DRAINAGE REPORT

44 – 50 LAKESIDE AVENUE (HULA)
REDEVELOPMENT
BURLINGTON, VERMONT

SEPTEMBER 4, 2018

Prepared For:

LAKESIDE OVENS, LLC

Prepared By:

ENGINEERING VENTURES PC

208 Flynn Ave, Suite 2A
Burlington, VT 05401
Tel: 802-863-6225
EV Project # 18119
**Project Description**
Lakeside Ovens, LLC proposes to redevelop 44-50 Lakeside Avenue (formerly the Blodgett Ovens Campus) and renovate two existing buildings (with office, manufacturing and warehouse) to convert to mixed use buildings. Underground utilities will be replaced. Existing impervious areas will be removed, reconfigured and relocated to expand existing parking to accommodate proposed uses. Stormwater management for the redevelopment will include a combination of impervious surface removal, planting of trees, installation of permeable parking and installation of buried forebay tanks and gravel wetlands, designed to comply with state stormwater regulations. The existing waterfront beach club use will be maintained.

**Existing Conditions:**

The existing property is located at 44 and 50 Lakeside Avenue and is bounded by Lakeside Avenue to the south, the Vermont Railway to the east and Lake Champlain to the west. The Burlington Bike Path traverses the east edge of the property and is located in part on an easement on the property. The area of the property is 14.86 acres.

Existing improvements on the property include (3) year-round buildings at 32, 44 and 50 Lakeside, seasonal wood framed buildings (built on piers) associated with the beach club and associated sidewalks, paved drives, parking, a railway spur and utilities.
According to soil maps, the property is primarily urban fill (FU). Test pits on the site (attached) confirm this and indicate that the seasonal high-water table is shallow, due in part to the elevation of the land and proximity to Lake Champlain.

There are two Class 3 wetland areas (roughly 20,000sf) located on the east edge of the property, adjacent to the toe of the bike path slope. The function of the wetland appears to be limited to conveyance and some filtration of rainwater discharging from the roof to 50 Lakeside Avenue and the paved and gravel parking and drives located north of 44 Lakeside Avenue.
As pictured above, the existing pre-development site includes 6.58 acres of impervious area. Rainwater discharges without any existing treatment/management from the site in 5 locations as noted below:

SN1: Roof drain from Building 50 along with runoff from parking area east and northeast of Building 44 and bike path, flowing to the Class 3 wetland and existing conveyance system along the west edge of the existing bike path, discharging to Lake Champlain via an existing 24" CMP at the north end of the site.

SN2 Roof drain from building 44 discharging to Lake Champlain via an existing 18" RCP.

SN3 Runoff from parking area and access drive west of building 50 and south of building 44 collected in a catch basin and discharging to Lake Champlain via an existing 10" CMP +/-200-ft north of building 32.

SN4 Runoff from parking area and access drive south and west of building 50 drains the City stormwater system in Lakeside Avenue, discharging to Lake Champlain via an existing 24" RCP or 10" CMP at the west end of Lakeside Avenue.

SN5 Runoff from remaining areas, generally the west edge of the site, included paved drive and parking west of Building 44, discharging to Lake Champlain via overland flow.
Proposed Conditions

As pictured above, 0.65 acres of impervious pavement (in blue), plus 3.54 acres or roof (in white) will remain in proposed conditions. 1.54 acres of impervious (in green) will be removed as part of the redevelopment, including the existing paved drive and parking located west of 44 Lakeside Avenue. 1.06 acres of existing impervious paved area (in orange) will be redeveloped into new paved drives and parking (note, this includes a 10% additional contingency for additional redeveloped impervious area). 1.28 acres of new impervious area (in red) will be added as paved parking and drives (note, this includes a 10% additional contingency for additional new impervious area).

The proposed siteplan results in relocation of existing pavement form near Lake Champlain, to the east side of the site, where stormwater treatment and shade from existing tree canopies can be provided. Not pictured are the extensive permeable parking spaces, located in tandem with paved parking spaces. The total redevelopment results in a slight decrease in overall impervious area on the property by about 0.05 acres.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Type</th>
<th>Total Impervious (s.f.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing Conditions</td>
<td>Existing Impervious</td>
<td>6.58-ac</td>
</tr>
<tr>
<td></td>
<td>Total Proposed (1+2+3)</td>
<td>6.53-ac</td>
</tr>
<tr>
<td>Proposed</td>
<td>New²</td>
<td>1.28-ac, includes 10% extra</td>
</tr>
<tr>
<td></td>
<td>Existing to Remain</td>
<td>4.19-ac</td>
</tr>
<tr>
<td></td>
<td>Redeveloped</td>
<td>1.06-ac, includes 10% extra</td>
</tr>
<tr>
<td></td>
<td>Net New – Existing</td>
<td>-0.05-ac</td>
</tr>
</tbody>
</table>
**Stormwater Management:**
Stormwater management for the redeveloped site includes a combination of several features including pavement reduction, existing tree retention and new landscaping, permeable parking, below ground forebay pretreatment tanks and gravel wetlands.

