NovaTox

3 September 2021

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Re: Soil Capping Barrier Risk Management Requirements for the Parkland Area, 200 Lees Avenue, Ottawa, Ontario; U of O Health Sciences – Foundation Permit Stage

NovaTox Inc. (NovaTox) reviewed the remedial action plan (RAP) prepared by Geosyntec Consultants (Geosyntec) dated December 11, 2020 (Geosyntec Project No. TR0885B) for the proposed redevelopment of the west portion of 200 Lees Avenue, located in Ottawa, Ontario (the 'Site'). In addition, we were provided with a copy of the updated landscape plan prepared by Architecture |49 in conjunction with WSP and PCL Construction (PCL) (dated April 15, 2021).

As described in the RA investigation completed by Geosyntec, the Site consists of two areas including (1) the 'Community Use Area', and (2) the 'Parkland Area'. The Parkland Area comprises a 1,700 m^2 strip along an existing multi-use trail. Geosyntec indicated there is no proposed change in land use as a result of the redevelopment on both the Community Use Area as well as the Parkland Area and as a result a Record of Site Condition ('RSC') is not required to be submitted to the Ontario Ministry of the Environment, Conservation and Parks (MECP) for approval. The focus of this memo concerns the Parkland Area, which is generally situated on or within 30 m of the water body.

Redevelopment Plans

The University of Ottawa (uOttawa) is proposing to redevelop the Site by constructing a new multi-story "C"-shaped building that will be constructed mostly within the Community Use Area, following the demolition of Buildings B, C, and D. A copy of the redevelopment plan showing the proposed building and landscape architecture plan is provided in the attached Figure (Attachment 1). The southern portion of existing Building D extends slightly into the parkland zoning (Parkland Area), however once Building D is demolished, the portion that extended will be filled and landscaped so that the new use is consistent with the current zoning (i.e., Parkland). uOttawa is also proposing to re-landscape the remainder of the Site around the new building.

Current and Redeveloped Parkland Area

Currently, the Parkland Area includes an existing pathway, several large trees in addition to a wooded river bank area (south of the existing pathway that will be preserved). As indicated above, Building D currently overlaps a small part of the Parkland Area, and this part of the building is to be demolished. On the west side of the Parkland Area, the proposed future Landscape plans indicate that a 3m asphalt pathway, a coloured concrete paved terrace and a walkway including a pre-cast concrete sitting wall and plinth feature, in addition to concrete seat walls, other walls and steps will be constructed in that area. Adjacent to that an additional 1.5–2m asphalt pathway will be constructed along the length of the Parkland Area, and additional trees will be added, along with benches (for sitting). Lastly, a bio-swale and ditch inlet in basin will be added south of the asphalt pathway (refer to Attachment 1). Based on the work by Geosyntec, the Parkland Area is not considered environmentally sensitive as per Section 41 of O. Reg. 153/04 (Geosyntec, 2020), although it is within 30 m of a water body. For the Parkland Area, the applicable generic SCS were determined to be the Table 9 Generic Site Condition Standards (SCS) for Use within 30 m of a Water Body in a non-potable ground water condition for all types of property use and soil textures (i.e., the 'Table 9 SCS'). As the current and future land use of the Parkland Area is a landscaped area and paved walkway paths (with the exception of the small portion of Building D, which will be demolished), the area meets the O. Reg. 153/04 definition of parkland use. The new landscaping post-redevelopment of the "C" shaped building will extend into the

Parkland Area south to the paved multi-use trail, however no work will occur south of the multi-use trail. Therefore, no redevelopment is planned for the multi-use trail or the portion of the Site that is between the river and the multi-use trail.

