April 20, 2017

GEORGIA DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION
SOLID WASTE MANAGEMENT PROGRAM
4244 International Parkway, Suite 104
Atlanta, Georgia 30354

Attention: Mr. Stephen Perkins

Subject: Response to Letter Concerning Proposed Construction of
McDonough Parkway Extension over West Asbury Landfill – Phase I
DESIGN SERVICES FOR THE MCDONOUGH PARKWAY
AT SR 20 INTERSECTION – PHASE II
McDonough, Henry County, Georgia
NOVA Project Number 3015085

Dear Mr. Perkins:

NOVA Engineering and Environmental, LLC (NOVA) respectfully submits this letter on behalf of Henry County and in response to an email from Mr. Stephen Perkins with the Department of Natural Resources (DNR) Environmental Monitoring Compliance Unit to Henry County dated January 5, 2017, a letter from the Georgia Department of Natural Resources (DNR) dated May 23, 2008 that was provided to Henry County in the aforementioned email, and the meeting between NOVA, Henry County, Heath and Lineback, and the Georgia Environmental Protection Division (GA EPD) on March 3, 2017 concerning the proposed construction of McDonough Parkway extension over West Asbury Landfill Phase I in McDonough, Henry County, Georgia.

At the time of NOVA’s initial investigation of the project site, Henry County did not have a record of the May 23, 2008 DNR letter provided by Mr. Stephen Perkins, referenced above.

Prior to our meeting and the resurfacing of the aforementioned letter, NOVA was contracted by Henry County to perform environmental services at the Subject Property including a Limited Subsurface Investigation and Methane Sampling (NOVA Project Number 3015085 dated June 23, 2016) and a DRAFT Proposed Methane Remediation System Design (NOVA Project Number 3015085 dated December 2, 2016). The project area is a length of the proposed roadway that extends through the former West Asbury Landfill Phase I. Reports detailing these services are attached to this letter. It should be reiterated that the proposed alignment of the McDonough Parkway extension has changed from the alignment originally anticipated in 2008.

Your letter, dated May 23, 2008, recommended the following provisions for design of all proposed construction:
1. Install, monitor, and maintain permanent groundwater and methane monitoring systems that may be needed to detect any releases that may occur from the landfill.

2. Encapsulate the existing waste in order to prevent direct human contact with the waste and prevent migration of contaminants from the waste from migrating into air, groundwater, or surrounding soils.

3. Prevent erosion or deterioration of landfill cover and minimize surface water infiltration into the waste mass.

4. Adequately collect and control landfill gas, using either an active collection system or a passive collection system that can be readily converted into an active system if needed. Prevention of landfill gas migration along bedding or backfill material for existing or new utilities is critical to achieve adequate landfill gas collection and control.

5. Install 24-hour automated methane gas monitoring equipment within any nearby occupied buildings.

6. Prevent vapor intrusion through the landfill cover.

7. Address geotechnical issues related to foundation support, pavement support, and any other issues that may be identified.

8. Annotate the property deed to restrict future construction not addressed in the approved design and construction documents.

We believe that NOVA’s attached environmental reports and recommendations as well as Heath and Lineback’s construction design satisfies the intent of the above provisions with the exception of the permanent groundwater monitoring system listed in Provision 1 above. During NOVA’s subsurface investigation of the Subject Property, solid waste was delineated to maximum depths of 18 feet below ground surface (bgs). Groundwater was not encountered in any of the borings installed during the investigation, and the excavation extents are not anticipated to extend significantly below 18 feet bgs (well above the groundwater table). Additionally, solid waste is being removed from the construction area, and any vapors associated with potentially impacted groundwater at this location would be mitigated by the methane mitigation system discussed above. Consequently, it is NOVA’s opinion that permanent groundwater monitoring is not critical at this time.

We appreciate the opportunity to be of service on this project. If you have any questions, or if we may be of further assistance, please do not hesitate to contact us.

Sincerely,

NOVA Engineering and Environmental, LLC

Nicholas E. Macie, EIT
Staff Environmental Engineer

Nickolaus DaSanto
Business Unit Manager
Environmental Services

Attachments: 3015085 McDonough Parkway at SR 20 Intersection – Phase II, Methane Sampling
3015085 DRAFT Methane Remediation System
LIMITED SUBSURFACE EXPLORATION AND METHANE SAMPLING

DESIGN SERVICES FOR THE MCDONOUGH PARKWAY AT SR 20 INTERSECTION – PHASE II
McDonough, Henry County, Georgia

PREPARED FOR:
Heath and Lineback Engineers, Inc.
2390 Canton Road
Building 200
Marietta, Georgia 30066

NOVA Project Number: 3015085

June 23, 2016
June 23, 2016

HEATH AND LINEBACK ENGINEERS, INC.
2390 Canton Road
Building 200
Marietta, Georgia 30066

Attention: Mr. Allen Krivsky

Subject: Limited Subsurface Exploration and Methane Sampling
DESIGN SERVICES FOR THE MCDONOUGH PARKWAY
AT SR 20 INTERSECTION – PHASE II
McDonough, Henry County, Georgia
NOVA Project Number 3015085

Dear Mr. Krivsky:

NOVA Engineering and Environmental, LLC (NOVA) has completed the authorized Limited Subsurface Exploration and Sampling Event for the Design Services for the McDonough Parkway at SR 20 Intersection – Phase II in McDonough, Henry County, Georgia. The work was performed in general accordance with Master Subagreement, dated September 16, 2015, between Heath and Lineback Engineers, Inc. and NOVA Engineering and Environmental, LLC for Henry County Contract No. HC-15-64 and Heath and Lineback Job No. 2015010.003.004.

