

**From:** Southorn, Richard  
**To:** [Bacher, David; "richard.southorn@gmail.com"](mailto:richard.southorn@gmail.com)  
**Cc:** [Carter, Andrew](#)  
**Subject:** Indian River Landfill Location Restriction Evaluation  
**Date:** Friday, October 05, 2018 10:31:56 AM  
**Attachments:** [image002.png](#)  
[IRLF - Location Restrictions - Unstable Areas - w attachments.pdf](#)

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Dear David and Andy,

On October 11, 2016, an evaluation of the CCR location restriction standards was submitted regarding the Indian River Landfill. The evaluation concluded that the landfill was appropriately located to comply with Section 25764 of the CCR Rule. The 2016 Location Restriction Evaluation is attached for your records. This information is deemed complete and can be placed in the operating record.

**Richard Southorn, P.E., P.G.**  
Senior Client Program Manager

**APTIM** | Solid Waste Group

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October 11, 2016

Mr. David Bacher  
Indian River Power LLC  
29416 Power Plant Road  
Dagsboro, DE 19939

**Subject: Indian River Landfill**  
**Location Restrictions: §257.64 Unstable Areas**

Dear Mr. Bacher:

As you are aware, the Indian River Landfill has been deemed to be a regulated coal combustion residual (CCR) unit by the United States Environmental Protection Agency (USEPA), through the Disposal of Coal Combustion Residuals from Electric Utilities Final Rule (CCR Rule) 40 CFR 257 and §261. Per §257.63 of the Rule, existing landfills must complete a demonstration that the unit is not located within an unstable area. Specifically, demonstration must be provided that the landfill is located such that it is not:

*"...located in an unstable area unless the owner or operator demonstrates by the dates specified in paragraph (d) of this section that recognized and generally accepted good engineering practices have been incorporated into the design of the CCR unit to ensure that the integrity of the structural components of the CCR unit will not be disrupted."*  
(40 CFR Ch. I §257.64).

CB&I has evaluated information associated with the Indian River Landfill (IRL) and has concluded that the facility is located in accordance with §257.64. The IRL location has been evaluated for the factors listed in in §257.64(b), which states:

*"b) The owner or operator must consider all of the following factors, at a minimum, when determining whether an area is unstable:*

- (1) On-site or local soil conditions that may result in significant differential settling;*
- (2) On-site or local geologic or geomorphologic features; and*
- (3) On-site or local human-made features or events (both surface and subsurface)."*

### Summary of Findings

There are no documented unstable areas located beneath the excavation of the landfill. There are no reported karst areas within the proposed facility boundary. Site specific studies have not identified site characteristics that are conducive to the formation of karst features nor the presence of coal mining.

The site geology was characterized by Golder Associates for the Phase II Coal Ash Landfill Hydrogeological Assessment performed in February 2004 (see **Attachment 1**). The assessment did not reveal any unstable areas including any evidence of coal mines or karst formations. The site was characterized as follows:

*“The geology of the site has been characterized as relatively homogenous, moderately well to poorly sorted sand with minor silt. The thickness of the Columbia Formation at the site is not extensively defined due to the limited depth of investigation over most of the site and similarity of the underlying Miocene deposits, but may range from 100 to 110 feet thick. The base of the sand unit ranges from a depth of approximately -75 to -90 feet mean sea level (msl) and consists of green silty clay interspersed with coarse sand. Deep test wells intersecting the lower confining units, including Well A and Well B located southwest of the Phase I landfill are reported to intersect lenses or pockets of green silty clay interspersed with coarse sand below approximately -90 feet msl (Gilbert Associates, 1980). Well C, located northeast of the landfill, encountered blue gray clay from -81 feet to -92 feet msl and clay from -92 to -109 feet msl. This clay interval is interpreted to be the Bethany Formation from a depth of approximately -130 feet to -160 feet msl. Well E, located on the western boundary of the Phase I landfill, intersected coarse tan sand and brown clay interbeds of undefined thickness from approximately -60 to -80 feet msl and medium sand with gray clay interbeds from approximately -95 to -110 feet msl.”*

Due to the fact that the site geology primarily consists of sandy soils, which are not likely to experience a lot of settlement, significant differential settlement is not anticipated.

