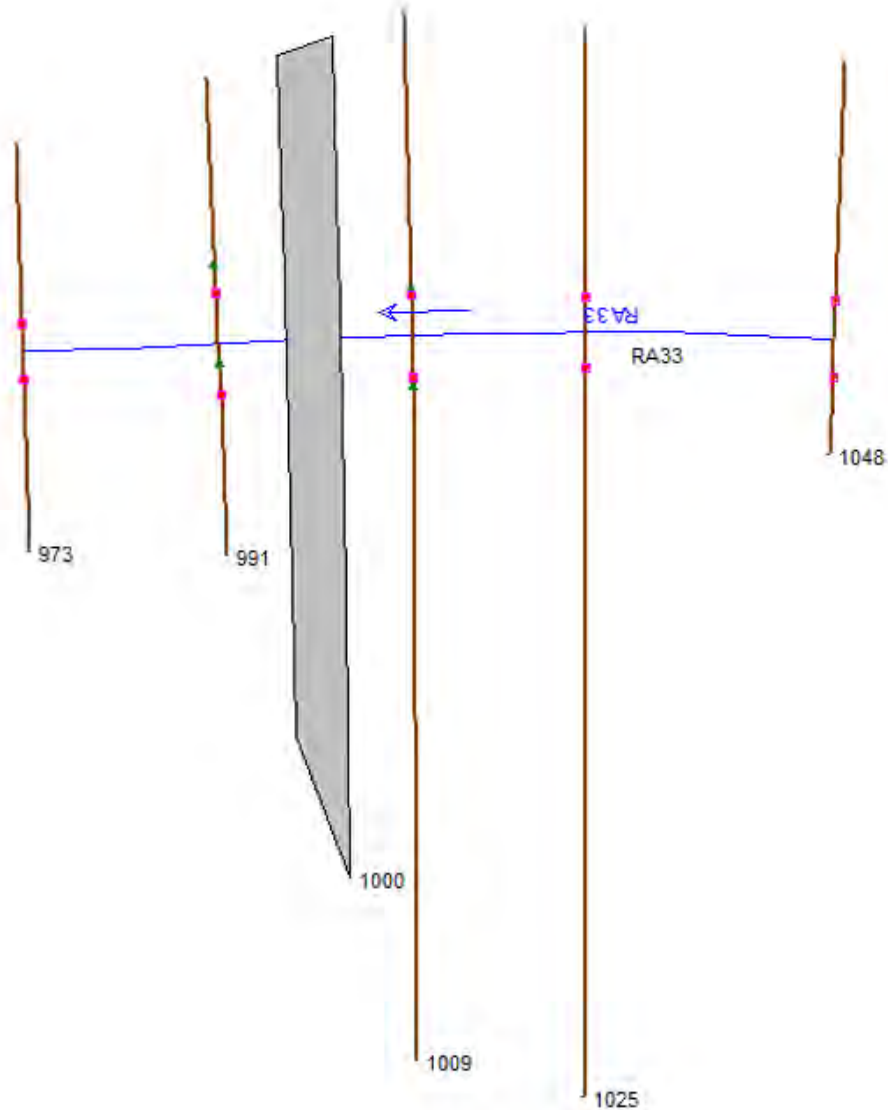
RA33 Plan: Plan 01 7/6/2017  
RS = 976.6\*



RA33 Plan: Plan 01 7/6/2017  
RS = 973 DS-XS (XS5)







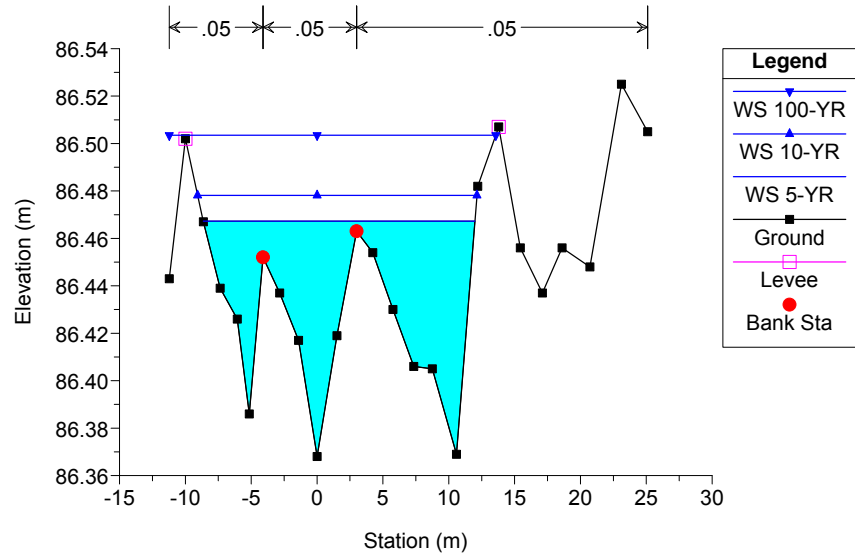
HEC-RAS Plan: Plan4\_DBL River: RA33 Reach: RA33

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Vel Total (m/s)	Vel Left (m/s)	Vel Right (m/s)
RA33	1048	5-YR	0.66	86.37	86.47	86.47	86.49	0.073872	0.72	0.94	20.63	1.05	0.70	0.61	0.72
RA33	1048	10-YR	0.82	86.37	86.48	86.48	86.50	0.058363	0.73	1.17	21.21	0.96	0.70	0.61	0.72
RA33	1048	100-YR	1.39	86.37	86.50	86.50	86.54	0.050226	0.86	1.77	24.78	0.95	0.78	0.65	0.79
RA33	1025	5-YR	0.66	86.17	86.32	86.21	86.32	0.000256	0.08	8.54	73.90	0.07	0.08	0.08	0.06
RA33	1025	10-YR	0.82	86.17	86.35	86.21	86.35	0.000178	0.08	10.94	73.90	0.06	0.08	0.08	0.06
RA33	1025	100-YR	1.39	86.17	86.45	86.22	86.45	0.000088	0.08	18.56	73.90	0.05	0.07	0.08	0.07
RA33	1015	5-YR	0.66	86.10	86.31		86.31	0.000526	0.12	5.73	54.09	0.11	0.11	0.13	0.07
RA33	1015	10-YR	0.82	86.10	86.35		86.35	0.000369	0.12	7.65	58.48	0.09	0.11	0.13	0.07
RA33	1015	100-YR	1.39	86.10	86.45		86.45	0.000170	0.11	14.21	66.20	0.07	0.10	0.11	0.08
RA33	1009	5-YR	0.66	86.06	86.29	86.22	86.30	0.005830	0.45	1.48	57.44	0.36	0.44	0.33	0.24
RA33	1009	10-YR	0.82	86.06	86.33	86.23	86.34	0.004623	0.46	1.83	60.35	0.33	0.45	0.36	0.29
RA33	1009	100-YR	1.39	86.06	86.43	86.27	86.45	0.003008	0.49	2.86	66.20	0.29	0.48	0.43	0.38
RA33	1000		Culvert												
RA33	991	5-YR	0.66	85.98	86.14	86.09	86.15	0.013468	0.57	1.17	38.92	0.52	0.56	0.30	0.07
RA33	991	10-YR	0.82	85.98	86.15	86.11	86.17	0.015417	0.65	1.29	42.01	0.57	0.64	0.38	0.14
RA33	991	100-YR	1.39	85.98	86.17	86.15	86.21	0.025669	0.93	1.53	44.13	0.75	0.91	0.60	0.35
RA33	987.4*	5-YR	0.66	85.95	86.11	86.07	86.11	0.007715	0.40	1.97	25.70	0.39	0.33	0.26	
RA33	987.4*	10-YR	0.82	85.95	86.12	86.07	86.12	0.007592	0.42	2.29	26.31	0.39	0.36	0.30	0.05
RA33	987.4*	100-YR	1.39	85.95	86.14	86.09	86.15	0.007059	0.47	3.77	42.85	0.39	0.37	0.35	0.21
RA33	983.8*	5-YR	0.66	85.92	86.08	86.05	86.08	0.007420	0.38	2.05	26.97	0.38	0.32	0.27	
RA33	983.8*	10-YR	0.82	85.92	86.09	86.06	86.10	0.006849	0.39	2.43	27.39	0.37	0.34	0.29	0.03
RA33	983.8*	100-YR	1.39	85.92	86.12	86.07	86.13	0.007806	0.48	3.53	41.58	0.41	0.39	0.38	0.17
RA33	980.2*	5-YR	0.66	85.89	86.06	86.03	86.06	0.005516	0.33	2.31	28.33	0.32	0.28	0.25	
RA33	980.2*	10-YR	0.82	85.89	86.07	86.04	86.08	0.004726	0.33	2.79	28.92	0.31	0.30	0.27	0.03
RA33	980.2*	100-YR	1.39	85.89	86.09	86.04	86.10	0.008412	0.48	3.30	34.58	0.42	0.42	0.40	0.12
RA33	976.6*	5-YR	0.66	85.86	86.04	86.00	86.05	0.002959	0.25	2.86	29.80	0.24	0.23	0.21	
RA33	976.6*	10-YR	0.82	85.86	86.06	86.02	86.07	0.002574	0.26	3.46	33.67	0.23	0.24	0.23	0.04
RA33	976.6*	100-YR	1.39	85.86	86.06	86.03	86.07	0.008117	0.46	3.34	33.44	0.41	0.42	0.39	0.06
RA33	973	5-YR	0.66	85.83	85.97	85.97	86.01	0.055314	0.96	0.69	7.50	1.01	0.96		
RA33	973	10-YR	0.82	85.83	85.99	85.99	86.04	0.051920	0.97	0.85	8.55	0.99	0.97		
RA33	973	100-YR	1.39	85.83	86.03	86.01	86.04	0.007004	0.42	3.54	32.69	0.38	0.39	0.38	0.02

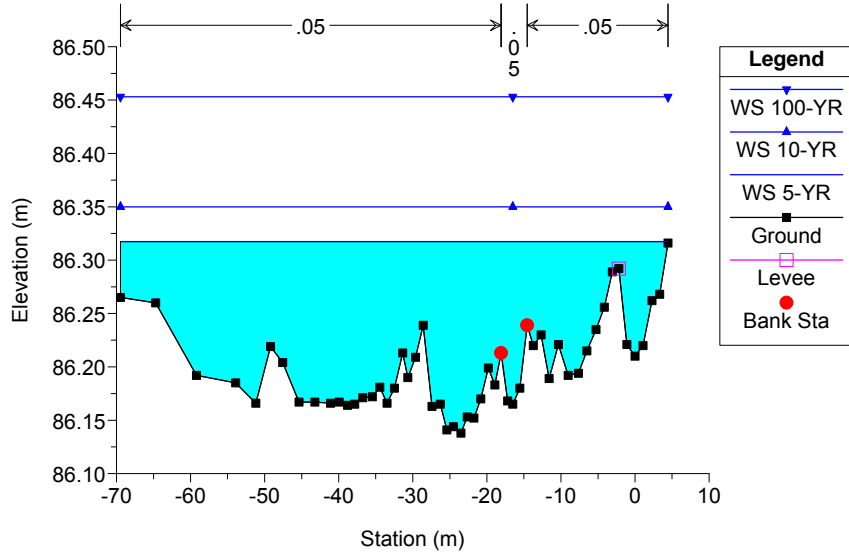


No Data for Plot

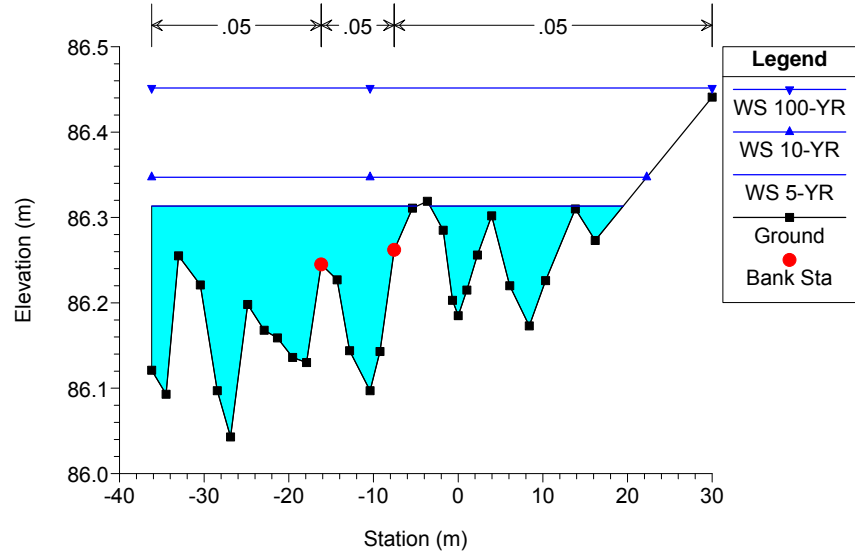
RA33 Plan: Plan 04 7/12/2017  
RS = 1048

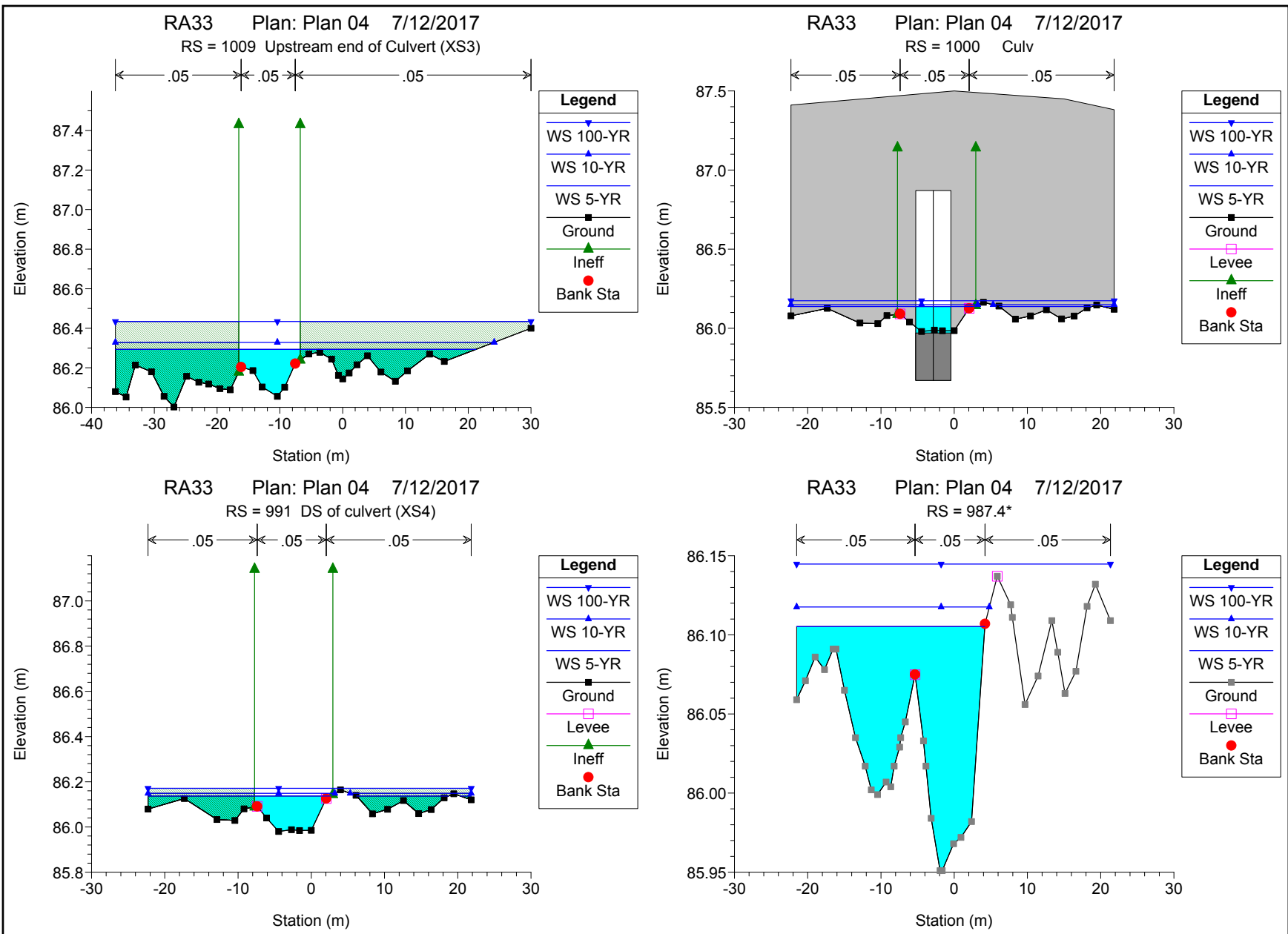


RA33 Plan: Plan 04 7/12/2017  
RS = 1025 25 m upstream of crossing

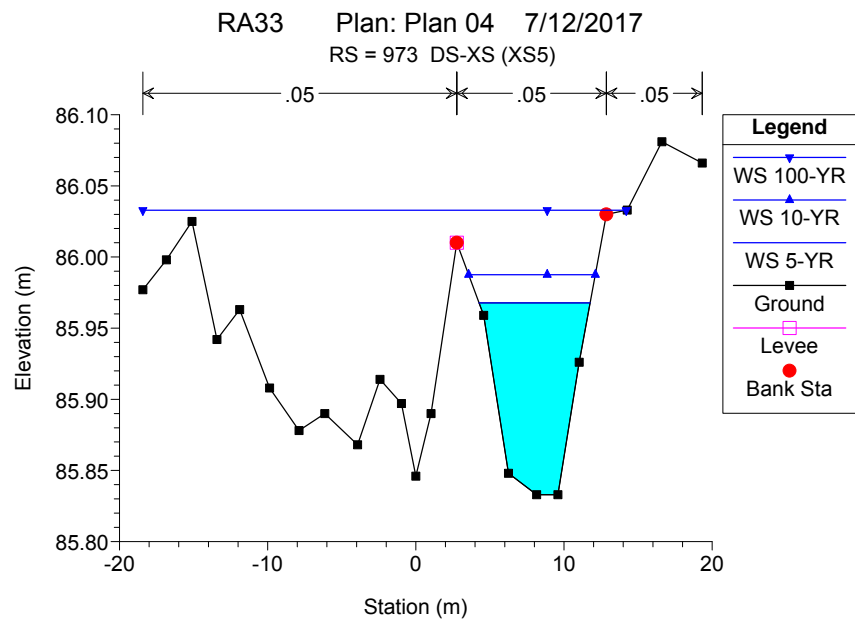
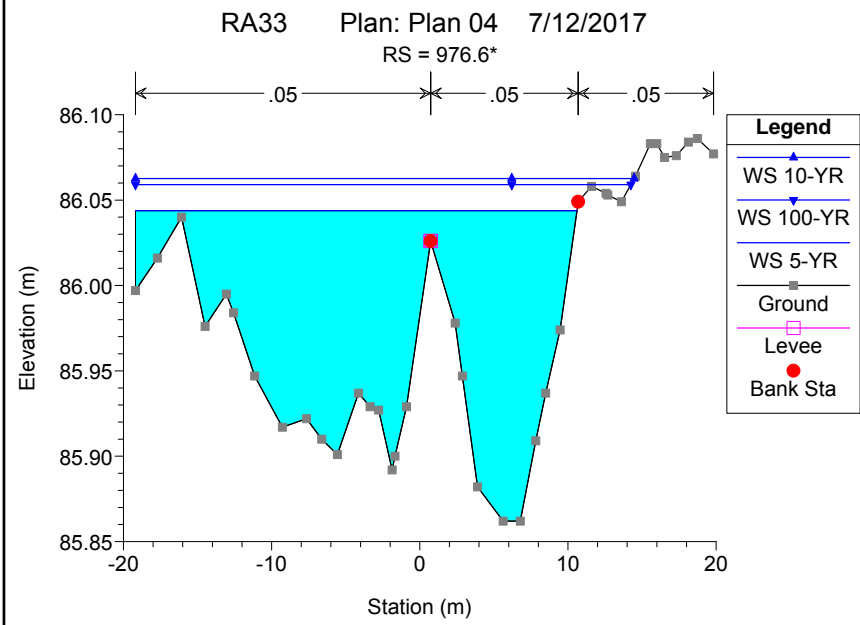
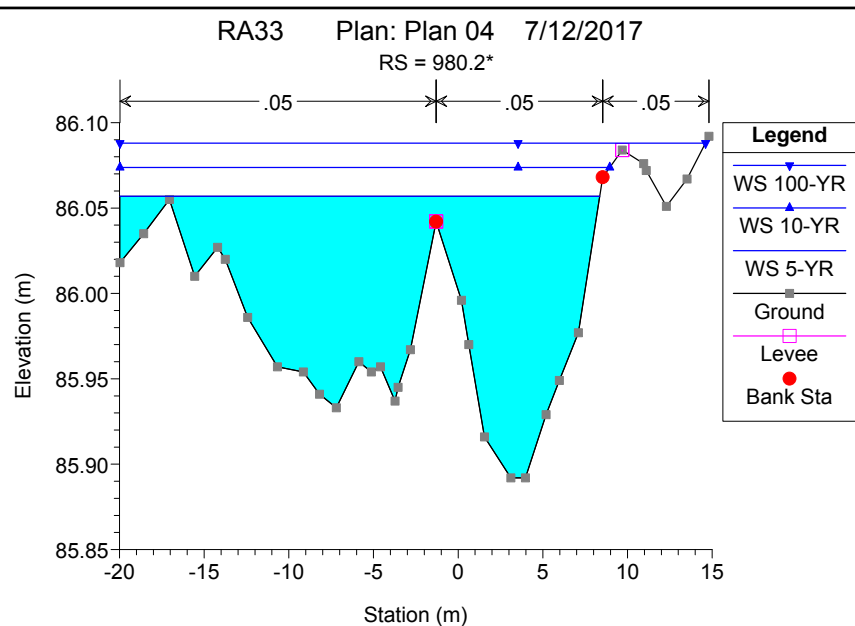
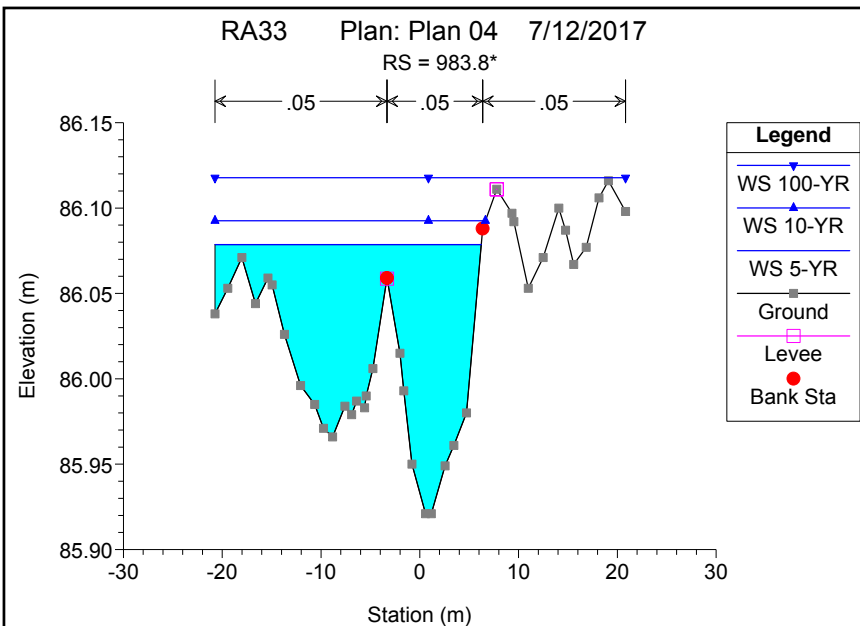


RA33 Plan: Plan 04 7/12/2017  
RS = 1015 Upstream end of Culvert (XS3)





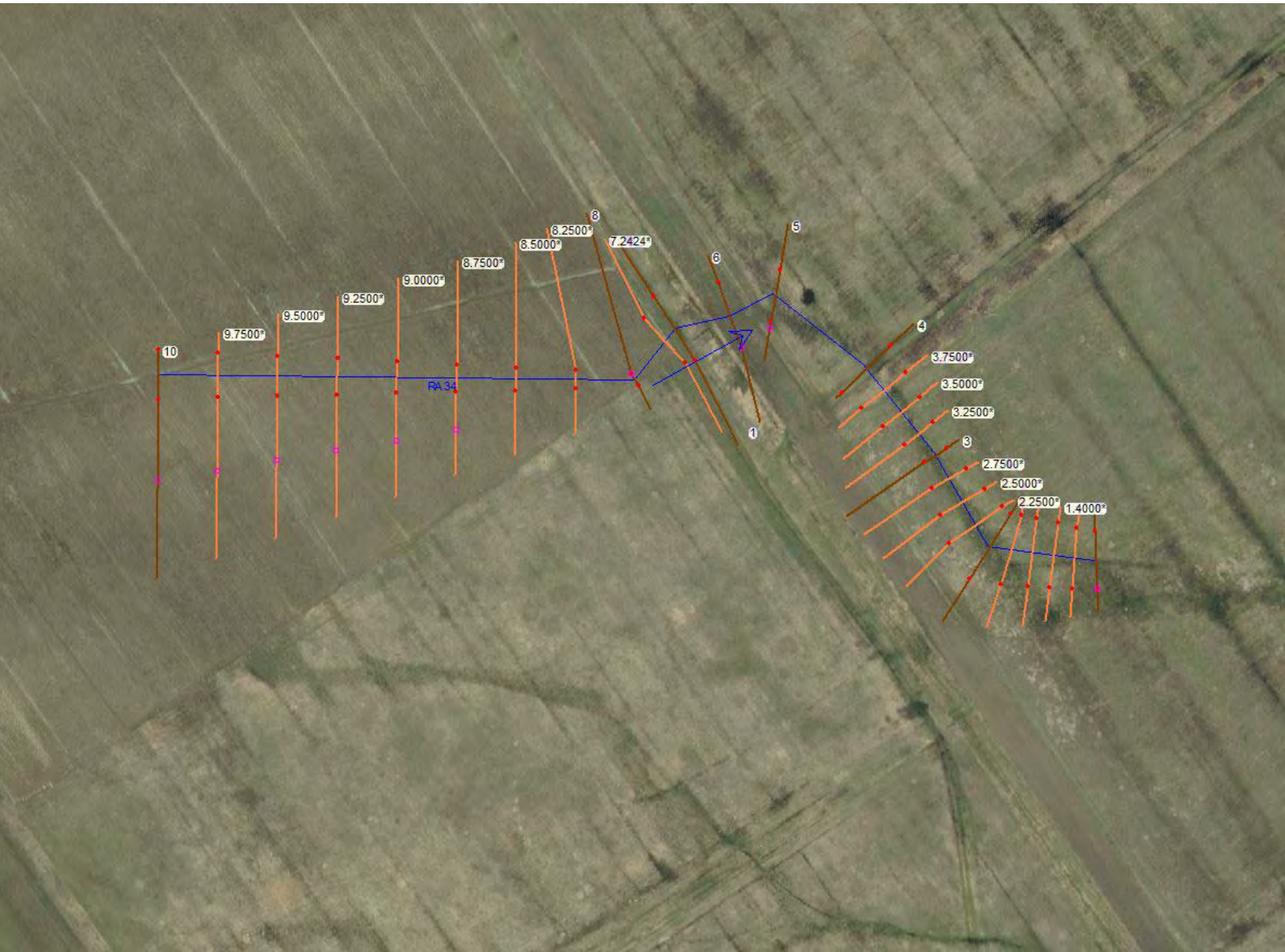




# RA34 – HYDRAULIC MODELING







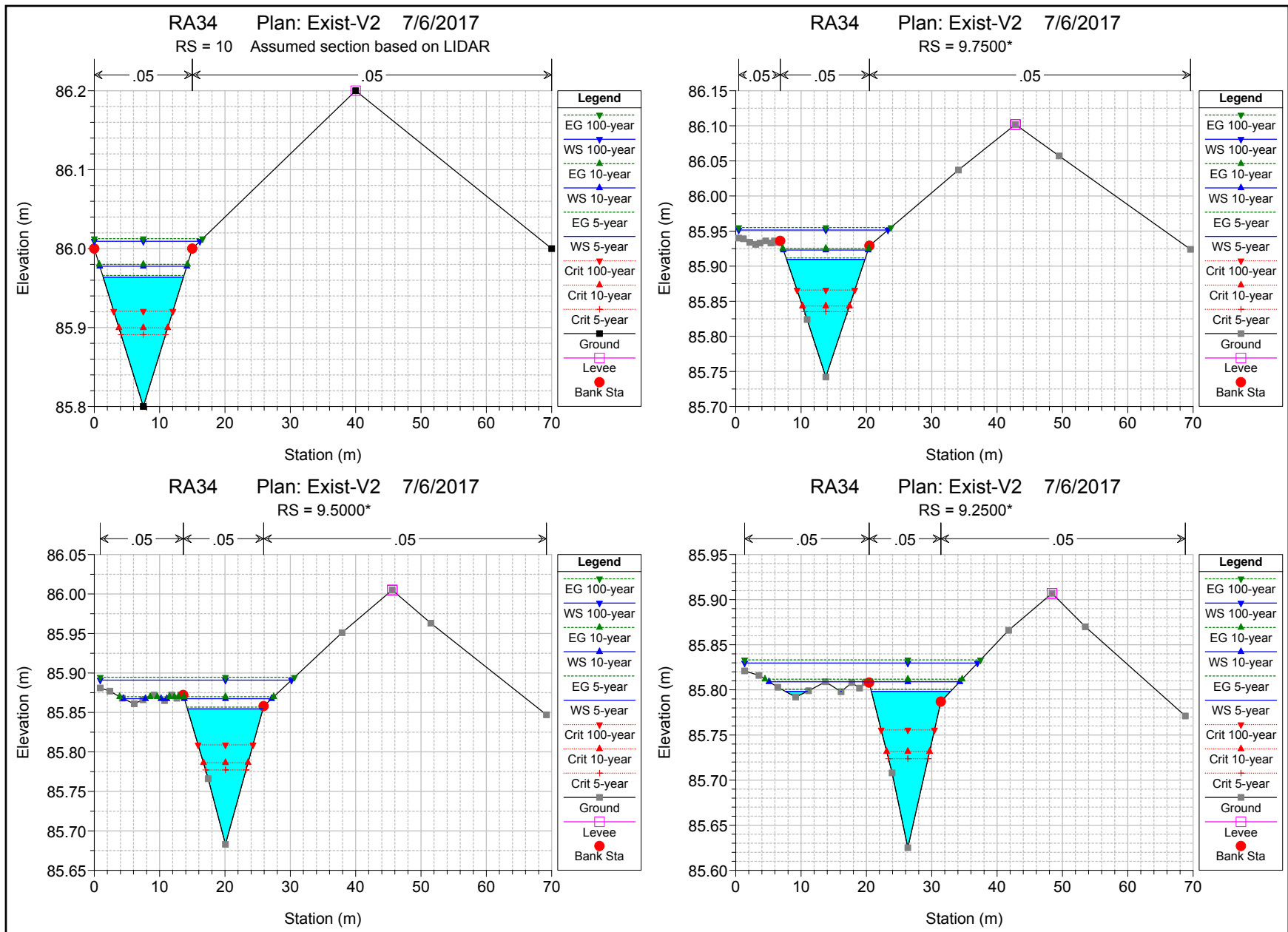
HEC-RAS Plan: Ex-V2 River: RA34 Reach: 1

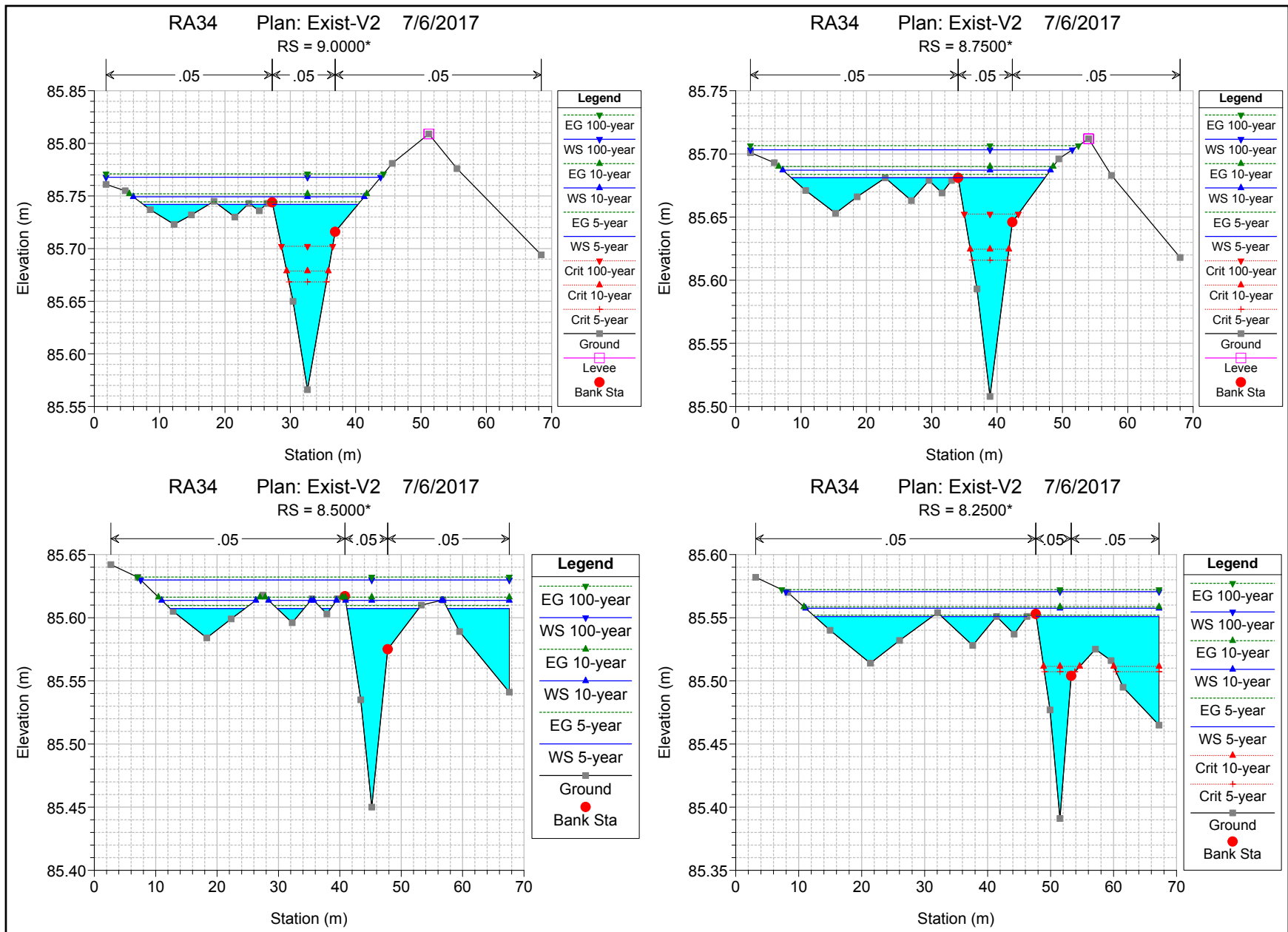
Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Vel Total (m/s)	Vel Left (m/s)	Vel Right (m/s)
1	10	5-year	0.20	85.80	85.96	85.89	85.97	0.002877	0.20	1.01	12.30	0.23	0.20		
1	10	10-year	0.25	85.80	85.98	85.90	85.98	0.002904	0.21	1.18	13.33	0.23	0.21		
1	10	100-year	0.42	85.80	86.01	85.92	86.01	0.003104	0.25	1.65	16.18	0.25	0.25		0.03
1	9.7500*	5-year	0.20	85.74	85.91	85.84	85.91	0.002879	0.20	1.00	12.00	0.23	0.20		
1	9.7500*	10-year	0.25	85.74	85.92	85.84	85.93	0.002959	0.22	1.16	12.97	0.23	0.22		
1	9.7500*	100-year	0.42	85.74	85.95	85.87	85.96	0.003152	0.26	1.69	22.86	0.25	0.25	0.07	0.06
1	9.5000*	5-year	0.20	85.68	85.85	85.78	85.86	0.002943	0.21	0.98	11.58	0.23	0.21		
1	9.5000*	10-year	0.25	85.68	85.87	85.79	85.87	0.002990	0.22	1.15	17.66	0.23	0.22	0.02	0.03
1	9.5000*	100-year	0.42	85.68	85.89	85.81	85.89	0.003337	0.27	1.76	29.29	0.26	0.24	0.09	0.07
1	9.2500*	5-year	0.20	85.63	85.80	85.72	85.80	0.003096	0.22	0.95	15.54	0.24	0.22	0.02	0.04
1	9.2500*	10-year	0.25	85.63	85.81	85.73	85.81	0.003228	0.24	1.18	29.14	0.25	0.21	0.04	0.06
1	9.2500*	100-year	0.42	85.63	85.83	85.76	85.83	0.003535	0.28	1.86	35.64	0.27	0.22	0.10	0.09
1	9.0000*	5-year	0.20	85.57	85.74	85.67	85.74	0.003107	0.22	1.04	29.87	0.24	0.20	0.05	0.06
1	9.0000*	10-year	0.25	85.57	85.75	85.68	85.75	0.003376	0.25	1.29	35.40	0.25	0.20	0.06	0.08
1	9.0000*	100-year	0.42	85.57	85.77	85.70	85.77	0.003808	0.29	2.02	42.02	0.27	0.21	0.11	0.11
1	8.7500*	5-year	0.20	85.51	85.68	85.62	85.68	0.003611	0.24	1.12	38.83	0.26	0.18	0.06	0.08
1	8.7500*	10-year	0.25	85.51	85.69	85.62	85.69	0.003874	0.26	1.36	40.98	0.27	0.19	0.08	0.09
1	8.7500*	100-year	0.42	85.51	85.70	85.65	85.71	0.004203	0.30	2.08	49.26	0.29	0.20	0.12	0.11
1	8.5000*	5-year	0.20	85.45	85.61		85.61	0.004547	0.25	1.14	39.77	0.28	0.18	0.06	0.13
1	8.5000*	10-year	0.25	85.45	85.61		85.62	0.004723	0.26	1.44	52.35	0.29	0.18	0.08	0.14
1	8.5000*	100-year	0.42	85.45	85.63		85.63	0.004181	0.28	2.37	60.05	0.28	0.18	0.11	0.16
1	8.2500*	5-year	0.20	85.39	85.55	85.51	85.55	0.002348	0.18	1.63	51.62	0.20	0.13	0.06	0.13
1	8.2500*	10-year	0.25	85.39	85.56	85.51	85.56	0.002312	0.19	1.99	56.15	0.20	0.13	0.07	0.14
1	8.2500*	100-year	0.42	85.39	85.57		85.57	0.002852	0.22	2.76	59.30	0.22	0.15	0.10	0.17
1	8	5-year	0.20	85.33	85.47	85.44	85.47	0.009773	0.32	0.69	11.81	0.40	0.30		0.28
1	8	10-year	0.25	85.33	85.48	85.44	85.48	0.009750	0.34	0.79	12.05	0.40	0.32		0.31
1	8	100-year	0.42	85.33	85.49	85.46	85.49	0.009481	0.35	1.64	62.57	0.40	0.25	0.14	0.34
1	7.2424*	5-year	0.20	85.30	85.35		85.35	0.006891	0.16	1.16	33.96	0.30	0.18		0.18
1	7.2424*	10-year	0.25	85.30	85.36		85.36	0.007159	0.18	1.32	34.23	0.31	0.19		0.20
1	7.2424*	100-year	0.42	85.30	85.37		85.37	0.007113	0.20	1.82	36.52	0.31	0.23		0.24
1	7	5-year	0.20	85.29	85.32		85.32	0.007568	0.11	1.15	39.21	0.28	0.18		0.19
1	7	10-year	0.25	85.29	85.33		85.33	0.006345	0.12	1.44	41.08	0.27	0.18		0.19
1	7	100-year	0.42	85.29	85.34		85.34	0.006077	0.15	2.01	43.29	0.28	0.21		0.22
1	6	5-year	0.20	85.10	85.26	85.22	85.26	0.003397	0.18	1.16	19.64	0.23	0.18		
1	6	10-year	0.25	85.10	85.27	85.22	85.27	0.003668	0.19	1.30	20.25	0.24	0.19		
1	6	100-year	0.42	85.10	85.29	85.23	85.29	0.003208	0.21	2.22	42.94	0.24	0.19	0.04	0.10
1	5	5-year	0.20	85.13	85.21	85.17	85.21	0.002888	0.17	1.32	28.02	0.22	0.15	0.04	0.09
1	5	10-year	0.25	85.13	85.22	85.17	85.22	0.002924	0.19	1.53	29.27	0.22	0.17	0.06	0.11
1	5	100-year	0.42	85.13	85.24	85.19	85.24	0.003045	0.22	2.13	32.45	0.24	0.20	0.07	0.14
1	4	5-year	0.20	84.92	85.00		85.00	0.017712	0.30	0.68	18.23	0.49	0.30		
1	4	10-year	0.25	84.92	85.00		85.01	0.018114	0.32	0.78	18.76	0.51	0.32		
1	4	100-year	0.42	84.92	85.02		85.02	0.018408	0.39	1.08	20.17	0.53	0.39	0.06	
1	3.7500*	5-year	0.20	84.75	84.84		84.84	0.019905	0.34	0.61	14.70	0.53	0.34		
1	3.7500*	10-year	0.25	84.75	84.84		84.85	0.018547	0.35	0.72	15.36	0.52	0.35		
1	3.7500*	100-year	0.42	84.75	84.86		84.87	0.018149	0.41	1.01	16.84	0.54	0.41	0.03	
1	3.5000*	5-year	0.20	84.58	84.68		84.69	0.017058	0.35	0.58	11.74	0.51	0.35		
1	3.5000*	10-year	0.25	84.58	84.69		84.70	0.017271	0.38	0.67	12.34	0.52	0.38		
1	3.5000*	100-year	0.42	84.58	84.71		84.72	0.017837	0.45	0.94	13.66	0.55	0.45		
1	3.2500*	5-year	0.20	84.41	84.52		84.53	0.020079	0.42	0.48	8.45	0.56	0.42		
1	3.2500*	10-year	0.25	84.41	84.53		84.54	0.019127	0.44	0.58	9.29	0.56	0.44		
1	3.2500*	100-year	0.42	84.41	84.56		84.57	0.017113	0.49	0.86	10.63	0.55	0.49		
1	3	5-year	0.20	84.25	84.38		84.39	0.014244	0.42	0.48	6.52	0.49	0.42		
1	3	10-year	0.25	84.25	84.39		84.40	0.014562	0.45	0.56	6.90	0.51	0.45		
1	3	100-year	0.42	84.25	84.42		84.43	0.015424	0.54	0.78	8.21	0.54	0.54	0.06	
1	2.7500*	5-year	0.20	84.15	84.27		84.27	0.012978	0.36	0.56	8.87	0.46	0.36		
1	2.7500*	10-year	0.25	84.15	84.28		84.29	0.013156	0.38	0.66	9.68	0.47	0.38		
1	2.7500*	100-year	0.42	84.15	84.30		84.31	0.013295	0.45	0.93	10.83	0.49	0.45		
1	2.5000*	5-year	0.20	84.05	84.17		84.17	0.012044	0.32	0.63	11.18	0.43	0.32		
1	2.5000*	10-year	0.25	84.05	84.18		84.18	0.012052	0.34	0.75	12.44	0.44	0.34		
1	2.5000*	100-year	0.42	84.05	84.20		84.21	0.012552	0.40	1.05	13.91	0.46	0.40		
1	2.2500*	5-year	0.20	83.95	84.06		84.07	0.013132	0.31	0.65	12.98	0.44	0.31		
1	2.2500*	10-year	0.25	83.95	84.07		84.08	0.013227	0.33	0.77	14.07	0.45	0.33		
1	2.2500*	100-year	0.42	83.95	84.09		84.10	0.013049	0.37	1.12	16.94	0.46	0.37		
1	2	5-year	0.20	83.85	83.97		83.97	0.010490	0.27	0.75	15.27	0.40	0.27		
1	2	10-year	0.25	83.85	83.98		83.98	0.010455	0.29	0.87	16.04	0.40	0.29		
1	2	100-year	0.42	83.85	84.00		84.00	0.010633	0.33	1.28	20.39	0.42	0.33		
1	1.8000*	5-year	0.20	83.78	83.90		83.90	0.011019	0.27	0.74	15.71	0.40	0.27		
1	1.8000*	10-year	0.25	83.78	83.91		83.91	0.011268	0.28	0.89	18.17	0.41	0.28		



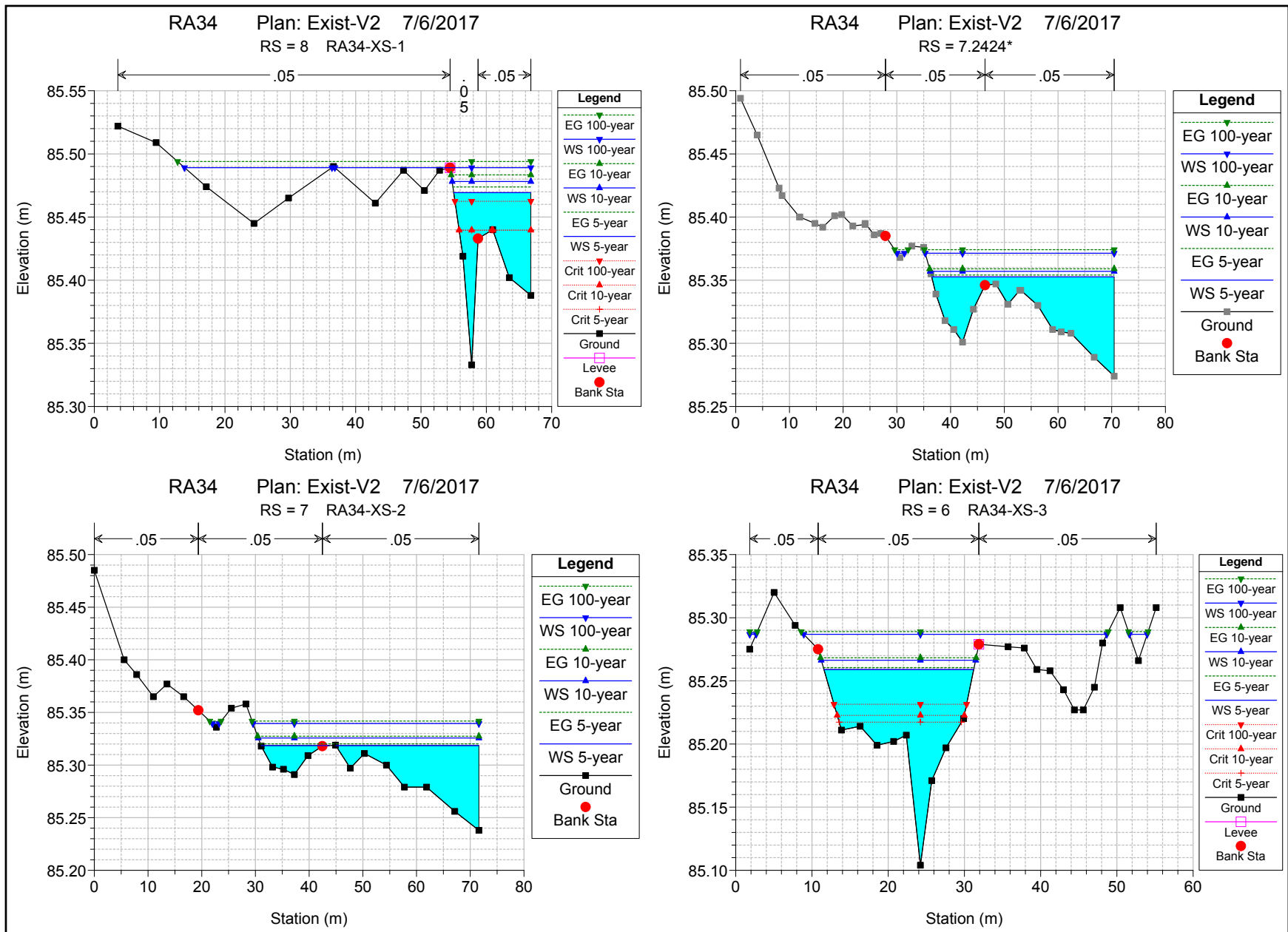
HEC-RAS Plan: Ex-V2 River: RA34 Reach: 1 (Continued)

