GREENBAUM ASSOCIATES, INC.
GEOTECHNICAL & MATERIALS ENGINEERS
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Louisville, Kentucky 40215
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September 29, 2020

Mr. Chase Durrett
LDG Development, LLC
1469 S. 4th Street
Louisville, KY 40208

Re: Karst Survey
8300 Cooper Chapel Road
Louisville, Kentucky
Project Number 20-174G

Dear Mr. Durrett:

On September 2nd, 2020, one of my personnel walked the above referenced property and observed a number of potential karst features. Included is a drawing showing the approximate locations of the potential karst features as well as a drawing showing the geologic mapping taken from the Kentucky Geological Survey. Also included are photos of several of the potential karst features.

If construction is to take place in the portion of the site in which these potential karst features are present, it will be necessary to expose the bedrock to determine if they are truly karst features or are due to some other cause and, if they are karst features, install a filter in any crevices or openings in the bedrock. A diagram of a typical treatment of a karst feature using a filter is included with this letter for illustration. Treatment should be on a case-by-case basis under the guidance of a geotechnical engineer. We are available to assist you with the design of the filter at each of these locations. Such a filter will allow water to pass into the opening in the bedrock, but prevent erosion of soil, thus preventing subsidence at that location and making construction possible.

Remediation of karst features is normally performed during sitework as they are exposed by the contractor. Installation of a filter as discussed above is common and most of the larger sitework contractors are familiar with this operation, though it should be performed under the direction of a geotechnical engineer.

The formations shown on the section taken from the geologic map are described by the Kentucky Geological Survey as follows:

JEFFERSONVILLE LIMESTONE

Limestone, olive, brownish, and medium to light gray; weathers pale yellowish brown to very light gray and light yellowish gray; fossil fragments abound in matrix of sparry calcite or calcareous mudstone; pyritic; dolomitic in part; prominent stylolites in

quarry exposures; scattered banded chert in thin irregular stringers. Abundant whole fossils include large colonial corals in lower part and the brachiopods Brevispirifer gregarius and Paraspirifer acuminatus in upper part. Weathered outcrops are characteristically thin slabs of crossbedded limestone on which fossils are etched in relief. Residuum typically contains silicified brachiopods and solitary corals. Unit disconformable with underlying Louisville Limestone; otherwise obscure contact commonly marked by abrupt transition from coarse grained limestone of Jeffersonville to fine grained dolomitic limestone of underlying unit.

LOUISVILLE LIMESTONE

Dolomitic limestone, light gray, yellowish gray, and light brownish gray, mottled medium dark gray; weathers yellowish gray and grayish orange to very pale orange; micro-grained to fine grained; very thin to thick bedded; stylolitic. Bedding locally nodular or thinly laminated. Six to 10 feet above base is persistent shaly zone 1 to 2 feet thick. Fossils, commonly as casts, include the distinctive chain coral Halysites, the brachiopod Conchidium, stromatoporoids, and colonial corals such as Arachvophyllum and Favosites. Calcite filled joints half an inch wide trend N. 10? E., extend into overlying Jeffersonville Limestone; rare calcite filled vugs as much as 0.5 foot across; chert locally common in discontinuous 0.2 foot thick layers in upper part. Unit forms distinctive northwest inclined plain in southeastern part of quadrangle. Basal contact distinct; exposed at only three localities in quadrangle: in underground mine at quarry northeast of Poplar Level Road interchange of Watterson Expressway, in tributary to Fern Creek in southeastern part of quadrangle, and along Middle Fork Beargrass Creek in Cherokee Park.

If you have any questions in regard to this study, please call.