CB&I has evaluated the facility with respect to seismic impacts. CB&I finds that the site is not located within 200 feet of the outermost damage zone of a fault that has had displacement in the Holocene time according to the United State Geological Survey (USGS)<sup>1</sup>. It is also noted that the peak horizontal acceleration at the site is approximately 4.8% g at a probability of 2% in 50 years according to the USGS<sup>2</sup> (see **Attachment 2**). As documented in the Phase II investigation, the site was designed with factors of safety of 1.3 for this seismic activity peak horizontal acceleration.

Due to the fact that the landfill has been developed in stable soils and has been designed to account for seismic activity, it is the opinion of CB&I that the design of the CCR unit has been appropriately located and designed to ensure that the integrity of the structural components of the CCR unit such that they will not be disrupted.

#### References:

1. “Hydrogeological Assessment for the Indian River Generation Station – Phase II Ash Landfill,” Golder Associates, February 2004.
2. U.S. Geological Survey, 2006, Quaternary fault and fold database for the United States, accessed 9/29/16, from USGS web site: <http://earthquakes.usgs.gov/regional/qfaults/>
3. U.S. Geological Survey, 2014, 2014 NSHM Gridded Data, accessed 9/29/16, from USGS web site: <https://earthquake.usgs.gov/hazards/products/conterminous/2014/data/>

It is my professional opinion as a licensed Delaware Professional Engineer (License No. 20894) that the landfill is so located and designed such that it conforms to 40 CFR Ch. I §257.64.

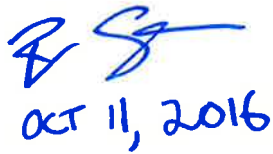
Please contact me with questions.

Sincerely,



Richard Southorn, P.E., P.G.  
Project Manager

attachments

Handwritten signature and date in blue ink. The signature is a stylized "R S" and the date is "OCT 11, 2016".

# Attachment 1

Hydrogeological Assessment  
Golder Associates, February 2004.

**HYDROGEOLOGICAL ASSESSMENT  
FOR THE INDIAN RIVER GENERATING STATION  
PHASE II COAL ASH LANDFILL  
MILLSBORO, DELAWARE**

Prepared for:



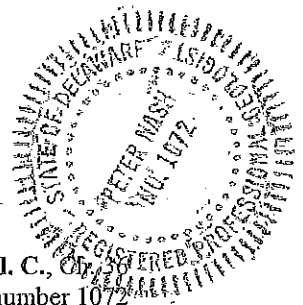
NRG Energy, Inc.  
Indian River Generating Station  
Power Plant Road  
Millsboro, DE 19966

Prepared by:



Golder Associates Inc.  
200 Century Parkway, Suite C  
Mt. Laurel, NJ 08054

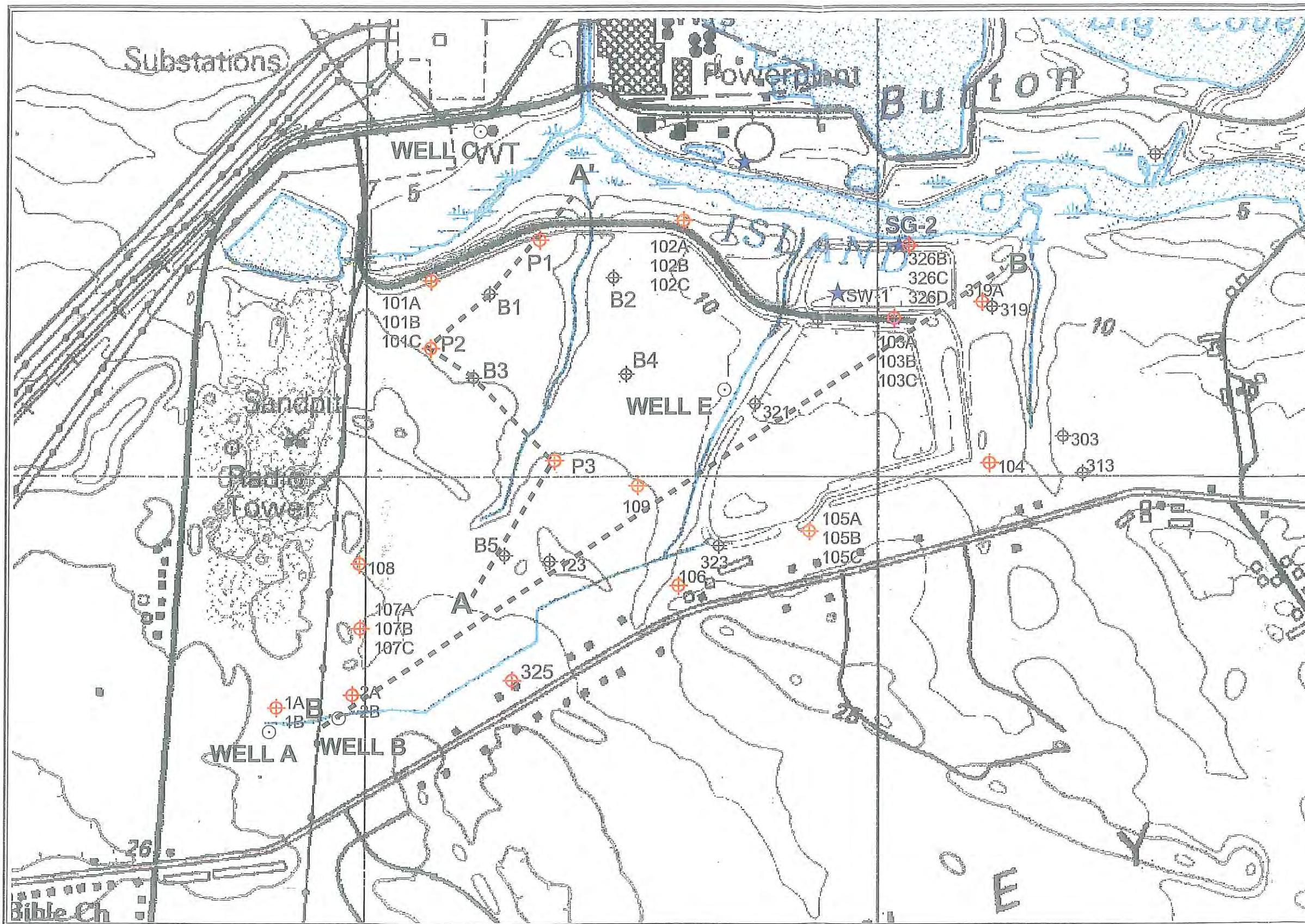
This submission is made in compliance with 24 Del. C., Ch. 36  
by Peter Nash, P.G., DE license number 1072



*Peter Nash*

March 18, 2008

Golder Project No. 033-6638



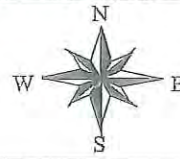
LOCATION MAP  
(Sussex County)

**LEGEND**

- ⊕ Exploration Well
- ⊕ Groundwater Monitor Well
- Production Well
- ★ Surface Water Monitor Point
- Cross Section Locations

**GENERAL NOTES**

This image was derived from USGS Frankford 7.5 deg. quad topographic images and is projected in Universal Transverse Mercator (UTM) Zone 18 on the North American datum of 1983.