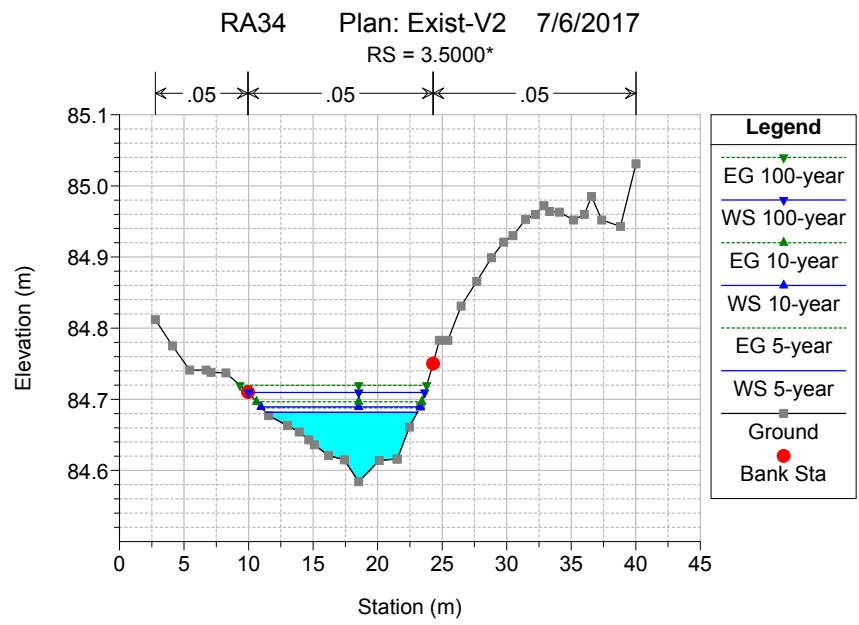
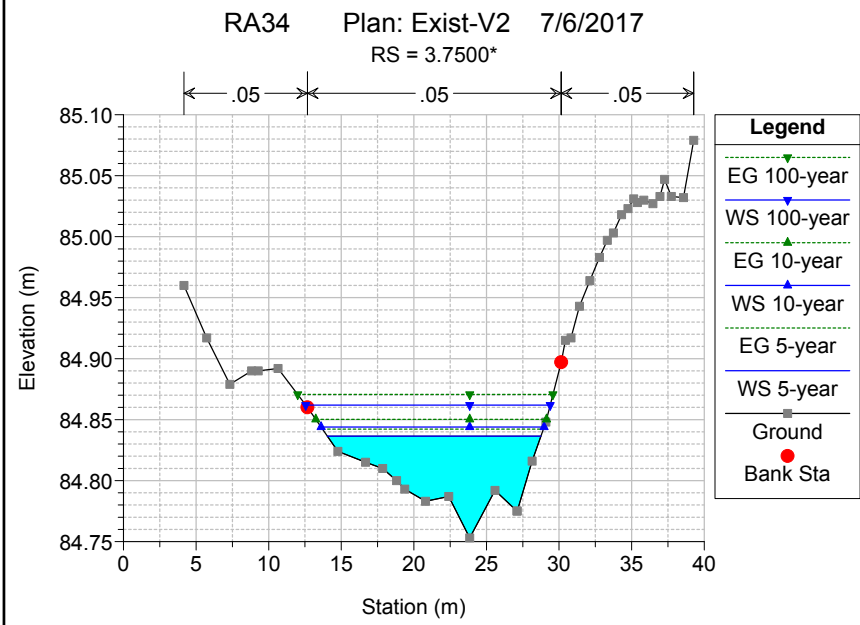
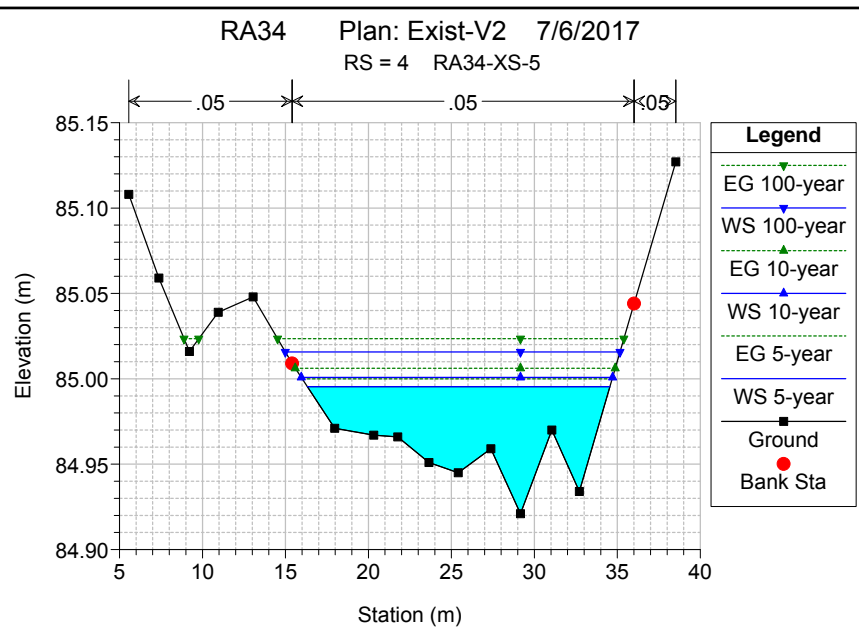
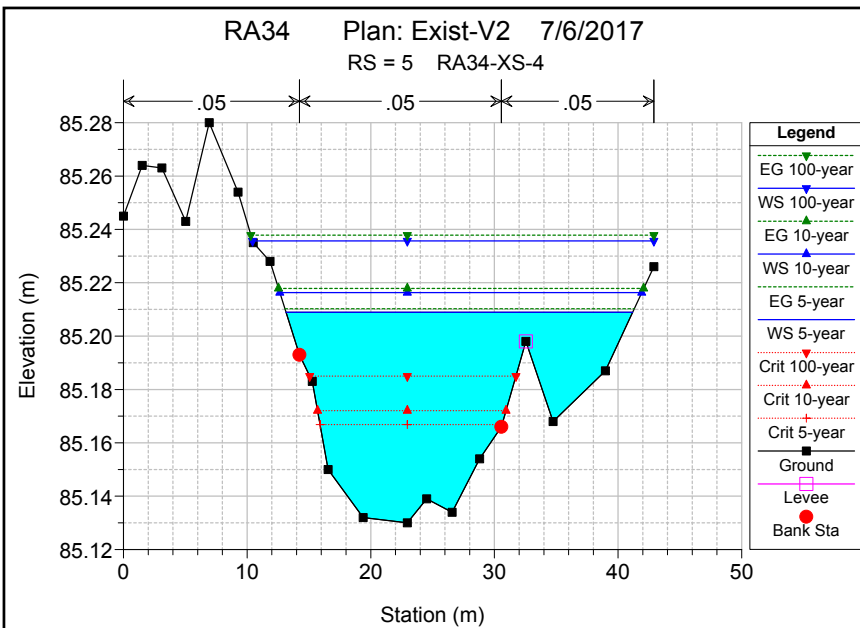
Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Vel Total (m/s)	Vel Left (m/s)	Vel Right (m/s)
1	1.8000*	100-year	0.42	83.78	83.93		83.93	0.010932	0.33	1.27	20.19	0.42	0.33		
1	1.6000*	5-year	0.20	83.72	83.83		83.83	0.011155	0.27	0.76	17.04	0.40	0.27		
1	1.6000*	10-year	0.25	83.72	83.84		83.84	0.011146	0.29	0.89	17.93	0.41	0.29		
1	1.6000*	100-year	0.42	83.72	83.86		83.86	0.011148	0.33	1.26	20.21	0.42	0.33		
1	1.4000*	5-year	0.20	83.65	83.76		83.76	0.010835	0.26	0.77	17.10	0.40	0.26		
1	1.4000*	10-year	0.25	83.65	83.77		83.77	0.010759	0.28	0.90	18.12	0.40	0.28		
1	1.4000*	100-year	0.42	83.65	83.78		83.79	0.010904	0.33	1.26	20.24	0.42	0.33		0.06
1	1.2000*	5-year	0.20	83.58	83.69		83.69	0.011694	0.27	0.76	17.24	0.41	0.27		
1	1.2000*	10-year	0.25	83.58	83.69		83.70	0.012015	0.29	0.87	18.26	0.42	0.29		0.03
1	1.2000*	100-year	0.42	83.58	83.71		83.72	0.011899	0.35	1.22	22.02	0.44	0.34		0.09
1	1	5-year	0.20	83.51	83.61	83.59	83.61	0.011501	0.27	0.77	19.44	0.41	0.27		0.09
1	1	10-year	0.25	83.51	83.62	83.59	83.62	0.011515	0.29	0.89	20.20	0.42	0.28		0.12
1	1	100-year	0.42	83.51	83.63	83.61	83.64	0.011513	0.35	1.26	21.90	0.43	0.33		0.19

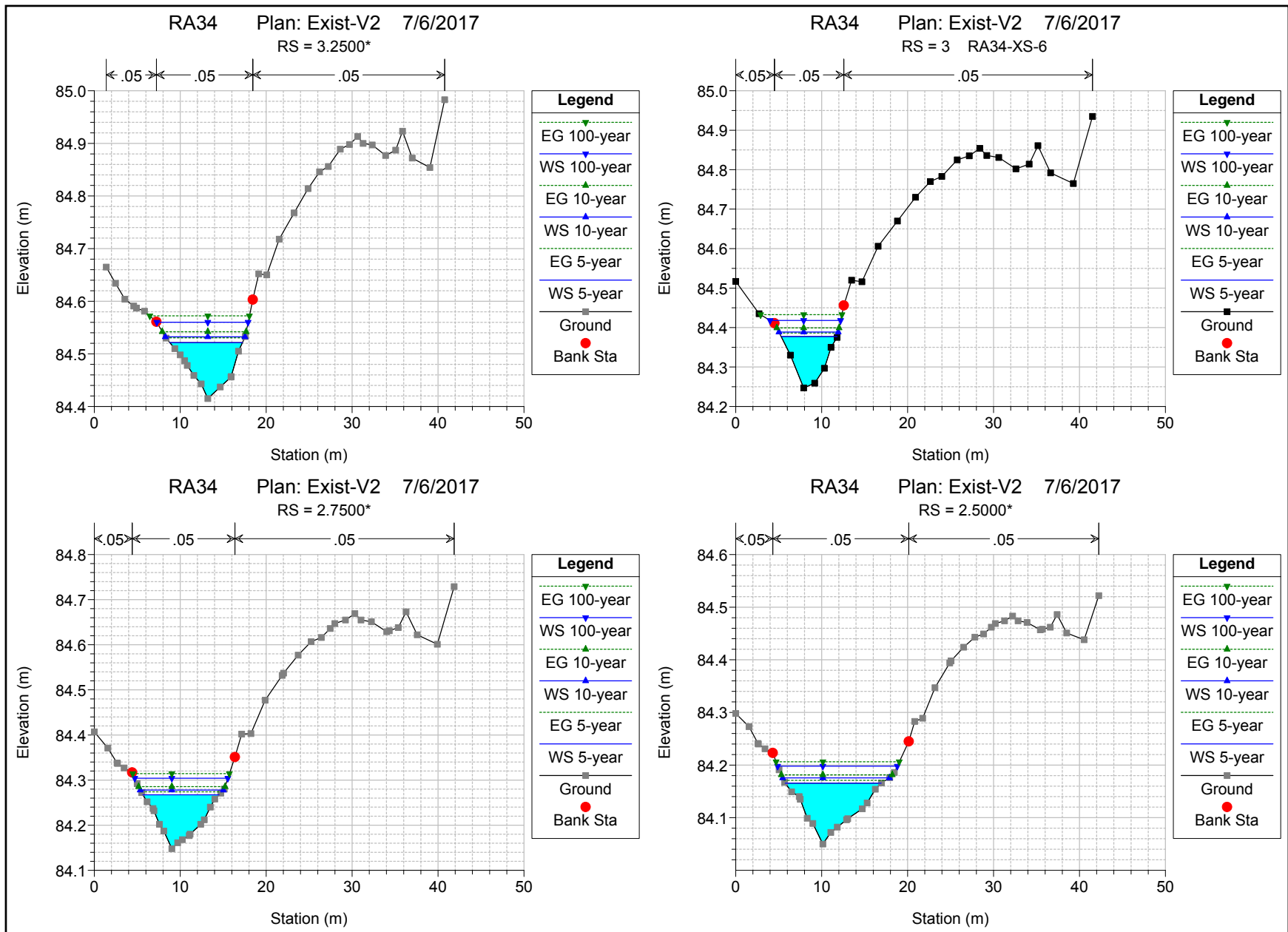




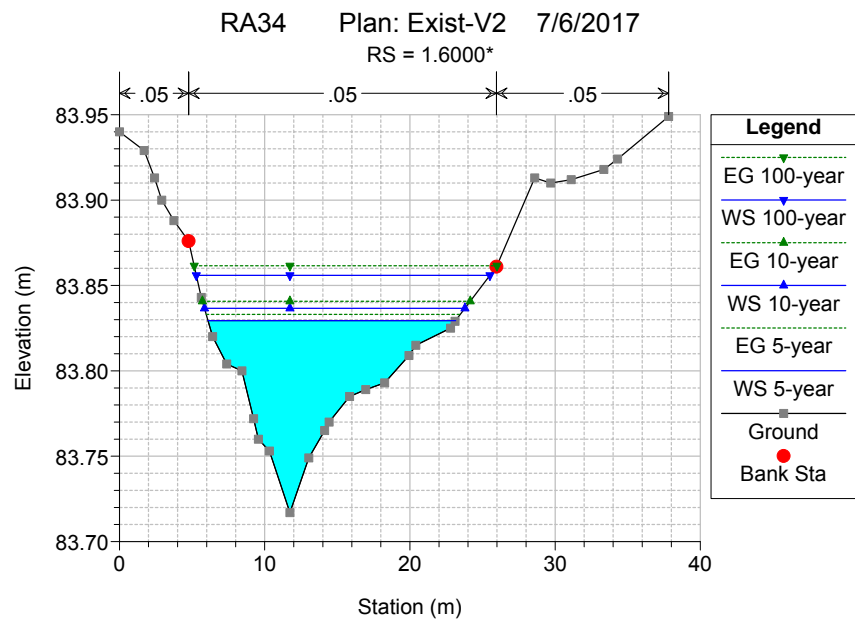
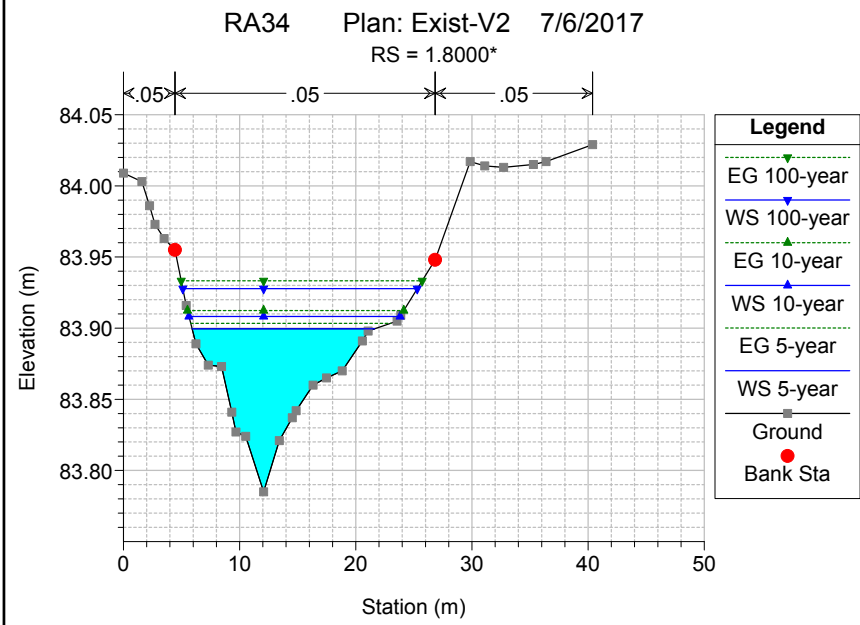
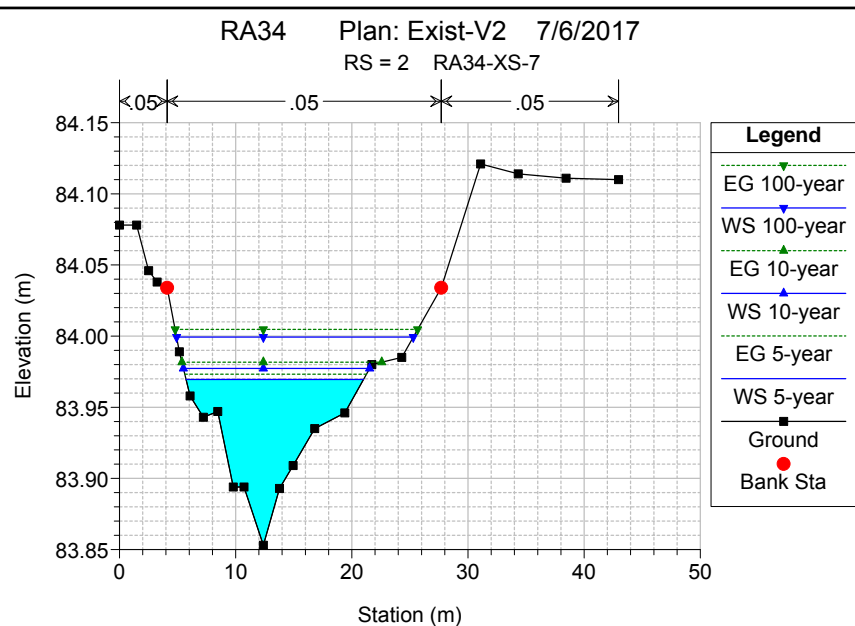
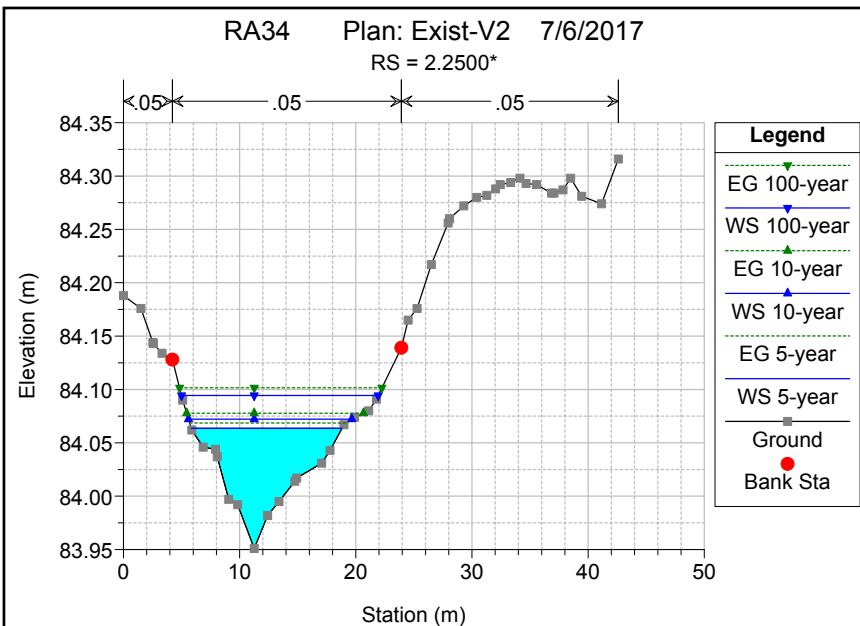




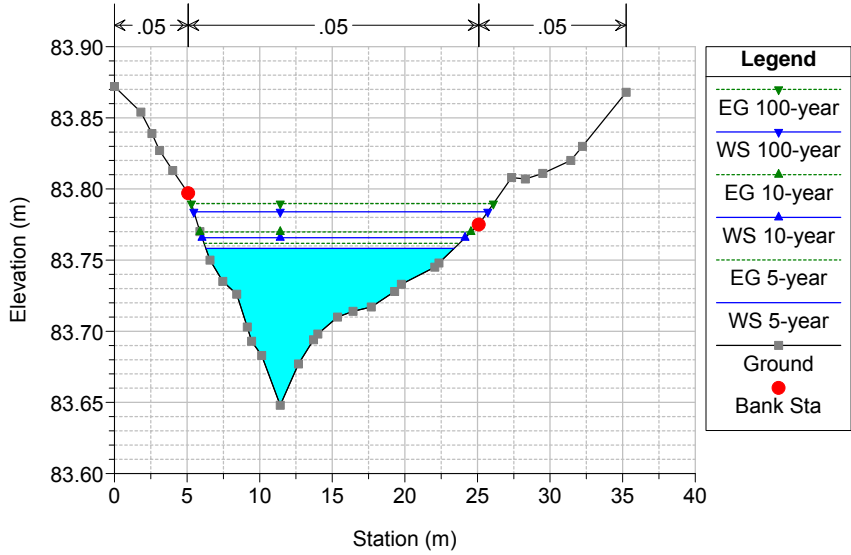




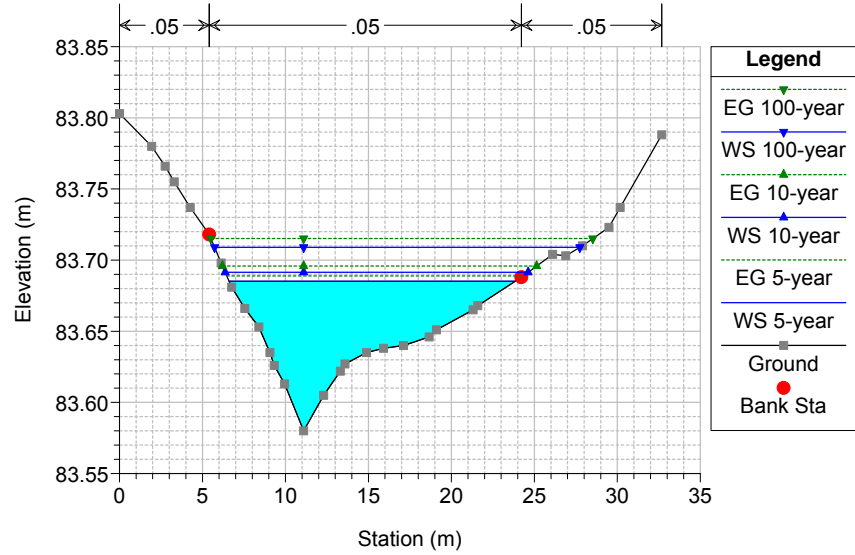




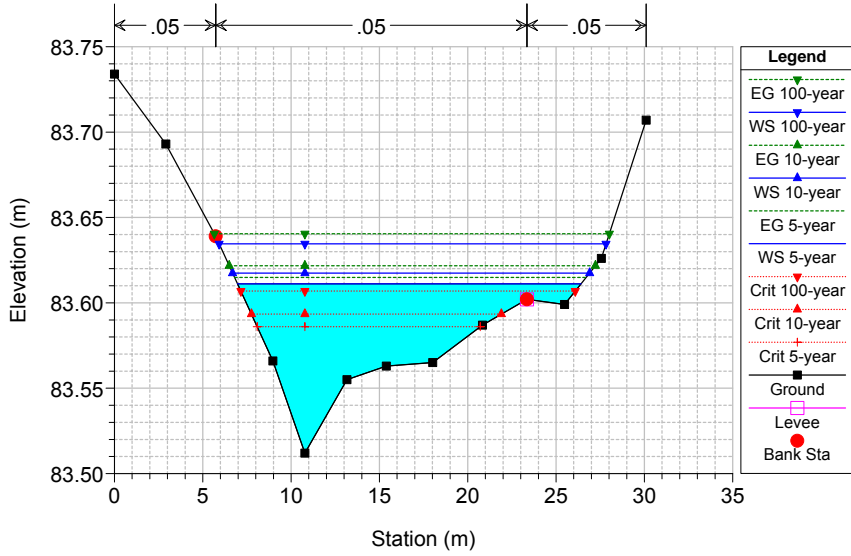
RA34 Plan: Exist-V2 7/6/2017  
RS = 1.4000\*

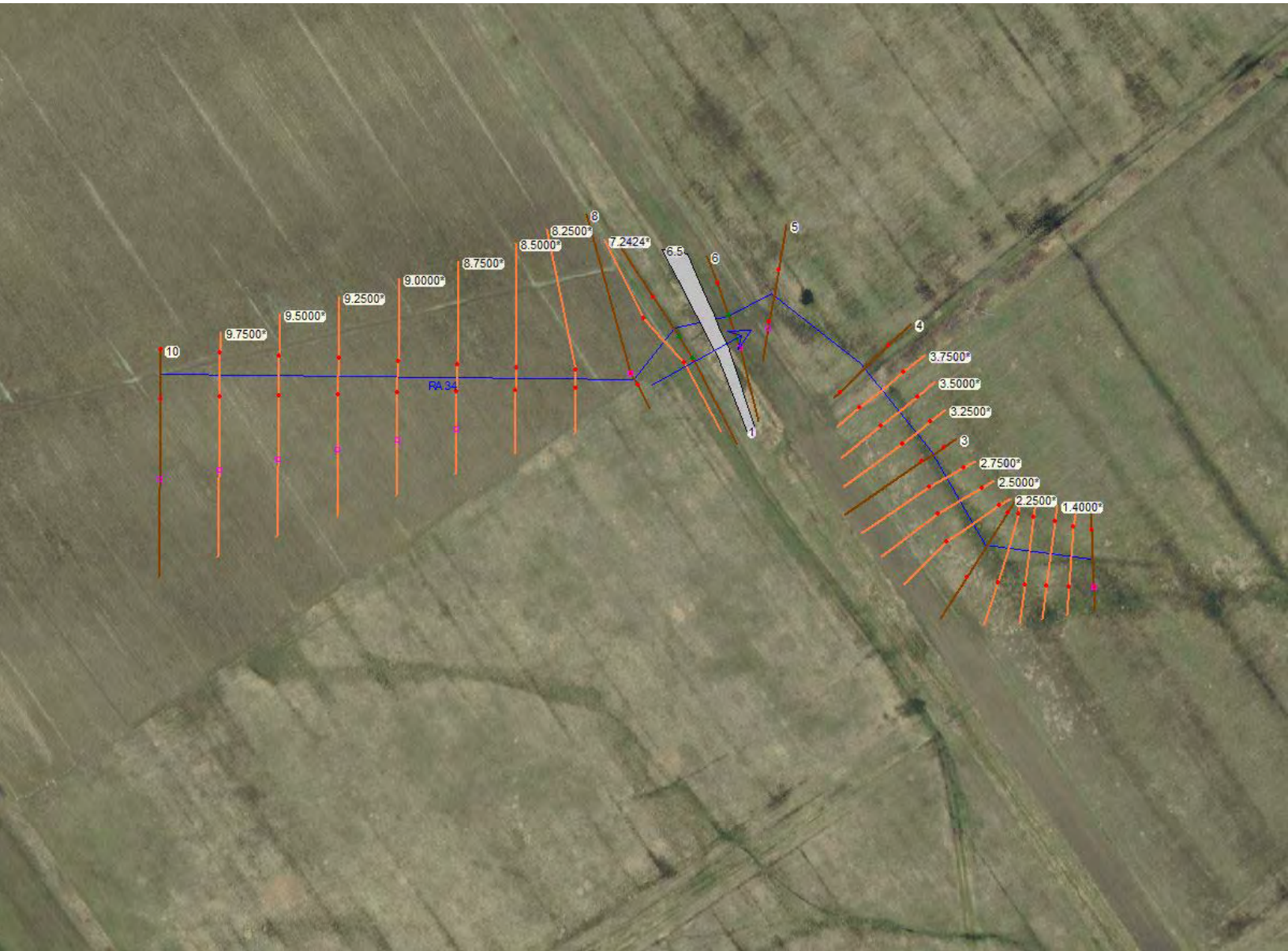


RA34 Plan: Exist-V2 7/6/2017  
RS = 1.2000\*



RA34 Plan: Exist-V2 7/6/2017  
RS = 1 RA34-XS-8





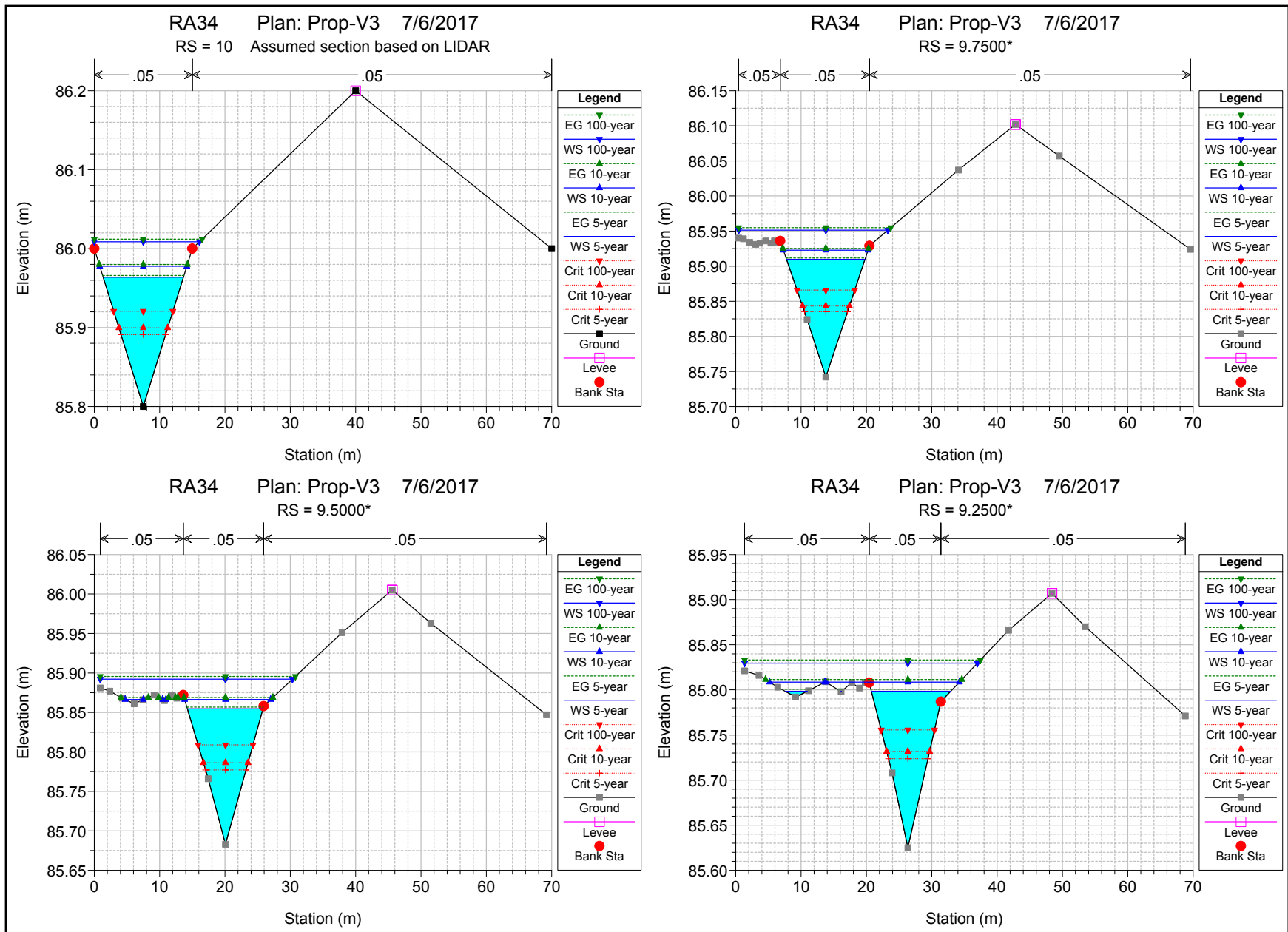


HEC-RAS Plan: Pr-V3 River: RA34 Reach: 1

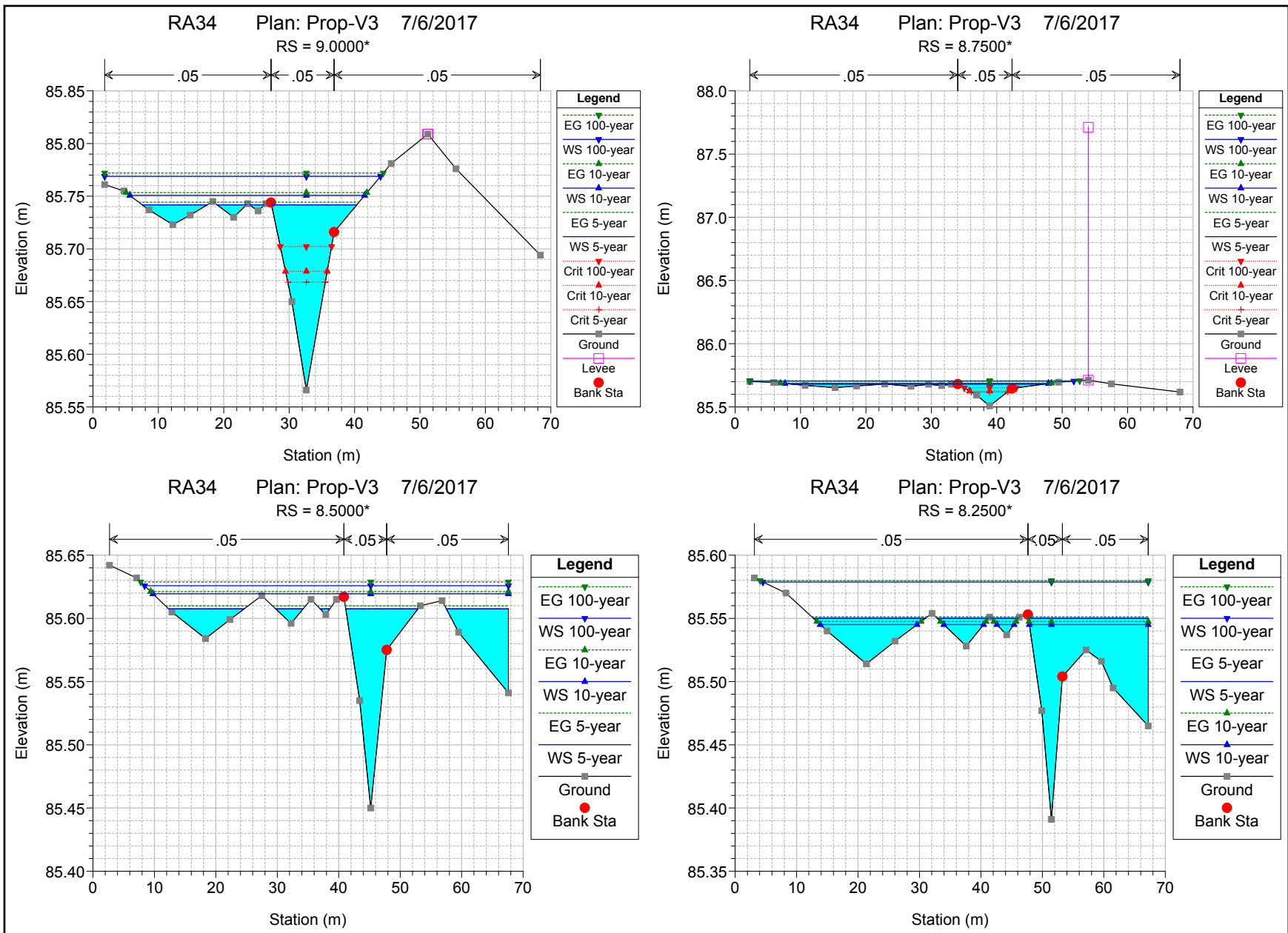
Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Vel Total (m/s)	Vel Left (m/s)	Vel Right (m/s)
1	10	5-year	0.20	85.80	85.96	85.89	85.97	0.002877	0.20	1.01	12.30	0.23	0.20		
1	10	10-year	0.25	85.80	85.98	85.90	85.98	0.002907	0.21	1.18	13.33	0.23	0.21		
1	10	100-year	0.42	85.80	86.01	85.92	86.01	0.003168	0.26	1.64	16.09	0.25	0.26		0.03
1	9.7500*	5-year	0.20	85.74	85.91	85.84	85.91	0.002879	0.20	1.00	12.00	0.23	0.20		
1	9.7500*	10-year	0.25	85.74	85.92	85.84	85.93	0.002969	0.22	1.16	12.96	0.23	0.22		
1	9.7500*	100-year	0.42	85.74	85.95	85.87	85.95	0.003172	0.26	1.69	22.84	0.25	0.25	0.07	0.06
1	9.5000*	5-year	0.20	85.68	85.85	85.78	85.86	0.002943	0.21	0.98	11.58	0.23	0.21		
1	9.5000*	10-year	0.25	85.68	85.87	85.79	85.87	0.003095	0.23	1.13	16.50	0.24	0.22	0.02	0.03
1	9.5000*	100-year	0.42	85.68	85.89	85.81	85.90	0.003185	0.27	1.80	29.45	0.25	0.23	0.09	0.08
1	9.2500*	5-year	0.20	85.63	85.80	85.72	85.80	0.003095	0.22	0.95	15.55	0.24	0.22	0.02	0.04
1	9.2500*	10-year	0.25	85.63	85.81	85.73	85.81	0.003287	0.24	1.17	28.80	0.25	0.22	0.04	0.06
1	9.2500*	100-year	0.42	85.63	85.83	85.76	85.83	0.003566	0.28	1.86	35.62	0.27	0.22	0.10	0.09
1	9.0000*	5-year	0.20	85.57	85.74	85.67	85.74	0.003111	0.22	1.04	29.83	0.24	0.20	0.05	0.06
1	9.0000*	10-year	0.25	85.57	85.75	85.68	85.75	0.003113	0.24	1.35	35.94	0.24	0.19	0.07	0.08
1	9.0000*	100-year	0.42	85.57	85.77	85.70	85.77	0.003427	0.28	2.06	42.16	0.26	0.20	0.11	0.10
1	8.7500*	5-year	0.20	85.51	85.68	85.62	85.68	0.003622	0.24	1.12	38.65	0.26	0.18	0.06	0.08
1	8.7500*	10-year	0.25	85.51	85.69	85.63	85.69	0.004378	0.27	1.28	40.26	0.28	0.20	0.08	0.10
1	8.7500*	100-year	0.42	85.51	85.70	85.65	85.71	0.003978	0.29	2.13	49.54	0.28	0.20	0.12	0.11
1	8.5000*	5-year	0.20	85.45	85.61		85.61	0.004476	0.25	1.15	40.15	0.28	0.18	0.06	0.13
1	8.5000*	10-year	0.25	85.45	85.62		85.62	0.003310	0.23	1.76	57.86	0.25	0.14	0.07	0.12
1	8.5000*	100-year	0.42	85.45	85.63		85.63	0.005534	0.31	2.13	59.20	0.32	0.20	0.11	0.17
1	8.2500*	5-year	0.20	85.39	85.55		85.55	0.002464	0.18	1.60	50.73	0.21	0.13	0.06	0.13
1	8.2500*	10-year	0.25	85.39	85.55		85.55	0.005419	0.27	1.35	44.38	0.31	0.19	0.08	0.19
1	8.2500*	100-year	0.42	85.39	85.58		85.58	0.001713	0.19	3.25	62.68	0.18	0.13	0.09	0.15
1	8	5-year	0.20	85.33	85.48	85.44	85.48	0.006937	0.28	0.77	12.00	0.34	0.27		0.26
1	8	10-year	0.25	85.33	85.50	85.44	85.50	0.001435	0.15	2.36	55.93	0.16	0.11	0.07	0.15
1	8	100-year	0.42	85.33	85.57	85.46	85.57	0.000182	0.08	6.72	63.22	0.06	0.06	0.06	0.08
1	7.2424*	5-year	0.20	85.30	85.48		85.48	0.000025	0.03	8.01	67.78	0.02	0.03	0.02	0.03
1	7.2424*	10-year	0.25	85.30	85.50		85.50	0.000021	0.03	9.72	69.58	0.02	0.03	0.02	0.03
1	7.2424*	100-year	0.42	85.30	85.57		85.57	0.000016	0.03	14.61	69.58	0.02	0.03	0.02	0.03
1	7	5-year	0.20	85.29	85.48	85.34	85.48	0.000596	0.15	1.34	70.98	0.12	0.15		
1	7	10-year	0.25	85.29	85.50	85.35	85.50	0.000596	0.17	1.52	71.61	0.12	0.17		
1	7	100-year	0.42	85.29	85.57	85.37	85.57	0.000597	0.20	2.06	71.61	0.13	0.20		
1	6.5		Culvert												
1	6	5-year	0.20	85.10	85.27	85.22	85.27	0.004960	0.29	0.71	20.29	0.30	0.29		
1	6	10-year	0.25	85.10	85.28	85.22	85.28	0.005429	0.32	0.79	21.47	0.32	0.32		
1	6	100-year	0.42	85.10	85.30	85.24	85.31	0.006736	0.42	1.00	49.67	0.37	0.42		
1	5	5-year	0.20	85.13	85.21	85.17	85.21	0.002888	0.17	1.32	28.02	0.22	0.15	0.04	0.09
1	5	10-year	0.25	85.13	85.22	85.17	85.22	0.002924	0.19	1.53	29.27	0.22	0.17	0.06	0.11
1	5	100-year	0.42	85.13	85.24	85.19	85.24	0.003045	0.22	2.13	32.45	0.24	0.20	0.07	0.14
1	4	5-year	0.20	84.92	85.00		85.00	0.017712	0.30	0.68	18.23	0.49	0.30		
1	4	10-year	0.25	84.92	85.00		85.01	0.018114	0.32	0.78	18.76	0.51	0.32		
1	4	100-year	0.42	84.92	85.02		85.02	0.018408	0.39	1.08	20.17	0.53	0.39	0.06	
1	3.7500*	5-year	0.20	84.75	84.84		84.84	0.019905	0.34	0.61	14.70	0.53	0.34		
1	3.7500*	10-year	0.25	84.75	84.84		84.85	0.018547	0.35	0.72	15.36	0.52	0.35		
1	3.7500*	100-year	0.42	84.75	84.86		84.87	0.018149	0.41	1.01	16.84	0.54	0.41	0.03	
1	3.5000*	5-year	0.20	84.58	84.68		84.69	0.017058	0.35	0.58	11.74	0.51	0.35		
1	3.5000*	10-year	0.25	84.58	84.69		84.70	0.017271	0.38	0.67	12.34	0.52	0.38		
1	3.5000*	100-year	0.42	84.58	84.71		84.72	0.017837	0.45	0.94	13.66	0.55	0.45		
1	3.2500*	5-year	0.20	84.41	84.52		84.53	0.020079	0.42	0.48	8.45	0.56	0.42		
1	3.2500*	10-year	0.25	84.41	84.53		84.54	0.019127	0.44	0.58	9.29	0.56	0.44		
1	3.2500*	100-year	0.42	84.41	84.56		84.57	0.017113	0.49	0.86	10.63	0.55	0.49		
1	3	5-year	0.20	84.25	84.38		84.39	0.014244	0.42	0.48	6.52	0.49	0.42		
1	3	10-year	0.25	84.25	84.39		84.40	0.014562	0.45	0.56	6.90	0.51	0.45		
1	3	100-year	0.42	84.25	84.42		84.43	0.015424	0.54	0.78	8.21	0.54	0.54	0.06	
1	2.7500*	5-year	0.20	84.15	84.27		84.27	0.012978	0.36	0.56	8.87	0.46	0.36		
1	2.7500*	10-year	0.25	84.15	84.28		84.29	0.013156	0.38	0.66	9.68	0.47	0.38		
1	2.7500*	100-year	0.42	84.15	84.30		84.31	0.013295	0.45	0.93	10.83	0.49	0.45		
1	2.5000*	5-year	0.20	84.05	84.17		84.17	0.012044	0.32	0.63	11.18	0.43	0.32		
1	2.5000*	10-year	0.25	84.05	84.18		84.18	0.012052	0.34	0.75	12.44	0.44	0.34		
1	2.5000*	100-year	0.42	84.05	84.20		84.21	0.012552	0.40	1.05	13.91	0.46	0.40		
1	2.2500*	5-year	0.20	83.95	84.06		84.07	0.013132	0.31	0.65	12.98	0.44	0.31		
1	2.2500*	10-year	0.25	83.95	84.07		84.08	0.013227	0.33	0.77	14.07	0.45	0.33		
1	2.2500*	100-year	0.42	83.95	84.09		84.10	0.013049	0.37	1.12	16.94	0.46	0.37		
1	2	5-year	0.20	83.85	83.97		83.97	0.010490	0.27	0.75	15.27	0.40	0.27		
1	2	10-year	0.25	83.85	83.98		83.98	0.010455	0.29	0.87	16.04	0.40	0.29		
1	2	100-year	0.42	83.85	84.00		84.00	0.010633	0.33	1.28	20.39	0.42	0.33		

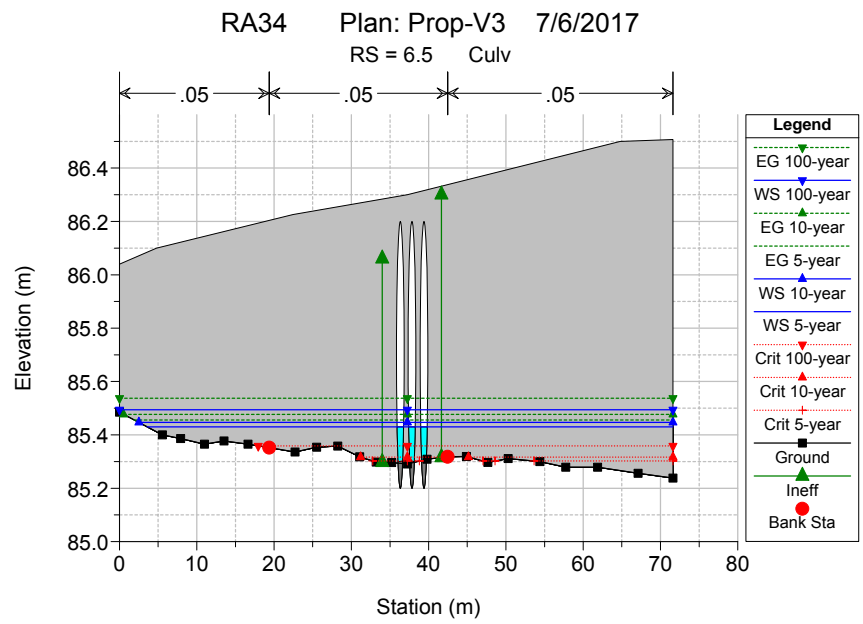
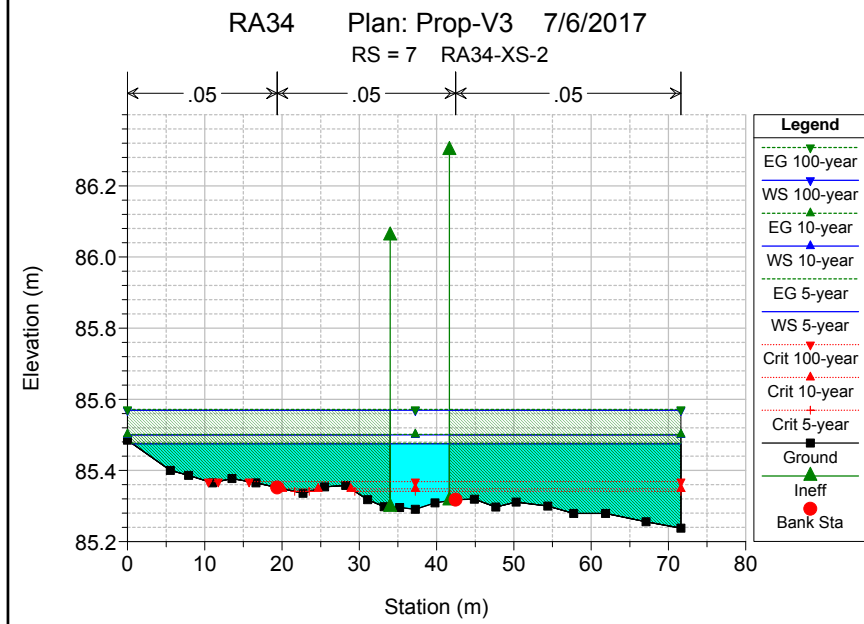
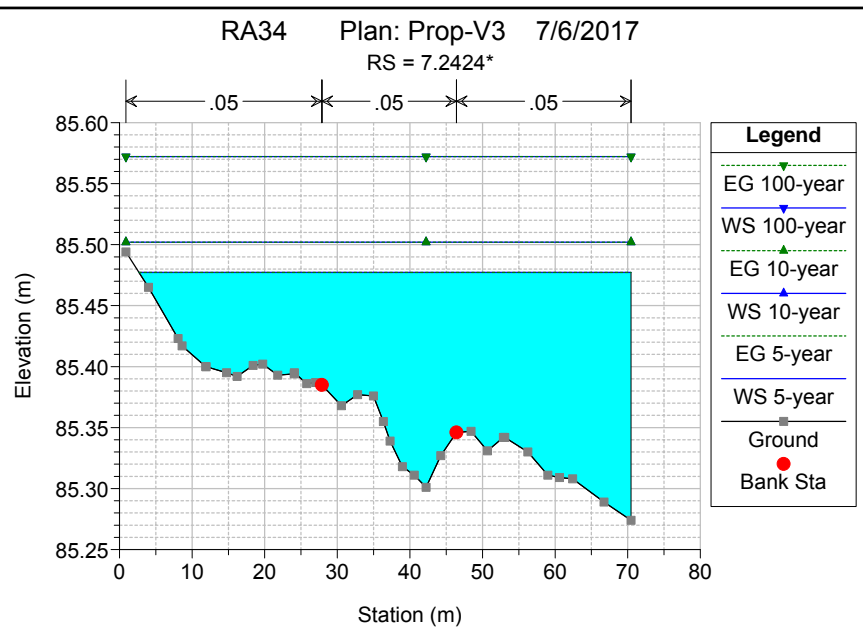
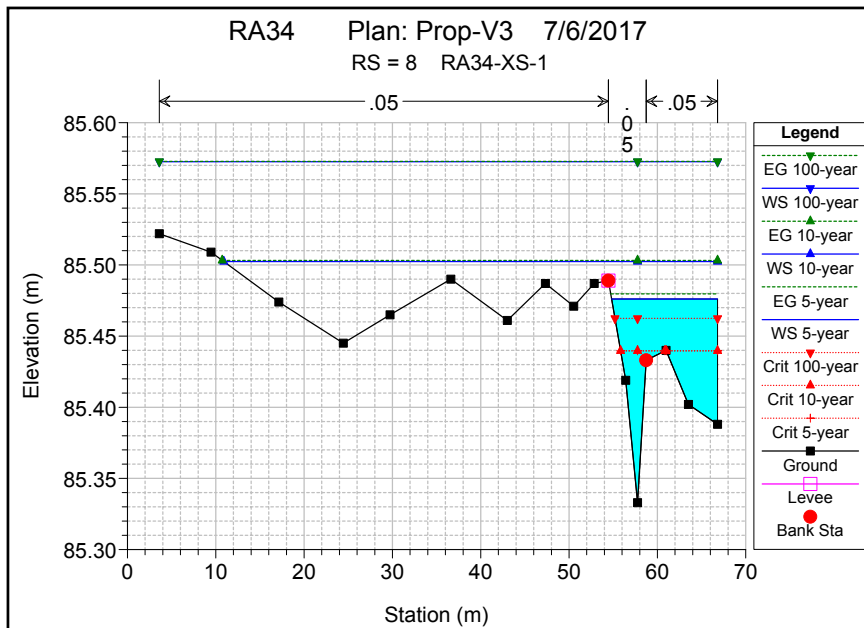
HEC-RAS Plan: Pr-V3 River: RA34 Reach: 1 (Continued)

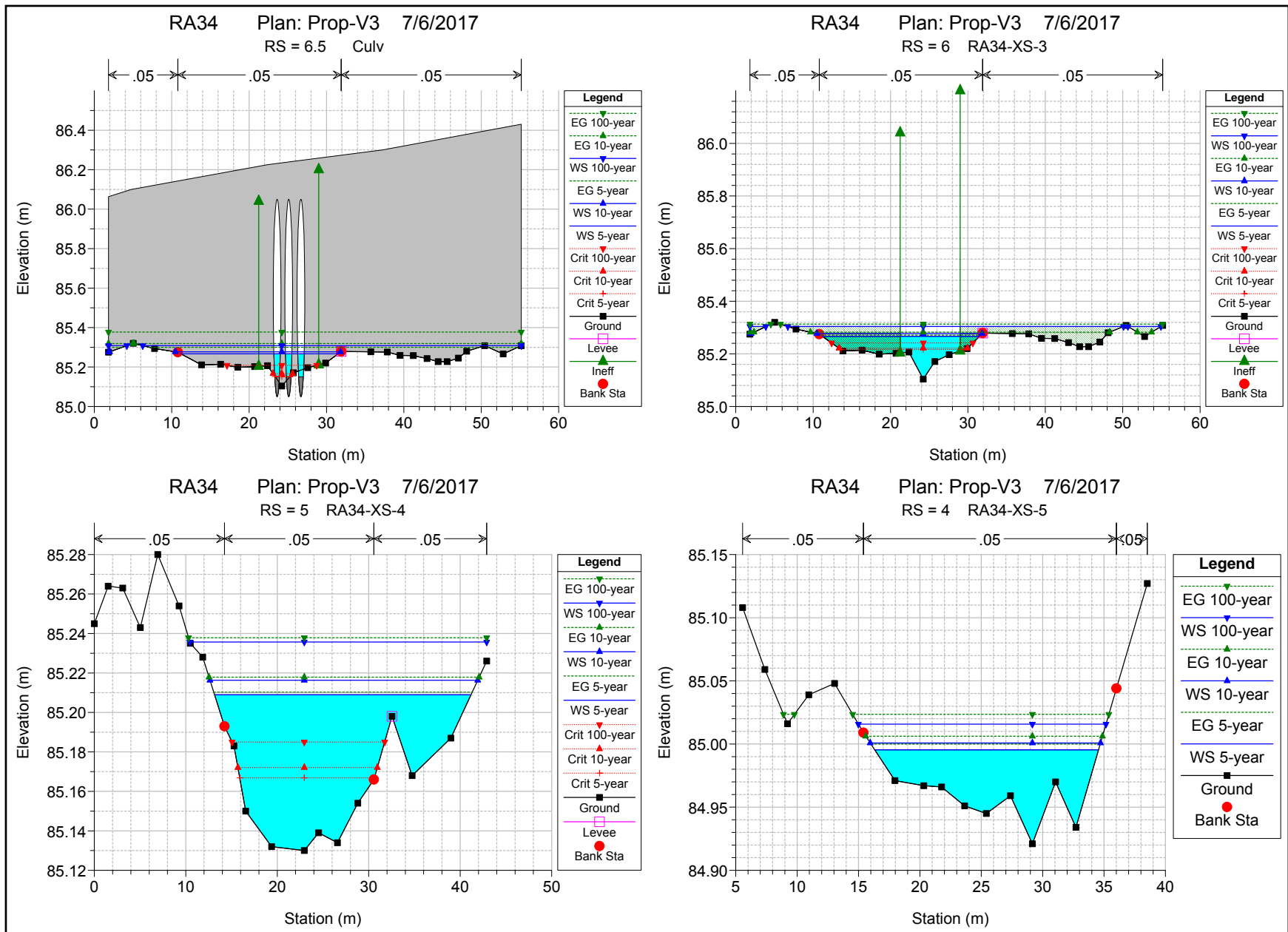
Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Vel Total (m/s)	Vel Left (m/s)	Vel Right (m/s)
1	1.8000*	5-year	0.20	83.78	83.90		83.90	0.011019	0.27	0.74	15.71	0.40	0.27		
1	1.8000*	10-year	0.25	83.78	83.91		83.91	0.011268	0.28	0.89	18.17	0.41	0.28		
1	1.8000*	100-year	0.42	83.78	83.93		83.93	0.010932	0.33	1.27	20.19	0.42	0.33		
1	1.6000*	5-year	0.20	83.72	83.83		83.83	0.011155	0.27	0.76	17.04	0.40	0.27		
1	1.6000*	10-year	0.25	83.72	83.84		83.84	0.011146	0.29	0.89	17.93	0.41	0.29		
1	1.6000*	100-year	0.42	83.72	83.86		83.86	0.011148	0.33	1.26	20.21	0.42	0.33		
1	1.4000*	5-year	0.20	83.65	83.76		83.76	0.010835	0.26	0.77	17.10	0.40	0.26		
1	1.4000*	10-year	0.25	83.65	83.77		83.77	0.010759	0.28	0.90	18.12	0.40	0.28		
1	1.4000*	100-year	0.42	83.65	83.78		83.79	0.010904	0.33	1.26	20.24	0.42	0.33		0.06
1	1.2000*	5-year	0.20	83.58	83.69		83.69	0.011694	0.27	0.76	17.24	0.41	0.27		
1	1.2000*	10-year	0.25	83.58	83.69		83.70	0.012015	0.29	0.87	18.26	0.42	0.29		0.03
1	1.2000*	100-year	0.42	83.58	83.71		83.72	0.011899	0.35	1.22	22.02	0.44	0.34		0.09
1	1	5-year	0.20	83.51	83.61	83.59	83.61	0.011501	0.27	0.77	19.44	0.41	0.27		0.09
1	1	10-year	0.25	83.51	83.62	83.59	83.62	0.011515	0.29	0.89	20.20	0.42	0.28		0.12
1	1	100-year	0.42	83.51	83.63	83.61	83.64	0.011513	0.35	1.26	21.90	0.43	0.33		0.19