The attached report presents our understanding of the project information, a description of the environmental consulting services provided by NOVA, and our findings and conclusions.

We appreciate your selection of NOVA and the opportunity to be of service on this project. If you have any questions, or if we may be of further assistance, please do not hesitate to contact us.

Sincerely,

NOVA Engineering and Environmental, LLC

[Signatures]

Nickolaus DaSantos
Business Unit Manager
Environmental Services

David A. Miller, P.E.
Senior Principal

Copies Submitted: Addresssee (electronic)
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1.0 INTRODUCTION

NOVA Engineering and Environmental, LLC (NOVA) was retained by Heath and Lineback Engineers, Inc. (Client) to complete a Limited Subsurface Exploration and Methane Sampling on the property located along McDonough Parkway, near its intersection with State Route 20/81 (Hampton Road) in McDonough, Henry County, Georgia (Subject Property). Figures are contained in Appendix A.

1.1.1 SITE AND PROJECT INFORMATION

The Subject Property is located south of the intersection of McDonough Parkway and State Route 20/81 (Hampton Road) in McDonough, Henry County, Georgia. See Figures in Appendix A.

Henry County seeks to redesign and improve McDonough Parkway at this intersection, including a new road segment to extend south and connect with Henry Parkway, as part of a Henry County Special Purpose Local Options Sales Tax (SPLOST). The new road segment is slated to extend through a closed Henry County Sanitary Landfill. The northern portion of the proposed roadway will extend through a fenced area currently operated as a Henry County Municipal facility. Information regarding the full extent of the former landfill, depth of buried debris, and methane levels on the project site was not provided to NOVA. It is our understanding that the former landfill is reportedly a non-lined landfill.

NOVA’s Limited Subsurface Exploration and Methane Sampling was conducted on the McDonough Parkway at SR 20 Site to determine the potential impact of the identified landfill on the Subject Property.

1.1.2 LIMITATIONS

NOVA has performed a limited subsurface investigation in general accordance with ASTM 1903-11, which is a limited inquiry into a property's environmental status and is not sufficient to discover every potential source of environmental liability or environmental impact, if any, of the property to be evaluated. No Environmental Site Assessment (ESA) can wholly eliminate uncertainty regarding the potential for Recognized Environmental Conditions (RECs) in connection with a property. Performance of this limited subsurface investigation is intended to reduce, but not eliminate, uncertainty regarding the potential for RECs in connection with a property, and this practice recognizes reasonable limits of time and cost.
The site and surrounding area have been developed with a landfill for more than forty (40) years. In addition, based on our experience in similar landfill locations, we anticipate fill and buried debris materials likely exist at other locations between our borings. Fills and buried debris in landfills are typically erratic in composition and consistency.

The level of inquiry is variable. Not every property will warrant the same level of assessment. Consistent with good commercial or customary practices, the appropriate level of ESA will be guided by the type of property subject to assessment, the expertise and risk tolerance of the Client, and the information developed in the course of the inquiry.

NOVA’s assessment represents our professional opinion, only. Therefore, NOVA cannot, under any circumstances, make a statement of warranty or guarantee, expressed or implied, that RECs, environmental impairment, or environmental impacts are limited to those that are discovered while we are performing the limited subsurface investigation.

1.1.3 USER RELIANCE

NOVA’s Limited Subsurface Exploration and Methane Sampling report, along with the findings and conclusions contained in the report, either in completed form, summary form, or by extraction, is prepared, and intended, for the sole use of the Client and the Henry County Board of Commissioners and therefore may not contain sufficient information for other purposes or parties. The Client and the Henry County Board of Commissioners is the only intended beneficiary of this report. The contents of NOVA's report will continue to be the property of NOVA. NOVA's report may not be disclosed to, used by, or relied upon by, any person or entity other than the Client and the Henry County Board of Commissioners without the express written consent of NOVA.

Authorization for disclosure to a third party or authorization for third-party reliance on a final report of any report will be considered by NOVA upon the written request of the Client. NOVA reserves the right to deny authorization to allow disclosure or reliance of NOVA's report to third parties.
2.0 SUBSURFACE EXPLORATION AND METHANE SAMPLING

Based on the potential for construction of the proposed roadway to be impacted by the identified landfill, Heath and Lineback Engineers, Inc. requested that NOVA conduct a Limited Subsurface Exploration and Methane Sampling to further investigate the potential extents and impacts on the Subject Property. Our investigation procedures, findings, conclusions, and recommendations are presented in the following sections.

2.1.1 SOIL BORING INSTALLATION

On May 10 and 11, 2016, NOVA provided oversight for the advancement of thirteen (13) exploratory soil borings (N-1 through N-13) to termination depths between 10 feet and 25 feet below ground surface (bgs), using hollow stem auger technology. A Boring and Sampling Location Map is provided as Figure 4 in Appendix A.

Soil boring samples were collected at approximately every 5 feet below ground surface (bgs) using a 2-inch split-spoon sampler. The sampler was first seated six inches and then driven an additional foot with blows of a 140 pound hammer falling 30 inches. Representative portions of the soil samples obtained from the sampler were field classified, and any extraneous debris observed in fill soil was noted. The soils were classified according to consistency (based on number of blows from standard penetration tests), color and texture. These classification descriptions and the debris notes are included on our Boring Logs in Appendix B.

The soil borings were generally advanced until residual soil was noted, or until 4-5 feet below residuum in the case of borings that were converted into methane monitoring wells.

