PMVogtleCOLPEm Resource

From: Joshi, Ravindra
Sent: Tuesday, August 11, 2009 7:56 AM
To: VogtleCOL Resource
Subject: FW: Hydrology supplemental response
Attachments: ND-09-1190_RAI Supp Resp.pdf

-----Original Message-----
From: Aughtman, Amy G. [mailto:AGAUGHTM@SOUTHERNCO.COM]
Sent: Wednesday, August 05, 2009 5:00 PM
To: Joshi, Ravindra
Subject: Hydrology supplemental response

<<ND-09-1190_RAI Supp Resp.pdf>> You may have already gotten this from Deborah Javorka (Dana is out this week) but wanted to send personally just in case.
Amy A.

The message is ready to be sent with the following file or link attachments:

ND-09-1190_RAI Supp Resp.pdf

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Hearing Identifier: Vogtle_COL_Public
Email Number: 182

Mail Envelope Properties (CEEA97CC21430049B821E684512F6E5ECA560B8138)

Subject: FW: Hydrology supplemental response
Sent Date: 8/11/2009 7:56:04 AM
Received Date: 8/11/2009 7:56:07 AM
From: Joshi, Ravindra

Created By: Ravindra.Joshi@nrc.gov

Recipients:
"VogtleCOL Resource" <VogtleCOL.Resource@nrc.gov>
Tracking Status: None

Post Office: HQCLSTR01.nrc.gov

Files	**Size**	**Date & Time**
MESSAGE	694	8/11/2009 7:56:07 AM
ND-09-1190_RAI Supp Resp.pdf	538297	

Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

Southern Nuclear
Operating Company, Inc.
40 Inverness Center Parkway
Birmingham, Alabama 35242

AUG 05 2009

SOUTHERN COMPANY
Energy to Serve Your World℠

Docket Nos.: 52-025
52-026

ND-09-1190

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555-0001

Southern Nuclear Operating Company
Vogtle Electric Generating Plant Units 3 and 4 Combined License Application
Supplemental Response to Request for Additional Information Number 02.04.02-1

Ladies and Gentlemen:

By letter dated March 28, 2008, Southern Nuclear Operating Company (SNC) submitted an application for combined licenses (COLs) for proposed Vogtle Electric Generating Plant (VEGP) Units 3 and 4 to the U.S. Nuclear Regulatory Commission (NRC) for two Westinghouse AP1000 reactor plants, in accordance with 10 CFR Part 52. During the NRC's detailed review of this application, the NRC identified a need for additional information, involving local intense flooding, required to complete their review of the COL application's Final Safety Analysis Report (FSAR) Section 2.4, "Hydrologic Engineering." By letter dated February 25, 2009, the NRC provided SNC with Request for Additional Information (RAI) Letter No. 028 concerning this information need. That RAI letter contained three RAI questions numbered 02.04.02-1 through -3. By letter dated March 27, 2009, SNC provided a response for these RAIs. However, based on teleconference calls with the NRC on April 21 and May 8, 2009, SNC is supplementing its response to RAI number 02.04.02-1 to provide the results of the revised hydraulic model of the VEGP Units 3 and 4 power block. The supplemental response to RAI number 02.04.02-1 is provided in Enclosure 1. Enclosure 2 contains a revised FSAR Figure 2.4-201a associated with the supplemental response. In addition, revised hydraulic model input files are provided electronically on compact disc (CD) in Enclosure 3. SNC is not supplementing its response to NRC RAI numbers 02.04.02-2 and -3.

If you have any questions regarding this letter, please contact Mr. Wes Sparkman at (205) 992-5061.

Mr. Charles R. Pierce states he is the AP1000 Licensing Manager of Southern Nuclear Operating Company, is authorized to execute this oath on behalf of Southern Nuclear Operating Company and to the best of his knowledge and belief, the facts set forth in this letter are true.