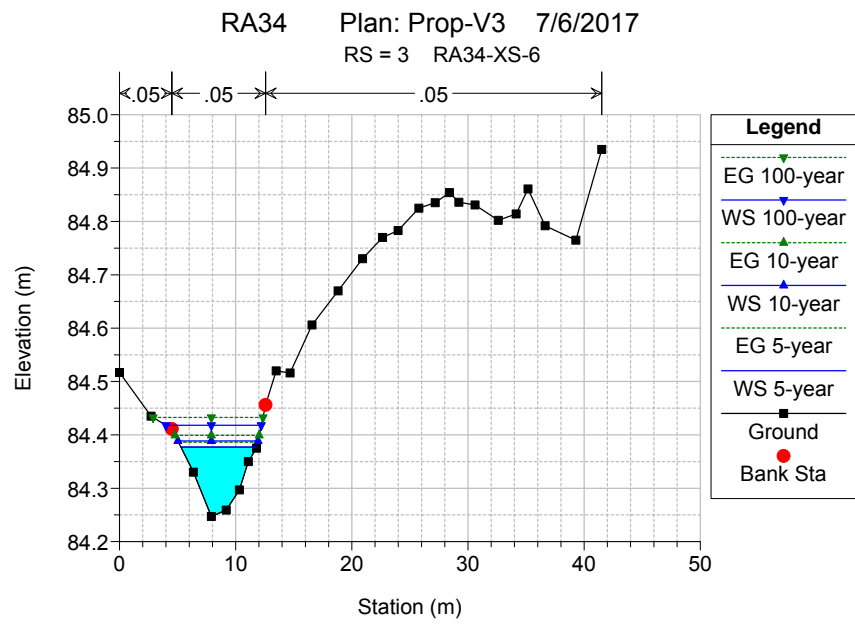
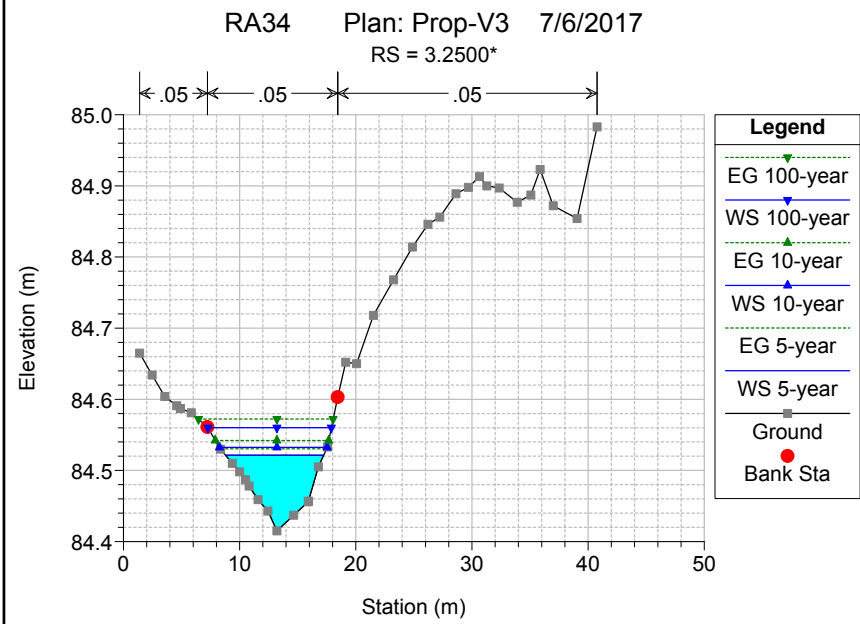
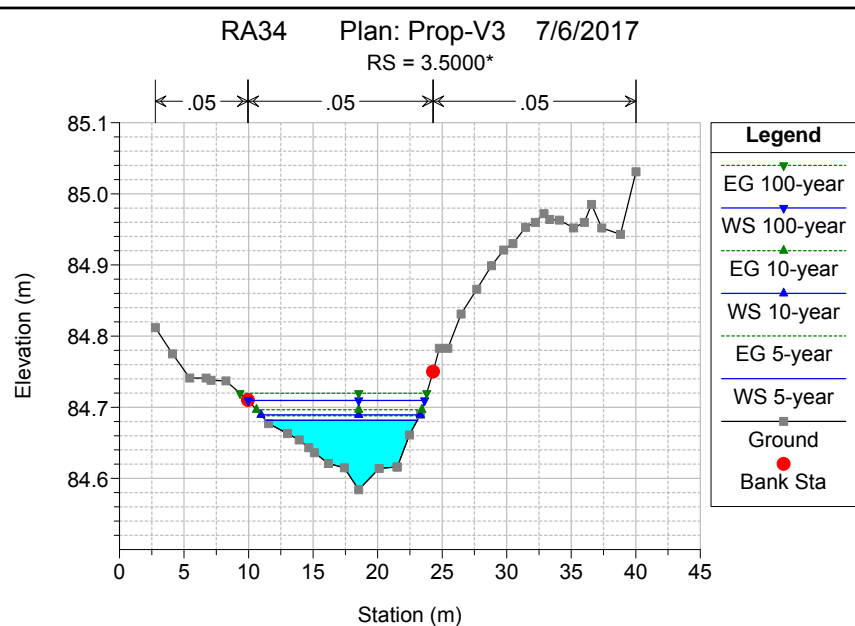
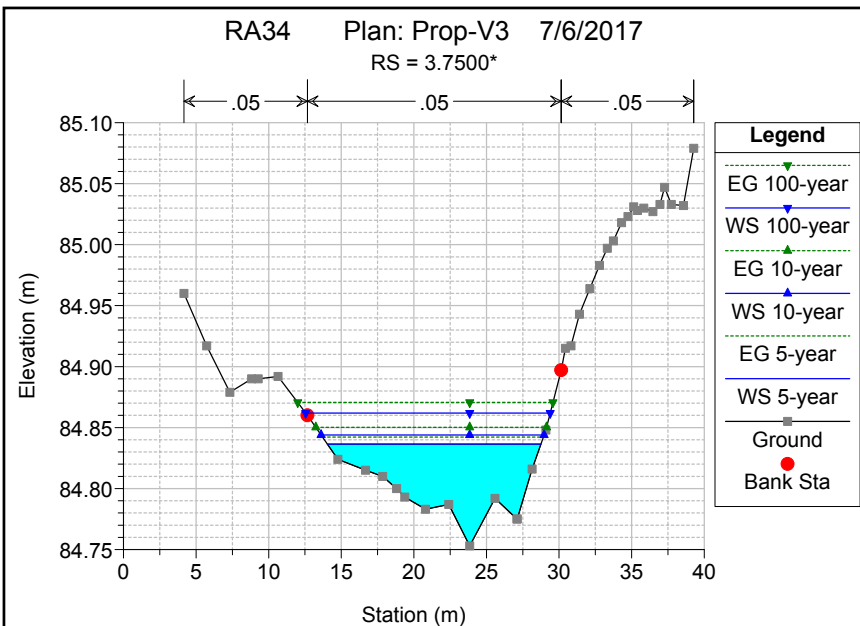


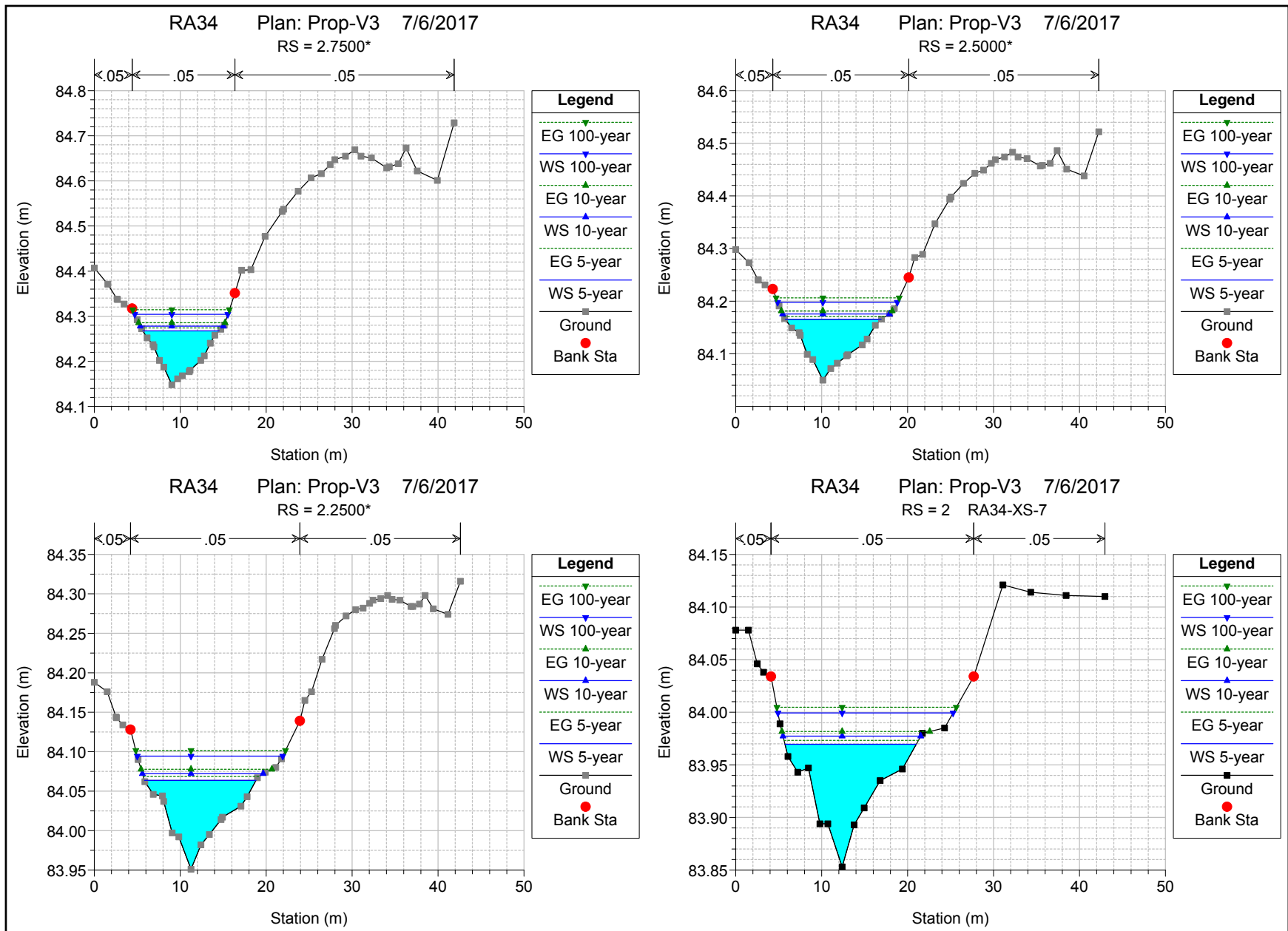




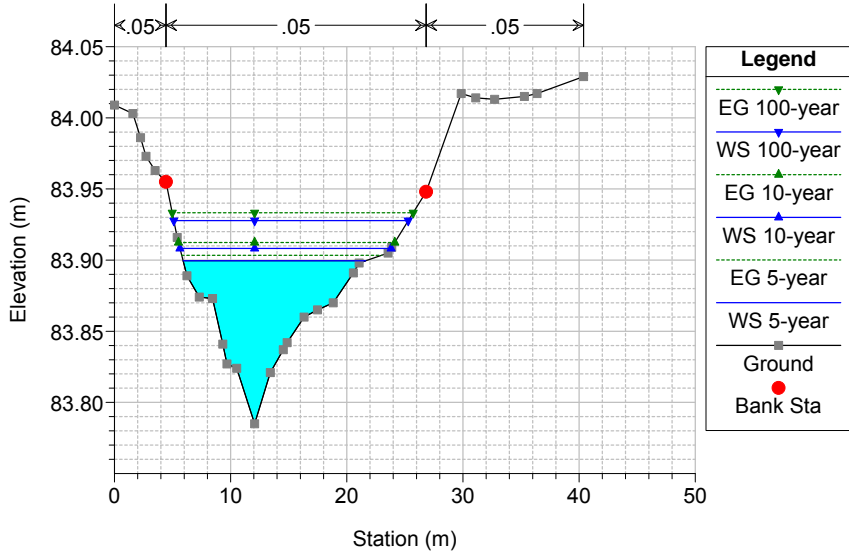




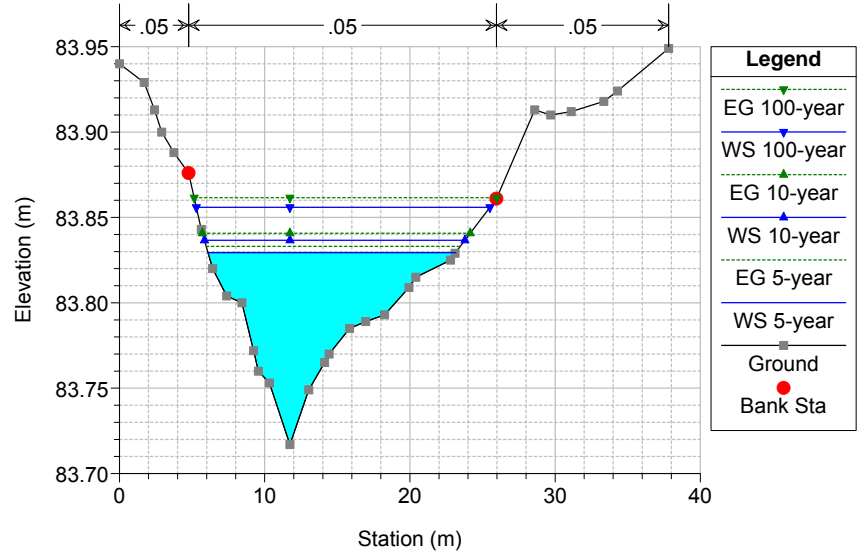




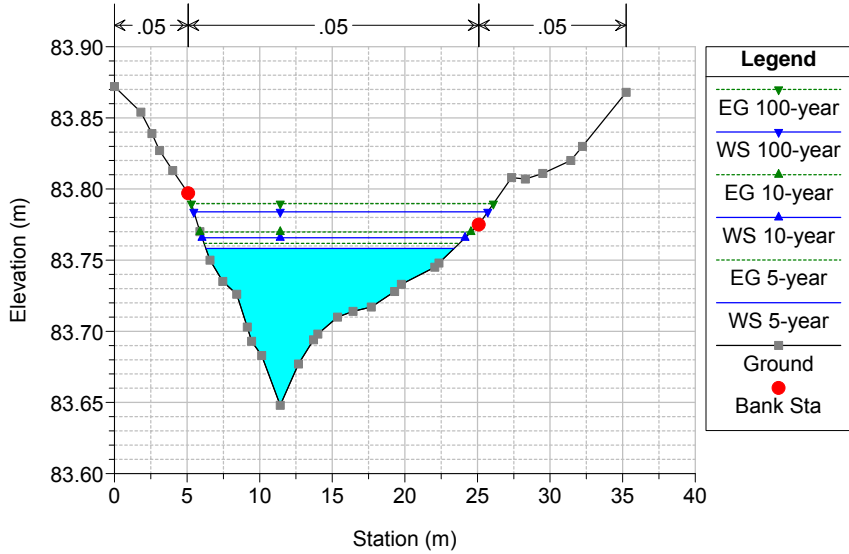
RA34 Plan: Prop-V3 7/6/2017  
RS = 1.8000\*



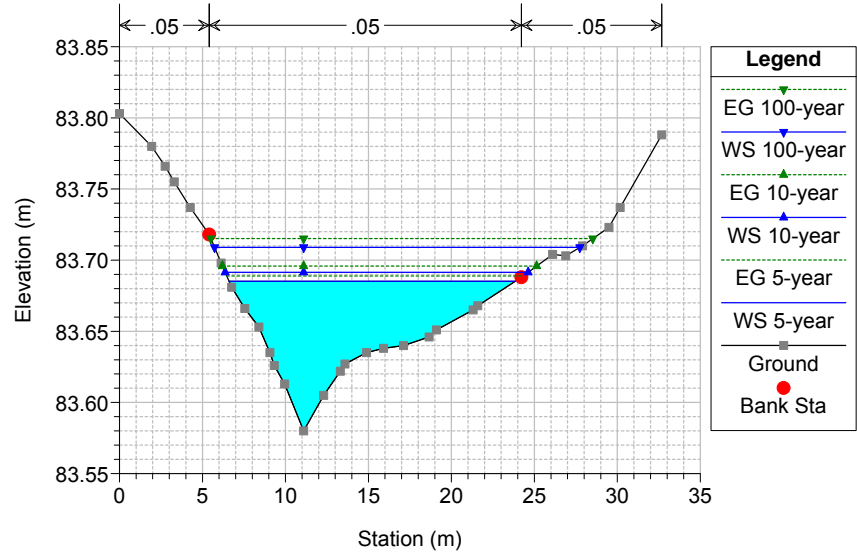
RA34 Plan: Prop-V3 7/6/2017  
RS = 1.6000\*



RA34 Plan: Prop-V3 7/6/2017  
RS = 1.4000\*



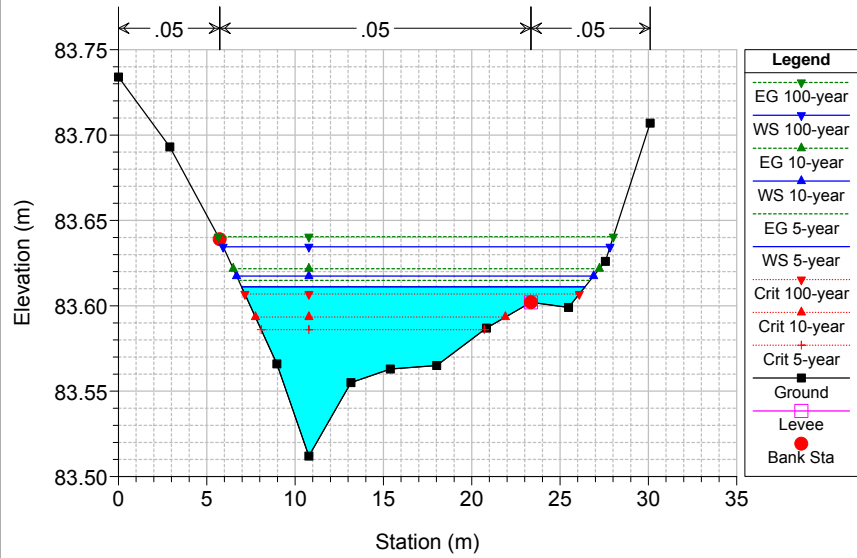
RA34 Plan: Prop-V3 7/6/2017  
RS = 1.2000\*





RA34 Plan: Prop-V3 7/6/2017

RS = 1 RA34-XS-8



# RA35A – HYDRAULIC MODELING

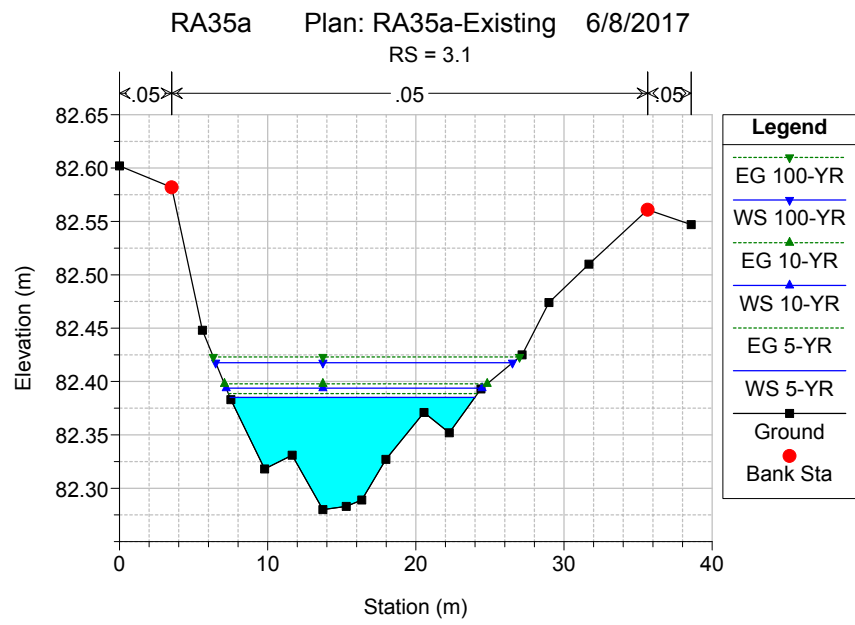
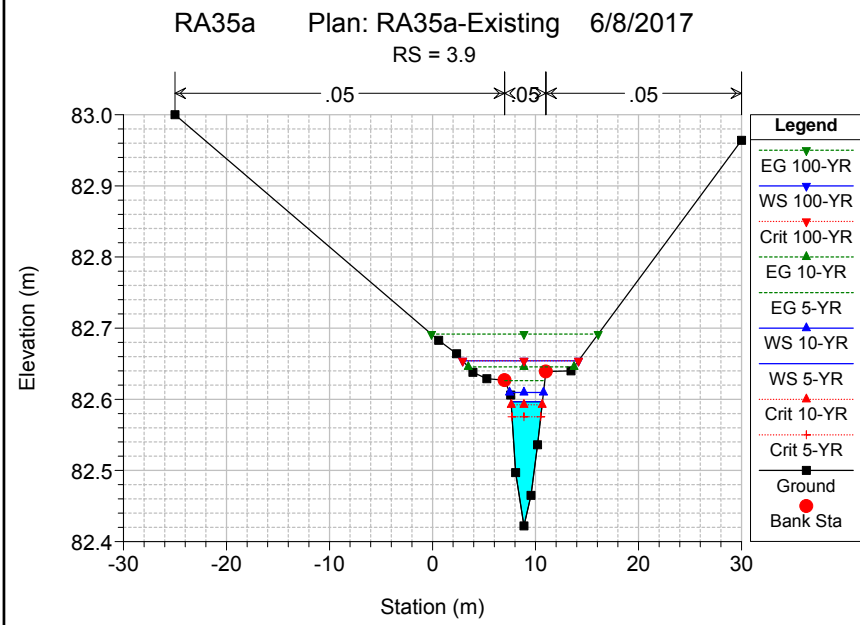
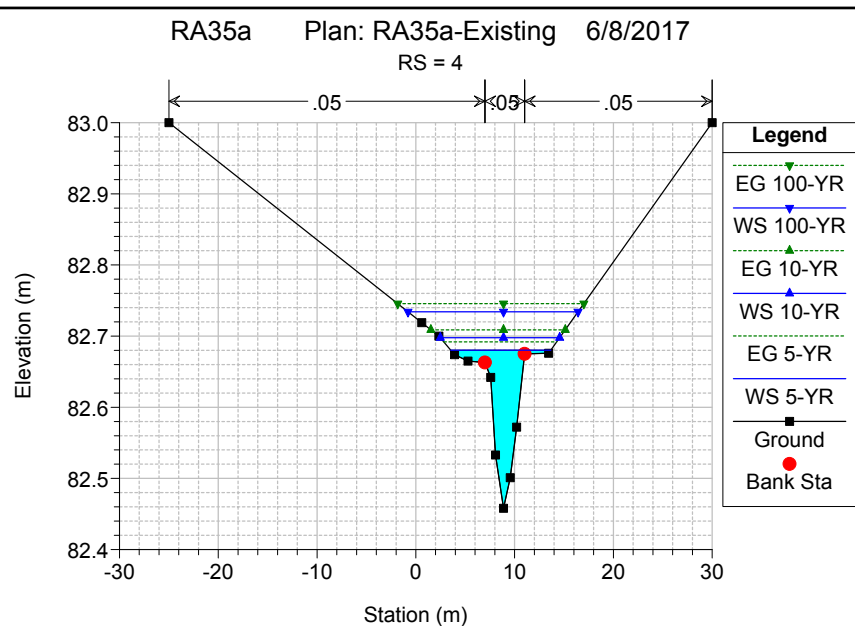
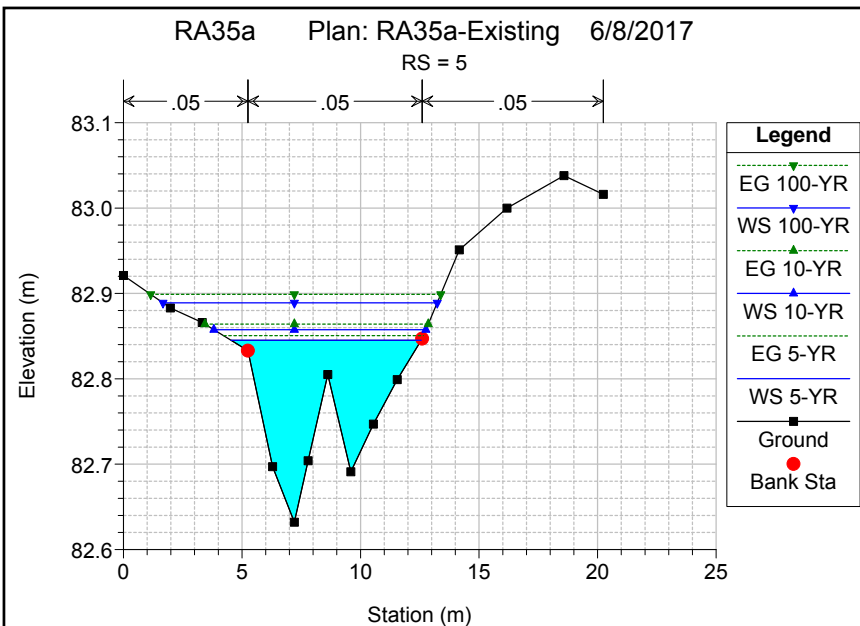




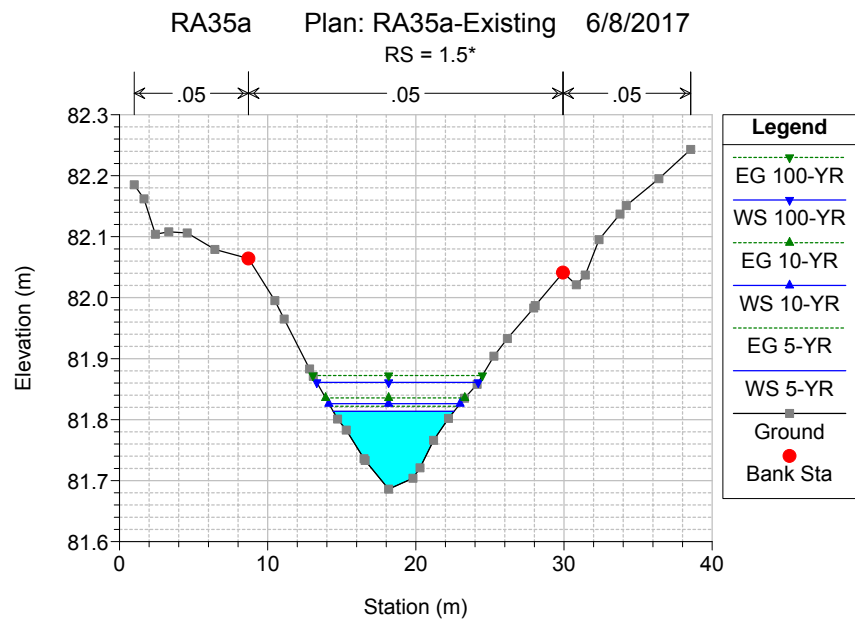
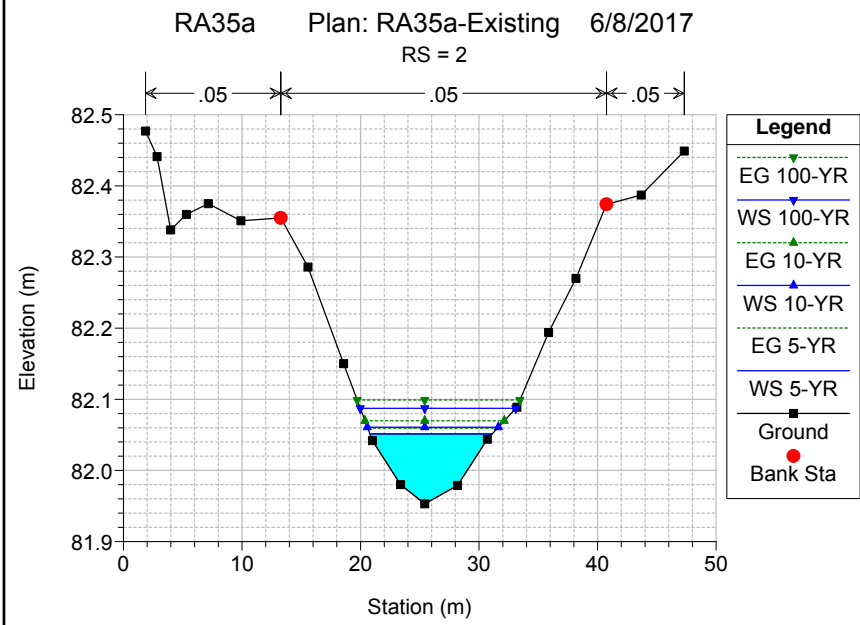
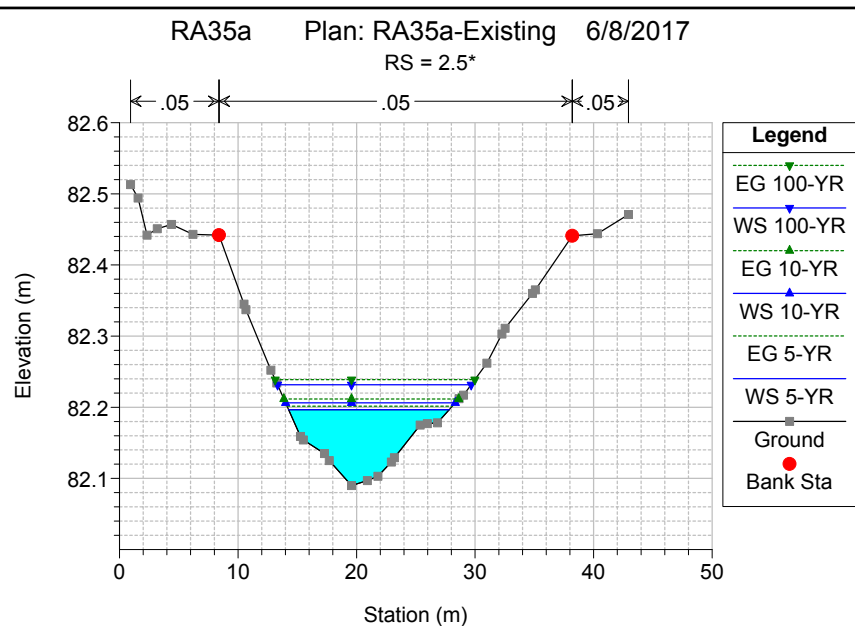
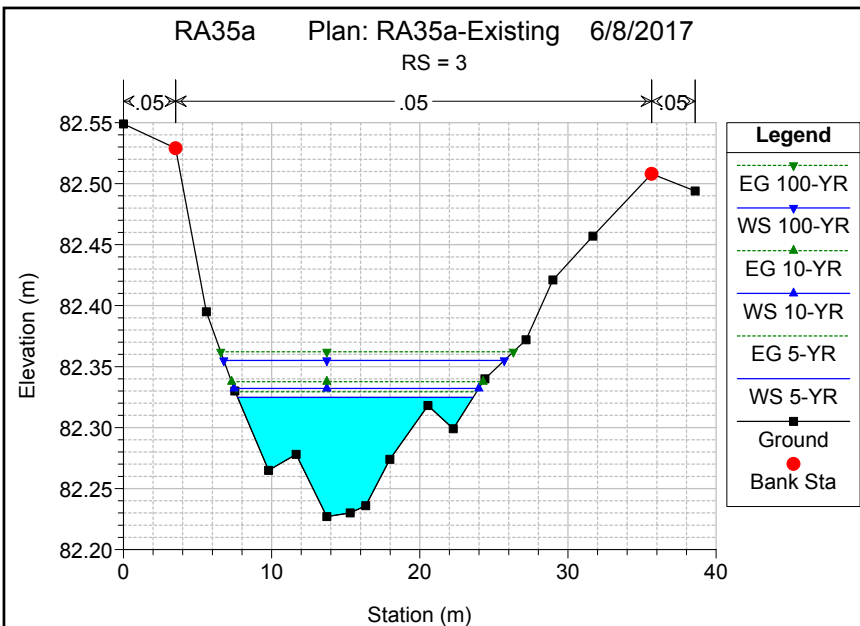


HEC-RAS Plan: Existing River: RA35a Reach: RA35a

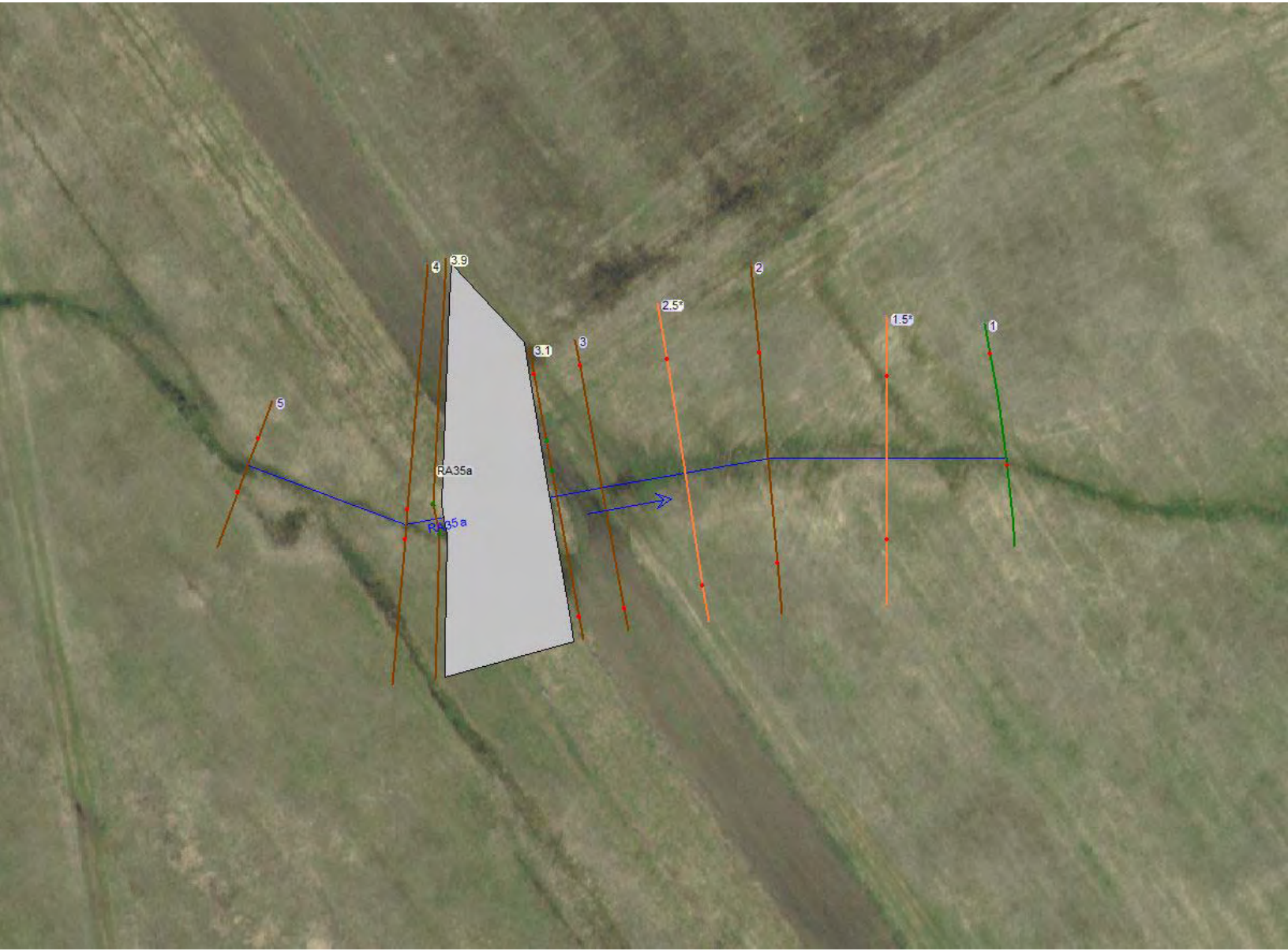
Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Vel Total (m/s)	Vel Left (m/s)	Vel Right (m/s)
RA35a	5	5-YR	0.24	82.63	82.85		82.85	0.005660	0.33	0.74	8.02	0.33	0.32	0.05	
RA35a	5	10-YR	0.30	82.63	82.86		82.86	0.005909	0.36	0.85	8.95	0.34	0.35	0.08	0.05
RA35a	5	100-YR	0.49	82.63	82.89		82.90	0.006711	0.45	1.17	11.56	0.38	0.42	0.15	0.12
RA35a	4	5-YR	0.24	82.46	82.68		82.69	0.009818	0.48	0.54	10.13	0.44	0.44	0.11	0.05
RA35a	4	10-YR	0.30	82.46	82.70		82.71	0.008418	0.49	0.73	12.08	0.42	0.41	0.16	0.13
RA35a	4	100-YR	0.49	82.46	82.73		82.75	0.007269	0.53	1.27	17.21	0.41	0.39	0.21	0.21
RA35a	3.9	5-YR	0.24	82.42	82.60	82.58	82.63	0.030724	0.76	0.31	3.05	0.76	0.76		
RA35a	3.9	10-YR	0.30	82.42	82.61	82.59	82.65	0.034876	0.84	0.35	3.30	0.82	0.84		
RA35a	3.9	100-YR	0.49	82.42	82.65	82.65	82.69	0.029376	0.88	0.65	11.24	0.78	0.76	0.25	0.19
RA35a	3.1	5-YR	0.24	82.28	82.39		82.39	0.008292	0.26	0.91	16.54	0.36	0.26		
RA35a	3.1	10-YR	0.30	82.28	82.39		82.40	0.008240	0.28	1.06	17.28	0.36	0.28		
RA35a	3.1	100-YR	0.49	82.28	82.42		82.42	0.008516	0.33	1.50	20.04	0.38	0.33		
RA35a	3	5-YR	0.24	82.23	82.32		82.33	0.012592	0.30	0.79	15.89	0.43	0.30		
RA35a	3	10-YR	0.30	82.23	82.33		82.34	0.012777	0.33	0.91	16.53	0.45	0.33		
RA35a	3	100-YR	0.49	82.23	82.36		82.36	0.012242	0.37	1.32	18.93	0.45	0.37		
RA35a	2.5*	5-YR	0.24	82.09	82.20		82.20	0.010315	0.30	0.79	13.55	0.40	0.30		
RA35a	2.5*	10-YR	0.30	82.09	82.21		82.21	0.010128	0.32	0.92	14.33	0.41	0.32		
RA35a	2.5*	100-YR	0.49	82.09	82.23		82.24	0.010124	0.37	1.31	16.33	0.42	0.37		
RA35a	2	5-YR	0.24	81.95	82.05		82.06	0.016986	0.39	0.61	10.32	0.52	0.39		
RA35a	2	10-YR	0.30	81.95	82.06		82.07	0.017350	0.42	0.71	11.04	0.53	0.42		
RA35a	2	100-YR	0.49	81.95	82.09		82.10	0.017090	0.48	1.03	13.12	0.55	0.48		
RA35a	1.5*	5-YR	0.24	81.69	81.81		81.82	0.013848	0.41	0.59	8.15	0.48	0.41		
RA35a	1.5*	10-YR	0.30	81.69	81.83		81.84	0.013560	0.43	0.70	8.86	0.49	0.43		
RA35a	1.5*	100-YR	0.49	81.69	81.86		81.87	0.012784	0.47	1.04	10.89	0.49	0.47		
RA35a	1	5-YR	0.24	81.42	81.57	81.53	81.59	0.017008	0.50	0.48	5.82	0.55	0.50		
RA35a	1	10-YR	0.30	81.42	81.59	81.55	81.60	0.017019	0.52	0.57	6.45	0.56	0.52		
RA35a	1	100-YR	0.49	81.42	81.63	81.58	81.64	0.017001	0.58	0.85	8.11	0.57	0.58		







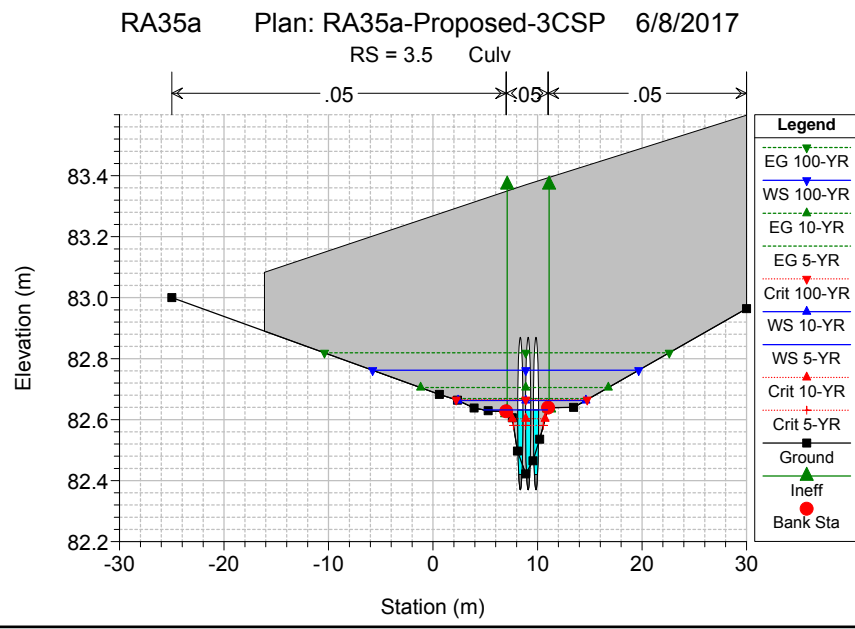
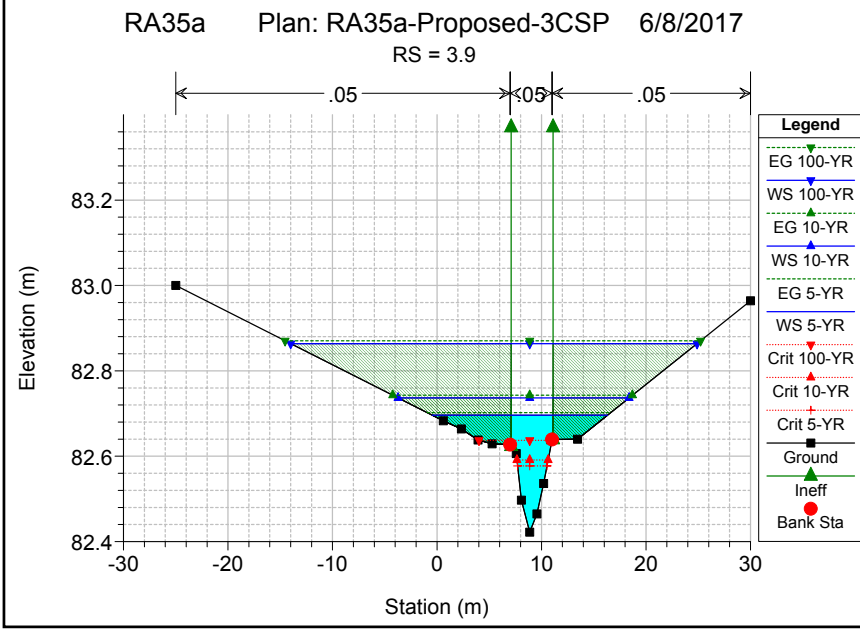
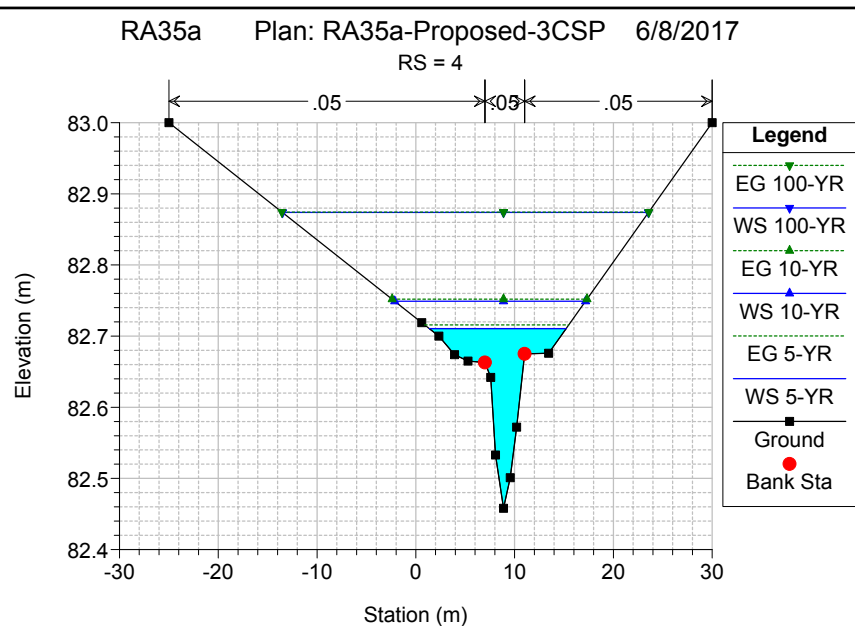
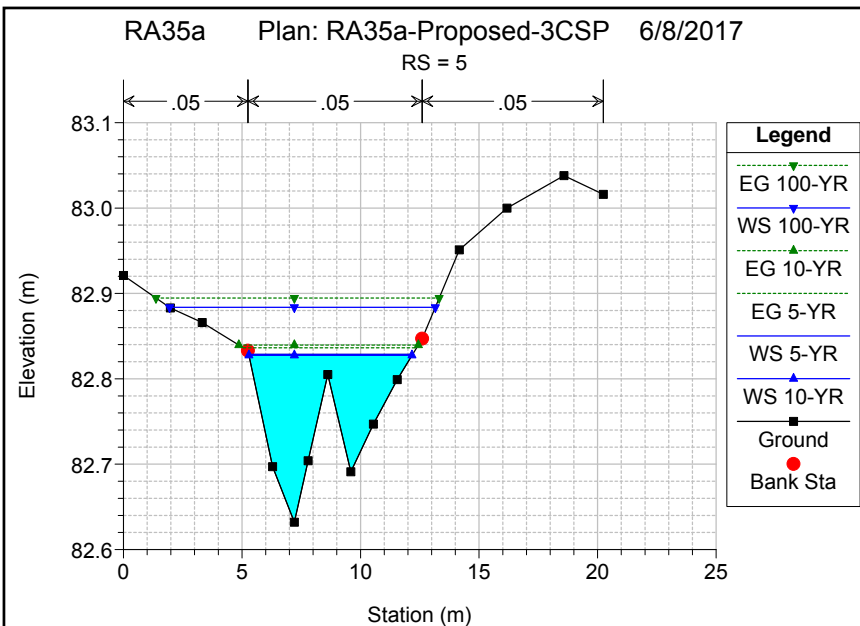


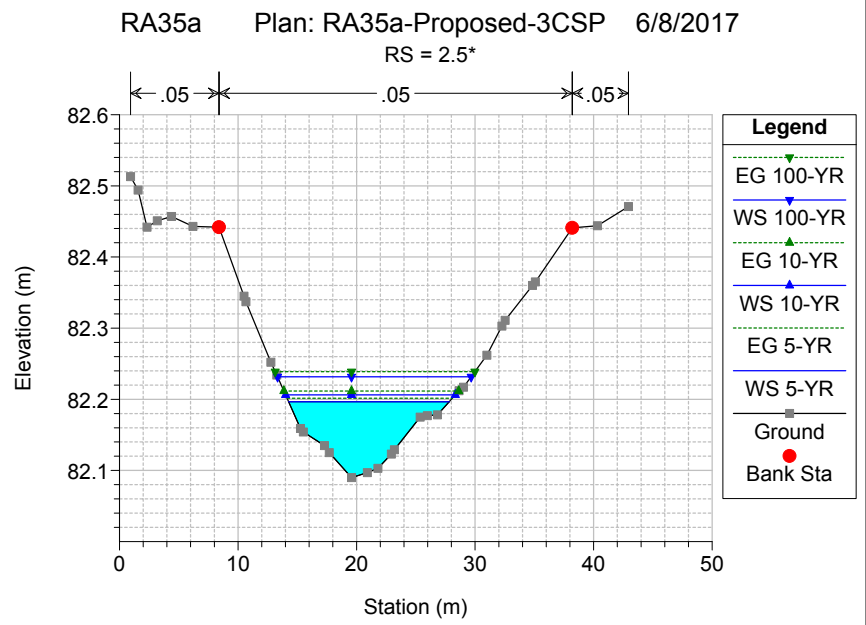
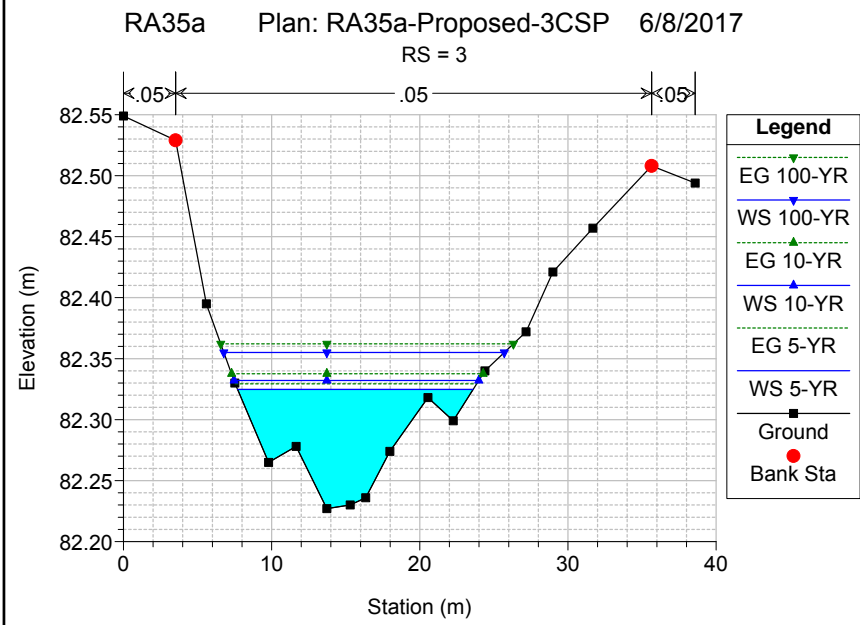
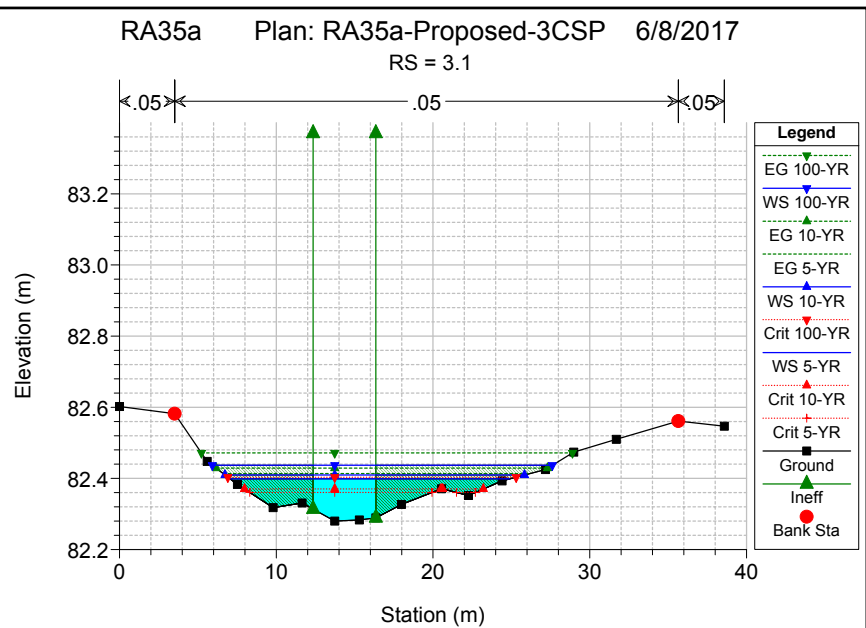
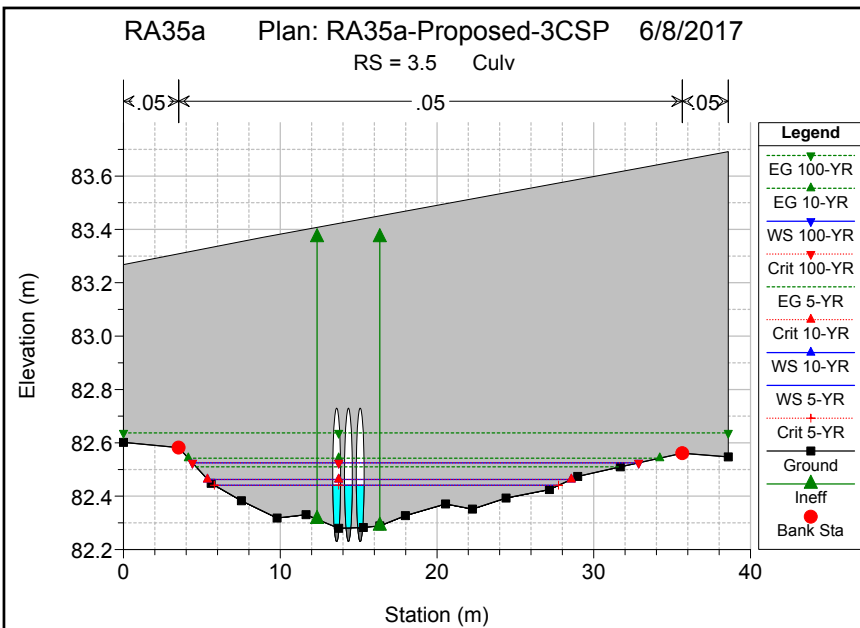




