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October 11, 2021

Illinois Power Generating Company
6725 North 500th Street
Newton, Illinois, 62448

Subject: USEPA CCR Rule and IEPA Part 845 Rule Applicability Cross-Reference
2021 USEPA CCR Rule Periodic Certification Report
Primary Ash Pond, Newton Power Plant, Newton, Illinois

At the request of Illinois Power Generating Company (IPGC), Geosyntec Consultants (Geosyntec) has prepared this letter to document how the attached 2021 United States Environmental Protection Agency (USEPA) CCR Rule Periodic Certification Report (Report) was prepared in accordance with both the Federal USEPA CCR Rule[1] and the state-specific Illinois Environmental Protection Agency (IEPA) Part 845 Rule[2]. Specific sections of the report and the applicable sections of the USEPA CCR Rule and Illinois Part 845 Rule are cross-referenced in **Table 1**. A certification from a Qualified Professional Engineer for each of the CCR Rule sections listed in **Table 1** is provided in Section 10 of the attached Report. This certification statement is also applicable to each section of the Part 845 Rule listed in **Table 1.**

Table 1 – USEPA CCR Rule and Illinois Part 845 Rule Cross-Reference

Report Section	USEPA CCR Rule		Illinois Part 845 Rule	
3	§257.73 (a)(2)	Hazard Potential Classification	845.440	Hazard Potential Classification Assessment[3]
4	§257.73 (c)(1)	History of Construction	845.220(a)	Design and Construction Plans (Construction History)
5	§257.73 (d)(1)	Structural Stability Assessment	845.450 (a) and (c)	Structural Stability Assessment
6	§257.73 (e)(1)	Safety Factor Assessment	845.460 (a-b)	Safety Factor Assessment
7	§257.82 (a)(1-3)	Adequacy of Inflow Design Control System Plan	845.510(a), (c)(1), (c)(3)	Hydrologic and Hydraulic Capacity Requirements / Inflow Design Flood Control System Plan
	§257.82 (b)	Discharge from CCR Unit	845.510(b)	Discharge from CCR Surface Impoundment

[1] United Stated Environmental Protection Agency, 2015. *40 CFR Parts 257 and 261, Hazardous and Solid Waste Management System, Disposal of Coal Combustion Residuals from Electric Utilities, Final Rule.*
[2] State of Illinois, Joint Committee on Administrative Rule, Administrative Code (2021). *Title 35: Environmental Protection, Subtitle G: Waste Disposal, Chapter I: Pollution Control Board, Subchapter j: Coal Combustion Waste Surface Impoundment, Part 845 Standards for the Disposal of Coal Combustion Residuals in Surface Impoundments.*
[3] "Significant" and "High" hazard, per the CCR Rule[1], are equivalent to Class II and Class I hazard potential, respectively, per Part 845[2].

CLOSING

This letter has been prepared to demonstrate that the content and Qualified Professional Engineer Certification of the 2021 Periodic USEPA CCR Rule Certification Report fulfills the corresponding requirements of Part 845 of Illinois Administrative Code listed in **Table 1**.

Sincerely,

Panos Andonyadis, P.E.
Senior Engineer

John Seymour, P.E.
Senior Principal

2021 USEPA CCR RULE PERIODIC CERTIFICATION REPORT §257.73(a)(2), (c), (d[1]), (e) and §257.82 PRIMARY ASH POND

Newton Power Plant

Newton, Illinois

Submitted to

Illinois Power Generating Company

6725 North 500th Street
Newton, Illinois 62448

Submitted by

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October 11, 2021

[1] Except for §257.73(d)(1)(vi).

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EXECUTIVE SUMMARY

This Periodic United States Environmental Protection Agency (USEPA) Coal Combustion Residuals (CCR) Rule [1] certification report (Periodic Certification Report) for the Primary Ash Pond (PAP) [2] at the Newton Power Plant (NPP), also known as Newton Power Station, has been prepared in accordance with Rule 40, Code of Federal Regulations (CFR) §257, herein referred to as the "CCR Rule" [1]. The CCR Rule requires that initial certifications for existing CCR surface impoundment, completed in 2016 and subsequently posted on Illinois Power Generating Company (IPGC) CCR Website ([2], [3], [4], [5], [6]) be updated on a five-year basis.

The initial certification reports developed in 2016 and 2017 ([2], [3], [4], [5], [6]) were independently reviewed by Geosyntec. Additionally, field observations, interviews with power plant staff, updated engineering analyses, and evaluations were performed to compare conditions in 2021 at the PAP relative to the 2016 and 2017 initial certifications. These tasks identified that updates are not required for the Initial Hazard Potential Classification. However, due to changes at the site and technical review comments, updates were required and were performed for the:

- History of Construction Report,
- Initial Structural Stability Assessment,
- Initial Safety Factor Assessment, and
- Initial Inflow Design Flood Control System Plan.

Geosyntec's evaluations of the initial certification reports and updated analyses identified that the PAP meets all requirements for hazard potential classification, history of construction reporting, structural stability, safety factor assessment, and hydrologic and hydraulic control, with the exception of the structural integrity of hydraulic structures (§257.73(d)(1)(vi)), which was certified by others. **Table 1** provides a summary of the initial 2016 certifications and the updated 2021 periodic certifications.

[2] The PAP is also referred to as ID Number W0798070001-01, Primary Ash Pond by the Illinois Environmental Protection Agency (IEPA); CCR unit ID 401 by EEI; and IL50719 within the National Inventory of Dams (NID) maintained by the Illinois Department of Natural Resources (IDNR). Within this document it is referred to as the PAP.

Table 1 – Periodic Certification Summary

			2016 Initial Certification		2021 Periodic Certification	
	CCR Rule Reference	**Requirement Summary**	**Requirement Met?**	**Comments**	**Requirement Met?**	**Comments**
Hazard Potential Classification						
3	§257.73(a)(2)	Document hazard potential classification	Yes	Impoundment was determined to have Significant hazard potential classification [2].	Yes	Updates were not determined to be necessary. Geosyntec recommends retaining the Significant hazard potential classification.
History of Construction						
4	§257.73(c)(1)	Compile a history of construction	Yes	History of Construction report was prepared for the PAP [3].	Yes	A letter listing updates to the History of Construction report is provided in **Attachment C**.
Structural Stability Assessment						
5	§257.73(d)(1)(i)	Stable foundations and abutments	Yes	Foundations were found to be stable. Abutments are not present [7].	Yes	Foundations and abutments were found to be stable after performing updated slope stability analyses.
	§257.73(d)(1)(ii)	Adequate slope protection	Yes	Slope protection is adequate [7].	Yes	No changes were identified that may affect this requirement.
	§257.73(d)(1)(iii)	Sufficiency of embankment compaction	Yes	Embankment compaction is sufficient for expected ranges in loading conditions [7].	Yes	Dike compaction was found to be sufficient after performing updated slope stability analyses.
	§257.73(d)(1)(iv)	Presence and condition of slope vegetation	Yes	Vegetation is present on interior and exterior slopes and is maintained. [7].	Yes	No changes were identified that may affect this requirement.
	§257.73(d)(1)(v)(A) and (B)	Adequacy of spillway design and management	Yes	Spillways are adequately designed and constructed and adequately manage flow during 1,000-year flood [7].	Yes	Spillways were found to be adequately designed and constructed and are expected to adequately manage flow during the 1,000-year flood, after performing updated hydrologic and hydraulic analyses.
	§257.73(d)(1)(vi)	Structural integrity of hydraulic structures	Yes	Hydraulic structures passing through the embankment were inspected and found to maintain structural integrity [7].	Periodic certification of §257.73(d)(1)(vi) was independently completed by Luminant in 2020 [8].	
	§257.73(d)(1)(vii)	Stability of downstream slopes inundated by water body.	Yes	Downstream slopes adjacent to Newton Lake and the Secondary Pond are expected to remain stable during inundation [7].	Yes	Downstream slopes were found to be stable after performing updated sudden drawdown slope stability analyses.
Safety Factor Assessment						
6	§257.73(e)(1)(i)	Maximum storage pool safety factor must be at least 1.50	Yes	Safety factors were calculated to be 1.66 and higher [5].	Yes	Safety factors from updated slope stability analyses were calculated to be 1.66 and higher.
	§257.73(e)(1)(ii)	Maximum surcharge pool safety factor must be at least 1.40	Yes	Safety factors were calculated to be 1.66 and higher [5].	Yes	Safety factors from updated slope stability analyses were calculated to be 1.66 and higher.
	§257.73(e)(1)(iii)	Seismic safety factor must be at least 1.00	Yes	Safety factors were calculated to be 1.07 and higher [5].	Yes	Safety factors from updated slope stability analyses were calculated to be 1.07 and higher.
	§257.73(e)(1)(iv)	For embankment construction of soils that have susceptible to liquefaction, safety factor must be at least 1.20	Not Applicable	Embankment soils were not susceptible to liquefaction [5].	Not Applicable	No changes were identified that may affect this requirement.
Inflow Design Flood Control System Plan						
8	§257.82(a)(1), (2), (3)	Adequacy of inflow design control system plan.	Yes	Flood control system adequately managed inflow and peak discharge during the 1,000-year, 24-hour, Inflow Design Flood [7].	Yes	The flood control system was found to adequately manage inflow and peak discharge during the 1,000-year, 24-hour, Inflow Design Flood, after performing updated hydrologic and hydraulic analyses.
	§257.82(b)	Discharge from CCR Unit	Yes	Discharge from the CCR Unit is routed through a NPDES-permitted outfall during both normal and 1,000-year, 24-hour Inflow Design Flood conditions [6].	Yes	Discharge from the CCR Unit is routed through a NPDES-permitted outfall during both normal and 1,000-year, 24-hour Inflow Design Flood conditions, after performing updated hydrologic and hydraulic analyses.

SECTION 1

INTRODUCTION AND BACKGROUND

This Periodic United States Environmental Protection Agency (USEPA) Coal Combustion Residual (CCR) Rule [1] Certification Report was prepared by Geosyntec Consultants (Geosyntec) for Illinois Power Generating Company (IPGC) to document the periodic certification of the Primary Ash Pond (PAP) at the Newton Power Plant (NPP), also known as the Newton Power Station, located at 6725 N 500th Street, Newton, Illinois, 62448. The location of NPP is provided in **Figure 1**, and a site plan showing the location of the PAP and landfill, among other closed and open CCR units and non-CCR surface impoundments, is provided in **Figure 2**.

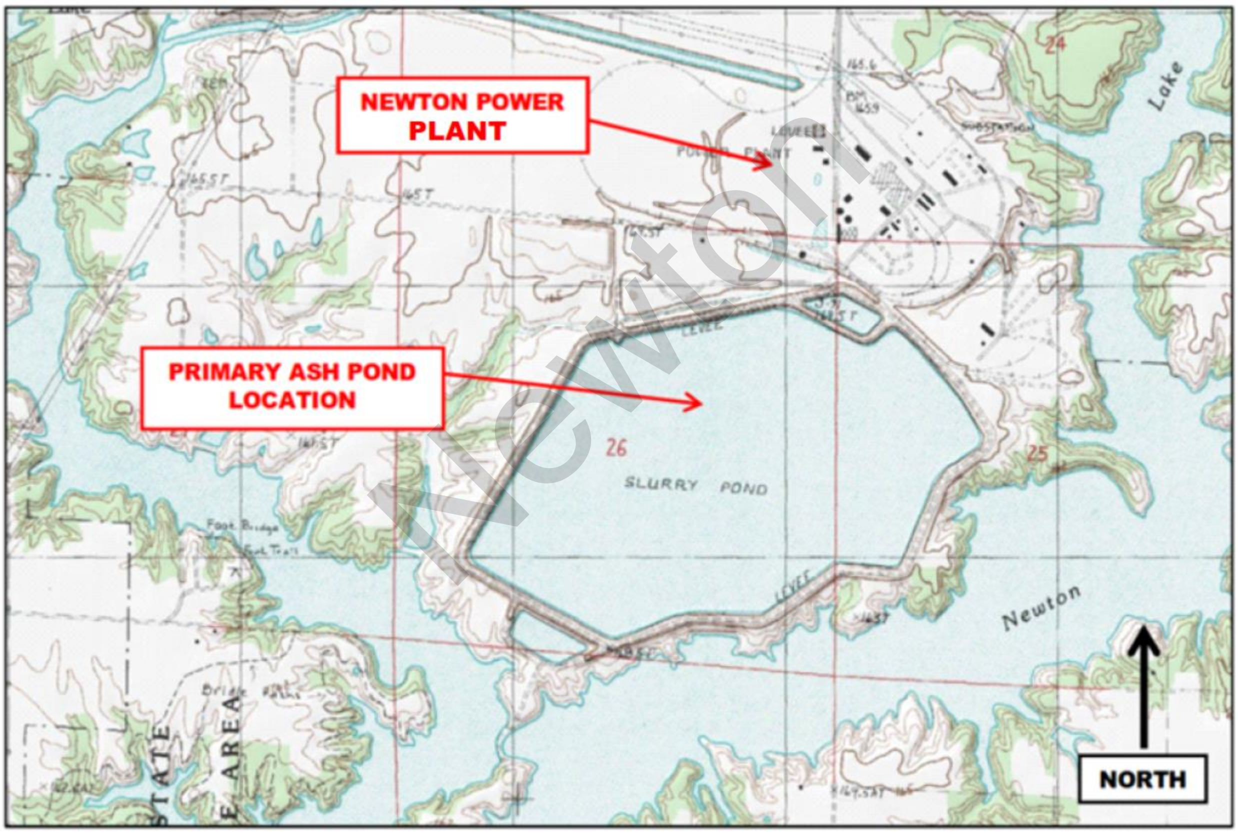


Figure 1 – Site Location Map (from AECOM, 2016)

Figure 2 – Site Plan

1.1 PAP Description

The PAP is utilized for managing CCR materials generated by NPP. The PAP has a Significant hazard potential, based on the initial hazard potential classification assessment performed by Stantec in 2016 in accordance with §257.73(a)(2) [2].

The PAP receives fly ash, bottom ash, and other miscellaneous non-CCR process waters produced by NPP. Bottom ash is sluiced from the north perimeter of the PAP on either side of the Secondary Settlement Pond, which is a non-CCR basin included within the footprint of the Primary Ash Pond. The outfall structure in the PAP discharges through the perimeter embankment into the Secondary Pond, which is a non-CCR basin that ultimately discharges into Newton Lake via a National Pollutant Discharge Elimination System (NPDES)-permitted outfall.

Two adjacent spillway structures are present at the PAP: the principal spillway structure and the secondary spillway structure. Only the principal structure is used to control outflow during both normal operational and flood conditions. The spillway structures are both identical square concrete riser structures, with inflow controlled by a series of stoplogs. Inflow into the structures is transmitted to the Secondary Pond through 30-inch diameter corrugated metal pipes that have been slip lined and now have an inside diameter of 28 inches. The principal spillway structure is located at a lower elevation than the secondary spillway structure, with a top of weir box elevation of 537 feet and a pipe invert elevation of 512.5 feet (presumed to be NGVD29 datum based on the date of the design drawings). The secondary spillway structure is located directly upslope from the primary structure and has a top of weir box elevation of 555 feet, which is the design crest elevation of the earthen embankment, and a pipe invert elevation of 533 feet. The 28-inch diameter slip lined outlet pipes from both structures converge within the earthen embankment into a single 28-inch slip lined outlet pipe that discharges into the Secondary Pond. The purpose of the secondary spillway structure is to be a supplemental spillway for the Primary Ash Pond under conditions where the pool level is significantly increased above the current normal pool to allow for additional storage volume [7].

The surface area of the impoundment is approximately 400 acres, and the embankment is a continuous structure (a ring embankment), which has a total perimeter length of approximately 3.2 miles and a maximum height above the exterior grade of 72 feet where the downstream toe of the embankment is underneath the normal pool level of the downstream Newton Lake. Typical embankment heights range from 14 to 42 feet. The embankment was constructed as a homogenous earthen structure with well-compacted clayey fill. Portions of the south embankment directly adjacent to Newton Lake include crushed stone near the waterline for erosion protection. The upstream and downstream slope orientations are typically 3H:1V (horizontal to vertical) but range from about 2.5H:1V to 3.4H:1V. Embankment crest widths range from approximately 12 to 50 feet, and the crest is covered with a gravel access road [7].

The pool elevation of the pond is controlled by the configuration of the outflow structure and plant process inflows. At the time of the periodic survey, was approximately[3] 535.5 feet. Crest elevations range from approximately 553 to 555 feet, and the minimum crest elevation is 552.7 feet [7].

Initial certifications for the PAP for Hazard Potential Classification (§257.73(a)(2)), History of Construction (§257.73(c)), Structural Stability Assessment (§257.73(d)), Safety Factor Assessment (§257.73(e)(1)), and Inflow Design Flood Control System Plan (§257.82) were completed by Stantec and AECOM in 2016 and 2017 and subsequently posted to IPGC's CCR Website ([2], [3], [4], [5], [6]).

[3] All elevations are in the North American Vertical Datum of 1988 (NAVD88), unless otherwise noted.

1.2 Report Objectives

These following objectives are associated with this report:

- Compare site conditions from 2015/2016 to site conditions in 2020/2021, and evaluate if updates are required to the:
  - §257.73(a)(2) Hazard Potential Classification [2];
  - §257.73(c) History of Construction [3];
  - §257.73(d) Structural Stability Assessment [4];
  - §257.73(e) Safety Factor Assessment [5], and/or
  - §257.82 Inflow Design Flood Control System Plan [6].
- Independently review the Hazard Potential Classification ([2], [9]), Structural Stability Assessment ([4], [7]), Safety Factor Assessment ([5], [7]), and Inflow Design Flood Control System Plan ([6], [7]) reports to determine if updates may be required based on technical considerations.
  - The History of Construction report [3] was not independently reviewed for technical considerations, as this report contained historical information primarily developed prior to promulgation of the CCR Rule [1] for the CCR units at NPP, and did not include calculations or other information used to certify performance and/or integrity of the impoundments under §257.73(a)(2)-(3), §257.73(c)-(e), or §257.82.
- If updates are required, they will be performed and documented within this report.
- Confirm that the PAP meets all of the requirements associated with §257.73(a)(2), (c), (d), (e), and §257.82, or, if the PAP does not meet all requirements, provide recommendations for compliance with these sections of the CCR Rule [1].

SECTION 2

COMPARISON OF 2015/16 AND 2020/21 SITE CONDITIONS

2.1 Overview

This section describes the comparison of conditions at the PAP between the start of the initial CCR certification program in 2015 and subsequent collection of periodic certification site data in 2020 and 2021.

2.2 Review of Annual Inspection Reports

Annual onsite inspections for the PAP were performed between 2016 and 2020 ([10], [11], [12], [13], [14] and, [15]) and were certified by a licensed professional engineer in accordance with §257.83(b). Each inspection report stated the following information, relative to the previous inspection:

- A statement that no changes in geometry of the impounding structure were observed since the previous inspection.
- Information on maximum recorded instrumentation readings and water levels.
- Approximate volumes of impounded water and CCR at the time of inspection.
- A statement that no appearances of actual or potential structural weakness or other disruptive conditions were observed.
- A statement that no other changes which may have affected the stability or operation of the impounding structure were observed.

In summary, the reports did not indicate any significant changes to the PAP between 2015 and 2020.

2.3 Review of Instrumentation Data

Twelve piezometers are present at the PAP and were monitored monthly between August 5, 2015 and April 29, 2021 [16]. Geosyntec reviewed the piezometer data to evaluate if significant fluctuations, partially increases in phreatic levels, may have occurred between development of the initial structural stability and factor of safety certifications [7], [4], [5]) and April 29, 2021. Available piezometer readings are plotted in **Attachment A**.

In summary, the peak measured groundwater levels for several piezometers were up to 10 ft higher than the phreatic conditions considered during the initial certification. These changes could impact the results of the factor of safety analyses required for the structural stability and factor of safety certifications ([7], [4], [5]). Specifically, up to four cross sections were identified with significant changes in phreatic conditions.

2.4 Comparison of 2015 to 2020 Surveys

Surveys conducted at the site by Weaver Consultants (Weaver) in 2015 [17] and IngenAE, LLC (IngenAE) in 2020 [18] were compared within AutoCAD Civil3D 2021 software. This comparison quantified changes in the volume of CCR placed within the PAP and considered volumetric changes above and below the starting water surface elevation (SWSE) used for the 2016 §257.82 inflow design flood control plan hydraulic analysis [7]. Potential changes to embankment geometry were also evaluated. This comparison is presented in side-by-side views of each survey in **Drawing 1**, and a plan view isopach map denoting changes in ground surface elevation in **Drawing 2**. A summary of the water elevations and changes in CCR volumes is provided in **Table 2**.

Table 2 – 2015 and 2020 Survey Comparison

Initial Surveyed Pool Elevation (ft)	534.0
Periodic Surveyed Pool Elevation (ft)	535.5
Initial §257.82 Starting Water Surface Elevation (SWSE) (ft)	534.0
Total Change in CCR Volume (CY)	98,711 (fill)
Change in CCR Volume Above SWSE (CY)	185,376 (fill)
Change in CCR Volume Below SWSE (CY)	-86,913 (cut)

The comparison indicated that approximately 98,711 CY of CCR was placed in the PAP between the initial and periodic survey, thereby leading to a potential for the peak water surface elevation (PWSE) to increase during the inflow design 1,000-year flood event. Also, the measured water surface elevation for the periodic survey is higher than the water levels estimated for both normal and a 1,000-yr flood events event in the initial certifications (**Section 7**).

No significant changes to embankment geometry appeared to have occurred between the initial and periodic surveys, as shown on the isopach. However, along the northern embankments there appears to be material stockpiled upstream of the embankments which would have increased the loading on the embankments. It is further noted that there are two areas along the southern embankment that appear to be cut and apparently excavated since the initial survey. Such excavation is not known to have occurred and it is likely this apparent cut is a byproduct of survey discrepancy between the initial and periodic bathymetric surveys.

2.5 Comparison of 2015 to 2020 Aerial Photography

Aerial photographs of the PAP collected by Weaver in 2015 [17] and IngenAE in 2020 [18] were compared to visually evaluate if potential site changes (i.e., changes to the embankment, outlet structures, limits of CCR, other appurtenances) may have occurred. A comparison of these aerial photographs is provided in **Drawing 3**, and the following changes were identified:

- A few mounds of new earth built up along the northern embankments; and
- No clear change in the ash delta or shoreline was observed; and
- It appears the water level of the impounded pond may have been higher in 2015.

2.6 Comparison of Initial and Periodic Site Visits

An initial site visit to the PAP was conducted by AECOM in 2015 and documented with a Site Visit Summary and corresponding photographs [19]. A site visit was conducted by Geosyntec on May 21, 2021, with Panos Andonyadis, P.E., conducting the site visit. The site visit was intended to evaluate potential changes at the site since 2015 (i.e., modification to the embankment, outlet structures or other appurtenances, limits of CCR, maintenance programs, repairs), in addition to performing visual observations of the PAP to evaluate if the structural stability requirements (§257.73(d)) were still met. The site visit included walking the perimeter of the PAP, visually observing conditions, recording filed notes, and collecting photographs. The site visit is documented in a photographic log provided in **Attachment B**. A summary of significant findings from the periodic site visit is provided below:

- The perimeter embankments appear to be structurally stable as no signs of structural or foundation instability were observed
- No new development was observed in the vicinity of the PAP, although the observation was limited to the portions of the vicinity visible form the crest of the PAP dike.
- No significant changes were observed since the previous certification.

2.7 Interview with Power Plant Staff

An interview with Ken Schafer of the NPP was conducted by Panos Andonyadis of Geosyntec on May 21, 2021. Mr. Schafer was employed at NPP between 2015 and 2021, The interview included a discussion of potential changes that that may have occurred at the PAP since development of the initial certifications ([2], [3], [4], [5], [6], [7]) in 2015 and 2016. between 2015 and 2020. A summary of the interview is provided below.

- Were any construction projects completed for the PAP between 2015 and 2021, and, if so, are design drawings and/or details available?

  - No repairs were performed since the initial certification.

- Were there any changes to the purpose of the PAP between 2015 and 2021?

  - No, the impoundment continues to receive sluiced ash, sluiced bottom ash, and plant waste water.

- Were there any changes to the to the instrumentation program and/or physical instruments for the PAP between 2015 and 2021?

  - No.

- Are area-capacity curves for the PAP available?

  - No area-capacity curves have been developed.

- Were there any changes to spillways and/or diversion features for the PAP completed between 2015 and 2021?

  - No changes to the spillway were made.

- Were there any changes to construction specifications, surveillance, maintenance, and repair procedures for the PAP between 2015 and 2021?

  - No changes were made.

- Were there any instances of embankment and/or structural instability for the PAP between 2015 and 2021?

  - A repair of a slough was performed on the upstream side of the southernmost embankment. The damage appears to have been caused by wave related erosion and is limited to the area of a previous repair.

SECTION 3

HAZARD POTENTIAL CLASSIFICATION - §257.73(a)(2)

3.1 Overview of 2016 Initial Hazard Potential Classification

The Initial Hazard Potential Classification (Initial HPC) was prepared by Stantec Consulting Services, Inc. (Stantec) in 2016 ([2], [9]), following the requirements of §257.73(a)(2). The Initial HPC included the following information:

- Performing a visual analysis to evaluate potential hazards associated with a failure of the PAP perimeter embankment, along all sides of the PAP.
- Evaluation of potential breach flow paths were evaluated using elevation data and aerial imagery to evaluate potential impacts to downstream structures, infrastructure, frequently occupied facilities/areas, and waterways [2].
- While a breach map is not included in the Initial HPC, it is included within the §257.73(a)(3) Initial Emergency Action Plan prepared by Stantec [20].

The visual analysis indicated that none of the breach scenarios appeared to impact occupied structures, although a breach of the east embankment could impact an infrequently-used gravel site access road and a breach of the north, northeast or east embankment could impact a nearby railroad. The Initial HPC concluded that none of breach scenarios considered would be likely to result in a probable loss of human life, although the breach could cause CCR to be released into the Newton Lake, thereby causing environmental damage. The Initial HPC therefore recommended a "Significant" hazard potential classification for the PAP [2].

3.2 Review of Initial HPC

Geosyntec performed a review of the Initial HPC ([2], [9]) in terms of technical approach, input parameters, assessment of the results, and applicable requirements of the CCR Rule [1]. No significant technical issues were noted within the technical review, although a detailed review (e.g., check) of the calculations was not performed.

3.3 Summary of Site Changes Affecting the Initial HPC

Geosyntec did not identify any changes at the site that may affect the HPC. No new structures, infrastructure, frequently occupied facilities/areas, or waterways were present in the probable breach area indicated in the Initial EmAP [20], although Geosyntec's evaluation of new structures was limited to visual observations completed from the dike crest during the site visit and a review of available aerial imagery provided by IngenAE in 2020 [18]. Additionally, no significant changes to the topography in the probable breach were identified.

3.4 Periodic HPC

Geosyntec recommends retaining the "Significant" hazard potential classification for the PAP, per §257.73(A)(2), based on the lack of site changes potentially affecting the Initial HPC occurring since the initial HPC was developed, as described in **Section 3.2**. Updates to the Initial HPC reports ([2], [9]) are not recommended at this time.

SECTION 4

HISTORY OF CONSTRUCTION REPORT - §257.73(c)

4.1 Overview of Initial HoC

The Initial History of Construction report (Initial HoC) was prepared by AECOM in 2016 [3], following the requirements of §257.73(c), and included information on the PAP. The Initial HoC included the following information for each CCR surface impoundment:

- The name and address of the owner/operator,
- Location maps,
- Statements of purpose,
- The names and size of the surrounding watershed,
- A description of the foundation and abutment materials,
- A description of the embankment materials,
- Approximate dates and stages of construction,
- A list of available design and engineering drawings,
- A summary of instrumentation,
- A statement that area-capacity curves are not available,
- Information on spillway structures,
- A statement that the constructions specifications are not available,
- Inspection and surveillance plans,
- Information on operational and maintenance procedures, and
- A statement of observed historical structural instability that occurred at the PAP.

4.2 Summary of Site Affecting the Initial HoC

Several significant changes were identified at the site that occurred after development of the initial HoC report [3] and are described below:

- A state identification number (ID) of W0798070001-01 was assigned to the PAP by the Illinois Environmental Protection Agency (IEPA).

- Revised area-capacity curves and spillway design calculations for the PAP were prepared as part of the updated periodic Inflow Design Flood Control System Plan, as described in **Section 7.3**.

A letter documenting changes to the HoC report is provided in **Attachment C**.

SECTION 5

STRUCTURAL STABILITY ASSESSMENT - §257.73(d)

5.1 Overview of Initial SSA

The Initial Structural Stability Assessment (Initial SSA) was prepared by AECOM in 2016 ([4], [7]) following the requirements of §257.73(d)(1), and included the following evaluations:

- Stability of embankment foundations, embankment abutments, slope protection, embankment compaction, and slope vegetation,
- Spillway stability including capacity, structural stability and integrity;
- Stability and structural integrity of hydraulic structures; and
- Downstream slope stability under sudden drawdown conditions for a downstream water body.

The Initial SSA concluded that the PAP met all structural stability requirements for §257.73(d)(1)(i)-(vii).

A periodic certification of the structural stability and structural integrity of hydraulic outfall structures (§257.73(d)(1)(vi)) was performed by Luminant in 2020 [8]. This certification independently determined that the criteria was met due to the condition of the spillway pipes and the soil types within the embankment. Therefore, the review and certification of §257.73(d)(1)(vi) was not included within the scope of this report.

The Initial SSA referenced the results of the Initial Structural Factor Assessment (Initial SFA) ([5], [7]), to demonstrate stability of the stability of foundations and abutments (§257.73(d)(1)(i)) and sufficiency of dike compaction (§257.73(d)(1)(iii)) portions of the SSA criteria. This included stating that slope stability analyses for slip surfaces passing through the foundation met or exceeded the criteria listed in §257.73(e)(1), for the stability of foundations and abutments. For the sufficiency of dike compaction, this included stating that slope stability analyses for slip surfaces passing through the dike also met or exceeded the §257.73(e)(1) criteria.

Additionally, the Initial SSA included a sudden drawdown slope stability analysis to evaluate the effect of a drawdown event in the adjacent Newton Lake from the 100-year flood pool to an empty-pool condition, as required by §257.73(3)(1)(vii) for CCR units where the downstream slopes are inundated by an adjacent water body. The minimum acceptable factor of safety for this loading condition was assumed to be 1.3 based on US Army Corps of Engineers guidance [21].

5.2 Review of Initial SSA

Geosyntec performed a review of the Initial SSA ([4], [7]) in terms of technical approach, calculation input parameters and methodology, recommendations, and completeness. The review included the following tasks:

- Reviewing photographs collected in 2015 and used to demonstrate compliance with §257.73(d)(1)(i)-(vii).
- Reviewing geotechnical calculations used to demonstrate the stability of foundations, per §257.73(d)(1)(i), sufficiency of embankment compaction, per §257.73(d)(1)(iii), and downstream slope inundation/stability, per §257.73(d)(1)(vii), in terms of supporting geotechnical investigation and testing data, input parameters, analysis methodology, selection of critical cross-sections, and loading conditions.
- Reviewing completeness and technical approach of closed-circuit television (CCTV) inspections used to evaluate the stability of hydraulic structures, per §257.73(d)(1)(vi).

No significant technical issues were noted within the technical review, although a detailed review (e.g., check) of the calculations was not performed.

5.3 Summary of Site Changes Affecting the Initial SSA

Several changes at the site that occurred after development of the Initial SSA were identified. These changes required updates to the Initial SSA and are described below:

- The Initial SSA utilized the results of the Initial Inflow Design Flood Control System Plan (IDF) to demonstrate compliance with the adequacy of spillway design and management (§257.73(d)(1)(v)(A)-(B)). The Initial IDF was subsequently updated to develop a Periodic IDF, based on site changes, as discussed in **Section 7**.
- The Initial SSA utilized the slope stability analysis results of the Initial Safety Factor Assessment (SFA) as part of the compliance demonstration for the stability of foundations and abutments (§257.73(d)(1)(i)) and sufficiency of dike compaction (§257.73(d)(1)(iii)) as discussed in **Section 5.1**. The Initial SSA also utilized sudden drawdown slope stability analyses performed using the same cross-sections and input data as the Initial SFA to demonstrate compliance with downstream slope inundation/stability (§257.73(d)(1)(vii). The Initial SFA slope stability analyses, including the sudden drawdown analyses, were subsequently updated to develop a Periodic SFA, based on site changes, as discussed in **Section 6.4**.

5.4 Periodic SSA

The Periodic SFA (**Section 6.4**) indicates that foundations and abutments are stable and dike compaction is sufficient for expected ranges in loading conditions, as slope stability factors of safety were found to meet or exceed the requirements of §257.73(e)(1), including for static maximums storage pool conditions and post-earthquake (i.e., liquefaction) loading conditions considering seismically-induced strength loss in the foundation soils. Therefore, the requirements of §257.73(d)(1)(i) and §257.73(d)(1)(iii) are met for the Periodic SSA.

The Periodic IDF (**Section 7.4**) indicates that spillways are adequately designed and constructed to adequately manage flow during the PMF flood, as the spillways can adequately manage flow during peak discharge from the PMP storm event without overtopping of the embankments. Therefore, the requirements of §257.73(d)(1)(v)(A)-(B) are met for the Periodic SSA.

Certification of §257.73(d)(1)(vi) was independently performed by Luminant [8] and is not included within the scope of this report.

SECTION 6

SAFETY FACTOR ASSESSMENT - §257.73(e)(1)

6.1 Overview of Initial SFA

The Initial Safety Factor Assessment (Initial SFA) was prepared by AECOM in 2016 [7], following the requirements of §257.73(e)(1). The Initial SFA included the following information:

- A geotechnical investigation program with in-situ and laboratory testing;
- An assessment of the potential for liquefaction in the embankment and foundation soils;
- The development of ten slope stability cross-sections for limit equilibrium stability analysis utilizing GeoStudio SLOPE/W software; and
- The analysis of all cross-sections for maximum storage pool, maximum surcharge pool, and seismic loading conditions.

The Initial SFA concluded that the PAP met all safety factor requirements, per §257.73(e), as all calculated safety factors were equal to or higher than the minimum required values.

6.2 Review of Initial SFA

Geosyntec performed a review of the Initial SFA ([5], [7]) in terms of technical approach, calculation input parameters and methodology, recommendations, and completeness. The review included the following tasks:

- Reviewing geotechnical calculations used to demonstrate the acceptable safety factors, per §257.73(e)(1), in terms of:
    - Completeness and adequacy of supporting geotechnical investigation and testing data;
    - Completeness and approach of liquefaction triggering assessments;
    - Input parameters, analysis methodology, selection of critical cross-sections, and loading conditions utilized for slope stability analyses; and
    - Phreatic conditions based on piezometric data, as discussed in **Section 2.3**.

No significant technical issues were noted within the technical review, although a detailed review (e.g., check) of the calculations was not performed.