Respectfully submitted,

SOUTHERN NUCLEAR OPERATING COMPANY

Charles R Pierce

Charles R. Pierce

Sworn to and subscribed before me this 5th *day of* August, *2009*

Notary Public: Deborah A. Javorka

My commission expires: October 24, 2012

CRP/BJS/dmw

Enclosures:
1. Supplemental Response to NRC RAI Number 02.04.02-1 on the VEGP Units 3 & 4 COL Application
2. VEGP Units 3 and 4 COL Application Revised FSAR Figure 2.4-201a
3. VEGP Units 3 and 4 COL Application Revised Hydrology Model Input Files (on Compact Disc)

cc: Southern Nuclear Operating Company
Mr. J. H. Miller, III, President and CEO (w/o enclosures)
Mr. J. T. Gasser, Executive Vice President, Nuclear Operations (w/o enclosures)
Mr. J. A. Miller, Executive Vice President, Nuclear Development (w/o enclosures)
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Mr. T. E. Tynan, Vice President – Vogtle (w/o enclosures)
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Document Services RTYPE: AR01.1053
File AR.01.02.06

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Oglethorpe Power Corporation
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Mr. N. C. Boyter, Consortium Project Director Vogtle Units 3 & 4 (w/o enclosures)
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Southern Nuclear Operating Company

ND-09-1190

Enclosure 1

Supplemental Response to NRC RAI Number 02.04.02-1

on the

VEGP Units 3 & 4 COL Application

NRC RAI Number 02.04.02-1 (Supplement):

In a telephone conference to discuss the SNC response to NRC RAI Number 02.04.02-1 on April 21, 2009, the NRC noted that the culvert at the downstream end of Feeder Ditch 4 was not included in the hydraulic model. SNC responded that the changes to the probable maximum precipitation (PMP) flood water surface elevation within the power block area would be minimal, since the culvert would be located in the backwater of the main ditch, resulting in low velocities and head loss. However, SNC agreed to an NRC request to reevaluate the maximum water surface elevation with the blocked culvert included in the model.

In a follow-up telephone conference on May 8, 2009, SNC reported that preliminary revision of the cross-section geometry in the hydraulic model to include the culvert in question had resulted in a small increase in the maximum water surface elevation, as anticipated – i.e., 0.02 feet (from 219.45 to 219.47 feet). The NRC also noted a bottom width variation in a cross section in the main channel and requested that this section (and any others as necessary) be adjusted and included in a revised hydraulic model of the PMP drainage system. The NRC further requested a copy of the revised hydraulic model input files for their evaluation and reference.

SNC Response:

This supplemental response to RAI Number 02.04.02-1 provides the results of the revised HEC-RAS model for local PMP flood level analysis of the VEGP Units 3 and 4 power block area. FSAR changes reflecting results from this updated hydraulic model are provided below for FSAR Subsections 2.4.2.3 and 2.4.10, Tables 2.0-201 and 2.4-207, and Figure 2.4-201a. Additionally, revised model input files are provided on compact disc (CD) in Enclosure 3.

Associated VEGP COL Application Revision:

1. COL Application Part 2, FSAR Section 2.0, Table 2.0-201 (Sheet 5 of 7), will be revised as follows:

The second paragraph of the Flood Level VEGP Site Characteristic at the bottom of page 2.0-6 will be modified to read:

> "Maximum local PMP flood elevation is 219.47 ft MSL, which is 0.53 feet below plant elevation (220 ft MSL)."

2. COL Application Part 2, FSAR Subsection 2.4.2.3, will be revised as follows:

The seventh paragraph starting on page 2.4-3 will be modified to read:

> "The assumptions made and the data utilized in the development of the hydraulic model are as follows:
> - All channels are concrete lined, so no local scoured-out cross sections are utilized in the model.
> - All culverts in the model are assumed to be 100% blocked by debris collected from the catchment.
> - The blocked culverts within the power block area are modeled as in-line weirs in HEC-RAS following common hydraulic engineering practice (Reference 205). The effect of the blocked

culvert in Feeder Ditch 4 is accounted for by adjusting cross section geometry to indicate the ditch is filled in at the culvert location.

- Peak discharges from the HEC-HMS model were used at all sections in a steady-state calculation. Based on the close coincidence in time of peak discharges along the main channel and in the contributing subbasins, as shown in Table 2.4-204 and Figure 2.4-202, this was considered to be a reasonable simplification."