Proposed Risk Management Measures

In the Remedial Action Plan, Geosyntec recommended that the following barrier capping methods be implemented at the Site:

- Shallow Soil Cap Barrier – Cover, above the COCs in soil, that is at least 0.5 m thick in the Community Use Area of the Site, *and at least 1.5 m thick in the Parkland Area (south portion) of the Site and consists of capping soil*;
- Hard Cap Barrier – Asphalt or concrete cover layer, above COCs in soil, that is at least 225 mm thick and consists of at least 75 mm of hot mix asphalt or poured concrete underlain by Granular "A" aggregate or equivalent material, and includes a building slab or building foundation and floor slab meeting these specifications; and
- Fill Cap Barrier - Cover, above the COCs in soil, that is at least 0.5 m thick in the Community Use Area of the Site, *and at least 1.5 m thick in the Parkland Area (south portion) of the Site*. The fill cap may be comprised of soil, wood chips or other landscaping finishes (e.g. patio stones, cobbles etc.).

Geosyntec stated that areas of the future redevelopment *void* of hard surfaces (e.g., landscaped areas) would require a soil/aggregate cap. Geosyntec stated '*To satisfy the requirements of the Human Health and Ecological Risk Assessment (HHERA) and O.Reg. 153/04, the soil/aggregate cap would require a minimum thickness of 0.5 m in areas of the proposed redevelopment (within the area proposed for new landscaping) located more than 30 m from the Rideau River (as specified in the MGRA User Guide, Appendix 9, Section 1 Hard cap/Shallow Cap Barrier RMM), and a minimum thickness of 1.5 m in areas north of the multi-use pathway in the Parkland Area'* (refer to Figure 1 of the RAP; the area within 30 metres of the Rideau River bounded by the green landscaping boundary to south up to the Community Use Area).

The specification for the application of a 1.5 m capping layer on the Parkland Area was obtained by Geosyntec from the MGRA User Guide, Appendix 9, Section 2.2 Hard cap/Shallow Cap Barrier (modified S3 soil component value) RMM.

Briefly, the Modified Subsurface Worker Protection risk management measure described in the MGRA model is designed to offer the QP the ability to '*modify'* the sub-surface worker exposure scenario. The Approved Model includes the assessment of the direct contact pathways for a worker exposed to contaminants in the sub-surface. The pathways include direct contact (oral ingestion, dermal contact) in addition to particulate inhalation. These pathways are combined and referred to as the S3 pathway.

Risk Assessment Review

Geosyntec quantitatively evaluated a construction worker for the following pathways:

- Inhalation of vapours sourced from soil while working in an excavation/ trench setting (for both the Community Use and Parkland Area);
- Dermal contact, oral ingestion, and inhalation of vapours sourced from groundwater while working in a deeper excavation for the new building foundation in the Community Use Area.

The results of the Geosyntec human health RA indicated that for the Parkland Areas, none of the hazard quotients (HQs) exceeded the non-cancer threshold of 0.2. Similarly, none of the derived Incremental Lifetime Cancer Risk (ILCR) estimates exceeded the cancer risk threshold of 1.0×10^{-6}. Therefore, the potential risks associated with these exposures were calculated to be below acceptable risk thresholds. On this basis, construction workers were not found to be at risk as a result of exposure to the chemicals that

were found in soil on the Parkland Area portion. Potential risks associated with COC vapours in outdoor air were also assessed to be below acceptable risk thresholds. Geosyntec also concluded that no RMMs were considered necessary for COCs vapours in outdoor air or excavation air or for contact with groundwater.

Based on the Geosyntec RA report, construction workers are not considered to be at risk at the Site as a result of exposure to vapours or to groundwater. Geosyntec did not quantitatively evaluate exposure to soil at the Site through direct contact pathways. Rather, Geosyntec screened the chemicals reported in soil and compared the maximal values reported to the S1 (residential), S2 (adult outdoor worker), and S3 (construction worker) pathway component values (obtained directly from the Ministry's Rationale document). The rationale for completing the screening to S1 and S2 values was that for the Parkland Area, recreational visitors may include children that could contact soil. Soil may also wash into the adjoining riparian area along the river where it could hypothetically be contacted by recreational users of the river. The Ministry's S1 component value is based on a high-frequency, high-intensity, exposure scenario equivalent to that of a surface soil at a residential site where children and pregnant women may be present. The soil value is calculated using TRVs and a soil ingestion and dermal exposure model. The purpose for screening using S3 component values was to assess construction workers (involved in the redevelopment).