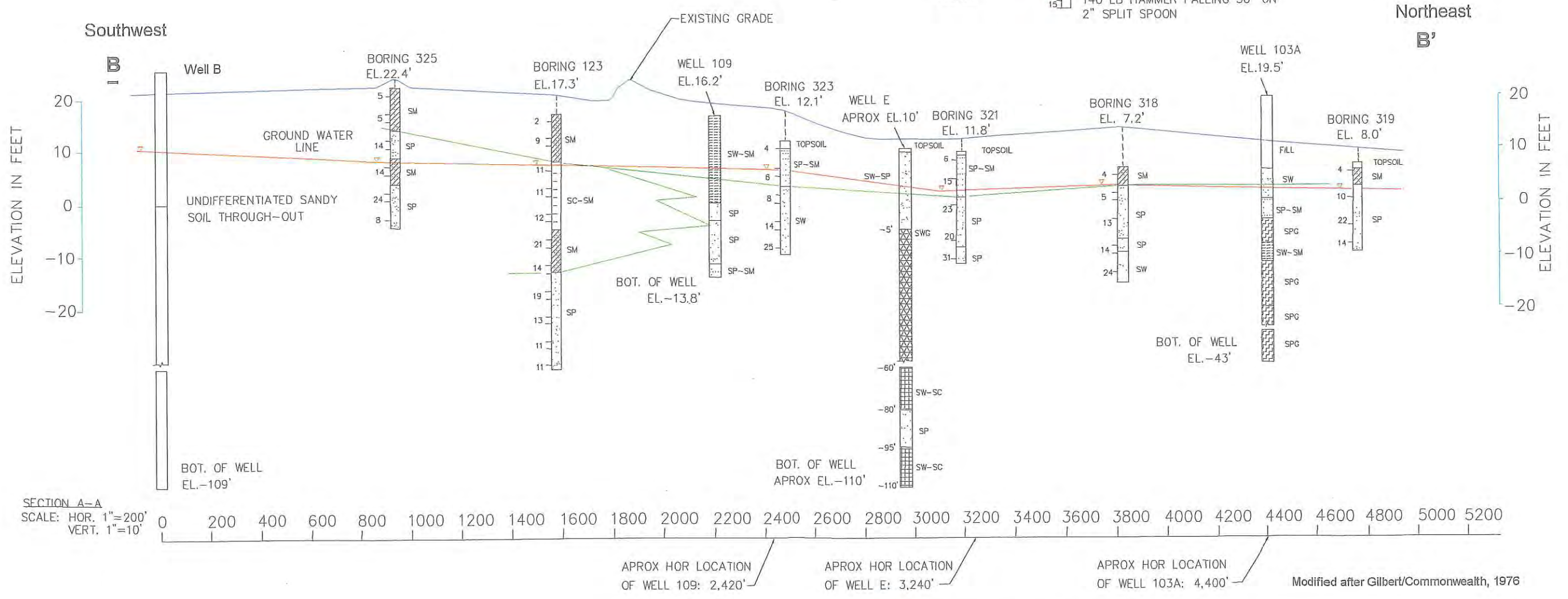
Title: Indian River Generating Station  
Phase II Ash Landfill  
Well Location Map