HEC-RAS Plan: Proposed-3CSP River: RA35a Reach: RA35a

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Vel Total (m/s)	Vel Left (m/s)	Vel Right (m/s)
RA35a	5	5-YR	0.24	82.63	82.83		82.84	0.009383	0.39	0.62	6.92	0.41	0.39		
RA35a	5	10-YR	0.30	82.63	82.83		82.84	0.015038	0.49	0.61	6.88	0.52	0.49		
RA35a	5	100-YR	0.49	82.63	82.88		82.89	0.007719	0.47	1.11	11.20	0.40	0.44	0.14	0.12
RA35a	4	5-YR	0.24	82.46	82.71		82.72	0.003583	0.34	0.90	13.85	0.28	0.27	0.12	0.11
RA35a	4	10-YR	0.30	82.46	82.75		82.75	0.001739	0.27	1.54	19.31	0.20	0.19	0.11	0.11
RA35a	4	100-YR	0.49	82.46	82.87		82.87	0.000278	0.15	5.05	37.04	0.09	0.10	0.08	0.08
RA35a	3.9	5-YR	0.24	82.42	82.70	82.58	82.70	0.003116	0.35	0.69	16.74	0.27	0.35		0.17
RA35a	3.9	10-YR	0.30	82.42	82.74	82.59	82.74	0.002385	0.35	0.85	22.10	0.24	0.35		0.21
RA35a	3.9	100-YR	0.49	82.42	82.86	82.64	82.87	0.001377	0.36	1.36	38.87	0.20	0.36		0.27
RA35a	3.5														
		Culvert													
RA35a	3.1	5-YR	0.24	82.28	82.40	82.36	82.41	0.013855	0.54	0.44	17.84	0.52	0.54		
RA35a	3.1	10-YR	0.30	82.28	82.41	82.37	82.43	0.015607	0.61	0.49	19.11	0.56	0.61		
RA35a	3.1	100-YR	0.49	82.28	82.44	82.40	82.47	0.021650	0.83	0.60	21.69	0.68	0.83		
RA35a	3	5-YR	0.24	82.23	82.32		82.33	0.012592	0.30	0.79	15.89	0.43	0.30		
RA35a	3	10-YR	0.30	82.23	82.33		82.34	0.012777	0.33	0.91	16.53	0.45	0.33		
RA35a	3	100-YR	0.49	82.23	82.36		82.36	0.012242	0.37	1.32	18.93	0.45	0.37		
RA35a	2.5*	5-YR	0.24	82.09	82.20		82.20	0.010315	0.30	0.79	13.55	0.40	0.30		
RA35a	2.5*	10-YR	0.30	82.09	82.21		82.21	0.010128	0.32	0.92	14.33	0.41	0.32		
RA35a	2.5*	100-YR	0.49	82.09	82.23		82.24	0.010124	0.37	1.31	16.33	0.42	0.37		
RA35a	2	5-YR	0.24	81.95	82.05		82.06	0.016986	0.39	0.61	10.32	0.52	0.39		
RA35a	2	10-YR	0.30	81.95	82.06		82.07	0.017350	0.42	0.71	11.04	0.53	0.42		
RA35a	2	100-YR	0.49	81.95	82.09		82.10	0.017090	0.48	1.03	13.12	0.55	0.48		
RA35a	1.5*	5-YR	0.24	81.69	81.81		81.82	0.013848	0.41	0.59	8.15	0.48	0.41		
RA35a	1.5*	10-YR	0.30	81.69	81.83		81.84	0.013560	0.43	0.70	8.86	0.49	0.43		
RA35a	1.5*	100-YR	0.49	81.69	81.86		81.87	0.012784	0.47	1.04	10.89	0.49	0.47		
RA35a	1	5-YR	0.24	81.42	81.57	81.53	81.59	0.017008	0.50	0.48	5.82	0.55	0.50		
RA35a	1	10-YR	0.30	81.42	81.59	81.55	81.60	0.017019	0.52	0.57	6.45	0.56	0.52		
RA35a	1	100-YR	0.49	81.42	81.63	81.58	81.64	0.017001	0.58	0.85	8.11	0.57	0.58		

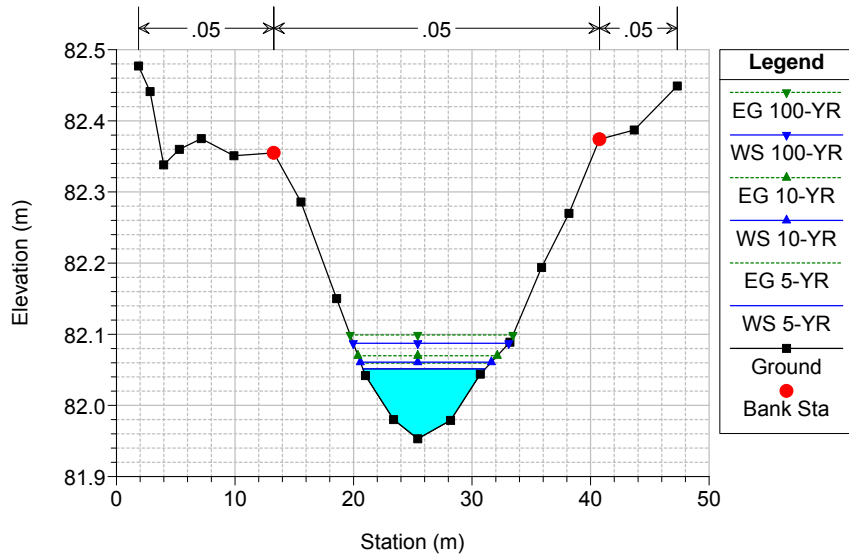






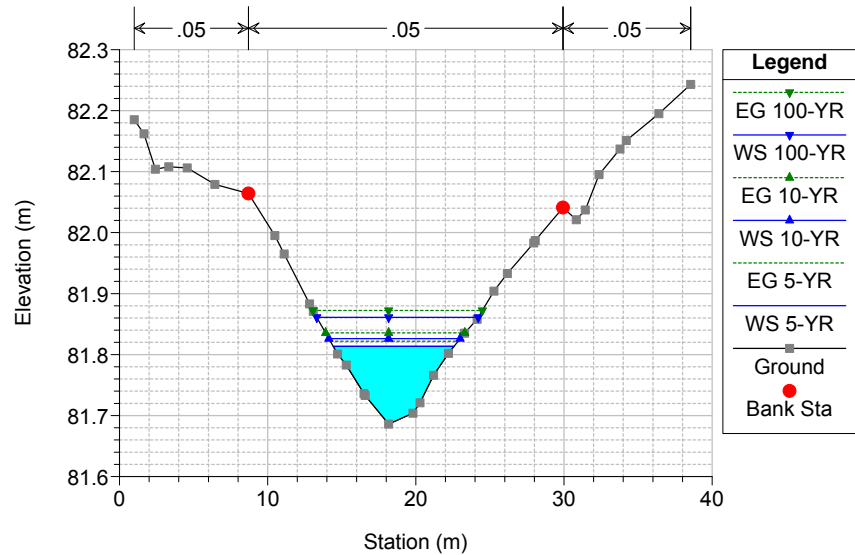
RA35a Plan: RA35a-Proposed-3CSP 6/8/2017

RS = 2



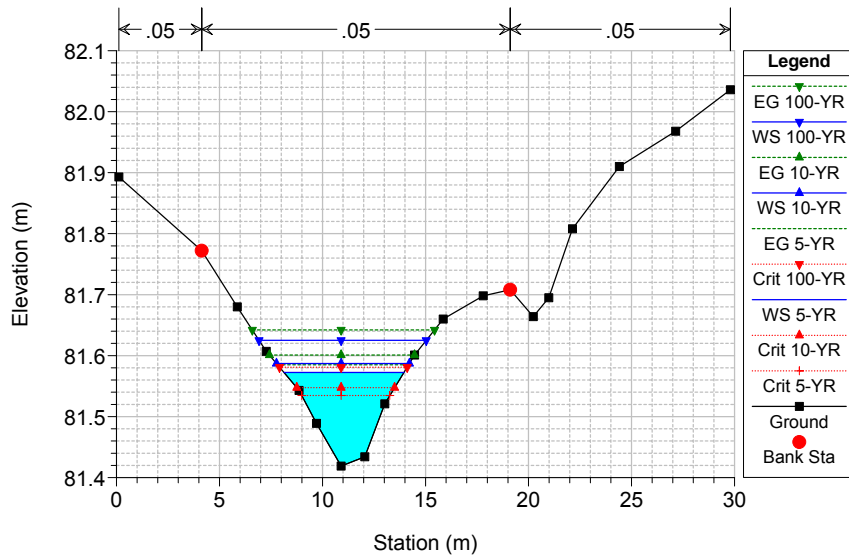
RA35a Plan: RA35a-Proposed-3CSP 6/8/2017

RS = 1.5\*



RA35a Plan: RA35a-Proposed-3CSP 6/8/2017

RS = 1



# RA35B – HYDRAULIC MODELING

Copyright Reserved

The Contractor shall verify and be responsible for all dimensions. DO NOT scale the drawing - any errors or omissions shall be reported to Stantec without delay.  
The Copyrights to all designs and drawings are the property of Stantec. Reproduction or use for any purpose other than that authorized by Stantec is forbidden.

General Notes

- UNDER GROUND AND ABOVE GROUND UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON THE DRAWINGS AND WHERE SHOWN, THE ACCURACY OF POSITION IS NOT GUARANTEED. THE CONTRACTOR SHALL INFORM THEMSELVES OF THE EXACT LOCATION OF ALL UTILITY PLANTS PRIOR TO STARTING WORK.
- SEE DRAWING "CIVIL ACCESS ROAD DETAILS" (DRAWING C302) FOR ADDITIONAL CONSTRUCTION AND CULVERT NOTES.
- UTILITY AND OTHER CONFLICTS HAVE NOT BEEN ADDRESSED IN THESE DRAWINGS, AND WILL BE RESOLVED IN THE FIELD USING VERIFIED UTILITY LOCATIONS AND OTHER SITE INFORMATION.
- TOPOGRAPHICAL SURVEY COMPLETED BY McINTOSH PERRY CONSULTING ENGINEERS, DATED 2015. (UTM ZONE 18 NAD83 (CRSR) 1997.0)
- SEE DRAWING "CIVIL ACCESS ROAD - EROSION AND SEDIMENT CONTROL" (DRAWING C301) FOR ADDITIONAL EROSION AND SEDIMENTATION CONTROL NOTES AND DETAILS.
- ACCESS ROAD ALIGNMENTS MAY REQUIRE FIELD MODIFICATIONS TO ACCOMMODATE EXISTING CONDITIONS.
- CONTRACTOR TO ADHERE TO ALL CONSERVATION AUTHORITY PERMITS AND CONDITIONS OF APPROVAL.
- CONTRACTOR TO CONSTRUCT OVERBUILD (ADDITIONAL COMPACTED AREA) AT ALL BENDS AND CURVES IN ACCORDANCE WITH SIEMENS SPECIFICATIONS "GENERAL SITE REQUIREMENTS, AMHERST ISLAND, EQUIPMENT ONLY AM" REV 6.31, DATED 2016-09-23.

Legend

- SILT FENCE
- LIMIT OF CONSTRUCTIBLE AREA
- EXISTING OVERLAND FLOW/DITCH DIRECTION
- PROPOSED DITCH FLOW
- EXISTING GROUND CONTOURS (AS PER NOTE 4 ABOVE)
- EXISTING GROUND CONTOURS (FROM LIDAR MAPPING)
- PROPOSED PAD ELEVATION

\*\*\*\*For PHCL and WindElectric Use Only\*\*\*\*

Review with no comments does not constitute approval of design details, calculations or methods. It is the responsibility of the consultant to ensure all information contained within the drawings are in full compliance with contractual obligations.

Reviewed - No comments	Date [dd-mm-YYYY]
Reviewed - Incorporate comments and resubmit	Date [dd-mm-YYYY]
Reviewed - Not accepted	Date [dd-mm-YYYY]
Reviewed by	Date [dd-mm-YYYY]
Project Manager - PHCL	Date [dd-mm-YYYY]
Project Manager - WindElectric	Date [dd-mm-YYYY]
Owner:	

B	ISSUED FOR CRCA PERMITTING	RCL	MPG	17.06.22
A	ISSUED FOR CLIENT REVIEW	RCL	MPG	16.02.02

Revision	By	Appd.	YY/MM/DD
----------	----	-------	----------

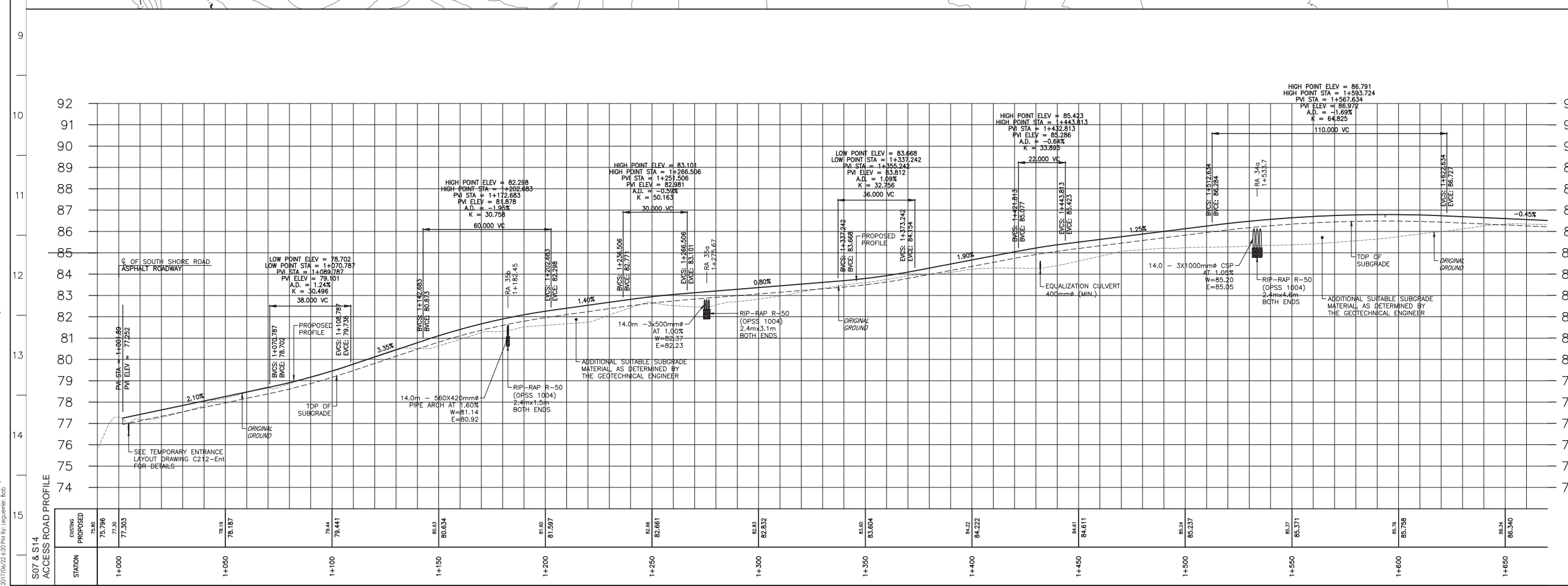
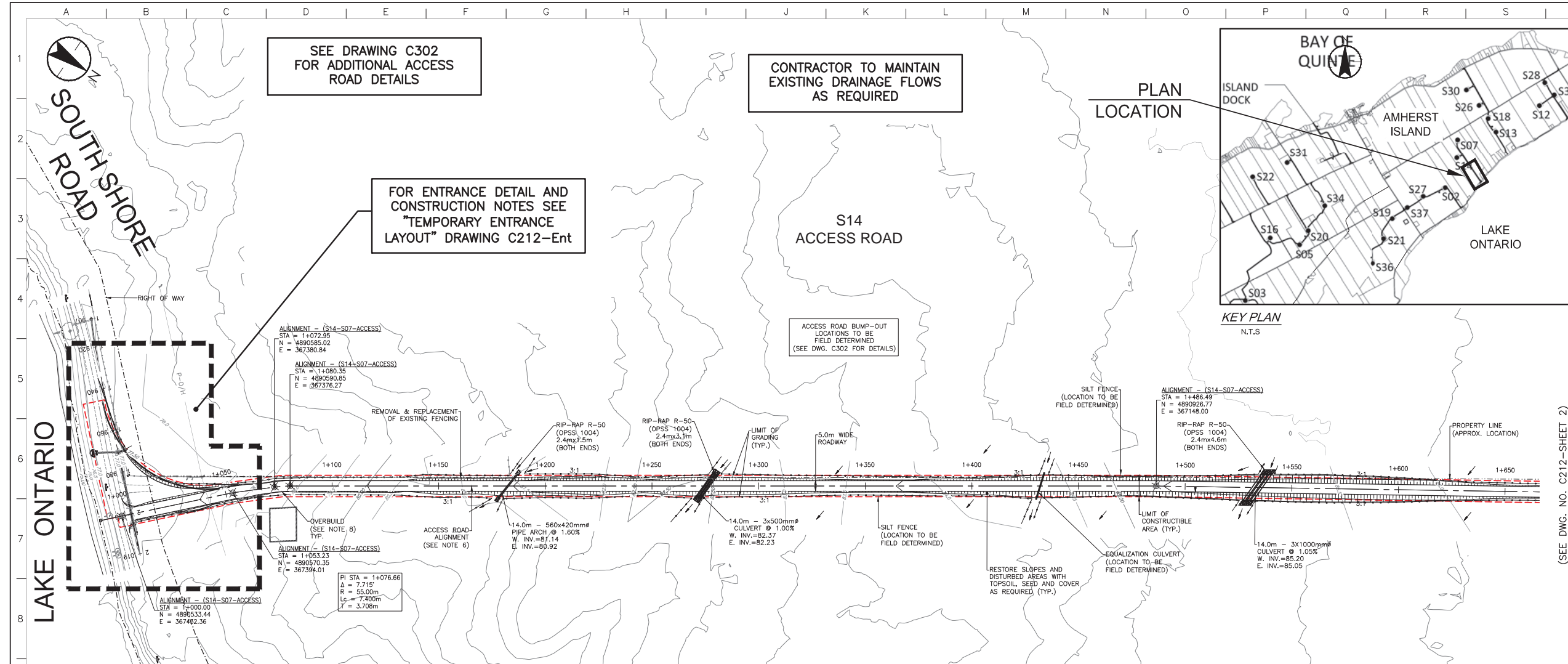
File Name:	C:\212\133560100\Subline S07-S14.DWG	RCL/DH	MPG	RCL	15.12.03
Permit/Seal	Dwn.	Chkd.	Dsgn.	YY/MM/DD	

Client/Project

**AMHERST ISLAND WIND PROJECT**  
75MW WIND FARM  
Amherst Island, Loyalist Township, Ontario

Title  
**ACCESS ROAD**  
**TURBINE S07 AND S14**  
**PLAN AND PROFILE**

Project No.	Scale
133560100	1:1000H 1:100V
Drawing No.	Sheet
C212	Revision

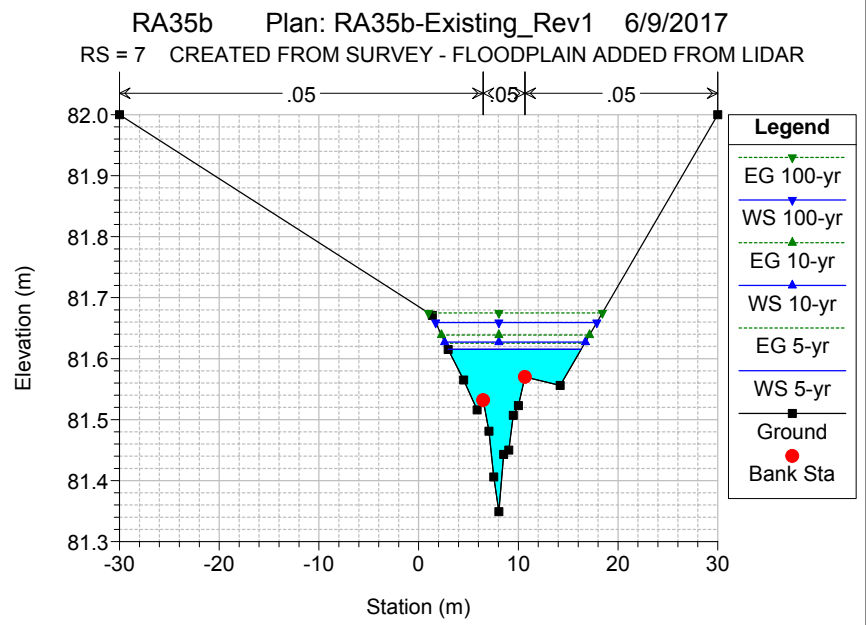
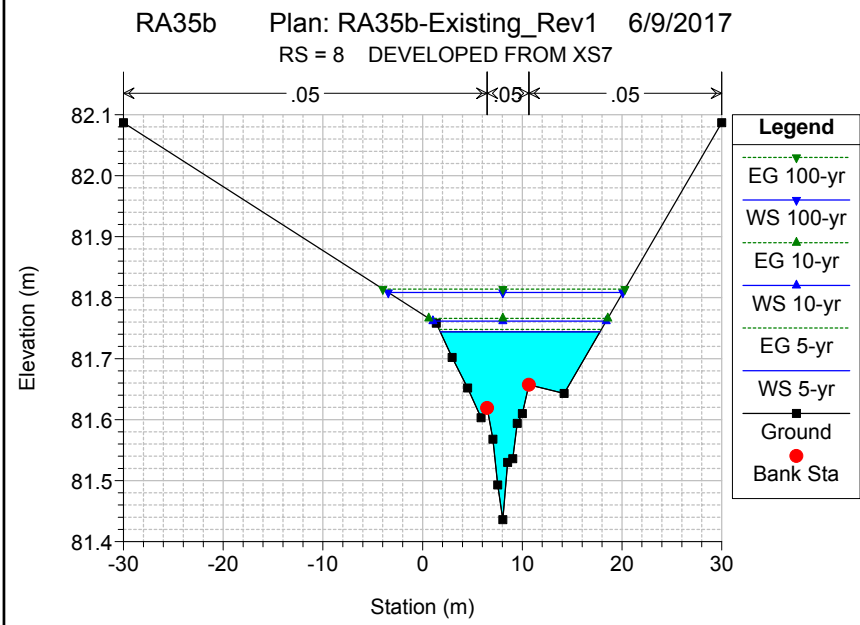
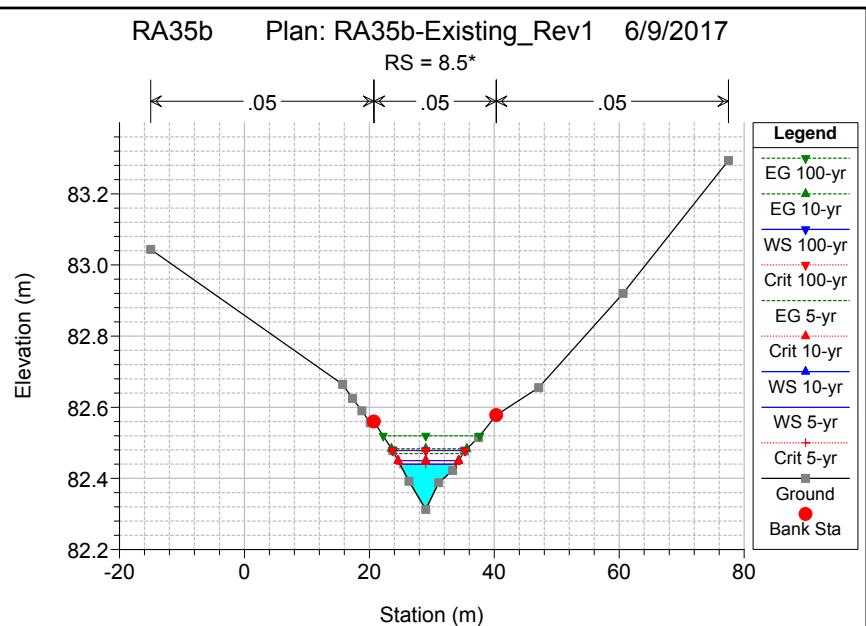
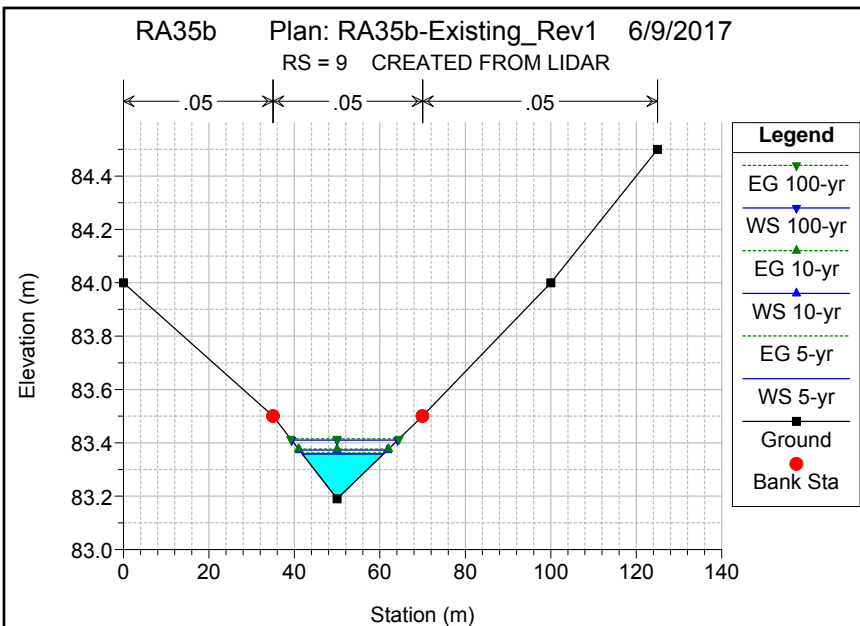






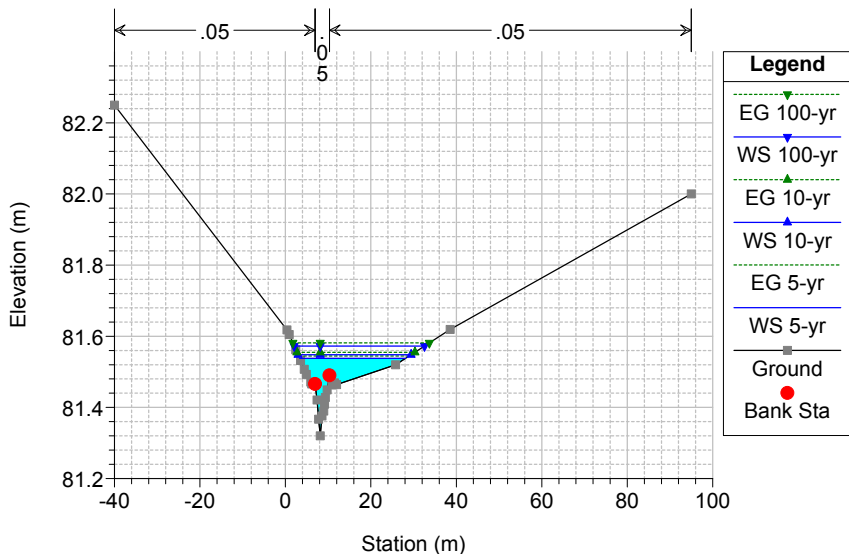
HEC-RAS Plan: Existing\_Rev1 River: RA35b Reach: RA35b

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Vel Total (m/s)	Vel Left (m/s)	Vel Right (m/s)
RA35b	9	5-yr	0.41	83.19	83.36		83.36	0.004445	0.26	1.61	19.05	0.28	0.26		
RA35b	9	10-yr	0.51	83.19	83.37		83.38	0.004475	0.27	1.89	20.64	0.29	0.27		
RA35b	9	100-yr	0.84	83.19	83.41		83.41	0.004546	0.31	2.73	24.83	0.30	0.31		
RA35b	8.5*	5-yr	0.41	82.31	82.44	82.44	82.47	0.063547	0.77	0.54	9.06	1.00	0.77		
RA35b	8.5*	10-yr	0.51	82.31	82.45	82.45	82.48	0.062174	0.81	0.63	9.72	1.01	0.81		
RA35b	8.5*	100-yr	0.84	82.31	82.48	82.48	82.52	0.058170	0.90	0.94	11.60	1.01	0.90		
RA35b	8	5-yr	0.41	81.44	81.74		81.75	0.002444	0.32	1.68	16.03	0.24	0.25	0.18	0.17
RA35b	8	10-yr	0.51	81.44	81.76		81.77	0.002504	0.35	1.97	17.38	0.24	0.26	0.19	0.19
RA35b	8	100-yr	0.84	81.44	81.81		81.81	0.002652	0.41	2.93	23.53	0.26	0.29	0.19	0.24
RA35b	7	5-yr	0.41	81.35	81.62		81.63	0.007919	0.50	1.06	13.36	0.41	0.39	0.26	0.22
RA35b	7	10-yr	0.51	81.35	81.63		81.64	0.008507	0.54	1.23	14.12	0.43	0.42	0.29	0.26
RA35b	7	100-yr	0.84	81.35	81.66		81.68	0.009769	0.65	1.71	16.16	0.48	0.49	0.36	0.35
RA35b	6.5*	5-yr	0.41	81.32	81.54		81.54	0.008139	0.46	1.37	24.75	0.41	0.30	0.23	0.22
RA35b	6.5*	10-yr	0.51	81.32	81.55		81.56	0.007988	0.48	1.64	26.47	0.41	0.31	0.25	0.24
RA35b	6.5*	100-yr	0.84	81.32	81.57		81.58	0.008622	0.56	2.33	30.51	0.44	0.36	0.30	0.30
RA35b	6	5-yr	0.41	81.29	81.45		81.46	0.009792	0.44	1.39	26.39	0.43	0.30	0.18	0.27
RA35b	6	10-yr	0.51	81.29	81.46		81.47	0.009567	0.46	1.66	28.64	0.43	0.31	0.20	0.28
RA35b	6	100-yr	0.84	81.29	81.48		81.49	0.009943	0.53	2.39	34.12	0.46	0.35	0.26	0.33
RA35b	5.33333*	5-yr	0.41	81.18	81.35	81.31	81.36	0.014021	0.50	0.97	18.98	0.51	0.43	0.10	0.18
RA35b	5.33333*	10-yr	0.51	81.18	81.36	81.33	81.37	0.013684	0.53	1.19	21.88	0.51	0.43	0.15	0.21
RA35b	5.33333*	100-yr	0.84	81.18	81.39	81.36	81.40	0.012737	0.59	1.89	28.79	0.52	0.45	0.23	0.27
RA35b	4	5-yr	0.41	80.96	81.10		81.11	0.017922	0.48	0.87	11.58	0.55	0.48		
RA35b	4	10-yr	0.51	80.96	81.11		81.12	0.018083	0.50	1.01	12.48	0.56	0.50		
RA35b	4	100-yr	0.84	80.96	81.14		81.16	0.018700	0.58	1.45	14.62	0.59	0.58		
RA35b	3	5-yr	0.41	80.74	80.88		80.89	0.021810	0.51	0.81	11.50	0.61	0.51		
RA35b	3	10-yr	0.51	80.74	80.89		80.91	0.021524	0.54	0.95	12.20	0.61	0.54		
RA35b	3	100-yr	0.84	80.74	80.92		80.94	0.020954	0.62	1.36	13.70	0.63	0.62		
RA35b	2	5-yr	0.41	80.32	80.46		80.47	0.017058	0.47	0.88	11.65	0.54	0.47		
RA35b	2	10-yr	0.51	80.32	80.47		80.48	0.017149	0.50	1.02	12.09	0.55	0.50		
RA35b	2	100-yr	0.84	80.32	80.50		80.52	0.017668	0.60	1.41	13.09	0.58	0.60		
RA35b	1	5-yr	0.41	79.94	80.09	80.07	80.10	0.018105	0.44	0.94	14.95	0.55	0.44		0.05
RA35b	1	10-yr	0.51	79.94	80.10	80.08	80.11	0.018103	0.47	1.10	16.96	0.55	0.46		0.10
RA35b	1	100-yr	0.84	79.94	80.13	80.10	80.14	0.018103	0.56	1.57	19.28	0.58	0.54		0.23

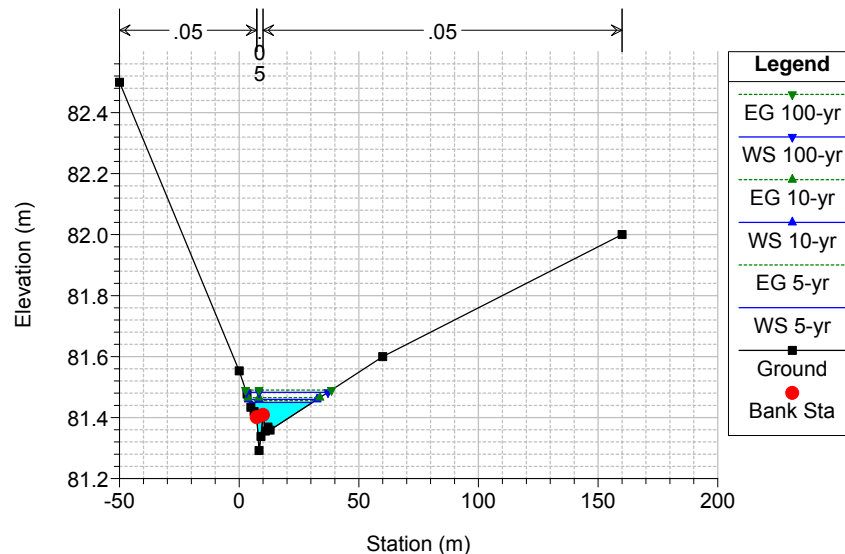




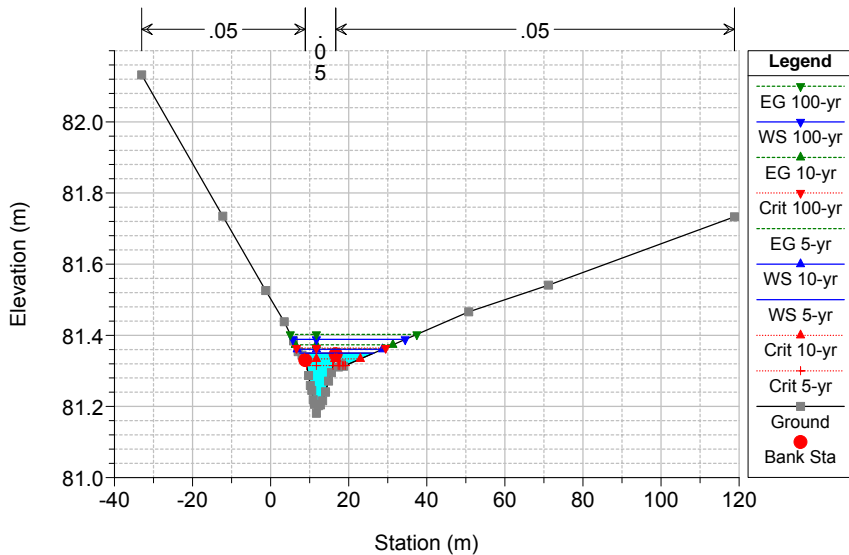
RA35b Plan: RA35b-Existing\_Rev1 6/9/2017  
RS = 6.5\*



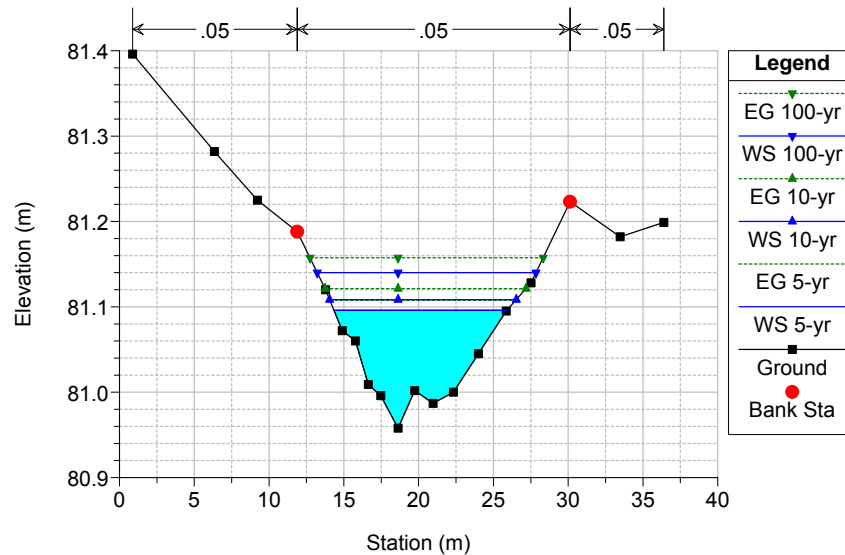
RA35b Plan: RA35b-Existing\_Rev1 6/9/2017  
RS = 6 CREATED FROM SURVEY - FLOODPLAIN ADDED FROM LIDAR



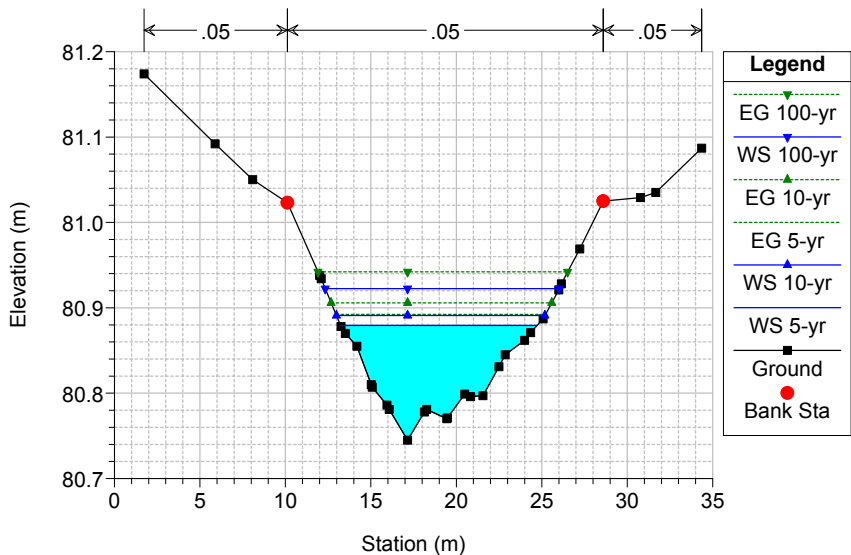
RA35b Plan: RA35b-Existing\_Rev1 6/9/2017  
RS = 5.333333\*



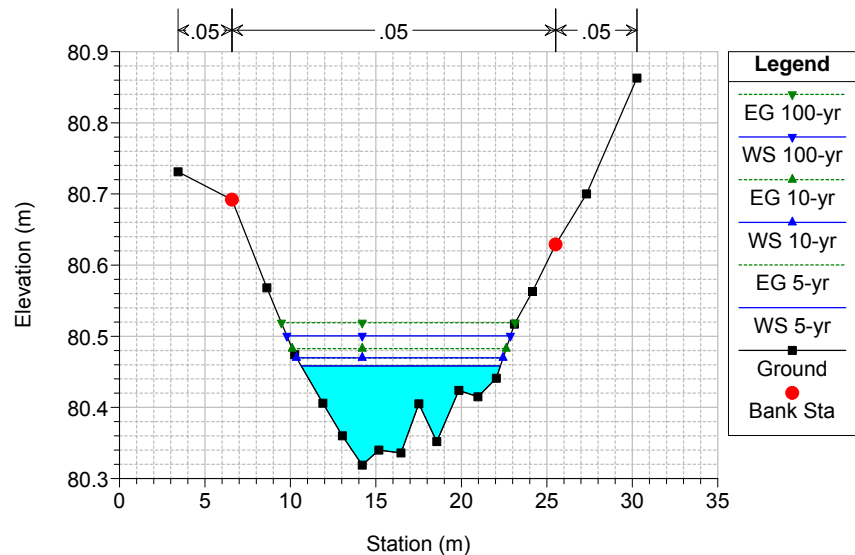
RA35b Plan: RA35b-Existing\_Rev1 6/9/2017  
RS = 4 SURVEYED SECTION WITH VERTICAL ADJUSTMENT OF -0.04M



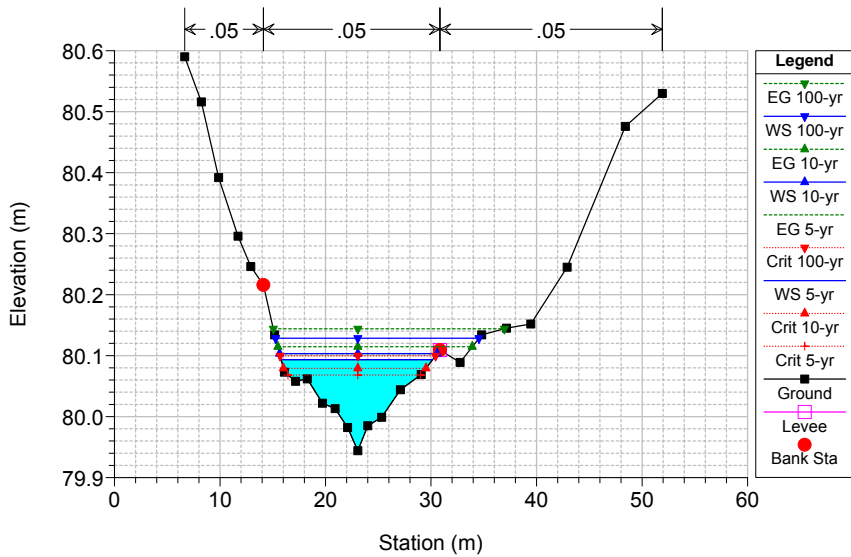
RA35b Plan: RA35b-Existing\_Rev1 6/9/2017  
RS = 3 INTERPOLATED

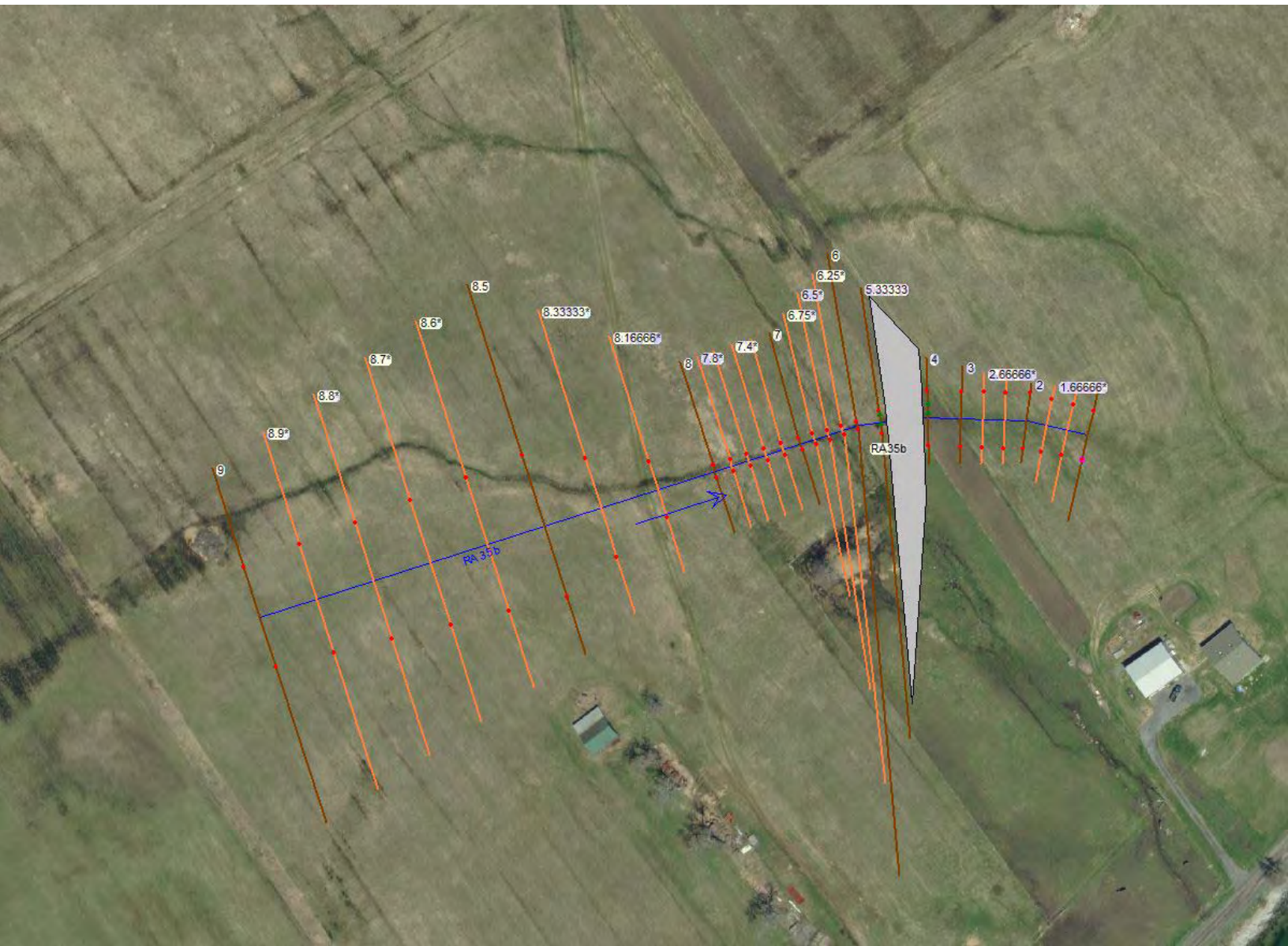


RA35b Plan: RA35b-Existing\_Rev1 6/9/2017  
RS = 2 CREATED FROM SURVEY



RA35b Plan: RA35b-Existing\_Rev1 6/9/2017  
RS = 1 CREATED FROM SURVEY







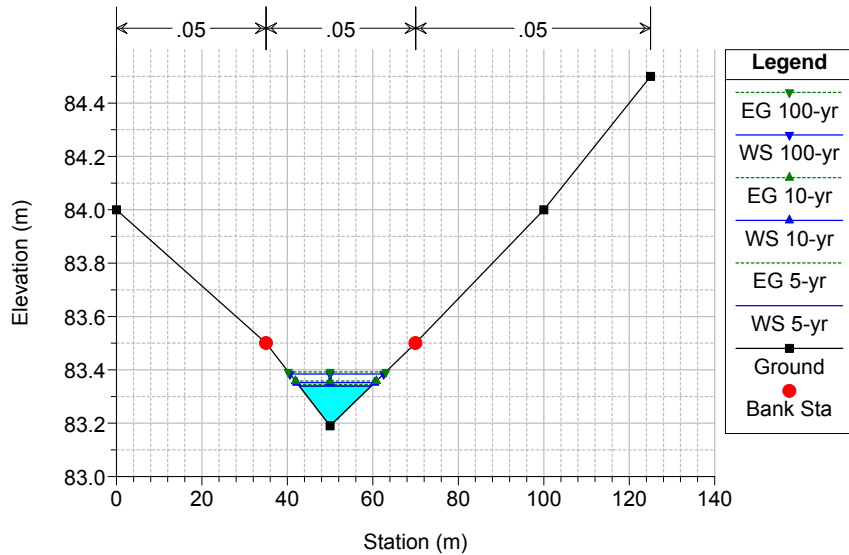
HEC-RAS Plan: ProposedRev2 River: RA35b Reach: RA35b