The maximum soil concentrations for the Parkland Area were compared to the S1, S2 and S3 component values and the findings were reported in Table 4.2. Seven of the PAHs and three metals (i.e., arsenic, cadmium and lead) were reported to have maximum concentrations that were greater than the S1 and S2 component values. One PAH (B[a]P) and two metals (cadmium and lead) have maximum concentrations greater than the S3 component values.

Using this screening approach, and based on these findings, RMMs were recommended by Geosyntec for both the Community Use Area and the Parkland Area to address potential risks associated with future long-term contact with COCs in fill materials and soil *by workers (by default, construction workers, and outdoor workers), and students and recreational visitors represented by the S1 component values*. RMMs were recommended to address potential risks during the short-term redevelopment phase when construction workers may contact soils or during subsurface activities after the redevelopment is complete. The RMMs were discussed in Sections 7.1 and 7.2 of the RA document. In Section 7.1 of the RA, Geosyntec's conclusion was that for the Parkland Area, the intervention concentrations are the lower of the S1 component values, which are protective of recreational visitors of all ages that may use the multi-use trail or access the adjacent newly landscaped area and the plants and soil organisms (PSO) component values, which are protective of plants and soil organisms. Geosyntec recognized that in some cases, component values might be lower than analytical detection limits or concentrations that occur naturally. If the selected value was lower than the applicable SCS (i.e., the Table 9 SCS for Parkland Area), then the SCS was selected instead to avoid setting the intervention concentrations at levels lower than typical background concentrations or analytical detection limits.

Discussion and Recommendations

The recommendation to include a 1.5 m barrier for the Parkland Area is health protective and conservative but the approach is flawed and is unnecessary and unwarranted, given the proposed development plans. The RA is not undergoing or following a modified generic risk assessment approach. Given there are no land use changes proposed for the Site, the RA work is classified as a non-regulatory RA submission; therefore the development of RM measures should be tailored specific for the Site and consider the actual development plans, as opposed to relying on the "*generic*" RM measures outlined in the Ministry's MGRA model.

RM measures are required to mitigate potential exposure to the COCs that are reported to be in soil at the Parkland Area of the Site in order to protect recreational visitors of all ages that may use the newly landscaped area (and to protect the plants and soil organisms (PSO) component values, which are protective of plants and soil organisms). In addition, there is a need to protect construction workers and outdoor

workers (i.e., landscapers). In order to protect these individual receptors, the most efficient and effective strategy is to block the exposure pathways to COCs at the site found within the soil.

In a standard (Tier III) risk assessment submitted to the MECP to obtain a Record of Site Condition, the QP would be required to propose appropriate RM measures to "*block*" pathways for exposure. In a standard RA, recreational receptors that visit the Parkland Area would not be expected to contact soil at depths exceeding ~20–30 cm at the Site. In reality, the majority of recreational receptors would be using the pathways (which will be hard-scaped). These types of receptors do not access soil at the site, and certainly do not access soil at deeper depths. It is possible that construction workers might access soil at the site, including soil at depth. However, simple blocking measures such as ensuring workers are protected with the use of Personal Protective Equipment (PPE) would be sufficient in blocking exposure to COCs at the Site. Outdoor workers involved in landscaping activities generally wear sufficient levels of PPE to protect themselves as well.

It also must be acknowledged that the same receptors found on the Community Use Area would also be expected on the Parkland Area. For example, there are landscaped areas (and COCs) that are found on the Community Use Area. We question why capping layers proposed for these areas were recommended to be 0.5 m thick while capping layers 1.5 m thick were recommended for the Parkland Area. The thickness of the soil/fill capping barrier thickness should not differ if the same receptors were using the both areas of the Site.

