December 10, 2021

Shekhar Dalal
Blue Meadows Inc.
Thornbury2021@gmail.com

Dear Shekhar Dalal:

Re: **D-4 Guideline Landfill Impact Assessment, 125 Arthur Street West and 123 Louisa Street West, Thornbury, ON**
Project #: **2105901**

1. Introduction

Palmer was retained by Blue Meadows Inc. (the Client) to conduct a D-4 Guideline Landfill Impact Assessment at 125 Arthur Street West and 123 Louisa Street West, in Thornbury, Ontario (hereinafter referred to as the 'Site').

The purpose of this study was to assess the potential impact to lands by waste disposal (landfill) operations located within 500 metres (m) of the Site.

2. Landfill Operations

Table 1 and **Figure 1** below identifies the landfill operations located within 500 m of the Site.

Table 1. Landfill Operation Locations

MECP Landfill ID Number	Municipality	Distance to Site	Status
X2090	Blue Mountains	152 m north	Closed in 1983

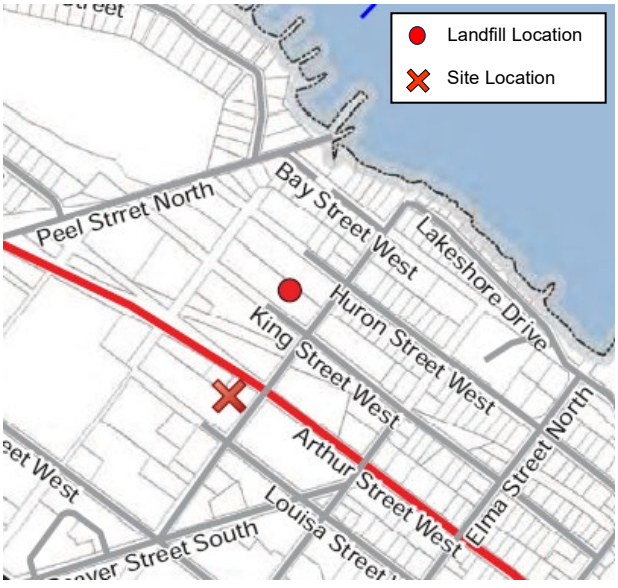

Figure 1. Landfill Location Map

An information request dated August 17. 2021 was sent to Shawn Postma, Senior Policy Planner with the Town of The Blue Mountains requesting copies of documentation associated with the presence of landfill operations in the vicinity of the Site. A response dated August 17, 2021, confirmed that there is a closed landfill located north of the Site. In addition, an Environmental Impact Study (EIS) for the Thornbury closed landfill site was provided for our review. A review of the provided EIS identified the following:

- Official Plans at the municipality dictate that an assessment be required prior to the development of lands within 500 m of an active or inactive landfill. A new comprehensive Zoning By-Law is under development such that all lands within 500 m of a closed or active landfill site will be subject to a holding provision and this holding provision can only be lifted once a D-4 study has been prepared. The D-4 study must demonstrate that the lands proposed for development are secure from potential methane gas and/or leachate migration;
- The purpose of the EIS was to evaluate the Thornbury Closed Landfill Site and determine whether lands within a 500 m radius of the site can have the holding provision lifted;
- Seven (7) testpits were excavated around and within the fill area on May 27, 2010. Native silt till-like soils were encountered at three (3) testpits, buried waste was observed in the northern portion of the fill area at one (1) testpit, and silt textured soils were encountered at two (2) testpits on the southeastern portion of the site. Methane gas was not detected in any of the testpit locations;
- A D-4 study was conducted in 2005 at a property located approximately 140 m southwest of the landfill at the northeast corner of Peel Street and Highway 26. This study indicated that there was no potential for environmental impacts to the proposed development from the former landfill site;
- A D-4 study was conducted in 2008 at a property located immediately east of the landfill at the northeast corner of Kind Street West and Lansdown Street North. This study indicated that groundwater and surface water impacts from the landfill were interpreted to flow toward Nottawasaga Bay and impacts were not expected; however groundwater sampling would be required to verify this. In addition, soil impacts were not expected and methane gas was not detected in any of the installed monitoring wells installed at the property;
- A Freedom of Information (FOI) request with the Ministry of Environment, Conservation and Parks (MECP) revealed an inspection was completed on July 8, 2004 and at the time of the inspection the site was being used for aggregate storage and storage of boat cribs. The inspection did not reveal any non-compliance issues and noted that the landfill had been closed for more than 25 years. The inspection report recommended that a Closure Plan be developed and include a plan to revegetate part or all of the site to prevent run off;
- The site falls within Zone 4, which is generally high susceptibility to contamination in the area and areas immediately south of the site fall within Zone 6a. Susceptibility to groundwater in Zone 6a is considered variable since there are no significant shallow aquifers and th potential for contaminating major groundwater resources is small;
- No leachate seeps were observed discharging from the site;
- The following conclusions were presented based on the results of the D-4 study:
    - Leachate generated from the waste will flow downward into the water table where it will migrate laterally in the direction of groundwater flow (i.e. toward the north with some flow toward Beaver Creek to the west). Groundwater flow rates are interpreted to be slow restricting the migration of contaminants and the potential impact zone has been delineated up to 320 m downgradient of the site and 100 m from the site in order directions;
    - There is potential for the landfill to impacts surface water quality in Beaver Creek from the south edge of the site to the discharge point in Georgian Bay;
    - Methane would likely not migrate more than 150 m from the site and will not migrate west of Beaver Creek assuming that the creek represents the water table in the vicinity of the site; and,
    - Portions of the site and surrounding lands are characterized by significant and potentially significant natural heritage and natural hazard features.
- Potential Impact Zones (Figure 6) for groundwater, surface water, and landfill gas incorporate a safety margin in the absence of detailed site specific information and these areas would retain their holding provisions. Areas beyond these zones could have the holding provisions lifted.