The fifth paragraph on page 2.4-4 will be modified to read:

"The results of the mixed-flow regime back water calculation for PMP discharges in the drainage network are presented in Table 2.4-207. Flow is supercritical in the steep reach of the main ditch from the downstream section up to section 37+00, with control (Froude No. = 1) at section 38+00, with a velocity of 16.6 fps and a depth of 14.14 feet. Velocities decrease and depths generally increase in the mild-sloped (S = .0022) reach upstream of that section to 3.7 fps and 15.98 feet respectively at section 20+00, and 0.9 fps and 11.98 feet respectively at section 1+00."

The last paragraph starting on page 2.4-4 will be modified to read:

"The feeder ditches draining the power block area are subject to high tailwater conditions in the main ditch for the PMP runoff event. The HEC-RAS output indicates that the maximum floodwater surface elevation would be between 219.28 ft msl in the SW corner and 219.47 ft msl in the NE corner of the VEGP Units 3 and 4 power block. As all safety-related facilities have entry elevations at or above 220 ft msl, it has been determined that the maximum local PMP flood elevation is at least 0.53 ft below any entry to any safety related facility, and the flooding of safety-related facilities due to this PMP event does not occur."

3. COL Application Part 2, FSAR Subsection 2.4.10 will be revised as follows:

The second paragraph on page 2.4-5 will be modified to read:

"Subsection 2.4.2 subsequently considered the flooding effects of local intense precipitation (also termed as the local probable maximum precipitation or local PMP) on the Units 3 and 4 safety-related structures at the VEGP site. A local PMP drainage analysis was performed by conservatively assuming that all underground storm drains and culverts were clogged. Details of the local PMP analysis and the resulting flood levels are presented in Subsection 2.4.2. As indicated in Subsection 2.4.2, the maximum water level in the Units 3 and 4 power block area due to the local PMP flood event is calculated to be at El. 219.47 ft msl. The entrances and openings for all safety-related facilities are located at or above the VEGP site grade of EL. 220 ft msl."

4. COL Application Part 2, FSAR Table 2.4-207 will be revised as shown on the following three pages.

5. COL Application Part 2, FSAR Figure 2.4-201a will be revised as shown in Enclosure 2.

Table 2.4-207
Summary of HEC-RAS output for PMP Profile
(Sheet 1 of 3)