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Vel Total (m/s)	Vel Left (m/s)	Vel Right (m/s)
RA35b	9	5-yr	0.41	83.19	83.34		83.34	0.008560	0.33	1.26	16.85	0.38	0.33		
RA35b	9	10-yr	0.51	83.19	83.35		83.36	0.008589	0.35	1.48	18.26	0.39	0.35		
RA35b	9	100-yr	0.84	83.19	83.38		83.39	0.008822	0.40	2.13	21.93	0.41	0.40		
RA35b	8.9*	5-yr	0.41	82.95	83.15		83.16	0.010317	0.39	1.06	12.55	0.43	0.39		
RA35b	8.9*	10-yr	0.51	82.95	83.17		83.18	0.009777	0.40	1.29	14.31	0.42	0.40		
RA35b	8.9*	100-yr	0.84	82.95	83.21		83.22	0.008539	0.42	2.02	18.82	0.41	0.42		
RA35b	8.8*	5-yr	0.41	82.71	82.94		82.95	0.010731	0.48	0.86	7.70	0.46	0.48		
RA35b	8.8*	10-yr	0.51	82.71	82.96		82.97	0.010733	0.49	1.04	9.03	0.46	0.49		
RA35b	8.8*	100-yr	0.84	82.71	83.01		83.03	0.010802	0.50	1.68	14.19	0.46	0.50		
RA35b	8.7*	5-yr	0.41	82.48	82.72		82.73	0.010898	0.51	0.80	6.60	0.47	0.51		
RA35b	8.7*	10-yr	0.51	82.48	82.74		82.76	0.010632	0.54	0.96	7.20	0.47	0.54		
RA35b	8.7*	100-yr	0.84	82.48	82.80		82.82	0.010305	0.60	1.41	8.84	0.48	0.60		
RA35b	8.6*	5-yr	0.41	82.24	82.50		82.51	0.011488	0.55	0.76	5.87	0.48	0.55		
RA35b	8.6*	10-yr	0.51	82.24	82.52		82.54	0.011248	0.57	0.90	6.39	0.49	0.57		
RA35b	8.6*	100-yr	0.84	82.24	82.57		82.59	0.012157	0.67	1.27	7.60	0.52	0.67		
RA35b	8.5	5-yr	0.41	82.00	82.27		82.29	0.010825	0.55	0.75	5.47	0.48	0.55		
RA35b	8.5	10-yr	0.51	82.00	82.30		82.31	0.010601	0.58	0.89	5.96	0.48	0.58		
RA35b	8.5	100-yr	0.84	82.00	82.37		82.39	0.008673	0.61	1.39	7.47	0.45	0.61		
RA35b	8.33333*	5-yr	0.41	81.81	82.12		82.13	0.006079	0.45	0.92	6.01	0.36	0.45		
RA35b	8.33333*	10-yr	0.51	81.81	82.15		82.16	0.006051	0.47	1.09	6.53	0.37	0.47		
RA35b	8.33333*	100-yr	0.84	81.81	82.22		82.23	0.007343	0.50	1.69	10.76	0.40	0.50		
RA35b	8.16666*	5-yr	0.41	81.62	81.86		81.89	0.032063	0.79	0.52	5.00	0.78	0.79		
RA35b	8.16666*	10-yr	0.51	81.62	81.88		81.91	0.035257	0.80	0.64	6.57	0.81	0.80		
RA35b	8.16666*	100-yr	0.84	81.62	81.93		81.96	0.032408	0.82	1.03	9.35	0.79	0.82		
RA35b	8	5-yr	0.41	81.44	81.74		81.74	0.003030	0.35	1.54	15.49	0.26	0.27	0.19	0.18
RA35b	8	10-yr	0.51	81.44	81.75		81.76	0.003057	0.37	1.82	16.58	0.27	0.28	0.21	0.20
RA35b	8	100-yr	0.84	81.44	81.80		81.81	0.003176	0.44	2.71	22.32	0.28	0.31	0.21	0.25
RA35b	7.8*	5-yr	0.41	81.42	81.72		81.72	0.003166	0.36	1.52	15.39	0.27	0.27	0.20	0.18
RA35b	7.8*	10-yr	0.51	81.42	81.73		81.74	0.003199	0.38	1.78	16.46	0.27	0.29	0.21	0.20
RA35b	7.8*	100-yr	0.84	81.42	81.78		81.79	0.003360	0.45	2.65	21.95	0.29	0.32	0.22	0.26
RA35b	7.6*	5-yr	0.41	81.40	81.70		81.70	0.003279	0.36	1.50	15.30	0.27	0.28	0.20	0.18
RA35b	7.6*	10-yr	0.51	81.40	81.71		81.72	0.003326	0.39	1.76	16.36	0.28	0.29	0.22	0.21
RA35b	7.6*	100-yr	0.84	81.40	81.76		81.77	0.003568	0.46	2.59	21.56	0.30	0.33	0.22	0.26
RA35b	7.4*	5-yr	0.41	81.38	81.68		81.68	0.003604	0.37	1.44	15.07	0.29	0.29	0.20	0.19
RA35b	7.4*	10-yr	0.51	81.38	81.69		81.70	0.003718	0.40	1.68	16.07	0.29	0.30	0.22	0.21
RA35b	7.4*	100-yr	0.84	81.38	81.73		81.74	0.004074	0.48	2.45	20.69	0.32	0.35	0.24	0.27
RA35b	7.2*	5-yr	0.41	81.37	81.65		81.66	0.004236	0.40	1.36	14.70	0.31	0.30	0.22	0.20
RA35b	7.2*	10-yr	0.51	81.37	81.67		81.67	0.004431	0.43	1.58	15.63	0.32	0.32	0.24	0.22
RA35b	7.2*	100-yr	0.84	81.37	81.71		81.72	0.005018	0.52	2.24	19.36	0.35	0.38	0.26	0.29
RA35b	7	5-yr	0.41	81.35	81.61		81.63	0.008032	0.50	1.06	13.33	0.41	0.39	0.26	0.22
RA35b	7	10-yr	0.51	81.35	81.63		81.64	0.008779	0.55	1.21	14.05	0.44	0.42	0.29	0.26
RA35b	7	100-yr	0.84	81.35	81.66		81.67	0.010076	0.66	1.69	16.08	0.48	0.50	0.37	0.35
RA35b	6.75*	5-yr	0.41	81.33	81.58		81.58	0.007747	0.47	1.26	20.32	0.40	0.33	0.24	0.21
RA35b	6.75*	10-yr	0.51	81.33	81.59		81.60	0.007821	0.50	1.50	21.66	0.41	0.34	0.26	0.24
RA35b	6.75*	100-yr	0.84	81.33	81.61		81.63	0.008790	0.59	2.11	24.80	0.45	0.40	0.32	0.31
RA35b	6.5*	5-yr	0.41	81.32	81.54		81.54	0.008297	0.47	1.36	24.68	0.41	0.30	0.23	0.22
RA35b	6.5*	10-yr	0.51	81.32	81.55		81.55	0.008385	0.49	1.61	26.28	0.42	0.32	0.25	0.25
RA35b	6.5*	100-yr	0.84	81.32	81.57		81.58	0.008377	0.55	2.36	30.65	0.43	0.36	0.29	0.30
RA35b	6.25*	5-yr	0.41	81.31	81.50		81.50	0.008603	0.45	1.43	26.64	0.41	0.29	0.21	0.24
RA35b	6.25*	10-yr	0.51	81.31	81.51		81.52	0.007125	0.44	1.81	29.69	0.38	0.28	0.22	0.24
RA35b	6.25*	100-yr	0.84	81.31	81.54		81.54	0.006378	0.47	2.76	35.63	0.38	0.31	0.25	0.27
RA35b	6	5-yr	0.41	81.29	81.47		81.48	0.003493	0.30	2.06	31.75	0.27	0.20	0.14	0.19
RA35b	6	10-yr	0.51	81.29	81.49		81.49	0.002700	0.29	2.68	36.09	0.24	0.19	0.14	0.18
RA35b	6	100-yr	0.84	81.29	81.52		81.52	0.002927	0.34	3.80	42.86	0.26	0.22	0.18	0.21
RA35b	5.33333	5-yr	0.41	81.18	81.33	81.33	81.39	0.050960	1.09	0.38	12.75	1.01	1.09		
RA35b	5.33333	10-yr	0.51	81.18	81.35	81.35	81.42	0.048441	1.17	0.44	18.66	1.01	1.17		
RA35b	5.33333	100-yr	0.84	81.18	81.49	81.45	81.50	0.004075	0.36	3.62	57.02	0.30	0.23	0.17	0.17
RA35b	4.5														
RA35b	4	5-yr	0.41	80.96	81.13	81.11	81.17	0.028526	0.91	0.45	13.92	0.78	0.91		
RA35b	4	10-yr	0.51	80.96	81.14	81.12	81.20	0.030699	1.02	0.50	14.82	0.82	1.02		
RA35b	4	100-yr	0.84	80.96	81.18	81.18	81.28	0.038399	1.33	0.63	17.85	0.95	1.33		
RA35b	3	5-yr	0.41	80.74	80.88		80.89	0.019994	0.49	0.84	11.65	0.58	0.49		
RA35b	3	10-yr	0.51	80.74	80.89		80.91	0.020022	0.52	0.98	12.30	0.59	0.52		
RA35b	3	100-yr	0.84	80.74	80.92		80.94	0.019786	0.61	1.39	13.78	0.61	0.61		
RA35b	2.66666*	5-yr	0.41	80.60	80.74		80.75	0.018910	0.48	0.86	11.79	0.57	0.48		
RA35b	2.66666*	10-yr	0.51	80.60	80.75		80.77	0.018813	0.51	1.00	12.27	0.58	0.51		
RA35b	2.66666*	100-yr	0.84	80.60	80.78		80.80	0.018813	0.60	1.40	13.51	0.60	0.60		

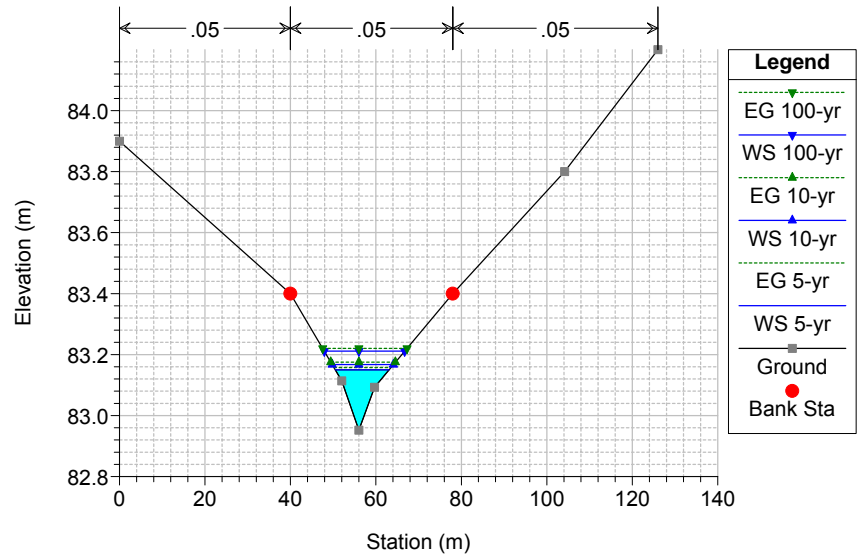
HEC-RAS Plan: ProposedRev2 River: RA35b Reach: RA35b (Continued)

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Vel Total (m/s)	Vel Left (m/s)	Vel Right (m/s)
RA35b	2.33333*	5-yr	0.41	80.46	80.60		80.61	0.020885	0.50	0.83	11.53	0.59	0.50		
RA35b	2.33333*	10-yr	0.51	80.46	80.61		80.62	0.020844	0.53	0.96	12.03	0.60	0.53		
RA35b	2.33333*	100-yr	0.84	80.46	80.64		80.66	0.020664	0.63	1.34	13.12	0.63	0.63		
RA35b	2	5-yr	0.41	80.32	80.46		80.47	0.017584	0.47	0.87	11.62	0.55	0.47		
RA35b	2	10-yr	0.51	80.32	80.47		80.48	0.017428	0.51	1.01	12.07	0.56	0.51		
RA35b	2	100-yr	0.84	80.32	80.50		80.52	0.017245	0.60	1.42	13.11	0.58	0.60		
RA35b	1.66666*	5-yr	0.41	80.19	80.34		80.35	0.017123	0.47	0.88	11.69	0.54	0.47		
RA35b	1.66666*	10-yr	0.51	80.19	80.35		80.36	0.017118	0.50	1.02	12.19	0.55	0.50		
RA35b	1.66666*	100-yr	0.84	80.19	80.38		80.40	0.016972	0.58	1.46	13.82	0.57	0.58		
RA35b	1.33333*	5-yr	0.41	80.07	80.22		80.23	0.018008	0.46	0.89	12.59	0.55	0.46		
RA35b	1.33333*	10-yr	0.51	80.07	80.23		80.24	0.017629	0.49	1.05	13.41	0.55	0.49		
RA35b	1.33333*	100-yr	0.84	80.07	80.26		80.27	0.019130	0.58	1.45	15.04	0.60	0.58		
RA35b	1	5-yr	0.41	79.94	80.09	80.07	80.10	0.018102	0.44	0.94	14.35	0.55	0.44		
RA35b	1	10-yr	0.51	79.94	80.10	80.08	80.11	0.018117	0.47	1.09	14.95	0.56	0.47		
RA35b	1	100-yr	0.84	79.94	80.13	80.10	80.14	0.018103	0.56	1.57	19.28	0.58	0.54		0.23

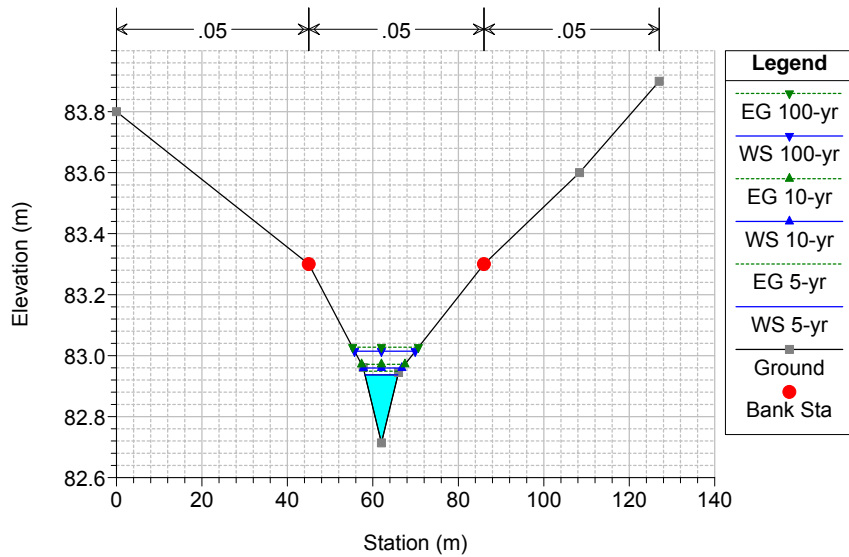
RA35b Plan: RA35b-Proposed\_Rev2 6/12/2017  
RS = 9 CREATED FROM LIDAR



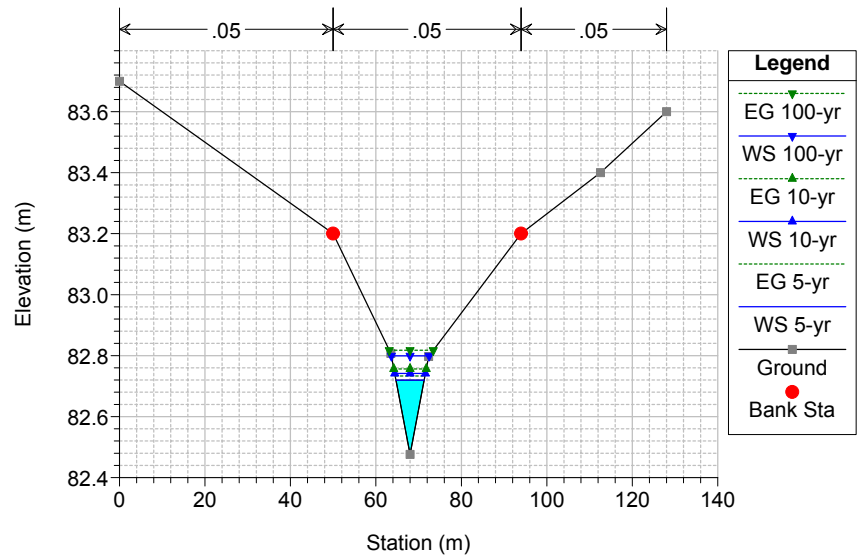
RA35b Plan: RA35b-Proposed\_Rev2 6/12/2017  
RS = 8.9\*



RA35b Plan: RA35b-Proposed\_Rev2 6/12/2017  
RS = 8.8\*

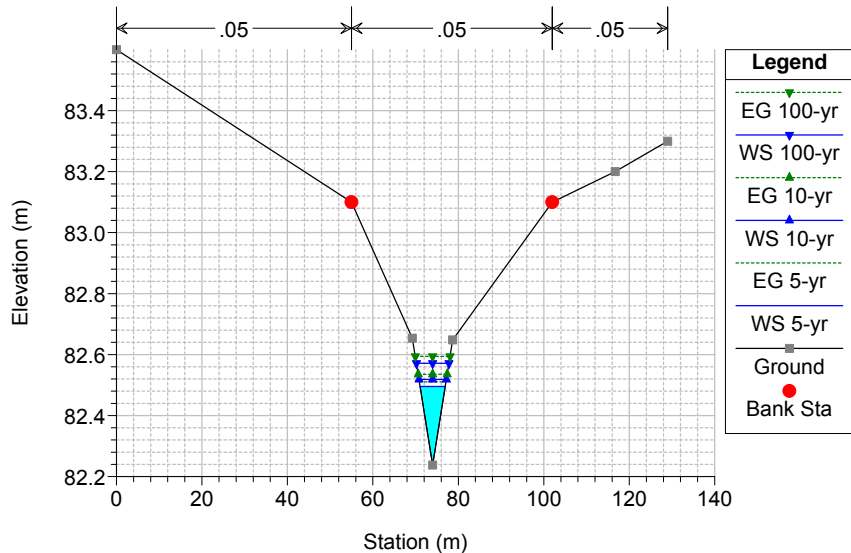


RA35b Plan: RA35b-Proposed\_Rev2 6/12/2017  
RS = 8.7\*

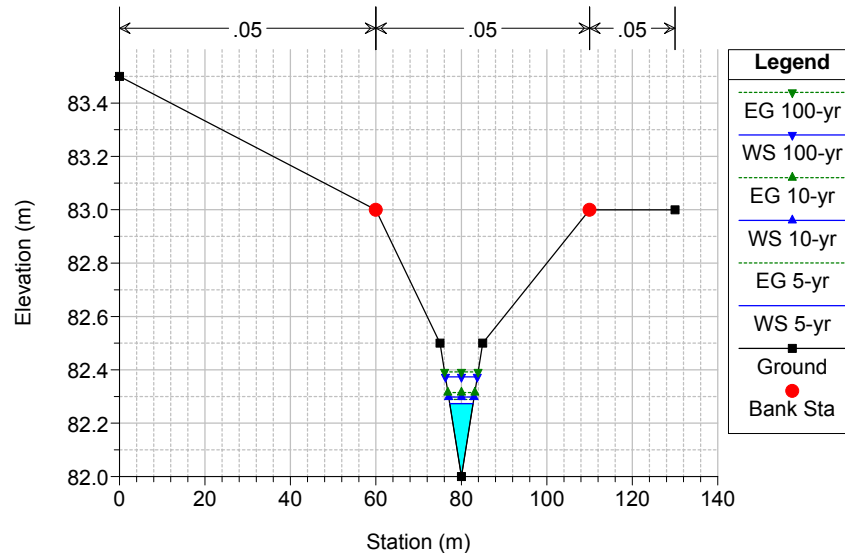




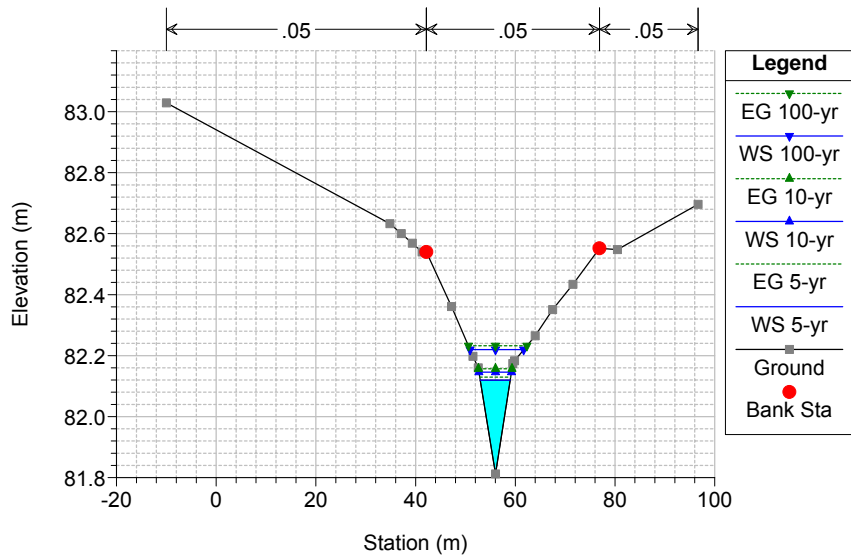
RA35b Plan: RA35b-Proposed\_Rev2 6/12/2017  
RS = 8.6\*



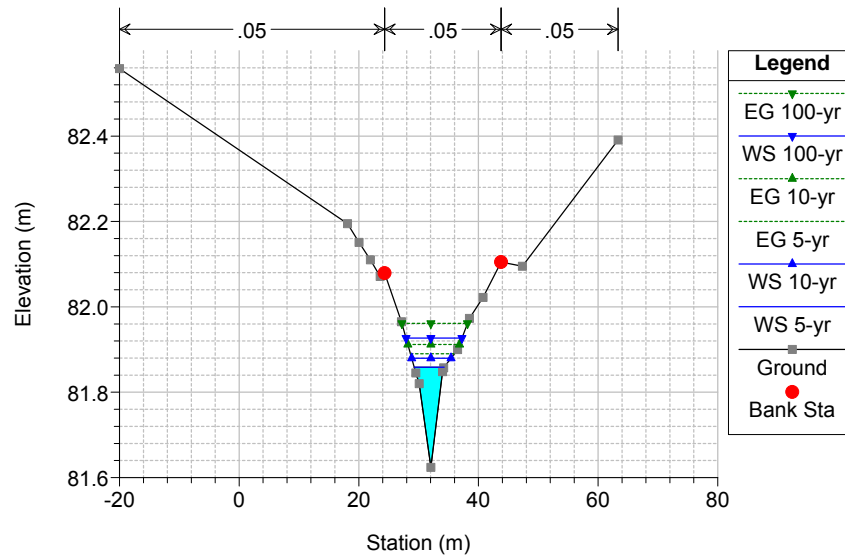
RA35b Plan: RA35b-Proposed\_Rev2 6/12/2017  
RS = 8.5 CREATED FROM LIDAR



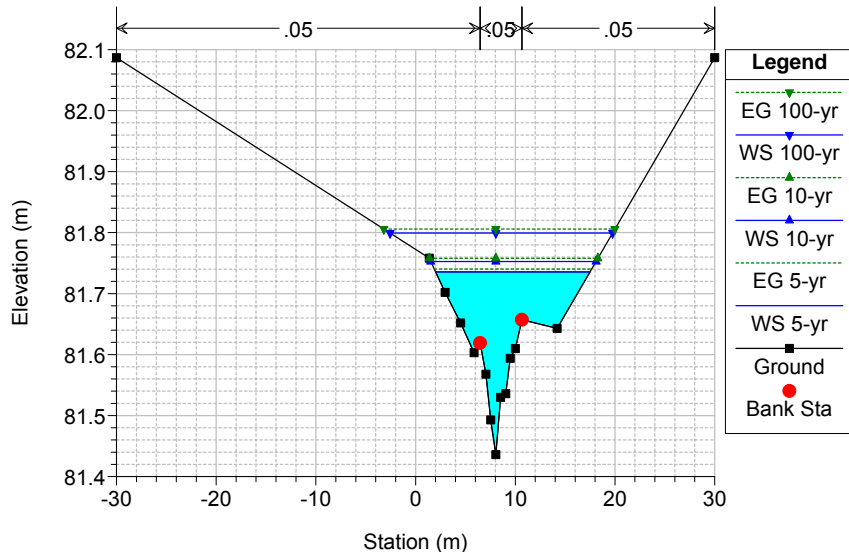
RA35b Plan: RA35b-Proposed\_Rev2 6/12/2017  
RS = 8.33333\*



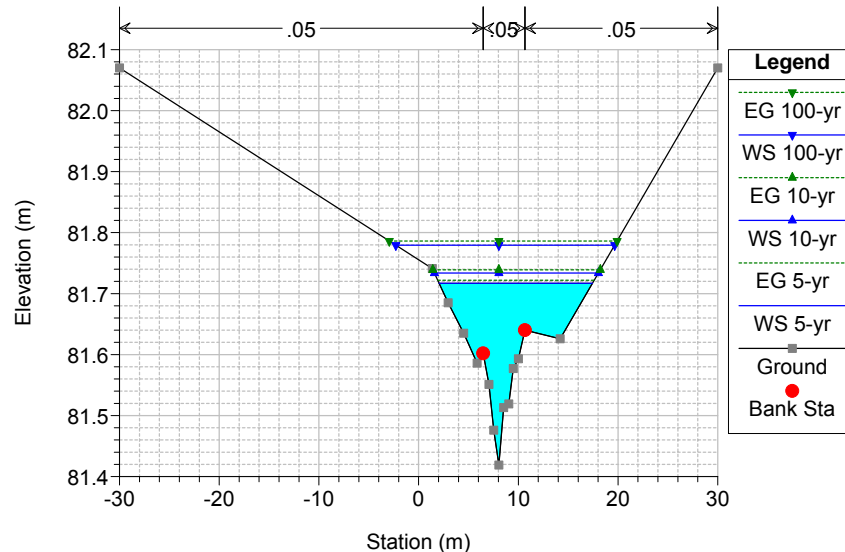
RA35b Plan: RA35b-Proposed\_Rev2 6/12/2017  
RS = 8.16666\*



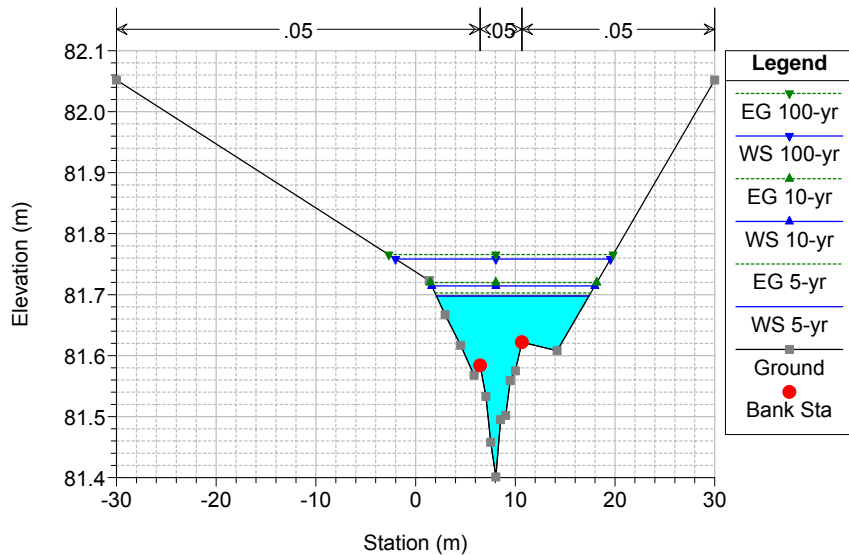
RA35b Plan: RA35b-Proposed\_Rev2 6/12/2017  
RS = 8 DEVELOPED FROM XS7



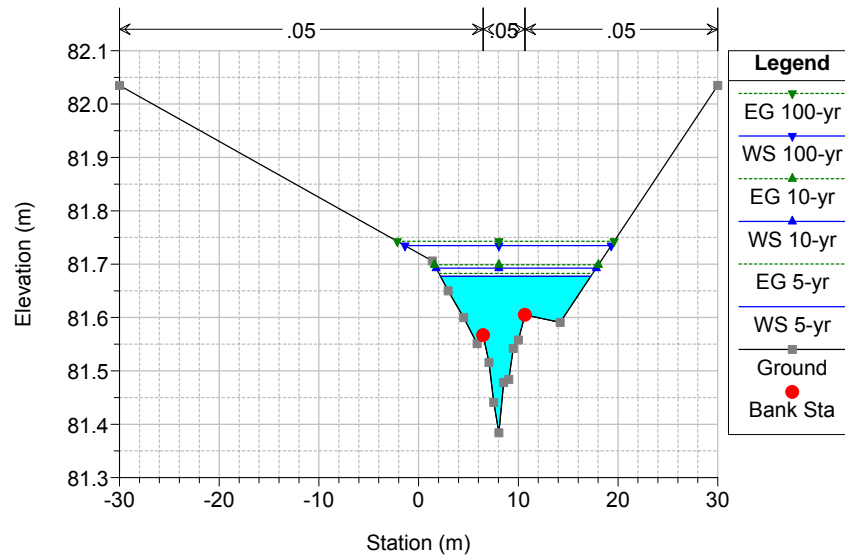
RA35b Plan: RA35b-Proposed\_Rev2 6/12/2017  
RS = 7.8\*



RA35b Plan: RA35b-Proposed\_Rev2 6/12/2017  
RS = 7.6\*



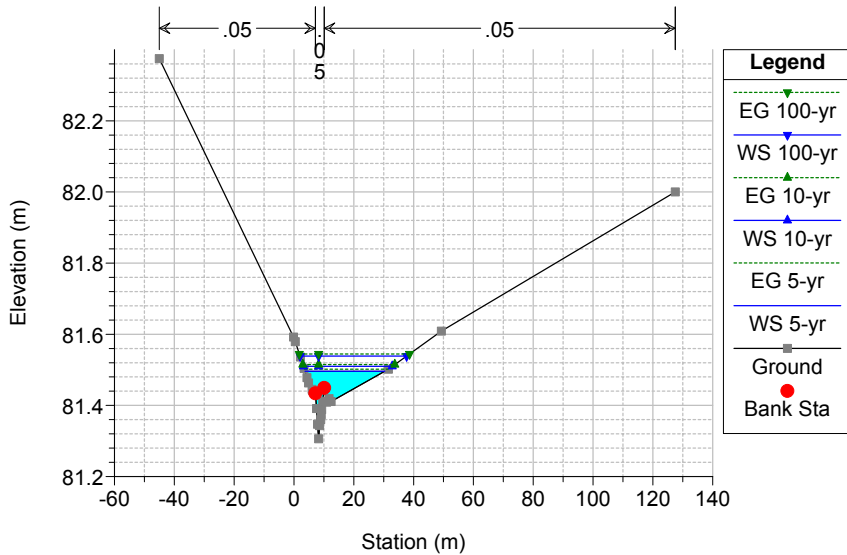
RA35b Plan: RA35b-Proposed\_Rev2 6/12/2017  
RS = 7.4\*



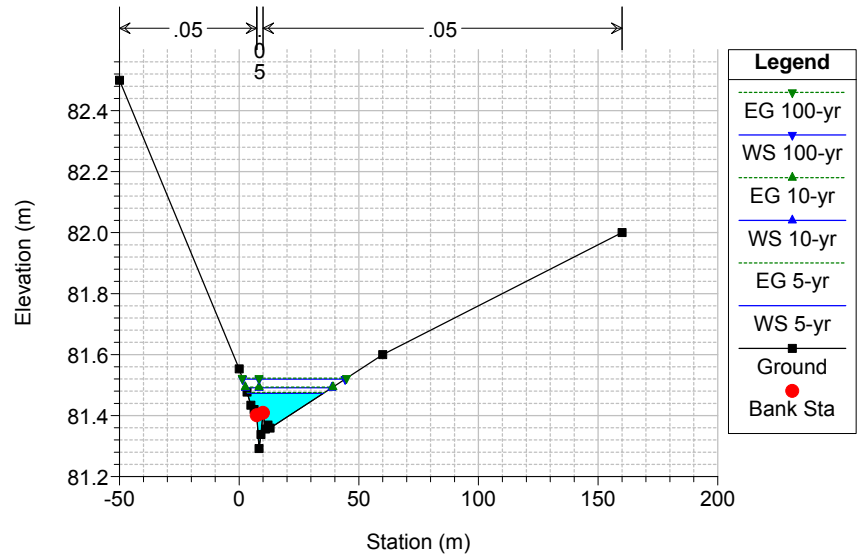




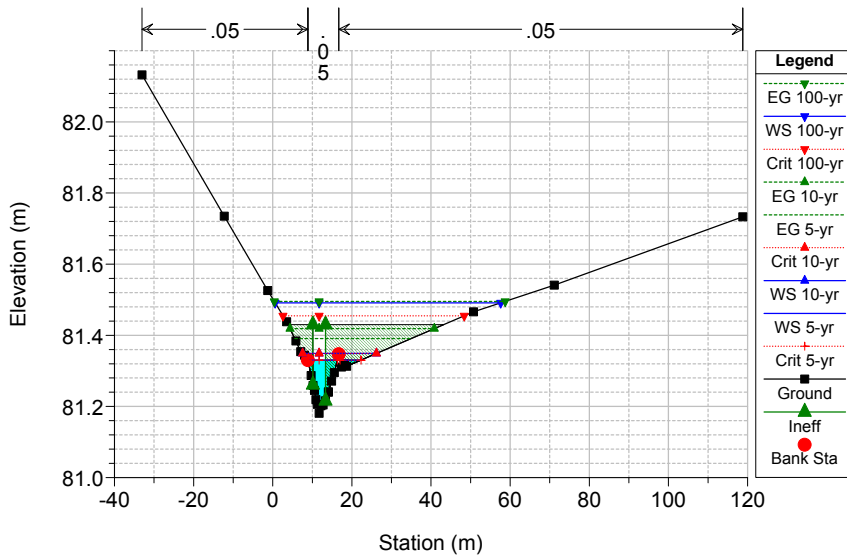
RA35b Plan: RA35b-Proposed\_Rev2 6/12/2017  
RS = 6.25\*



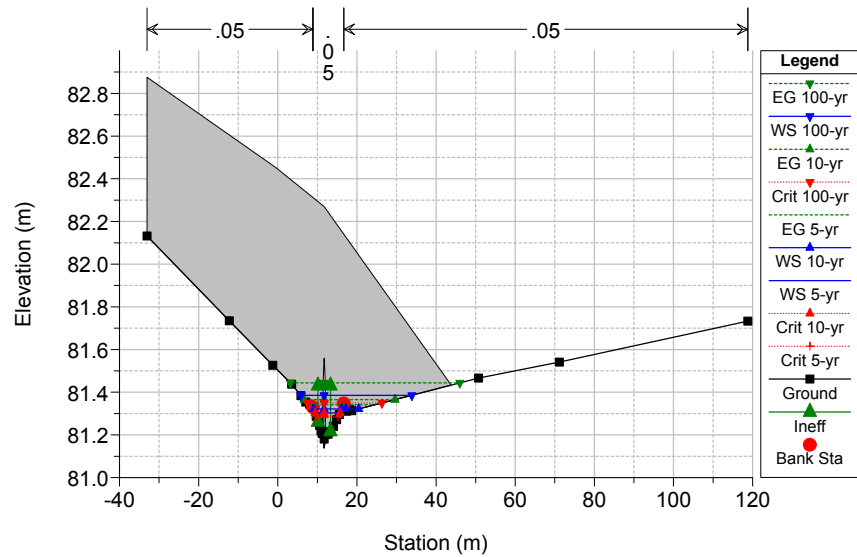
RA35b Plan: RA35b-Proposed\_Rev2 6/12/2017  
RS = 6 CREATED FROM SURVEY - FLOODPLAIN ADDED FROM LIDAR



RA35b Plan: RA35b-Proposed\_Rev2 6/12/2017  
RS = 5.33333 INTERPOLATED SECTION

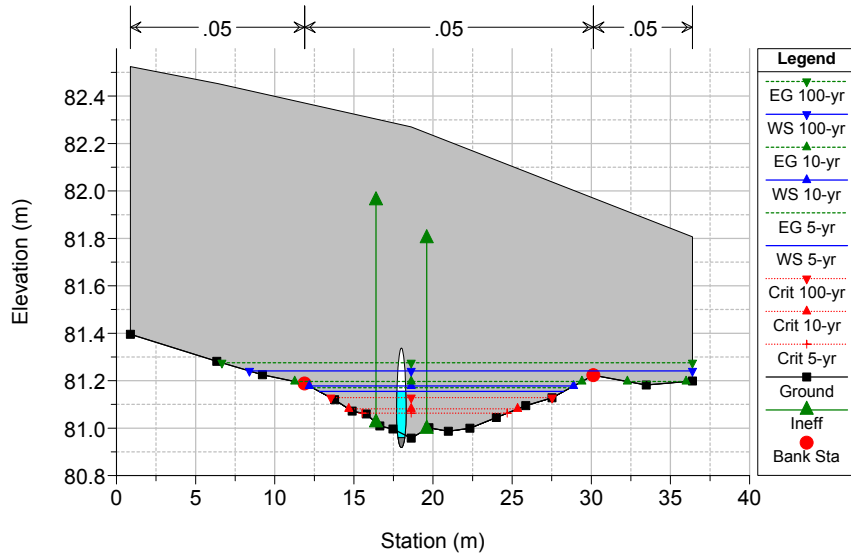


RA35b Plan: RA35b-Proposed\_Rev2 6/12/2017  
RS = 4.5 Culv



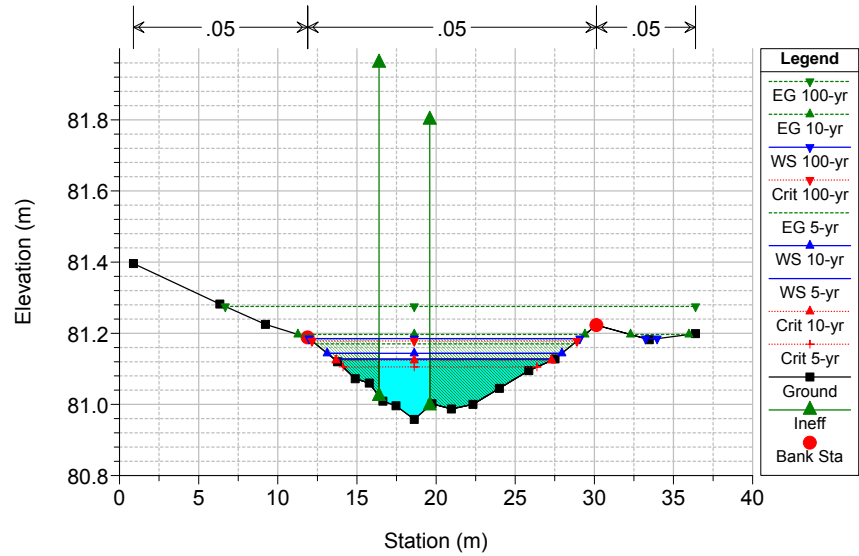
RA35b Plan: RA35b-Proposed\_Rev2 6/12/2017

RS = 4.5 Culv



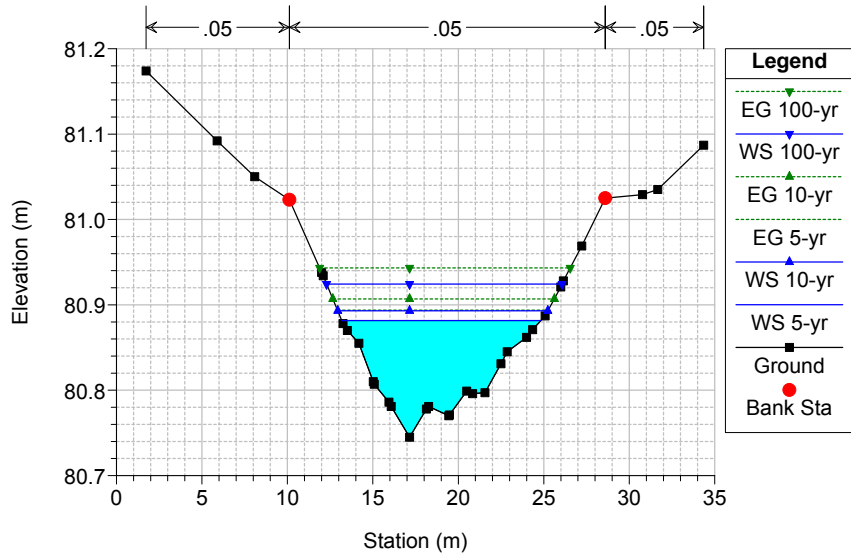
RA35b Plan: RA35b-Proposed\_Rev2 6/12/2017

RS = 4 SURVEYED SECTION WITH VERTICAL ADJUSTMENT OF -0.04M



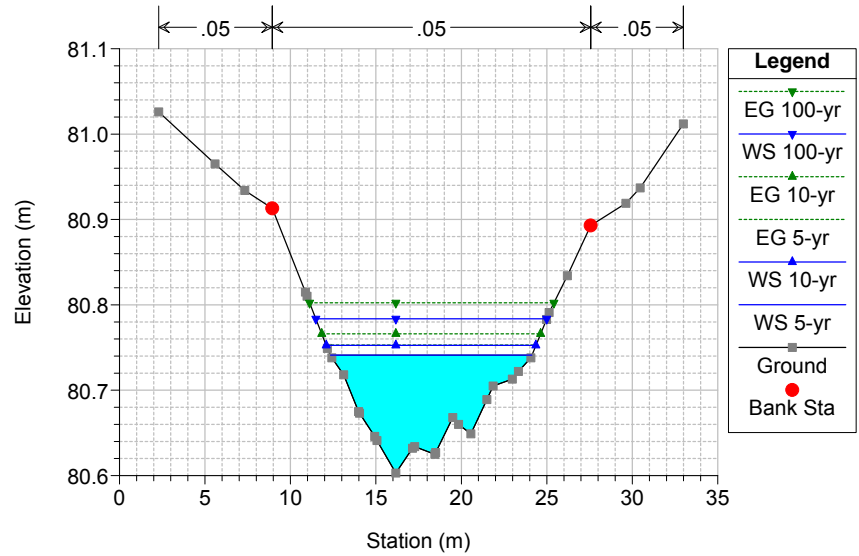
RA35b Plan: RA35b-Proposed\_Rev2 6/12/2017

RS = 3 INTERPOLATED

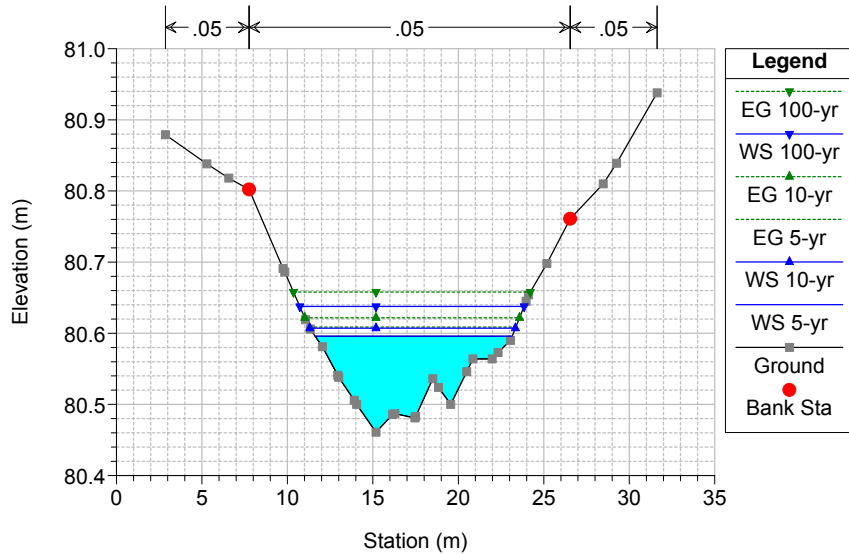


RA35b Plan: RA35b-Proposed\_Rev2 6/12/2017

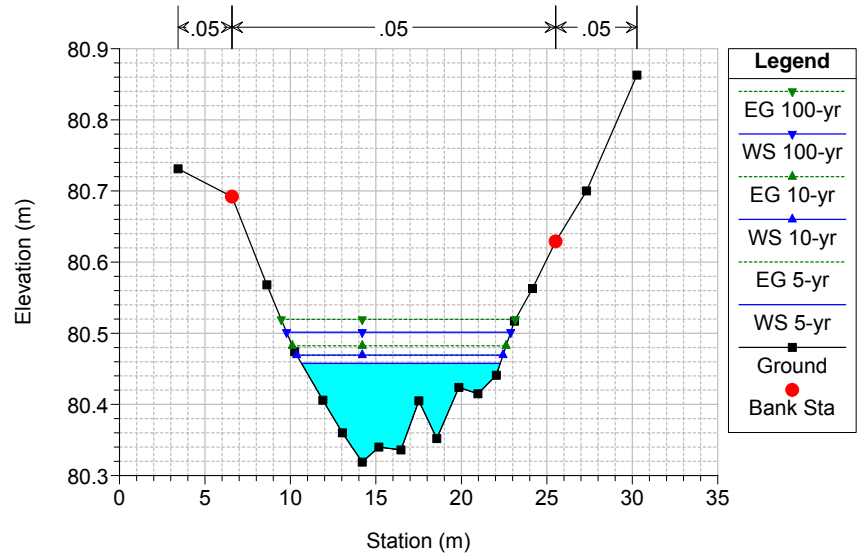
RS = 2.66666\*



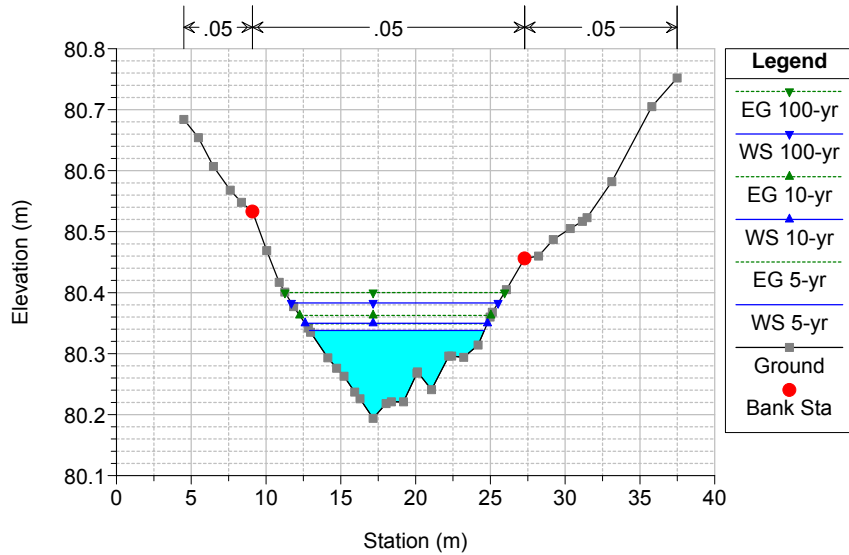
RA35b Plan: RA35b-Proposed\_Rev2 6/12/2017  
RS = 2.33333\*



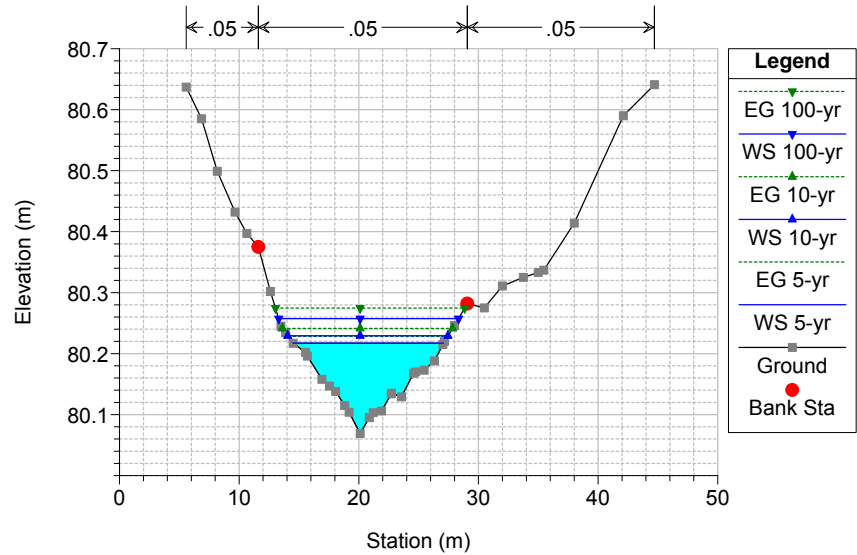
RA35b Plan: RA35b-Proposed\_Rev2 6/12/2017  
RS = 2 CREATED FROM SURVEY



RA35b Plan: RA35b-Proposed\_Rev2 6/12/2017  
RS = 1.66666\*



RA35b Plan: RA35b-Proposed\_Rev2 6/12/2017  
RS = 1.33333\*







# RA42 – HYDRAULIC MODELING

- UNDER GROUND AND ABOVE GROUND UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON THE DRAWINGS AND WHERE SHOWN, THE ACCURACY OF POSITION IS NOT GUARANTEED. THE CONTRACTOR SHALL INFORM THEMSELVES OF THE EXACT LOCATION OF ALL UTILITY PLANTS PRIOR TO STARTING WORK.
- SEE DRAWING "CIVIL ACCESS ROAD DETAILS" (DRAWING C302) FOR ADDITIONAL CONSTRUCTION AND CULVERT NOTES.
- UTILITY AND OTHER CONFLICTS HAVE NOT BEEN ADDRESSED IN THESE DRAWINGS, AND WILL BE RESOLVED IN THE FIELD USING VERIFIED UTILITY LOCATIONS AND OTHER SITE INFORMATION.
- TOPOGRAPHICAL SURVEY COMPLETED BY McINTOSH PERRY CONSULTING ENGINEERS, DATED 2015. (UTM ZONE 18 NAD83 (CRSR) 1997.0)
- SEE DRAWING "CIVIL ACCESS ROAD - EROSION AND SEDIMENT CONTROL" (DRAWING C301) FOR ADDITIONAL EROSION AND SEDIMENTATION CONTROL NOTES AND DETAILS.
- ACCESS ROAD ALIGNMENTS MAY REQUIRE FIELD MODIFICATIONS TO ACCOMMODATE EXISTING CONDITIONS.
- CONTRACTOR TO ADHERE TO ALL CONSERVATION AUTHORITY PERMITS AND CONDITIONS OF APPROVAL.
- CONTRACTOR TO CONSTRUCT OVERBUILD (ADDITIONAL COMPACTED AREA) AT ALL BENDS AND CURVES IN ACCORDANCE WITH SIEMENS SPECIFICATIONS "GENERAL SITE REQUIREMENTS, AMHERST ISLAND, EQUIPMENT ONLY AM" REV 6.31, DATED 2016-09-23.

Legend

- SILT FENCE
- LIMIT OF CONSTRUCTIBLE AREA
- EXISTING OVERLAND FLOW/DITCH DIRECTION
- PROPOSED DITCH FLOW
- EXISTING GROUND CONTOURS (AS PER NOTE 4 ABOVE)
- EXISTING GROUND CONTOURS (FROM LIDAR MAPPING)
- PROPOSED PAD ELEVATION

\*\*\*\*For PHCL and WindElectric Use Only\*\*\*\*

Review with no comments does not constitute approval of design details, calculations or methods. It is the responsibility of the consultant to ensure all information contained within the drawings are in full compliance with contractual obligations.