SN1 Roof drain from Building 50 to remain with reconfigured culvert and diversion swale. Runoff from reconfigured parking area and drives north, east and south of building 44 to be directed to gravel wetland treatment areas north of Building 44, generally adjacent to the proposed parking area. Treatment areas will be tied into the existing storm system running along the bike path that discharges at the north end of the site.

SN2 Roof drain from Building 44 (loading dock on east side of Building 44 to be removed). Net reduction of impervious area (+/-6,200-sf). No proposed changes to existing roof drain.

SN3 Resurfacing of existing access drive. Curbed sidewalk proposed on west edge of drive will convey runoff from an additional +/-2,000-sf of impervious area.

SN4 Reconfiguration of parking area and sidewalk along Lakeside Avenue. Net reduction of impervious area (+/-4,000-sf). No proposed changes to existing drainage pattern.

SN5 Reconfiguration of parking areas and walks associated with Building 44 and the beach club. Net reduction of impervious area (+/-34,000-sf).
Summary:
The stormwater management has been designed to meet the City of Burlington and State of Vermont 2017 Stormwater manual requirements. The State of Vermont 2017 Stormwater worksheets will be used to demonstrate compliance with the required Vermont State Stormwater Operational Permit. Accordingly, a stormwater model (hydrocad, etc) has not been developed for the site.

The primary function will be treatment of Water Quality for the redeveloped and new impervious areas through forebays and gravel wetlands.

Infiltration and ground water recharge will occur in a limited fashion through permeable parking areas. However due to the shallow seasonal high groundwater (influenced by Lake Champlain) and historic urban fills at the site, concentrated infiltration and groundwater recharge is not proposed.

Rate and volume of stormwater discharge will be lower in post-development conditions due to the slight reduction in impervious area as well as minimal attenuation of flows in the gravel wetlands. Due to the proximity to Lake Champlain, additional flow attenuation (Channel Protection, Overbank Flood and Extreme Flood Protection) is not required nor beneficial and will not be provided.

In addition, the mature grove of existing trees north of the 44 Lakeside building will be maintained and protected and new landscaping planted to promote evapotranspiration and pavement surface cooling.
Please provide the following information to the Stormwater Program (stormwater@burlingtonvt.gov, ph: 863-4501) in order to determine what the requirements will be for your project.

- **General Information**
  - Project Address: 32, 44, 50 Lakeside Avenue, Burlington, VT
  - Owner: Lakeside Ovens, LLC
  - Engineer: Kevin Worden, P.E., Engineering Ventures, PC
  - Brief project description: Redevelop +/-14.89-acre parcel. Renovate two existing warehouse buildings to convert to mixed use buildings. Replace & relocate existing underground utilities. Reconfigure & expand existing parking to accommodate proposed uses. Incorporate stormwater treatment system to treat redeveloped and expanded impervious to comply with state stormwater regulations.

- **Stormwater Management Plan**
  - Impervious\(^1\) change summary

<table>
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<tbody>
<tr>
<td>Existing Conditions</td>
<td>Existing Impervious</td>
<td>6.58-ac</td>
</tr>
<tr>
<td>Proposed</td>
<td>Total Proposed (1+2+3)</td>
<td>6.53-ac</td>
</tr>
<tr>
<td></td>
<td>1) New(^2)</td>
<td>1.28-ac, includes 10% extra</td>
</tr>
<tr>
<td></td>
<td>2) Existing to Remain</td>
<td>4.19-ac</td>
</tr>
<tr>
<td></td>
<td>3) Redeveloped</td>
<td>1.06-ac, includes 10% extra</td>
</tr>
<tr>
<td>Net New</td>
<td>Total Proposed – Existing</td>
<td>-0.05-ac</td>
</tr>
</tbody>
</table>