In our opinion, in areas that are void of hard surfaces, a soil/fill cap barrier that is at most 0.5 m thick, underlain by a light-duty geotextile fabric would be sufficient. These measures should be implemented in all areas not covered with a building or other substantial hard surface (e.g., asphalt parking area). The measures would be similar to what was recommended at the Community Use Area (but include the use of a light duty geotextile fabric) and are considered to be sufficient to 'block" exposure to COCs that are potentially found in soil at the Site for all receptors.

We note that for the Laroche Park, Mechanicsville Community redevelopment located in the City of Ottawa, the Park Renewal Project Presentation (City of Ottawa, July 25th, 2018) indicated that the City was planning to implement a risk management program to "*isolate the underlying impacted fill across the park*". A recommendation (i.e, a RM measure) was designed to prevent direct contact with the underlying fill using an approach referred to as "soil capping". The RM measure was designed to protect parkland users. The approach involved the placement of 0.5 m of clean imported soil placed over a geotextile fabric. An excerpt of the recommendation is provided in Attachment #2, for reference.

All other aspects of the RAP are appropriate and sufficient to ensure that all receptors using the Parkland Area will be protected. We concur with Geosyntec that the areas that will require hard capping barriers (asphalt or concrete cover layers above COCs in soil) should be at least 225 mm thick and consist of at least 75 mm of hot mix asphalt or poured concrete underlain by Granular "A" aggregate or equivalent material (e.g., HPB over granular, etc.). The new building slab (i.e, the "C" Section building could also meet the specifications). The other RM measures (e.g., Health and Safety Plan - HASP), Soil and Groundwater Management Plan) should be included in the management program for the Site. In addition, we concur that the selection of backfill or soil capping material should be reviewed with the Site landscaper and/or arborist to ensure that the material is conducive to the growth and sustainability of the proposed tree species. Typically, a root-ball includes a 1–1.5 m clean layer of soil, to ensure that the trees are growing properly.

We trust that the rationale to support the use of 0.5 m capping layer in impacted areas of the Site is sufficient and clearly explained. If any additional information is required, please contact the authors below for further assistance.

This Memo Contains a Statement of Limitations and Additional Disclaimers. The Limitations and Disclaimers are Provided Below.

Sincerely,
NovaTox Inc.

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Attachments:
1 – Redevelopment Plans for the Site
2 – Laroche Park Redevelopment

Limitations of Use

The findings and conclusions presented in this memo are the result of NovaTox's professional interpretation of the information collected and assessed by others, including the above-described risk assessment work completed by Geosyntec Consultants. We cannot "certify" or guarantee that any portion or area of the property is free of environmental impairment, and therefore is free of environmental risks or hazards. We cannot certify the results of Geosyntec's risk assessment report, and our statements only apply to the use of a 0.5 m soil capping layer as being protective of human health and mitigating exposure. No warranties regarding the environmental quality of the property are expressed or implied. We are not responsible for independent conclusions, opinions, or recommendations made by others or otherwise based on the findings presented in this report.

This report has been prepared and the work referred to in this memo has been undertaken by NovaTox for Paterson Group and PCL Construction, and on behalf of their client the uOttawa. It is intended for the sole and exclusive use of Paterson Group and PCL Construction or their client. Any use, reliance on, or decision made by any person other than Paterson Group and PCL Construction or their client based on this memo is the sole responsibility of such other person. NovaTox makes no representation or warranty to any such other person with regard to this memo report and the work referred to in this memo and accepts no duty of care to any person and any liability or responsibility whatsoever for any losses, expenses, damages, fines, penalties, or other harm that may be suffered or incurred by any other person as a result of the use of or reliance on any decision made or any action taken based on this report or the report of the work referred to in this memo.

