CPNPP Units 3 and 4
Surface Water Analysis

Calculation 036 & 037 Revision
and
Supplemental RAI 139

Status Update

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Revised Drainage Areas

- Minor shifts in sub-basin boundaries
- Minor changes to resulting Local Intense Precipitation water surface elevation (based on preliminary results)

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Sub-basin Area Comparison

Sub-basin ID	Updated	Previous	Difference (ac.)
1	0.69	0.70	-0.01
2	2.22	2.09	0.13
3	3.04	3.11	-0.07
4	1.35	1.28	0.07
5	3.59	3.43	0.16
6	2.44	2.44	0.00
7	0.74	0.74	0.00
8	1.78	1.75	0.03
9	4.79	4.88	-0.09
10	4.35	4.32	0.03
11	1.04	1.06	-0.02
12	3.23	3.26	-0.03
13	1.65	1.63	0.02
14	1.73	1.79	-0.06
15	1.72	1.63	0.09
16	4.47	4.46	0.01
17	0.88	0.88	0.00
18	1.29	1.29	0.00
19	0.49	0.49	0.00
20	1.03	1.03	0.00
21	1.80	1.80	0.00
22	5.85	5.85	0.00
23	38.08	38.08	0.00
24	62.72	62.72	0.00
25	1.67	1.67	0.00
26	0.49	0.51	-0.02
27	6.59	6.59	0.00
28	2.38	2.61	-0.23
29	5.95	4.94	1.01
30	2.26	2.84	-0.58
31	3.60	3.60	0.00
32	34.99	32.30	2.69
SUMMATION	208.90	205.77	3.13

- A majority of sub-basins experienced slight changes in surface drainage area. The range of increase is between 0.01 ac. to 2.69 ac. The range of decrease is between 0.01 ac. to 0.58 ac.
- The 1.01 ac. increase in Sub-basin #29 results from grading around the Fire Pump House and Water Storage Tanks.
- The 2.69 ac. increase in Sub-basin #32 results from the addition of Drainage Pond C.

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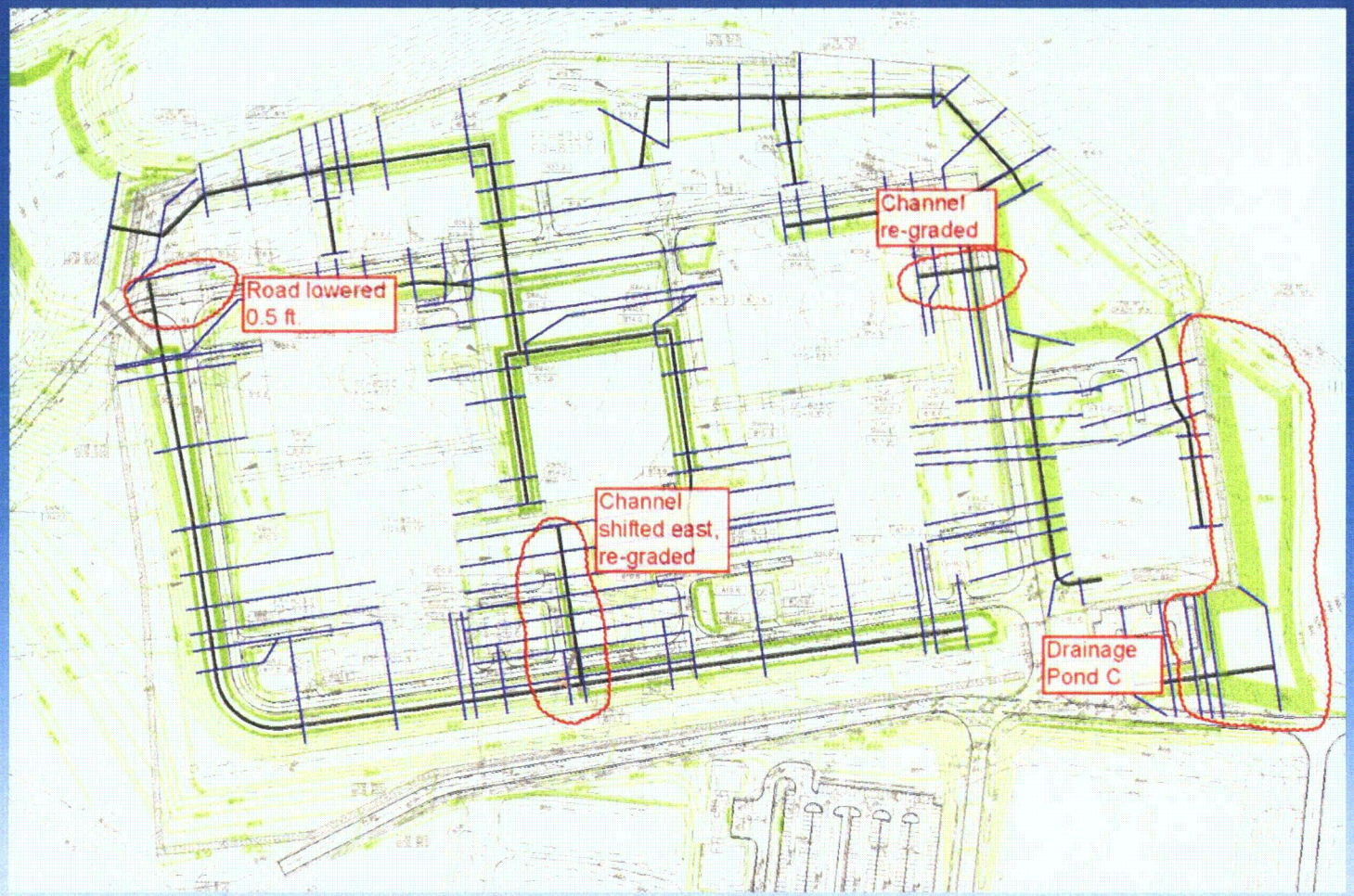