2.1.2 METHANE WELL INSTALLATION

Once soil sampling was completed, boreholes N-3 through N-9 and N-12 were converted into Temporary Methane Monitoring Wells (TMMWs) constructed of two (2) inch PolyVinyl Chloride (PVC) screen and riser. Approximately four (4) feet of bentonite was placed into each boring, prior to the PVC screen and riser, to act as a seal between fill soil and residual soil. PVC screen was then placed into each boring from the bottom of the boring to a depth of approximately three (3) to four (4) feet below ground surface. PVC riser was then used for the final four (4) feet. Sand was placed into the borings around the PVC screen portion of the well. Bentonite was used to cap the final three (3) feet surrounding the well. Bentonite was hydrated with water to form a complete seal at the top and bottom of each well. A monitoring well locking plug was inserted into the exposed end of each methane monitoring well. Well diagrams are included in Appendix C.
2.1.3 METHANE SAMPLING

After installation, the TMMWs were allowed to sit undisturbed for a minimum of 24 hours. On May 12, 2016, NOVA conducted sampling of the monitoring wells constructed in borings N-3, N-4, N-6, N-7, N-9, N-10, N-11, and N-12. Sampling was conducted with a Landtec GEM2000 Landfill Gas Analyzer. The inlet hose for the sampler was lowered into the monitoring well through a PVC cap to mitigate the influence of ambient air on the readings. The monitor was allowed to stabilize, and this stabilized value was taken at the maximum reading.

After methane sampling was complete, the wells were uncapped and allowed to off-gas before the top five (5) feet of the well was removed. The wells were then filled with a combination of fill dirt and bentonite. Each well was capped with several feet of bentonite before it was hydrated with water to form a complete seal.

2.1.4 QUALITY CONTROL AND QUALITY ASSURANCE METHODS

Field procedures and protocols used during the limited subsurface investigation were performed in general accordance with those prescribed ASTM International (ASTM) Standard Practice for Environmental Site Assessments: Phase II Environmental Site Assessment Process, Designation: E1903-11, USEPA Region IV Science and Ecosystem Support Division (SESD) guideline document SESDPROC-300-R3 dated August 21, 2014 for soil sampling, and guideline document SESDPROC-301-R3 dated March 6, 2013 for groundwater sampling.
3.0 RESULTS

3.1.1 SUBSURFACE EXPLORATION

The following table depicts the locations and depths at which debris was noted in the borings and includes a description of what debris was noted. Boring logs are included in Appendix B.

<table>
<thead>
<tr>
<th>Boring Number</th>
<th>Depth of Debris</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-1</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>N-2</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>N-3</td>
<td>8’</td>
<td>Primarily organic debris (wood, etc.), lawn mower blade noted at 1’</td>
</tr>
<tr>
<td>N-4</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>N-5</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>N-6</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>N-7</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>N-8</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>N-9</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>N-10</td>
<td>8’</td>
<td>Metal, glass, wood, paper debris</td>
</tr>
<tr>
<td>N-11</td>
<td>18’</td>
<td>Organic, metal, ceramic, plastic, and paper debris</td>
</tr>
<tr>
<td>N-12</td>
<td>18’</td>
<td>Organic, metal, plastic, debris, glass, and fabric debris</td>
</tr>
<tr>
<td>N-13</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

3.1.2 METHANE SAMPLING RESULTS

The following results were collected from borings N-3, N-4, N-6, N-7, N-9, N-10, N-11, and N-12. A complete data table showing relative O₂, CO₂, and the Balance of the remaining gas (BAL) readings is included in Appendix D. A Boring and Sampling Location Plan identifying the sampled well locations and methane levels is included as Figure 5 in Appendix A.

<table>
<thead>
<tr>
<th>Methane (% CH₄)</th>
<th>Lower Explosive Limit (LEL)</th>
<th>Upper Explosive Limit (UEL)</th>
<th>N-3</th>
<th>N-4</th>
<th>N-6</th>
<th>N-7</th>
<th>N-9</th>
<th>N-10</th>
<th>N-11</th>
<th>N-12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methane (% CH₄)</td>
<td>4.4</td>
<td>15</td>
<td>2.4</td>
<td>13.7</td>
<td>24.0</td>
<td>29.8</td>
<td>56.5</td>
<td>45.4</td>
<td>65.4</td>
<td>72.7</td>
</tr>
</tbody>
</table>

**Bold** = concentration exceeds lower explosive limit (LEL) for methane

**Highlighted** = concentration exceeds upper explosive limit (UEL) for methane
4.0 CONCLUSIONS

NOVA performed a Subsurface Exploration and Methane Sampling event on the property located along McDonough Parkway, near its intersection with State Route 20/81 (Hampton Road) in McDonough, Henry County, Georgia. The study was performed in a manner generally consistent with the requirements of the ASTM 1903-11 and generally accepted industry standards.

Fill material was located throughout the project area. Buried debris associated with the on-site landfill was noted at depths ranging from eight (8) to eighteen (18) feet bgs in borings N-3, N-10, N-11, and N-12. The noted debris primarily contained organic matter, metal, plastic, fabric, ceramics, glass, and paper. In addition to boring N-3, we note that the debris was primarily observed in borings located in the southern half of the roadway design area (N-10, N-11, and N-12).

Methane was detected in all eight (8) monitoring wells at concentrations ranging from 2.4%-72.7%. We note that the highest measured concentrations of methane were located in the southern half of the roadway design area (N-9, N-10, N-11, and N-12) near the location of the debris noted above.

Methane is a colorless, odorless, tasteless, flammable gas that occurs often in nature. Methane is produced whenever organic material is decomposed by bacterial action in the absence of oxygen (as is likely the case in the identified on-site landfill). The atmosphere contains about 2.2 ppm by volume (0.00022%) of methane on average.