6.3 Summary of Site Changes Affecting the Initial SFA

Several changes at the site that occurred after development of the Initial SFA were identified. These changes required updates to the Initial SFA and are described below:

- The groundwater levels measured since 2015 (**Section 2.3**) appear to be up to 10 ft higher than the phreatic surface modeled for the perimeter embankments during the Initial SFA ([5], [7]). Therefore, the phreatic surface needed to be updated to reflect the critical levels observed since 2015.

- The Periodic IDF (**Section 7.4)** found that the normal pool elevation within the PAP increased from 534.0 to 537.0 ft, resulting in 3.0 ft more water loading on the embankment dikes than was considered in the Initial SFA for the maximum storage pool, seismic loading conditions (§257.73(e)(1)(i) and (iii)), and sudden drawdown loading condition (§257.73(d)(1)(ii)). Peak water surface elevations during the IDF also increased from 534.9 to 538.2 ft, resulting in 3.3 ft more water loading on the embankment dikes than was considered in the Initial SFA for the maximum surcharge pool loading conditions (§257.73(e)(1)(i)).

6.4 Periodic SFA

Geosyntec revised existing slope stability analyses associated with the Initial SFA ([5], [7]) for the ten cross- sections of PAP to account for the increase in normal and peak pool loadings, and phreatic level changes as described in **Section 2.3** and **Section 7.4**. This included revising the slope stability analyses evaluating sudden drawdown conditions in the cross-sections adjacent to the downstream water body that were utilized as part of the Initial SSA (**Section 6.2**). The following approach and input data were used to revise the analyses:

- Water levels in the PAP for the maximum storage pool, seismic slope stability analysis, and sudden drawdown loading conditions were increased to El. 537.0 ft, based on the Periodic IDF (**Section 7.4)**.

- Water levels in the PAP for the maximum surcharge pool slope stability analysis loading conditions were increased to El. 538.2 ft, based on the Periodic IDF (**Section 7.4)**.

- According to updated groundwater level monitoring plot (**Section 2.3**), the phreatic level in the location of related piezometers increased for all the loading conditions from El. 534 to El. 538 ft in cross-section "E", from El. 537 to El. 539 ft in cross-section "F", from El. 535 to El. 544 ft in cross-section "G", and from El. 535 to El. 541 ft in cross-section "K".

- All other analysis input data and settings from the Initial SFA ([5], [7]), were utilized, including, but not limited to, subsurface stratigraphy and soil strengths, phreatic conditions, ground surface geometry, software package and version, slip surface search routines and methods, and input data for the seismic analyses.

Factors of safety from the Periodic SFA are summarized in **Table 3** and confirm that the PAP meets the requirements of §257.73(e)(1). Slope stability analysis output associated with the Initial SFA is provided in **Attachment D**.

Table 3 – Factors of Safety from Periodic SFA

	Structural Stability Assessment (§257.73(d)) and Safety Factor Assessment (§257.73(e))				**Structural Stability Assessment (§257.73(d))**
Cross-Section	**Maximum Storage Pool §257.73(e)(1)(i) Minimum Required = 1.50**	**Maximum Surcharge Pool[1] §257.73(e)(1)(ii) Minimum Required = 1.40**	**Seismic §257.73(e)(1)(iii) Minimum Required = 1.00**	**Dike Liquefaction §257.73(e)(1)(iv) Minimum Required = 1.20**	**Sudden Drawdown §257.73(d)(1)(ii) Minimum Required = 1.30**
A	1.82	1.82	1.26	N/A	N/A
B	1.81	1.81	1.07*	N/A	1.59*
C	1.67	1.67	1.11	N/A	1.67
D	1.76	1.76	1.23	N/A	1.76
E	2.18	2.18	1.91	N/A	N/A
F	1.93	1.93	1.45	N/A	N/A
G	1.98	1.98	1.46	N/A	N/A
H	1.81	1.81	1.36	N/A	N/A
I	1.66*	1.66*	1.43	N/A	1.61
K	1.73	1.74	1.17	N/A	1.73

Notes:
*Indicates critical cross-section (i.e., lowest calculated factor of safety out of the ten cross-sections analyzed)
N/A – Loading condition is not applicable.

SECTION 7

INFLOW DESIGN FLOOD CONTROL SYSTEM PLAN - §257.82

7.1 Overview of 2016 Inflow Design Flood Control System Plan

The Initial Inflow Design Flood Control System Plan (Initial IDF) was prepared by AECOM in 2016 [7], following the requirements of §257.82. The Initial IDF included the following information:

- A hydraulic and hydrologic analysis, performed for the 1,000-year design flood event because of the hazard potential classification of "Significant", which corresponded to 9.01 inches of rainfall over a 24-hour period.
- The Initial IDF utilized a HydroCAD Version 10 model to evaluate spillway flows and pool level increases during the design flood, with a starting water surface elevation of 534.0 ft.

The Initial IDF concluded that the PAP met the requirements of §257.82, as the peak water surface estimated by the HydroCAD model was elevation 534.9 ft, relative to a minimum PAP embankment crest elevation of 552.7 ft. Therefore, overtopping was not expected. The Initial IDF also evaluated the potential for discharge from the CCR unit and determined that discharge from the PAP during normal and inflow design flood conditions was expected to be routed through the existing spillway and NPDES-permitted outfall.

7.2 Review of Initial IDF

Geosyntec performed a review of the Initial IDF ([6], [7]) in terms of technical approach, calculation input parameters and methodology, recommendations, and completeness. The review included the following tasks:

- Reviewing the return interval used vs. the hazard potential classification.
- Reviewing the rainfall depth and distribution for appropriateness.
- Performing a high-level review of the inputs to the hydrological modeling.
- Reviewing the hydrologic model parameters for spillway parameters, starting pool elevation, and storage vs. the reference data.
- Reviewing the overall Initial IDF vs. the applicable requirements of the CCR Rule

Several review comments were identified during review of the Initial IDF. The comments are described below:

- The Initial IDF utilized the National Resource Conservation Service (NRCS) Type II rainfall distribution type [22]. Geosyntec recommend utilizing the Huff 3rd Quartile distribution for areas less than 10 square miles [23] for the reasons listed below.
  - Huff 3rd Quartile distribution was determined to be a more appropriate representation of a 1,000-year, 24-hour storm event per the Illinois State Water Survey (ISWS) Circular 173 [24] which developed standardized rainfall distributions from compiled rainfall data at sites throughout Illinois.
  - Illinois Department of Natural Resources, Office of Water Resources (IDNR-OWR) [25] recommends use of the Huff Quartile distributions in Circular 173 when using frequency events to determine the spillway design flood inflow hydrograph, "*The suggested method to distribute this rainfall is described in the ISWS publication, Circular 173, "Time Distributions of Heavy Rainstorms in Illinois"*.
- The process inflows (ash sluice and wastewater) included within the hydrologic and hydraulic analysis file were daily averages which are less than the maximum pump rate (i.e., worst-case scenario).

7.3 Summary of Site Changes Affecting the Initial IDF

Two changes at the site that occurred after development of the Initial IDF were identified. These changes required updates to the Initial IDF and are described below:

- Approximately 98,700 CY of CRR were placed above the SWSE utilized for the Initial IDF certification, thereby altering the stage-storage curve for the PAP relative to the Initial IDF.
- The operative water level of the impoundment is higher, thereby altering the SWSE for the PAP relative to the Initial IDF.

7.4 Periodic IDF

Geosyntec revised the HydroCAD model associated with the Initial IDF to account for the revised rainfall distribution type, cessation of process flows, and additional CCR placement, as described in **Sections 7.2** and **7.3**. The following approach and input data were used for the revised analyses and are referenced in **Attachment E** as appropriate:

- Stage-storage (i.e., area-capacity) curves for the PAP were updated based on the 2020 site survey [18].

  - A revised stage-volume curves for the PAP and Secondary Pond were prepared based on measuring the storage volume of the ponds at every one-foot increment of depth from an elevation at the bottom of the ponds (495 ft PAP; 505 ft Secondary Pond) to the perimeter dike embankment's approximate minimum crest elevation (552 ft PAP; 532 ft Secondary Pond). This analysis identified an overall increase of 129,070 CY (80 ac-ft) of storage volume at the PAP and an overall decrease of 14,520 CY (9 ac-ft) of storage volume at the Secondary Pond from 2016 to 2021.

- The SWSE within the PAP was updated from 534.0 ft to 537.0 ft as this is the invert of the pond outlet structure. The 2020 site survey showed a water surface elevation (WSE) of 535.5 ft; however, the greater elevation of the outlet invert and the surveyed WSE was used as the SWSE to provide conservatism in the model.

- The SWSE within the Secondary Pond was updated from 520.0 ft to 519.9 ft to reflect the 2020 site survey. The primary outlet invert elevation from the Secondary Pond is 505 ft; however, the greater elevation of the outlet invert and the surveyed WSE was used as the SWSE to provide conservatism in the model.

- Updated the inflows from the Ash Sluice from 3.88 cfs for 14 hours per day to 13.37 cfs for 14 hours per day for the duration of the modeled simulation. This more accurately reflects the full load operation of the pumps described in the Initial Full Certification Report (two pumps at 3,000 gpm each, operating 14 hours/day under full load).

- Wastewater inflows were updated from 11.64 cfs for 24 hours per day to 23.39 cfs for 12 hours per day for the duration of the modeled simulation. This more accurately reflects the full load operation of the pumps described in the Initial Full Certification Report (five pumps at 2,100 gpm each, operating 60 pump hours/day).

- The time of concentration (ToC) was updated for drainage areas to the PAP and Secondary Pond from 16.7 minutes (PAP) and 5 minutes (Secondary Pond) to 6 minutes to reflect direct run-on inflow in accordance with TR-20 [22].

- The primary outlet structure from the PAP was updated to reflect the description in the Initial Full Certification Report with no noted changes to the outlet structures.

  - The outlet invert elevation was updated from 512.0 ft to 512.18 ft to reflect the described invert elevation of 512.5 ft using the NGVD29 datum. This was converted to the NAVD88 datum to be consistent with the vertical datum used for the IDF HydroCAD model.

  - Added a weir box riser structure by routing a 28-inch diameter horizontal orifice to the existing outlet culvert. The invert of the riser was set to 537.0 ft. The dimensions of the riser structure were not available; therefore, the riser structure was sized in the model to be consistent with the downstream culvert; this was assumed to be a conservatively restrictive outlet.

- The routing method for the model was updated to more accurately account for routing between the ponds and Lake Newton. The Reach Routing Method was updated from “Storage Indication+ Translation” to “Dynamic Storage Indication”. The Pond Routing Method was updated from “Storage – Indication” to “Dynamic Storage Indication”.

- The tailwater conditions of the PAP and Secondary Pond were changed from fixed elevations to “Automated” to more accurately account for routing between the ponds.

- Lake Newton was changed to be represented by a link instead of a pond, which allowed a fixed water surface of 504.33 ft (based on 2020 survey of outlet invert elevation).

- The outlet invert elevation of the culvert outlet from the Secondary Pond was updated to 504.33 ft to reflect the 2020 site survey.

- All other input data and settings from the Initial IDF HydroCAD model were utilized, including, but not limited to software package and version, runoff method, rainfall depth, analysis time span and analysis time step.

The results of the Updated IDF are summarized in **Table 4** and confirm that the PAP meets the requirements of §257.82(a)-(b), as the peak water surface elevation does not exceed the minimum perimeter dike crest elevations. Additionally, all discharge from the PAP is routed through the existing spillway system to the NPDES-permitted outfall, during both normal and IDF conditions. Updated area-capacity curves and HydroCAD model output is provided in **Attachment E**.

Table 4- Water Levels from Periodic IDF

	Primary Ash Pond		
Analysis	**Starting Water Surface Elevation (ft)**	**Peak Water Surface Elevation (ft)**	**Minimum Dike Crest Elevation (ft)**
Initial IDF	534.0	534.9	552.0
Updated Periodic IDF	537.0	538.2	552.0
Initial to Periodic Change[1]	+3.0	+3.3	

Notes:
[1]Postive change indicates increase in the WSE relative to the Initial IDF, negative change indicates decrease in the WSE, relative to the Initial IDF.

SECTION 8

CONCLUSIONS

The PAP at NPP was evaluated relative to the USEPA CCR Rule periodic assessment requirements for:

- Hazard potential classification (§257.73(a)(2)),
- History of Construction reporting (§257.73(d)),
- Structural stability assessment (§257.73(d)), with the exception of §257.73(d)(1)(vi) that was independently certified by Luminant [8];
- Safety factor assessment (§257.73(e)), and
- Inflow design flood control system planning (§257.82).

Based on the evaluations presented herein, the referenced requirements are satisfied.

SECTION 9

CERTIFICATION STATEMENT

CCR Unit: Illinois Power Generating Company, Newton Power Plant, Primary Ash Pond

I, Panos Andonyadis, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief that the information contained in this 2021 USEPA CCR Rule Periodic Certification Report, has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the periodic assessment of the hazard potential classification, history of construction report, structural stability, safety factors, and inflow design flood control system planning, dated October 2021, were conducted in accordance with the requirements of 40 CFR §257.73(a)(2), (c), (d), (e), and §257.82, with the exception of §257.73(d)(1)(vi)) that was independently certified by others.

Panos Andonyadis

OCTOBER 11, 2021

Date

SECTION 10

REFERENCES

[1] United States Environmental Protection Agency, 40 CFR Parts 257 and 261; Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule, 2015.

[2] Stantec Consulting Services Inc., "Initial Hazard Potetnial Classificaiton Assessment, EPA Final CCR Rule, Primary Ash Pond, Newton Power Station, Jasper County, Illinois," Fenton, MO, October 12, 2016.

[3] AECOM, "History of Construction, USEPA Final CCR Rule, Newton Power Station, Newton, Illinois," October 2016.

[4] AECOM, "CCR Rule Report: Initial Structural Stability Assessment For Primary Ash Pond At Newton Power Station," St. Louis, MO, October 2016.

[5] AECOM, "CCR Rule Report: Initial Safety Factor Assessment For Primary Ash Pond At Newton Power Station," St. Louis, MO, October 2016.

[6] AECOM, "CCR Rule Report: Initial Inflow Design Flood Control System Plan For Primary Ash Pond At Newton Power Station," St. Louis, MO, October 2016.

[7] AECOM, "CCR Certification Report: Initial Structural Stability Assessment, Initial Safety Factor Assessment, and Initial Inflow Design Flood Control System Plan for Primary Ash Pond at Newton Power Station," St. Louis, MO, October 2016.

[8] V. Modeer, "Primary Ash Pond Structural Stability Assessment, Illinois Power Resrouces Generationg, LLC, Newton Power Station," Luminant, October 1, 2020.

[9] Stantec Consulting Services, Inc., "Documentation of Initial Hazard Potential Classificaiton Assessment, Primary Ash Pond, Newton Power Station, Jasper County, Illinois," October 12, 2016.

[10] J. Knutelski and J. Campbell, *Annual CCR Surface Impoundment Inspection Report (per 40 CFR 257.83(b)(2)), Newton Power Station, Primary Ash Pond*, January 18, 2016.

[11] J. Knutelski and J. Campbell, *Annual CCR Surface Impoundment Inspection Report (per 40 CFR 257.83(b)(2)), Newton Power Station, Primary Ash Pond*, January 18, 2017.

[12] J. Knutelski and J. Campbell, *Annual CCR Surface Impoundment Inspection Report (per 40 CFR 257.83(b)(2)), Newton Power Station, Primary Ash Pond*, February 7, 2018.

[13] J. Knutelski, *Annual Inspection by a Qualified Professional Engineer, 40 CFR 257.83(b), Newton Power Station, Primary Ash Pond*, January 10, 2019.

[14] Knutelski, James, *Annual Inspection by a Qualified Professional Engineer, 40 CFR §257.83(b), Newton Power Station, Primary Ash Pond*, January 10, 2020.

[15] James Knutelski, *Annual Inspection by a Qualified Professional Engineer, 40 CFR §257.83(b), Newton Power Station, Primary Ash Pond*, January 06, 2021.

[16] Geocyntec Consultants Inc., "Newton Piezo Measurements_20160121," Geocyntec Consultants Inc., Chesterfield, MO, 2021.

[17] Weaver Consultants Group, "Dynegy, Collinsville, IL, 2015 - Newton Topography," Collinsville, IL, December 2015.

[18] IngenAE, "Luminant, Dynegy Midwest Generation, LLC, Newton Power Station, December 2020 Topography," Earth City, Missouri, March 12, 2021.

[19] AECOM, "Draft CCR Unit Initial Site Visit Summary, Dynegy CCR Compliance Program," June 24, 2015.

[20] Stantec Consulting Services Inc, "Illinois Power Generating Company, Newton Power Station, City of Newton, Jasper County, IL, Emergency Action Plan, Primary Ash Pond (NID # IL50719)," Fenton, MO, April 13, 2017.

[21] U.S. Army Corps of Engineers, "Slope Stability, EM 1110-2-1902," October 31, 2003.

[22] Natural Resources Conservation Service, Conservation Engineering Division, "Urban Hydrology for Small Watersheds (TR-55)," United States Department of Agriculture, June 1985.

[23] F. A. Huff and J. R. Angel, "Frequency Distributions and Hydroclimatic Characteristics of Heavy Rainstorms in Illinois," State Water Survey Division, Department of Energy and Natural Resoruces, State of Illinois, Champaign, Illinois, 1989.

[24] F. A. Huff, "Time Distributions of Heavy Rainstorms in Illinois," State Water Survey, Department of Energy and Natural Resoruces, State of Illinois, Champaign, Illinois, 1990.

[25] Office of Natural Resources, "Procedural Guidelines for Preparation of Technical Data to be included in Applications for Permits for Construction and Maintenance of Dams," Department of Natural Resoruces, State of Illinois, Springfield, Illinois, Undated.

DRAWINGS

NOTES:

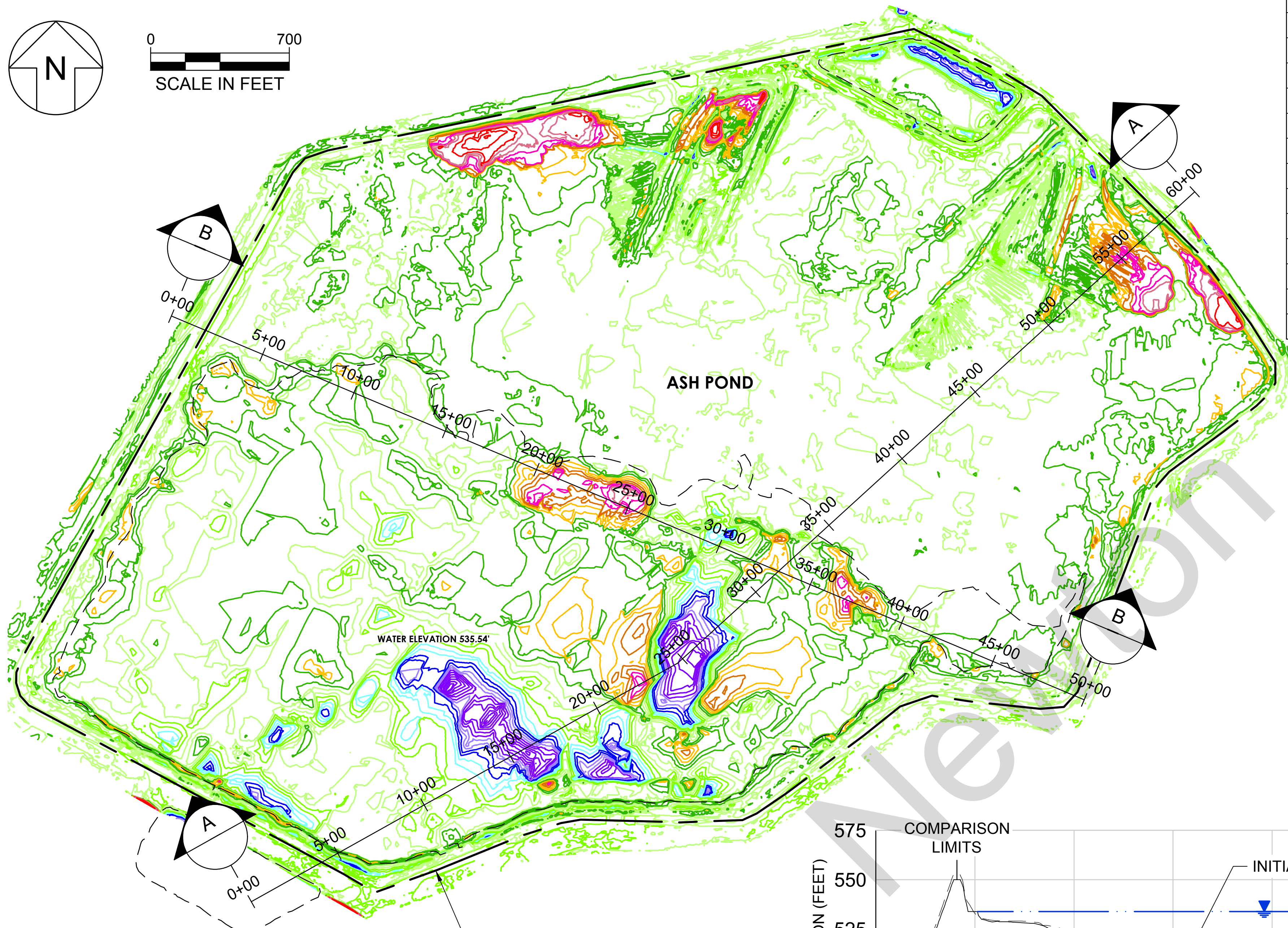
1. THE INITIAL SURVEY WAS TAKEN FROM THE DRAWING PACKAGE TITLED "DYNEGY, COLLINSVILLE, ILLINOIS, 2015 - NEWTON TOPOGRAPHY", PREPARED BY WEAVER CONSULTANTS GROUP, DATED DECEMBER 1, 2015.
2. THE PERIODIC SURVEY WAS TAKEN FROM THE DRAWING PACKAGE TITLED "LUMINANT, ILLINOIS POWER GENERATING COMPANY, NEWTON POWER STATION, DECEMBER 2020 TOPOGRAPHY", PREPARED BY INGENAE, DATED FEBRUARY 26, 2021.
3. ALL SURVEY DATA WAS COLLECTED IN THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) AND NORTH AMERICAN DATUM OF 1983 (NAD83) FOR VERTICAL AND HORIZONTAL COORDINATES, RESPECTIVELY.

INITIAL TO PERIODIC SURVEY COMPARISON
ASH POND
NEWTON POWER PLANT
NEWTON, ILLINOIS

Geosyntec consultants

DRAWING
1

GLP8027.08 | MAY 2021

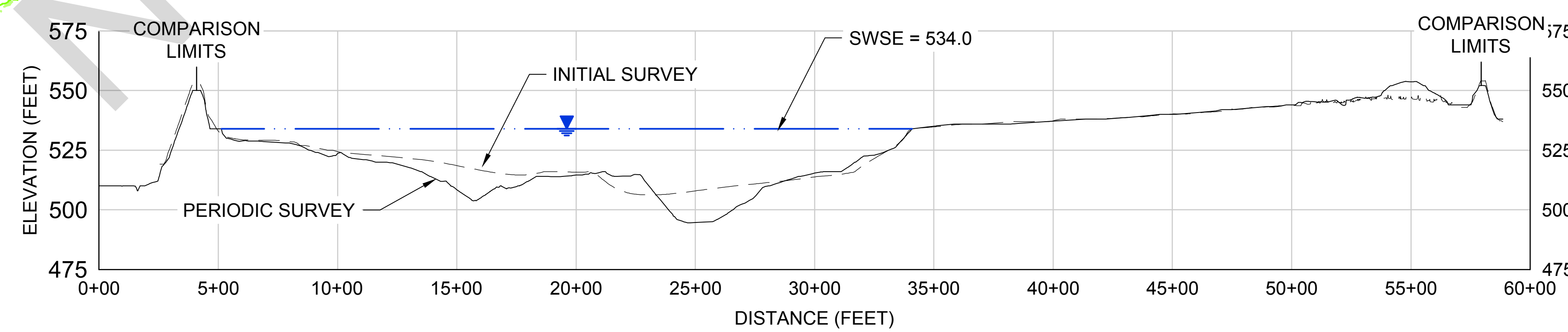


ISOPACH CONTOUR KEY		
COLOR	MIN ELEV	MAX ELEV
(purple)	-17	-10
(light purple)	-10	-8
(blue)	-8	-6
(cyan)	-6	-4
(green)	-4	-2
(light green)	-2	0
(dark green)	0	2
(yellow)	2	4
(orange)	4	6
(magenta)	6	8
(pink)	8	10
(red)	10	26

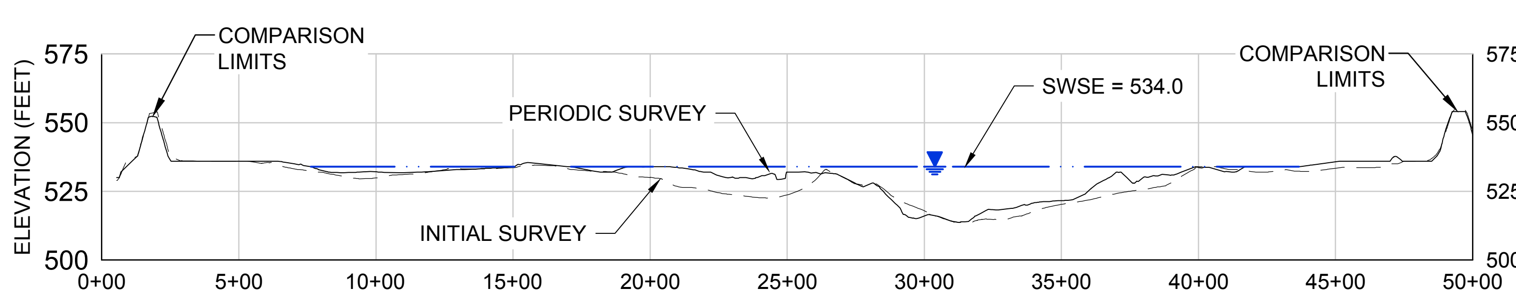
INITIAL TO PERIODIC SURVEY COMPARISON SUMMARY			
SURFACE IMPOUNDMENT	CUT	FILL	NET (CU. YD.)
ASH POND	467,675	566,386	98,711(FILL)
ABOVE SWSE	144,793	330,169	185,376 (FILL)
BELOW SWSE	322,591	235,677	86,913 (CUT)

NOTES:

1. THE INITIAL SURVEY WAS TAKEN FROM THE DRAWING PACKAGE TITLED "DYNEGY, COLLINSVILLE, ILLINOIS, 2015 - NEWTON TOPOGRAPHY", PREPARED BY WEAVER CONSULTANTS GROUP, DATED DECEMBER 1, 2015.
2. THE PERIODIC SURVEY WAS TAKEN FROM THE DRAWING PACKAGE TITLED "LUMINANT, ILLINOIS POWER GENERATING COMPANY, NEWTON POWER STATION, DECEMBER 2020 TOPOGRAPHY", PREPARED BY INGENAE, DATED FEBRUARY 26, 2021.
3. ALL SURVEY DATA WAS COLLECTED IN THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) AND NORTH AMERICAN DATUM OF 1983 (NAD83) FOR VERTICAL AND HORIZONTAL COORDINATES, RESPECTIVELY.
4. THE STARTING WATER SURFACE ELEVATION (SWSE) OF THE PRIMARY ASH POND IS EL. 534.0 FT, AS NOTED IN THE REPORT TITLED "CCR CERTIFICATION REPORT: INITIAL STRUCTURAL STABILITY ASSESSMENT, INITIAL SAFETY FACTOR ASSESSMENT, AND INITIAL INFLOW DESIGN FLOOD CONTROL SYSTEM PLAN FOR PRIMARY ASH POND AT NEWTON POWER STATION", PREPARED BY AECOM, DATED OCTOBER, 2016.



SECTION A



SECTION B

0 700
HORZ: SCALE IN FEET

0 70
VERT: SCALE IN FEET

SURVEY COMPARISON ISOPACH
NEWTON POWER PLANT
NEWTON, ILLINOIS

Geosyntec consultants

DRAWING 2

GLP8027.08 | MAY 2021

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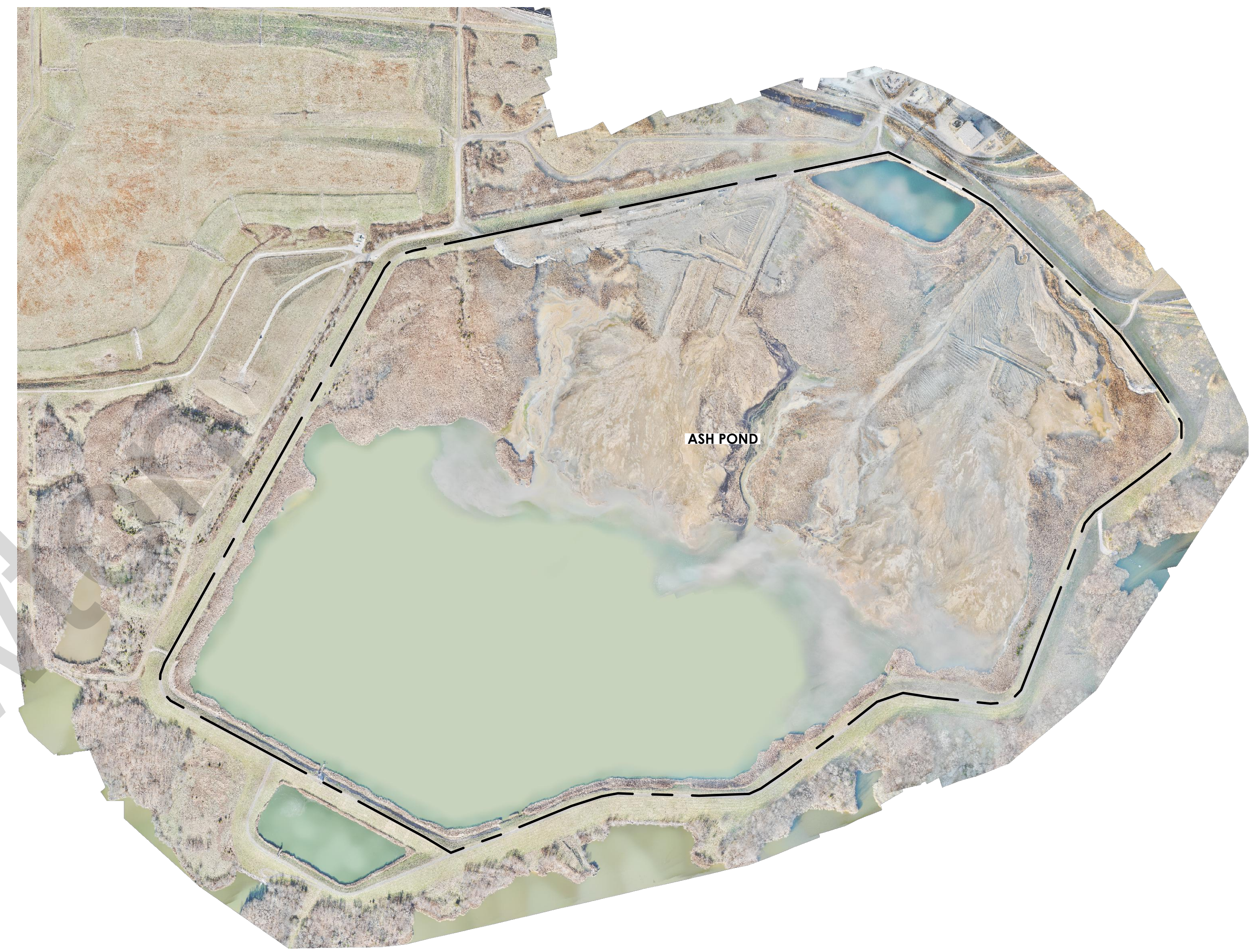
INITIAL AERIAL
12-01-2015 IMAGERY



PERIODIC AERIAL
02-26-2021 IMAGERY

0 1,000
SCALE IN FEET

NOTES:

1. THE INITIAL IMAGERY WAS TAKEN FROM THE DRAWING PACKAGE TITLED "DYNEGY, COLLINSVILLE, ILLINOIS, 2015 - NEWTON TOPOGRAPHY", PREPARED BY WEAVER CONSULTANTS GROUP, DATED DECEMBER 1, 2015.
2. THE PERIODIC IMAGERY WAS TAKEN FROM THE DRAWING PACKAGE TITLED "LUMINANT, ILLINOIS POWER GENERATING COMPANY, NEWTON POWER STATION, DECEMBER 2020 TOPOGRAPHY", PREPARED BY INGENAE, DATED FEBRUARY 26, 2021.

INITIAL TO PERIODIC AERIAL IMAGERY COMPARISON
ASH POND
NEWTON POWER PLANT
NEWTON, ILLINOIS

Geosyntec consultants

DRAWING 3

GLP8027.08 | MAY 2021

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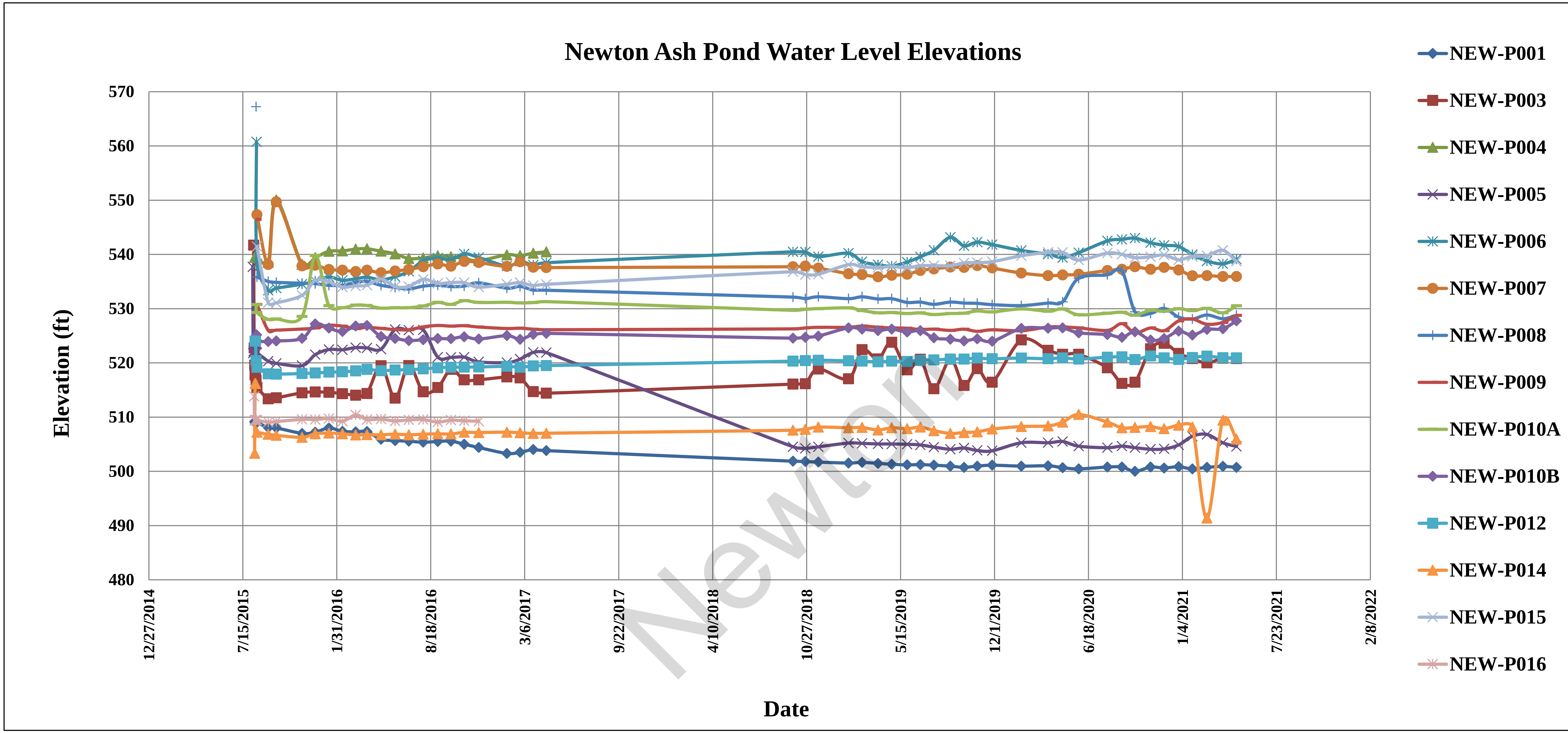
ATTACHMENTS

Attachment A

PAP Piezometer Data Plots



NOTES:

1. Piezometer data was taken from the spreadsheet titled "Newton Piezo Measurements_20160121", provided by the Newton Power Station.