*If available at this time:*

- Existing conditions: *description of existing conditions, description of existing stormwater system, existing drainage issues, current connectivity to City system* [See attached Exiting Conditions Plan.](#)
- Roof drain from building 50 along with runoff from parking area east and northeast of building 44, bike path, beach club rooftops flowing to the existing conveyance system along the west edge of the existing privately owned bike path, discharging to Lake Champlain via an existing 24” CMP at the north end of the parcel.
- Roof drain from building 44 discharging to Lake Champlain via an existing 18” RCP.
- Runoff from parking area & access drive west of building 50 and south of building 44 collected in a catch basin and discharging to Lake Champlain via an existing 10” CMP +/-200-ft north of building 32.
- Runoff from parking area & access drive south and west of building 50 reaches the city stormwater system in lakeside ave, discharging to Lake Champlain via an existing 24” RCP or 10” CMP at the west end of lakeside ave.
- Runoff from remaining areas, generally the west edge of the site discharging to Lake Champlain via overland flow.

- Proposed Conditions: *description of proposed conditions, brief description of proposed stormwater system, proposed method of discharge to receiving water or City system (overland flow, direct connection via pipe, existing or new manhole or CB)* [See attached Grading & Utility Plan.](#)
- Roof drain from building 50 to remain with reconfigured culvert and diversion swale. Runoff from reconfigured parking area & drives north, east and south of building 44 to be directed to gravel wetland treatment areas north of building 44, generally within the proposed parking area. Treatment areas will be tied into the existing storm system running along the bike path with the addition of several storm manholes.
- Loading dock on east side of building 44 to be removed. Net reduction of impervious area (+/-6,200-sf). No proposed changes to existing roof drain.
- Resurfacing of existing access drive. Curbed sidewalk proposed on west edge of drive will convey runoff from an additional +/-2,000-sf of impervious area.
- Reconfiguration of parking area & sidewalk along Lakeside Avenue. Net reduction of impervious area (+/-4,000-sf). No proposed changes to existing drainage pattern.
- Reconfiguration of parking areas & walks associated with building 44 and the beach club. Net reduction of impervious area (+/-34,000-sf).

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\(^1\) Impervious = any surface off of which water runs off rather than infiltrates, including, but not limited to rooftops and paved/ unpaved (gravel/packed dirt) driveways, walkways and patios

\(^2\) Impervious where there is not currently impervious

Pre-Screen V1 (11/17/2015)
**TEST PIT LOG**

**PROJECT:** HULA Redevelopment Project  
**LOCATION:** 44 Lakeside Ave, Burlington, VT  
**FIELD ENGINEER:** Hannah Wingate, Peter Gibbs, Kevin Worden, EV  
**EXCAV. CONTRACTOR:** David Bertrand, Bertrand Design Build  
**PROJECT NO.:** 18119  
**DATE:** 06/27/2018  
**WEATHER:** 60°F, Overcast  
**ONSITE:** 8AM – 10 AM

**TEST PIT: TP #1**

<table>
<thead>
<tr>
<th>Depth (in.)</th>
<th>Color</th>
<th>Structure</th>
<th>Consistence, Density</th>
<th>Mottles</th>
<th>Texture, Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-12”</td>
<td>Light Brown</td>
<td></td>
<td>N</td>
<td></td>
<td>Gravel fill – 4” minus stone</td>
</tr>
<tr>
<td>12”-16”</td>
<td>Black</td>
<td></td>
<td>N</td>
<td></td>
<td>Coal tar layer – former pavement surface, later filled over</td>
</tr>
<tr>
<td>16”-27”</td>
<td>Dark Brown</td>
<td></td>
<td>Y</td>
<td></td>
<td>Gravel fill – 4” minus stone, former pavement subbase</td>
</tr>
<tr>
<td>27”-40”</td>
<td>Grey Brown</td>
<td></td>
<td>Y</td>
<td></td>
<td>Silt</td>
</tr>
</tbody>
</table>

**Ground Surface Slope:** generally flat  
**Depth to SHWT:** Interpreted at 22” depth below grade  
**Depth to Bedrock:** N/A  
**Remarks:** Existing grade at elev. 109±  
**SHWT near elev. 107±**
**TEST PIT LOG**