Reviewed - No comments

Reviewed - Incorporate comments and resubmit

Reviewed - Not accepted

Reviewed by: \_\_\_\_\_ Date [dd-mm-yy]

Project Manager - PHCL: \_\_\_\_\_ Date [dd-mm-yy]

Project Manager - WindElectric: \_\_\_\_\_ Date [dd-mm-yy]

Owner: \_\_\_\_\_

B	ISSUED FOR CRCA PERMITTING	RCL	MPG	17.06.22
A	ISSUED FOR CLIENT REVIEW	RCL	MPG	17.01.30
Revision		By	Appd.	YY.MM.DD

File Name:	C214_133560100-Turbine S28-S33.DWG	RCL	MPG	RCL	15.12.03
Permit/Seal		Dwn.	Chkd.	Dsgn.	YY.MM.DD

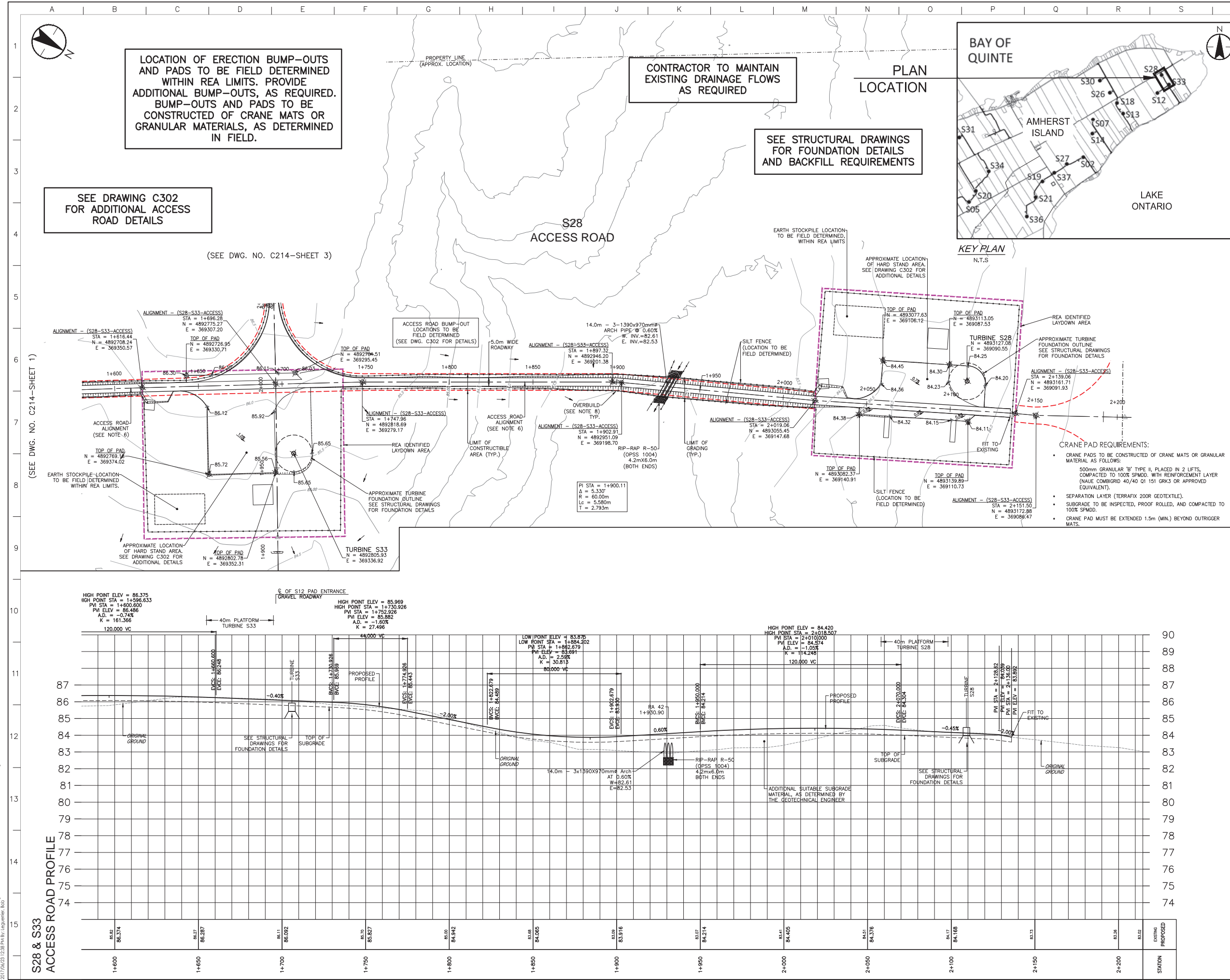
Client/Project



AMHERST ISLAND WIND PROJECT  
75MW WIND FARM  
Amherst Island, Loyalist Township, Ontario

Title  
ACCESS ROAD  
TURBINE S28, S33 AND S12  
PLAN AND PROFILE

Project No.	Scale
133560100	1:1000H 1:100V
Drawing No.	Sheet
C214	Revision



X:\016570\active\133560100\Drawings\10\_Lines\Drawings\133560100-Turbine S28-S33.dwg  
 20/10/2022 10:53 AM P:\P\133560100-Turbine S28-S33.dwg  
 ORIGINAL SHEET - ARCH-D



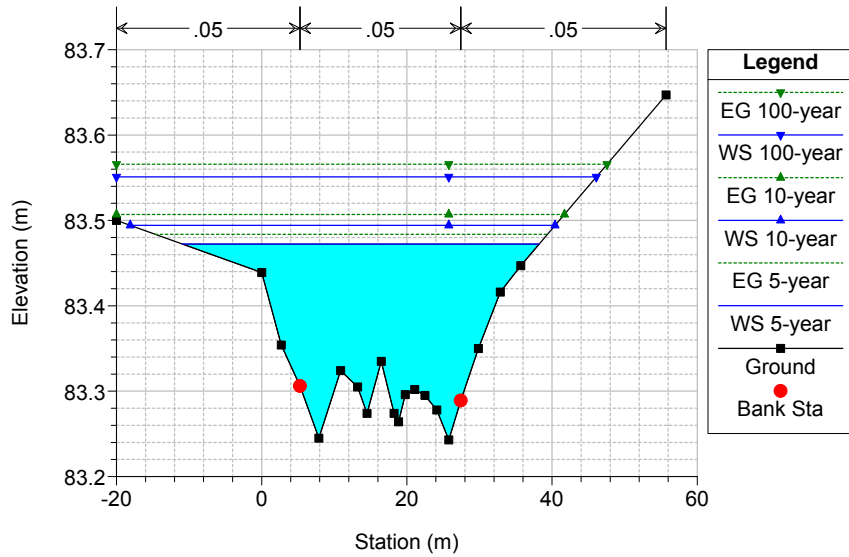


HEC-RAS Plan: RA42-ex(exter) River: RA42 Reach: 1

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Vel Total (m/s)	Vel Left (m/s)	Vel Right (m/s)
1	7	5-year	2.42	83.24	83.47		83.48	0.006107	0.51	5.61	49.15	0.38	0.43	0.20	0.27
1	7	10-year	3.02	83.24	83.49		83.51	0.006023	0.54	6.79	58.53	0.38	0.44	0.21	0.29
1	7	100-year	5.02	83.24	83.55		83.57	0.005482	0.61	10.37	66.10	0.38	0.48	0.33	0.33
1	6	5-year	2.42	83.12	83.36		83.37	0.005634	0.49	5.62	42.19	0.36	0.43	0.26	0.26
1	6	10-year	3.02	83.12	83.38		83.39	0.005532	0.53	6.68	46.94	0.37	0.45	0.27	0.28
1	6	100-year	5.02	83.12	83.44		83.46	0.005374	0.62	9.98	59.36	0.38	0.50	0.32	0.33
1	5	5-year	2.42	82.96	83.25		83.27	0.005348	0.54	5.43	42.64	0.36	0.45	0.27	0.21
1	5	10-year	3.02	82.96	83.28		83.29	0.005287	0.57	6.49	45.79	0.37	0.47	0.31	0.24
1	5	100-year	5.02	82.96	83.35		83.37	0.004714	0.64	10.23	59.05	0.36	0.49	0.34	0.32
1	4.1724*	5-year	2.42	82.75	83.12		83.14	0.005784	0.55	5.64	40.43	0.38	0.43	0.41	0.34
1	4.1724*	10-year	3.02	82.75	83.15		83.16	0.005707	0.59	6.67	43.79	0.38	0.45	0.44	0.36
1	4.1724*	100-year	5.02	82.75	83.22		83.23	0.006646	0.75	10.09	68.36	0.43	0.50	0.46	0.38
1	4	5-year	2.42	82.70	83.10		83.11	0.004926	0.51	6.01	40.92	0.35	0.40	0.41	0.34
1	4	10-year	3.02	82.70	83.12		83.13	0.005018	0.55	7.06	44.65	0.36	0.43	0.44	0.36
1	4	100-year	5.02	82.70	83.19		83.20	0.005070	0.65	10.32	54.44	0.37	0.49	0.50	0.41
1	3	5-year	2.42	82.61	82.97		82.99	0.009521	0.63	4.57	33.08	0.47	0.53	0.53	0.46
1	3	10-year	3.02	82.61	83.02		83.03	0.006620	0.61	6.17	38.54	0.40	0.49	0.48	0.43
1	3	100-year	5.02	82.61	83.05		83.07	0.010767	0.85	7.49	42.25	0.53	0.67	0.66	0.59
1	2	5-year	2.42	82.62	82.94		82.95	0.006268	0.53	5.16	38.63	0.38	0.47	0.29	0.22
1	2	10-year	3.02	82.62	83.00	82.87	83.01	0.003233	0.45	7.66	43.59	0.29	0.39	0.28	0.23
1	2	100-year	5.02	82.62	83.00		83.03	0.008079	0.73	7.94	44.36	0.46	0.63	0.45	0.37
1	1	5-year	2.42	82.53	82.82	82.71	82.83	0.003003	0.38	7.10	40.88	0.27	0.34		0.34
1	1	10-year	3.02	82.53	82.72	82.72	82.77	0.050183	1.12	3.25	34.59	1.01	0.93		0.90
1	1	100-year	5.02	82.53	82.89	82.76	82.89	0.003001	0.45	13.18	68.83	0.28	0.38	0.27	0.42

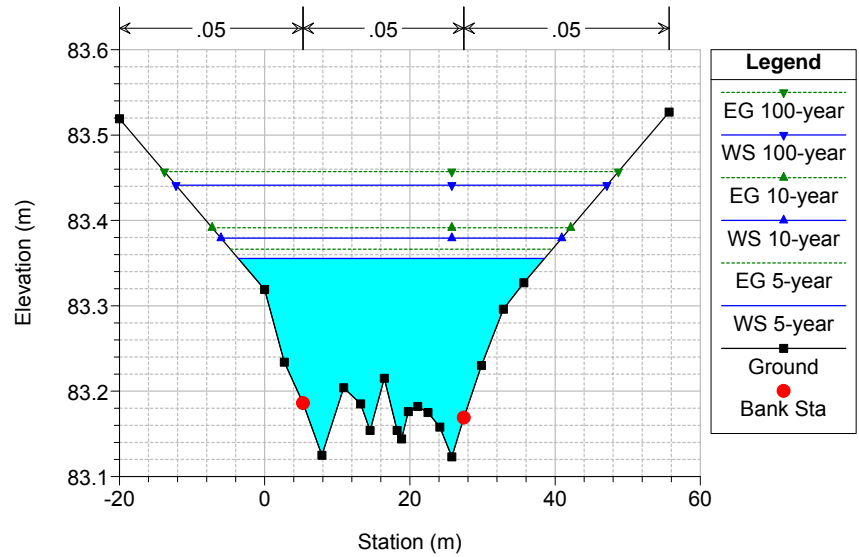
RA42 Plan: RA42-ex(extended) 7/6/2017

RS = 7



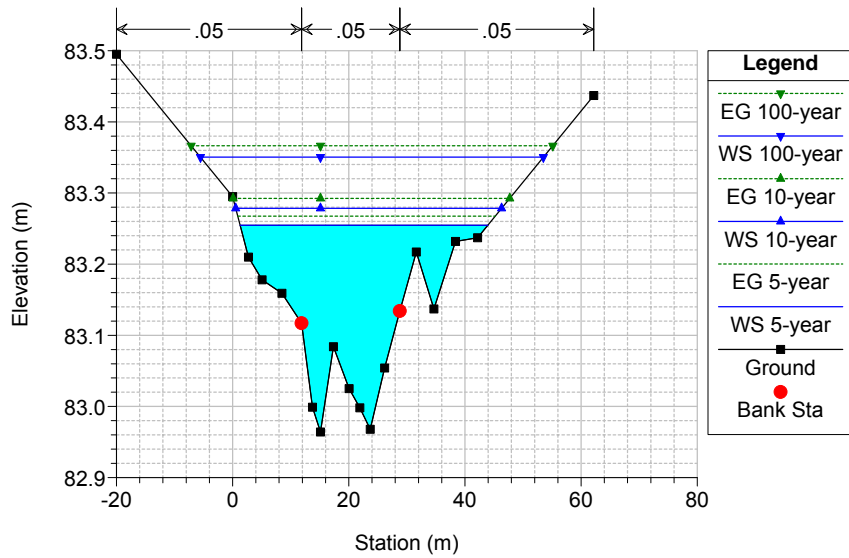
RA42 Plan: RA42-ex(extended) 7/6/2017

RS = 6



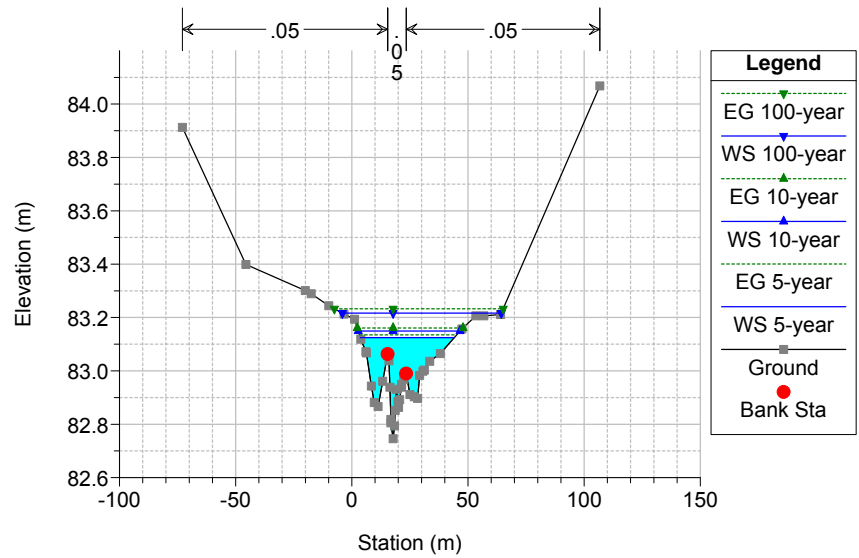
RA42 Plan: RA42-ex(extended) 7/6/2017

RS = 5

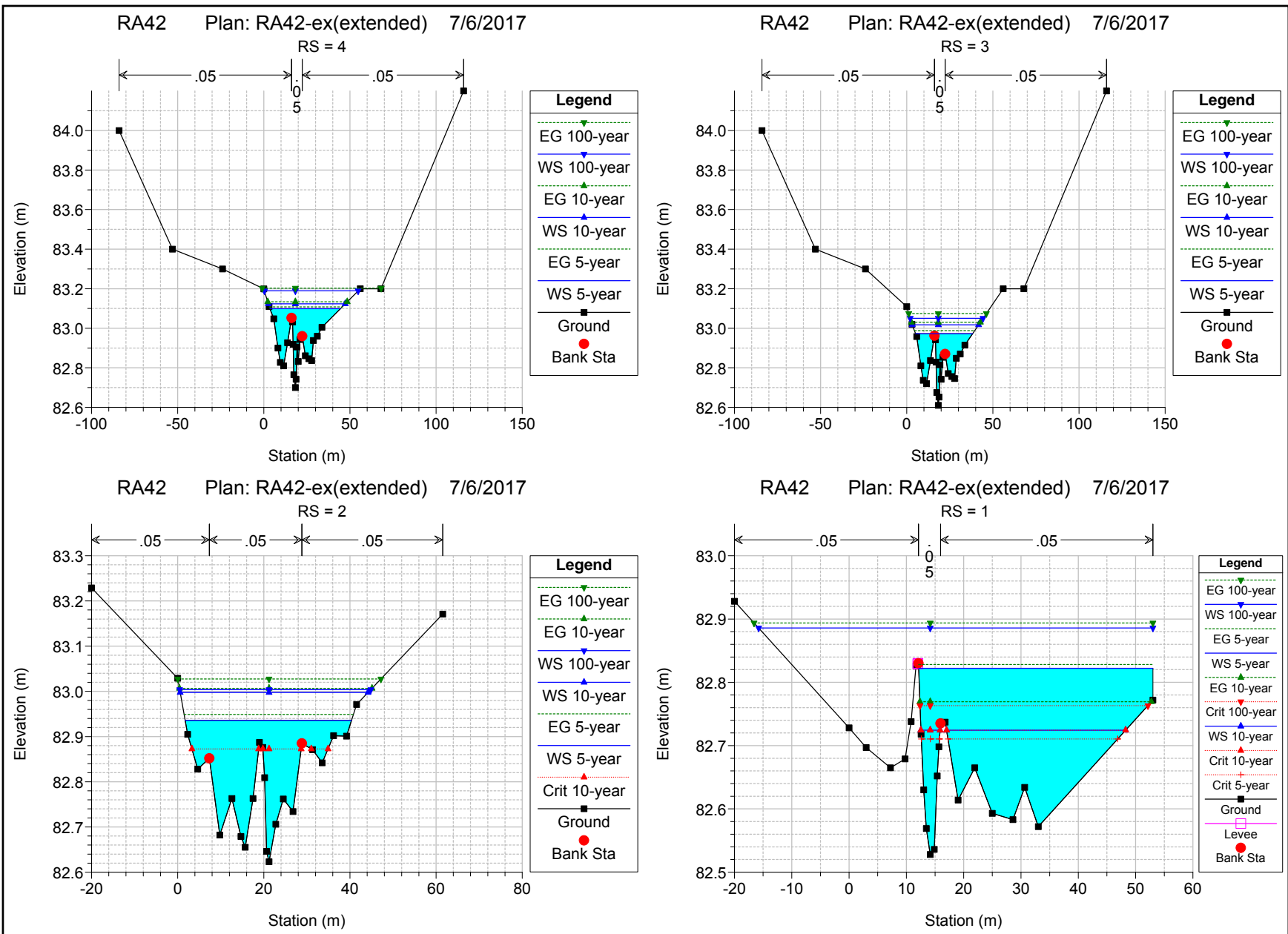


RA42 Plan: RA42-ex(extended) 7/6/2017

RS = 4.1724\*









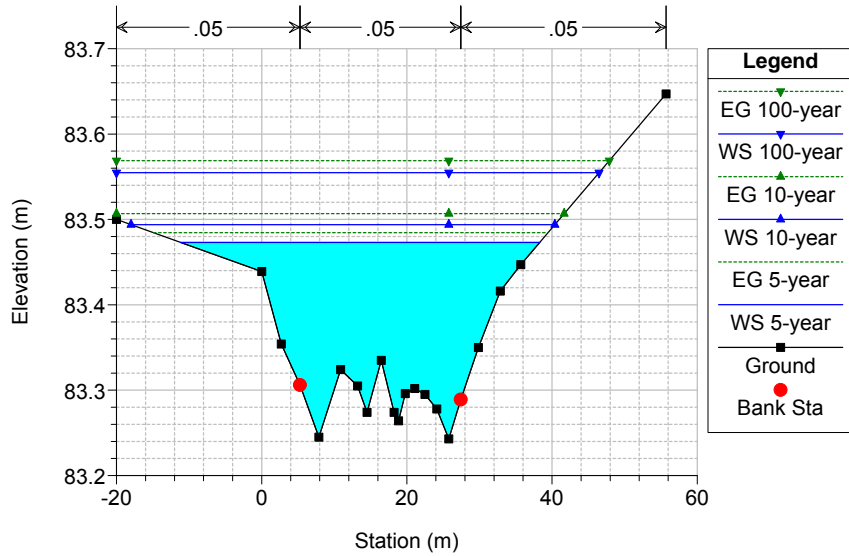
HEC-RAS Plan: RA42-prV4(ex River: RA42 Reach: 1

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Vel Total (m/s)	Vel Left (m/s)	Vel Right (m/s)
1	7	5-year	2.42	83.24	83.47		83.48	0.006003	0.50	5.65	49.50	0.37	0.43	0.20	0.27
1	7	10-year	3.02	83.24	83.49		83.51	0.006064	0.54	6.77	58.39	0.38	0.45	0.21	0.29
1	7	100-year	5.02	83.24	83.55		83.57	0.005132	0.59	10.62	66.48	0.37	0.47	0.32	0.32
1	6	5-year	2.42	83.12	83.36		83.37	0.005673	0.49	5.60	42.12	0.36	0.43	0.26	0.27
1	6	10-year	3.02	83.12	83.38		83.39	0.005184	0.52	6.85	47.65	0.36	0.44	0.27	0.28
1	6	100-year	5.02	83.12	83.48		83.49	0.003018	0.51	12.49	67.29	0.29	0.40	0.27	0.28
1	5	5-year	2.42	82.96	83.28		83.29	0.003248	0.45	6.61	46.14	0.29	0.37	0.25	0.19
1	5	10-year	3.02	82.96	83.32		83.33	0.002654	0.45	8.55	53.07	0.27	0.35	0.24	0.21
1	5	100-year	5.02	82.96	83.45		83.46	0.001298	0.40	17.09	77.66	0.20	0.29	0.21	0.22
1	4.1724*	5-year	2.42	82.75	83.25		83.25	0.000957	0.30	12.29	76.16	0.16	0.20	0.17	0.17
1	4.1724*	10-year	3.02	82.75	83.29		83.30	0.000720	0.29	16.19	86.87	0.15	0.19	0.15	0.17
1	4.1724*	100-year	5.02	82.75	83.44		83.44	0.000342	0.24	31.71	123.08	0.11	0.16	0.13	0.16
1	4	5-year	2.42	82.70	83.11	83.11	83.21	0.036332	1.43	1.80	42.55	0.95	1.34	0.89	1.16
1	4	10-year	3.02	82.70	83.14	83.14	83.25	0.035668	1.54	2.08	47.14	0.96	1.45	1.04	1.29
1	4	100-year	5.02	82.70	83.23	83.23	83.39	0.033336	1.82	2.90	77.21	0.97	1.73	1.39	1.60
1	3.5														
1	3	5-year	2.42	82.61	83.02	83.02	83.12	0.036227	1.43	1.80	38.81	0.95	1.34	0.89	1.16
1	3	10-year	3.02	82.61	83.05	83.05	83.16	0.035598	1.54	2.08	42.28	0.96	1.45	1.04	1.28
1	3	100-year	5.02	82.61	83.14	83.14	83.30	0.033593	1.82	2.90	55.35	0.98	1.73	1.39	1.60
1	2	5-year	2.42	82.62	82.94		82.95	0.006268	0.53	5.16	38.63	0.38	0.47	0.29	0.22
1	2	10-year	3.02	82.62	83.00	82.87	83.01	0.003232	0.45	7.66	43.59	0.29	0.39	0.28	0.23
1	2	100-year	5.02	82.62	83.00		83.03	0.008078	0.73	7.94	44.36	0.46	0.63	0.45	0.37
1	1	5-year	2.42	82.53	82.82	82.71	82.83	0.003003	0.38	7.10	40.88	0.27	0.34		0.34
1	1	10-year	3.02	82.53	82.72	82.72	82.77	0.050183	1.12	3.25	34.59	1.01	0.93		0.90
1	1	100-year	5.02	82.53	82.89	82.76	82.89	0.003001	0.45	13.18	68.83	0.28	0.38	0.27	0.42



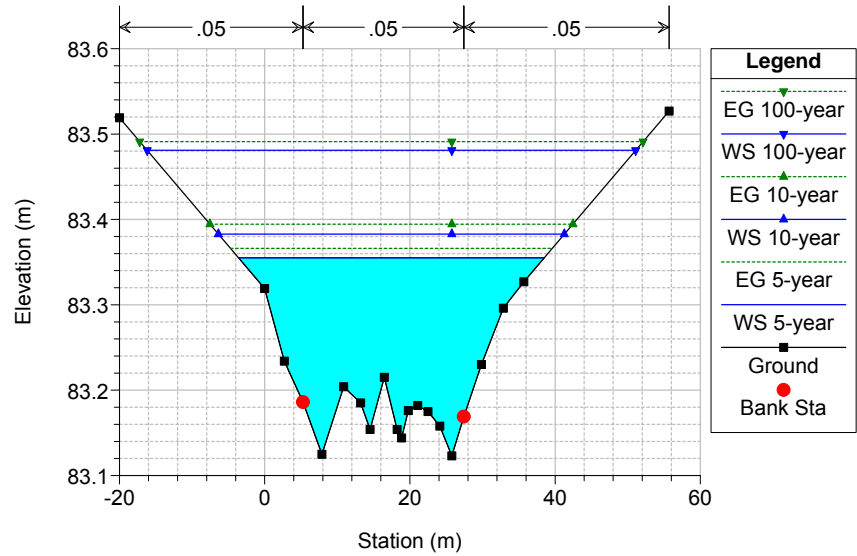
RA42 Plan: RA42-prV4(extended) 6/5/2017

RS = 7



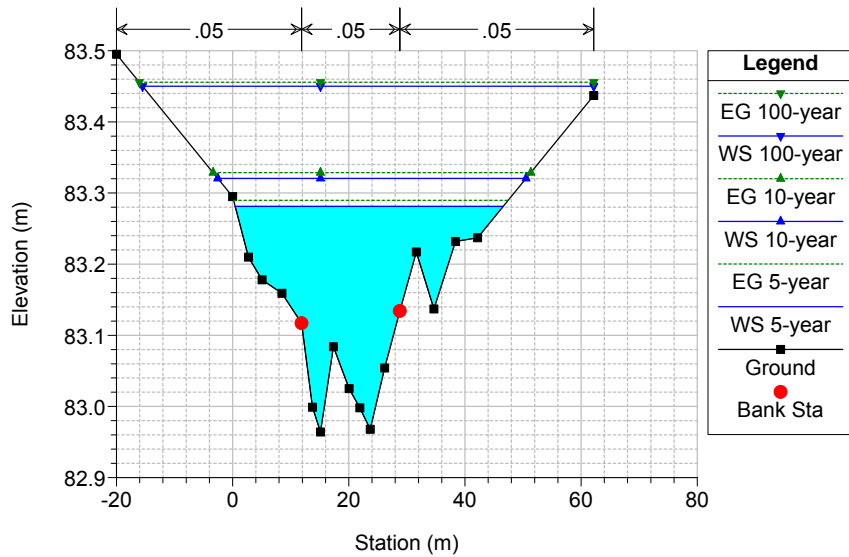
RA42 Plan: RA42-prV4(extended) 6/5/2017

RS = 6



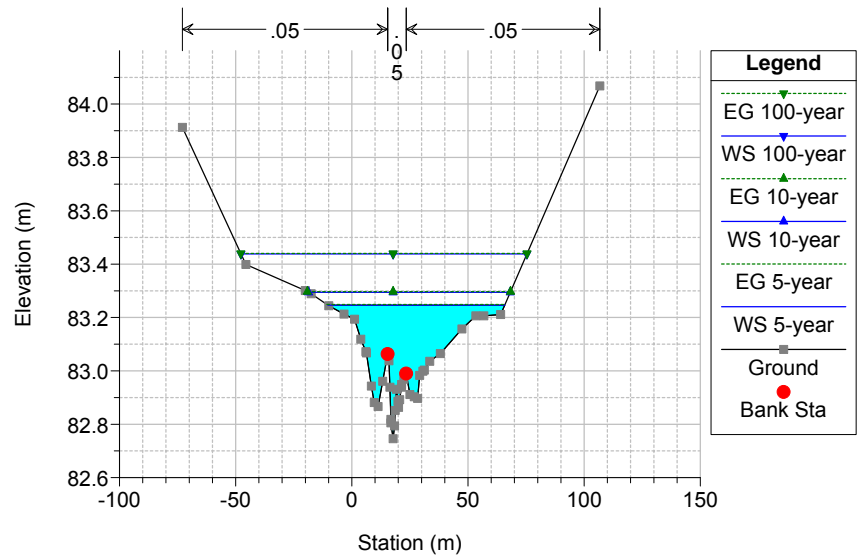
RA42 Plan: RA42-prV4(extended) 6/5/2017

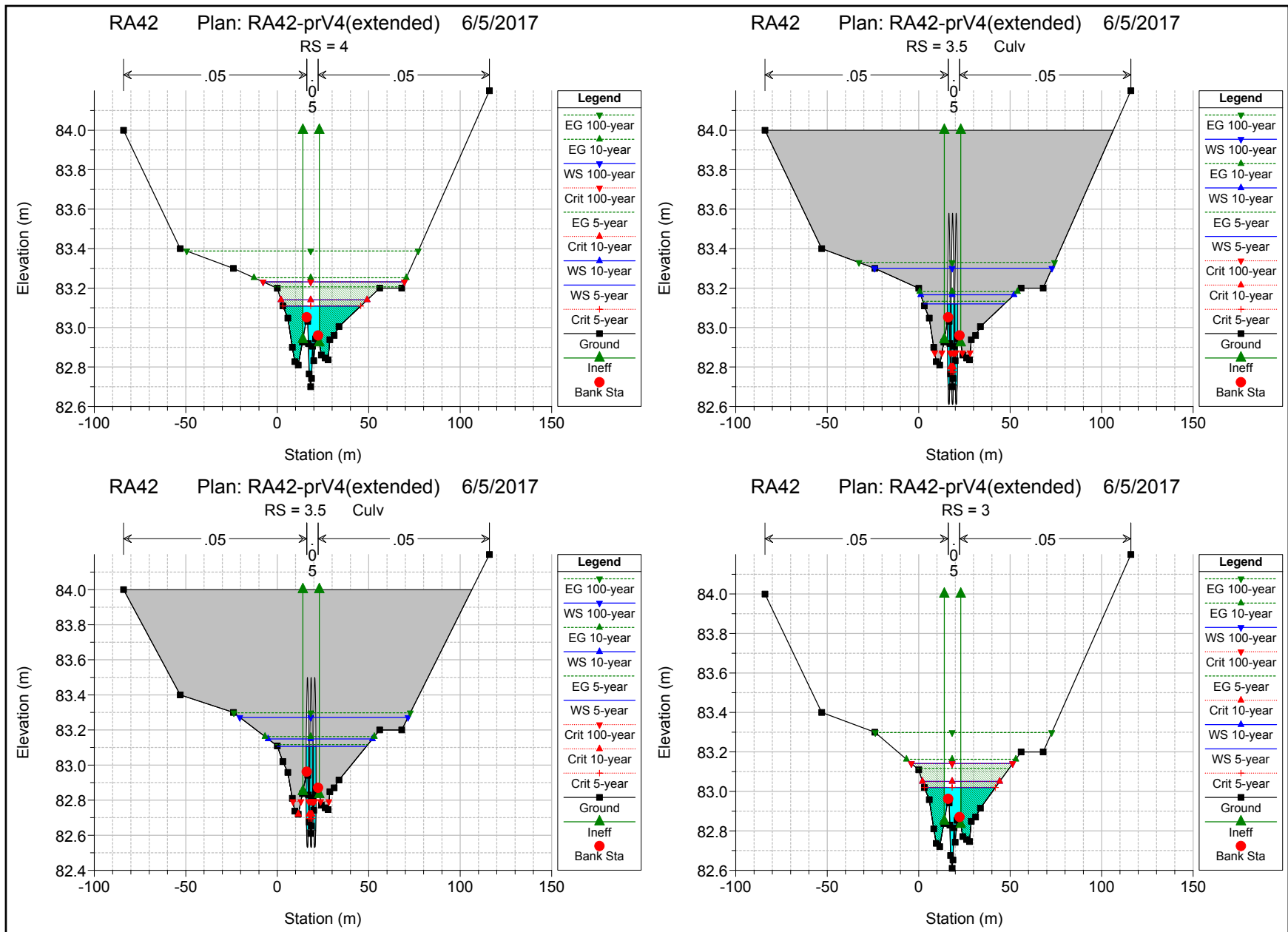
RS = 5



RA42 Plan: RA42-prV4(extended) 6/5/2017

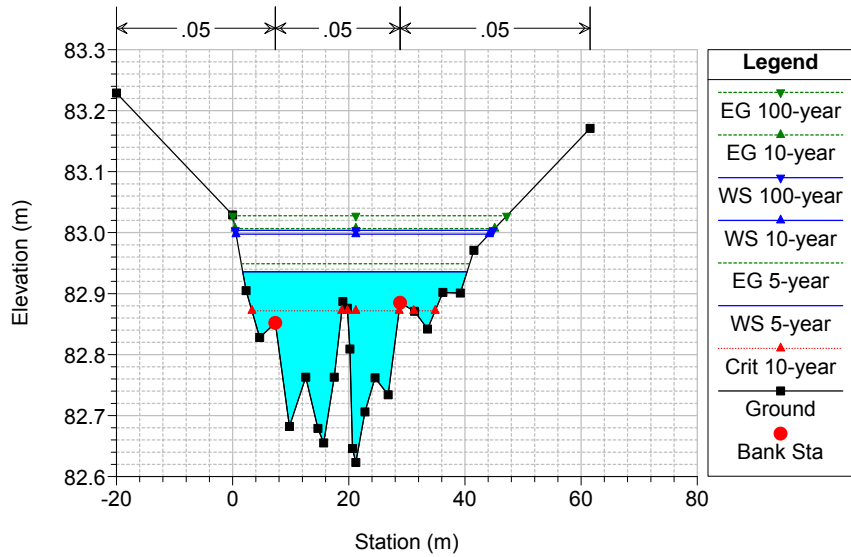
RS = 4.1724\*





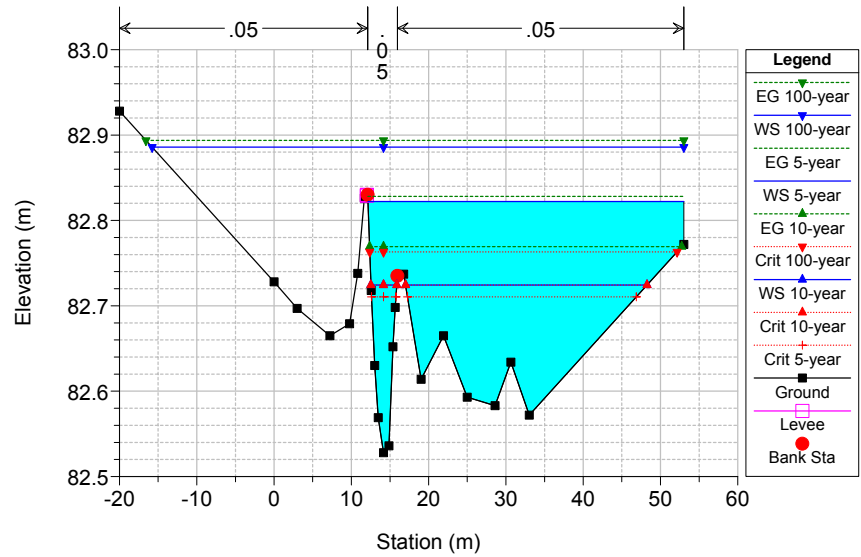
RA42 Plan: RA42-prV4(extended) 6/5/2017

RS = 2



RA42 Plan: RA42-prV4(extended) 6/5/2017

RS = 1





# DFO3 – HYDRAULIC MODELING

Copyright Reserved

The Contractor shall verify and be responsible for all dimensions. DO NOT scale the drawing - any errors or omissions shall be reported to Stantec without delay.  
The Copyrights to all designs and drawings are the property of Stantec. Reproduction or use for any purpose other than that authorized by Stantec is forbidden.

General Notes

- UNDER GROUND AND ABOVE GROUND UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON THE DRAWINGS AND WHERE SHOWN, THE ACCURACY OF POSITION IS NOT GUARANTEED. THE CONTRACTOR SHALL INFORM THEMSELVES OF THE EXACT LOCATION OF ALL UTILITY PLANTS PRIOR TO STARTING WORK.
- SEE DRAWING "CIVIL ACCESS ROAD DETAILS" (DRAWING C302) FOR ADDITIONAL CONSTRUCTION AND CULVERT NOTES.
- UTILITY AND OTHER CONFLICTS HAVE NOT BEEN ADDRESSED IN THESE DRAWINGS, AND WILL BE RESOLVED IN THE FIELD USING VERIFIED UTILITY LOCATIONS AND OTHER SITE INFORMATION.
- TOPOGRAPHICAL SURVEY COMPLETED BY McINTOSH PERRY CONSULTING ENGINEERS, DATED 2015. (UTM ZONE 18 NAD83 (CRSR) 1997.0)
- SEE DRAWING "CIVIL ACCESS ROAD - EROSION AND SEDIMENT CONTROL" (DRAWING C301) FOR ADDITIONAL EROSION AND SEDIMENTATION CONTROL NOTES AND DETAILS.
- ACCESS ROAD ALIGNMENTS MAY REQUIRE FIELD MODIFICATIONS TO ACCOMMODATE EXISTING CONDITIONS.
- CONTRACTOR TO ADHERE TO ALL CONSERVATION AUTHORITY PERMITS AND CONDITIONS OF APPROVAL.
- CONTRACTOR TO CONSTRUCT OVERBUILD (ADDITIONAL COMPACTED AREA) AT ALL BENDS AND CURVES IN ACCORDANCE WITH SIEMENS SPECIFICATIONS "GENERAL SITE REQUIREMENTS, AMHERST ISLAND, EQUIPMENT ONLY AM" REV. 6.31, DATED 2016-09-23.

Legend

- SILT FENCE
- LIMIT OF CONSTRUCTIBLE AREA
- EXISTING OVERLAND FLOW/DITCH DIRECTION
- PROPOSED DITCH FLOW
- EXISTING GROUND CONTOURS (AS PER NOTE 4 ABOVE)
- EXISTING GROUND CONTOURS (FROM LIDAR MAPPING)
- PROPOSED PAD ELEVATION

\*\*\*\*For PHCL and WindElectric Use Only\*\*\*\*

Review with no comments does not constitute approval of design details, calculations or methods. It is the responsibility of the consultant to ensure all information contained within the drawings are in full compliance with contractual obligations.

<input type="checkbox"/> Reviewed - No comments	Date [dd-mm-YYYY]
<input type="checkbox"/> Reviewed - Incorporate comments and resubmit	Date [dd-mm-YYYY]
<input type="checkbox"/> Reviewed - Not accepted	Date [dd-mm-YYYY]
Project Manager - PHCL	Date [dd-mm-YYYY]
Project Manager - WindElectric	Date [dd-mm-YYYY]
Owner:	

B	ISSUED FOR CIRCA PERMITTING	RCL	MPG	17.06.22
A	ISSUED FOR CLIENT REVIEW	RCL	MPG	17.01.27
Revision		By	Appd.	YY.MM.DD

File Name:	C206_133560100-Turbine S34.dwg	RCL/DWg	MPG	RCL	15.12.03
Permit-Seat		Dwn.	Chkd.	Desgn.	YY.MM.DD

NOT FOR CONSTRUCTION

Client/Project



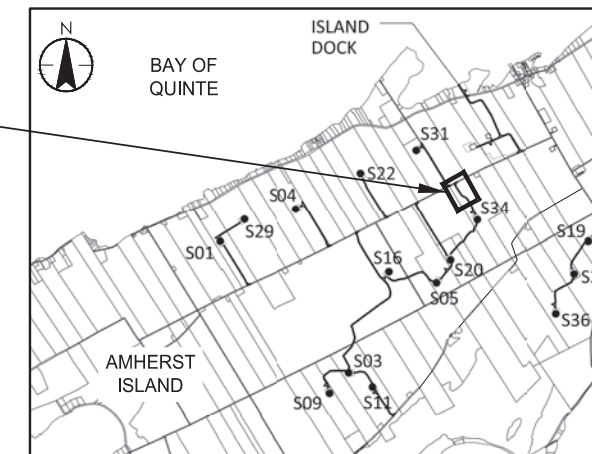
AMHERST ISLAND WIND PROJECT  
75MW WIND FARM  
Amherst Island, Loyalist Township, Ontario

Title

ACCESS ROAD  
TURBINE S34  
PLAN AND PROFILE

Project No.	Scale
133560100	1:1000H 1:100V
Drawing No.	Sheet
C206	Revision

PLAN LOCATION

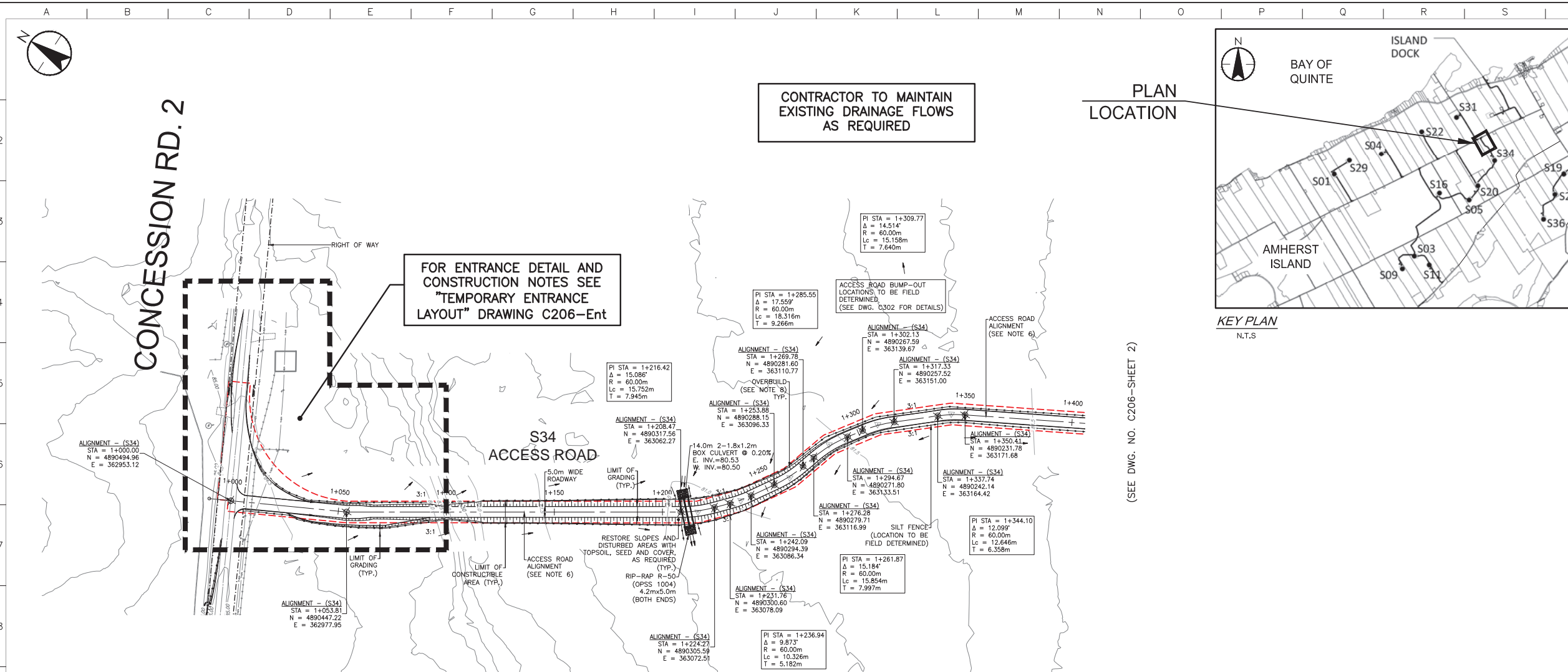


KEY PLAN  
N.T.S.

CONTRACTOR TO MAINTAIN EXISTING DRAINAGE FLOWS AS REQUIRED

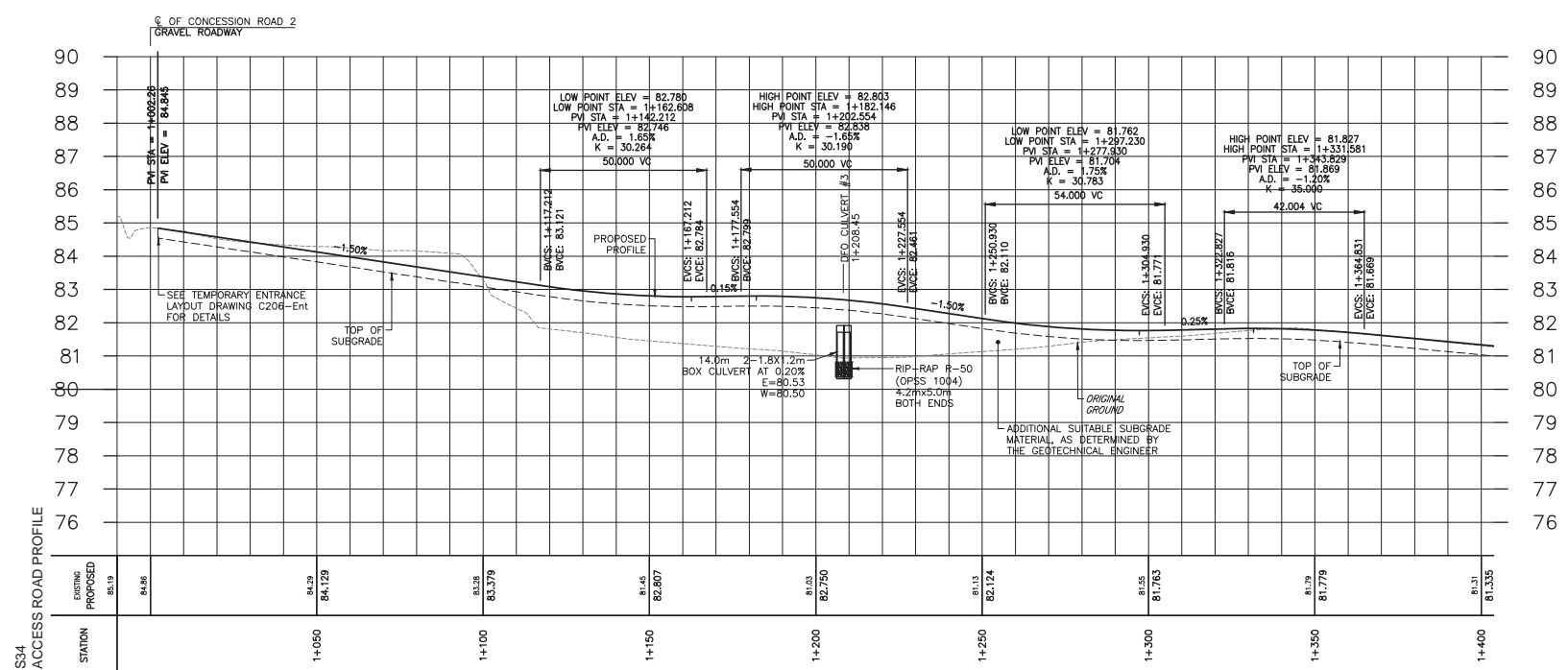
FOR ENTRANCE DETAIL AND CONSTRUCTION NOTES SEE "TEMPORARY ENTRANCE LAYOUT" DRAWING C206-Ent

CONCESSION RD. 2

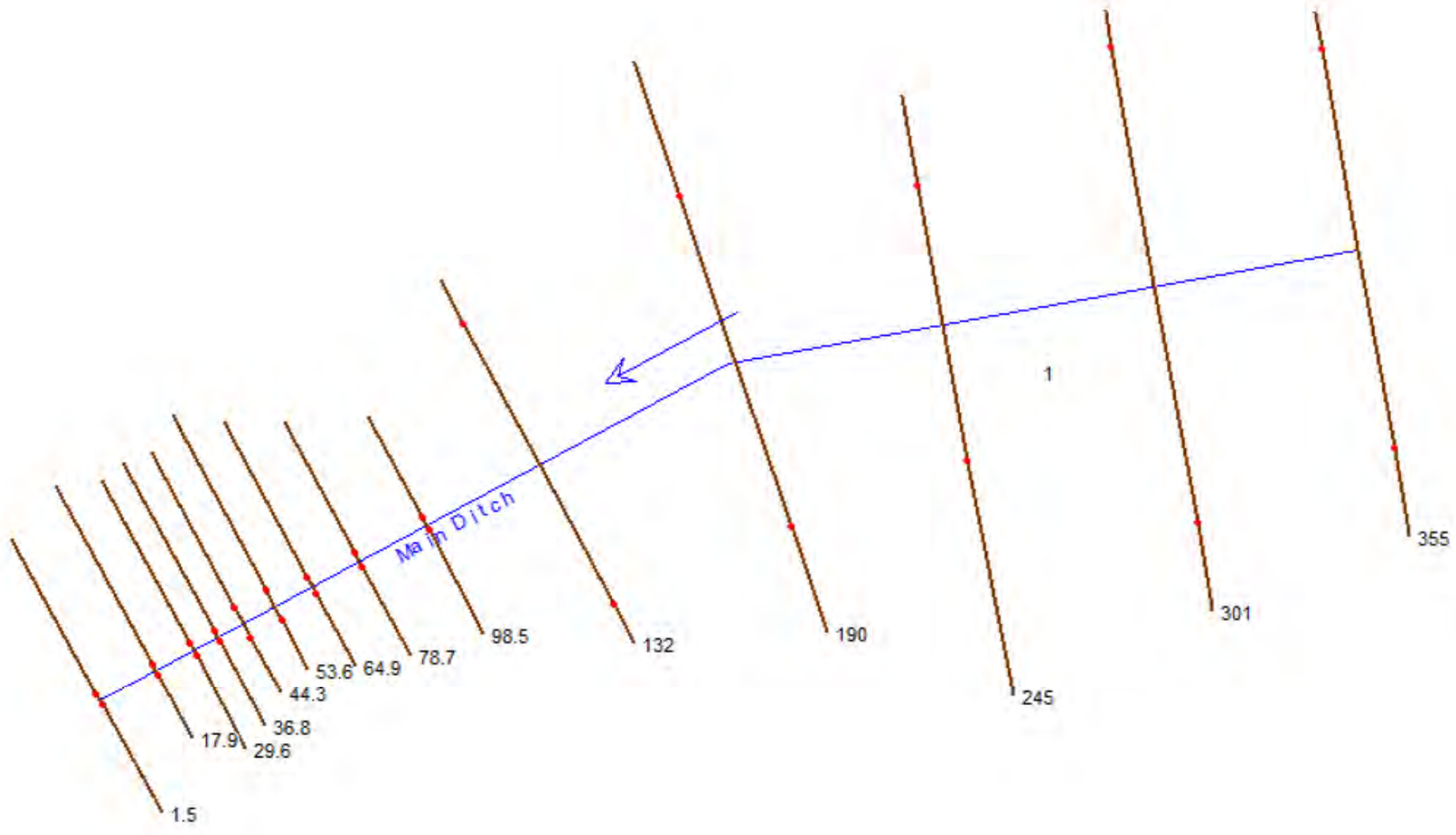


(SEE DWG. NO. C206-SHEET 2)

SEE DRAWING C302 FOR ADDITIONAL ACCESS ROAD DETAILS



X:\01657622\133560100\Drawings\10\_Lines\Drawings\C206\_133560100-Turbine S34.dwg  
20/10/2022 2:23:10 PM [unpublished]



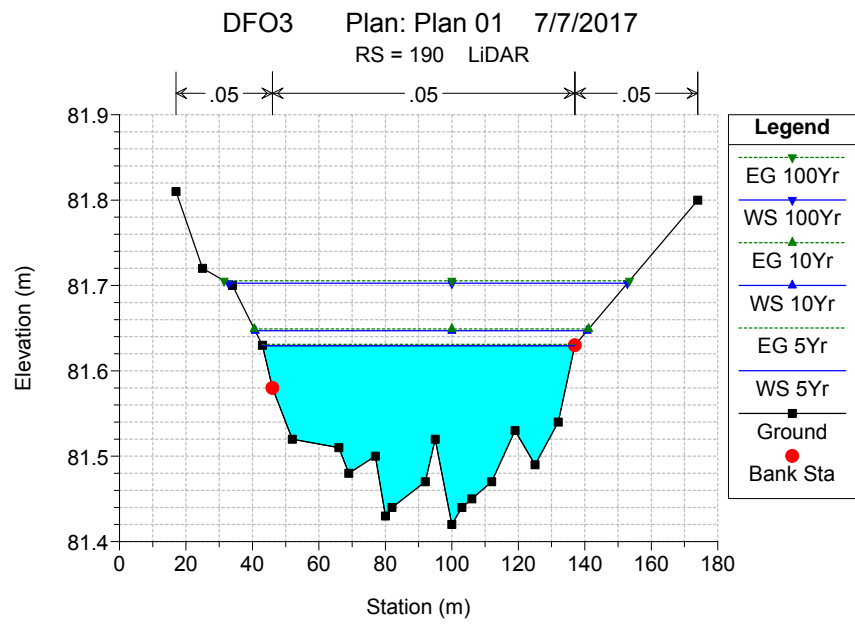
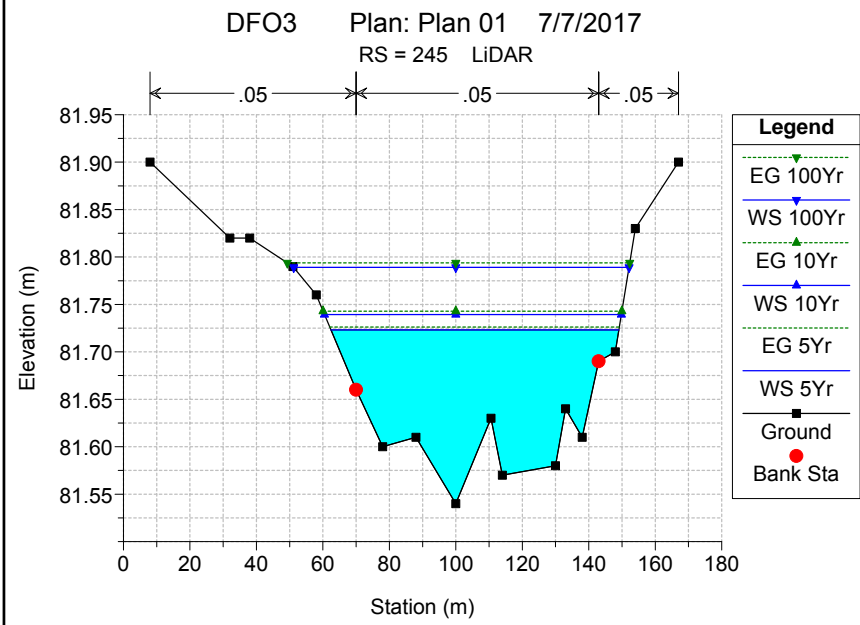
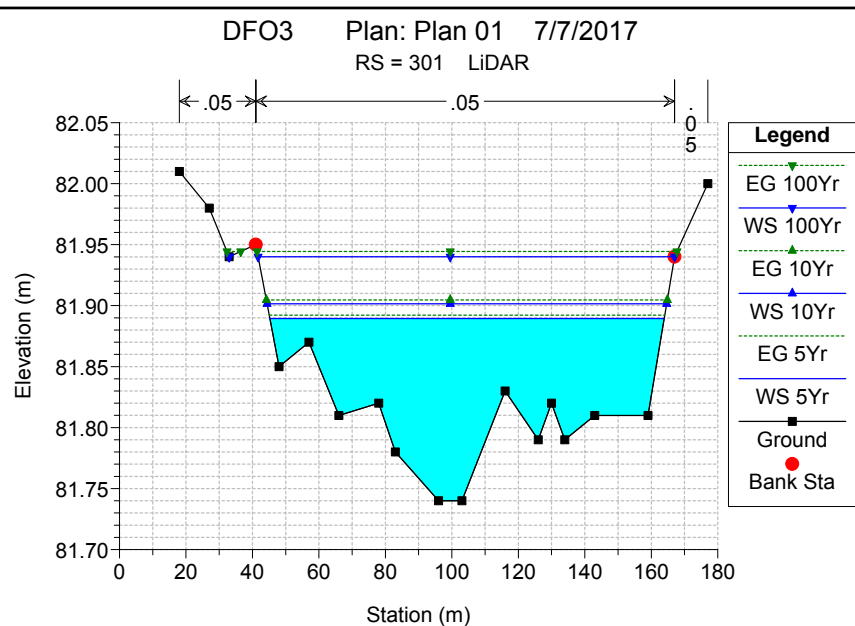
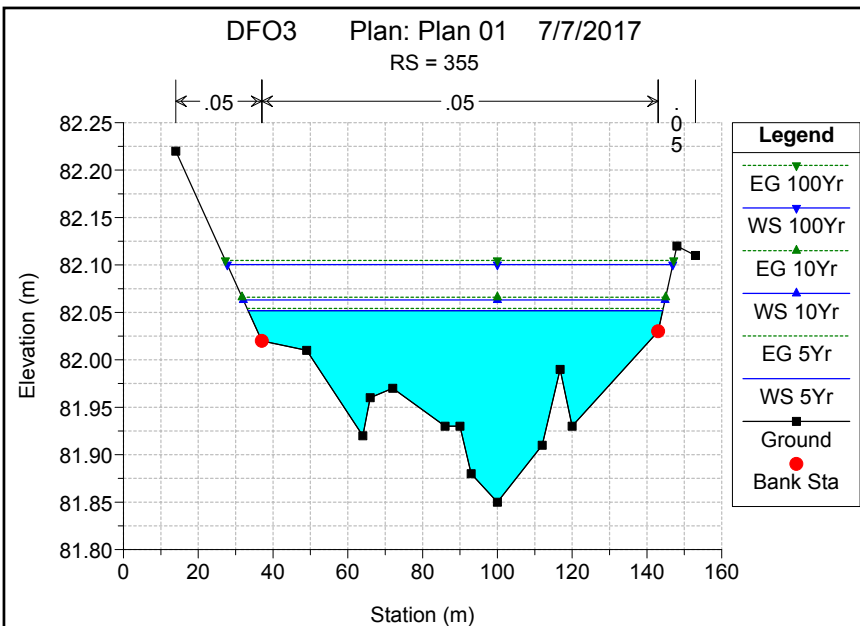