The lower explosive limit (LEL) of a gas is defined as the lowest concentration (as a percentage) of a gas in air capable of producing a flash of fire or explosion in the presence of an ignition source (arc, flame, heat). For methane, this value is reached at 4.4%.

The upper explosive limit (UEL) of a gas is defined as the highest concentration (as a percentage) of a gas in air capable of producing a flash of fire or explosion in the presence of an ignition source (arc, flame, heat). Concentrations higher than the UEL contain too much of the explosive constituent to be able to ignite. For methane, this value is reached at 15%.

While methane is relatively non-toxic by nature, health effects can occur through inhalation at high concentrations due to the displacement oxygen in the air (asphyxiation). Increased methane concentrations will correlate with a decrease in oxygen concentrations in the air. A decrease of oxygen from a natural average of ~21% to lower than 16% represents a health hazard. As show in the data tables in Appendix D, low oxygen concentration (<16%) were observed in all eight (8) monitoring wells.

Control of the inhalation and explosion hazard can be achieved by implementing sufficient natural or mechanical ventilation, to limit the concentration of flammable gases or vapors to a maximum level of 25% of their lower explosive limit.
FIGURE 1
SITE LOCATION MAP

SOURCE: www.Mapquest.com
DATE: Unknown
SCALE: As Shown

HEATH AND LINEBACK ENGINEERS, INC.
McDonough Parkway at SR 20
McDonough, Henry County, Georgia
NOVA Project Number 3015085
FIGURE 3
AERIAL PHOTOGRAPH

SOURCE: www.google.com
SCALE: As Shown

HEATH AND LINEBACK ENGINEERS, INC.
McDonough Parkway at SR 20
McDonough, Henry County, Georgia
NOVA Project Number 3015085
FIGURE 4
BORING LOCATION PLAN

SOURCE: Google
SCALE: Not to Scale
FIGURE 5
METHANE SAMPLING RESULTS

SOURCE: Google
SCALE: Not to Scale

Heath and Lineback Engineers, Inc.
McDonough Parkway at SR 20
McDonough, Henry County, Georgia
NOVA Proposal Number 3015085
FIGURE 6
METHANE SAMPLING RESULTS
AND APPROXIMATE OBSERVED FILL & BURIED DEBRIS DEPTHS

SOURCE: Google
SCALE: Not to Scale

<table>
<thead>
<tr>
<th>Sampling Location</th>
<th>CH4 %</th>
<th>Fill Depth</th>
<th>Debris Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-2</td>
<td>2.4%</td>
<td>0 - 13.5'</td>
<td>1' - 8'</td>
</tr>
<tr>
<td>N-3</td>
<td>13.7%</td>
<td>0 - 3.5'</td>
<td>NE</td>
</tr>
<tr>
<td>N-4</td>
<td>24.0%</td>
<td>0 - 8.5'</td>
<td>NE</td>
</tr>
<tr>
<td>N-5</td>
<td>29.8%</td>
<td>0 - 13.5'</td>
<td>NE</td>
</tr>
<tr>
<td>N-6</td>
<td>56.5%</td>
<td>0 - 8.5'</td>
<td>NE</td>
</tr>
<tr>
<td>N-7</td>
<td>57.6%</td>
<td>0 - 8.5'</td>
<td>NE</td>
</tr>
<tr>
<td>N-8</td>
<td>65.4%</td>
<td>0 - 8.5'</td>
<td>NE</td>
</tr>
<tr>
<td>N-9</td>
<td>72.7%</td>
<td>0 - 18.5'</td>
<td>5' - 18'</td>
</tr>
<tr>
<td>N-10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N-11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N-12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N-13</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Approximate Boring and Methane Sampling Location
Approximate Soil Boring Only Location
Debris - NE = Buried Debris Not Encountered

HEATH AND LINEBACK ENGINEERS, INC.
McDonough Parkway at SR 20
McDonough, Henry County, Georgia
NOVA Proposal Number 3015085
APPENDIX B

BORING LOGS
**TOPSOIL:** 3 inches

**FILL:** Dark brown silty coarse SAND, dry, no odor

No Sample Recovered

**RESIDUUM:** Tan white silty coarse SAND, wet, no odor

Boring Terminated at 20 ft.
TOPSOIL: 3 inches
   FILL: Brown silty coarse to fine SAND, wet, no odor

RESIDUUM: Gray tan silty coarse to fine SAND, moist, no odor

White tan brown silty coarse SAND, moist, no odor
   Boring Terminated at 15 ft.

This information pertains only to this boring and should not be interpreted as being indicative of the site.

PROJECT: Henry County Roadway Site  PROJECT NO.: 3015085
CLIENT: Heath & Lineback Engineers, Inc.
PROJECT LOCATION: McDonough, Georgia
LOCATION: McDonough Pkwy. at SR20 Intersect  ELEVATION:
DRILLER: Piedmont Drilling  LOGGED BY: N. Macie
DRILLING METHOD: Hollow Stem Auger  DATE: 5/10/2016
DEPTH TO WATER INITIAL: 11.38'  AFTER 24 HOURS: N/M  CAVING:

<table>
<thead>
<tr>
<th>Depth (feet)</th>
<th>Elevation (ft-MSL)</th>
<th>Graphic</th>
<th>Groundwater</th>
<th>Sample Type</th>
<th>N Value</th>
<th>Graphic Depiction</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>5</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
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<td>15</td>
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<td>20</td>
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<tr>
<td>35</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
GRAVEL: 4 inches
FILL: Brown silty coarse to fine SAND, dry, no odor, wood debris
Lawn mower blade at 1 foot