PIEZOMETER DATA PERIODIC CERTIFICATION NEWTON POWER PLANT NEWTON, ILLINOIS		Figure
Geosyntec consultants		1
GLP8027	6/2/2021	

Attachment B

PAP Site Visit Photolog

GEOSYNTEC CONSULTANTS **Photographic Record**	Geosyntec consultants
Site Owner: Illinois Power Generating Company	**Project Number:** GLP8027
CCR Unit: Primary Ash Pond	**Site:** Newton Power Plant

Photo: 01	
Date: 5/21/2021	
Direction Facing: NW	
Comments: Photo of the ash pond from the east embankment. Example of vegetative coverage and phragmites within the ash basin.	

Photo: 02	
Date: 5/21/2021	
Direction Facing: NE	
Comments: Example of vegetative coverage for the downstream slope along the northeast embankment.	

GEOSYNTEC CONSULTANTS
Photographic Record

Site Owner: Illinois Power Generating Company	**Project Number:** GLP8027
CCR Unit: Primary Ash Pond	**Site:** Newton Power Plant

Photo: 03

Date: 5/21/2021

Direction Facing: W

Comments: Photo taken from the east embankment. Example of vegetative cover along the upstream slope of the embankment.

Photo: 04

Date: 5/21/2021

Direction Facing: SW

Comments: Photo taken from the east embankment. Example of vegetative cover along the downstream slope of the embankment.

GEOSYNTEC CONSULTANTS
Photographic Record

Geosyntec consultants

Site Owner: Illinois Power Generating Company	**Project Number:** GLP8027
CCR Unit: Primary Ash Pond	**Site:** Newton Power Plant

Photo: 05

Date: 5/21/2021

Direction Facing: E

Comments: Example of the vegetative cover of the upstream side of the embankment and within the ash basin. Some tree growth and phragmite growth within the ash basin.

Photo: 06

Date: 5/21/2021

Direction Facing: E

Comments: Tallest downstream slope along the south embankment and Newton Lake. Complete vegetative cover with no signs of instability or evidence of rapid draw down.

GEOSYNTEC CONSULTANTS
Photographic Record

Site Owner: Illinois Power Generating Company	**Project Number:** GLP8027
CCR Unit: Primary Ash Pond	**Site:** Newton Power Plant

Photo: 07 **Date:** 5/21/2021 **Direction Facing:** E **Comments:** Upstream side of southern embankment. Example of vegetative cover. No signs of instability and erosion.	
Photo: 08 **Date:** 5/21/2021 **Direction Facing:** W **Comments:** Wave damage erosion observed along the downstream side of the southern embankment. At present this does not appear to be a stability concern for the embankment.	

Site Owner: Illinois Power Generating Company	**Project Number:** GLP8027
CCR Unit: Primary Ash Pond	**Site:** Newton Power Plant

Photo: 09

Date: 5/21/2021

Direction Facing: E

Comments: Downstream side of the southern embankment. Good vegetative cover, no tree growth or signs of erosion or instability.

Photo: 10

Date: 5/21/2021

Direction Facing: NW

Comments: Upstream side of the southwest embankment. Good vegetative cover, no tree growth or signs of erosion or instability.

Site Owner: Illinois Power Generating Company	**Project Number:** GLP8027
CCR Unit: Primary Ash Pond	**Site:** Newton Power Plant

Photo: 11 **Date:** 5/21/2021 **Direction Facing:** N **Comments:** Discharge point for the secondary Pond outlet pipe.	
Photo: 12 **Date:** 5/21/2021 **Direction Facing:** N **Comments:** Secondary pond downstream side embankments. Good vegetative cover, no tree growth or signs of erosion or instability.	

GEOSYNTEC CONSULTANTS
Photographic Record

Geosyntec consultants

Site Owner: Illinois Power Generating Company	**Project Number:** GLP8027
CCR Unit: Primary Ash Pond	**Site:** Newton Power Plant

Photo: 13 **Date:** 5/21/2021 **Direction Facing:** NE **Comments:** Primary ash pond discharge structure. No signs of erosion along the structure and no signs of deterioration or damage of the structure.	
Photo: 14 **Date:** 5/21/2021 **Direction Facing:** N **Comments:** Downstream side of the western embankment. Good vegetative cover, no tree growth or signs of erosion or instability. Some vegetative growth observed on the embankment crest.	

GEOSYNTEC CONSULTANTS
Photographic Record

Geosyntec consultants

Site Owner: Illinois Power Generating Company	**Project Number:** GLP8027
CCR Unit: Primary Ash Pond	**Site:** Newton Power Plant

Photo: 15	
Date: 5/21/2021	
Direction Facing: W	
Comments: Some erosion along the access ramp on the western embankment. Geosyntec recommended regrading the ramp as part of regular maintenance.	

Photo: 16	
Date: 5/21/2021	
Direction Facing: N	
Comments: Downstream side of the western embankment. Good vegetative cover, no tree growth or signs of erosion or instability.	

GEOSYNTEC CONSULTANTS
Photographic Record

Geosyntec consultants

Site Owner: Illinois Power Generating Company	**Project Number:** GLP8027
CCR Unit: Primary Ash Pond	**Site:** Newton Power Plant

Photo: 17

Date: 5/21/2021

Direction Facing: S

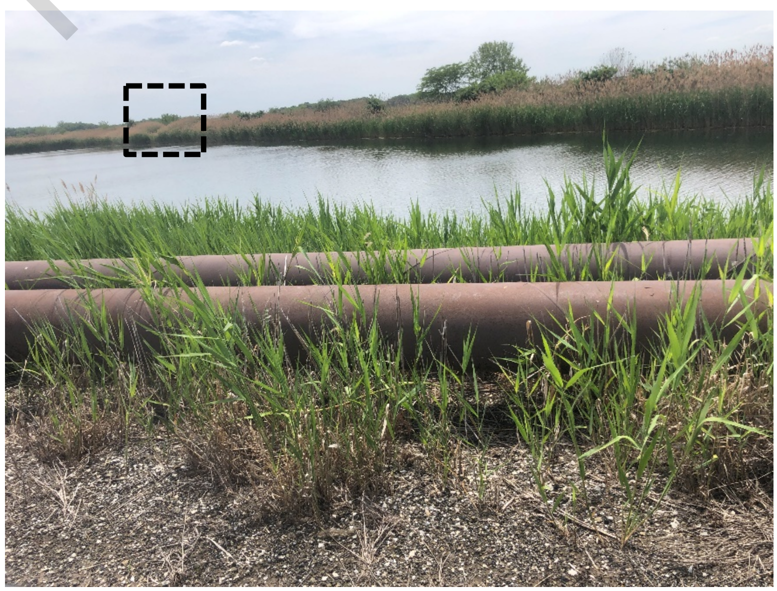
Comments: Sluice discharge west of the Secondary Settlement Pond. Discharge channel and sluiced ash flow to the southwest.

Photo: 18

Date: 5/21/2021

Direction Facing: S

Comments: Secondary Settlement Pond. Breach with Primary Ash Pond is visible. Phragmite growth observed along the separation berm between Primary Ash Pond and Secondary Settlement Pond.



Site Owner: Illinois Power Generating Company	**Project Number:** GLP8027
CCR Unit: Primary Ash Pond	**Site:** Newton Power Plant

Photo: 19

Date: 5/21/2021

Direction Facing: NW

Comments: Downstream side of the northeastern embankment. Good vegetative cover, no tree growth or signs of erosion or instability.

Photo: 20

Date: 5/21/2021

Direction Facing: S

Comments: Erosion and poor vegetative cover underneath the sluice pipe racks along the northern embankment. Geosyntec recommended reseeding or applying erosion protective features on the side slope as part of regular maintenance.

Attachment C

Periodic History of Construction Report Update Letter

Geosyntec consultants

1 McBride and Son Center Drive, Suite 202
Chesterfield, MO 63005
PH 636-812-0800
www.geosyntec.com

October 2021

Illinois Power Generating Company
6725 North 500th Street
Newton, Illinois 62448

Subject: Periodic History of Construction Report Update Letter
USEPA Final CCR Rule, 40 CFR §257.73(c)
Newton Power Plant
Newton, Illinois

At the request of Illinois Power Generating Company (IPGC), Geosyntec Consultants (Geosyntec) has prepared this Letter to documents updates to the Initial History of Construction (HoC) report for the Newton Power Plant (NPP), also known as the Newton Power Station (NEW). The Initial HoC report was prepared by AECOM in October of 2016 [1] in accordance with 40 Code of Federal Regulations (CFR) §257.73(c) of the United States Environmental Protection Agency (USEPA) Coal Combustion Residuals Rule, known as the CCR Rule [2]. This letter also includes information required by Section 845.220(a)(1)(B) (Design and Construction Plans) of the state-specific Illinois Environmental Protection Agency (IEPA) Part 845 CCR Rule [3] that is not expressly required by §257.73(c).

BACKGROUND

The CCR Rule required that, by October 17, 2016, Initial HoC reports to be compiled for existing CCR surface impoundments with: (1) a height of five feet or more and a storage volume of 20 acre-feet or more, or (2) a height of 20 feet or more. The Initial HoC report was required to contain, to the extent feasible, the information specified in 40 CFR §257.73(c)(1)(i)-(xii). The Initial HoC report for NEW, which included the existing CCR surface impoundment, the Primary Ash Pond (PAP), was prepared and subsequently posted to IPGC's CCR Website prior to October 17, 2016.

The CCR Rule requires that Initial HoC to be updated if there is a significant change to any information complied in the Initial HoC report, as listed below:

§ 257.73(c)(2): If there is a significant change to any information complied under paragraph (c)(1) of this section, the owner or operator of the CCR unit must update the relevant information and place it in the facility's operating record as required by § 257.105(f)(9).

IPGC retained Geosyntec to review the Initial HoC report, review reasonably and readily available information for the PAP generated since the Initial HoC report was prepared, and perform a site visit to NEW to evaluate if significant changes may have occurred since the Initial HoC report was prepared. This Letter contains the results of Geosyntec's evaluation and documents significant changes that have occurred at the PAP and NPP, as they pertain the requirements of §257.73(c)(1)(i)-(xii)

UPDATES TO HISTORY OF CONSTRUCTION REPORT

Geosyntec's evaluation for the NPP PAP determined that no known significant changes requiring updates to the information in the Initial HoC report pertaining to §257.73(c)(1)(ii)-(vi), (viii), (ix), (xi), and (xii) of the CCR Rule had occurred since the Initial HoC report was developed.

However, Geosyntec's evaluation determined that significant changes at the NEW PAP pertaining to §257.73(c)(1)(i), (vii), and (x) of the CCR Rule had occurred since the Initial HoC report had been developed. Additionally, information how long the CCR surface impoundments have been operating and the types of CCR in the surface impoundments, as required by Section 845.220(a)(1)(B) of the Part 845 Rule were not included in the Initial HoC report, as this information is not required by the CCR Rule. Each change and the subsequent updates to the Initial HoC report is described within this section.

Section 845.220(a)(1)(B): A statement of … how long the CCR surface impoundment has been in operation, and the types of CCR that have been placed in the surface impoundment.

<u>*Primary Ash Pond*</u>
The PAP was in operation from 1977 until today, for a total of approximately 44 years [1].

CCR placed in the PAP has included bottom ash and economizer ash, in addition to other non-CCR plant process wastewater [1].

§ 257.73(c)(1)(i): The name and address of the person(s) owning or operating the CCR unit; the name associated with the CCR unit; and the identification number of the CCR unit if one has been assigned by the state.

A state identification numbers (IDs) for the PAP was assigned by the Illinois Environmental Protection Agency (IEPA). The ID is listed in **Table 1**.

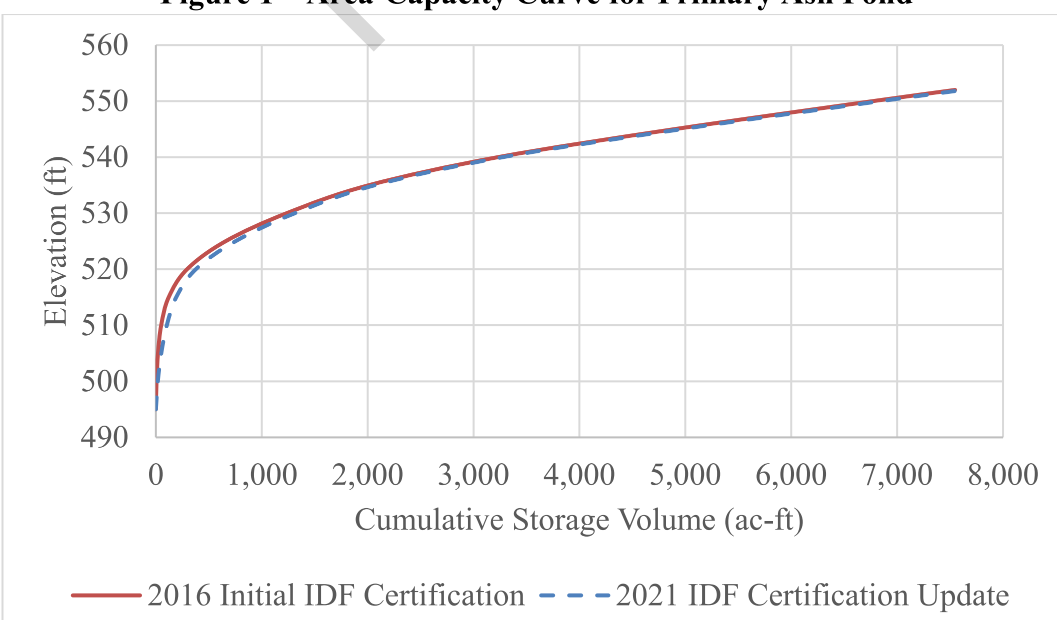
Table 1 – IEPA ID Numbers

CCR Surface Impoundment	State ID
Primary Ash Pond (PAP)	W0798070001-01

§ 257.73(c)(1)(vii): At a scale that details engineering structures and appurtenances relevant to the design, construction, operation, and maintenance of the CCR unit, detailed dimensional drawings of the CCR unit, including a plan view and cross sections of the length and width of the CCR unit, showing all zones, foundation improvements, drainage provisions, spillways diversion ditches, outlets, instrument locations, and slope protection, in addition to the normal operating pool surface elevation and the maximum pool surface elevation following peak discharge from the inflow design flood, the expected maximum depth of CCR within the CCR surface impoundment, and any identifiable natural or manmade features that could adversely affect operation of the CCR unit due to malfunction or mis-operation.

Updated area-capacity curves were prepared for the PAP in 2021. These curves are provided in **Figures 1**.

Figure 1 – Area-Capacity Curve for Primary Ash Pond



§ 257.73(c)(1)(x): A description of each spillway and diversion design features and capacities and calculations used in their determination.

Updated discharge capacity calculations for the existing spillways were prepared in 2021 using HydroCAD 10 modeling software. The calculations indicate that the PAP has sufficient storage capacity and will not overtop the embankments during the Probable Maximum Precipitation (PMP), 24-hour, storm event. The results of the calculations are provided in **Table 2**.

Table 2 – Results of Updated Discharge Capacity Calculations

	Primary Ash Pond
Approximate Berm Minimum Elevation[1], ft	553.0
Starting Water Surface Elevation[1] (SWSE), ft	537.0
Peak Water Surface Elevation[1] (PWSE), ft	538.2
Time to Peak, hr	24.0
Surface Area[2], ac	272.0
Storage[3], ac-ft	281.1

Notes:
[1]Elevations are based on the NAVD88 datum
[2] Surface Area is defined as the water surface area at the PWSE
[3]Storage is defined as the volume between the SWSE and PWSE

CLOSING

This letter has been prepared to document Geosyntec's evaluation of changes that have occurred at the PAP at the NEW since the Initial HoC was developed, based on reasonably and readily available information provided by IPGC, observed by Geosyntec during the site visit, or generated by Geosyntec as part of subsequent calculations.

Sincerely,

Panos Andonyadis, P.E.
Senior Engineer

John Seymour, P.E.
Senior Principal

REFERENCES

[1] AECOM, "History of Construction, USEPA Final CCR Rule, 40 CFR § 257.73(c), Newton Power Station, Newton, Illinois," October 2016.

[2] United Stated Environmental Protection Agency, "40 CFR Parts 257 and 261, Hazardous and Solid Waste Management System, Disposal of Coal Combustion Residuals from Electric Utilities, Final Rule, 2015," 2015.

[3] Illinois Environmental Protection Agency, "35 Ill. Adm. Code Part 845, Standards for the Disposal of Coal Combustion Residuals in Surface Impoundments," Springfield, IL, 2021.

Attachment D

Periodic Structural Stability and Safety Factor Assessment Analyses

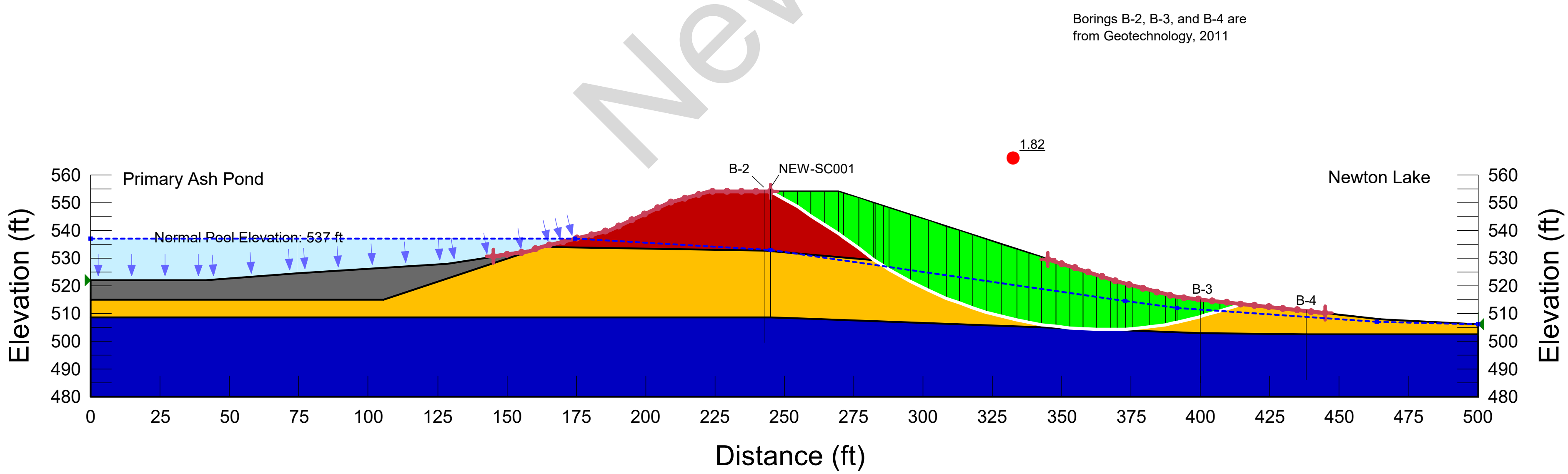
Project Name: Newton Primary Ash Pond Stability Analysis-Section A

Analysis: Long Term (Drained)

Calculated By: MJN Date: 6/17/2016
Checked By: VMCh Date: 6/20/2016
Modified By: PK Date: 9/01/2021
Checked By:ZJF Date: 9/08/2021

Name: Upper Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 29 °
Name: Ash (Drained) Model: Mohr-Coulomb Unit Weight: 90 pcf Cohesion': 0 psf Phi': 30 °
Name: Lower Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 3,700 psf Phi': 33 °
Name: Embankment Fill (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 31 °

Materials
- Upper Clay (Drained)
- Ash (Drained)
- Lower Clay (Drained)
- Embankment Fill (Drained)



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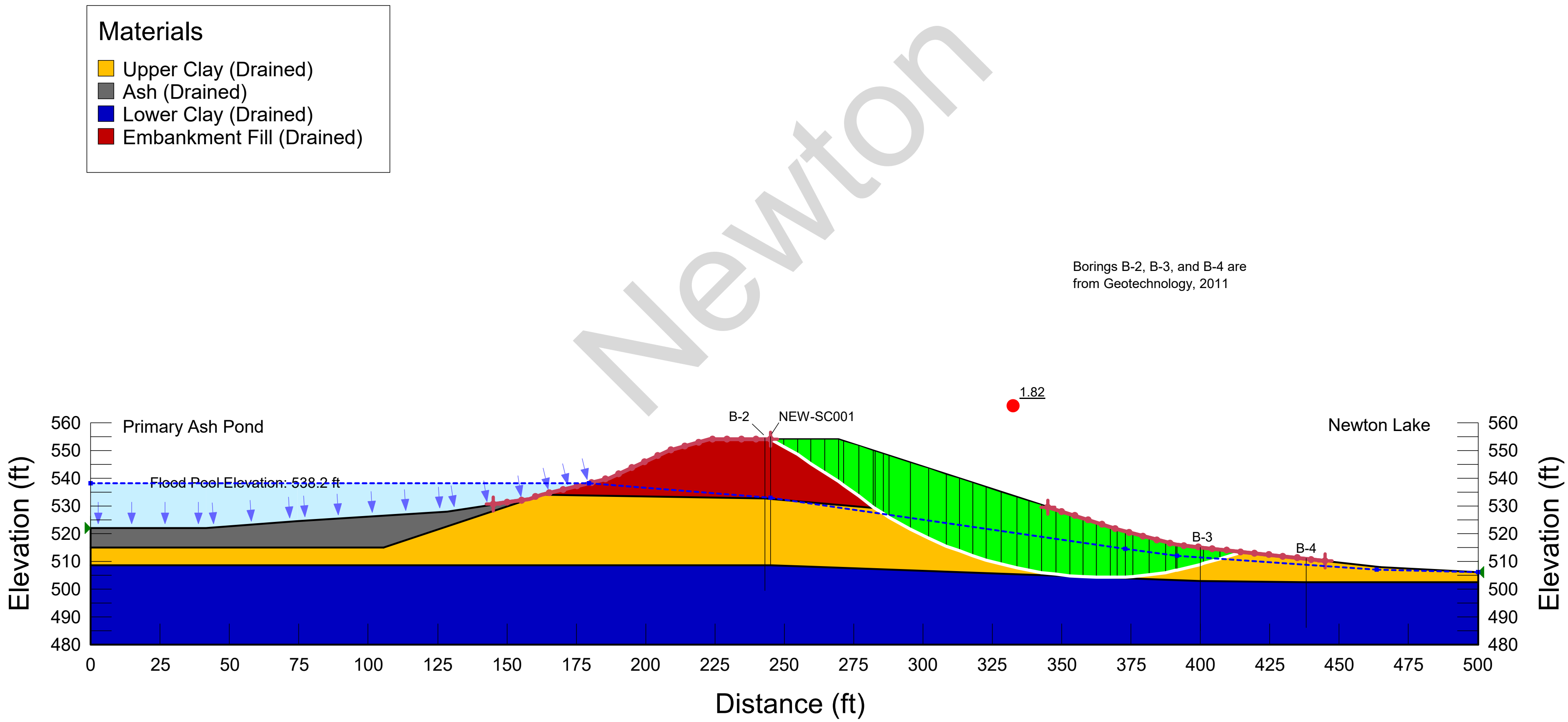
Project Name: Newton Primary Ash Pond Stability Analysis-Section A

Analysis: Surcharge (Drained)

Calculated By: MJN Date: 6/17/2016
Checked By: VMCh Date: 6/20/2016
Modified By: PK Date: 9/01/2021
Checked By:ZJF Date: 9/08/2021

Name: Upper Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 29 °
Name: Ash (Drained) Model: Mohr-Coulomb Unit Weight: 90 pcf Cohesion': 0 psf Phi': 30 °
Name: Lower Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 3,700 psf Phi': 33 °
Name: Embankment Fill (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 31 °



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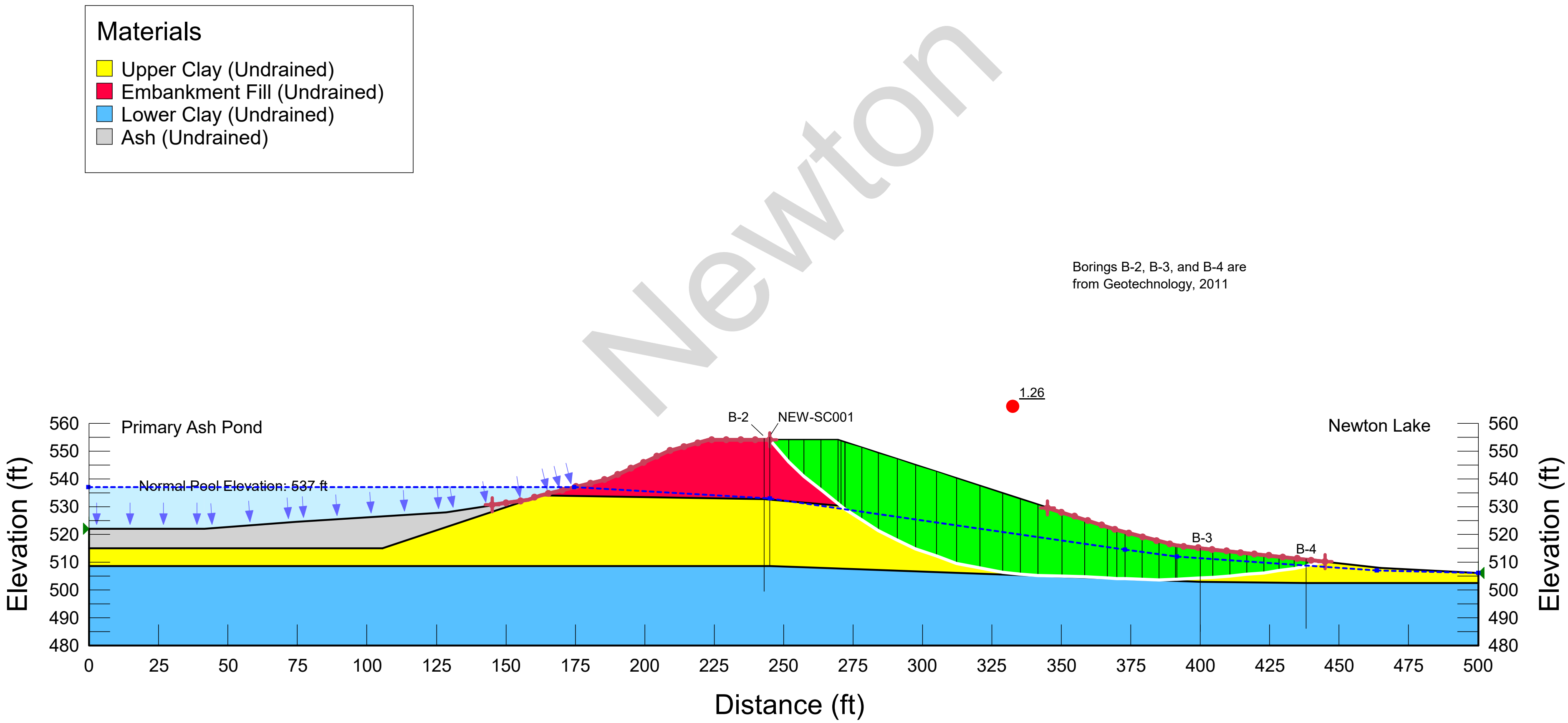
Calculated By: MJN Date: 6/17/2016
Checked By: VMCh Date: 6/20/2016
Modified By: PK Date: 9/01/2021
Checked By:ZJF Date: 9/08/2021

Project Name: Newton Primary Ash Pond Stability Analysis-Section A

Analysis: Pseudostatic (Undrained)

Horizontal Seismic Coefficient = 0.153g

Name: Upper Clay (Undrained) Model: Shear/Normal Fn. Unit Weight: 130 pcf Strength Function: Upper Clay (Undrained)
Name: Embankment Fill (Undrained) Model: Shear/Normal Fn. Unit Weight: 130 pcf Strength Function: Embankment Fill (Undrained)
Name: Lower Clay (Undrained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 5,000 psf Phi': 0 °
Name: Ash (Undrained) Model: S=f(overburden) Unit Weight: 90 pcf Tau/Sigma Ratio: 0.05 Minimum Strength: 0 psf



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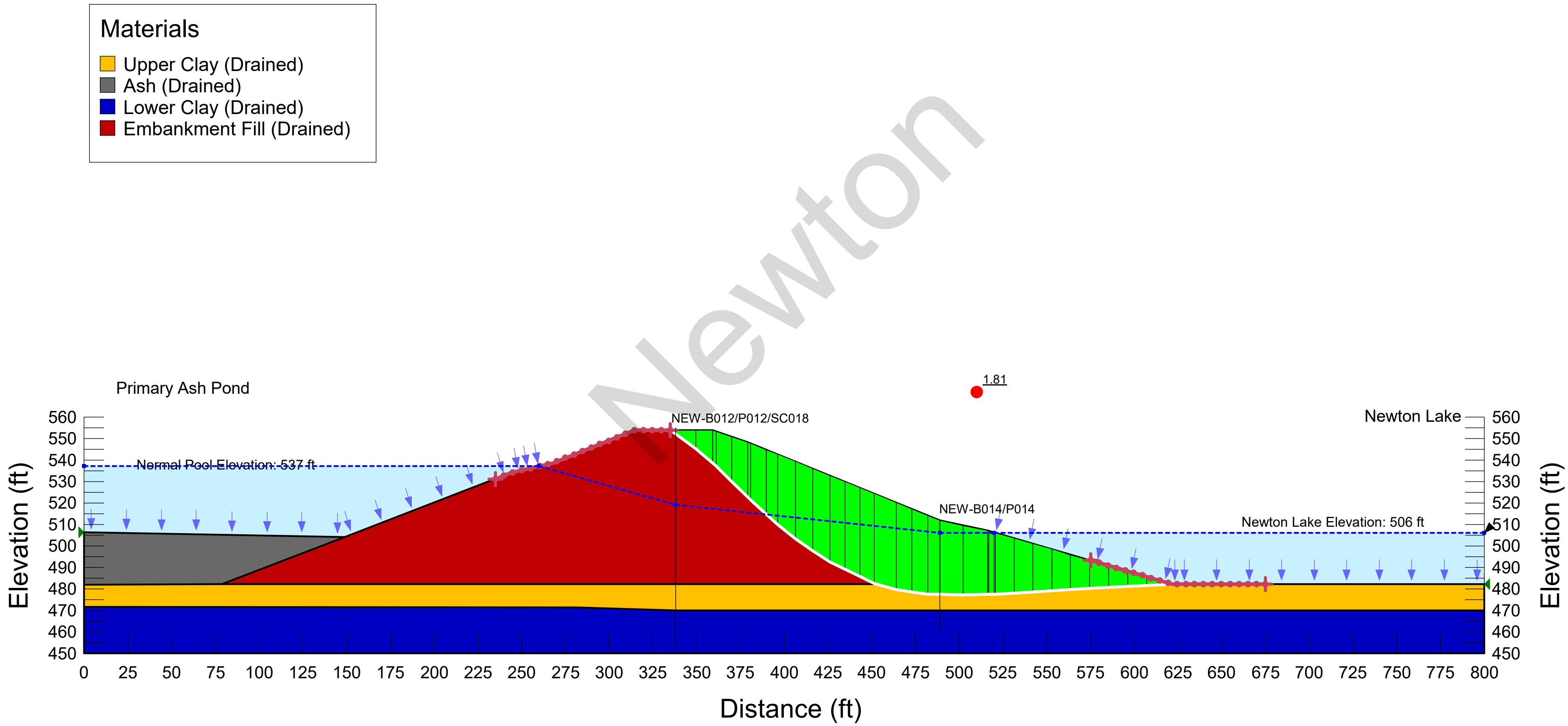
Project Name: Newton Primary Ash Pond Stability Analysis-Section B

Analysis: Long Term (Drained)

Calculated By: MJN Date: 6/17/2016
Checked By: VMCh Date: 6/20/2016
Modified By: PK Date: 9/01/2021
Checked By:ZJF Date: 9/08/2021

Name: Upper Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 29 °
Name: Ash (Drained) Model: Mohr-Coulomb Unit Weight: 90 pcf Cohesion': 0 psf Phi': 30 °
Name: Lower Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 3,700 psf Phi': 33 °
Name: Embankment Fill (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 31 °