Figure No. 3

**SYMBOLS**

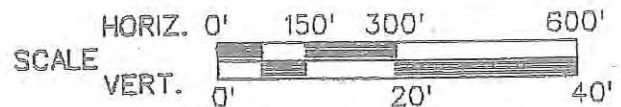
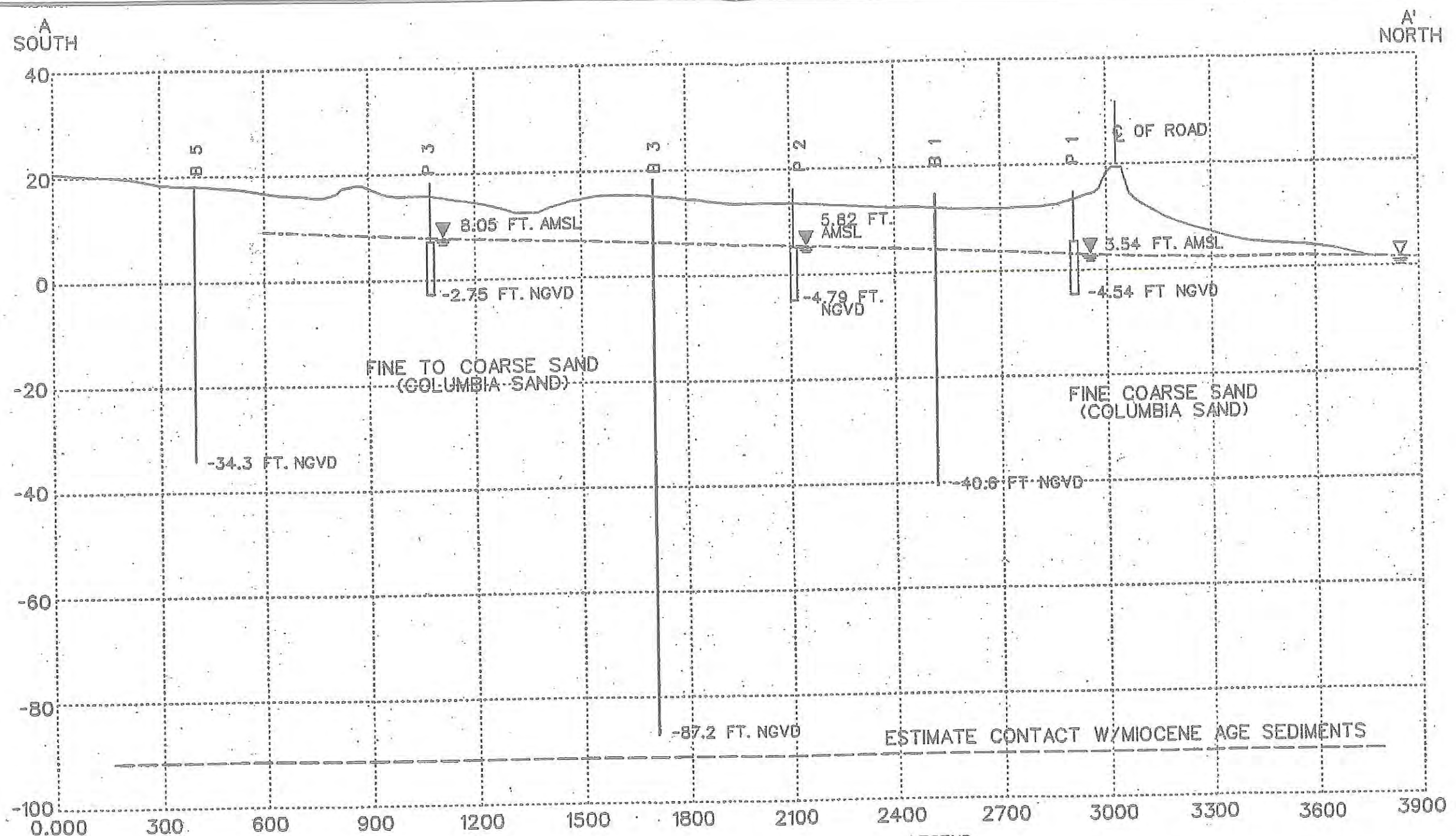
- SP & SW, SAND
- SM, SILTY SAND
- SP - SM, SAND & SILTY SAND
- SC - SM, CLAYEY SAND & SILTY SAND
- SW - SM, GRAVELY & SILTY SAND
- SW - SC, GRAVELY & CLAYEY SAND
- SWG, WELL-GRADED, GRAVELY SAND
- SWP, POORLY-GRAVED, GRAVELY SAND