Brown gray silty coarse to fine SAND, dry, no odor, wood debris

RESIDUUM: Brown black gray micaceous silty medium to fine SAND, moist, no odor

Boring Terminated at 18 ft.
### TOPSOIL: 4 inches
- FILL: Brown silty coarse to fine SAND, moist, no odor
- RESIDUUM: Red brown micaceous silty medium to fine SAND, dry, no odor
- Gray brown micaceous silty coarse to fine SAND, wet, no odor

---

**Boring Terminated at 18 ft.**
<table>
<thead>
<tr>
<th>Depth (feet)</th>
<th>Elevation (ft-MSL)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>GRAVEL: 4 inches</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FILL: Brown silty coarse to fine SAND, dry, no odor</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>RESIDUUM: Brown white tan silty coarse to fine SAND, dry, no odor</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>Boring Terminated at 15 ft.</td>
</tr>
</tbody>
</table>

This information pertains only to this boring and should not be interpreted as being indicative of the site.
TOPSOIL: 2 inches
FILL: Red brown micaceous silty coarse to fine SAND, dry, no odor

RESIDUUM: White brown slightly micaceous silty coarse to fine SAND, dry, no odor

Gray brown silty medium to fine SAND, dry, no odor

Boring Terminated at 15 ft.

<table>
<thead>
<tr>
<th>Depth (feet)</th>
<th>Elevation (ft-MSL)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>TOPSOIL: 2 inches</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>FILL: Red brown micaceous silty coarse to fine SAND, dry, no odor</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>RESIDUUM: White brown slightly micaceous silty coarse to fine SAND, dry, no odor</td>
</tr>
<tr>
<td>15</td>
<td></td>
<td>Gray brown silty medium to fine SAND, dry, no odor</td>
</tr>
<tr>
<td>20</td>
<td></td>
<td>Boring Terminated at 15 ft.</td>
</tr>
</tbody>
</table>

This information pertains only to this boring and should not be interpreted as being indicative of the site.
**TOPSOIL:** 2 inches

FILL: Red brown clayey medium to fine SAND, moist, no odor

Tan red brown silty coarse to fine SAND, dry, no odor

**RESIDUUM:** Brown silty medium to fine SAND, dry, no odor

PARTIALLY WEATHERED ROCK: Sampled as very dense brown silty medium to fine SAND, dry, no odor

Boring Terminated at 25 ft.
<table>
<thead>
<tr>
<th>Depth (feet)</th>
<th>Description</th>
<th>Graphic Depiction</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>ASPHALT: 2 inches</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FILL: Red brown silty coarse to fine SAND, dry, no odor</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>RESIDUUM: Tan silty coarse to fine SAND, dry, no odor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Boring Terminated at 10 ft.</td>
<td></td>
</tr>
</tbody>
</table>

**Graphic Depiction**

- **NATURAL MOISTURE**
- **PLASTIC LIMIT**
- **LIQUID LIMIT**

**BLOW COUNT**

<table>
<thead>
<tr>
<th>N-Value Graphic Depiction</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>60</th>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This information pertains only to this boring and should not be interpreted as being indicative of the site.
<table>
<thead>
<tr>
<th>Depth (feet)</th>
<th>Elevation (ft-MSL)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>TOPSOIL: 2 inches</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FILL: Brown silty coarse to fine SAND, dry, slight odor</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>RESIDUUM: Brown tan medium to fine sandy SILT, dry, no odor</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>Gray brown silty coarse to fine SAND, dry, no odor</td>
</tr>
<tr>
<td>20</td>
<td></td>
<td>Boring Terminated at 20 ft.</td>
</tr>
<tr>
<td>25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Graphic Depiction:
- BLOW COUNT
- NATURAL MOISTURE
- PLASTIC LIMIT
- LIQUID LIMIT

This information pertains only to this boring and should not be interpreted as being indicative of the site.
**PROJECT:** Henry County Roadway Site  
**PROJECT NO.:** 3015085  
**CLIENT:** Heath & Lineback Engineers, Inc.  
**PROJECT LOCATION:** McDonough, Georgia  
**LOCATION:** McDonough Pkwy. at SR20 Intersect  
**ELEVATION:**  
**DRILLER:** Piedmont Drilling  
**LOGGED BY:** N. Macie  
**DRILLING METHOD:** Hollow Stem Auger  
**DATE:** 5/11/2016  
**DEPTH TO WATER> INITIAL:** N/E  
**AFTER 24 HOURS:** N/M  
**CAVING:**  

**TEST BORING RECORD**  
**N-10**  

<table>
<thead>
<tr>
<th>Depth (feet)</th>
<th>Elevation (ft-MSL)</th>
<th>Description</th>
<th>Graphic</th>
<th>Groundwater</th>
<th>Sample</th>
<th>N Value</th>
<th>Graphic Depiction</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>FILL: Red brown gray silty medium to fine SAND, dry, slight odor, metal, glass, wood, paper debris</td>
<td>![graphic]</td>
<td>![groundwater]</td>
<td>![sample]</td>
<td>21</td>
<td>BLOW COUNT</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td>![graphic]</td>
<td>![groundwater]</td>
<td>![sample]</td>
<td>16</td>
<td>PLASTIC LIMIT</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>RESIDUUM: Gray tan silty medium to fine SAND, dry, no odor</td>
<td>![graphic]</td>
<td>![groundwater]</td>
<td>![sample]</td>
<td>16</td>
<td>NATURAL MOISTURE</td>
</tr>
<tr>
<td>15</td>
<td></td>
<td>Boring Terminated at 15 ft.</td>
<td>![graphic]</td>
<td>![groundwater]</td>
<td>![sample]</td>
<td>16</td>
<td>LIQUID LIMIT</td>
</tr>
<tr>
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<td></td>
<td></td>
<td>![graphic]</td>
<td>![groundwater]</td>
<td>![sample]</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td></td>
<td></td>
<td>![graphic]</td>
<td>![groundwater]</td>
<td>![sample]</td>
<td>16</td>
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</tr>
<tr>
<td>30</td>
<td></td>
<td></td>
<td>![graphic]</td>
<td>![groundwater]</td>
<td>![sample]</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td></td>
<td></td>
<td>![graphic]</td>
<td>![groundwater]</td>
<td>![sample]</td>
<td>16</td>
<td></td>
</tr>
</tbody>
</table>