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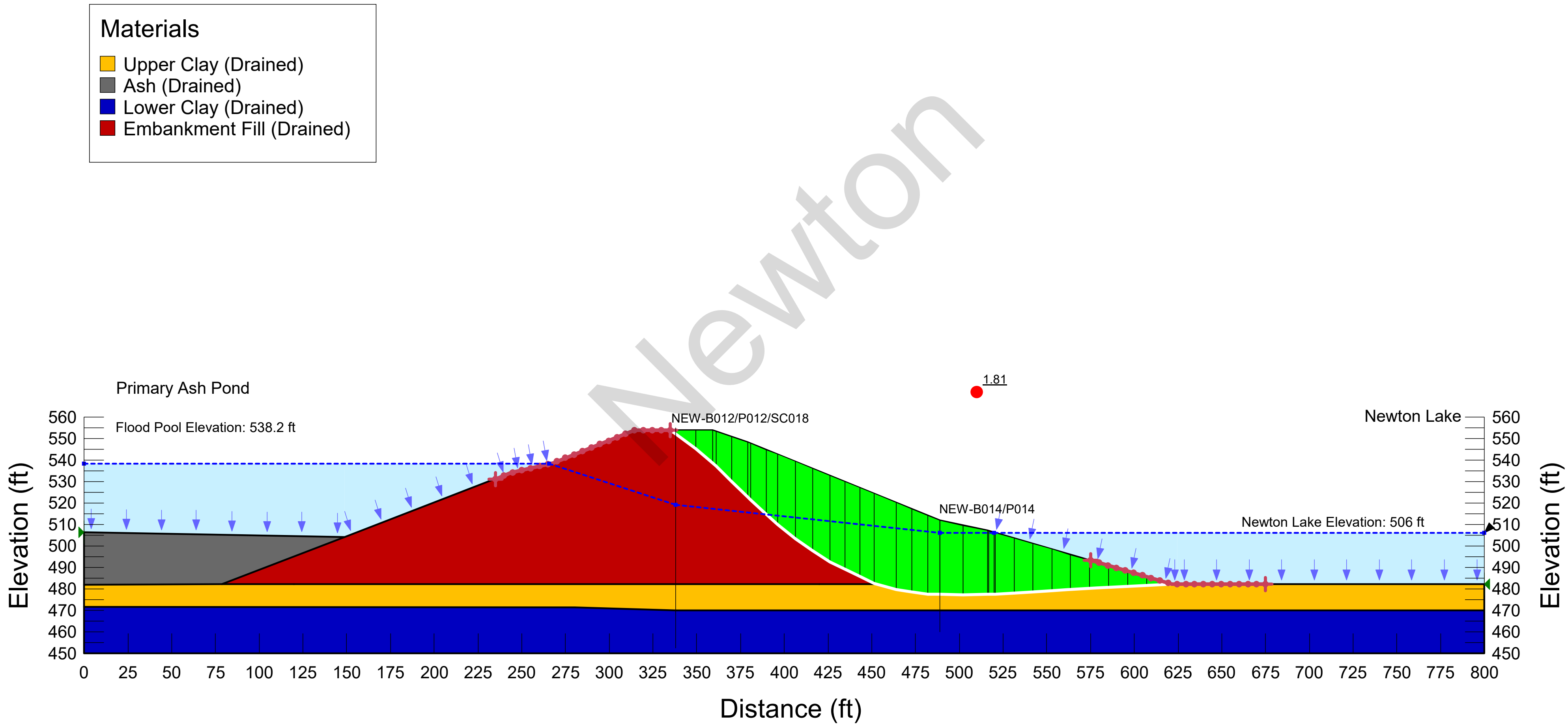
Project Name: Newton Primary Ash Pond Stability Analysis-Section B

Analysis: Surcharge (Drained)

Calculated By: MJN Date: 6/17/2016
Checked By: VMCh Date: 6/20/2016
Modified By: PK Date: 9/01/2021
Checked By:ZJF Date: 9/08/2021

Name: Upper Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 29 °
Name: Ash (Drained) Model: Mohr-Coulomb Unit Weight: 90 pcf Cohesion': 0 psf Phi': 30 °
Name: Lower Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 3,700 psf Phi': 33 °
Name: Embankment Fill (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 31 °



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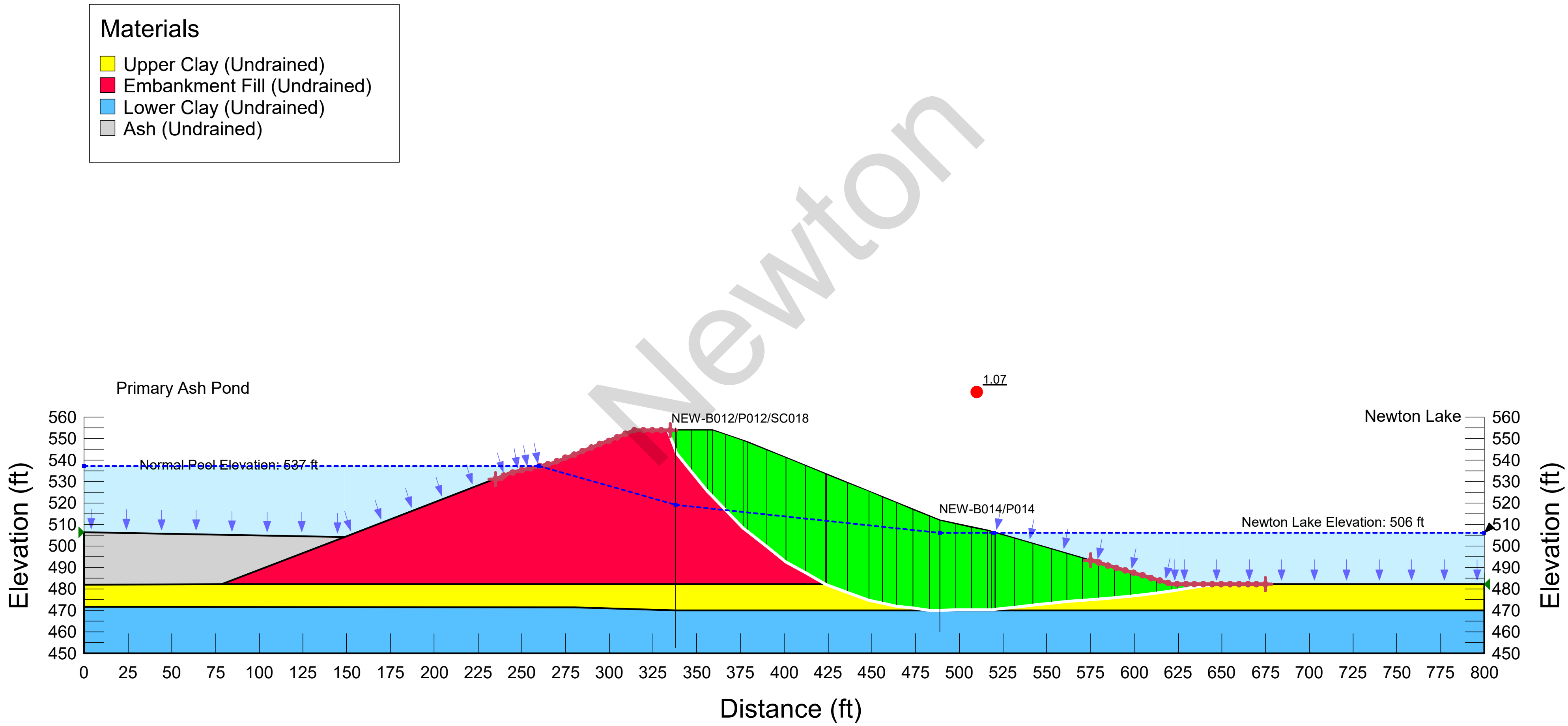
Project Name: Newton Primary Ash Pond Stability Analysis-Section B

Analysis: Pseudostatic (Undrained)

Horizontal Seismic Coefficient = 0.153g

Calculated By: MJN Date: 6/17/2016
Checked By: VMCh Date: 6/20/2016
Modified By: PK Date: 9/01/2021
Checked By:ZJF Date: 9/08/2021

Name: Upper Clay (Undrained) Model: Shear/Normal Fn. Unit Weight: 130 pcf Strength Function: Upper Clay (Undrained)
Name: Embankment Fill (Undrained) Model: Shear/Normal Fn. Unit Weight: 130 pcf Strength Function: Embankment Fill (Undrained)
Name: Lower Clay (Undrained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 5,000 psf Phi': 0 °
Name: Ash (Undrained) Model: S=f(overburden) Unit Weight: 90 pcf Tau/Sigma Ratio: 0.05 Minimum Strength: 0 psf



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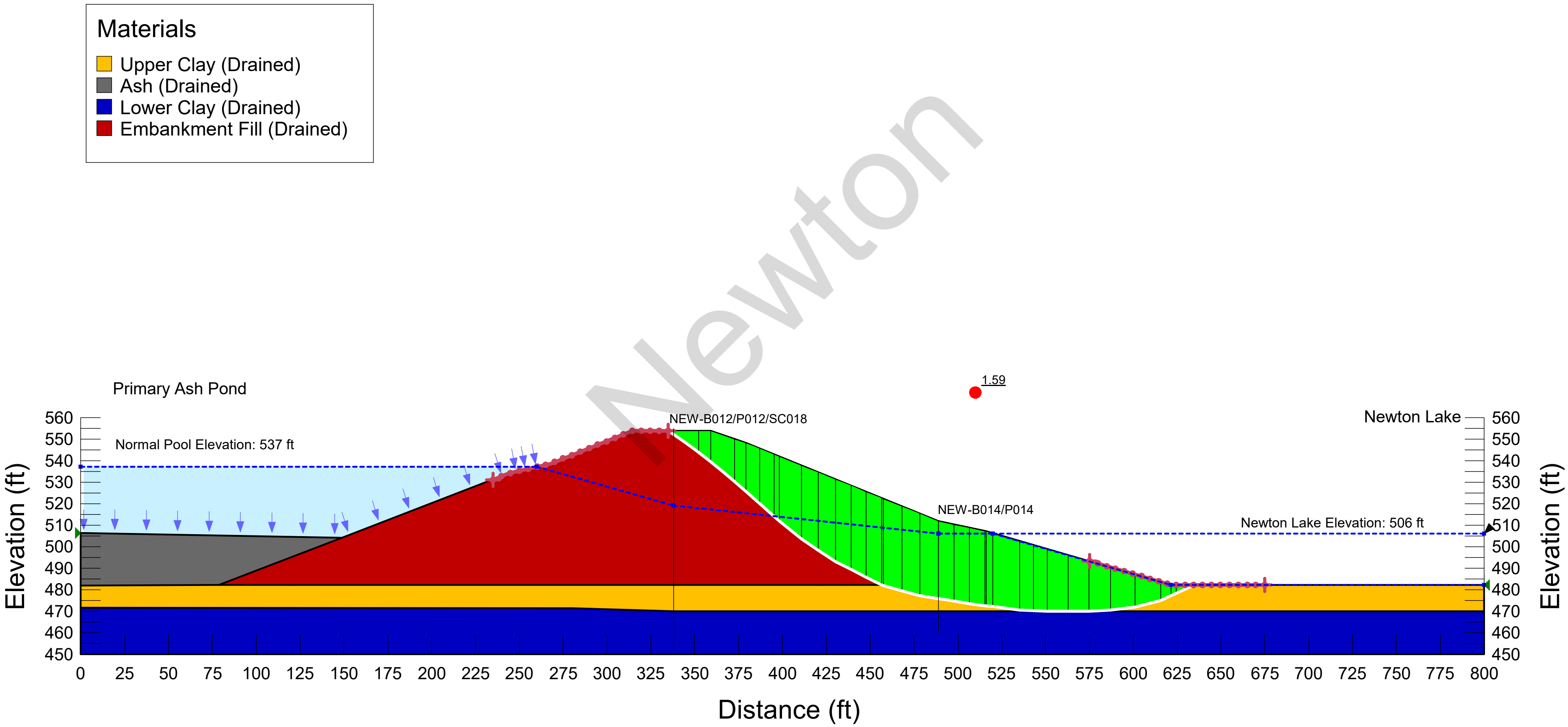
Project Name: Newton Primary Ash Pond Stability Analysis-Section B

Analysis: Sudden Drawdown

Calculated By: MJN Date: 6/17/2016
Checked By: VMCh Date: 6/20/2016
Modified By: PK Date: 9/01/2021
Checked By:ZJF Date: 9/08/2021

Name: Upper Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 29 ° Cohesion R: 470 psf Phi R: 22 ° Piezometric Line After Drawdown: 2
Name: Ash (Drained) Model: Mohr-Coulomb Unit Weight: 90 pcf Cohesion': 0 psf Phi': 30 ° Cohesion R: 0 psf Phi R: 0 ° Piezometric Line After Drawdown: 2
Name: Lower Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 3,700 psf Phi': 33 ° Cohesion R: 0 psf Phi R: 0 ° Piezometric Line After Drawdown: 2
Name: Embankment Fill (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 31 ° Cohesion R: 500 psf Phi R: 22 ° Piezometric Line After Drawdown: 2



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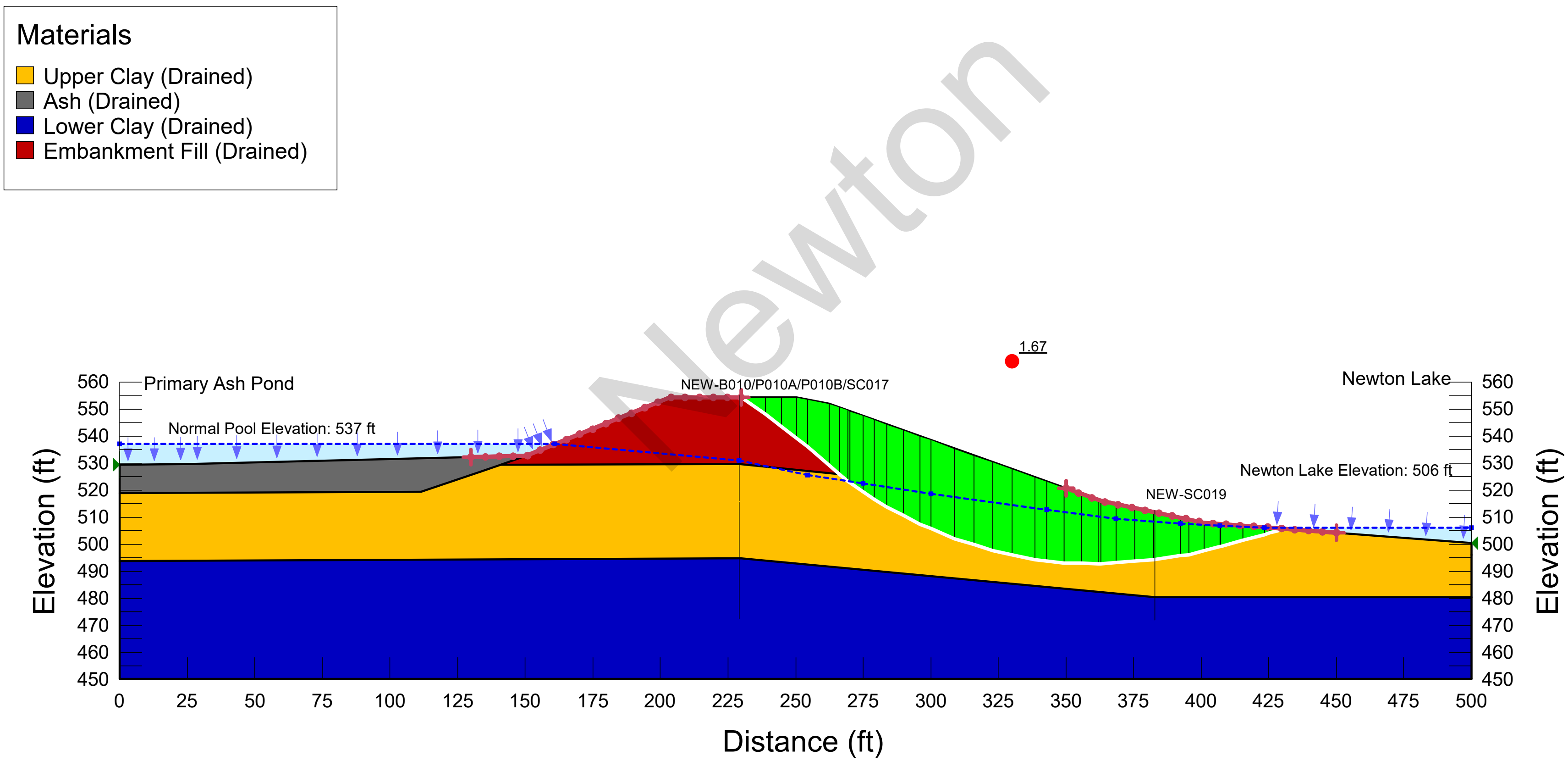
Project Name: **Newton Primary Ash Pond Stability Analysis-Section C**

Analysis: Long Term (Drained)

Calculated By: MJN Date: 6/20/2016
Checked By: VMCh Date: 6/20/2016
Modified By: PK Date:9/01/2021
Checked By:ZJF Date: 9/08/2021

Name: Upper Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 29 °
Name: Ash (Drained) Model: Mohr-Coulomb Unit Weight: 90 pcf Cohesion': 0 psf Phi': 30 °
Name: Lower Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 3,700 psf Phi': 33 °
Name: Embankment Fill (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 31 °



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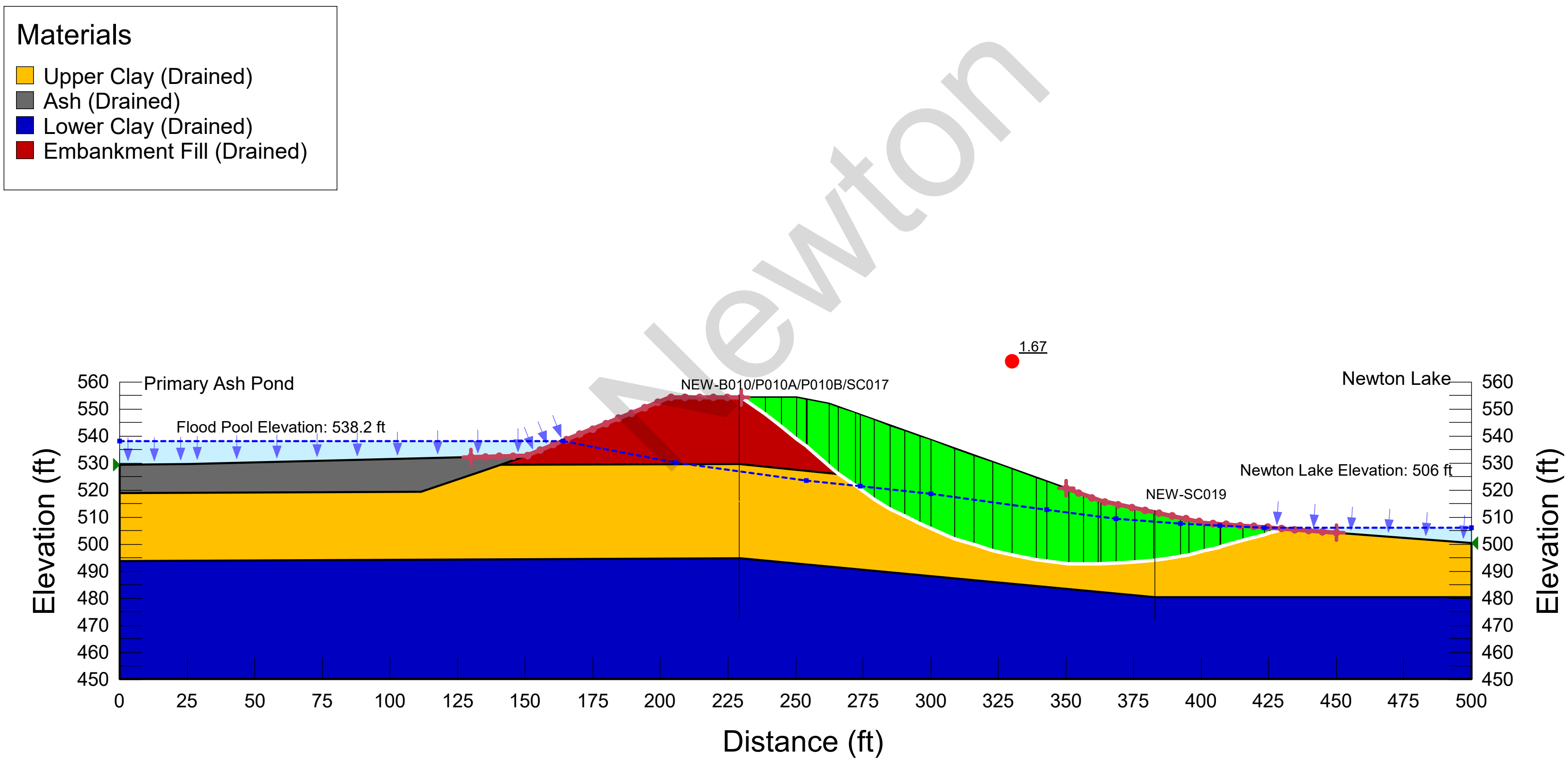
Project Name: **Newton Primary Ash Pond Stability Analysis-Section C**

Analysis: Surcharge (Drained)

Calculated By: MJN Date: 6/20/2016
Checked By: VMCh Date: 6/20/2016
Modified By: PK Date:9/01/2021
Checked By:ZJF Date: 9/08/2021

Name: Upper Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 29 °
Name: Ash (Drained) Model: Mohr-Coulomb Unit Weight: 90 pcf Cohesion': 0 psf Phi': 30 °
Name: Lower Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 3,700 psf Phi': 33 °
Name: Embankment Fill (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 31 °



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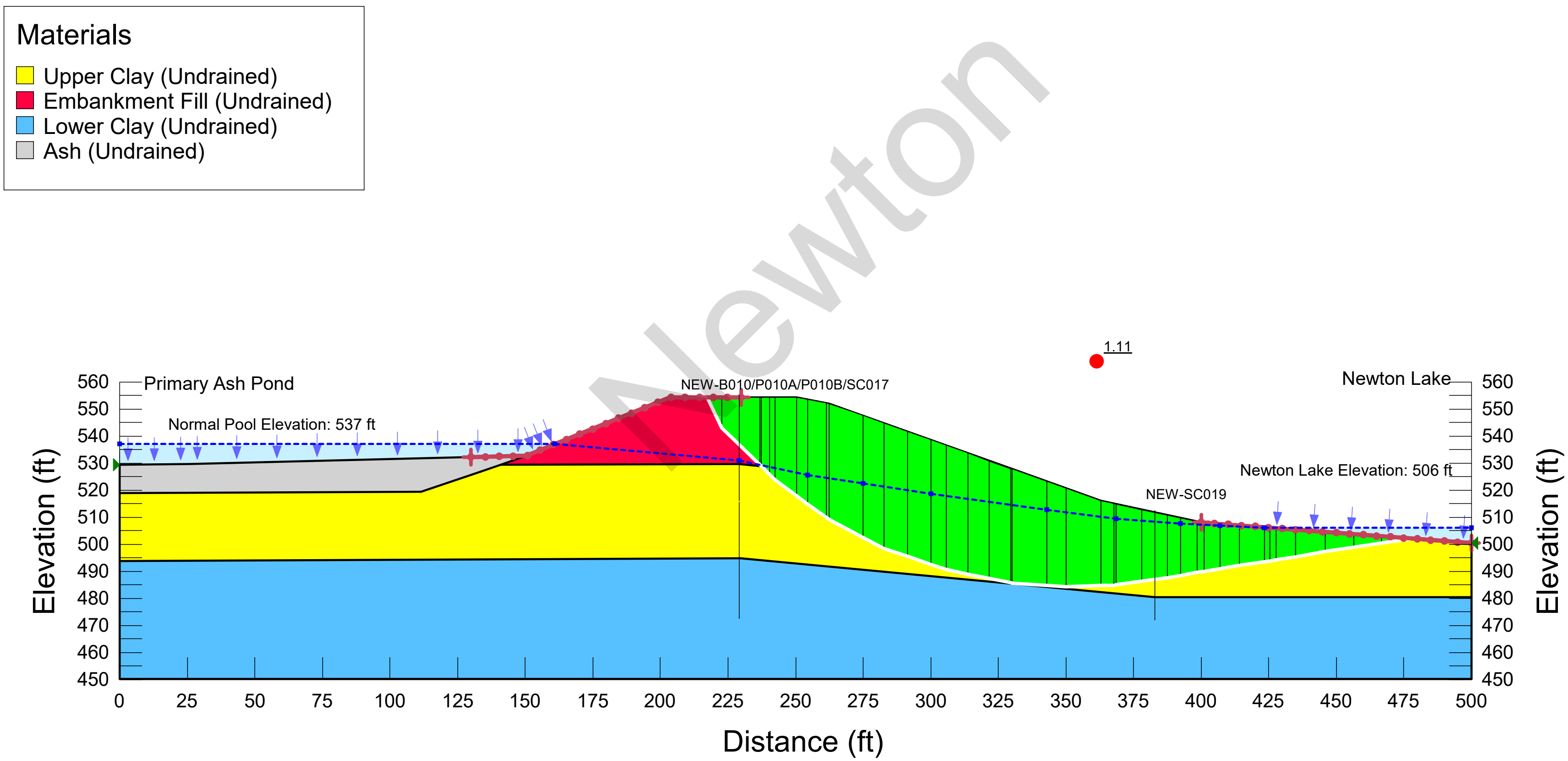
Project Name: Newton Primary Ash Pond Stability Analysis-Section C

Analysis: Pseudostatic (Undrained)

Horizontal Seismic Coefficient = 0.153g

Calculated By: MJN Date: 6/20/2016
Checked By: VMCh Date: 6/20/2016
Modified By: PK Date:9/01/2021
Checked By:ZJF Date: 9/08/2021

Name: Upper Clay (Undrained) Model: Shear/Normal Fn. Unit Weight: 130 pcf Strength Function: Upper Clay (Undrained)
Name: Embankment Fill (Undrained) Model: Shear/Normal Fn. Unit Weight: 130 pcf Strength Function: Embankment Fill (Undrained)
Name: Lower Clay (Undrained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 5,000 psf Phi': 0 °
Name: Ash (Undrained) Model: S=f(overburden) Unit Weight: 90 pcf Tau/Sigma Ratio: 0.05 Minimum Strength: 0 psf



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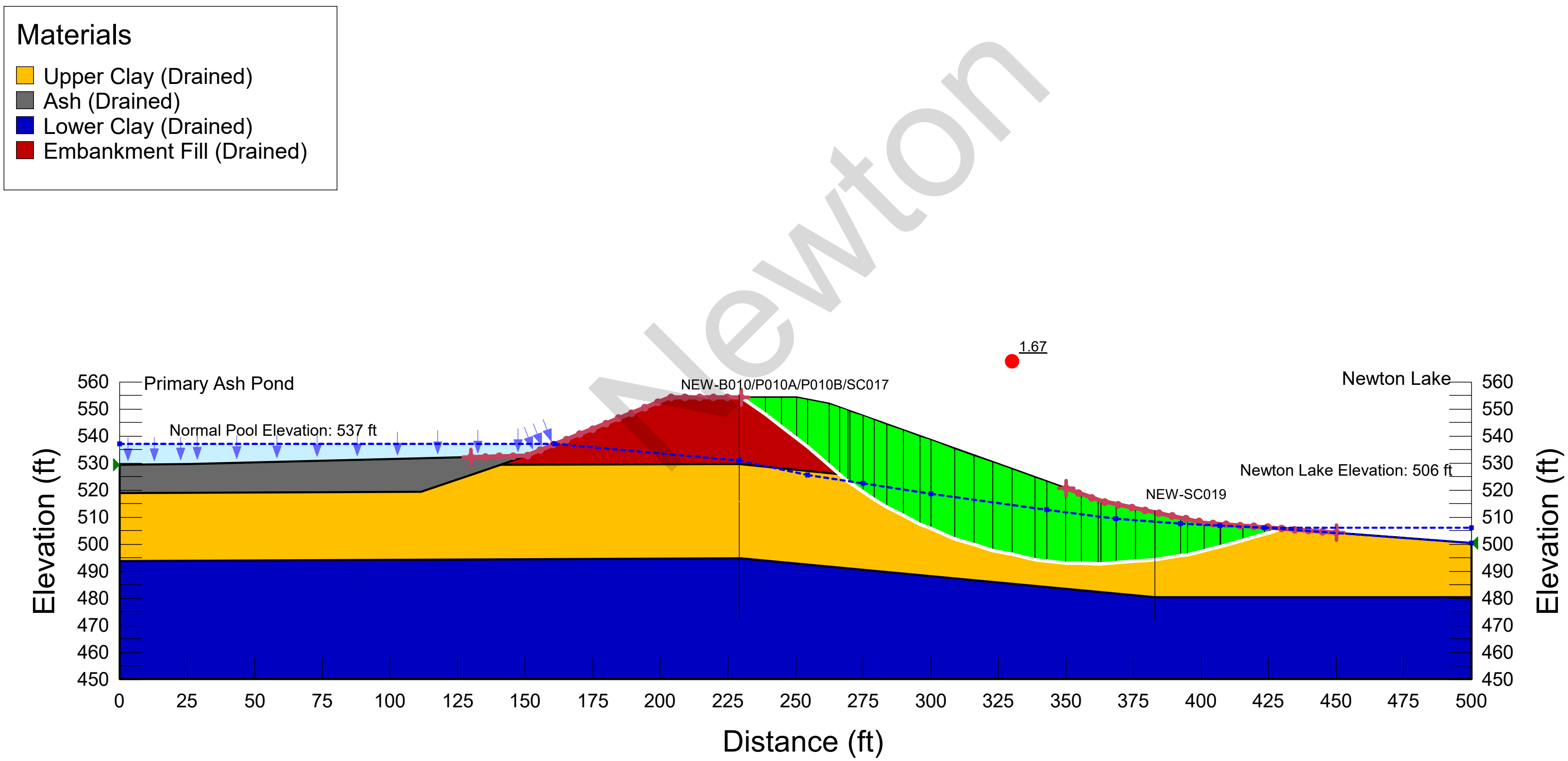
Project Name: Newton Primary Ash Pond Stability Analysis-Section C

Analysis: Sudden Drawdown

Calculated By: MJN Date: 6/20/2016
Checked By: VMCh Date: 6/20/2016
Modified By: PK Date:9/01/2021
Checked By:ZJF Date: 9/08/2021

Name: Upper Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 29 ° Cohesion R: 470 psf Phi R: 22 ° Piezometric Line After Drawdown: 2
Name: Ash (Drained) Model: Mohr-Coulomb Unit Weight: 90 pcf Cohesion': 0 psf Phi': 30 ° Cohesion R: 0 psf Phi R: 0 ° Piezometric Line After Drawdown: 2
Name: Lower Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 3,700 psf Phi': 33 ° Cohesion R: 0 psf Phi R: 0 ° Piezometric Line After Drawdown: 2
Name: Embankment Fill (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 31 ° Cohesion R: 500 psf Phi R: 22 ° Piezometric Line After Drawdown: 2



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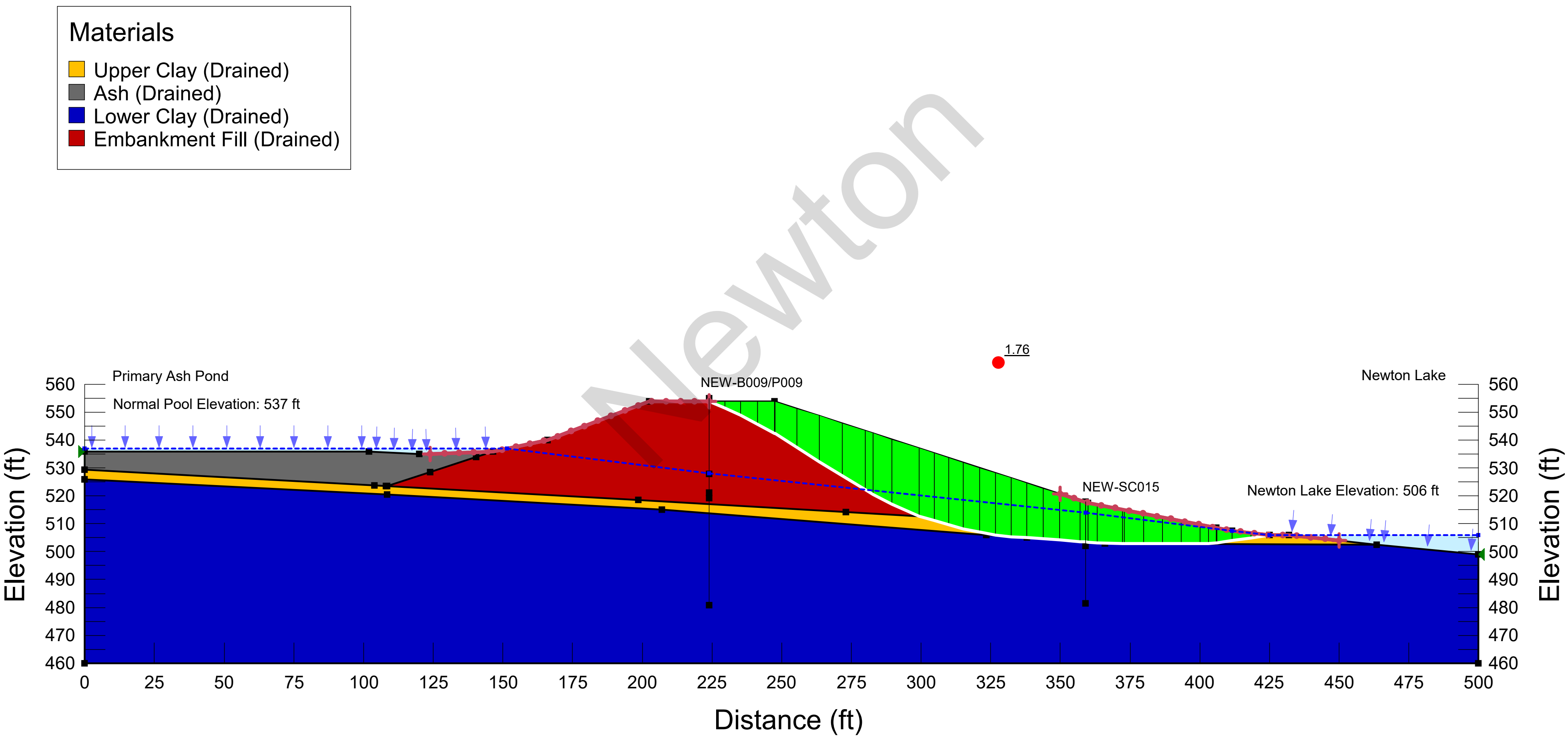
Project Name: Newton Primary Ash Pond Stability Analysis-Section D

Analysis: Long Term (Drained)

Calculated By: MJN Date: 6/20/2016
Checked By: VMCh Date: 6/20/2016
Modified By: PK Date:9/01/2021
Checked By:ZJF Date: 9/08/2021

Name: Upper Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 29 °
Name: Ash (Drained) Model: Mohr-Coulomb Unit Weight: 90 pcf Cohesion': 0 psf Phi': 30 °
Name: Lower Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 3,700 psf Phi': 33 °
Name: Embankment Fill (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 31 °