HEC-RAS Plan: Plan 01 River: Main Ditch Reach: 1

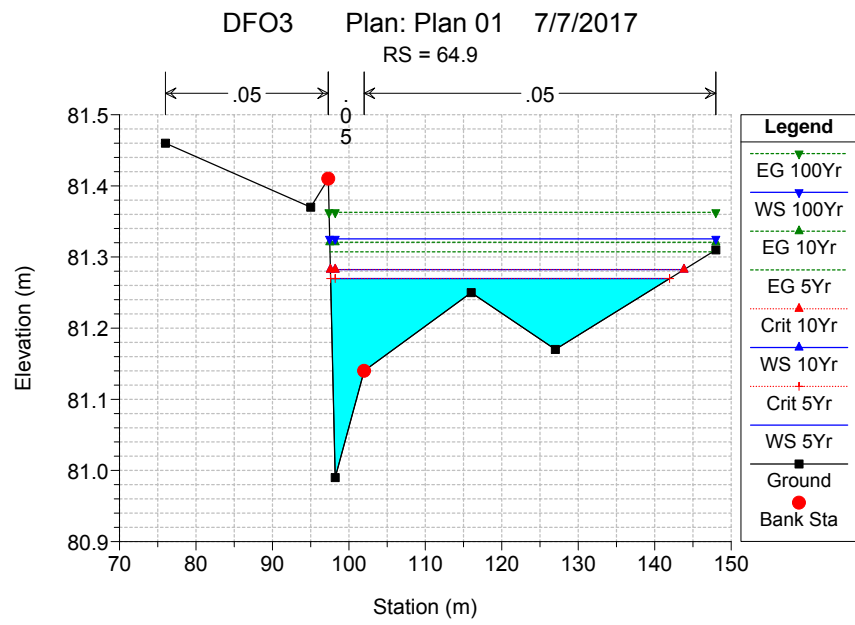
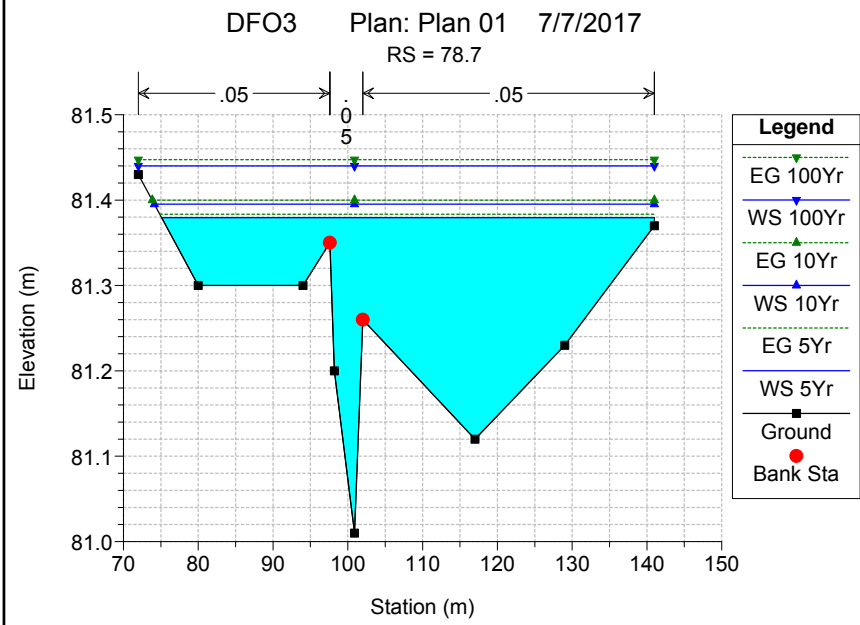
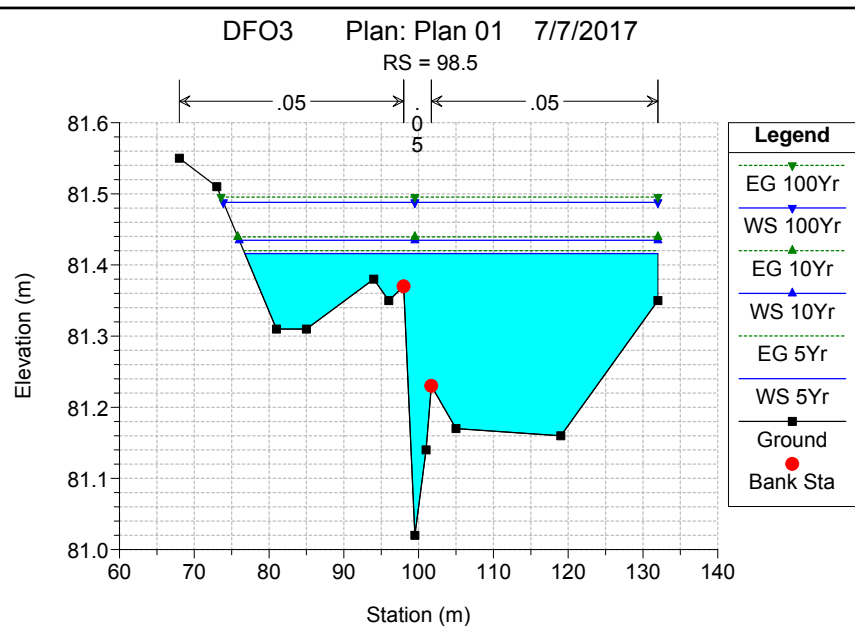
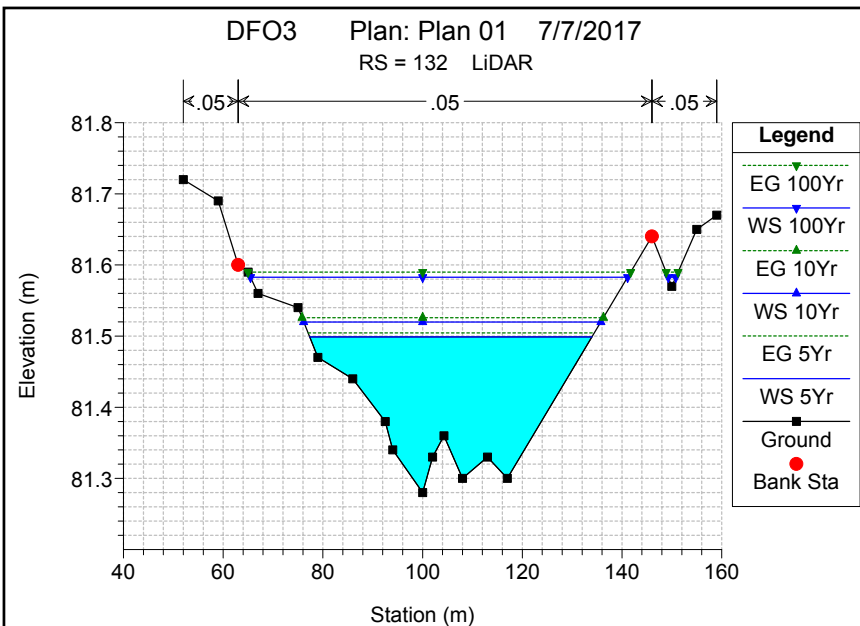
Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Vel Total (m/s)	Vel Left (m/s)	Vel Right (m/s)
1	355	5Yr	2.31	81.85	82.05		82.05	0.002499	0.22	10.73	110.90	0.22	0.22	0.06	0.05
1	355	10Yr	2.83	81.85	82.06		82.07	0.002618	0.24	11.99	112.82	0.23	0.24	0.08	0.07
1	355	100Yr	4.67	81.85	82.10		82.10	0.002690	0.29	16.31	119.16	0.24	0.29	0.12	0.11
1	301	5Yr	2.31	81.74	81.89		81.89	0.003698	0.23	9.92	118.63	0.26	0.23		
1	301	10Yr	2.83	81.74	81.90		81.90	0.003579	0.25	11.37	120.23	0.26	0.25		
1	301	100Yr	4.67	81.74	81.94		81.94	0.003241	0.29	16.10	125.36	0.26	0.29		
1	245	5Yr	2.31	81.54	81.72		81.73	0.002451	0.25	9.55	86.66	0.22	0.24	0.10	0.09
1	245	10Yr	2.83	81.54	81.74		81.74	0.002403	0.27	10.97	89.35	0.23	0.26	0.11	0.11
1	245	100Yr	4.67	81.54	81.79		81.79	0.002269	0.32	15.66	100.87	0.23	0.30	0.14	0.16
1	190	5Yr	2.31	81.42	81.63		81.63	0.001287	0.19	12.30	93.92	0.16	0.19	0.06	
1	190	10Yr	2.83	81.42	81.65		81.65	0.001275	0.20	14.01	99.88	0.17	0.20	0.07	0.03
1	190	100Yr	4.67	81.42	81.70		81.71	0.001187	0.24	20.10	119.93	0.17	0.23	0.09	0.08
1	132	5Yr	2.31	81.28	81.50		81.50	0.004506	0.33	6.95	56.60	0.30	0.33		
1	132	10Yr	2.83	81.28	81.52		81.53	0.004214	0.35	8.18	59.60	0.30	0.35		
1	132	100Yr	4.67	81.28	81.58		81.59	0.003905	0.38	12.45	77.18	0.30	0.37		0.04
1	98.5	5Yr	2.31	81.02	81.42		81.42	0.001592	0.33	8.82	55.25	0.20	0.26	0.14	0.28
1	98.5	10Yr	2.83	81.02	81.43		81.44	0.001730	0.36	9.86	55.99	0.21	0.29	0.16	0.31
1	98.5	100Yr	4.67	81.02	81.49		81.50	0.002138	0.45	12.90	58.12	0.24	0.36	0.24	0.40
1	78.7	5Yr	2.31	81.01	81.38		81.38	0.002119	0.36	8.82	65.89	0.23	0.26	0.15	0.27
1	78.7	10Yr	2.83	81.01	81.40		81.40	0.002273	0.39	9.88	66.86	0.24	0.29	0.18	0.30
1	78.7	100Yr	4.67	81.01	81.44		81.45	0.002754	0.47	12.92	69.00	0.27	0.36	0.25	0.38
1	64.9	5Yr	2.31	80.99	81.27	81.27	81.31	0.029819	1.15	3.31	44.35	0.83	0.70		0.54
1	64.9	10Yr	2.83	80.99	81.28	81.28	81.32	0.029343	1.19	3.88	46.26	0.83	0.73		0.59
1	64.9	100Yr	4.67	80.99	81.33		81.36	0.023358	1.19	6.00	50.52	0.76	0.78		0.69
1	53.6	5Yr	2.31	80.88	81.18		81.19	0.003492	0.47	6.90	53.98	0.30	0.33	0.13	0.28
1	53.6	10Yr	2.83	80.88	81.21		81.21	0.003314	0.48	8.22	58.50	0.30	0.34	0.15	0.29
1	53.6	100Yr	4.67	80.88	81.28		81.28	0.002838	0.52	12.68	69.26	0.28	0.37	0.22	0.33
1	44.3	5Yr	2.31	80.88	81.15		81.16	0.002929	0.41	7.04	44.62	0.27	0.33	0.26	0.30
1	44.3	10Yr	2.83	80.88	81.18		81.18	0.002861	0.44	8.14	46.40	0.27	0.35	0.28	0.32
1	44.3	100Yr	4.67	80.88	81.25		81.26	0.003228	0.54	12.22	68.32	0.30	0.38	0.36	0.32
1	36.8	5Yr	2.31	80.80	81.13		81.14	0.002984	0.43	6.87	43.19	0.27	0.34	0.22	0.35
1	36.8	10Yr	2.83	80.80	81.16		81.16	0.002930	0.45	7.97	45.80	0.28	0.35	0.24	0.37
1	36.8	100Yr	4.67	80.80	81.22		81.23	0.004136	0.62	11.47	67.50	0.34	0.41	0.33	0.40
1	29.6	5Yr	2.31	80.80	81.12		81.12	0.001512	0.31	9.57	59.89	0.20	0.24	0.14	0.25
1	29.6	10Yr	2.83	80.80	81.14		81.15	0.001462	0.32	11.13	62.52	0.20	0.25	0.15	0.26
1	29.6	100Yr	4.67	80.80	81.20		81.21	0.001651	0.39	15.10	68.77	0.22	0.31	0.20	0.32

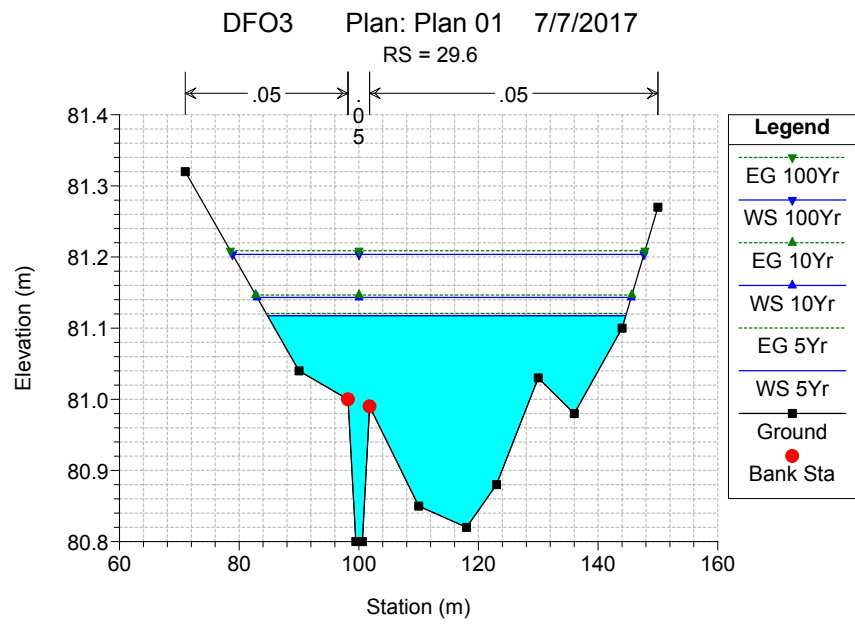
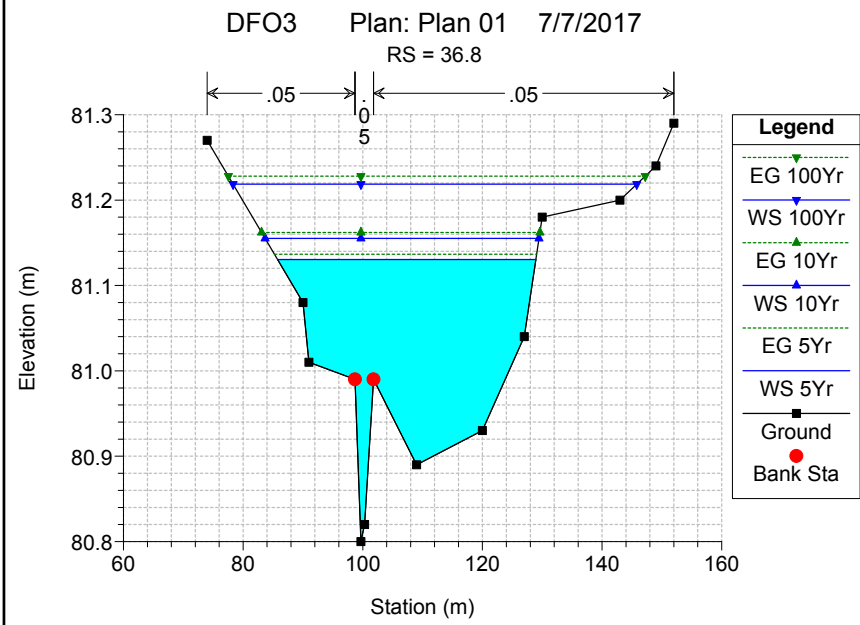
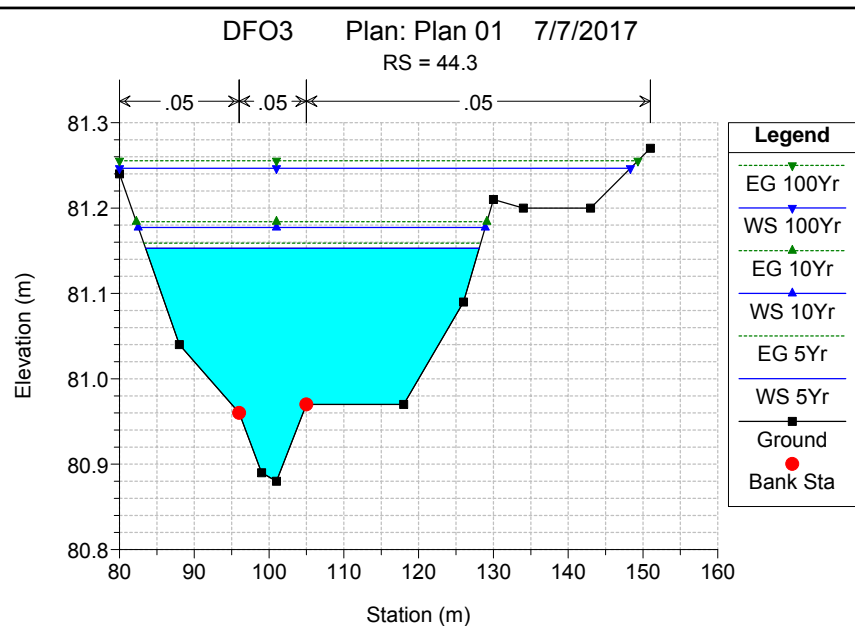
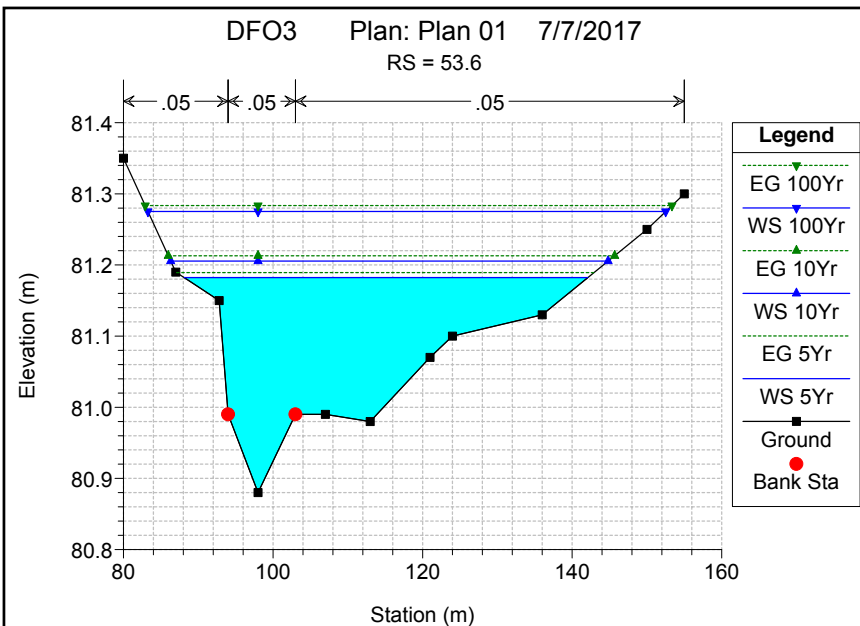
HEC-RAS Plan: Plan 01 River: Main Ditch Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Vel Total (m/s)	Vel Left (m/s)	Vel Right (m/s)
1	17.9	5Yr	2.31	80.77	81.10		81.10	0.001672	0.33	9.32	58.93	0.21	0.25	0.15	0.25
1	17.9	10Yr	2.83	80.77	81.13		81.13	0.001603	0.34	10.87	61.99	0.21	0.26	0.16	0.26
1	17.9	100Yr	4.67	80.77	81.18		81.19	0.001855	0.41	14.68	68.91	0.23	0.32	0.21	0.33
1	1.5	5Yr	2.31	80.73	81.06	80.95	81.07	0.002904	0.48	7.50	54.48	0.28	0.31	0.25	0.29
1	1.5	10Yr	2.83	80.73	81.09	80.97	81.09	0.002901	0.51	9.11	62.74	0.28	0.31	0.27	0.29
1	1.5	100Yr	4.67	80.73	81.14	81.01	81.15	0.002900	0.56	12.65	65.92	0.29	0.37	0.30	0.36



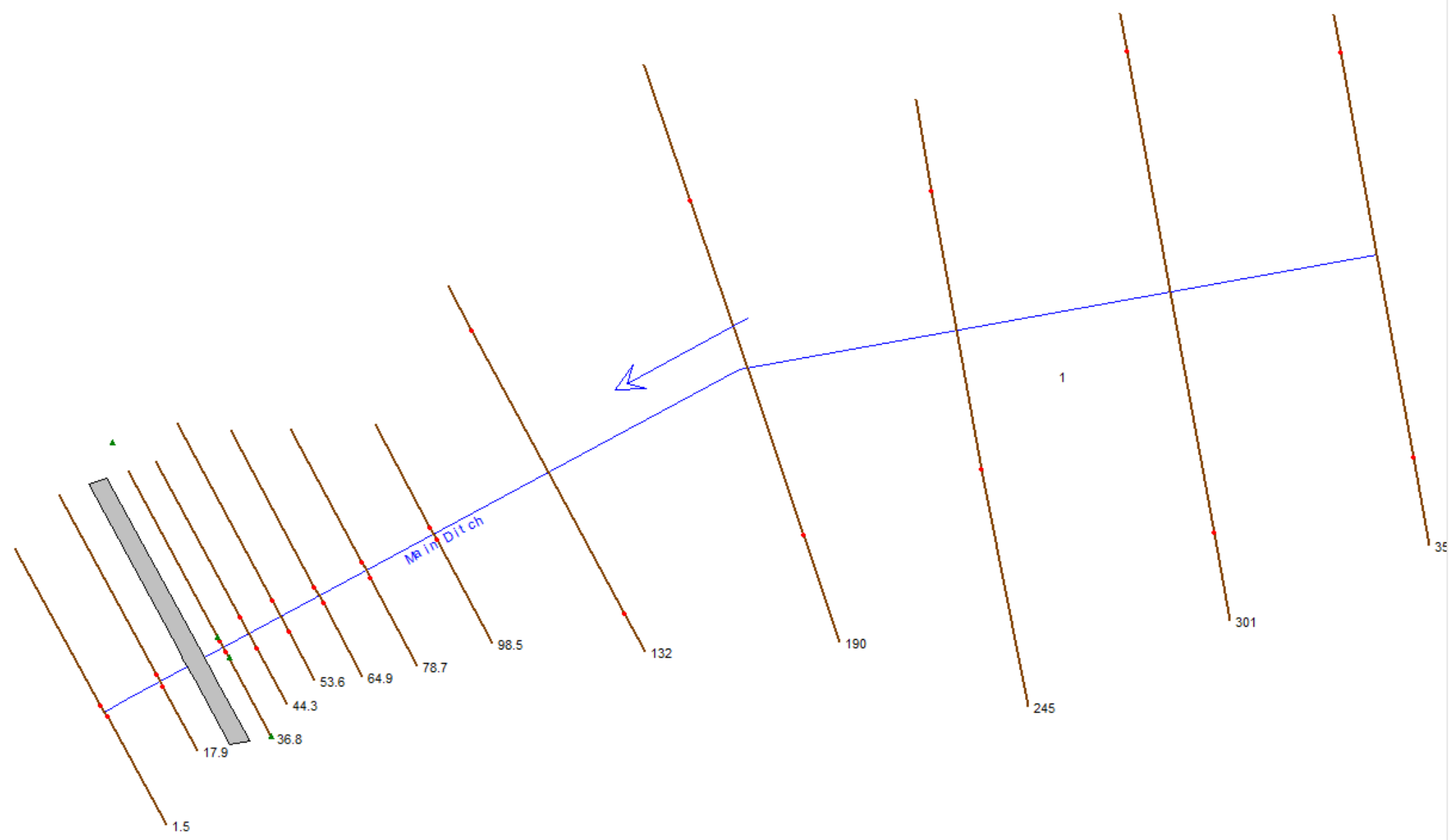












HEC-RAS Plan: Plan 01 River: Main Ditch Reach: 1

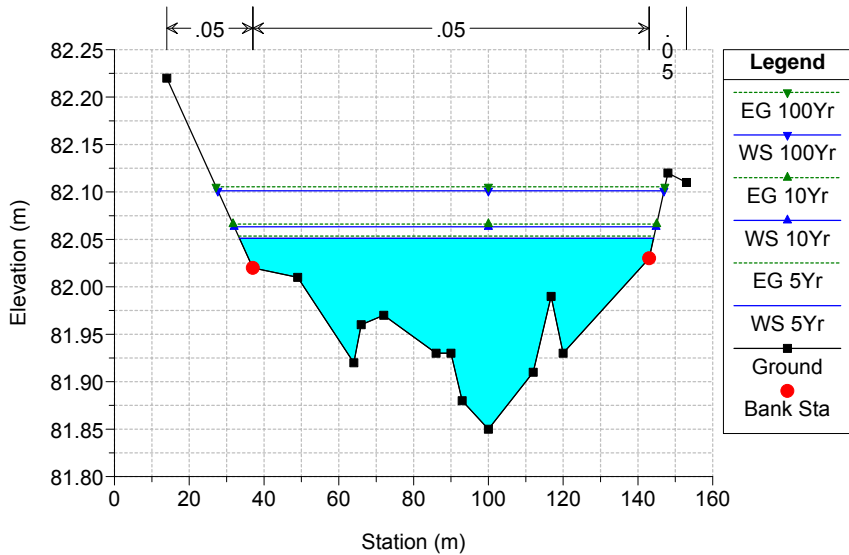
Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Vel Total (m/s)	Vel Left (m/s)	Vel Right (m/s)
1	355	5Yr	2.27	81.85	82.05		82.05	0.002491	0.21	10.64	110.76	0.22	0.21	0.06	0.05
1	355	10Yr	2.83	81.85	82.06		82.07	0.002612	0.24	12.00	112.83	0.23	0.24	0.08	0.07
1	355	100Yr	4.67	81.85	82.10		82.11	0.002636	0.29	16.42	119.31	0.24	0.28	0.12	0.11
1	301	5Yr	2.27	81.74	81.89		81.89	0.003707	0.23	9.82	118.52	0.26	0.23		
1	301	10Yr	2.83	81.74	81.90		81.90	0.003568	0.25	11.38	120.25	0.26	0.25		
1	301	100Yr	4.67	81.74	81.94		81.94	0.003674	0.30	15.47	124.64	0.27	0.30		
1	245	5Yr	2.27	81.54	81.72		81.73	0.002455	0.25	9.45	86.47	0.22	0.24	0.10	0.08
1	245	10Yr	2.83	81.54	81.74		81.74	0.002416	0.27	10.95	89.32	0.23	0.26	0.11	0.11
1	245	100Yr	4.67	81.54	81.86		81.86	0.000682	0.22	24.60	140.89	0.13	0.19	0.09	0.10
1	190	5Yr	2.27	81.42	81.63		81.63	0.001300	0.19	12.15	93.73	0.16	0.19	0.06	
1	190	10Yr	2.83	81.42	81.65		81.66	0.001110	0.20	14.65	102.06	0.16	0.19	0.06	0.03
1	190	100Yr	4.67	81.42	81.85		81.85	0.000159	0.13	41.29	157.00	0.07	0.11	0.07	0.07
1	132	5Yr	2.27	81.28	81.51		81.51	0.003533	0.30	7.48	57.91	0.27	0.30		
1	132	10Yr	2.83	81.28	81.57		81.58	0.001654	0.24	11.83	74.98	0.19	0.24		0.01
1	132	100Yr	4.67	81.28	81.84		81.84	0.000139	0.13	38.05	107.00	0.06	0.12	0.07	0.08
1	98.5	5Yr	2.27	81.02	81.46		81.47	0.000701	0.24	11.57	57.20	0.14	0.20	0.12	0.21
1	98.5	10Yr	2.83	81.02	81.55		81.55	0.000364	0.21	16.84	64.00	0.10	0.17	0.11	0.19
1	98.5	100Yr	4.67	81.02	81.84		81.84	0.000099	0.15	34.89	64.00	0.06	0.13	0.12	0.14
1	78.7	5Yr	2.27	81.01	81.45		81.45	0.000525	0.21	13.85	69.00	0.12	0.16	0.12	0.17
1	78.7	10Yr	2.83	81.01	81.55		81.55	0.000237	0.17	20.36	69.00	0.08	0.14	0.11	0.15
1	78.7	100Yr	4.67	81.01	81.83		81.83	0.000070	0.13	40.08	69.00	0.05	0.12	0.11	0.12
1	64.9	5Yr	2.27	80.99	81.45		81.45	0.000567	0.24	12.82	68.96	0.13	0.18	0.06	0.18
1	64.9	10Yr	2.83	80.99	81.54		81.55	0.000245	0.18	19.90	72.00	0.09	0.14	0.08	0.15
1	64.9	100Yr	4.67	80.99	81.83		81.83	0.000069	0.13	40.66	72.00	0.05	0.11	0.09	0.12
1	53.6	5Yr	2.27	80.88	81.44		81.44	0.000083	0.12	25.23	75.00	0.05	0.09	0.07	0.09
1	53.6	10Yr	2.83	80.88	81.54		81.54	0.000055	0.11	32.66	75.00	0.04	0.09	0.07	0.08
1	53.6	100Yr	4.67	80.88	81.83		81.83	0.000029	0.10	54.31	75.00	0.03	0.09	0.08	0.09
1	44.3	5Yr	2.27	80.88	81.44		81.44	0.000069	0.11	26.20	71.00	0.05	0.09	0.09	0.08
1	44.3	10Yr	2.83	80.88	81.54		81.54	0.000049	0.10	33.25	71.00	0.04	0.08	0.08	0.08
1	44.3	100Yr	4.67	80.88	81.83		81.83	0.000028	0.10	53.76	71.00	0.03	0.09	0.09	0.08
1	36.8	5Yr	2.27	80.80	81.41	81.18	81.44	0.004346	0.85	2.83	78.00	0.38	0.80	0.73	0.74
1	36.8	10Yr	2.83	80.80	81.50	81.22	81.54	0.003602	0.87	3.42	78.00	0.35	0.83	0.77	0.78
1	36.8	100Yr	4.67	80.80	81.78	81.33	81.83	0.002599	0.95	5.11	78.00	0.32	0.91	0.87	0.88
1	29.5		Inl Struct												
1	17.9	5Yr	2.27	80.77	81.10		81.10	0.001672	0.32	9.22	58.74	0.21	0.25	0.15	0.25
1	17.9	10Yr	2.83	80.77	81.13		81.13	0.001603	0.34	10.87	61.99	0.21	0.26	0.16	0.26

HEC-RAS Plan: Plan 01 River: Main Ditch Reach: 1 (Continued)

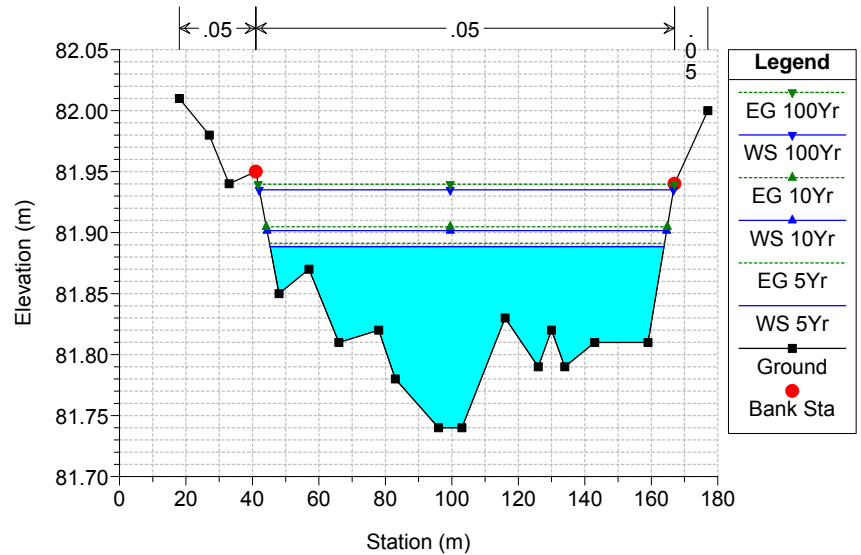
Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Vel Total (m/s)	Vel Left (m/s)	Vel Right (m/s)
1	17.9	100Yr	4.67	80.77	81.18		81.19	0.001854	0.41	14.68	68.91	0.23	0.32	0.21	0.33
1	1.5	5Yr	2.27	80.73	81.06	80.95	81.07	0.002904	0.48	7.41	52.91	0.28	0.31	0.25	0.29
1	1.5	10Yr	2.83	80.73	81.09	80.97	81.09	0.002901	0.51	9.11	62.74	0.28	0.31	0.27	0.29
1	1.5	100Yr	4.67	80.73	81.14	81.01	81.15	0.002900	0.56	12.65	65.92	0.29	0.37	0.30	0.36



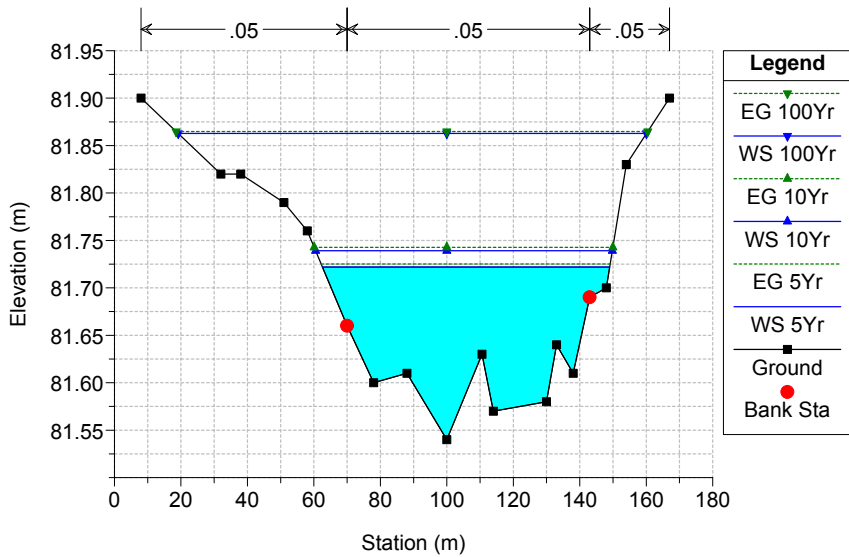
DFO3-PR-AKK Plan: Plan 01 7/7/2017  
RS = 355 LIDAR



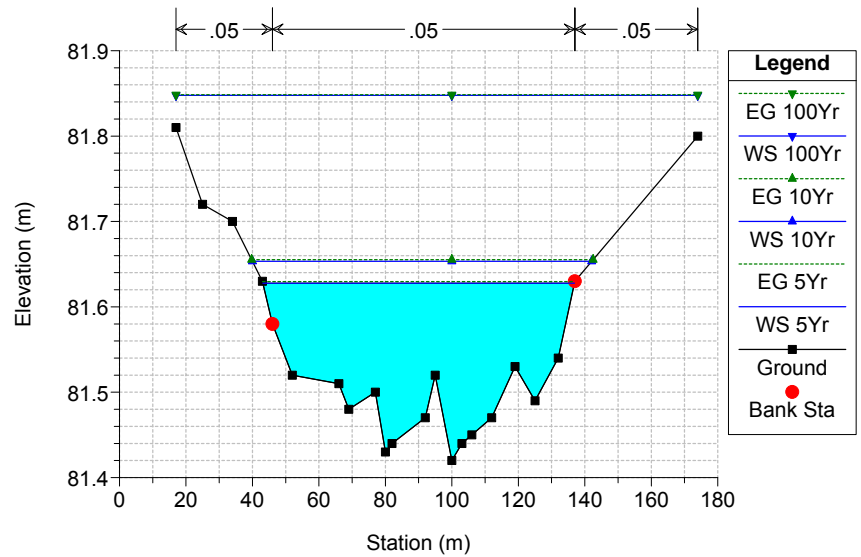
DFO3-PR-AKK Plan: Plan 01 7/7/2017  
RS = 301 LIDAR



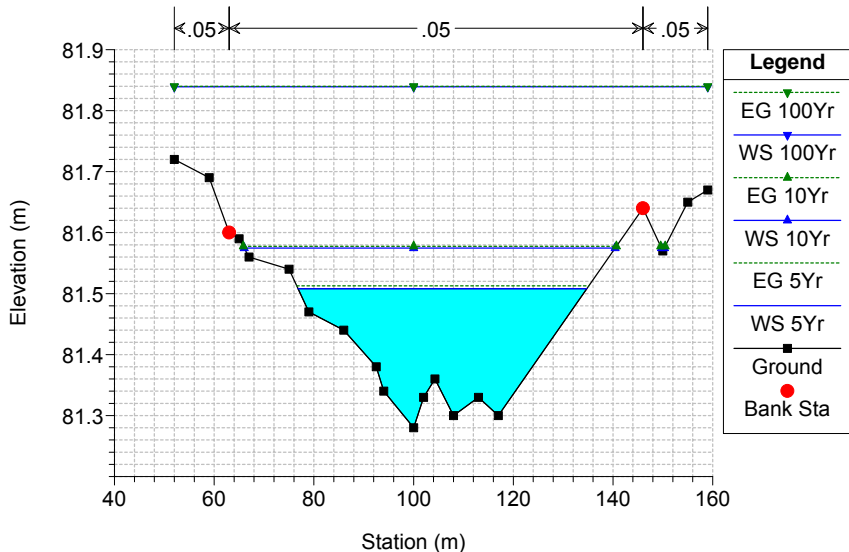
DFO3-PR-AKK Plan: Plan 01 7/7/2017  
RS = 245 LIDAR



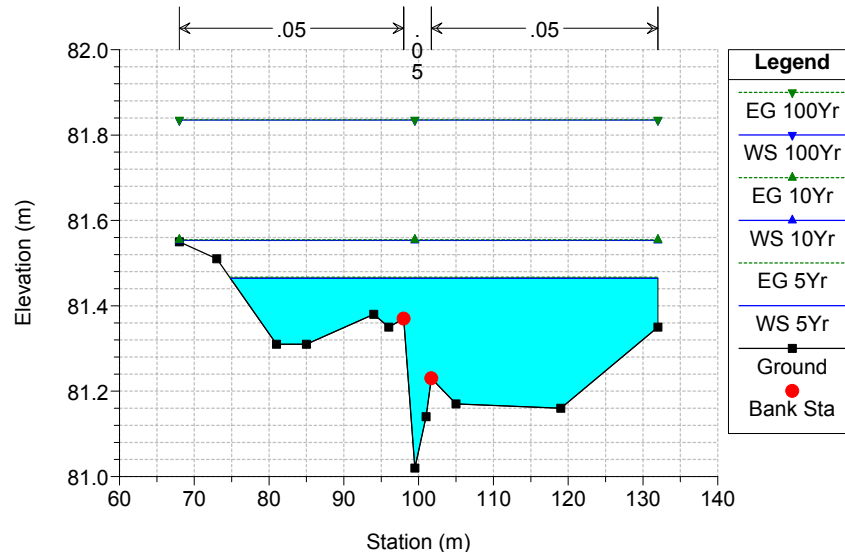
DFO3-PR-AKK Plan: Plan 01 7/7/2017  
RS = 190 LIDAR



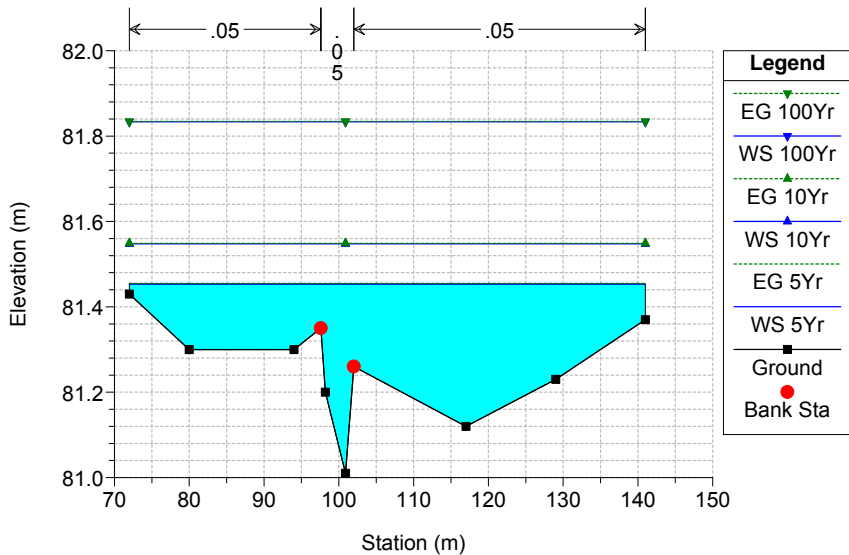
DFO3-PR-AKK Plan: Plan 01 7/7/2017  
RS = 132 LIDAR



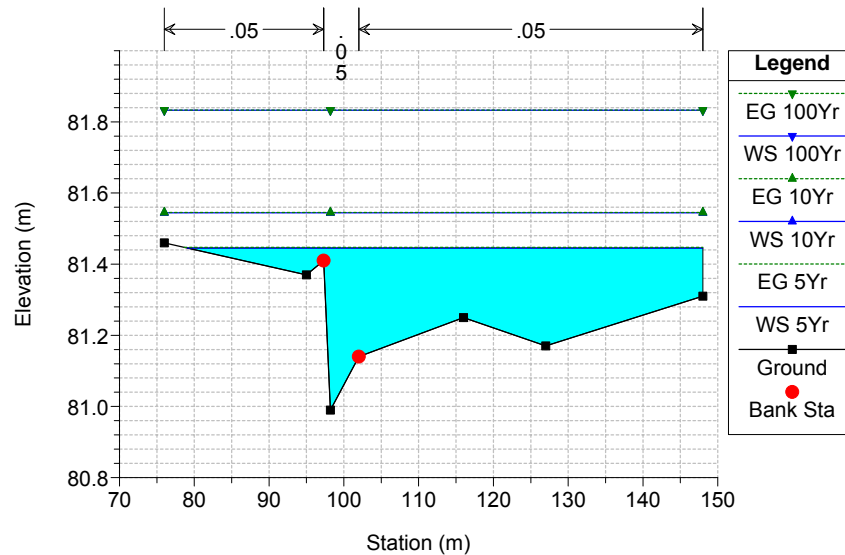
DFO3-PR-AKK Plan: Plan 01 7/7/2017  
RS = 98.5



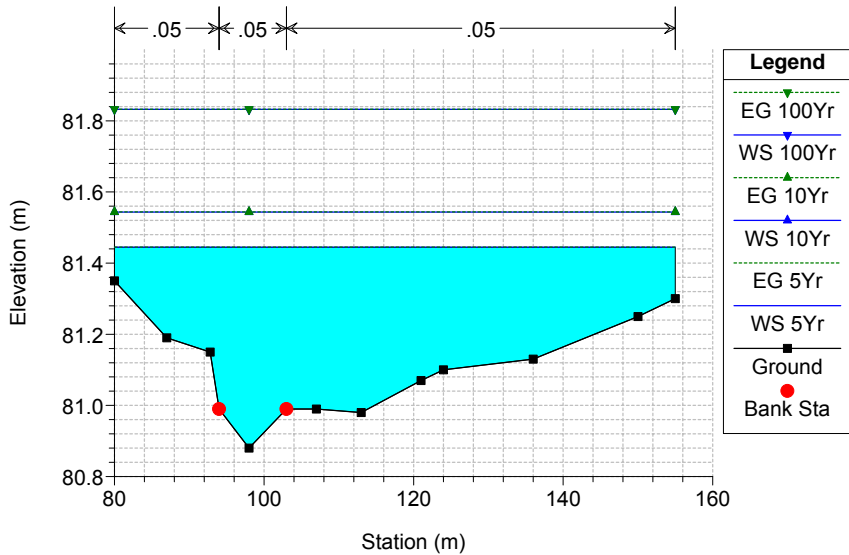
DFO3-PR-AKK Plan: Plan 01 7/7/2017  
RS = 78.7



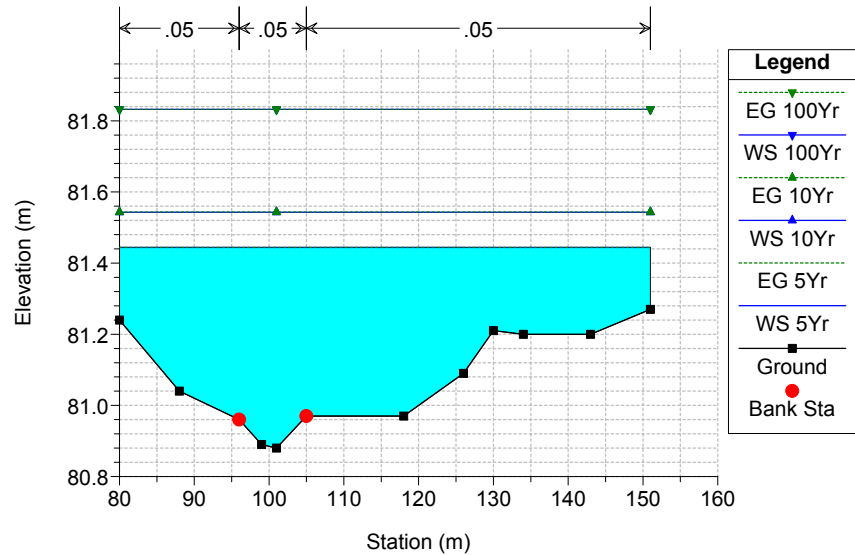
DFO3-PR-AKK Plan: Plan 01 7/7/2017  
RS = 64.9



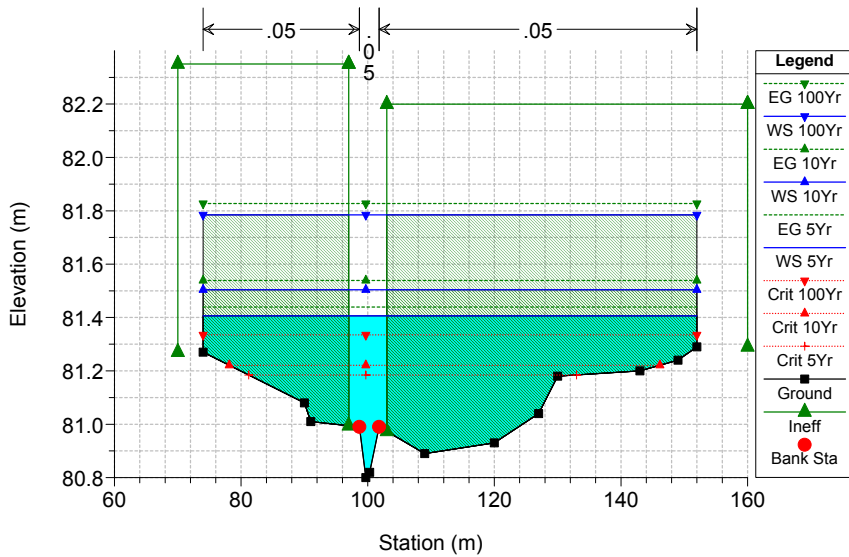
DFO3-PR-AKK Plan: Plan 01 7/7/2017  
RS = 53.6



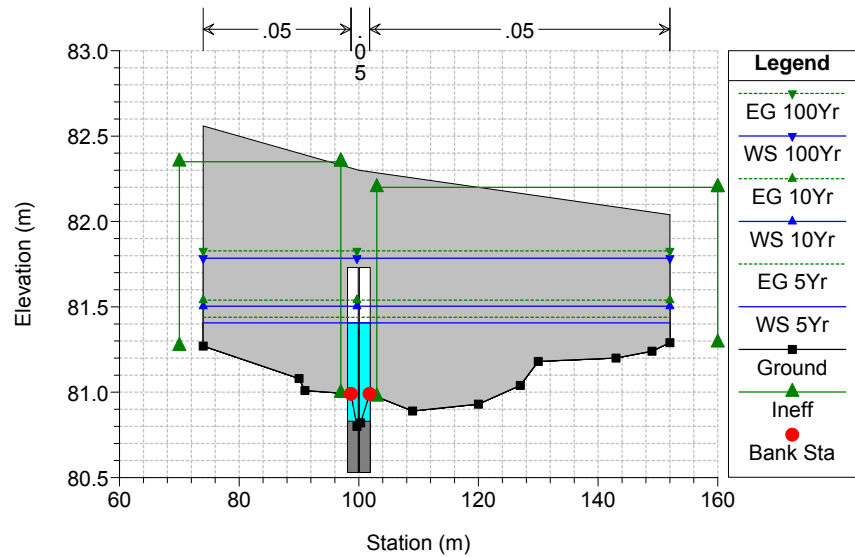
DFO3-PR-AKK Plan: Plan 01 7/7/2017  
RS = 44.3



DFO3-PR-AKK Plan: Plan 01 7/7/2017  
RS = 36.8



DFO3-PR-AKK Plan: Plan 01 7/7/2017  
RS = 29.5 IS







# DFO4 – HYDRAULIC MODELING

- UNDER GROUND AND ABOVE GROUND UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON THE DRAWINGS AND WHERE SHOWN, THE ACCURACY OF POSITION IS NOT GUARANTEED. THE CONTRACTOR SHALL INFORM THEMSELVES OF THE EXACT LOCATION OF ALL UTILITY PLANTS PRIOR TO STARTING WORK.
- SEE DRAWING "CIVIL ACCESS ROAD - EROSION AND SEDIMENT CONTROL AND OTHER SITE INFORMATION."
- SEE DRAWING "CIVIL ACCESS ROAD - EROSION AND SEDIMENT CONTROL AND OTHER SITE INFORMATION."
- TOPOGRAPHICAL SURVEY COMPLETED BY McINTOSH PERRY CONSULTING ENGINEERS, DATED 2015. (UTM ZONE 18 NAD83 (CRSR) 1997.0)
- SEE DRAWING "CIVIL ACCESS ROAD - EROSION AND SEDIMENT CONTROL AND DETAILS."
- ACCESS ROAD ALIGNMENTS MAY REQUIRE FIELD MODIFICATIONS TO ACCOMMODATE EXISTING CONDITIONS.
- CONTRACTOR TO ADHERE TO ALL CONSERVATION AUTHORITY PERMITS AND CONDITIONS OF APPROVAL.
- CONTRACTOR TO CONSTRUCT OVERBUILD (ADDITIONAL COMPACTED AREA) AT ALL BENDS AND CURVES IN ACCORDANCE WITH SIEMENS SPECIFICATIONS "GENERAL SITE REQUIREMENTS, AMHERST ISLAND, EQUIPMENT ONLY AM" REV. 6.31, DATED 2016-09-23.