Note: Auger spoils contained plastic, metal, and organic debris
**TOPSOIL:** 2 inches

**FILL:** Brown micaceous silty coarse to fine SAND, dry, no odor

---

Gray micaceous silty coarse to fine SAND, dry, no odor

---

Brown micaceous silty coarse to fine SAND, metal, organic debris, dry, no odor

---

Brown micaceous silty coarse to fine SAND, metal, organic debris, ceramic, dry, strong odor

---

**RESIDUUM:** Brown white tan micaceous silty medium to fine SAND, dry, no odor

---

Boring Terminated at 22 ft.

---

**Note:** Plastic, metal, paper, organic debris observed in auger spoils
### TOPSOIL: 2 inches
- **FILL:** Brown silty coarse to fine SAND with organic debris, dry, no odor

### FILL: Brown gray silty coarse to fine SAND with organic debris, dry, strong odor

### Brown gray silty coarse to fine SAND with organic debris, metal wire, plastic, moist, strong odor

### RESIDUUM: Brown micaceous silty medium to fine SAND, moist, no odor

Boring Terminated at 25 ft.

---

**Note:** Glass, plastic, organic, and fabric debris observed in auger spoils

---

**Graphic Depiction**

- **BLOW COUNT**
- **NATURAL MOISTURE**
- **PLASTIC LIMIT**
- **LIQUID LIMIT**
<table>
<thead>
<tr>
<th>Depth (feet)</th>
<th>Elevation (ft-MSL)</th>
<th>Description</th>
<th>Graphic Groundwater</th>
<th>Sample Type</th>
<th>N Value</th>
<th>Graphic Depiction</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>FILL: Red brown slightly micaceous silty coarse to fine SAND, dry, no odor</td>
<td>![Graphic]</td>
<td>![Groundwater Sample]</td>
<td>![N Value]</td>
<td>![Graphic Depiction]</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td>![Graphic]</td>
<td>![Groundwater Sample]</td>
<td>![N Value]</td>
<td>![Graphic Depiction]</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>RESIDUUM: Gray tan black silty coarse to fine SAND, dry, no odor</td>
<td>![Graphic]</td>
<td>![Groundwater Sample]</td>
<td>![N Value]</td>
<td>![Graphic Depiction]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Boring Terminated at 10 ft.</td>
<td>![Graphic]</td>
<td>![Groundwater Sample]</td>
<td>![N Value]</td>
<td>![Graphic Depiction]</td>
</tr>
</tbody>
</table>

This information pertains only to this boring and should not be interpreted as being indicative of the site.
APPENDIX C

WELL LOGS
TEMPORARY METHANE MONITORING WELL
CONSTRUCTION DIAGRAM

Logged By: N. Macie
Drilling Contractor: Piedmont Drilling
Well Number: N-3
Client: Heath and Lineback Engineers, Inc.
Project Name: McDonough Parkway at SR 20
Project Number: 3015085
Date Installed: May 10, 2016

Comments:

Depth in Reference to Ground Surface:

- Ground Surface: 0'
- Groundwater: 14.46'
- Top of Well Screen: 4'
- Bottom of Monitoring Well: 14'

Well Type: PVC
Well Diameter: 2"
Coupling Type: Threaded
Total Well Length: 14'
Screen Type: PVC
Screen Diameter: 2"
Screen Length: 10'
Screen Slot Size: 0.010"
TEMPORARY METHANE MONITORING WELL
CONSTRUCTION DIAGRAM

Logged By: N. Macie
Client: Heath and Lineback Engineers, Inc.
Drilling Contractor: Piedmont Drilling
Well Number: N-4
Project Name: McDonough Parkway at SR 20
Project Number: 3015085
Date Installed: May 10, 2016

Comments:

Depth in Reference to Ground Surface:

- Ground Surface: 0'
- Groundwater: 15.46'
- Top of Well Screen: 4'
- Bottom of Monitoring Well: 14'

Well Type: PVC
Well Diameter: 2"
Coupling Type: Threaded
Total Well Length: 14'
Screen Type: PVC
Screen Diameter: 2"
Screen Length: 10'
Screen Slot Size: 0.010"
TEMPORARY METHANE MONITORING WELL
CONSTRUCTION DIAGRAM

Logged By: N. Macie
Drilling Contractor: Piedmont Drilling
Well Number: N-5

Client: Heath and Lineback Engineers, Inc.
Project Name: McDonough Parkway at SR 20
Project Number: 3015085
Date Installed: May 10, 2016

Comments:

Depth in Reference to Ground Surface:

Ground Surface

0'

Top of Well Screen: 4'

10'

Bottom of Monitoring Well: 18'

20'

Well Type: PVC
Well Diameter: 2"
Coupling Type: Threaded
Total Well Length: 18'
Screen Type: PVC
Screen Diameter: 2"
Screen Length: 15'
Screen Slot Size: 0.010"
TEMPORARY METHANE MONITORING WELL
CONSTRUCTION DIAGRAM