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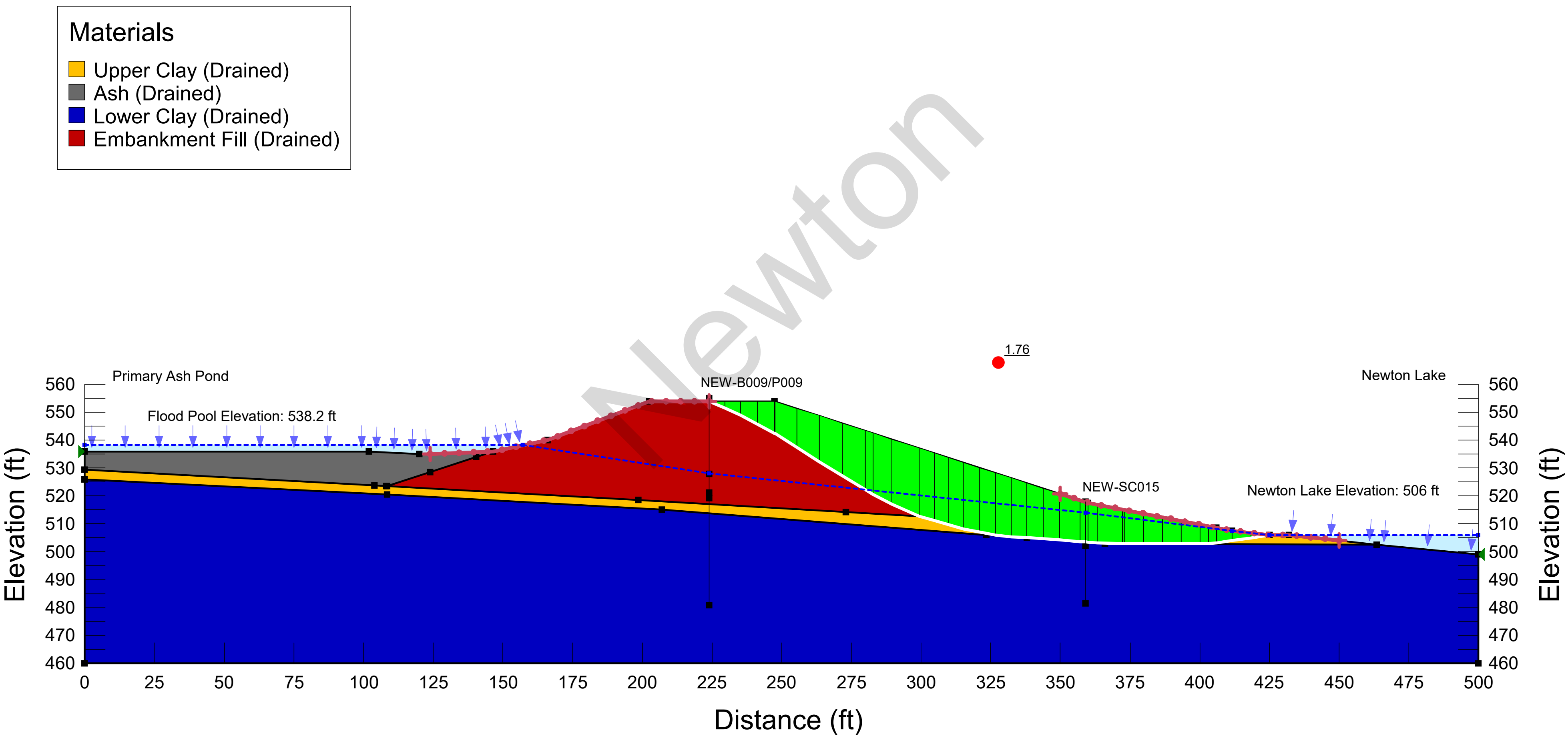
Project Name: **Newton Primary Ash Pond Stability Analysis-Section D**

Analysis: Surcharge (Drained)

Calculated By: MJN Date: 6/20/2016
Checked By: VMCh Date: 6/20/2016
Modified By: PK Date:9/01/2021
Checked By:ZJF Date: 9/08/2021

Name: Upper Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 29 °
Name: Ash (Drained) Model: Mohr-Coulomb Unit Weight: 90 pcf Cohesion': 0 psf Phi': 30 °
Name: Lower Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 3,700 psf Phi': 33 °
Name: Embankment Fill (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 31 °



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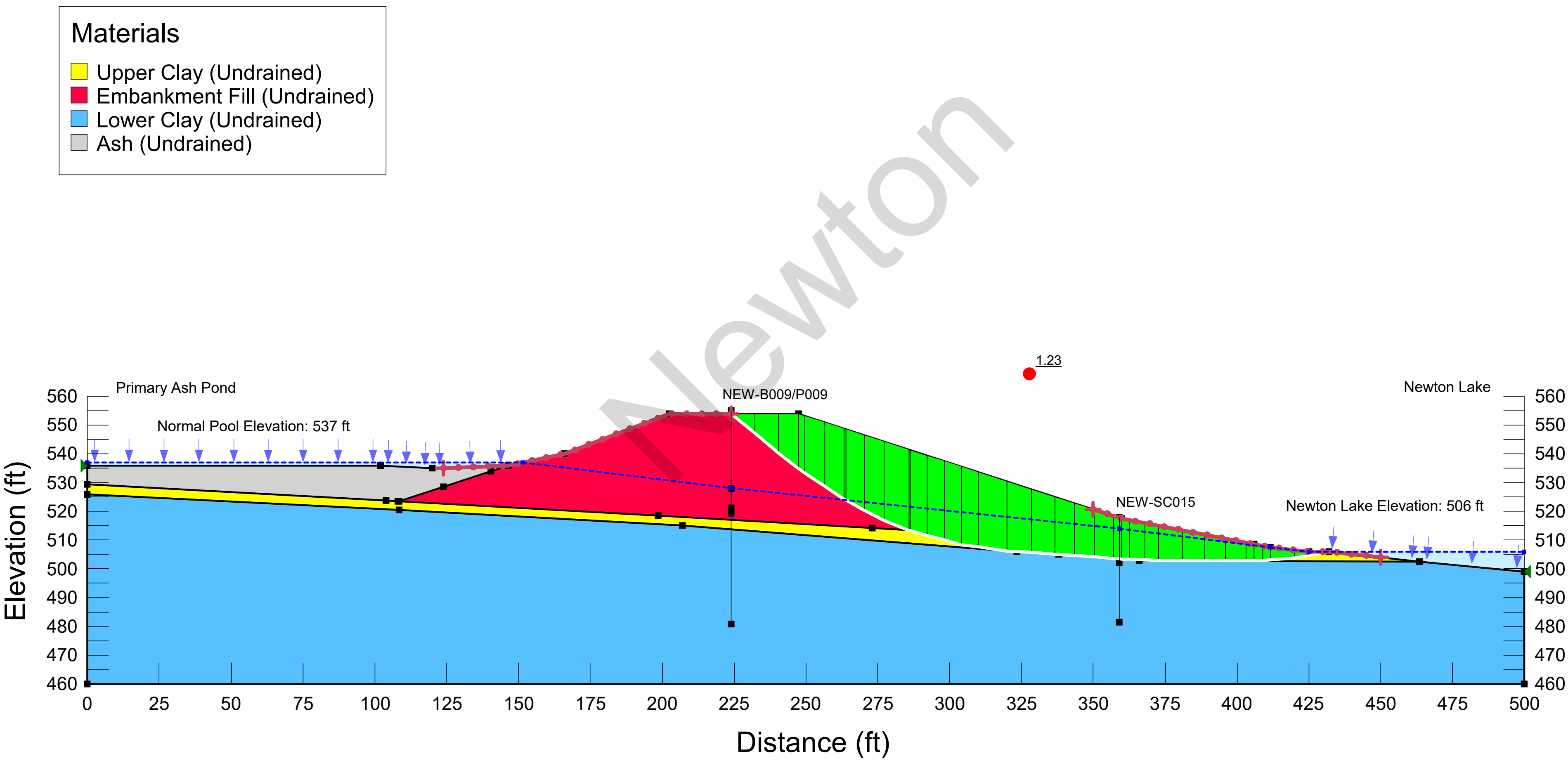
Project Name: Newton Primary Ash Pond Stability Analysis-Section D

Calculated By: MJN Date: 6/20/2016
Checked By: VMCh Date: 6/20/2016
Modified By: PK Date:9/01/2021
Checked By:ZJF Date: 9/08/2021

Analysis: Pseudostatic (Undrained)

Horizontal Seismic Coefficient = 0.153g

Name: Upper Clay (Undrained) Model: Shear/Normal Fn. Unit Weight: 130 pcf Strength Function: Upper Clay (Undrained)
Name: Embankment Fill (Undrained) Model: Shear/Normal Fn. Unit Weight: 130 pcf Strength Function: Embankment Fill (Undrained)
Name: Lower Clay (Undrained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 5,000 psf Phi': 0 °
Name: Ash (Undrained) Model: S=f(overburden) Unit Weight: 90 pcf Tau/Sigma Ratio: 0.05 Minimum Strength: 0 psf



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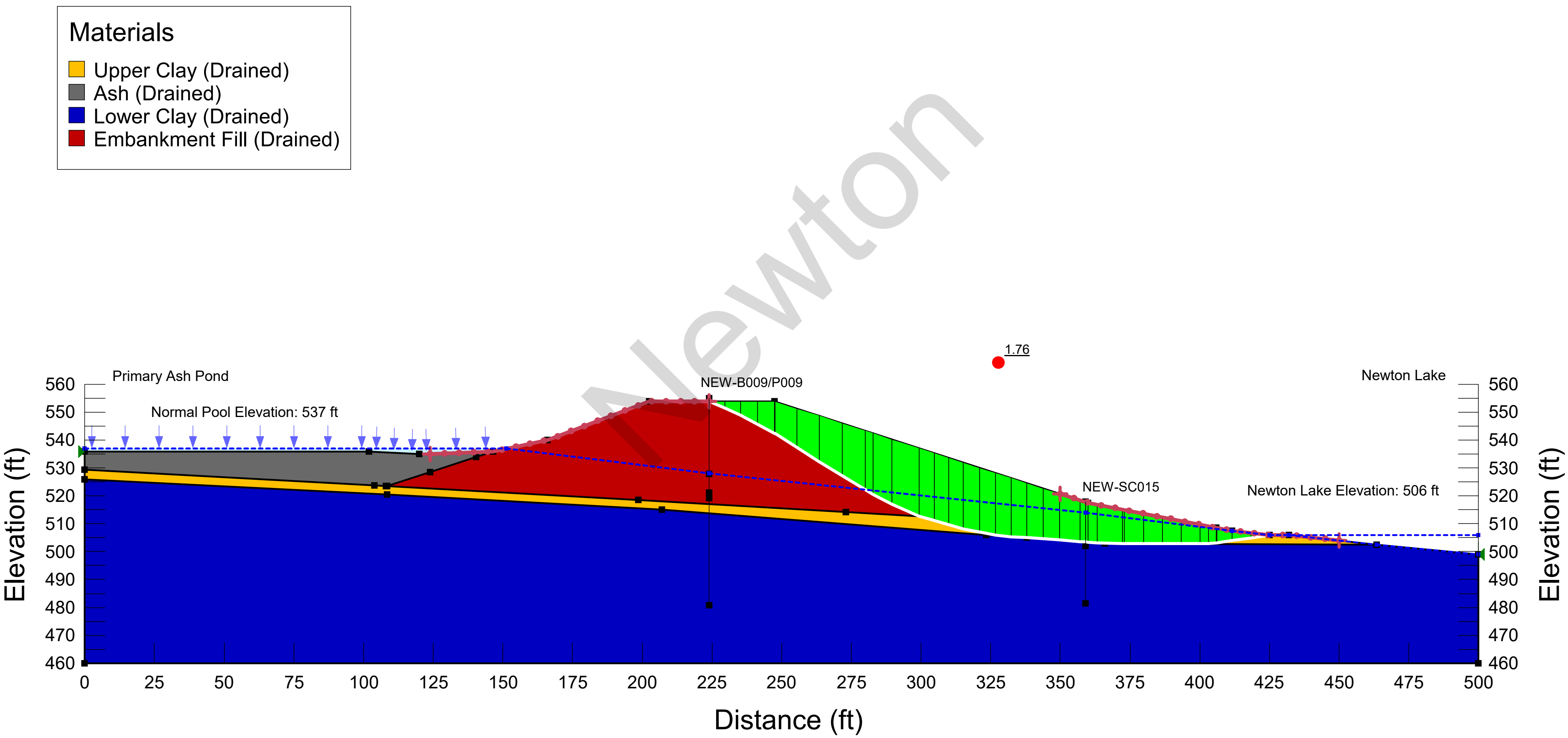
Project Name: **Newton Primary Ash Pond Stability Analysis-Section D**

Analysis: Sudden Drawdown

Calculated By: MJN Date: 6/20/2016
Checked By: VMCh Date: 6/20/2016
Modified By: PK Date:9/01/2021
Checked By:ZJF Date: 9/08/2021

Name: Upper Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 29 ° Cohesion R: 470 psf Phi R: 22 ° Piezometric Line After Drawdown: 2
Name: Ash (Drained) Model: Mohr-Coulomb Unit Weight: 90 pcf Cohesion': 0 psf Phi': 30 ° Cohesion R: 0 psf Phi R: 0 ° Piezometric Line After Drawdown: 2
Name: Lower Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 3,700 psf Phi': 33 ° Cohesion R: 0 psf Phi R: 0 ° Piezometric Line After Drawdown: 2
Name: Embankment Fill (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 31 ° Cohesion R: 500 psf Phi R: 22 ° Piezometric Line After Drawdown: 2



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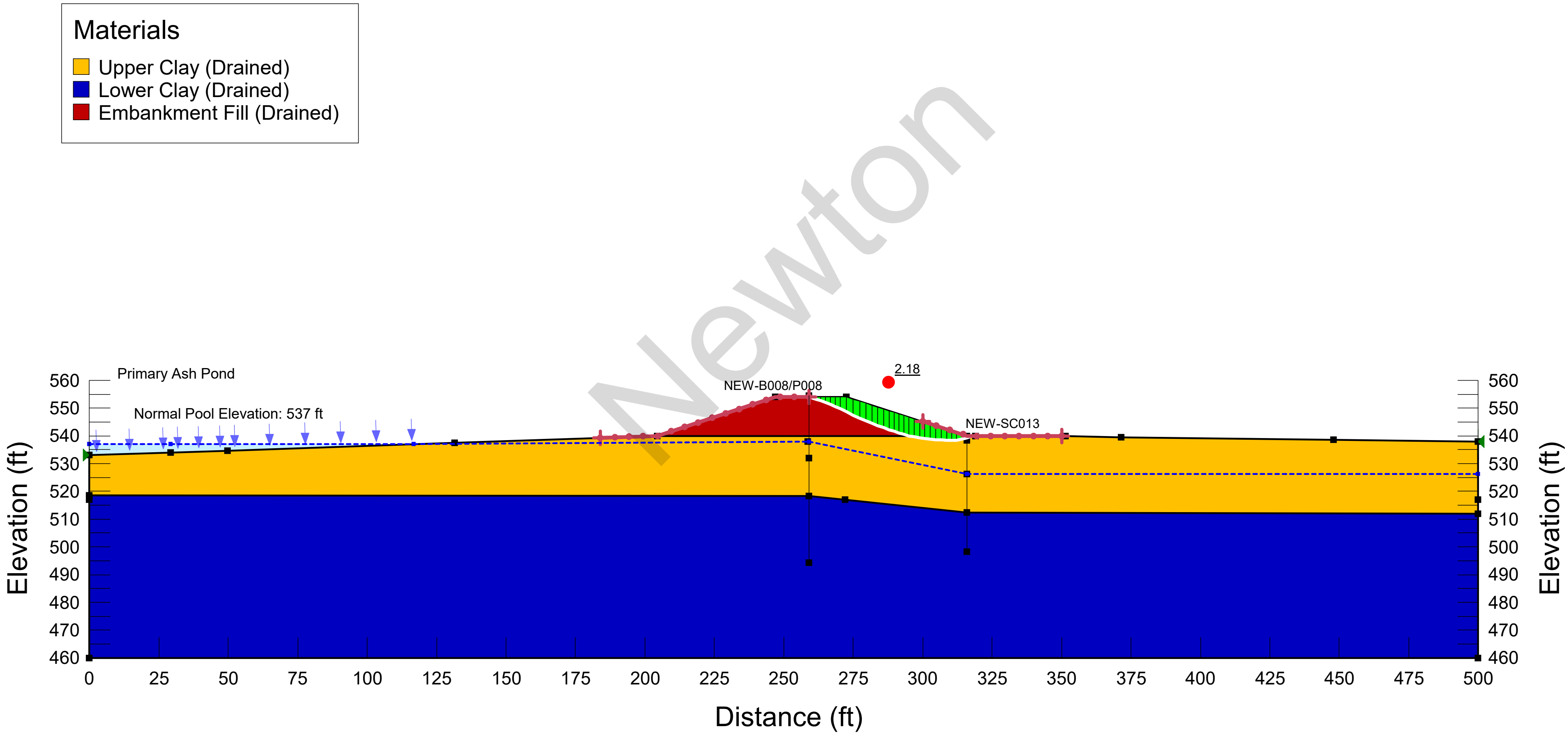
Project Name: Newton Primary Ash Pond Stability Analysis-Section E

Analysis: Long Term (Drained)

Calculated By: MJN Date: 6/20/2016
Checked By: VMCh Date: 6/20/2016
Modified By: PK Date:9/01/2021
Checked By:ZJF Date: 9/08/2021

Name: Upper Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 29 °
Name: Lower Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 3,700 psf Phi': 33 °
Name: Embankment Fill (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 31 °



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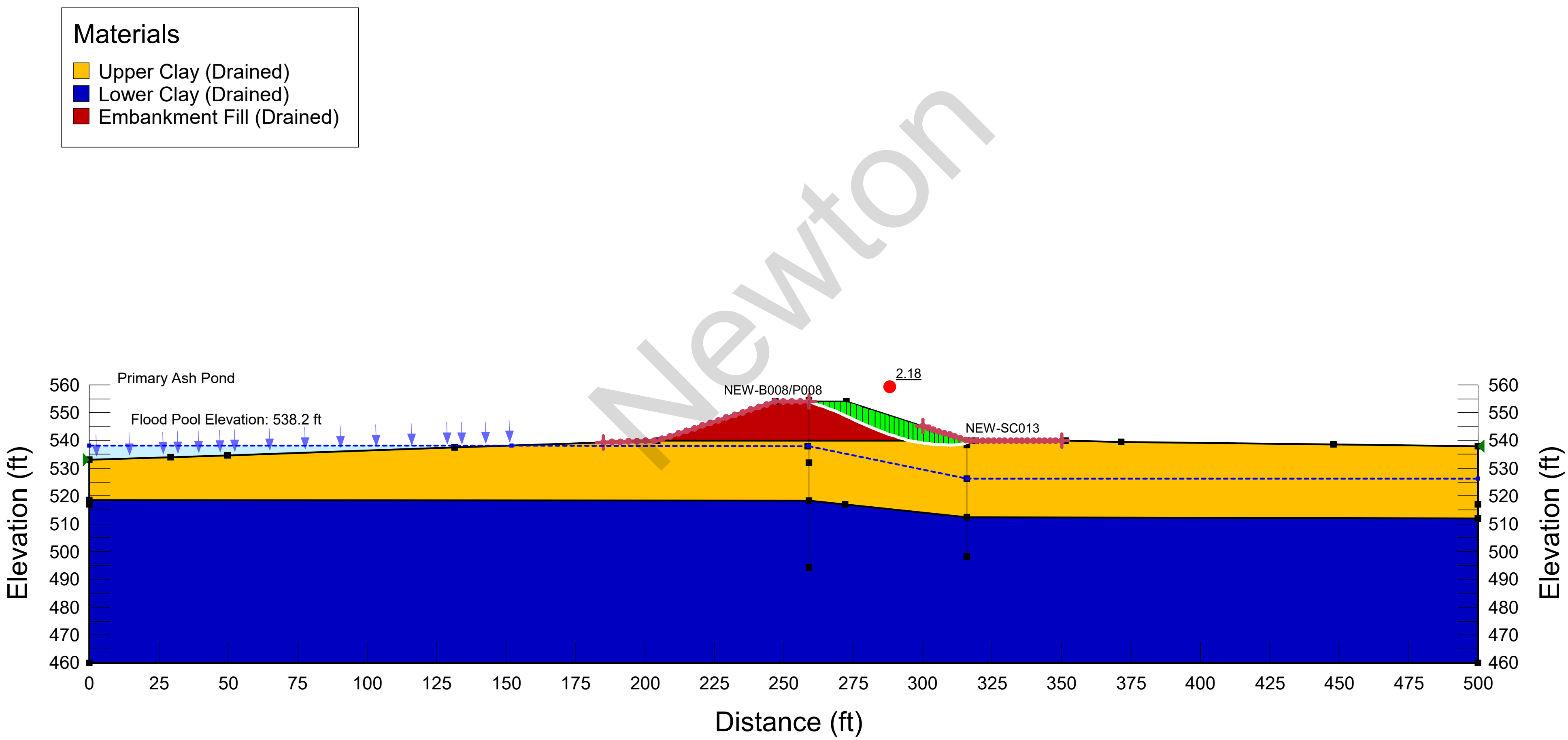
Project Name: **Newton Primary Ash Pond Stability Analysis-Section E**

Analysis: Surcharge (Drained)

Calculated By: MJN Date: 6/20/2016
Checked By: VMCh Date: 6/20/2016
Modified By: PK Date:9/01/2021
Checked By:ZJF Date: 9/08/2021

Name: Upper Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 29 °
Name: Lower Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 3,700 psf Phi': 33 °
Name: Embankment Fill (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 31 °



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Project Name: **Newton Primary Ash Pond Stability Analysis-Section E**

Analysis: Pseudostatic (Undrained)

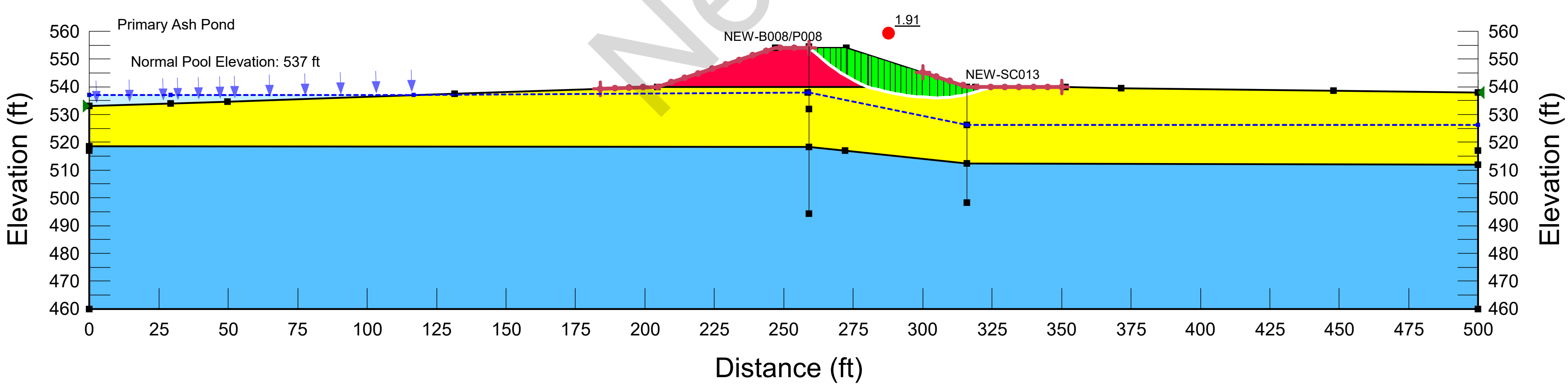
Calculated By: MJN Date: 6/20/2016
Checked By: VMCh Date: 6/20/2016
Modified By: PK Date:9/01/2021
Checked By:ZJF Date: 9/08/2021

Horizontal Seismic Coefficient = 0.153g

Name: Upper Clay (Undrained) Model: Shear/Normal Fn. Unit Weight: 130 pcf Strength Function: Upper Clay (Undrained)
Name: Embankment Fill (Undrained) Model: Shear/Normal Fn. Unit Weight: 130 pcf Strength Function: Embankment Fill (Undrained)
Name: Lower Clay (Undrained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 5,000 psf Phi': 0 °

Materials

- Upper Clay (Undrained)
- Embankment Fill (Undrained)
- Lower Clay (Undrained)



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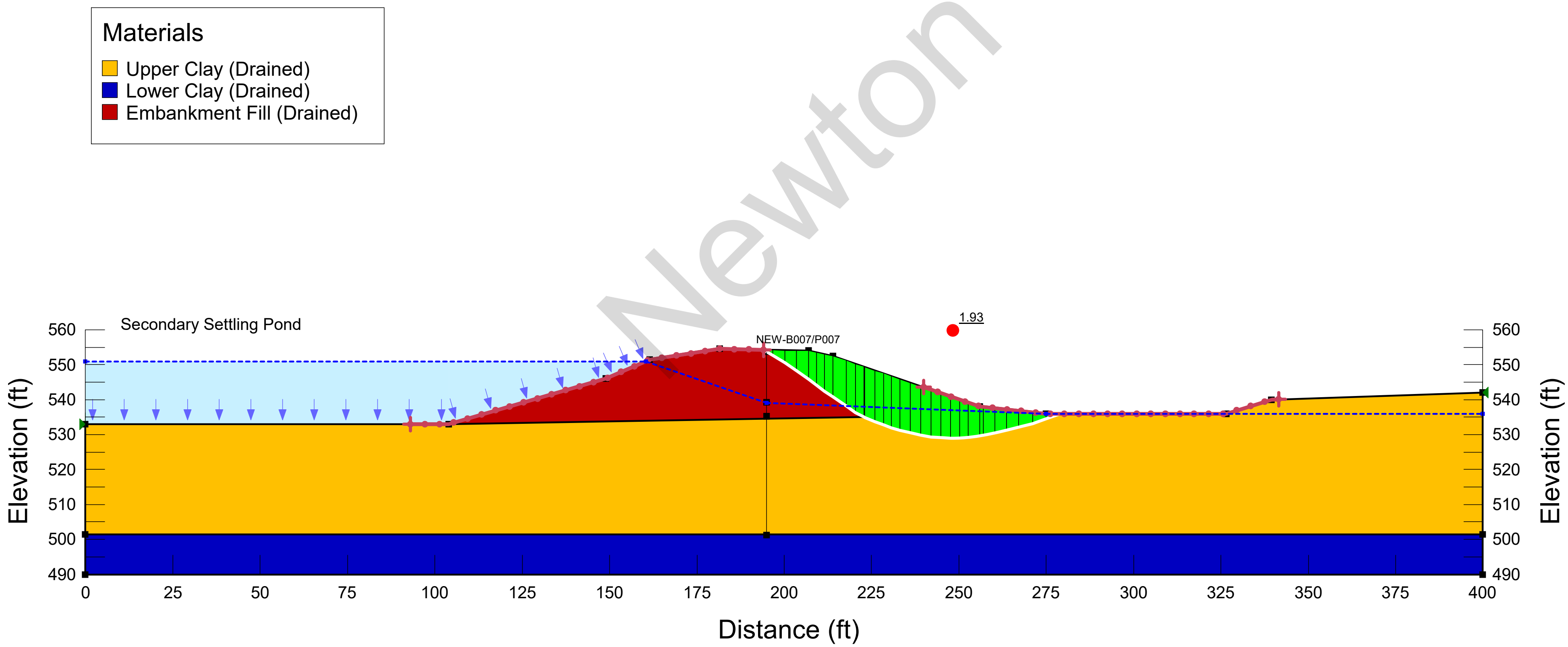
Project Name: **Newton Primary Ash Pond Stability Analysis-Section F**

Analysis: Long Term (Drained)

Calculated By: ZJF Date: 5/23/2016
Checked By: VMCh Date: 6/16/2016
Modified By: PK Date:9/01/2021
Checked By:ZJF Date: 9/08/2021

Name: Upper Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 29 °
Name: Lower Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 3,700 psf Phi': 33 °
Name: Embankment Fill (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 31 °



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Project Name: Newton Primary Ash Pond Stability Analysis-Section F

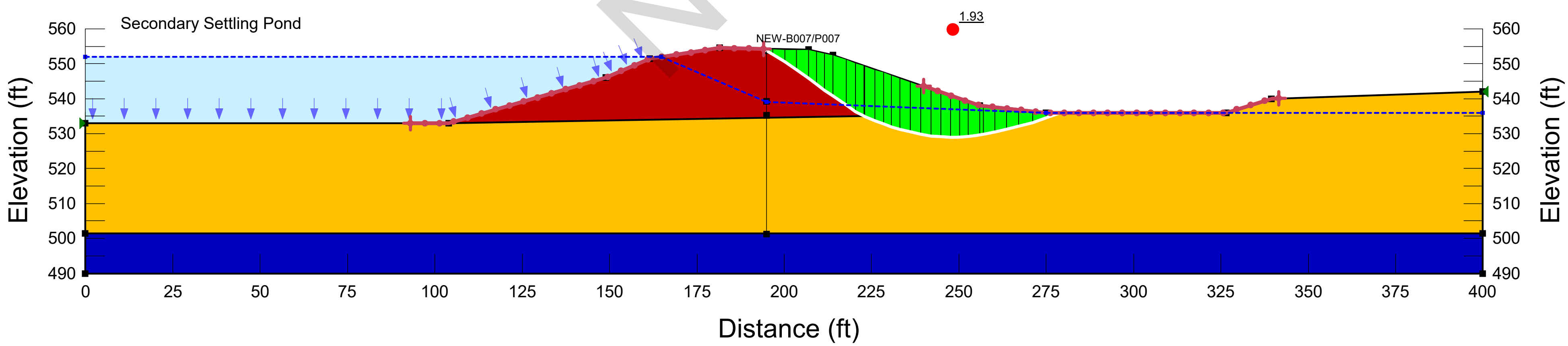
Analysis: Surcharge (Drained)

Calculated By: ZJF Date: 5/23/2016
Checked By: VMCh Date: 6/16/2016
Modified By: PK Date:9/01/2021
Checked By:ZJF Date: 9/08/2021

Name: Upper Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 29 °
Name: Lower Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 3,700 psf Phi': 33 °
Name: Embankment Fill (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 31 °

Materials

- Upper Clay (Drained)
- Lower Clay (Drained)
- Embankment Fill (Drained)



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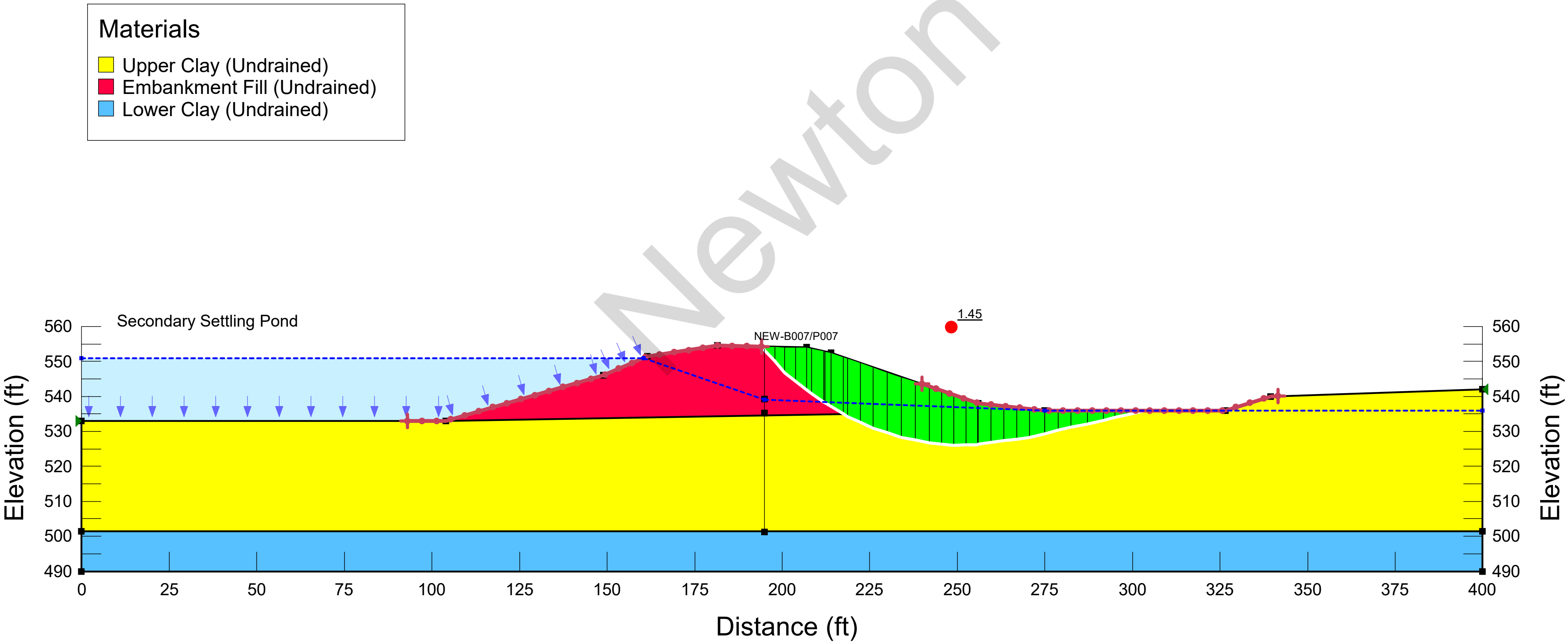
Project Name: **Newton Primary Ash Pond Stability Analysis-Section F**

Analysis: Pseudostatic (Undrained)

Calculated By: ZJF Date: 5/23/2016
Checked By: VMCh Date: 6/16/2016
Modified By: PK Date:9/01/2021
Checked By:ZJF Date: 9/08/2021

Horizontal Seismic Coefficient = 0.153 g

Name: Upper Clay (Undrained) Model: Shear/Normal Fn. Unit Weight: 130 pcf Strength Function: Upper Clay (Undrained)
Name: Embankment Fill (Undrained) Model: Shear/Normal Fn. Unit Weight: 130 pcf Strength Function: Embankment Fill (Undrained)
Name: Lower Clay (Undrained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 5,000 psf Phi': 0 °