- Palmer's review of the Potential Impact Zones revealed that the Site located at 125 Arthur Street West and 123 Louisa Street West is located along the edge of the 500 m radius from the landfill and is not located within the potential surface water, groundwater, or landfill gas impact zones.

3. Physiography, Topography, and Hydrostratigraphy

The Site location is shown on the Atlas of Canada Topographic Map, as presented in **Figure 2** below. The surface elevation of the Site is approximately 190 metres above mean sea level (amsl). Topography across the Site is relatively flat, and the topography in the vicinity of the Site slopes gradually downward to the north and east.

The nearest surface water body is the Little Beaver Creek, located approximately 30 m northwest of the Site.

The Site is located within the broad physiographic region known as the Beaver Valley (Chapman and Putnam, 1984). This region consists of two, small distinctive moraines located on either side of Thornbury.

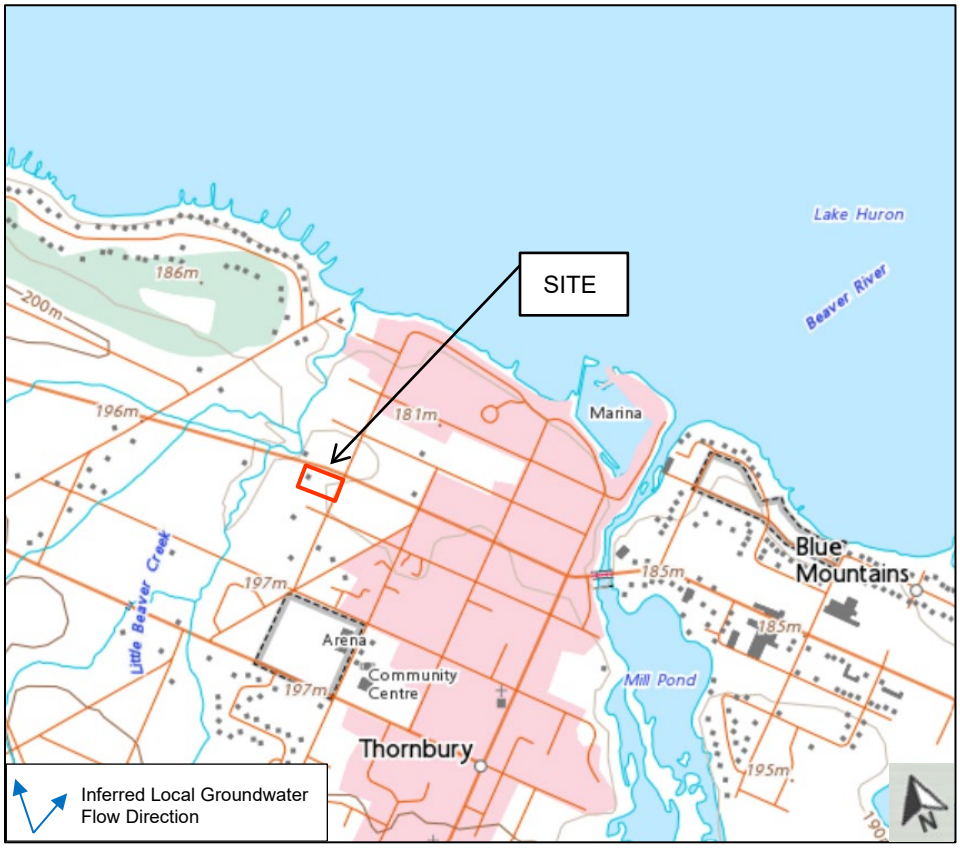

Figure 2. Topographic Map

Local surficial geologic mapping (The Ontario Geological Survey, 2003) of the Thornbury area indicates that fine-textured glaciolacustrine deposits (massive to well laminated) of silt and clay, minor sand and gravel, underlie the Site.

Bedrock geologic mapping of Ontario (The Ontario Geological Survey, 1990) indicates that the glacially derived overburden soil at the Site is underlain by Upper Ordovician Age shale and limestone of the Georgian Bay Formation.

Based on surface topography and nearby surface water features, the horizontal ground water flow direction at the Site is anticipated to be to the north-northeast towards Little Beaver Creek and Lake Huron. Ground water depth is estimated to be approximately 1.52 metres below grade (mbg) based on well records in the vicinity of the Site.