HEC-RAS identification		Section	Q Total	Min Ch El	Bottom	W.S. Elev	Crit W.S.	E.G. Elev	Vel Chnl	Froude #
Channel	Station	stationing	(cfs)	(ft)	Width, ft	(ft)	(ft)	(ft)	(ft/s)	Chl
Main Ditch	46	00+00	759	207.66	10.00	219.39	213.16	219.39	0.5	0.03
Main Ditch	45.5	00+30	759	207.66	10.00	219.39	213.16	219.39	0.5	0.03
Main Ditch	45.1	00+60	1,433	207.56	10.00	219.39	214.47	219.39	0.9	0.05
Main Ditch	45	01+00	1,433	207.41	10.00	219.39	213.84	219.39	0.9	0.05
Main Ditch	44	02+00	1,433	207.19	10.00	219.39	213.68	219.39	0.9	0.05
Main Ditch	43	03+00	1,433	206.98	10.00	219.39	213.54	219.39	0.9	0.05
Main Ditch	42	04+00	1,433	206.76	10.00	219.39		219.39	0.8	0.05
Main Ditch	41	05+00	1,433	206.54	10.00	219.39	212.99	219.39	0.9	0.05
Main Ditch	40	06+00	1,433	206.32	10.00	219.38	212.32	219.39	1.1	0.06
Main Ditch	39	07+00	1,433	206.11	10.00	219.38	212.09	219.39	0.9	0.05
Main Ditch	38	08+00	1,433	205.89	10.00	219.38	211.83	219.39	0.9	0.05
Main Ditch	37	09+00	1,433	205.67	10.00	219.38	211.58	219.39	0.9	0.05
Main Ditch	36	10+00	2,546	205.45	10.00	219.37	213.59	219.39	1.6	0.09
Main Ditch	35	11+00	2,546	205.24	10.00	219.37	213.31	219.38	1.6	0.09
Main Ditch	34	12+00	2,546	205.02	10.00	219.37	213.03	219.38	1.5	0.09
Main Ditch	33	13+00	2,546	204.80	10.00	219.36	212.28	219.38	1.6	0.08
Main Ditch	32	14+00	2,546	204.58	10.00	219.36	212.02	219.38	1.4	0.08
Main Ditch	31	15+00	2,546	204.37	10.00	219.36	211.75	219.38	1.5	0.08
Main Ditch	30	16+00	2,546	204.15	10.00	219.36	211.49	219.38	1.5	0.08
Main Ditch	29	17+00	2,546	203.93	10.00	219.35	211.22	219.38	1.7	0.09
Main Ditch	28	18+00	2,546	203.71	10.00	219.35	210.96	219.37	1.6	0.08
Main Ditch	27	19+00	2,546	203.50	10.00	219.35	210.69	219.37	1.6	0.08
Main Ditch	26.95	19+05	2,546	203.49	10.00	219.35	211.37	219.37	1.7	0.09
Main Ditch	26	20+00	6,291	203.28	14.00	219.26		219.36	3.7	0.19
Main Ditch	25	21+00	6,291	203.06	14.00	219.17		219.35	4.5	0.23
Main Ditch	24.44	21+56	6,291	202.94	14.00	219.17		219.34	4.4	0.22
Main Ditch	24.39	21+61	6,291	202.94	14.00	219.20		219.32	3.9	0.20
Main Ditch	24	22+00	6,367	202.84	14.00	218.90		219.29	6.0	0.32
Main Ditch	23	23+00	6,367	202.63	14.00	218.84		219.27	6.1	0.33
Main Ditch	22	24+00	6,367	202.41	14.00	218.42		219.21	7.6	0.42
Main Ditch	21	25+00	6,367	202.19	14.00	217.94	213.62	219.13	8.8	0.50
Main Ditch	20	26+00	6,367	201.97	14.00	217.92		219.08	8.7	0.49
Main Ditch	19	27+00	6,835	201.88	14.00	217.59		219.01	9.6	0.55
Main Ditch	18	28+00	6,835	201.54	14.00	217.61		218.93	9.2	0.53
Main Ditch	17	29+00	6,835	201.32	14.00	217.60		218.86	9.0	0.51
Main Ditch	16	30+00	6,835	201.00	14.00	217.67		218.78	8.5	0.47
Main Ditch	15	31+00	6,835	200.89	14.00	217.72		218.71	8.2	0.44
Main Ditch	14	32+00	6,835	200.67	14.00	217.80		218.63	7.6	0.41
Main Ditch	13	33+00	8,463	200.45	14.00	216.97		218.51	10.3	0.57
Main Ditch	12	34+00	8,463	200.23	14.00	216.54	213.37	218.42	11.0	0.63
Main Ditch	11	35+00	8,463	200.02	14.00	216.57		218.31	10.7	0.60
Main Ditch	10	36+00	8,463	199.80	14.00	216.54		218.23	10.5	0.59
Main Ditch	9	37+00	8,463	199.58	14.00	216.58		218.14	10.1	0.56
Main Ditch	8	38+00	9,919	199.36	14.00	213.50	213.50	217.77	16.6	1.00
Main Ditch	7	39+00	9,919	198.68	14.00	211.54	213.15	217.39	19.4	1.22
Main Ditch	6	40+00	9,919	198.00	14.00	209.75	211.96	216.92	21.7	1.49
Main Ditch	5	41+00	9,919	196.51	14.00	207.34	210.13	216.27	24.4	1.66
Main Ditch	4	42+00	9,919	192.00	14.00	198.94	202.49	214.63	36.3	3.15
Main Ditch	3	43+00	9,919	183.22	14.00	189.47	193.41	211.29	41.9	3.90
Main Ditch	2	44+00	9,919	172.00	14.00	179.37	179.37	181.90	17.3	1.24
Main Ditch	1	45+00	11,021	161.21	14.00	167.41	170.79	180.33	30.7	2.39