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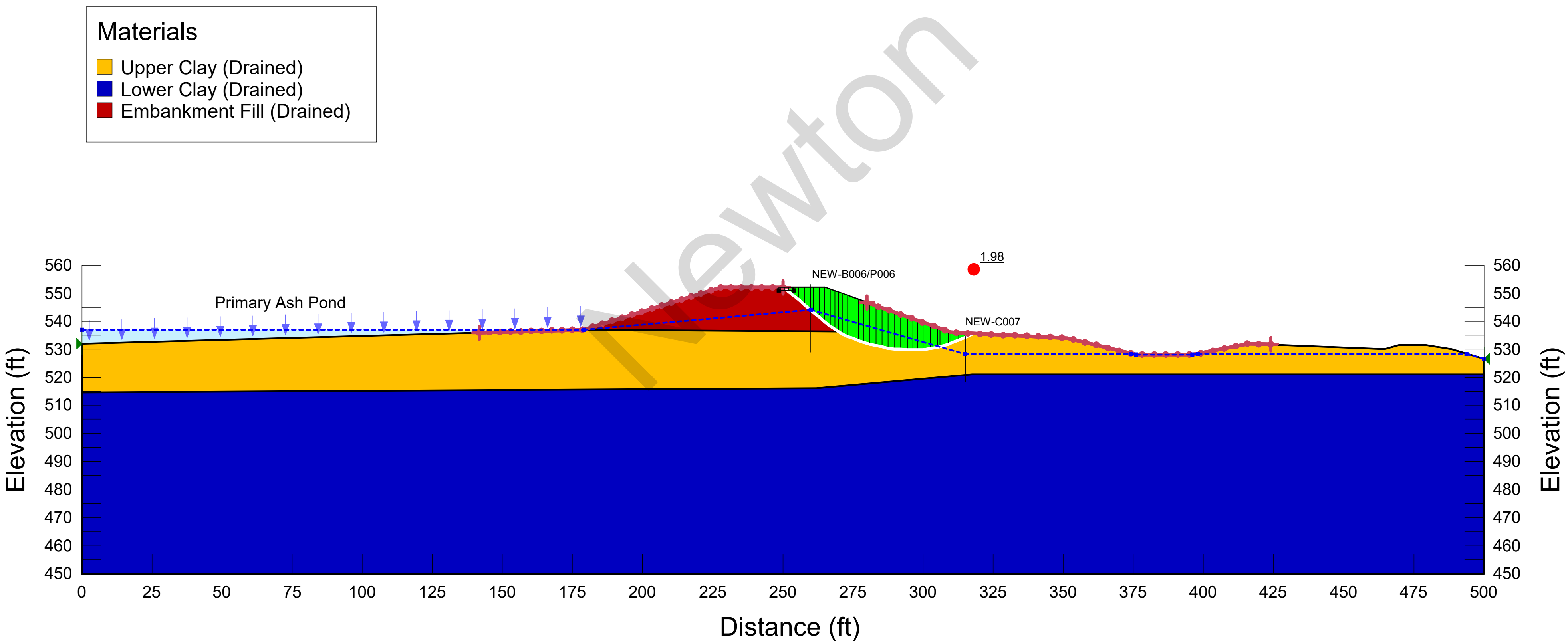
Project Name: Newton Primary Ash Pond Stability Analysis-Section G

Analysis: Long Term (Drained)

Calculated By: ZJF Date: 5/23/16
Checked By: VMCh Date: 06/20/16
Modified By: PK Date:9/01/21
Checked By:ZJF Date: 9/08/21

Name: Upper Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 29 °
Name: Lower Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 3,700 psf Phi': 33 °
Name: Embankment Fill (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 31 °



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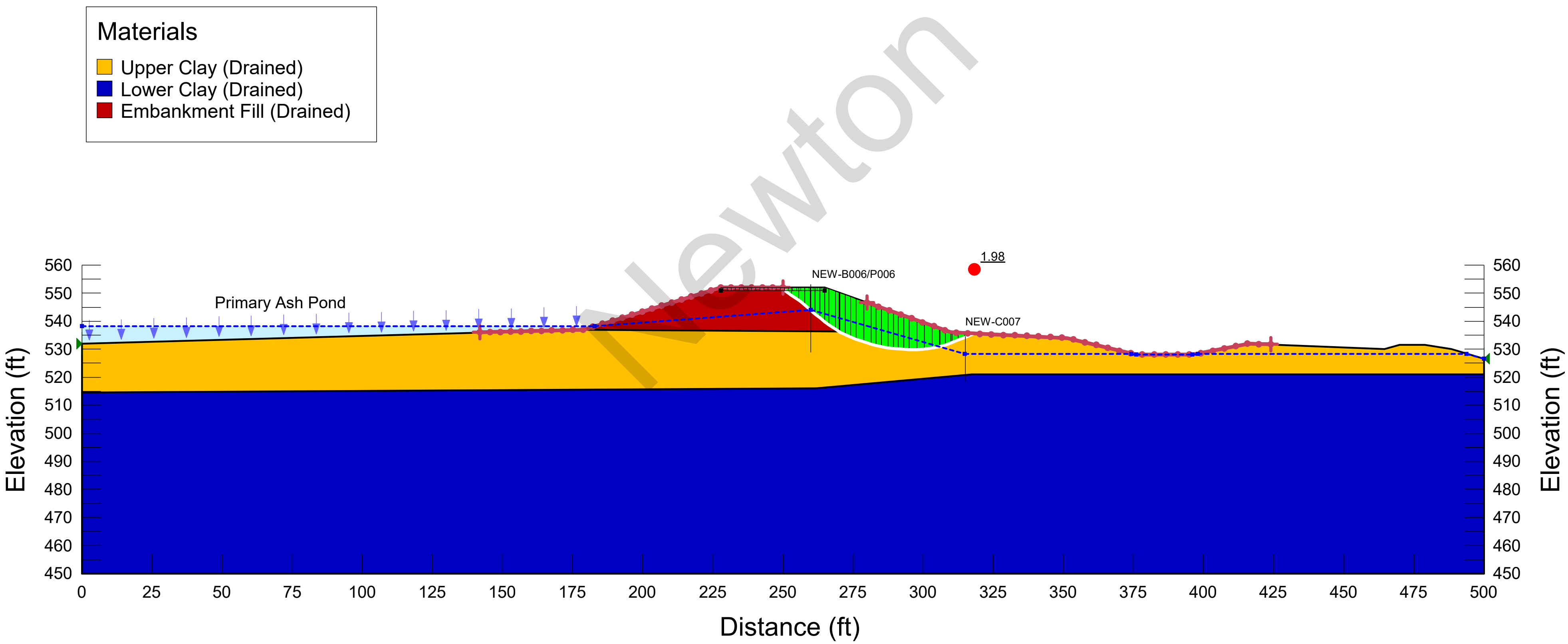
Project Name: Newton Primary Ash Pond Stability Analysis-Section G

Analysis: Surcharge (Drained)

Calculated By: ZJF	Date: 5/23/16
Checked By: VMCh	Date: 06/20/16
Modified By: PK	Date:9/01/21
Checked By:ZJF	Date: 9/08/21

Name: Upper Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 29 °
Name: Lower Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 3,700 psf Phi': 33 °
Name: Embankment Fill (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 31 °



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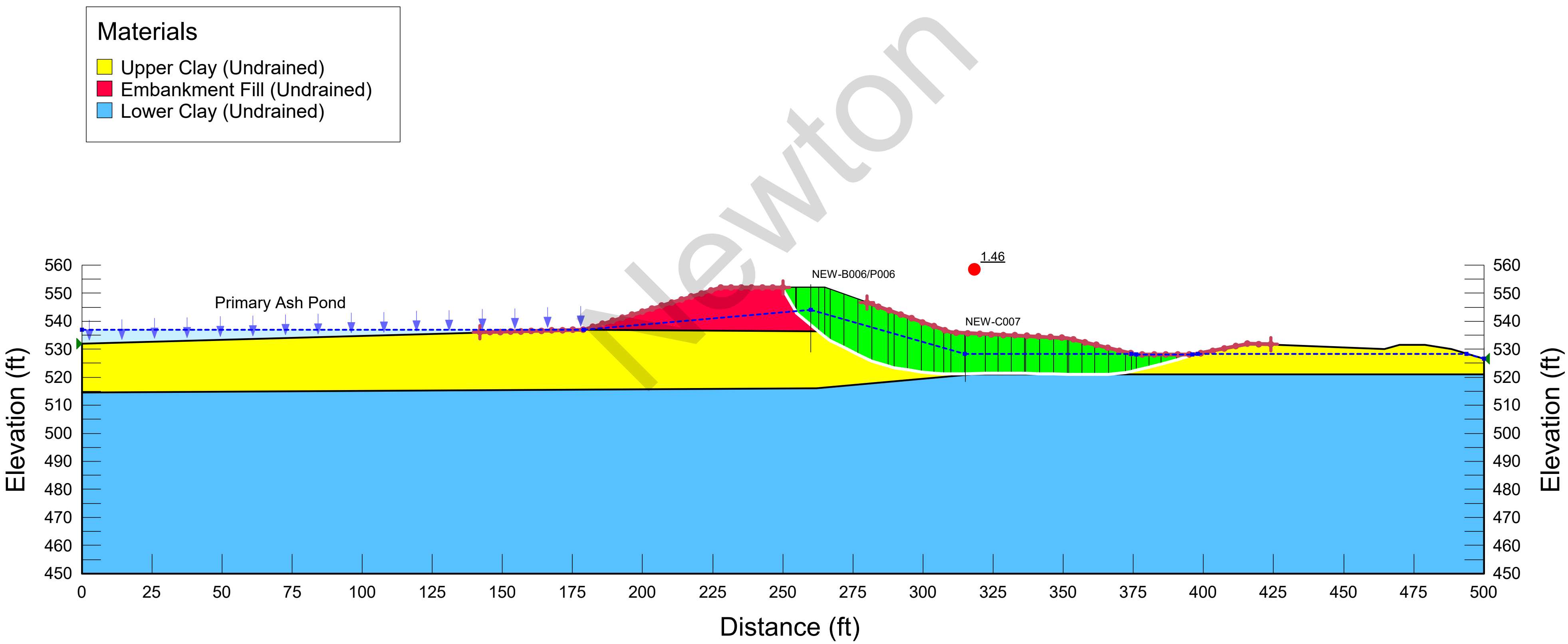
Project Name: Newton Primary Ash Pond Stability Analysis-Section G

Analysis: Pseudostatic (Undrained)

Calculated By: ZJF Date: 5/23/16
Checked By: VMCh Date: 06/20/16
Modified By: PK Date:9/01/21
Checked By:ZJF Date: 9/08/21

Horizontal Seismic Coefficient = 0.153 g

Name: Upper Clay (Undrained) Model: Shear/Normal Fn. Unit Weight: 130 pcf Strength Function: Upper Clay (Undrained)
Name: Embankment Fill (Undrained) Model: Shear/Normal Fn. Unit Weight: 130 pcf Strength Function: Embankment Fill (Undrained)
Name: Lower Clay (Undrained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 5,000 psf Phi': 0 °



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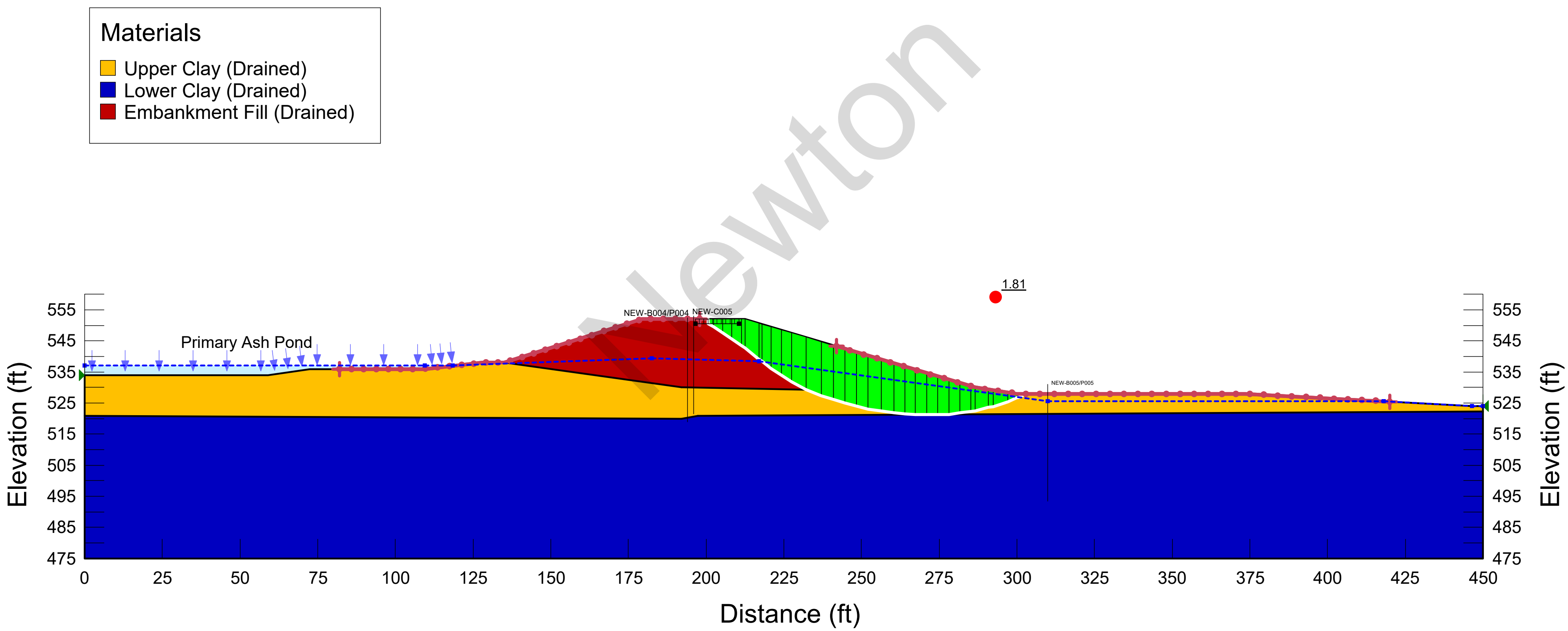
Project Name: Newton Primary Ash Pond Stability Analysis-Section H

Analysis: Long Term (Drained)

Calculated By: ZJF Date: 5/23/16
Checked By: VMCh Date: 6/20/16
Modified By: PK Date:9/01/21
Checked By:ZJF Date: 9/08/21

Name: Upper Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 29 °
Name: Lower Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 3,700 psf Phi': 33 °
Name: Embankment Fill (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 31 °



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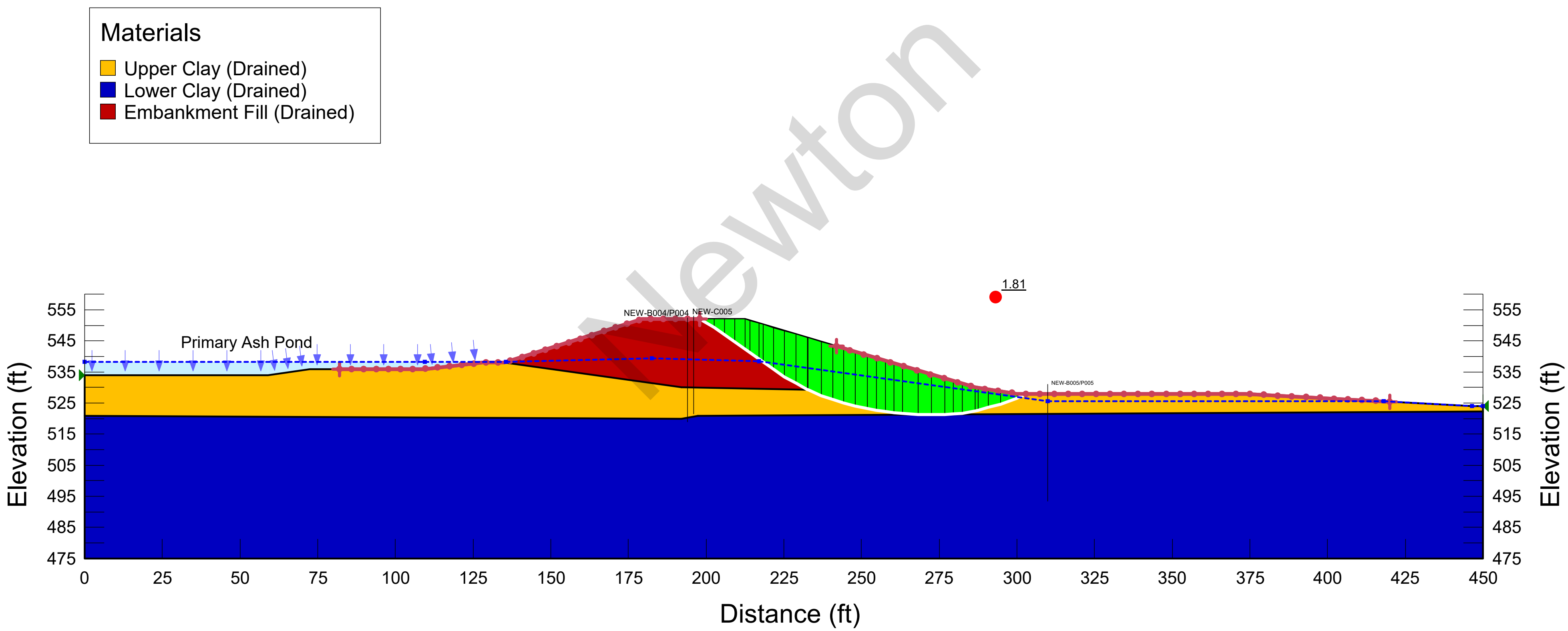
Project Name: Newton Primary Ash Pond Stability Analysis-Section H

Analysis: Surcharge (Drained)

Calculated By: ZJF Date: 5/23/16
Checked By: VMCh Date: 6/20/16
Modified By: PK Date:9/01/21
Checked By:ZJF Date: 9/08/21

Name: Upper Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 29 °
Name: Lower Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 3,700 psf Phi': 33 °
Name: Embankment Fill (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 31 °



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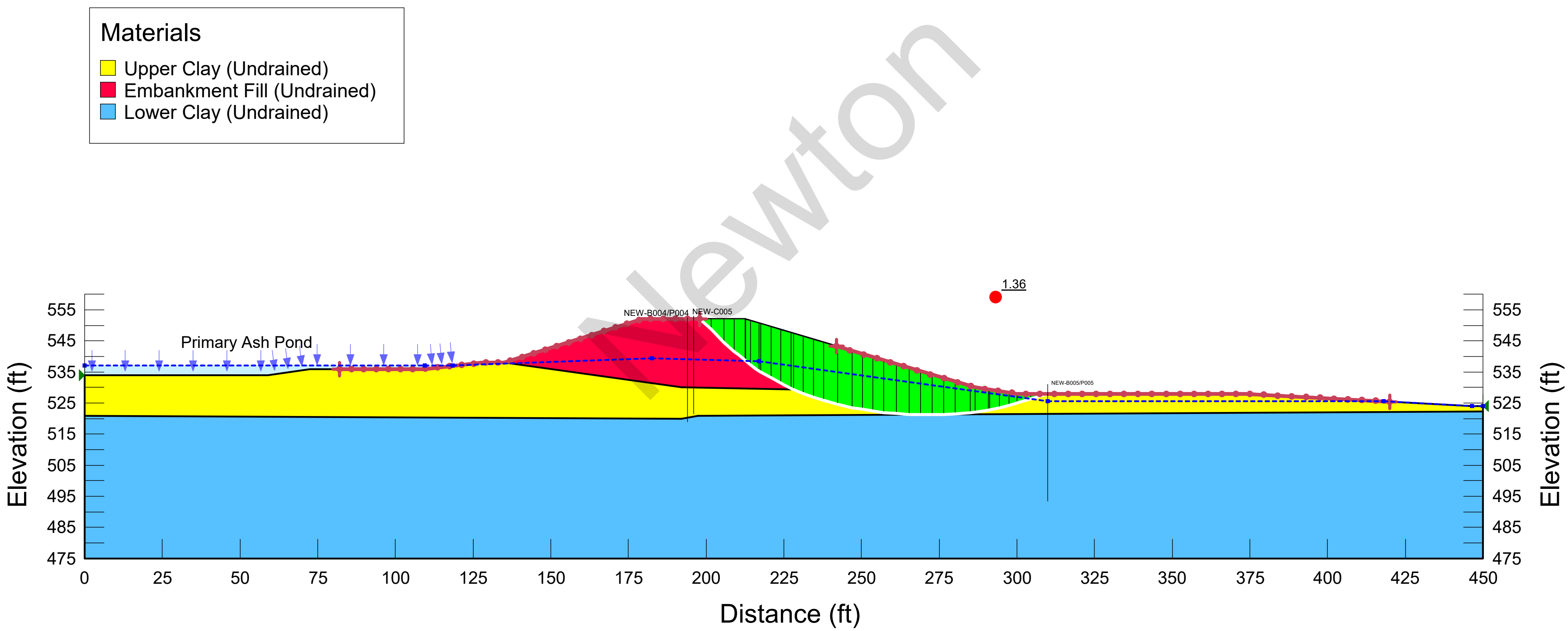
Project Name: **Newton Primary Ash Pond Stability Analysis-Section H**

Analysis: Pseudostatic (Undrained)

Calculated By: ZJF Date: 5/23/16
Checked By: VMCh Date: 6/20/16
Modified By: PK Date:9/01/21
Checked By:ZJF Date: 9/08/21

Horizontal Seismic Coefficient = 0.153 g

Name: Upper Clay (Undrained) Model: Shear/Normal Fn. Unit Weight: 130 pcf Strength Function: Upper Clay (Undrained)
Name: Embankment Fill (Undrained) Model: Shear/Normal Fn. Unit Weight: 130 pcf Strength Function: Embankment Fill (Undrained)
Name: Lower Clay (Undrained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 5,000 psf Phi': 0 °



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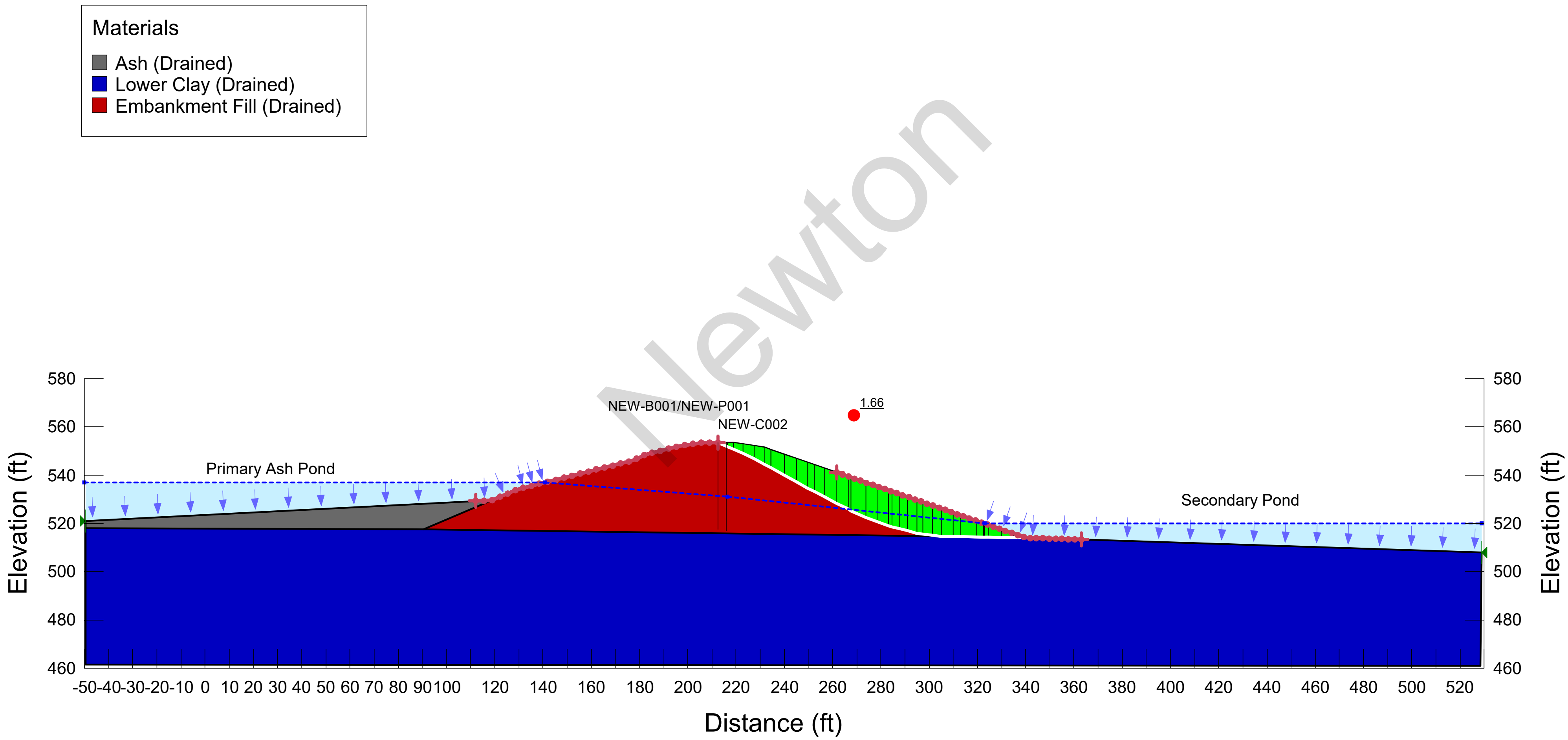
Project Name: **Newton Primary Ash Pond Stability Analysis-Section I**

Analysis: Long Term (Drained)

Calculated By: NDS Date: 5/25/16
Checked By: VMCh Date: 6/20/16
Modified By: PK Date:9/01/21
Checked By:ZJF Date: 9/08/21

Name: Ash (Drained) Model: Mohr-Coulomb Unit Weight: 90 pcf Cohesion': 0 psf Phi': 30 °
Name: Lower Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 3,700 psf Phi': 33 °
Name: Embankment Fill (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 31 °



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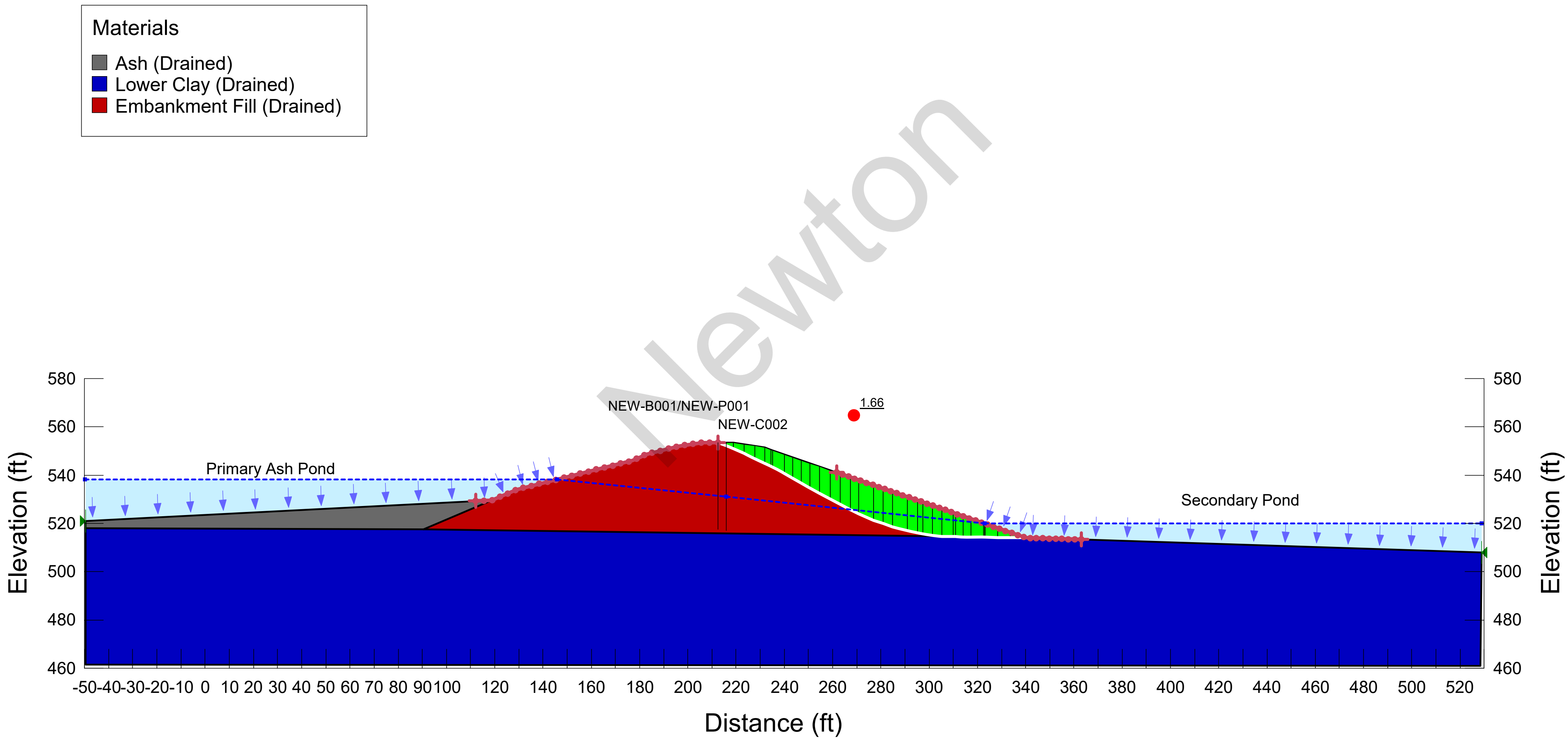
Project Name: Newton Primary Ash Pond Stability Analysis-Section I

Analysis: Surcharge (Drained)

Calculated By: NDS Date: 5/25/16
Checked By: VMCh Date: 6/20/16
Modified By: PK Date:9/01/21
Checked By:ZJF Date: 9/08/21

Name: Ash (Drained) Model: Mohr-Coulomb Unit Weight: 90 pcf Cohesion': 0 psf Phi': 30 °
Name: Lower Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 3,700 psf Phi': 33 °
Name: Embankment Fill (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 31 °



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Project Name: Newton Primary Ash Pond Stability Analysis-Section I

Analysis: Pseudostatic (Undrained)

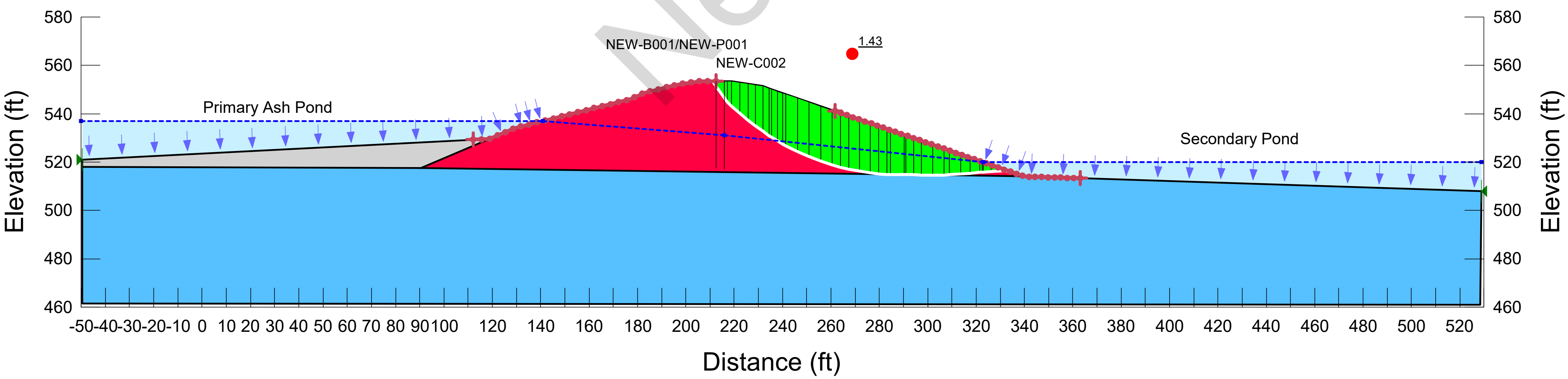
Calculated By: NDS Date: 5/25/16
Checked By: VMCh Date: 6/20/16
Modified By: PK Date:9/01/21
Checked By:ZJF Date: 9/08/21

Horizontal Seismic Coefficient = 0.153 g

Name: Embankment Fill (Undrained) Model: Shear/Normal Fn. Unit Weight: 130 pcf Strength Function: Embankment Fill (Undrained)
Name: Lower Clay (Undrained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 5,000 psf Phi': 0 °
Name: Ash (Undrained) Model: S=f(overburden) Unit Weight: 90 pcf Tau/Sigma Ratio: 0.05 Minimum Strength: 0 psf

Materials

- Embankment Fill (Undrained)
- Lower Clay (Undrained)
- Ash (Undrained)



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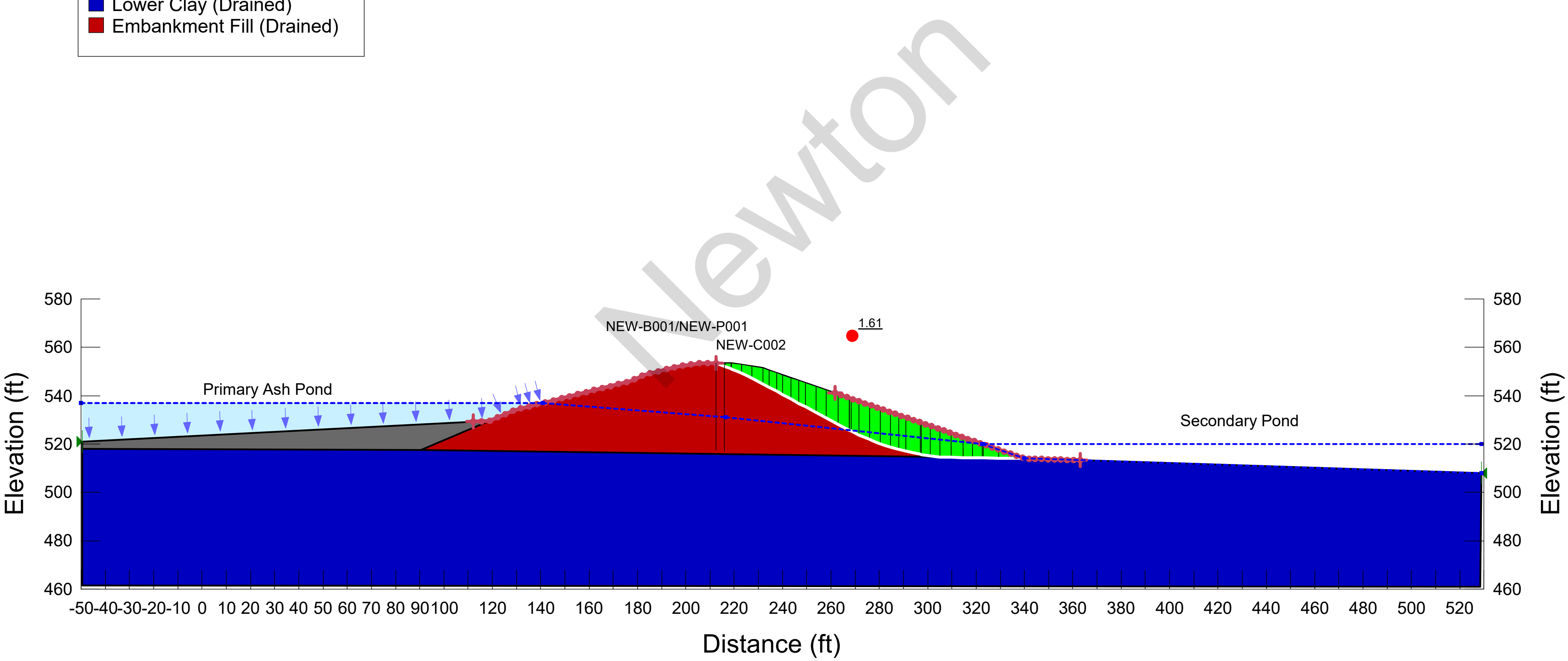
Project Name: Newton Primary Ash Pond Stability Analysis-Section I