Sincerely,

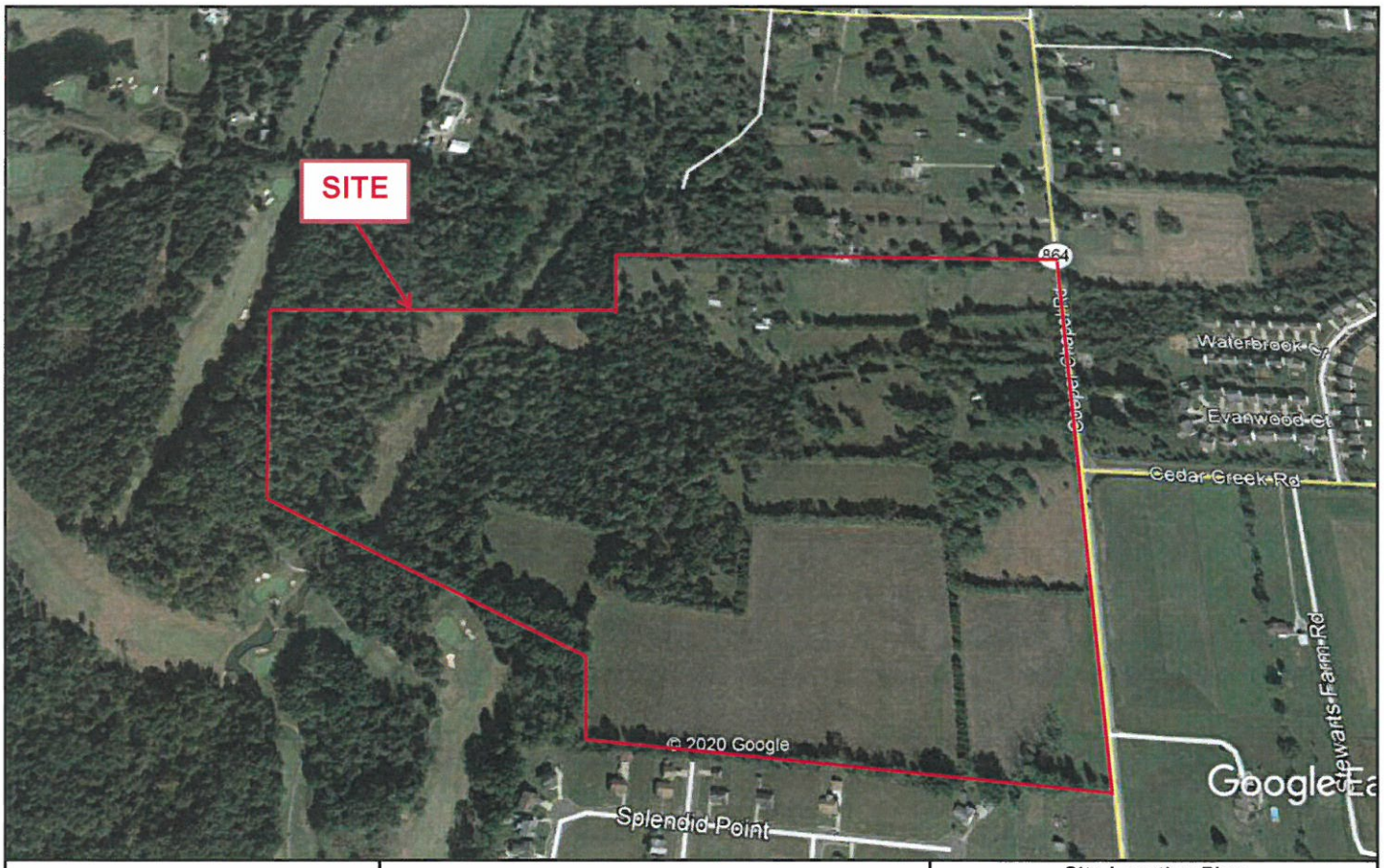
GREENBAUM ASSOCIATES, INC.

Sandor R. Greenbaum

Digitally signed by Sandor R. Greenbaum
DN: cn=Sandor R. Greenbaum, o=Greenbaum Associates, Inc., ou, email=srg@geo-engineers.com, c=US
Date: 2020.10.12 13:29:13 -04'00'

Sandor R. Greenbaum, P.E.
Principal Engineer

20 - ZONE - 0057



LDG Development, LLC	Greenbaum Associates, Inc.	**Site Location Plan** 8300 Cooper Chapel Road Louisville, Kentucky Greenbaum Project Number: 20-174G