Table 2.4-207
Summary of HEC-RAS output for PMP Profile
(Sheet 2 of 3)

HEC-RAS identification		Section	Q Total	Min Ch El	Bottom	W.S. Elev	Crit W.S.	E.G. Elev	Vel Chnl	Froude #
Channel	Station	stationing	(cfs)	(ft)	Width, ft	(ft)	(ft)	(ft)	(ft/s)	Chl
Feeder Ditch 3	83	83+00	568	211.70	5.00	219.43	214.83	219.44	0.4	0.02
Feeder Ditch 3	82	82+00	1,136	211.20	5.00	219.43		219.43	0.8	0.05
Feeder Ditch 3	81.9	81+90	1,136	211.15	5.00	219.43	215.22	219.43	0.7	0.05
Feeder Ditch 3	81.75	81+75	Inl Struct							
Feeder Ditch 3	81.6	81+60	1,136	211.00	5.00	219.42		219.42	0.7	0.04
Feeder Ditch 3	81	81+00	1,705	210.70	5.00	219.41		219.42	1.5	0.10
Feeder Ditch 3	80	80+00	2,273	210.20	5.00	219.40		219.42	2.0	0.12
Feeder Ditch 3	79	79+00	2,841	209.70	5.00	219.38		219.42	2.5	0.16
Feeder Ditch 3	78	78+00	3,409	209.20	5.00	219.36		219.41	3.0	0.19
Feeder Ditch 3	77	77+00	3,978	208.70	5.00	219.33		219.40	3.4	0.21
Feeder Ditch 3	76	76+00	4,172	208.20	5.00	219.34		219.39	3.0	0.18
Feeder Ditch 3	75	75+00	4,366	207.70	5.00	219.34		219.39	2.9	0.17
Feeder Ditch 3	74	74+00	4,561	207.20	5.00	219.32		219.38	3.1	0.18
Feeder Ditch 3	73	73+00	4,755	206.70	5.00	219.31		219.37	3.2	0.18
Feeder Ditch 3	72	72+00	4,949	206.20	5.00	219.30		219.37	3.3	0.19
Feeder Ditch 3	71	71+00	5,144	205.70	5.00	219.28		219.36	3.4	0.19
Feeder Ditch 2	83	83+00	62	214.26	5.00	219.42	214.99	219.42	0.1	0.00
Feeder Ditch 2	82	82+00	124	212.76	5.00	219.42		219.42	0.1	0.01
Feeder Ditch 2	81.95	81+95	124	212.74	5.00	219.42	214.85	219.42	0.1	0.01
Feeder Ditch 2	81.65	81+65	Inl Struct							
Feeder Ditch 2	81.35	81+35	124	212.44	5.00	219.41		219.41	0.1	0.01
Feeder Ditch 2	81	81+00	186	212.26	5.00	219.41		219.41	0.2	0.01
Feeder Ditch 2	80.65	80+65	186	212.06	5.00	219.41	214.65	219.41	0.2	0.01
Feeder Ditch 2	80.3	80+30	Inl Struct							
Feeder Ditch 2	80	80+00	249	211.76	5.00	219.41		219.41	0.2	0.02
Feeder Ditch 2	79.95	79+95	249	211.74	5.00	219.41		219.41	0.2	0.02
Feeder Ditch 2	79	79+00	311	211.26	5.00	219.41		219.41	0.3	0.02
Feeder Ditch 2	78.45	78+45	311	210.98	5.00	219.41	213.92	219.41	0.3	0.02
Feeder Ditch 2	78.2	78+20	Inl Struct							
Feeder Ditch 2	78	78+00	373	210.76	5.00	219.40		219.40	0.3	0.02
Feeder Ditch 2	77.95	77+95	373	210.74	5.00	219.40		219.40	0.3	0.02
Feeder Ditch 2	77	77+00	435	210.26	5.00	219.40		219.40	0.5	0.03
Feeder Ditch 2	76	76+00	535	209.76	5.00	219.40		219.40	0.8	0.05
Feeder Ditch 2	75	75+00	634	209.26	5.00	219.40		219.40	0.6	0.04
Feeder Ditch 2	74.95	74+95	634	209.24	5.00	219.40	213.35	219.40	0.6	0.04
Feeder Ditch 2	74.7	74+70	Inl Struct							
Feeder Ditch 2	74.45	74+45	634	208.99	5.00	219.39		219.39	0.6	0.04
Feeder Ditch 2	74.15	74+15	734	208.33	5.00	219.39	212.75	219.39	0.6	0.04
Feeder Ditch 2	74.1	74+10	Inl Struct							
Feeder Ditch 2	73.35	73+35	734	208.43	5.00	219.39		219.39	0.7	0.05
Feeder Ditch 2	73	73+00	834	208.26	5.00	219.38		219.39	0.8	0.05
Feeder Ditch 2	72	72+00	933	207.76	5.00	219.38		219.39	0.8	0.05
Feeder Ditch 2	71	71+00	1,033	207.26	5.00	219.38		219.39	0.9	0.06
Feeder Ditch 1	83	83+00	103	216.00	5.00	219.47	216.65	219.47	0.2	0.02
Feeder Ditch 1	82	82+00	206	215.70	5.00	219.47	216.85	219.47	0.4	0.03