Analysis: Sudden Drawdown

Calculated By: NDS Date: 5/25/16
Checked By: VMCh Date: 6/20/16
Modified By: PK Date:9/01/21
Checked By:ZJF Date: 9/08/21

Name: Ash (Drained) Model: Mohr-Coulomb Unit Weight: 90 pcf Cohesion': 0 psf Phi': 30 ° Cohesion R: 0 psf Phi R: 0 ° Piezometric Line After Drawdown: 2
Name: Lower Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 3,700 psf Phi': 33 ° Cohesion R: 0 psf Phi R: 0 ° Piezometric Line After Drawdown: 2
Name: Embankment Fill (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 31 ° Cohesion R: 500 psf Phi R: 22 ° Piezometric Line After Drawdown: 2

Materials
- Ash (Drained)
- Lower Clay (Drained)
- Embankment Fill (Drained)



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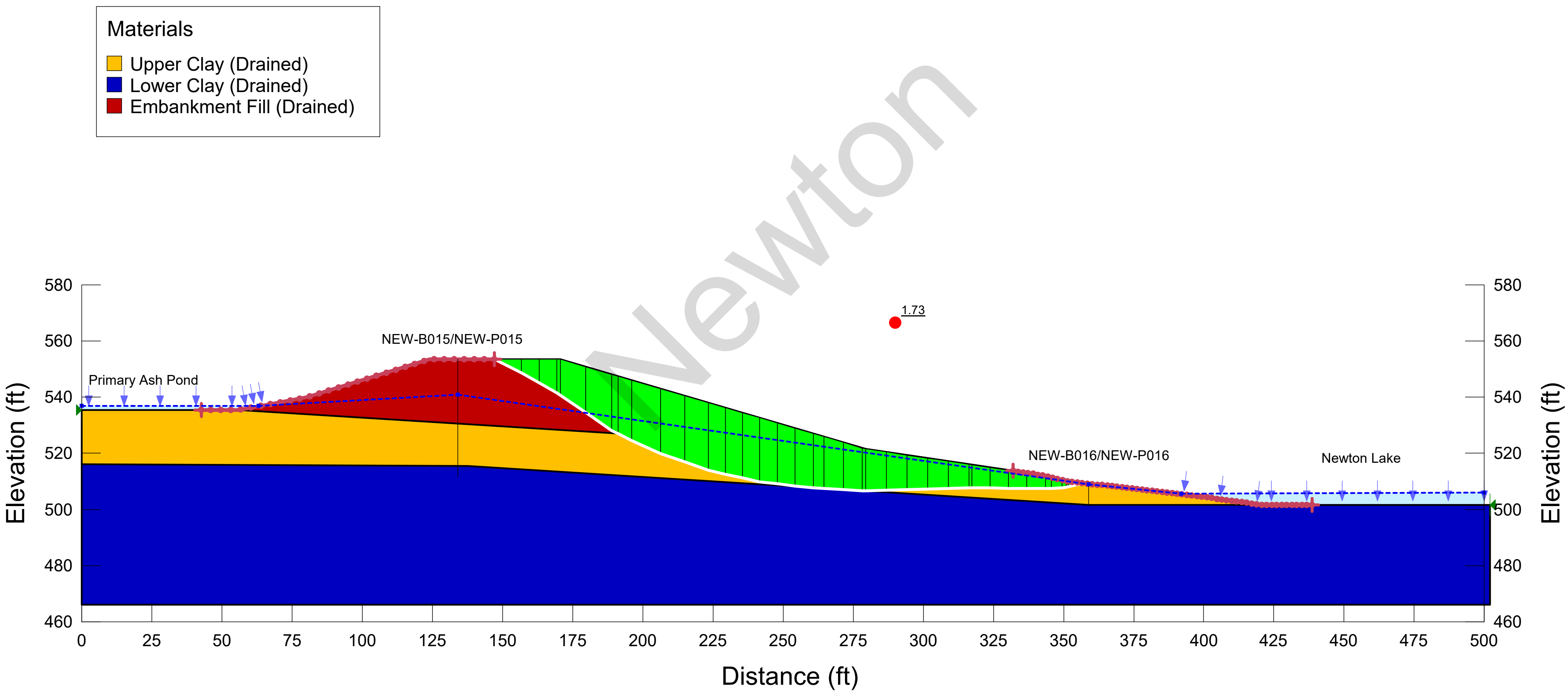
Project Name: **Newton Primary Ash Pond Stability Analysis-Section K**

Analysis: Long Term (Drained)

Calculated By: NDS Date: 5/31/16
Checked By: VMCh Date: 6/20/16
Modified By: PK Date:9/01/21
Checked By:ZJF Date: 9/08/21

Name: Upper Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 29 °
Name: Lower Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 3,700 psf Phi': 33 °
Name: Embankment Fill (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 31 °



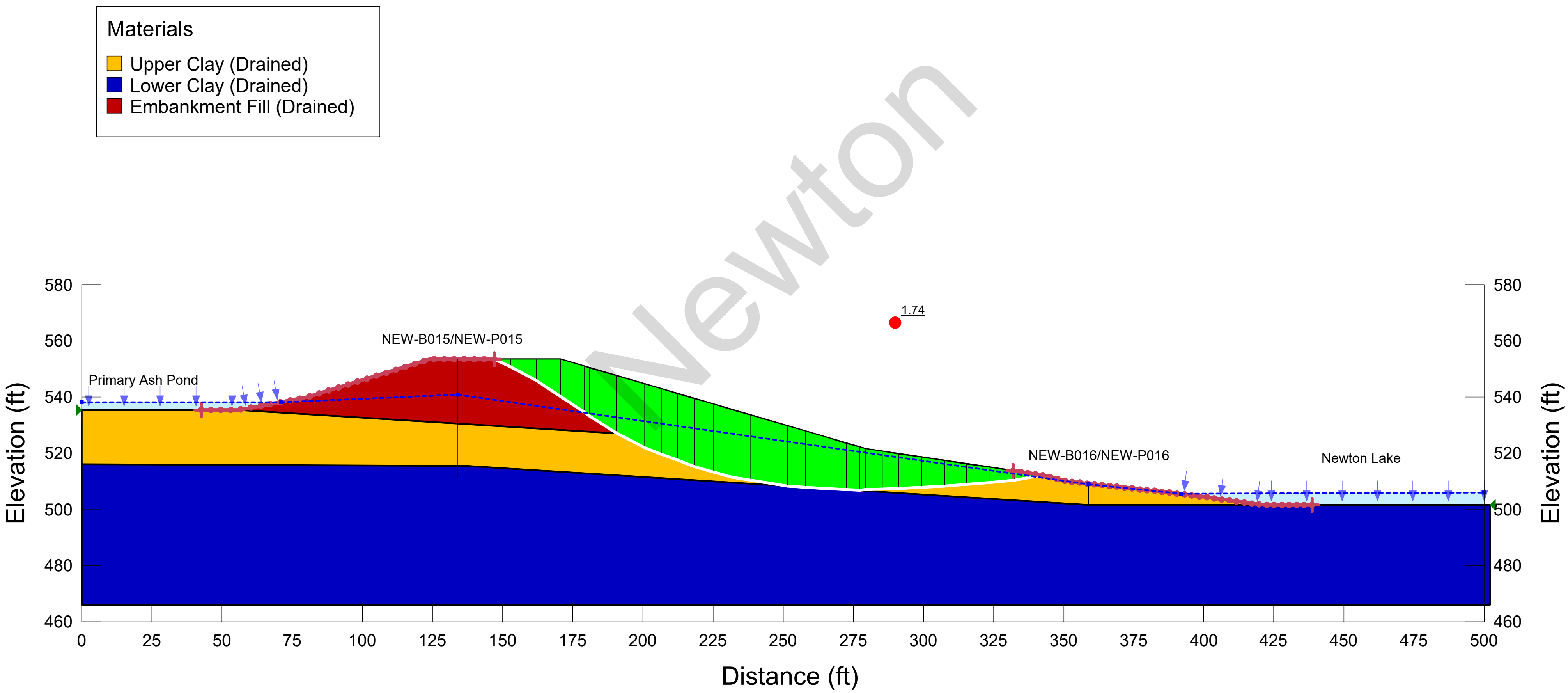
\\STLOUISMO-01\Data\Company\Projects_post_2014\GLP8027_CCR_ReCert\500_Technical\509_NEW\509d_Periodic_Report\Revised SFA\PAP\Section K\ Section K_PK_20210902.gsz

Project Name: Newton Primary Ash Pond Stability Analysis-Section K

Analysis: Surcharge (Drained)

Calculated By: NDS Date: 5/31/16
Checked By: VMCh Date: 6/20/16
Modified By: PK Date:9/01/21
Checked By:ZJF Date: 9/08/21

Name: Upper Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 29 °
Name: Lower Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 3,700 psf Phi': 33 °
Name: Embankment Fill (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 31 °



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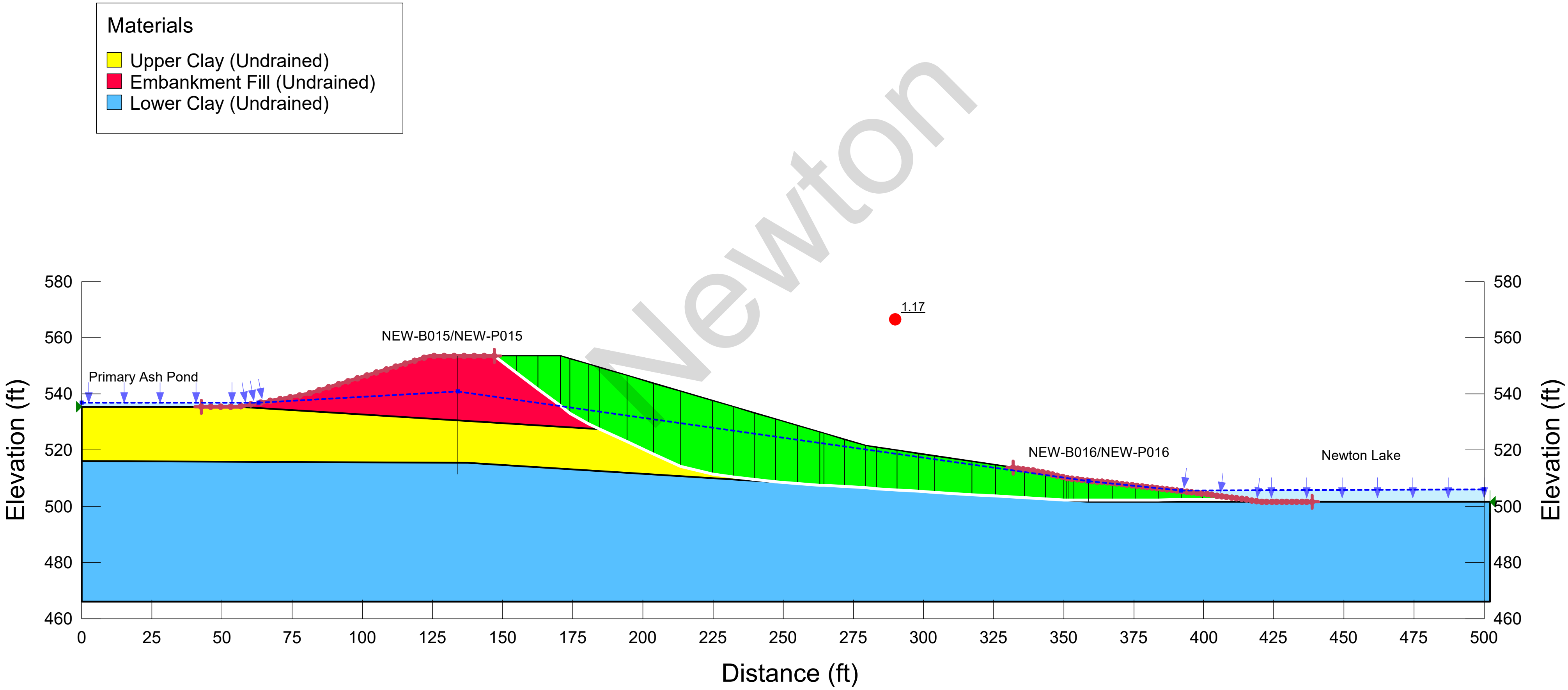
Project Name: **Newton Primary Ash Pond Stability Analysis-Section K**

Analysis: Pseudostatic (Undrained)

Calculated By: NDS Date: 5/31/16
Checked By: VMCh Date: 6/20/16
Modified By: PK Date:9/01/21
Checked By:ZJF Date: 9/08/21

Horizontal Seismic Coefficient = 0.153 g

Name: Upper Clay (Undrained) Model: Shear/Normal Fn. Unit Weight: 130 pcf Strength Function: Upper Clay (Undrained)
Name: Embankment Fill (Undrained) Model: Shear/Normal Fn. Unit Weight: 130 pcf Strength Function: Embankment Fill (Undrained)
Name: Lower Clay (Undrained) Model: Undrained (Phi=0) Unit Weight: 130 pcf Cohesion': 5,000 psf



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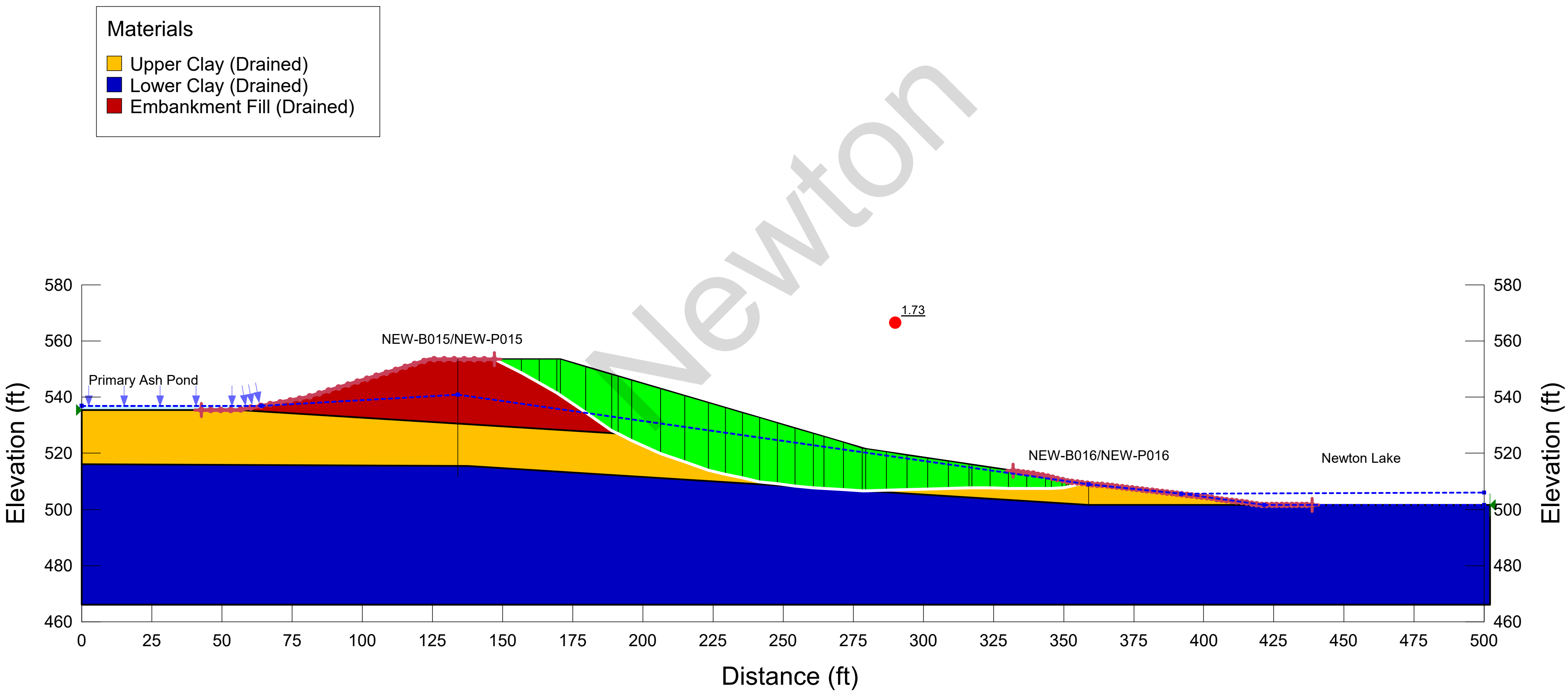
Project Name: **Newton Primary Ash Pond Stability Analysis-Section K**

Analysis: Sudden Drawdown

Calculated By: NDS Date: 5/31/16
Checked By: VMCh Date: 6/20/16
Modified By: PK Date:9/01/21
Checked By:ZJF Date: 9/08/21

Name: Upper Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 29 ° Cohesion R: 470 psf Phi R: 22 ° Piezometric Line After Drawdown: 2
Name: Lower Clay (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 3,700 psf Phi': 33 ° Cohesion R: 0 psf Phi R: 0 ° Piezometric Line After Drawdown: 2
Name: Embankment Fill (Drained) Model: Mohr-Coulomb Unit Weight: 130 pcf Cohesion': 0 psf Phi': 31 ° Cohesion R: 500 psf Phi R: 22 ° Piezometric Line After Drawdown: 2



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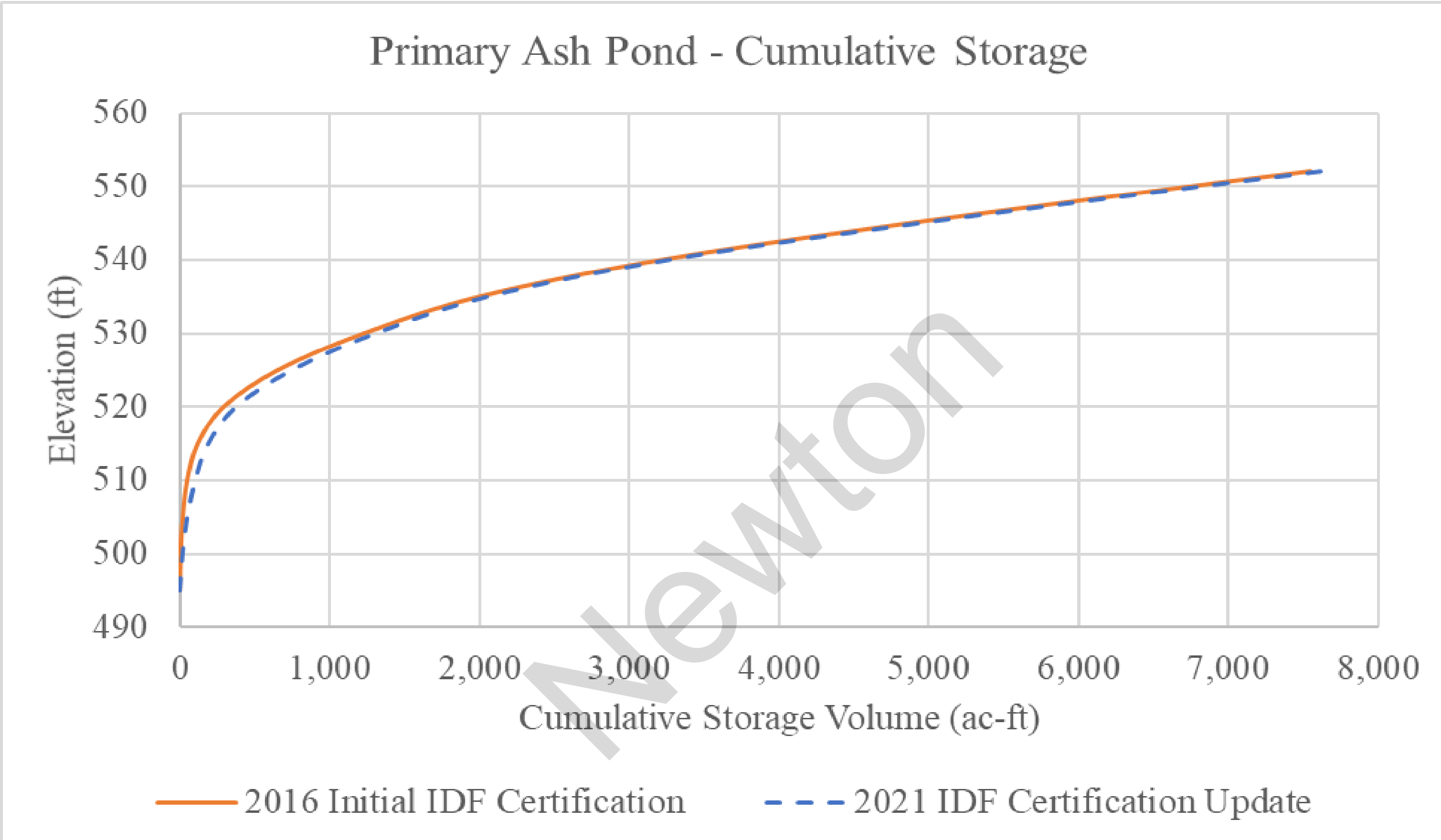
Attachment E

Periodic Inflow Design Flood Control System Plan Analyses

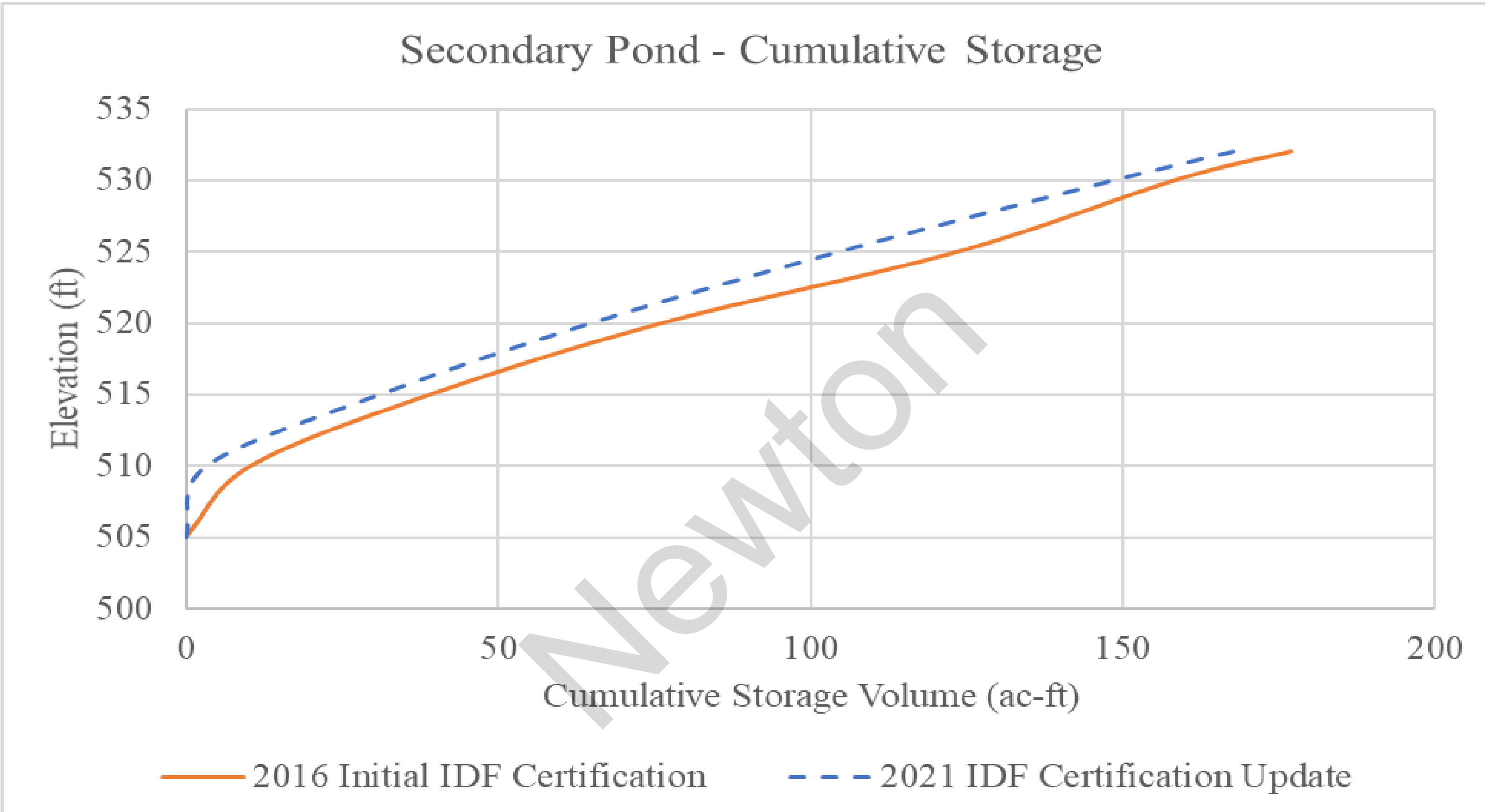


PRIMARY ASH POND CUMULATIVE STORAGE
PERIODIC CERTIFICATION
NEWTON POWER PLANT
NEWTON, ILLINOIS

Geosyntec consultants

Figure E-1

GLP8027 9/10/2021

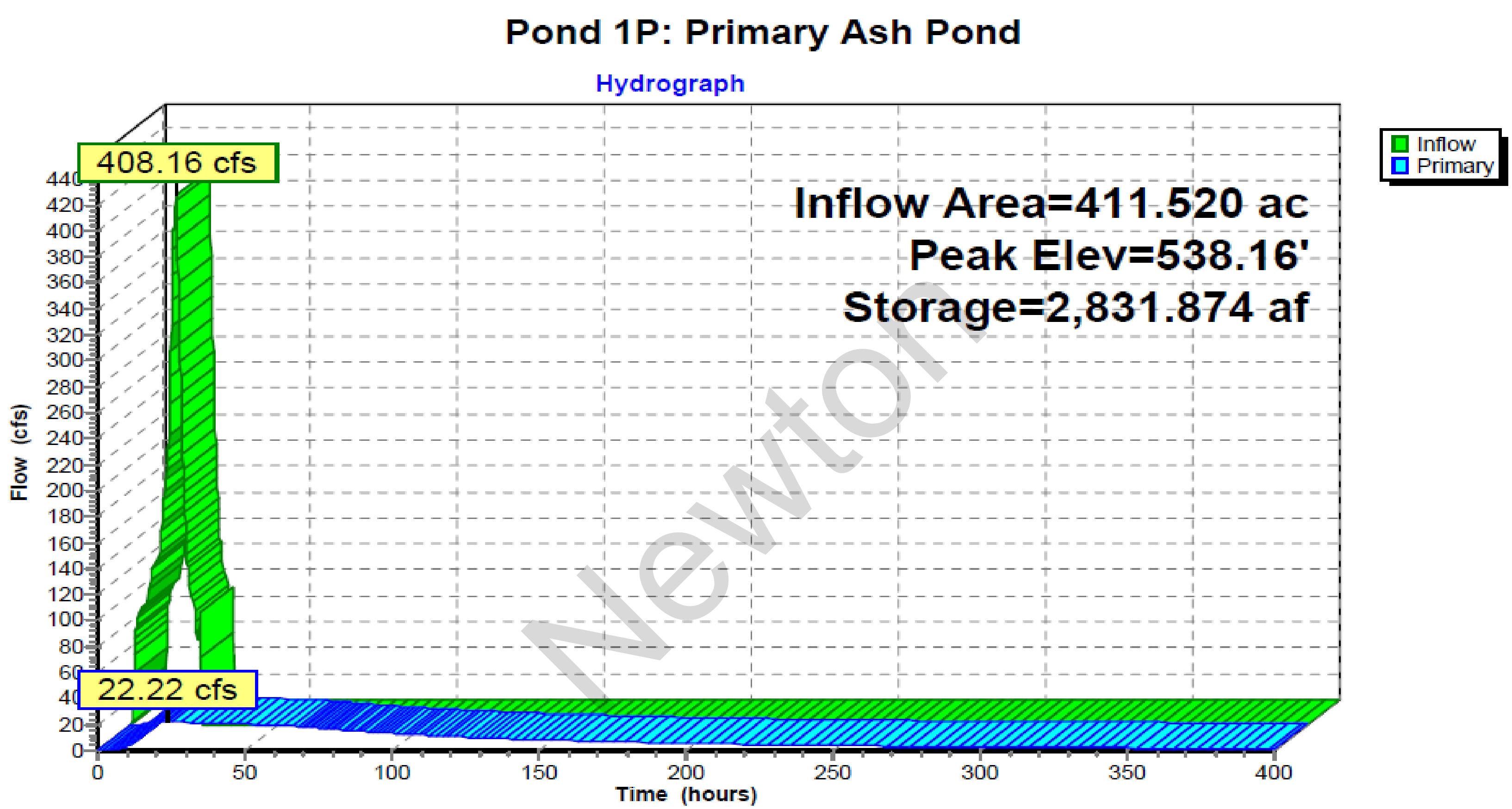


SECONDARY POND CUMULATIVE STORAGE
PERIODIC CERTIFICATION
NEWTON POWER PLANT
NEWTON, ILLINOIS

Geosyntec consultants

Figure E-2

GLP8027 | 9/10/2021



AP1 IDF HYDROGRAPH PERIODIC CERTIFICATION NEWTON POWER PLANT NEWTON, ILLINOIS		
Geosyntec consultants		Figure E-3
GLP8027	9/10/2021	

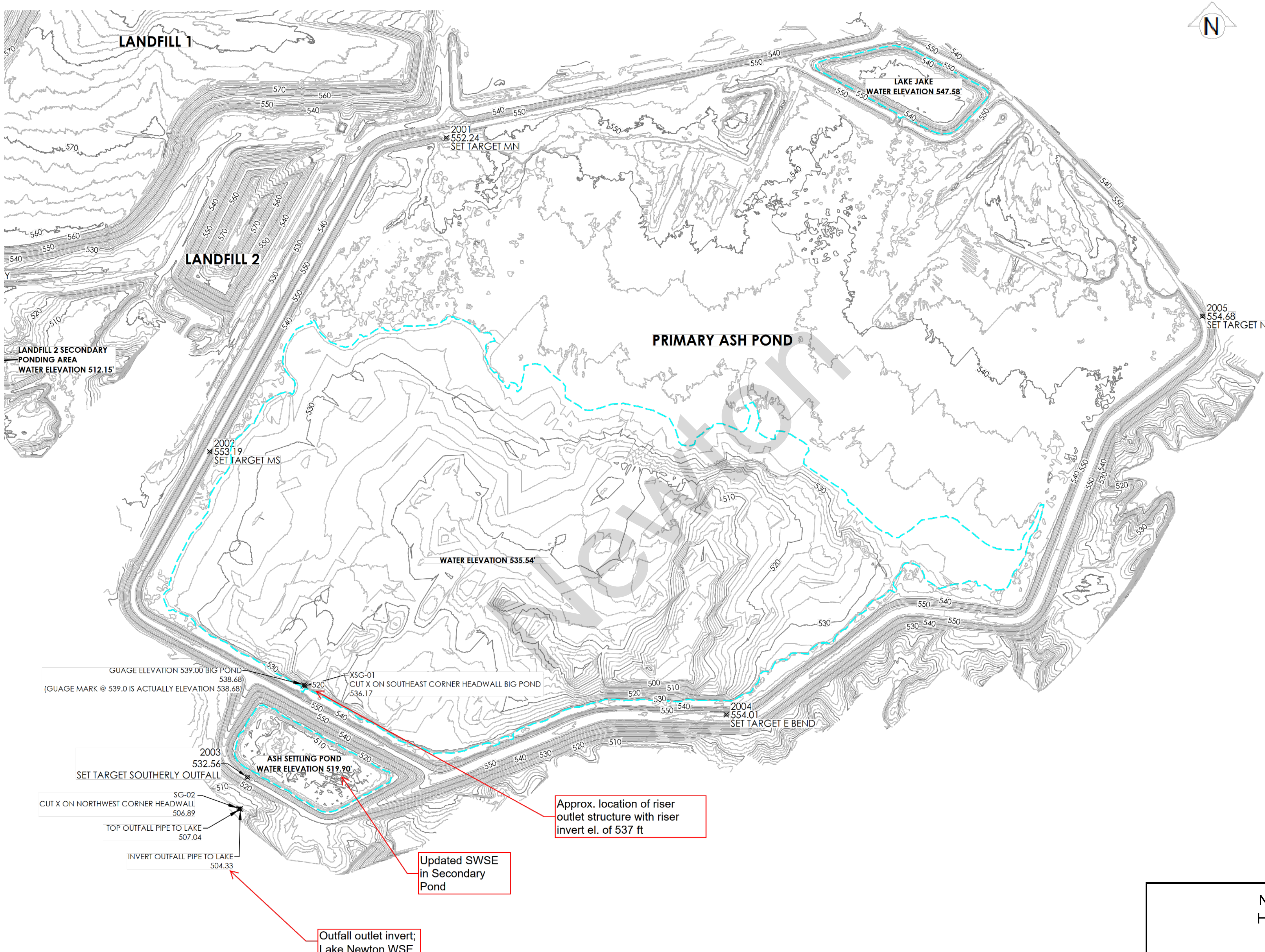
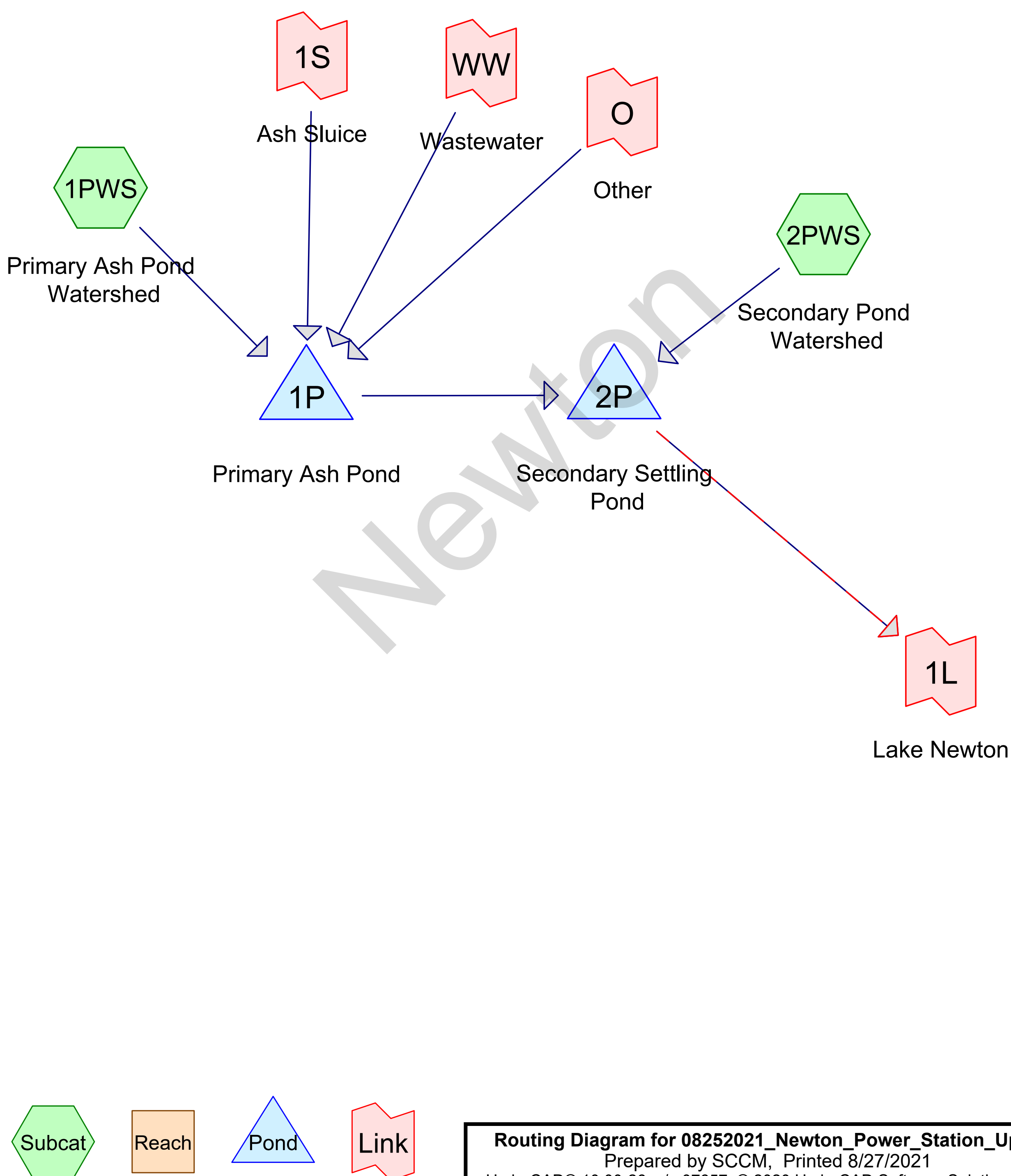