NUMBERS INDICATED REPRESENT NUMBER OF BLOWS PER FOOT WITH 140 LB HAMMER FALLING 30" ON 2" SPLIT SPOON



Title: **Indian River Generating Station  
Phase II Ash Landfill  
Geological Cross Section B - B'**

Figure No. **4**



NOTE:  
ELEVATION IN FEET NGVD

LEGEND

- WATER TABLE
- EST. SURFACE WATER ELEV.
- WELL SCREEN

(After Wenck, 2003)



Title: Indian River Generating Station  
Phase II Ash Landfill  
Geological Cross Section A - A'

Figure No.  
5

# Attachment 2

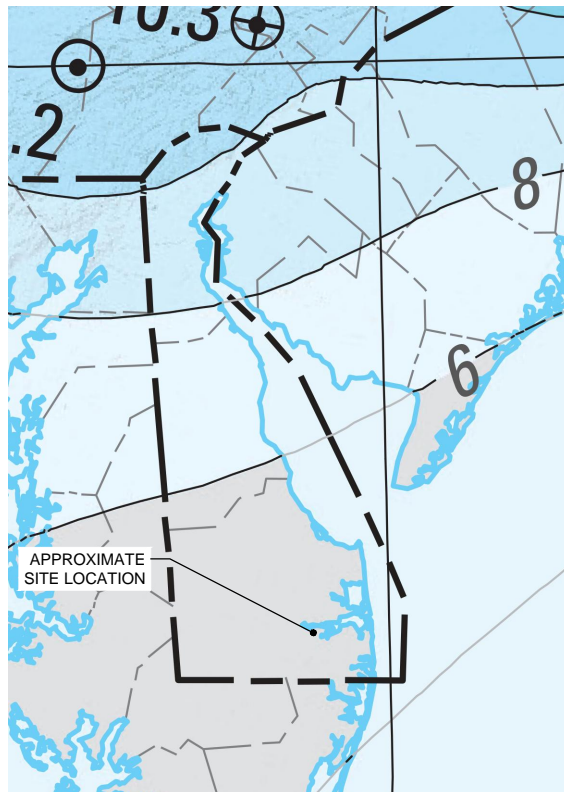
USGS Peak Horizontal Acceleration

LOCATION 38.58 Lat. -75.23 Long.

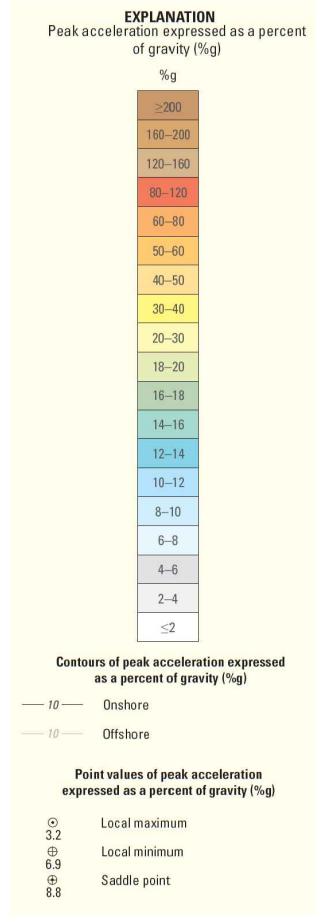
The interpolated probabilistic ground motion values, in %g, at the requested point are:

P.E. %	Exp. Time (years)	Ground Motion (g)
2	50	0.048

U.S. NATIONAL SEISMIC HAZARD MAPS: Peterson, M.D., et al, 2014



Peak Horizontal Acceleration with 2% Probability of Exceedance in 50 Years



### NOTES

- Information obtained from the United States Geological Survey website.



**CB&I Environmental & Infrastructure, Inc.**

STATE OF ILLINOIS LICENSED DESIGN FIRM #184004093

## INDIAN RIVER LANDFILL

### MAP OF HORIZONTAL ACCELERATION

APPROVED BY: RDS    PROJ. NO.: 1009684058    DATE: OCT 2016