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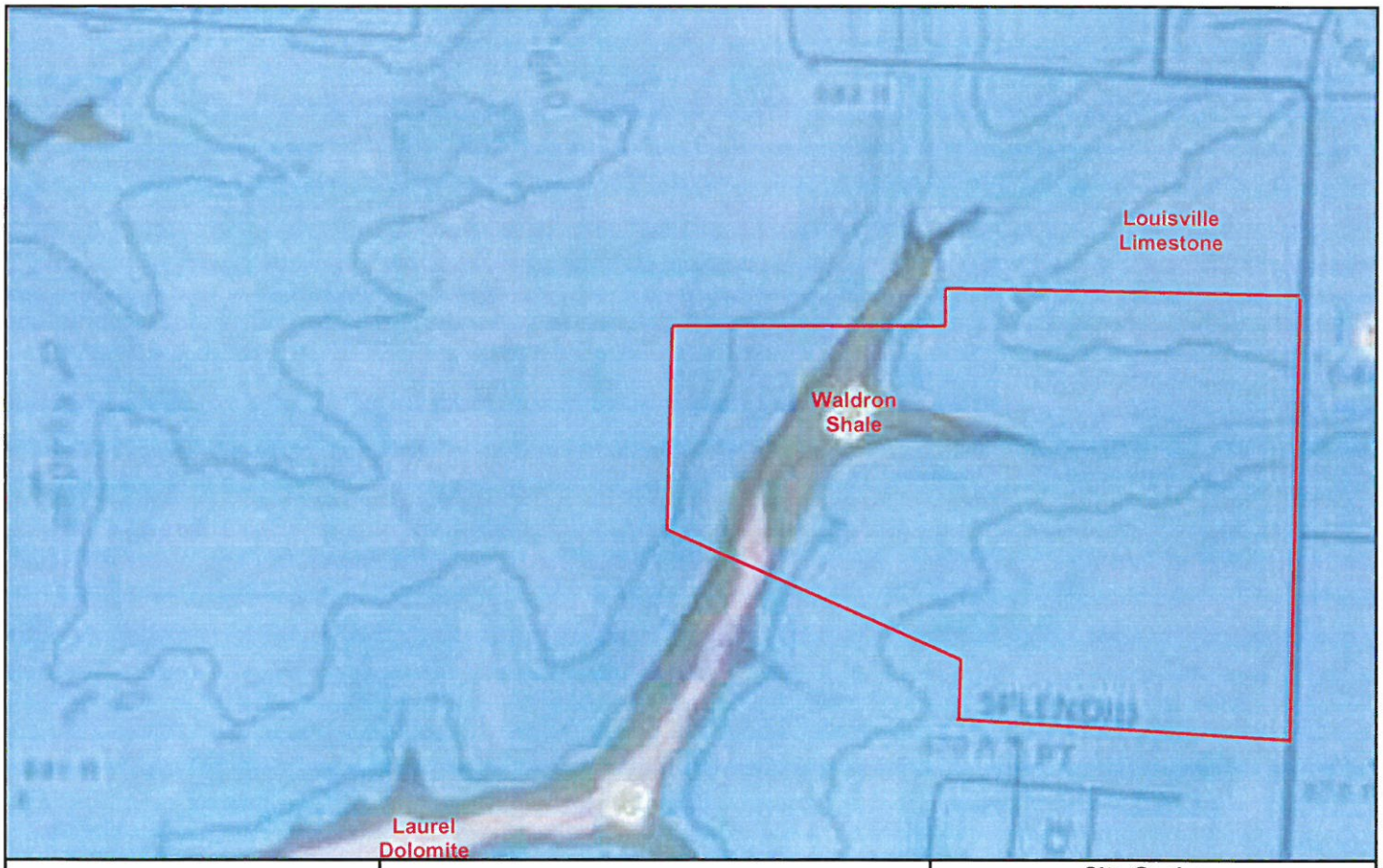

LDG Development, LLC	Greenbaum Associates, Inc.	**Site Geology** Cooper Chapel Road Property 8300 Cooper Chapel Rd., Louisville, Kentucky Greenbaum Project Number: 20-174G

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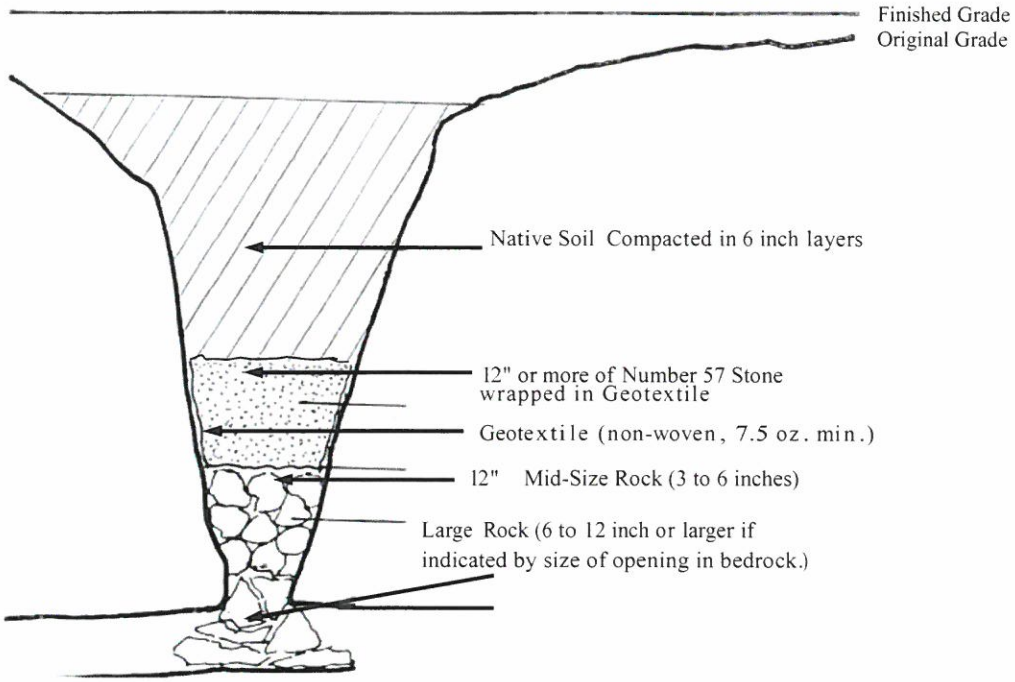

LDG Development	Greenbaum Associates, Inc.	**Diagram of Typical Karst Remediation** Cooper Chapel Road Property Louisville, Kentucky Greenbaum Project Number: 20-174

20 - ZONE - 0057

Possible Sinkhole

Possible Sinkhole

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Possible Sinkhole

Possible Sinkhole

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Potential Sinkhole Throat

Potential Sinkhole Throat

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Potential Sinkhole Throat

Potential Sinkhole Throat

Apparent Spring