Significant Changes to Grading and Drainage Plan

- Addition of a stormwater basin on southeast side (Drainage Pond C)
- Access Road elevation lowered on northwest side
- Revised grading at Channels (Center South, West and Unit 3 East)

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NRC Comment Discussion by Category

Outlet, watershed and sub-basin delineation

- *Comment: Difficult to discern the different layers within the drawings. Structures related to a PMP event are not identified (culverts, channels, outlets) and it is necessary to identify where these are located.*

  Response: Figures are crowded with details and linework and will be updated to disaggregate the layers where possible. In addition, one new figure will be added showing the proposed grading contours, sub-basin boundaries, surface flowpaths and structures related to the PMP event within the power block area.

NRC Comment Discussion by Category

Site Drainage Design (Rainfall-Runoff Transformation)

- *Comment: NRC staff identified 6.25 inches for 5 min. intensity (75in./hr.). HEC-RAS input for PMP used was 6.2 in. Why wasn't the more conservative 6.25 in. value used?*

  Response: CALC-019 (Determination of the Local Intense Precipitation at CPNPP Units 3 and 4 HMR 51 & HMR 52) is being updated to utilize the conservative (rounded) value of 6.3 in. CALC-036 will be updated with this value.

NRC Comment Discussion by Category

HEC-RAS model details

- *Comment:* *Interpolation between cross sections was not turned on for the HEC-RAS model. NRC staff uses interpolation at 5 ft. intervals. Why wasn't interpolation used?*

  Response: *CALC-036 will be revised to include cross section interpolation at constant 5 ft. intervals. Instances where interpolation already occurs at less than 5 ft. will be preserved in the analysis.*

- *Comment:* *How were the Manning's "n" coefficient values selected? The calculation uses 50% increase in coefficients , but the values are not tied to references other than Chow.*

  Response: *Most recent grading and drainage plans specifies the surface covers. Once the surface cover was known, the Chow reference was used to select the coefficient values for use in HEC-RAS.*

NRC Comment Discussion by Category

HEC-RAS model details (cont.)

- *Comment: Some cross sections are overlapping, was this intentional?*

  Response: Overlapping was not included in the HEC-RAS model run and all figures will be updated to reflect no overlapping to the extent possible.

- *Comment: Figure 7.1.3-3 (CALC-036) Unit 3 East channel shows no cross section.*

  Response: CALC-036 will be revised to include all cross sections in the figure.

- *Comment: Table 7-8 (CALC-036) shows no run-off of 52 cfs and the value does not seem to be accounted for in HEC-RAS.*

  Response: An entry of 52 cfs was not located in Table 7-8 of CALC-036. The calculation is being revised and the table entries will be verified to be consistent with the HEC-RAS results.

NRC Comment Discussion by Category

HEC-RAS model details (cont.)

- *Comment: The 2423 cfs contribution to the east channel is reduced and it is not apparent why this is. Clarification is needed.*

  Response: This reduction is the result of a culvert. This culvert is removed in the revised grading plan. CALC-036 will be revised to include a text explanation.

- *Comment: Identify east channel culvert.*

  Response: The east channel culvert is removed in the revised grading plan.

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NRC Comment Discussion by Category

HEC-RAS model details (cont.)

- *Comment: The process of the transfer of surface boundary conditions between models is not clear. What is the process to transfer boundary conditions and subcritical flow from downstream to upstream.*

  Response: Downstream channels were run and the highest resulting water surface adjacent to upstream channels were used as the boundary condition. ENERCON has evaluated the transfer of downstream boundary conditions to upstream channels to ensure that the boundary conditions were transferred appropriately.

- *Comment: NRC staff has identified a higher downstream water surface elevation for the Center North channel than what was provided in CALC-036.*

  Response: The water surface elevation for the Unit 3 UHS upstream Cross Section 12 was used as the boundary condition. Optionally, Unit 4 UHS Cross Section 107 could be used as the boundary condition. The more conservative water surface of those two cross sections will be utilized if determined to be appropriate.

NRC Comment Discussion by Category

HEC-RAS model details (cont.)

- *Comment: HEC-RAS modeling suggest using two cross sections for upstream and downstream inline structures. Why was this not done?*

  Response: CALC-036 is being revised to include two cross sections upstream and downstream of the inline structures.

- *Comment: Figure 2-1 includes a surface water elevation of 822.70 ft. NRC staff needs additional rationale and certainty that there is no threat to safety-related structures.*

  Response: This elevation occurred at Unit 3 Southeast channel Cross Section 11 and will be modified based on revised HEC-RAS modeling. Additionally, a discussion will be included in CALC 036 to provide a rationale that there is no threat to SSCs.

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NRC Comment Discussion by Category

HEC-RAS model details (cont.)

- *Comment:* *There is a discrepancy in surface water elevation for the Unit 3 Southeast channel. (listed in one table as 822.7 and as 819.77 in another). For those channels where "N/A" was listed for surface water elevation, actual values in the tables should be provided.*

  Response: *The elevations in question occur at different cross sections within the channel. All calculation tables will be revised to indicate all pertinent elevation values. The "N/A" value was added in locations where the water elevations are not adjacent to SSCs. CALC 036 will be revised to include an explanation.*

Summary

- Text and figures will be revised to better clarify modeling results.
- Most recent configuration of the site Grading and Drainage Plan and the results of the revised hydraulic model supports the safety evaluation of all site structures. Further refinement of the hydraulic model is not expected.
- Resolution to NRC comments will be summarized in the official RAI 139 response letter.