Legend

- SILT FENCE
- - - - - LIMIT OF CONSTRUCTIBLE AREA
- EXISTING OVERLAND FLOW/DITCH DIRECTION
- PROPOSED DITCH FLOW
- - - - - 218.5 EXISTING GROUND CONTOURS (AS PER NOTE 4 ABOVE)
- - - - - EXISTING GROUND CONTOURS (FROM LIDAR MAPPING)
- 84.86 PROPOSED PAD ELEVATION

\*\*\*\*For PHCL and WindElectric Use Only\*\*\*\*

Review with no comments does not constitute approval of design details, calculations or methods. It is the responsibility of the consultant to ensure all information contained within the drawings are in full compliance with contractual obligations.

Reviewed - No comment

Reviewed - Incorporate comments and resubmit

Reviewed - Not accepted

Reviewed by: \_\_\_\_\_ Date (dd-mm-YYYY): \_\_\_\_\_

Project Manager - PHCL: \_\_\_\_\_ Date (dd-mm-YYYY): \_\_\_\_\_

Project Manager - WindElectric: \_\_\_\_\_ Date (dd-mm-YYYY): \_\_\_\_\_

Owner: \_\_\_\_\_

ISSUED FOR CRCA PERMITTING RCL MPG 17.06.22

ISSUED FOR CLIENT REVIEW RCL MPG 17.01.27

Revision By Appd. YY.MM.DD

File Name: C207\_133560100-Turbine S05-S20.DWG RCL/DM MPG RCL 15.12.03

Permit-Seal Dwn. Chkd. Dsgn. YY.MM.DD

Client/Project

AMHERST ISLAND WIND PROJECT

75MW WIND FARM

Amherst Island, Loyalist Township, Ontario

Title

ACCESS ROAD

TURBINE S05 AND S20

PLAN AND PROFILE

Project No. 133560100

Scale 1:1000H

1:100V

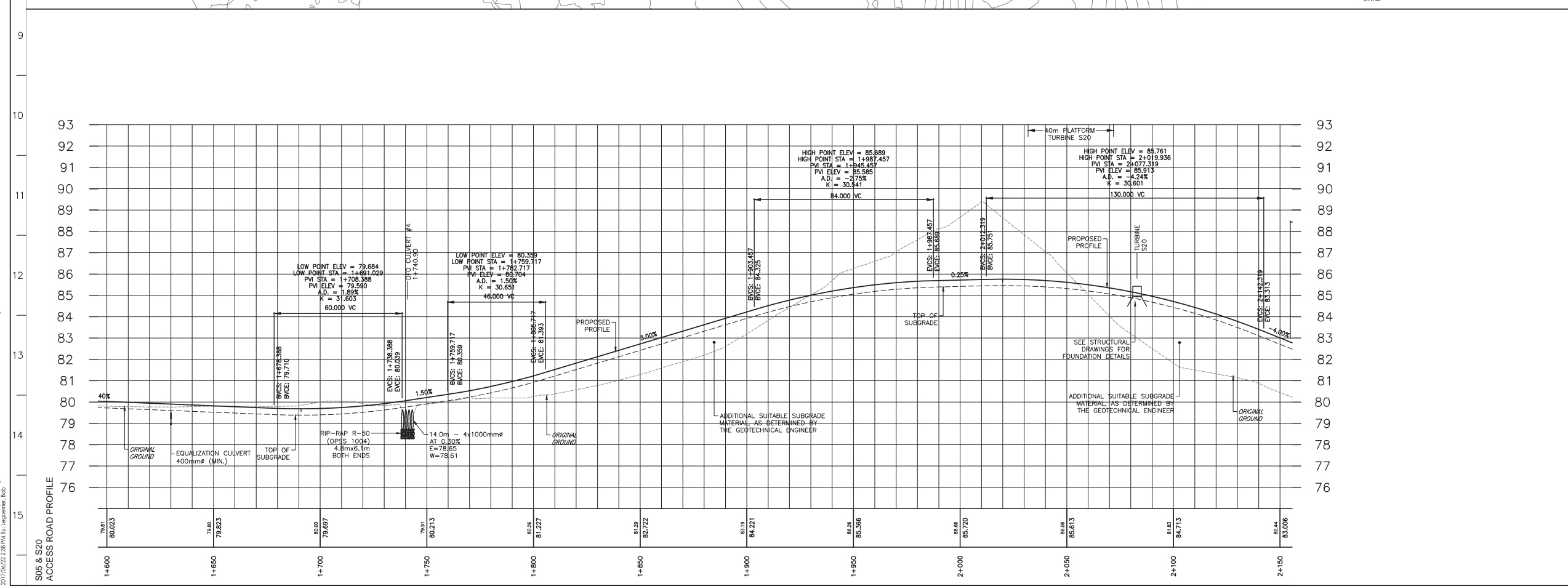
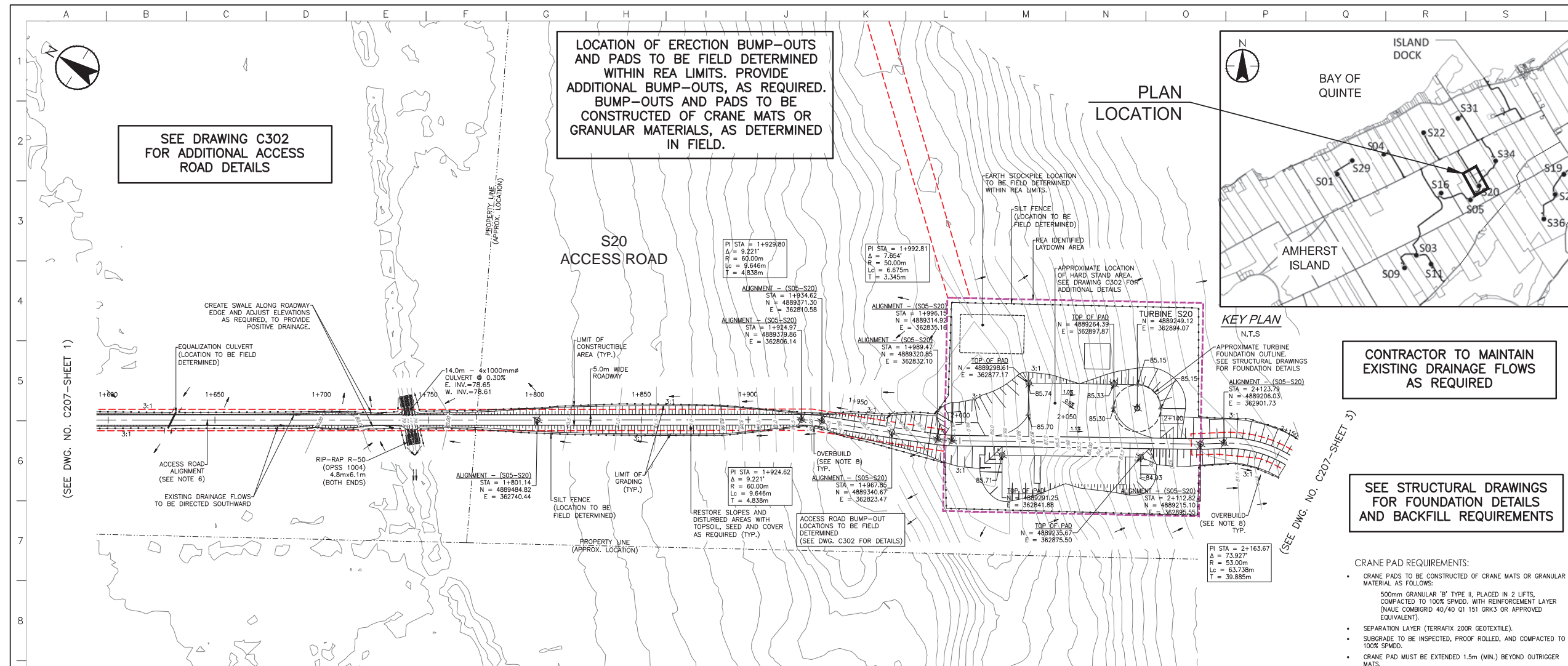
Drawing No. Sheet

Revision

C207

2 of 3

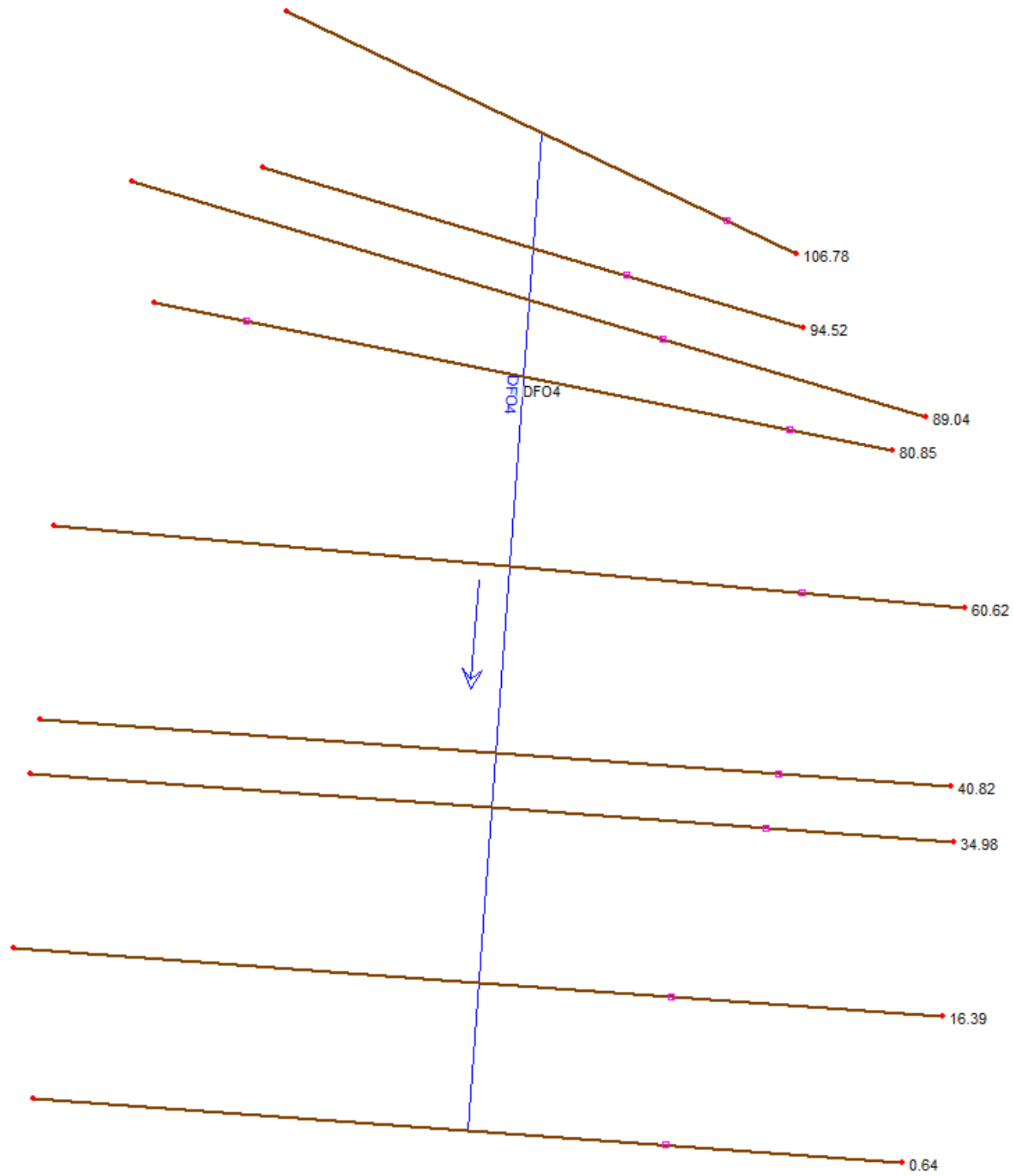
B



NOT FOR CONSTRUCTION

X:\0165702\c207\133560100\Drawings\10\_Lines\Drawings\10\_Lines\133560100-Turbine S05-S20.DWG  
 20/10/2022 2:23:10 PM by: [unclear]

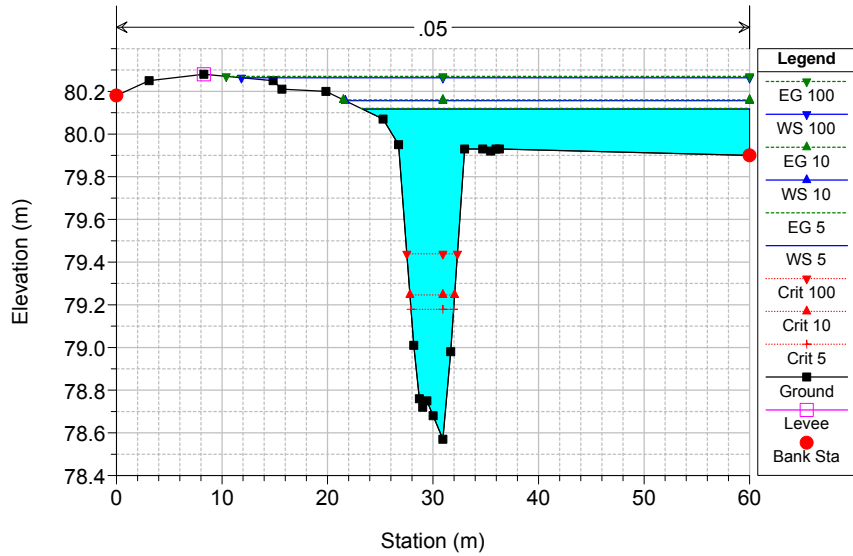




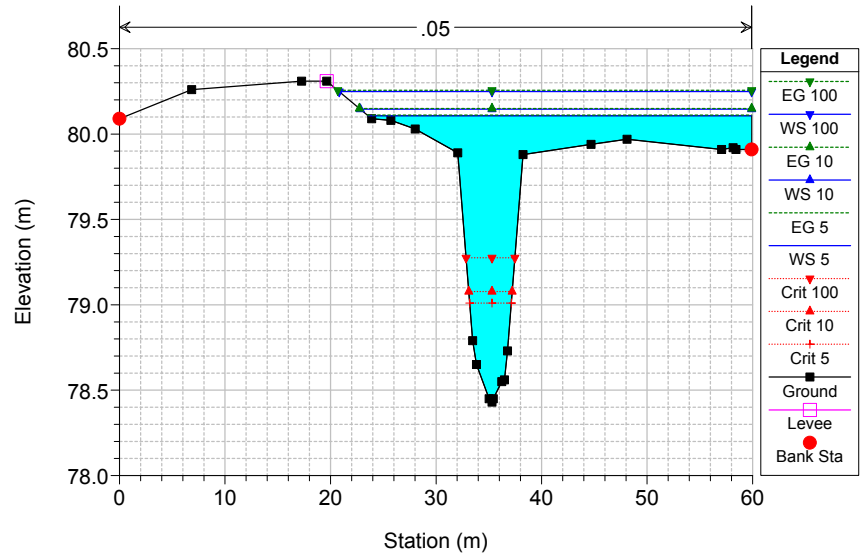
HEC-RAS Plan: Existing River: DFO4 Reach: DFO4

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Vel Total (m/s)	Vel Left (m/s)	Vel Right (m/s)
DFO4	106.78	5	3.16	78.57	80.12	79.18	80.12	0.000745	0.26	12.24	36.70	0.14	0.26		
DFO4	106.78	10	3.93	78.57	80.16	79.25	80.16	0.000837	0.29	13.71	38.33	0.15	0.29		
DFO4	106.78	100	6.57	78.57	80.26	79.44	80.27	0.001212	0.36	18.28	48.17	0.19	0.36		
DFO4	94.52	5	3.16	78.43	80.11	79.01	80.11	0.000786	0.26	12.02	36.36	0.15	0.26		
DFO4	94.52	10	3.93	78.43	80.15	79.08	80.15	0.000867	0.29	13.41	37.09	0.16	0.29		
DFO4	94.52	100	6.57	78.43	80.25	79.28	80.26	0.001105	0.38	17.34	39.09	0.18	0.38		
DFO4	89.04	5	3.16	78.87	80.10	79.35	80.11	0.001389	0.27	11.76	53.78	0.18	0.27		
DFO4	89.04	10	3.93	78.87	80.14	79.41	80.14	0.001278	0.28	13.82	54.58	0.18	0.28		
DFO4	89.04	100	6.57	78.87	80.24	79.59	80.25	0.001181	0.34	19.59	56.75	0.18	0.34		
DFO4	80.85	5	3.16	78.89	80.08	79.39	80.09	0.002208	0.38	8.22	31.02	0.24	0.38		
DFO4	80.85	10	3.93	78.89	80.12	79.44	80.13	0.002549	0.42	9.46	35.48	0.26	0.42		
DFO4	80.85	100	6.57	78.89	80.22	79.61	80.23	0.003088	0.43	15.30	63.15	0.28	0.43		
DFO4	60.62	5	3.16	78.77	80.04	79.30	80.05	0.001978	0.29	11.05	60.13	0.21	0.29		
DFO4	60.62	10	3.93	78.77	80.08	79.36	80.09	0.001734	0.29	13.39	63.48	0.20	0.29		
DFO4	60.62	100	6.57	78.77	80.19	79.53	80.19	0.001433	0.29	22.88	97.12	0.19	0.29		
DFO4	40.82	5	3.16	78.81	80.01	79.32	80.02	0.001222	0.25	12.62	58.39	0.17	0.25		
DFO4	40.82	10	3.93	78.81	80.05	79.38	80.06	0.001136	0.26	15.06	62.10	0.17	0.26		
DFO4	40.82	100	6.57	78.81	80.16	79.55	80.17	0.001041	0.29	22.39	72.38	0.17	0.29		
DFO4	34.98	5	3.16	78.78	80.01	79.29	80.01	0.001004	0.24	13.37	58.24	0.16	0.24		
DFO4	34.98	10	3.93	78.78	80.05	79.34	80.05	0.000961	0.25	15.84	62.09	0.16	0.25		
DFO4	34.98	100	6.57	78.78	80.16	79.52	80.16	0.000938	0.28	23.16	72.75	0.16	0.28		
DFO4	16.39	5	3.16	78.77	79.99	79.29	80.00	0.000535	0.19	16.30	59.59	0.12	0.19		
DFO4	16.39	10	3.93	78.77	80.04	79.36	80.04	0.000545	0.21	18.80	62.25	0.12	0.21		
DFO4	16.39	100	6.57	78.77	80.14	79.54	80.15	0.000591	0.25	25.85	67.67	0.13	0.25		
DFO4	0.64	5	3.16	78.75	79.98	79.24	79.99	0.000700	0.21	15.09	60.15	0.13	0.21		
DFO4	0.64	10	3.93	78.75	80.03	79.30	80.03	0.000700	0.22	17.64	64.11	0.14	0.22		
DFO4	0.64	100	6.57	78.75	80.13	79.48	80.14	0.000701	0.24	27.80	92.47	0.14	0.24		

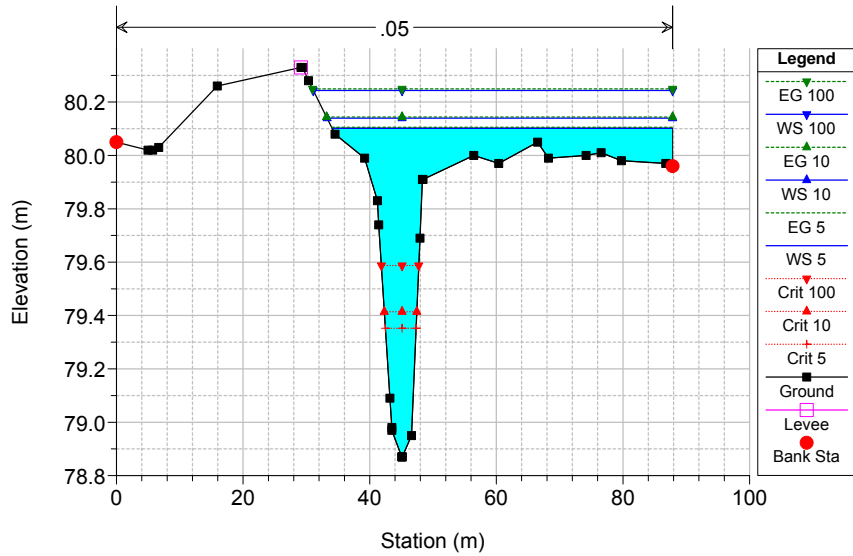
DFO\_4\_LIDAR Plan: Plan 02 6/14/2017  
RS = 106.78



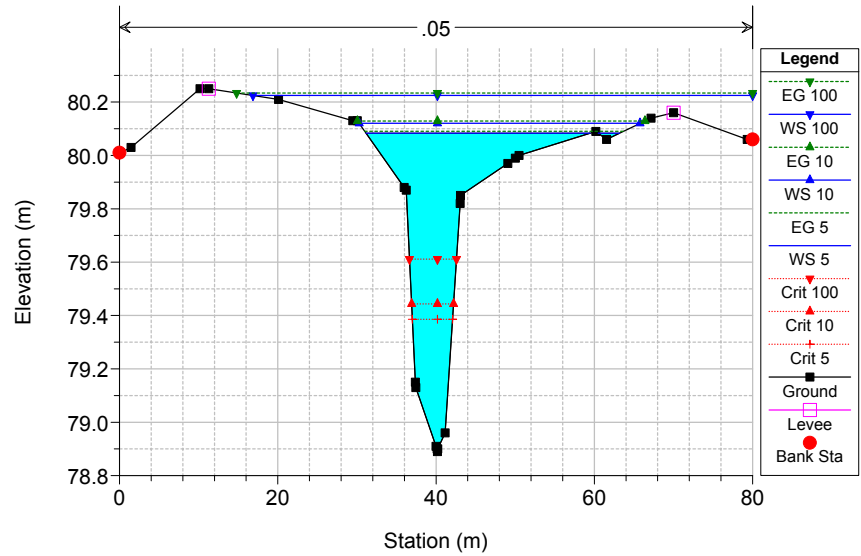
DFO\_4\_LIDAR Plan: Plan 02 6/14/2017  
RS = 94.52



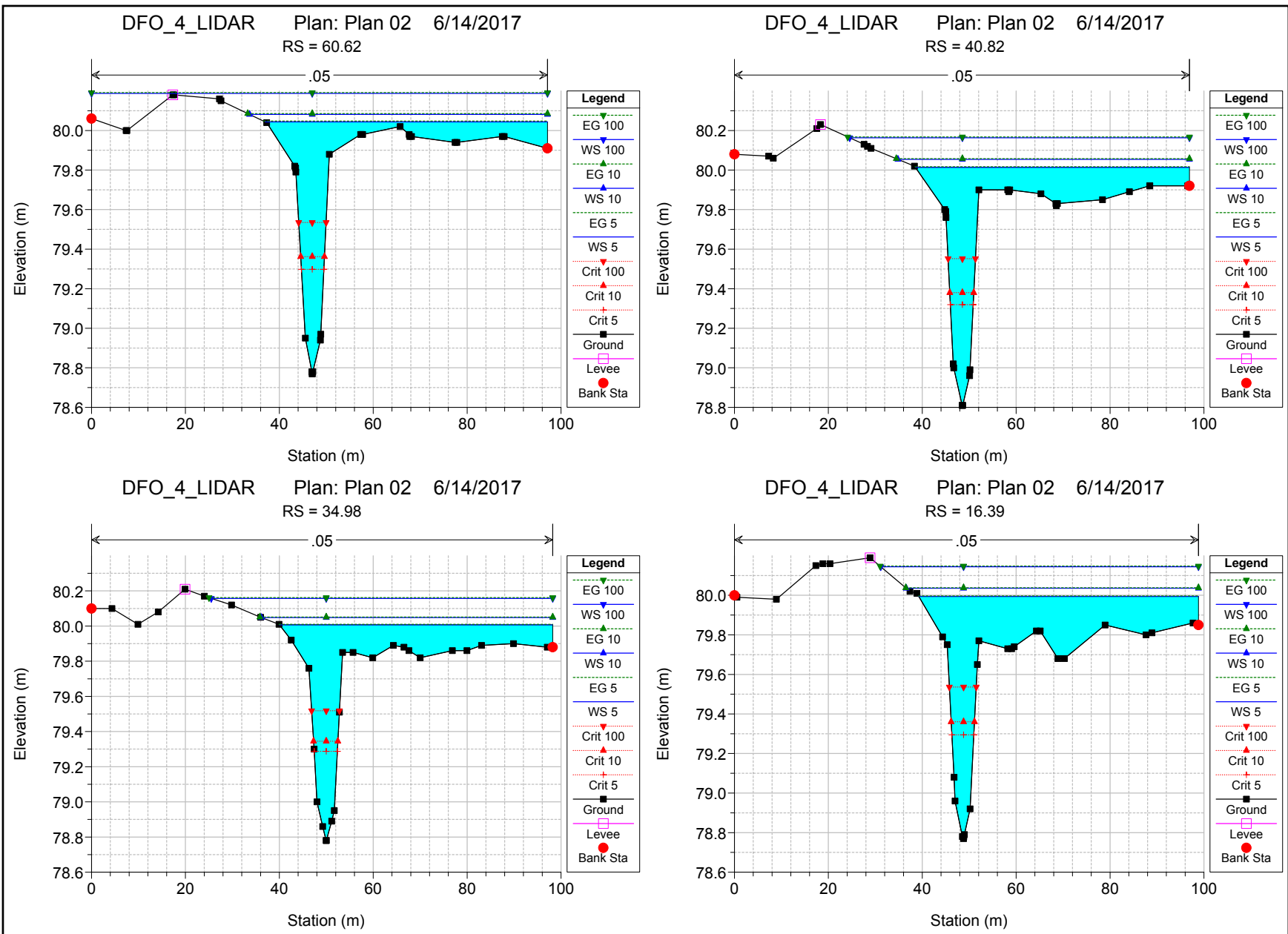
DFO\_4\_LIDAR Plan: Plan 02 6/14/2017  
RS = 89.04



DFO\_4\_LIDAR Plan: Plan 02 6/14/2017  
RS = 80.85

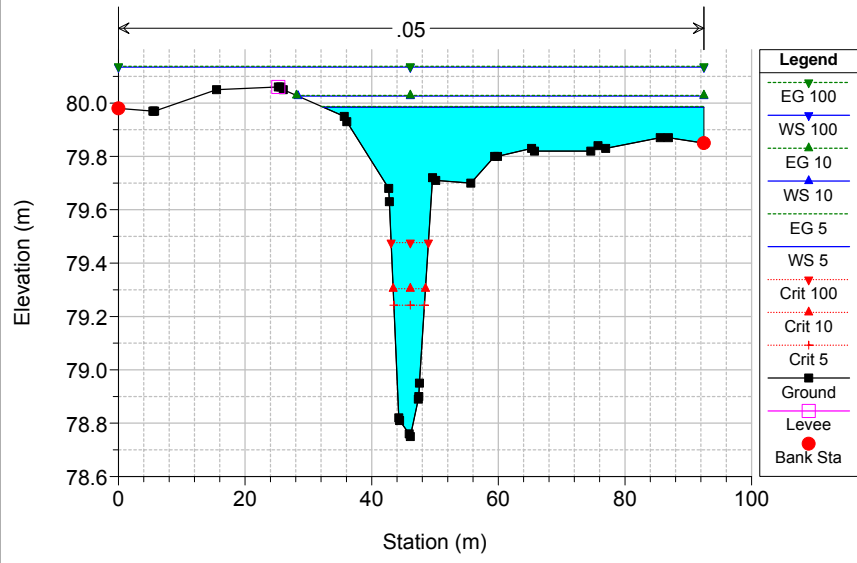


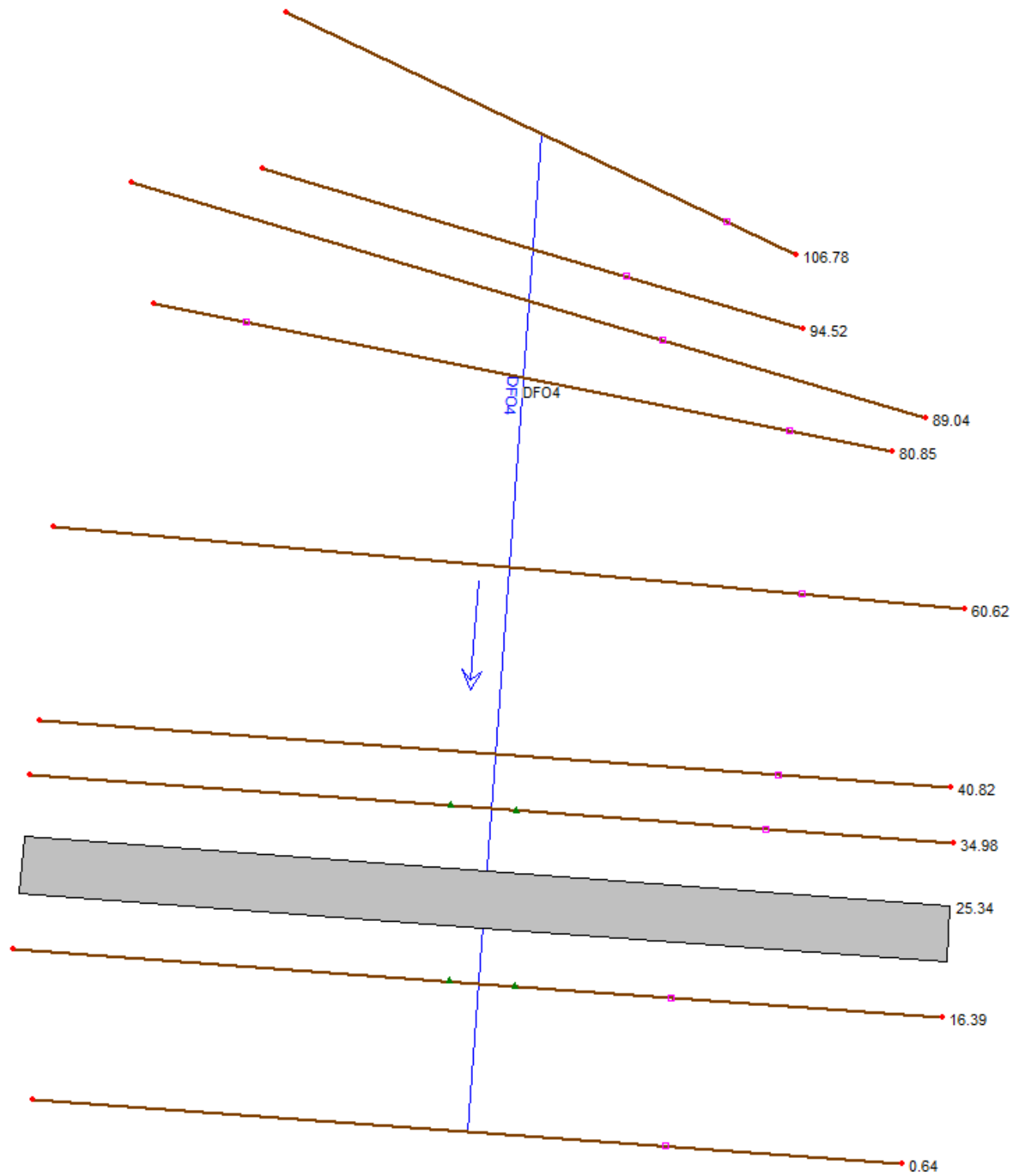




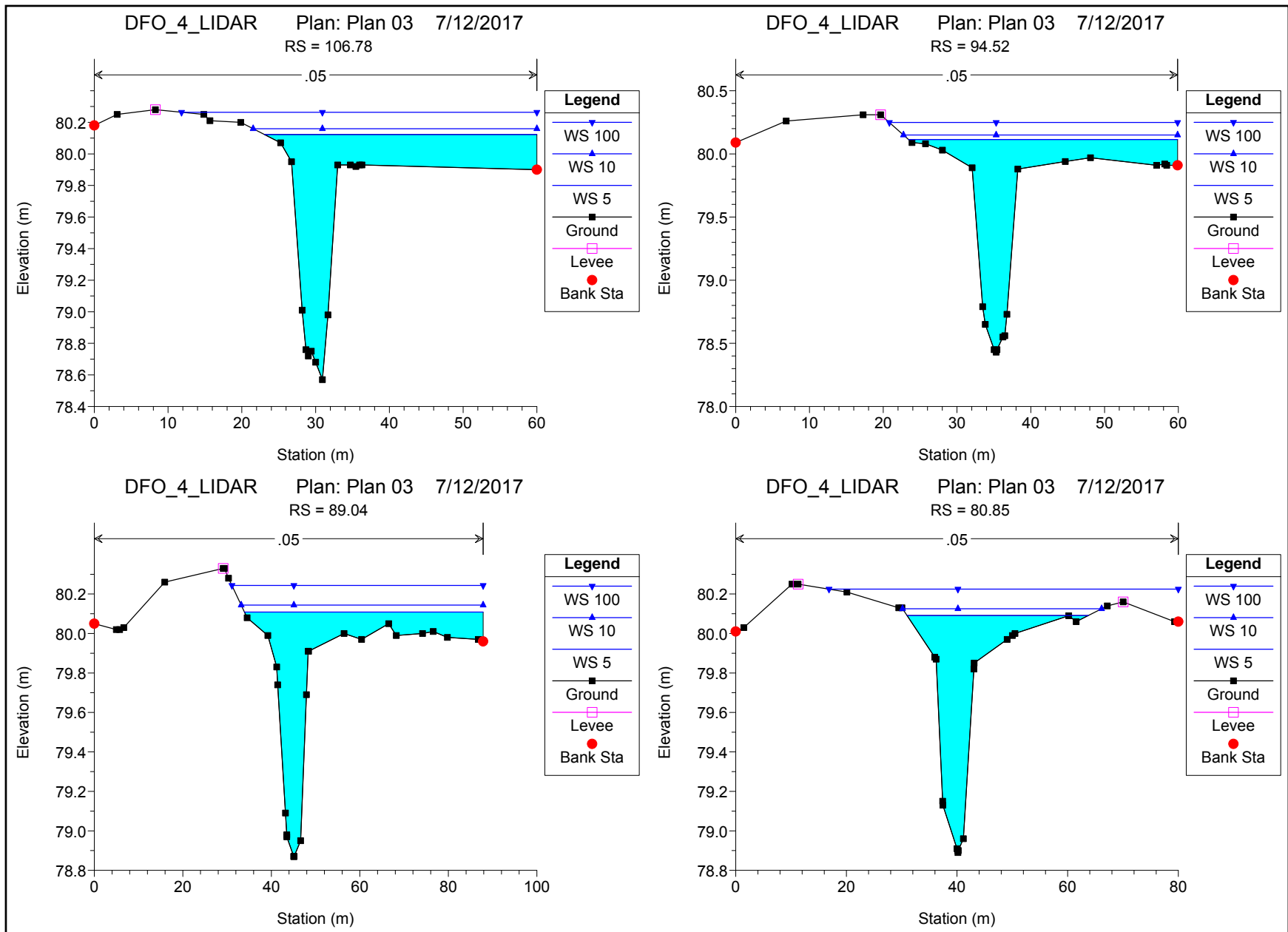
DFO\_4\_LIDAR Plan: Plan 02 6/14/2017

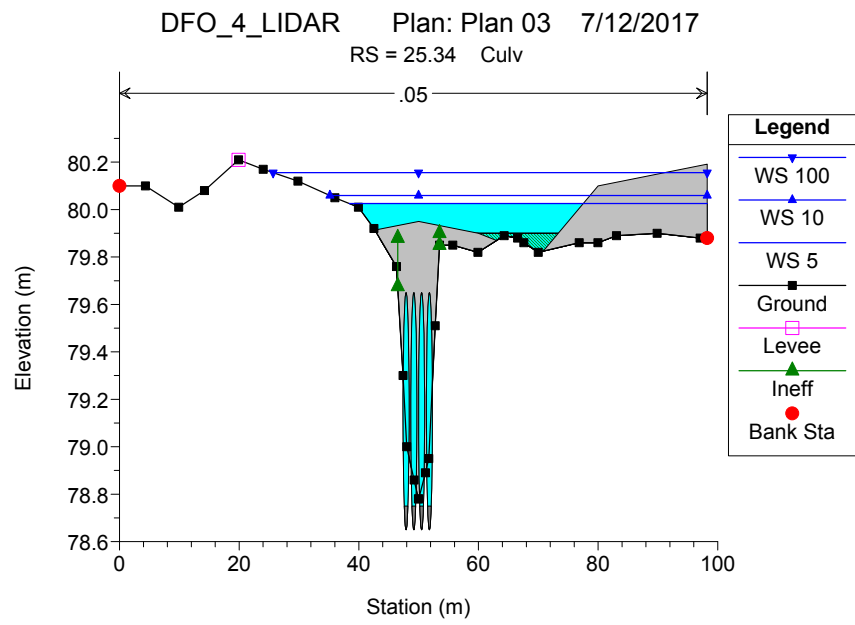
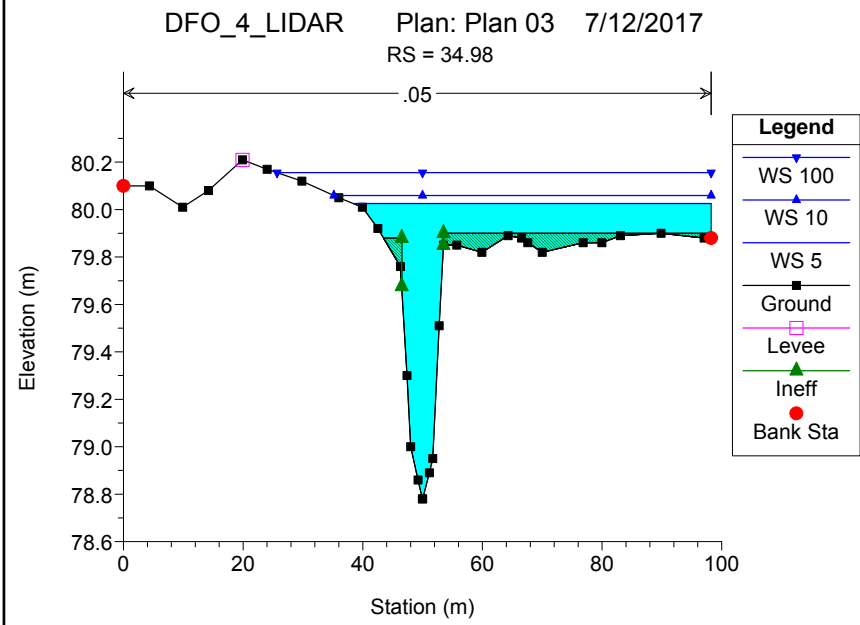
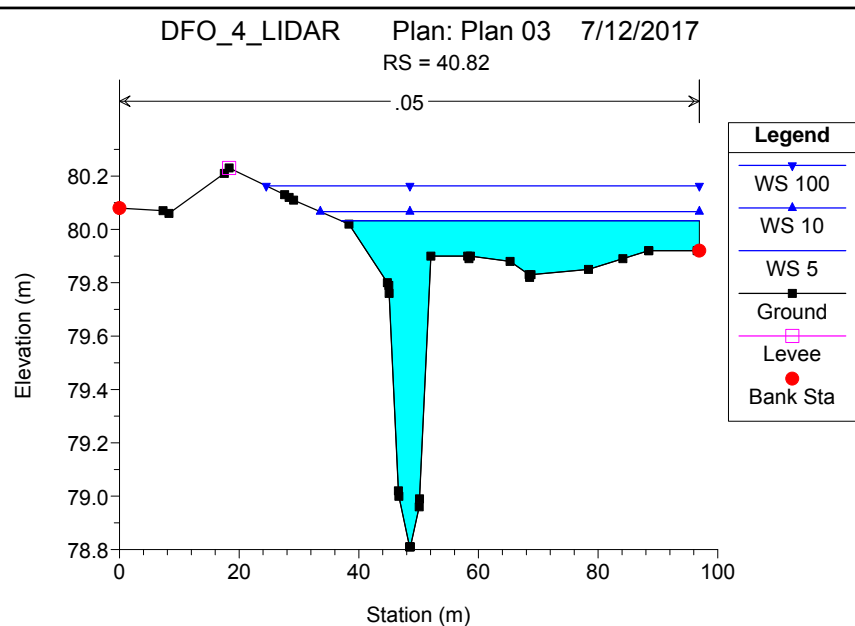
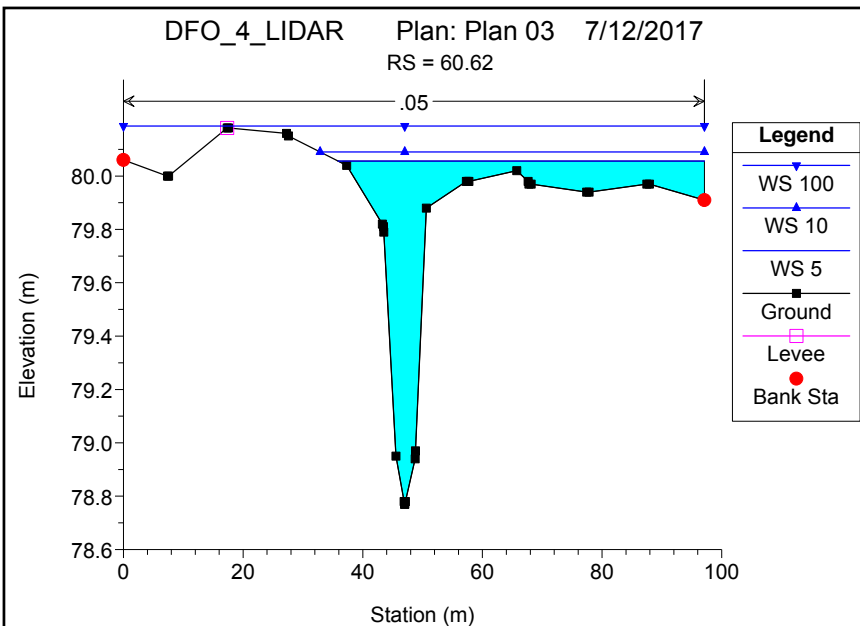
RS = 0.64





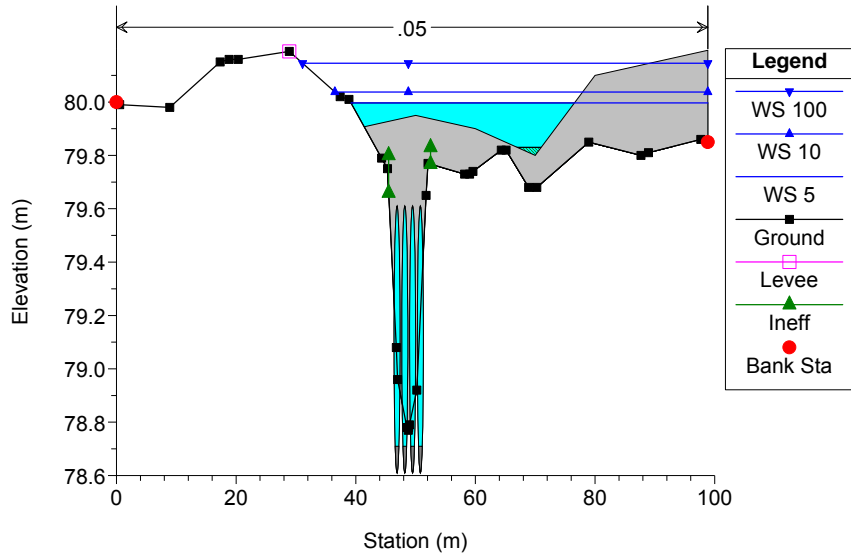






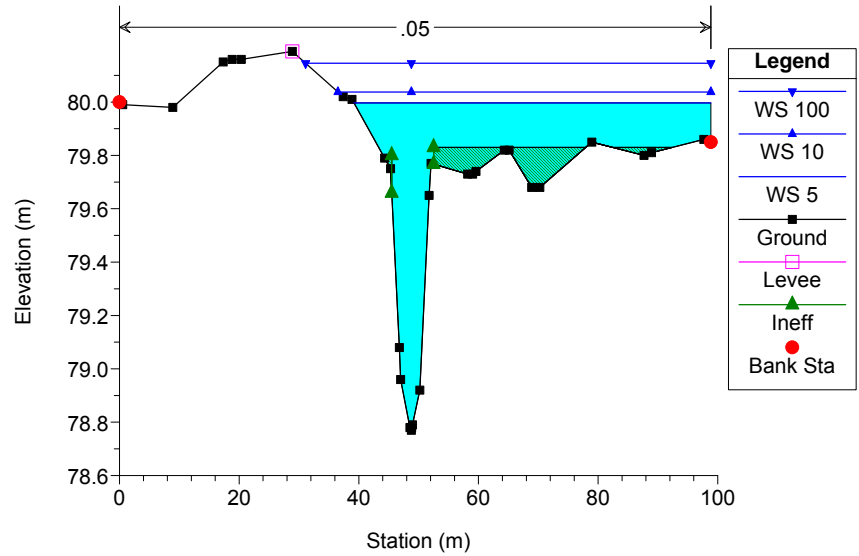
DFO\_4\_LIDAR Plan: Plan 03 7/12/2017

RS = 25.34 Culv



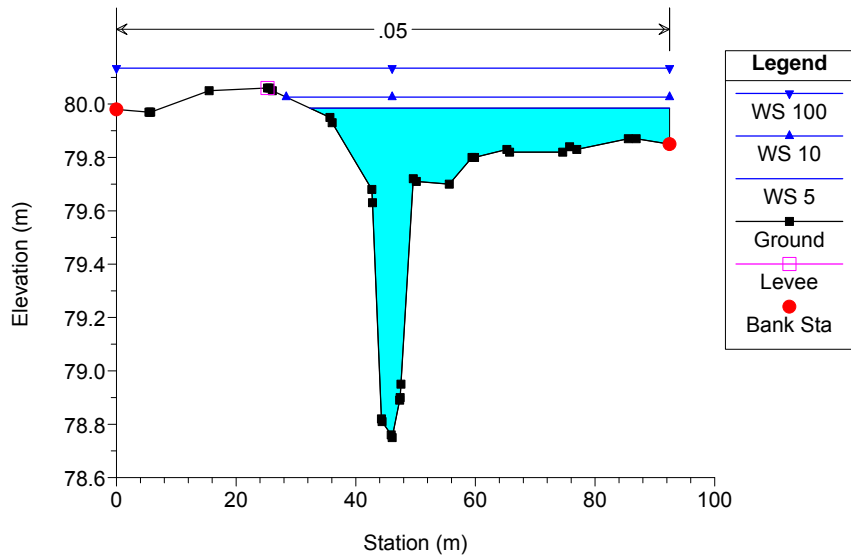
DFO\_4\_LIDAR Plan: Plan 03 7/12/2017

RS = 16.39



DFO\_4\_LIDAR Plan: Plan 03 7/12/2017

RS = 0.64





HEC-RAS Plan: Propo\_Box River: DFO4 Reach: DFO4

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl	Vel Total (m/s)	Vel Left (m/s)	Vel Right (m/s)
DFO4	106.78	5	3.16	78.57	80.12	79.18	80.13	0.000709	0.25	12.46	36.95	0.14	0.25		
DFO4	106.78	10	3.93	78.57	80.16	79.25	80.16	0.000814	0.28	13.84	38.47	0.15	0.28		
DFO4	106.78	100	6.57	78.57	80.26	79.44	80.27	0.001212	0.36	18.28	48.18	0.19	0.36		
DFO4	94.52	5	3.16	78.43	80.11	79.01	80.12	0.000741	0.26	12.25	36.49	0.14	0.26		
DFO4	94.52	10	3.93	78.43	80.15	79.08	80.15	0.000839	0.29	13.55	37.17	0.15	0.29		
DFO4	94.52	100	6.57	78.43	80.25	79.28	80.26	0.001105	0.38	17.34	39.09	0.18	0.38		
DFO4	89.04	5	3.16	78.87	80.11	79.35	80.11	0.001257	0.26	12.13	53.92	0.18	0.26		
DFO4	89.04	10	3.93	78.87	80.14	79.41	80.15	0.001214	0.28	14.05	54.66	0.18	0.28		
DFO4	89.04	100	6.57	78.87	80.24	79.59	80.25	0.001181	0.34	19.59	56.75	0.18	0.34		
DFO4	80.85	5	3.16	78.89	80.09	79.39	80.10	0.002142	0.37	8.48	32.77	0.23	0.37		
DFO4	80.85	10	3.93	78.89	80.13	79.44	80.13	0.002432	0.41	9.65	35.97	0.25	0.41		
DFO4	80.85	100	6.57	78.89	80.22	79.61	80.23	0.003087	0.43	15.31	63.16	0.28	0.43		
DFO4	60.62	5	3.16	78.77	80.06	79.30	80.06	0.001617	0.27	11.83	61.26	0.19	0.27		
DFO4	60.62	10	3.93	78.77	80.09	79.36	80.09	0.001537	0.28	13.95	64.26	0.19	0.28		
DFO4	60.62	100	6.57	78.77	80.19	79.54	80.19	0.001432	0.29	22.89	97.12	0.19	0.29		
DFO4	40.82	5	3.16	78.81	80.03	79.32	80.04	0.000952	0.23	13.73	59.85	0.15	0.23		
DFO4	40.82	10	3.93	78.81	80.07	79.38	80.07	0.000990	0.25	15.82	63.34	0.16	0.25		
DFO4	40.82	100	6.57	78.81	80.16	79.55	80.17	0.001042	0.29	22.39	72.38	0.17	0.29		
DFO4	34.98	5	3.16	78.78	80.03	79.29	80.03	0.001232	0.25	12.71	59.84	0.17	0.25		
DFO4	34.98	10	3.93	78.78	80.06	79.35	80.06	0.001233	0.27	14.79	63.07	0.18	0.27		
DFO4	34.98	100	6.57	78.78	80.16	79.52	80.16	0.001235	0.31	21.30	72.55	0.18	0.31		
DFO4	25.34		Culvert												
DFO4	16.39	5	3.16	78.77	80.00	79.30	80.00	0.000855	0.22	14.17	59.64	0.15	0.22		
DFO4	16.39	10	3.93	78.77	80.04	79.36	80.04	0.000817	0.24	16.66	62.33	0.15	0.24		
DFO4	16.39	100	6.57	78.77	80.15	79.54	80.15	0.000792	0.28	23.69	67.73	0.15	0.28		
DFO4	0.64	5	3.16	78.75	79.98	79.24	79.99	0.000700	0.21	15.09	60.15	0.13	0.21		
DFO4	0.64	10	3.93	78.75	80.03	79.30	80.03	0.000700	0.22	17.64	64.11	0.14	0.22		
DFO4	0.64	100	6.57	78.75	80.13	79.48	80.14	0.000701	0.24	27.81	92.47	0.14	0.24		