Table 2.4-207
Summary of HEC-RAS output for PMP Profile
(Sheet 3 of 3)

HEC-RAS identification		Section stationing	Q Total	Min Ch El	Bottom	W.S. Elev	Crit W.S.	E.G. Elev	Vel Chnl	Froude #
Channel	Station		(cfs)	(ft)	Width, ft	(ft)	(ft)	(ft)	(ft/s)	Chl
Feeder Ditch 1	81.9	81+90	206	215.65	5.00	219.47	216.81	219.47	0.4	0.03
Feeder Ditch 1	81.75	81+75	Inl Struct							
Feeder Ditch 1	81.6	81+60	206	215.50	5.00	219.46	216.67	219.46	0.4	0.03
Feeder Ditch 1	81	81+00	309	215.20	5.00	219.46	217.02	219.46	0.6	0.05
Feeder Ditch 1	80	80+00	413	214.70	5.00	219.46	217.15	219.46	0.8	0.07
Feeder Ditch 1	79	79+00	516	214.20	5.00	219.46	217.26	219.46	1.0	0.08
Feeder Ditch 1	78	78+00	619	213.70	5.00	219.45	217.35	219.46	1.2	0.10
Feeder Ditch 1	77	77+00	722	213.20	5.00	219.44	217.40	219.46	1.5	0.12
Feeder Ditch 1	76	76+00	843	212.70	5.00	219.43	217.43	219.45	1.8	0.14
Feeder Ditch 1	75.1	75+10	843	212.25	5.00	219.43	217.30	219.45	1.7	0.12
Feeder Ditch 1	75	75+00	964	212.20	5.00	219.43	217.41	219.45	1.9	0.14
Feeder Ditch 1	74.85	74+85	Inl Struct							
Feeder Ditch 1	74.7	74+70	964	212.05	5.00	219.42	217.26	219.44	1.7	0.13
Feeder Ditch 1	74	74+00	1,085	211.70	5.00	219.39	217.38	219.43	2.4	0.18
Feeder Ditch 1	73	73+00	1,205	211.20	5.00	219.38	217.29	219.42	2.3	0.17
Feeder Ditch 1	72	72+00	1,326	210.70	5.00	219.37	217.13	219.42	2.5	0.18
Feeder Ditch 1	71	71+00	1,447	210.20	5.00	219.35	216.22	219.41	2.7	0.18