Logged By: N. Macie
Drilling Contractor: Piedmont Drilling
Well Number: N-6

Client: Heath and Lineback Engineers, Inc.
Project Name: McDonough Parkway at SR 20
Project Number: 3015085
Date Installed: May 11, 2016

Comments:

Depth in Reference to Ground Surface:

0'

Top of Well Screen: 4'

10'

Bottom of Monitoring Well: 9'

20'

Well Type: PVC
Well Diameter: 2"
Coupling Type: Threaded
Total Well Length: 9'
Screen Type: PVC
Screen Diameter: 2"
Screen Length: 5'
Screen Slot Size: 0.010"
TEMPORARY METHANE MONITORING WELL CONSTRUCTION DIAGRAM

Logged By: N. Macie
Drilling Contractor: Piedmont Drilling
Well Number: N-7

Client: Heath and Lineback Engineers, Inc.
Project Name: McDonough Parkway at SR 20
Project Number: 3015085
Date Installed: May 10, 2016

Comments:

Depth in Reference to Ground Surface:

Ground Surface

0'

10'

20'

Top of Well Screen: 3'
Bottom of Monitoring Well: 13'

Well Type: PVC
Well Diameter: 2"
Coupling Type: Threaded
Total Well Length: 13'
Screen Type: PVC
Screen Diameter: 2"
Screen Length: 10'
Screen Slot Size: 0.010"
TEMPORARY METHANE MONITORING WELL
CONSTRUCTION DIAGRAM

Logged By: N. Macie
Drilling Contractor: Piedmont Drilling
Well Number: N-9

Client: Heath and Lineback Engineers, Inc.
Project Name: McDonough Parkway at SR 20
Project Number: 3015085
Date Installed: May 10, 2016

Comments:

Depth in Reference to Ground Surface:

- Ground Surface
- Top of Well Screen: 3’
- Bottom of Monitoring Well: 8’

Well Type: PVC
Well Diameter: 2”
Coupling Type: Threaded
Total Well Length: 8’
Screen Type: PVC
Screen Diameter: 2”
Screen Length: 5’
Screen Slot Size: 0.010”
TEMPORARY METHANE MONITORING WELL
CONSTRUCTION DIAGRAM

Logged By: N. Macie
Drilling Contractor: Piedmont Drilling
Well Number: N-10

Client: Heath and Lineback Engineers, Inc.
Project Name: McDonough Parkway at SR 20
Project Number: 3015085
Date Installed: May 11, 2016

Comments:

Depth in Reference to Ground Surface:

0'

Ground Surface
↓

Top of Well Screen: 4'

10'

Bottom of Monitoring Well: 9'

20'

Well Type: PVC
Well Diameter: 2"
Coupling Type: Threaded
Total Well Length: 9'
Screen Type: PVC
Screen Diameter: 2"
Screen Length: 5'
Screen Slot Size: 0.010"
TEMPORARY METHANE MONITORING WELL
CONSTRUCTION DIAGRAM

Logged By: N. Macie
Drilling Contractor: Piedmont Drilling
Well Number: N-11

Client: Heath and Lineback Engineers, Inc.
Project Name: McDonough Parkway at SR 20
Project Number: 3015085
Date Installed: May 10, 2016

Comments:

Depth in Reference to Ground Surface:

0’

Ground Surface

10’

Top of Well Screen: 4’

20’

Bottom of Monitoring Well: 18’

Well Type: PVC
Well Diameter: 2”
Coupling Type: Threaded
Total Well Length: 18’
Screen Type: PVC
Screen Diameter: 2”
Screen Length: 15’
Screen Slot Size: 0.010”
TEMPORARY METHANE MONITORING WELL
CONSTRUCTION DIAGRAM

Logged By: N. Macie
Drilling Contractor: Piedmont Drilling
Well Number: N-12

Client: Heath and Lineback Engineers, Inc.
Project Name: McDonough Parkway at SR 20
Project Number: 3015085
Date Installed: May 10, 2016

Comments:

Depth in Reference to Ground Surface:

0'

Ground Surface → Top of Well Screen: 4'

10'

20'

Bottom of Monitoring Well: 18'

30'

Well Type: PVC
Well Diameter: 2"
Coupling Type: Threaded
Total Well Length: 18'
Screen Type: PVC
Screen Diameter: 2"
Screen Length: 15'
Screen Slot Size: 0.010"
APPENDIX D

DATA TABLE
Methane Sampling Results (May 12, 2016)

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<thead>
<tr>
<th></th>
<th>N-3</th>
<th>N-4</th>
<th>N-6</th>
<th>N-7</th>
<th>N-9</th>
<th>N-10</th>
<th>N-11</th>
<th>N-12</th>
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<tbody>
<tr>
<td>CH₄ %</td>
<td>2.4</td>
<td>13.7</td>
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<td>29.8</td>
<td>56.5</td>
<td>45.4</td>
<td>65.4</td>
<td>72.7</td>
</tr>
<tr>
<td>CO₂ %</td>
<td>4.3</td>
<td>6.3</td>
<td>12.3</td>
<td>21.7</td>
<td>29.6</td>
<td>28.1</td>
<td>25.3</td>
<td>26.6</td>
</tr>
<tr>
<td>O₂ %</td>
<td>11.3</td>
<td>9.9</td>
<td>5.1</td>
<td>5.3</td>
<td>1.3</td>
<td>3.3</td>
<td>0.4</td>
<td>0.6</td>
</tr>
<tr>
<td>BAL %</td>
<td>82</td>
<td>70.1</td>
<td>58.6</td>
<td>43.2</td>
<td>12.6</td>
<td>23.2</td>
<td>8.9</td>
<td>0.1</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
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</tr>
</tbody>
</table>
APPENDIX E

QUALIFICATIONS OF CONCLUSIONS
QUALIFICATIONS OF CONCLUSIONS

The findings and opinions presented are relative to the dates of our site work and should not be relied on to represent conditions at substantially later dates or locations not investigated.