**PROJECT:** HULA Redevelopment Project
**LOCATION:** 44 Lakeside Ave, Burlington, VT
**FIELD ENGINEER:** Hannah Wingate, Peter Gibbs, Kevin Worden, EV
**EXCAV. CONTRACTOR:** David Bertrand, Bertrand Design Build
**PROJECT NO.:** 18119
**DATE:** 06/27/2018
**WEATHER:** 60°F, Overcast
**ONSITE:** 8AM – 10 AM

<table>
<thead>
<tr>
<th>Depth (in.)</th>
<th>Color</th>
<th>Structure</th>
<th>Consistency, Density</th>
<th>Mottles</th>
<th>Texture, Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-8”</td>
<td>Brown</td>
<td>Silty Sand</td>
<td></td>
<td>N</td>
<td>Organic Layer</td>
</tr>
<tr>
<td>8”-20”</td>
<td>Dark Brown</td>
<td>Silty Sand</td>
<td></td>
<td>Y</td>
<td>Mottling at 15-16” depth below grade</td>
</tr>
<tr>
<td>20”-40”</td>
<td>Grey Brown</td>
<td>Sandy Silt</td>
<td></td>
<td>Y</td>
<td>Saturated at 30” where tree roots do not penetrate</td>
</tr>
<tr>
<td>Depth to SHWT: Interpreted at 16” depth below grade</td>
<td>Depth to Bedrock: N/A</td>
<td>Remarks: Existing grade at elev. 104± SHWT near elev. 102.5±</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depth (in.)</td>
<td>Color</td>
<td>Structure</td>
<td>Consistence, Density</td>
<td>Mottles</td>
<td>Texture, Comments</td>
</tr>
<tr>
<td>------------</td>
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<td>--------------</td>
<td>----------------------</td>
<td>---------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>0-4&quot;</td>
<td>Dark Brown</td>
<td>Silty Sandy</td>
<td>Loam</td>
<td>N</td>
<td>Organic Layer</td>
</tr>
<tr>
<td>4&quot;-18&quot;</td>
<td>Grey</td>
<td>Silty Sand</td>
<td></td>
<td>Y</td>
<td>Mottling at 8” depth below grade</td>
</tr>
<tr>
<td>18&quot;-30&quot;</td>
<td>Dark Brown</td>
<td>Clayey Silt</td>
<td></td>
<td>Y</td>
<td>Possible original topsoil layer before site received fill material</td>
</tr>
<tr>
<td>30&quot;-50&quot;</td>
<td>Light Grey</td>
<td>Silty Clay</td>
<td></td>
<td></td>
<td>Seepage at bottom of excavation</td>
</tr>
</tbody>
</table>

**Depth to SHWT:** Interpreted at 8” depth below grade  

**Depth to Bedrock:** N/A  

**Remarks:** Existing grade at elev. 102±  
SHWT near elev. 101.33±
## TEST PIT LOG

**LOCATION:** 44 Lakeside Ave, Burlington, VT  
**FIELD ENGINEER:** Hannah Wingate, Peter Gibbs, Kevin Worden, EV  
**EXCAV. CONTRACTOR:** David Bertrand, Bertrand Design Build  
**DATE:** 06/27/2018  
**WEATHER:** 60°F, Overcast  
**ONSITE:** 8AM – 10 AM  

**PROJECT NO.:** 18119  
**PROJECT:** HULA Redevelopment Project  

**TEST PIT:** TP #4  
**Ground Surface Slope:** generally flat  
**Method of Excavation:** CAT 302.5 mini excavator

<table>
<thead>
<tr>
<th>Depth (in.)</th>
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<th>Structure</th>
<th>Consistence, Density</th>
<th>Mottles</th>
<th>Texture, Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10&quot;</td>
<td>Dark Brown</td>
<td>Sandy loam</td>
<td>N</td>
<td></td>
<td>Organic Layer</td>
</tr>
<tr>
<td>10&quot;-18&quot;</td>
<td>Grey Brown</td>
<td>Silty Sand</td>
<td>N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18&quot;-30&quot;</td>
<td>Dark Brown</td>
<td>Very fine silt</td>
<td>Y</td>
<td>Mottling at 24” depth below grade</td>
<td></td>
</tr>
<tr>
<td>30&quot;-48&quot;</td>
<td>Grey</td>
<td>Silty Clay</td>
<td></td>
<td></td>
<td>Seepage at bottom of excavation</td>
</tr>
</tbody>
</table>

**Depth to SHWT:** Interpreted at 24” depth below grade  
**Depth to Bedrock:** N/A  
**Remarks:** Existing grade at elev. 104±  
SHWT near elev. 102±