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Enclosure 2

VEGP Units 3 and 4 COL Application

Revised FSAR Figure 2.4-201a

Vogtle Electric Generating Plant, Units 3 and 4

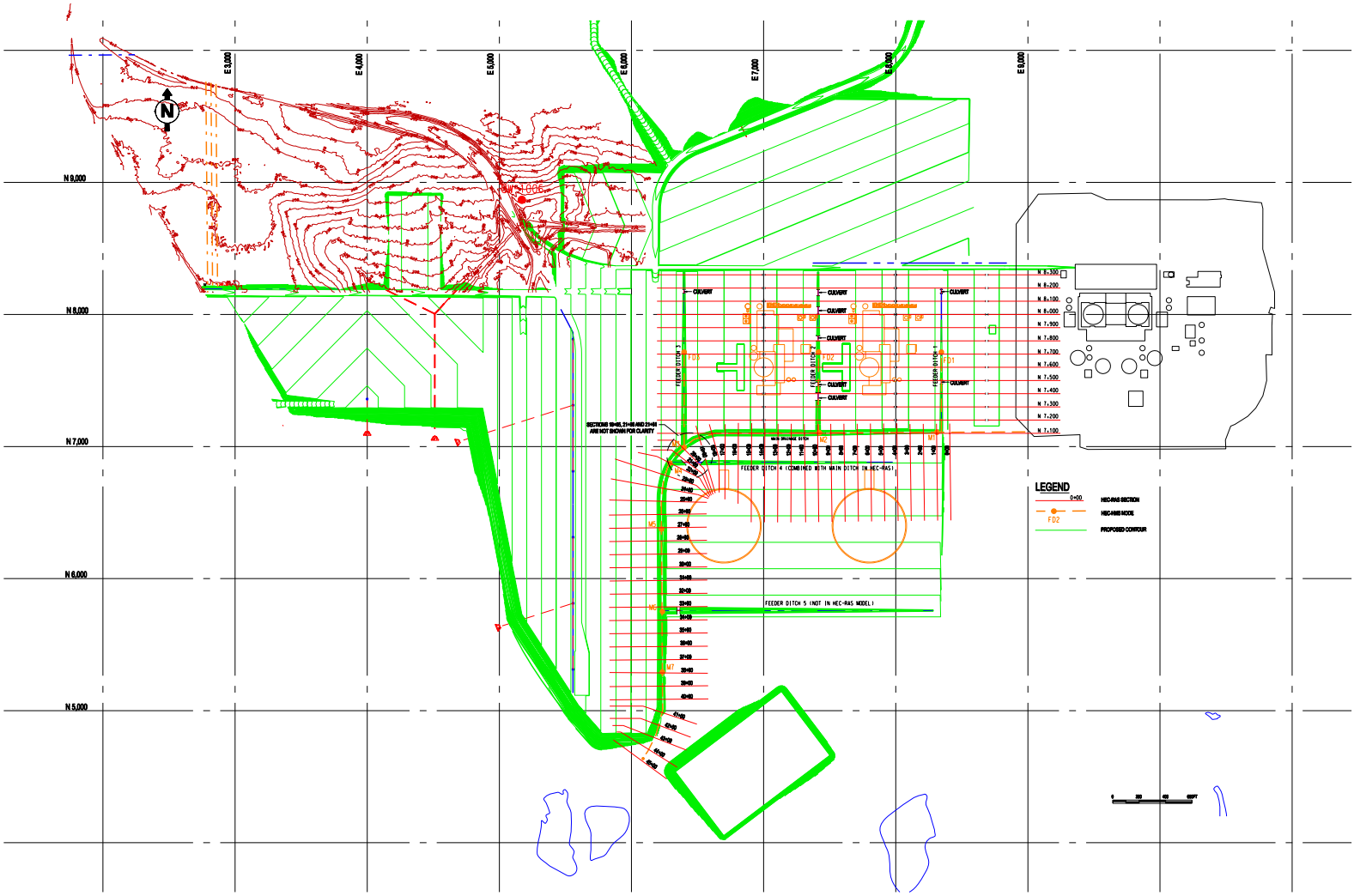

Figure 2.4-201a
Cross-Section Location Map for HEC-RAS Model of Local PMF for Units 3 and 4

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Enclosure 3

VEGP Units 3 and 4 COL Application

Revised Hydrology Model Input Files

(on Compact Disc)