The opinions included herein are based on information obtained during the study and our experience. If additional information becomes available which might impact our environmental conclusions, we request the opportunity to review the information, reassess the potential concerns and modify our opinions, if necessary.

Assessments may include interviews, a review of documents prepared by others or other secondary information sources. NOVA has not verified the provided information and has no responsibility for the accuracy or completeness of the information.

Although this assessment has attempted to identify the potential for environmental impacts to the subject property, potential sources of contamination may have escaped detection due to: (1) the limited scope of this assessment, (2) the inaccuracy of public records, (3) the presence of undetected or unreported environmental incidents, (4) inaccessible areas and/or (5) deliberate concealment of detrimental information. It was not the purpose of this study to determine the actual presence, degree or extent of contamination at the site, except as specifically described in the previous sections of this report. This would require additional exploratory work, including supplemental sampling and laboratory analysis.

This report is intended for the sole use of Heath and Lineback Engineers, Inc. The scope of work performed during this study was developed for purposes specifically intended by Heath and Lineback Engineers, Inc. and may not satisfy other user requirements. Use of this report or the findings and conclusions by others will be at the sole risk of the user.

Our professional services have been performed, our findings obtained, our conclusions derived and our recommendations prepared in accordance with generally accepted engineering practices and principles. This statement is in lieu of all other statements or warranties, either expressed or implied.
December 2, 2016

HEATH AND LINEBACK ENGINEERS, INC.
2390 Canton Road
Building 200
Marietta, Georgia 30066

Attention: Mr. Allen Krivsky

Subject: Proposed Methane Remediation System Design
DESIGN SERVICES FOR THE MCDONOUGH PARKWAY AT SR 20 INTERSECTION – PHASE II
McDonough, Henry County, Georgia
NOVA Project Number 3015085

Dear Mr. Krivsky:

NOVA Engineering and Environmental, LLC (NOVA) has completed the authorized Conceptual Design for the proposed Methane Remediation System for the McDonough Parkway at SR 20 Intersection – Phase II site in McDonough, Henry County, Georgia. The work was performed in general accordance with Master Subagreement, dated September 16, 2015, between Heath and Lineback Engineers, Inc. and NOVA Engineering and Environmental, LLC for Henry County Contract No. HC-15-64 and Heath and Lineback Job No. 2015010.003.004.

There are two (2) attachments to this letter. Attachment 1 is an overview site plan showing the general, overhead layout of the proposed methane remediation system. Actual excavation depths may vary due to the unknown extents of the landfill cells. Based on the results of NOVA’s previous Limited Subsurface Exploration and Methane Sampling (NOVA Project Number 3015085 dated June 23, 2016), debris laden fill was identified to a maximum depth of eighteen (18) feet below the ground surface. Deeper areas of debris laden fill may be present on the Subject Property. Attachment 2 is a cross section showing the installation of the methane remediation system and landfill cap along the roadway path excavated to eighteen (18) feet.

Based on the methane concentrations measured during NOVA’s previous Limited Subsurface Exploration and Methane Sampling, we are recommending a passive remediation system at this time (i.e. no active fans, blowers, flares, or energy inputs). Once the passive system is in place, NOVA recommends monthly methane sampling be conducted on the system and on nearby structures and utility vaults that may be at risk of methane build up. If elevated methane concentrations are identified in these areas, the passive system can be readily converted to a more aggressive, active system through the addition of fans, blowers, or flare/pump systems.
The passive system illustrated in Attachment 1 and 2 is constructed using a series of 4” diameter slotted PVC and 2” diameter unslotted slotted PVC to discharge released methane a safe distance from structures and utility vaults. The system rests on a #57 stone base. Layers of geotextile fabric, clay liner, and topsoil form a vapor resistant cap to the excavated areas. Actual remediation system dimensions are dependent on the final excavated depths and on-site conditions.

In addition to the methane remediation system recommendations detailed above, NOVA recommends the following construction and access limitations:

1. During construction of the proposed roadway and installation of the methane remediation system, methane vapors escaping from the subsurface present a risk for explosion. Consequently, we recommend adherence to a strict no smoking policy. No smoking signage and restrictions should be in place during all planned and future construction activities in the area.

2. Due to the nature of the proposed passive extraction system, the no smoking signage and restriction should remain in place after construction activities to ensure the protection of the public.

3. The County should limit access to the area that the passive system will vent above the ground surface to ensure the protection of the public.

We appreciate your selection of NOVA and the opportunity to be of service on this project. If you have any questions, or if we may be of further assistance, please do not hesitate to contact us.

Sincerely,

NOVA Engineering and Environmental, LLC

Nickolaus DaSanto
Business Unit Manager
Environmental Services

David A. Miller, P.E.
Principal
Environmental Services

Georgia P.E. License 11730
APPROXIMATE LANDFILL CELL BOUNDARIES

2" UNSLOTTED PVC
4" SLOTTED PVC

NOTE:
CURRENT METHANE REMEDIATION SYSTEM WILL NOT BE IMPACTED BY EXCAVATION AND INSTALLATION OF THE PROPOSED NEW SYSTEM.
2.1 EXAMPLE ROAD SECTION, DIMENSION BASED ON VARIABLE DEPTH FILL AND CONSTRUCTION SAFE SIDEWALL SLOPE TBD

2.2 SECTION CLOSE-UP

2.3 SECTION CLOSE-UP