4. Landfill Impacts

Based on the available landfill records and geological records, including topographic maps, the former landfill (X2090) is inferred to be located hydraulically down-gradient from the Site. In addition, based on the D-4 study conducted for the closed landfill in July 2010, the Site was identified to be located along the edge of the 500 m radius from the landfill and is not located within the potential surface water, groundwater, or landfill gas impact zones. Furthermore, as the Site has been identified as an area beyond the potential impact zones, the holding provisions that apply to the Site may be lifted.

This former landfill is considered to pose a low environmental concern to the Site and the potential for ground water contamination by leachate, surface water contamination by leachate, surface water run-off impacts, and impact by landfill generated gases are minimal, if any.

No adverse effects or risks to health and safety, nuisance impacts and degradation of the natural environment have been identified during this assessment. Therefore, no remedial measures are currently required to prevent or minimize adverse effects at the Site.

5. References

- Atlas of Canada, Topographic Maps;
  - http://atlas.nrcan.gc.ca/Site/english/toporama/index.html
- Chapman and Putnam, The Physiography of Southern Ontario, 1984;
- Environmental Impact Study, Thornbury Closed Landfill Site, R.J. Burnside & Associates Limited, July 2010;
- Historic Landfill Site Reviews, Grey County, 2015;
- Ontario Ministry of the Environment, Conservation and Parks, Large Landfill Sites Map, 2020;
- Ontario Ministry of the Environment, Conservation and Parks, Small Landfill Sites, 2020;
- The Ontario Geological Survey, 1990; and,
- The Ontario Geological Survey, 2003.

6. Limitations of Report

This report was prepared by Palmer for the account of Blue Meadows Inc. in accordance with the professional services agreement.

The conclusions and recommendations detailed in this report are based upon the information available at the time of preparation of the report. No investigative method eliminates the possibility of obtaining imprecise or incomplete information. Professional judgement was exercised in gathering and analyzing the information obtained and in the formulation of our conclusions and recommendations.

The nature of the sampling works makes it possible that contrary conditions may be identified in locations which were not sampled. However, it does suggest that the conditions will be localized and not extensive. The soil boundaries indicated on the borehole logs are inferred from non-continuous sampling and observations made during drilling and therefore should not be interpreted as exact planes of geological change.

The disclosure of any information contained in this report is the sole responsibility of the intended recipient. The material in it reflects Palmer's best judgement in light of the information available to it at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Palmer accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report. This limitations statement is considered part of this report.

Unless stated otherwise in this report, provided that the report is still reliable, and less than 12 months old, Palmer may issue a third-party reliance letter to parties, client identifies in writing, upon payment of the then current fee for such letters. All third parties relying on Palmer's report, by such reliance agree to be bound by our proposal and Palmer's standard reliance letter. Palmer's standard reliance letter indicates that in no event shall Palmer be liable for any damages, howsoever arising, relating to third-party reliance on Palmer's report. No reliance by any party is permitted without such agreement. This report is not to be given over to any third party for any purpose whatsoever without the written permission of Palmer.

The original of the technology-based document sent herewith has been authenticated and will be retained by Palmer for a minimum of five years. Since the file transmitted is now out of Palmer's control and its integrity can no longer be ensured, no guarantee may be given with regards to any modifications made to this document.

7. Certification

This report was prepared by Sarah Sipak, B.Sc., P.Geo (limited), QP_{ESA}, an Environmental Geoscience Team Lead in the Toronto office of Palmer. She has over eleven years' experience conducting Phase One and Two ESAs, soil and ground water sampling, and site remediation in accordance with Ontario Regulation 153/04 and 511/09, the CSA Z768-01 and Z769-00 environmental protocols, the Consulting Engineers of Ontario's Generally Accepted Standards for Environmental Investigations, and the Canadian Mortgage and Housing Corporation (CMHC) environmental site investigation procedures for mortgage loan insurance. The aforementioned ESAs have covered all land use types across Canada. Sarah also has numerous years of experience in preparing and filing Record of Site Conditions (RSCs) with the Ministry of the Environment, Conservation and Parks (MECP). Sarah also has experience conducting Excess Soil Reuse Planning assessments in accordance with Ontario Regulation 406/19. Sarah is a Qualified Person (QP_{ESA}) under the MECP O.Reg. 153/04 as amended.

This report was reviewed by Bobby Katanchi, M.Sc., P.Geo., QP_{ESA}, a Senior Hydrogeologist in the Toronto Office of Palmer, with a Masters of Science Degree in Hydrogeology, and is a recognized Professional Geoscientist in Ontario since 2013. Bobby has conducted and managed over 50 of environmental investigations including Phase One ESAs, Phase Two ESAs, and various site remediation projects across Ontario. Bobby is a Qualified Person (QP_{ESA}) under the MECP O.Reg. 153/04 as amended.

Prepared By:

Sarah Sipak, B.Sc., P.Geo(limited), QP_{ESA}
Environmental Geoscience Team Lead

Reviewed By:

Bobby Katanchi, M.Sc., P.Geo. QP_{ESA}
Senior Hydrogeologist