Figure based on IngenAE 2020 Site Topo

DRAFT - NOT FOR CONSTRUCTION - NOT TO SCALE - ATTORNEY-CLIENT PRIVILEGED & CONFIDENTIAL

Newton Power Plant Hydrologic Workmap		Figure E-4
Geosyntec consultants		
GLP8027	September 2021	



Routing Diagram for 08252021_Newton_Power_Station_Update
Prepared by SCCM, Printed 8/27/2021
HydroCAD® 10.00-26 s/n 07657 © 2020 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
423.520	98	(1PWS, 2PWS)
423.520	**98**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
423.520	Other	1PWS, 2PWS
423.520		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	423.520	423.520		1PWS, 2PWS
0.000	**0.000**	**0.000**	**0.000**	**423.520**	**423.520**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	1P	512.18	508.00	220.0	0.0190	0.013	28.0	0.0	0.0
2	2P	505.00	504.33	226.0	0.0030	0.013	28.0	0.0	0.0

Time span=0.00-400.00 hrs, dt=0.15 hrs, 2668 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1PWS: Primary Ash Runoff Area=411.520 ac 100.00% Impervious Runoff Depth=8.77"
Tc=6.0 min CN=98 Runoff=408.16 cfs 300.740 af

Subcatchment 2PWS: Secondary Pond Runoff Area=12.000 ac 100.00% Impervious Runoff Depth=8.77"
Tc=6.0 min CN=98 Runoff=11.90 cfs 8.770 af

Pond 1P: Primary Ash Pond Peak Elev=538.16' Storage=2,831.874 af Inflow=408.16 cfs 300.740 af
Outflow=22.22 cfs 260.432 af

Pond 2P: Secondary Settling Pond Peak Elev=519.90' Storage=64.320 af Inflow=28.79 cfs 269.202 af
Primary=61.56 cfs 333.516 af Secondary=0.00 cfs 0.000 af Outflow=61.56 cfs 333.516 af

Link 1L: Lake Newton Inflow=61.56 cfs 333.516 af
Primary=61.56 cfs 333.516 af

Link 1S: Ash Sluice Manual Hydrograph above 13.37 cfs below 13.37 cfs Inflow=13.37 cfs 171.338 af
Primary=0.00 cfs 0.000 af Secondary=13.37 cfs 171.338 af

Link O: Other Manual Hydrograph above 1.54 cfs below 1.54 cfs Inflow=1.54 cfs 50.935 af
Primary=0.00 cfs 0.000 af Secondary=1.54 cfs 50.935 af

Link WW: Wastewater Manual Hydrograph above 23.39 cfs below 23.39 cfs Inflow=23.39 cfs 201.231 af
Primary=0.00 cfs 0.000 af Secondary=23.39 cfs 201.231 af

Total Runoff Area = 423.520 ac Runoff Volume = 309.510 af Average Runoff Depth = 8.77"
0.00% Pervious = 0.000 ac 100.00% Impervious = 423.520 ac

Summary for Subcatchment 1PWS: Primary Ash Pond Watershed

[49] Hint: Tc<2dt may require smaller dt

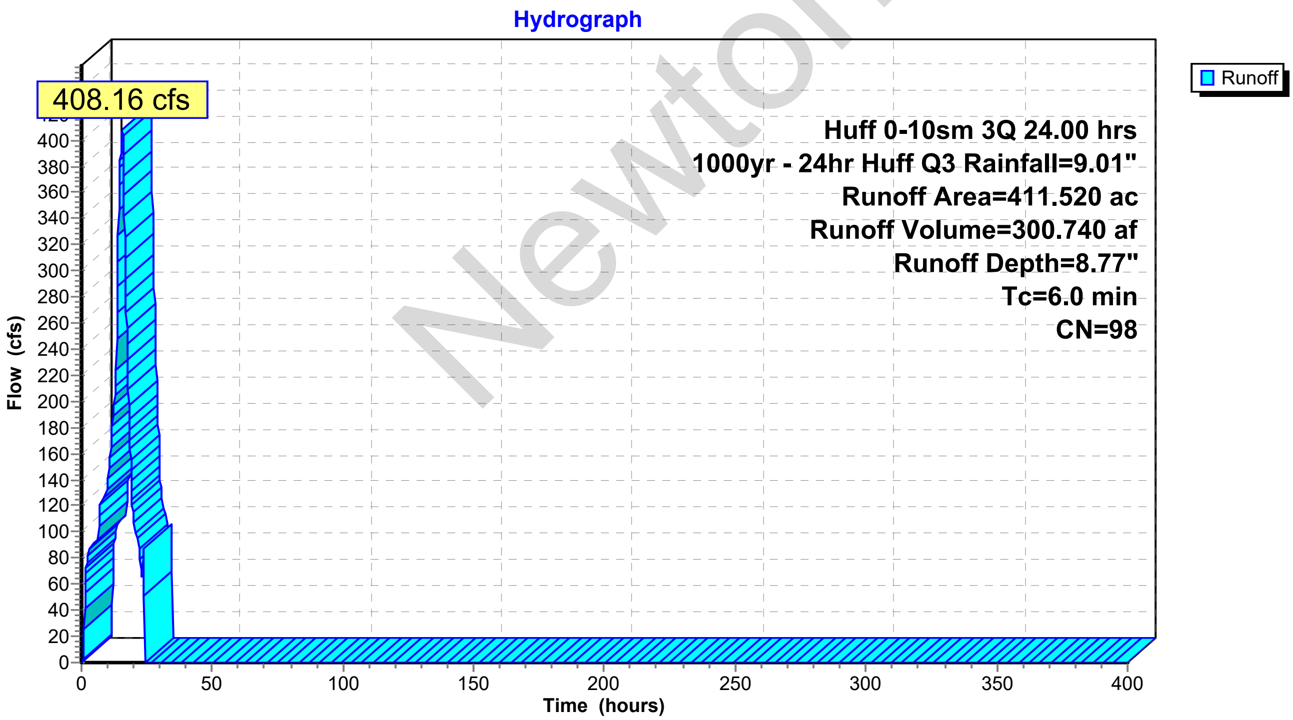
Runoff = 408.16 cfs @ 15.60 hrs, Volume= 300.740 af, Depth= 8.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-400.05 hrs, dt= 0.15 hrs
Huff 0-10sm 3Q 24.00 hrs 1000yr - 24hr Huff Q3 Rainfall=9.01"

	Area (ac)	CN	Description
*	411.520	98	
	411.520		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 1PWS: Primary Ash Pond Watershed



Summary for Subcatchment 2PWS: Secondary Pond Watershed

[49] Hint: Tc<2dt may require smaller dt

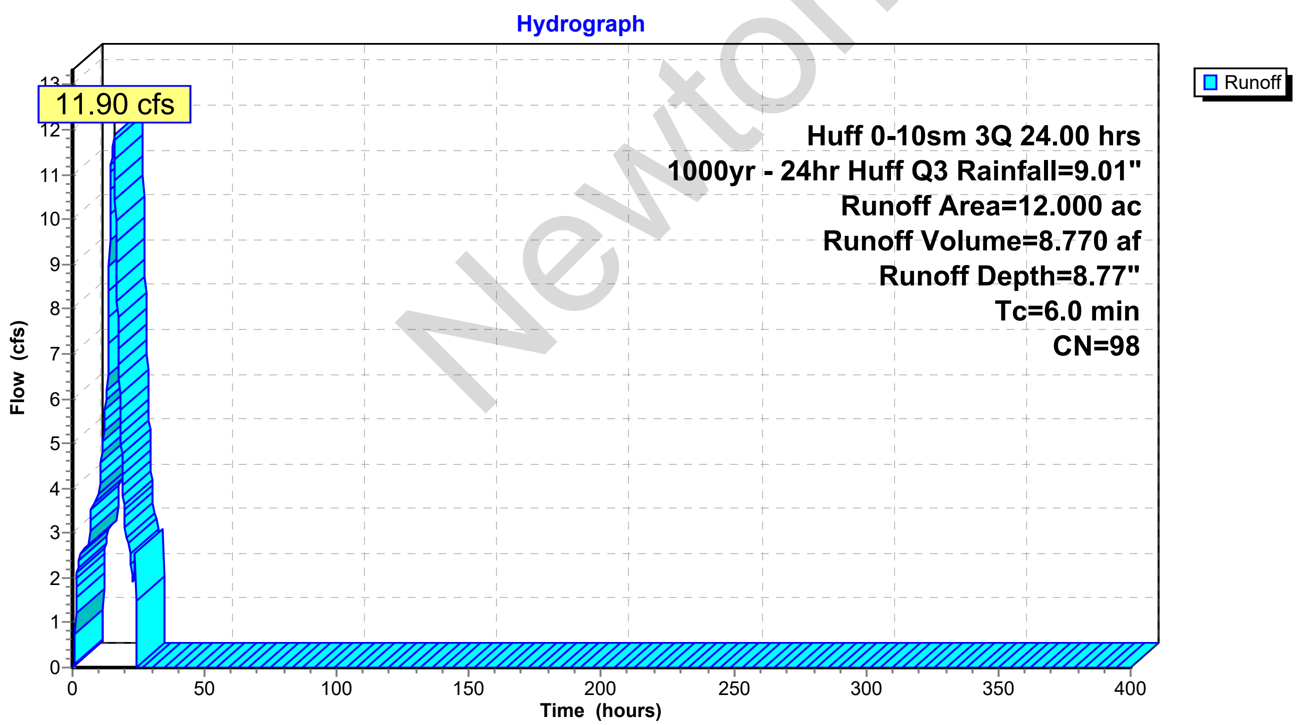
Runoff = 11.90 cfs @ 15.60 hrs, Volume= 8.770 af, Depth= 8.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-400.05 hrs, dt= 0.15 hrs
Huff 0-10sm 3Q 24.00 hrs 1000yr - 24hr Huff Q3 Rainfall=9.01"

	Area (ac)	CN	Description
*	12.000	98	
	12.000		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 2PWS: Secondary Pond Watershed



Summary for Pond 1P: Primary Ash Pond

Inflow Area = 411.520 ac,100.00% Impervious, Inflow Depth = 8.77" for 1000yr - 24hr Huff Q3 event
Inflow = 408.16 cfs @ 15.60 hrs, Volume= 300.740 af
Outflow = 22.22 cfs @ 24.18 hrs, Volume= 260.432 af, Atten= 95%, Lag= 514.8 min
Primary = 22.22 cfs @ 24.18 hrs, Volume= 260.432 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-400.05 hrs, dt= 0.15 hrs
Starting Elev= 537.00' Surf.Area= 0.000 ac Storage= 2,550.800 af
Peak Elev= 538.16' @ 24.18 hrs Surf.Area= 0.000 ac Storage= 2,831.874 af (281.074 af above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 6,560.9 min (7,370.8 - 809.8)

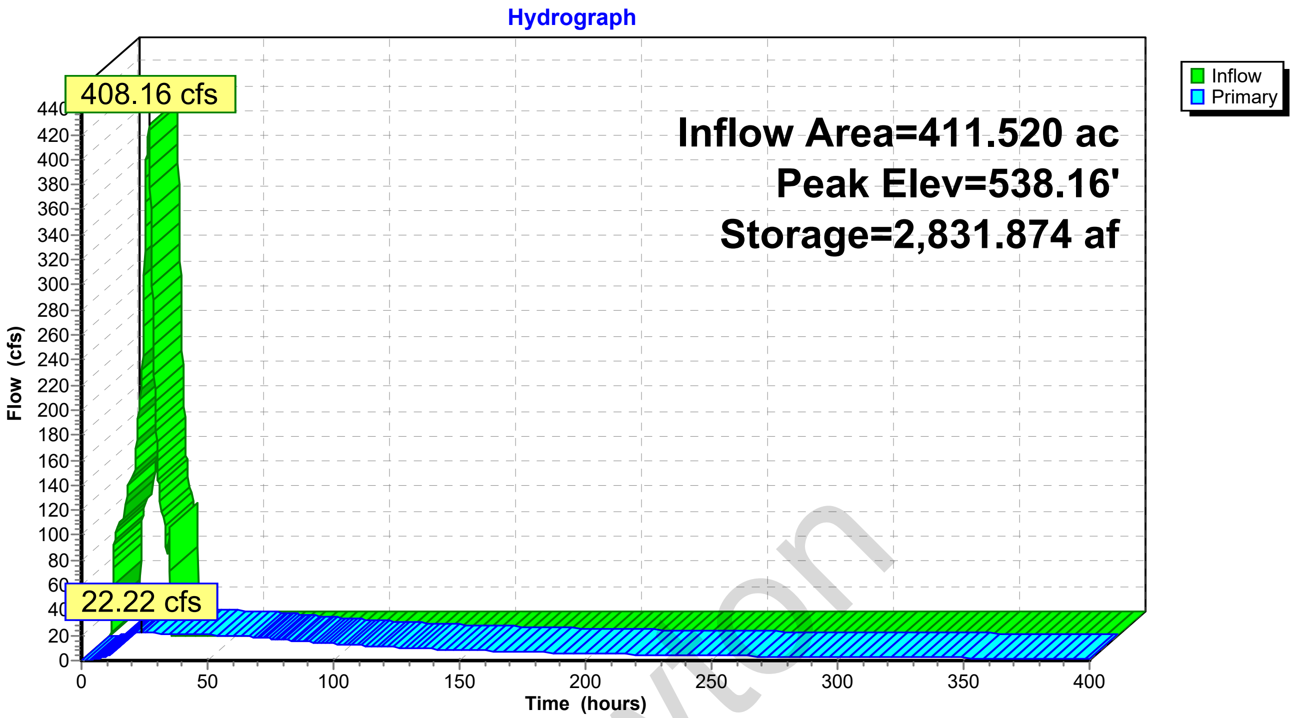
Volume	Invert	Avail.Storage	Storage Description
#1	495.00'	7,623.000 af	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (acre-feet)
495.00	0.000
500.00	18.000
505.00	51.000
510.00	104.000
515.00	192.000
520.00	377.000
525.00	752.000
530.00	1,312.000
535.00	2,068.000
540.00	3,275.000
545.00	4,965.000
550.00	6,842.000
551.00	7,231.000
552.00	7,623.000

Device	Routing	Invert	Outlet Devices
#1	Primary	512.18'	**28.0" Round Culvert** L= 220.0' Ke= 0.820 Inlet / Outlet Invert= 512.18' / 508.00' S= 0.0190 '/' Cc= 0.900 n= 0.013, Flow Area= 4.28 sf
#2	Device 1	537.00'	**28.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=22.22 cfs @ 24.18 hrs HW=538.16' TW=510.37' (Dynamic Tailwater)
└─**1=Culvert** (Passes 22.22 cfs of 84.54 cfs potential flow)
  └─**2=Orifice/Grate** (Orifice Controls 22.22 cfs @ 5.20 fps)

Pond 1P: Primary Ash Pond



Summary for Pond 2P: Secondary Settling Pond

Inflow Area = 423.520 ac,100.00% Impervious, Inflow Depth > 7.63" for 1000yr - 24hr Huff Q3 event
Inflow = 28.79 cfs @ 16.35 hrs, Volume= 269.202 af
Outflow = 61.56 cfs @ 0.00 hrs, Volume= 333.516 af, Atten= 0%, Lag= 0.0 min
Primary = 61.56 cfs @ 0.00 hrs, Volume= 333.516 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-400.05 hrs, dt= 0.15 hrs
Starting Elev= 519.90' Surf.Area= 0.000 ac Storage= 64.320 af
Peak Elev= 519.90' @ 0.00 hrs Surf.Area= 0.000 ac Storage= 64.320 af

Plug-Flow detention time= 67.0 min calculated for 269.095 af (100% of inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	505.00'	168.000 af	**Custom Stage Data** Listed below

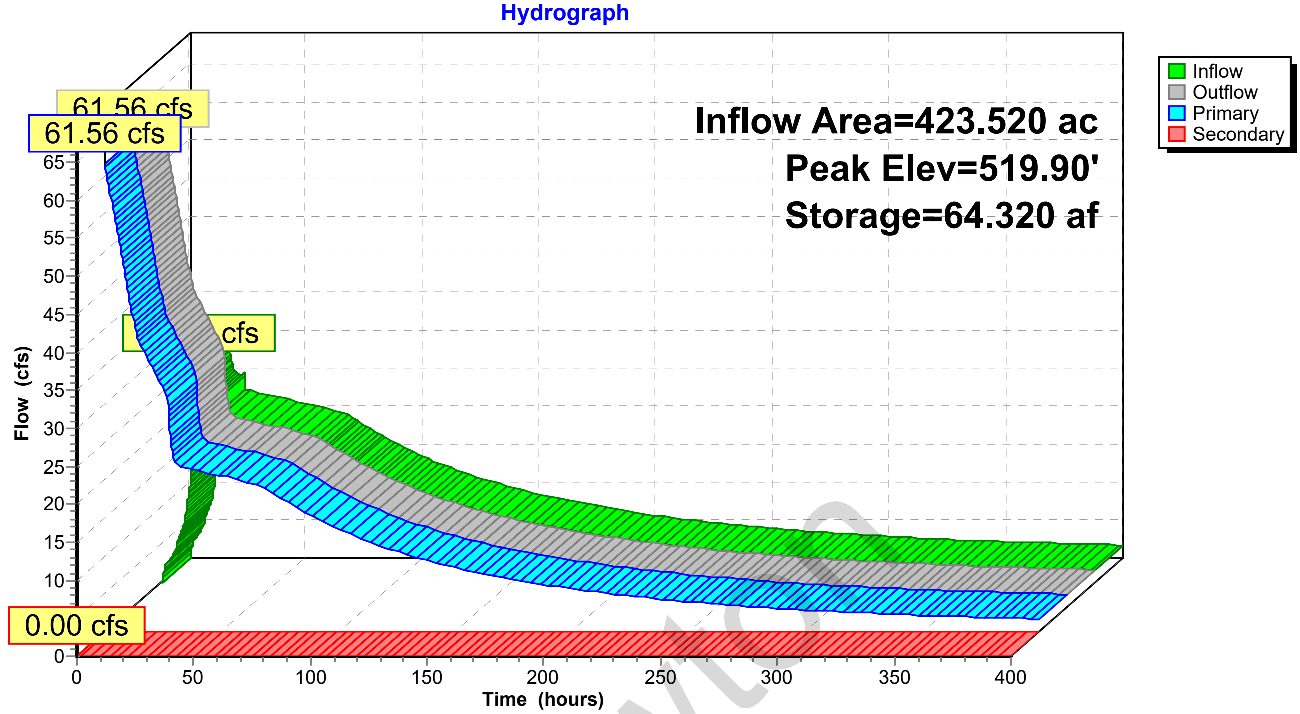
Elevation (feet)	Cum.Store (acre-feet)
505.00	0.000
510.00	3.000
515.00	31.000
520.00	65.000
525.00	105.000
530.00	149.000
531.00	158.000
532.00	168.000

Device	Routing	Invert	Outlet Devices
#1	Primary	505.00'	**28.0" Round Culvert** L= 226.0' Ke= 0.820 Inlet / Outlet Invert= 505.00' / 504.33' S= 0.0030 '/' Cc= 0.900 n= 0.013, Flow Area= 4.28 sf
#2	Secondary	528.50'	**5.0' long Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 Coef. (English) 2.65 2.65 2.65 2.65 2.65 2.65 2.65 2.65 2.65

Primary OutFlow Max=61.56 cfs @ 0.00 hrs HW=519.90' TW=504.33' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 61.56 cfs @ 14.40 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=519.90' TW=504.33' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Secondary Settling Pond



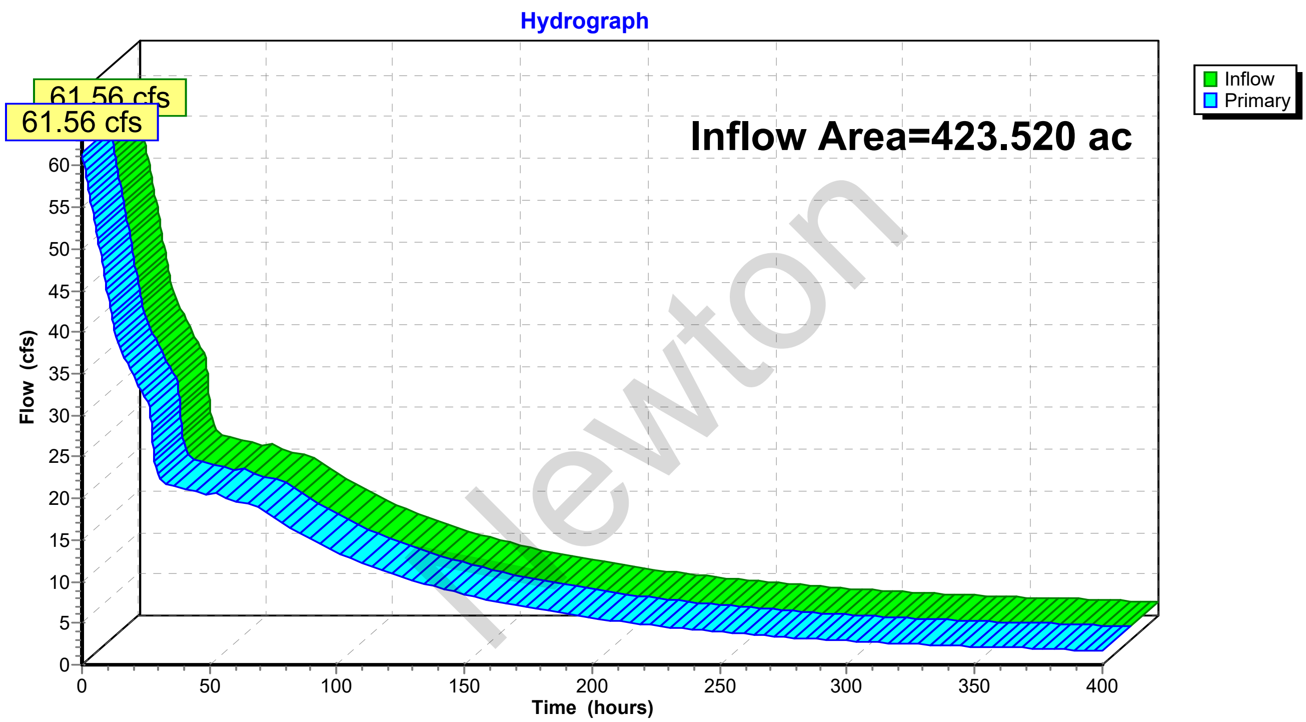
Summary for Link 1L: Lake Newton

Inflow Area = 423.520 ac,100.00% Impervious, Inflow Depth > 9.45" for 1000yr - 24hr Huff Q3 event
Inflow = 61.56 cfs @ 0.00 hrs, Volume= 333.516 af
Primary = 61.56 cfs @ 0.00 hrs, Volume= 333.516 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-400.05 hrs, dt= 0.15 hrs

Fixed water surface Elevation= 504.33'

Link 1L: Lake Newton



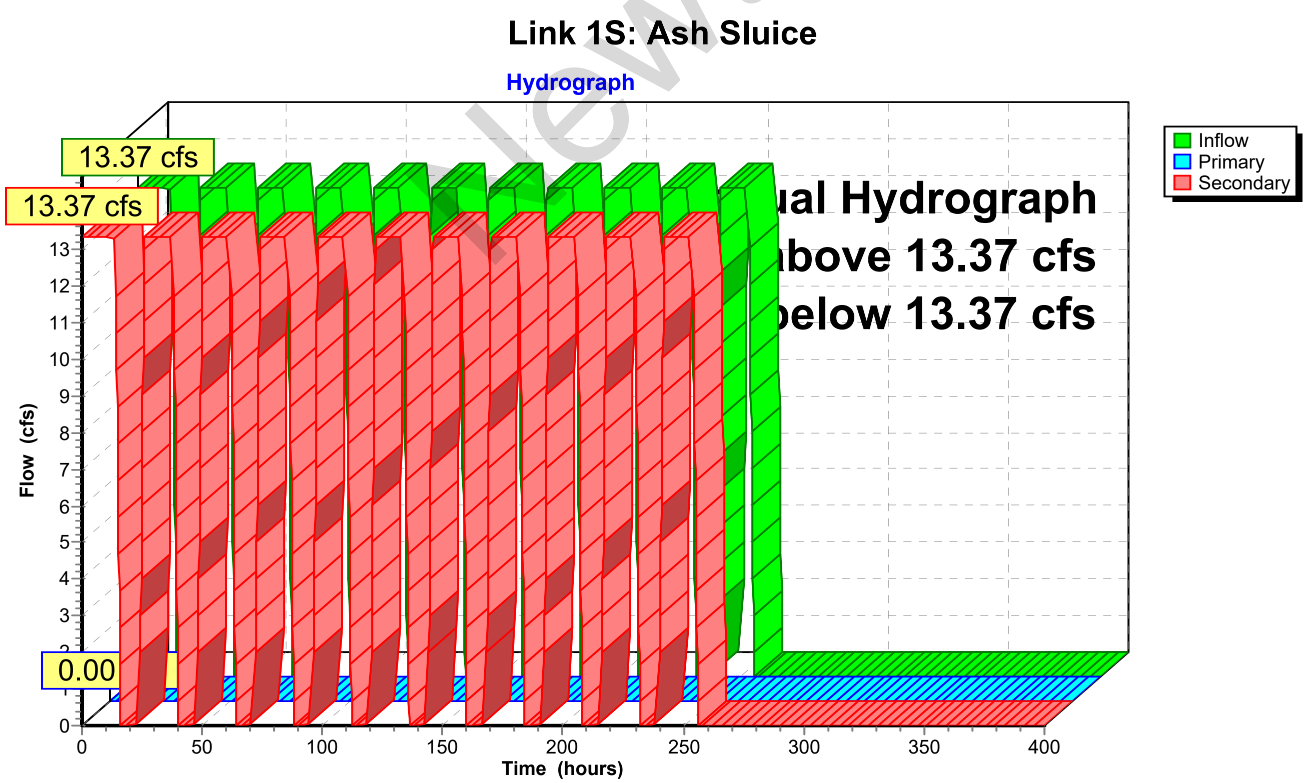
Summary for Link 1S: Ash Sluice

Inflow = 13.37 cfs @ 0.00 hrs, Volume= 171.338 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Secondary = 13.37 cfs @ 0.00 hrs, Volume= 171.338 af

Primary outflow = Inflow above 13.37 cfs below 13.37 cfs, Time Span= 0.00-400.05 hrs, dt= 0.15 hrs

132 Point manual hydrograph, To= 0.00 hrs, dt= 2.00 hrs, cfs =

13.37	13.37	13.37	13.37	13.37	13.37	13.37	13.37	0.00	0.00
0.00	0.00	0.00	13.37	13.37	13.37	13.37	13.37	13.37	13.37
0.00	0.00	0.00	0.00	0.00	13.37	13.37	13.37	13.37	13.37
13.37	13.37	0.00	0.00	0.00	0.00	0.00	13.37	13.37	13.37
13.37	13.37	13.37	13.37	0.00	0.00	0.00	0.00	0.00	13.37
13.37	13.37	13.37	13.37	13.37	13.37	0.00	0.00	0.00	0.00
0.00	13.37	13.37	13.37	13.37	13.37	13.37	13.37	0.00	0.00
0.00	0.00	0.00	13.37	13.37	13.37	13.37	13.37	13.37	13.37
0.00	0.00	0.00	0.00	0.00	13.37	13.37	13.37	13.37	13.37
13.37	13.37	0.00	0.00	0.00	0.00	0.00	13.37	13.37	13.37
13.37	13.37	13.37	13.37	0.00	0.00	0.00	0.00	0.00	13.37
13.37	13.37	13.37	13.37	13.37	13.37	0.00	0.00	0.00	0.00
0.00	13.37	13.37	13.37	13.37	13.37	13.37	13.37	0.00	0.00
0.00	0.00								



Summary for Link O: Other

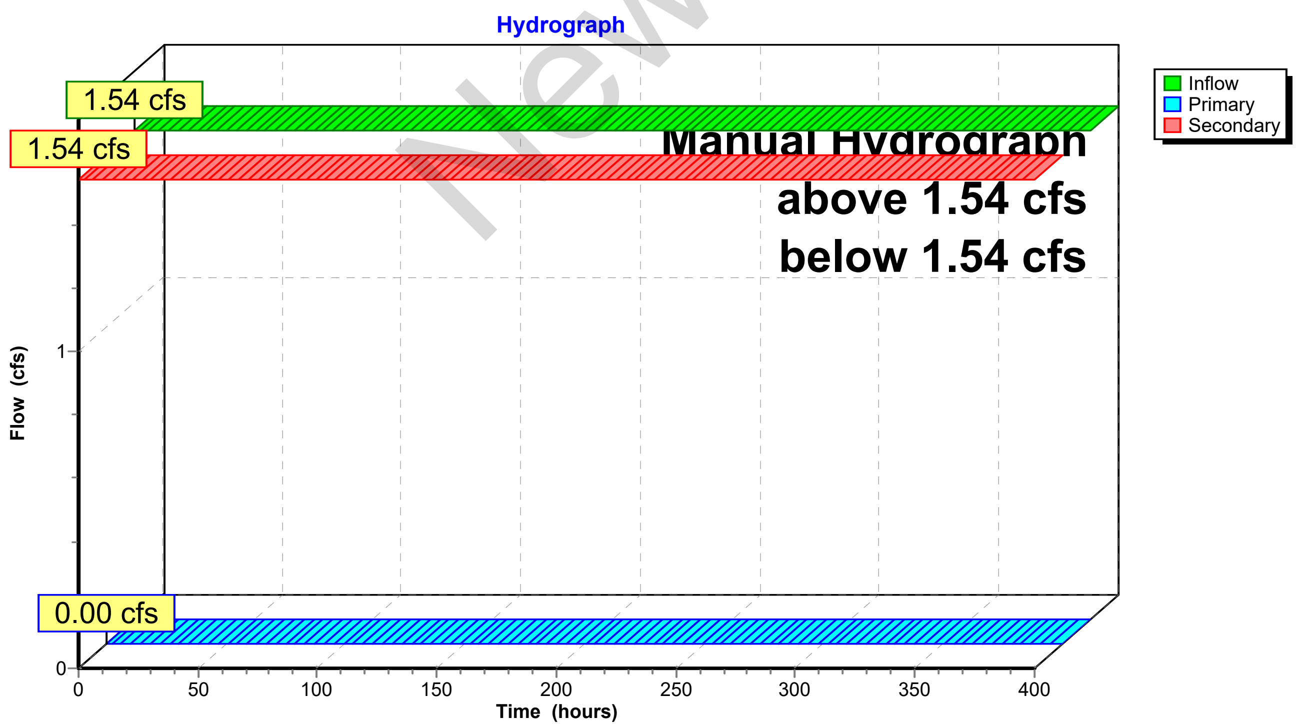
Inflow = 1.54 cfs @ 0.00 hrs, Volume= 50.935 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Secondary = 1.54 cfs @ 0.00 hrs, Volume= 50.935 af

Primary outflow = Inflow above 1.54 cfs below 1.54 cfs, Time Span= 0.00-400.05 hrs, dt= 0.15 hrs

126 Point manual hydrograph, To= 0.00 hrs, dt= 5.00 hrs, cfs =

1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54
1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54
1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54
1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54
1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54
1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54
1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54
1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54
1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54
1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54
1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54
1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54
1.54	1.54	1.54	1.54	1.54	1.54				

Link O: Other



Summary for Link WW: Wastewater

Inflow = 23.39 cfs @ 0.00 hrs, Volume= 201.231 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Secondary = 23.39 cfs @ 0.00 hrs, Volume= 201.231 af

Primary outflow = Inflow above 23.39 cfs below 23.39 cfs, Time Span= 0.00-400.05 hrs, dt= 0.15 hrs

101 Point manual hydrograph, To= 0.00 hrs, dt= 2.00 hrs, cfs =

23.39	23.39	23.39	23.39	23.39	23.39	23.39	0.00	0.00	0.00
0.00	0.00	0.00	23.39	23.39	23.39	23.39	23.39	23.39	0.00
0.00	0.00	0.00	0.00	0.00	23.39	23.39	23.39	23.39	23.39
23.39	0.00	0.00	0.00	0.00	0.00	0.00	23.39	23.39	23.39
23.39	23.39	23.39	0.00	0.00	0.00	0.00	0.00	0.00	23.39
23.39	23.39	23.39	23.39	23.39	0.00	0.00	0.00	0.00	0.00
0.00	23.39	23.39	23.39	23.39	23.39	23.39	0.00	0.00	0.00
0.00	0.00	0.00	23.39	23.39	23.39	23.39	23.39	23.39	0.00
0.00	0.00	0.00	0.00	0.00	23.39	23.39	23.39	23.39	23.39
23.39	0.00	0.00	0.00	0.00	0.00	0.00	23.39	23.39	23.39
23.39									

Link WW: Wastewater