This report has been prepared for the exclusive use of Paterson Group and PCL Construction and their client for specific application to the Site (the Parkland Area). Any conclusions or recommendations made in this report reflect NovaTox's best judgment based on information available at the time of the memo's preparation based, in part, on monitoring at various locations of the site (by others), and specific analysis of specific chemical parameters and materials during a specific time interval, all as described in this report and other reports referenced herein.

Other than by Paterson Group and PCL Construction and their client, copying or distribution of this report or use of or reliance on the information contained herein, in whole or in part, is not permitted without the express written permission of NovaTox and Paterson Group and PCL Construction.

Nothing in this report is intended to constitute or provide a legal opinion.

References

Geosyntec Consultants (2020) Human Health and Ecological Risk Assessment. Proposed Site Redevelopment - 200 Lees Avenue, Ottawa, Ontario. Prepared by Geosyntec Consultants International Inc., Suite 424-135 Laurier Ave. W., Ottawa, Ontario. TR0885B. December 15, 2020.

Geosyntec Consultants (2020) Remedial Action Plan. Proposed Site Redevelopment , West Portion of 200 Lees Avenue, Ottawa, Ontario. Prepared by Geosyntec Consultants International Inc., Suite 424-135 Laurier Ave. W., Ottawa, Ontario. TR0885B. December 11, 2020.

TOWARDS LEES STATION

LEES AVENUE

SERVICE ROAD

LIMIT OF WORK

RELOCATED CROSS-WALK

NATURAL CONCRETE WITH COLOURED CONCRETE BANDS

ANTI-RAM BOLLARDS (x10)

LINE OF EXISTING CURB

BUILDING SIGN

LAY-BY

RAISED PLANTER WITH LIMESTONE COPING

POST & RING BIKE RACK (X4)

COLOURED CONCRETE WALKWAY

EXISTING TREES TO BE PRESERVED

3m ASPHALT PATHWAY

REFORESTATION PLANTING

3m WIDE CONCRETE PAVING
5 BIKE RACKS, TYP.
(FIVE SPACES PER RACK)

60cm PEA STONE DRIP STRIP UNDER WALLS WITH WINDOWS WITH ALUMINUM EDGER

3m WIDE CONCRETE PAVING
COVERED BIKE SHELTER WITH 9 BIKE RACKS, TYP.
(18 SPACES)

COLOURED CONCRETE PAVING

PRE-CAST CONCRETE SEAT WALLS, WALLS AND STEPS

3 X 3R=9R

PRE-CAST CONCRETE SITTING WALL AND PLINTH

3m ASPHALT PATHWAY

COLOURED CONCRETE PAVING
TERRACE AND WALKWAY

EXISTING PATHWAY

3R=6R

uOTTAWA HEALTH SCIENCE BUILDING

CONCRETE

1.8m HIGH WOOD SCREEN FENCE (2.4m SEGMENTS)

12 RAISED COMMUNAL GARDEN PLANTERS ON STONE DUST

60cm PEA STONE DRIP STRIP UNDER WALLS WITH WINDOWS

2m ASPHALT PATHWAY

COLOURED CONCRETE PAVING

2m ASPHALT PATHWAY

2m ASPHALT PATHWAY

EXISTING TREES TO BE PRESERVED

SNOW FENCE PROTECTION FOR EXISTING TREES

EXISTING PATHWAY PORTION TO BE REMOVED

EXISTING WOODED RIVER BANK

3m ASPHALT PATHWAY

MOUNTABLE CURB FOR TRUCK MOVEMENT

ASPHALT PAVING

LAWN

60cm PEA STONE DRIP STRIP UNDER WALLS WITH WINDOWS WITH ALUMINUM EDGER

60cm PEA STONE DRIP STRIP UNDER WALLS WITH WINDOWS

1.5m ASPHALT PATHWAY

EXISTING PATHWAY TO BE PRESERVED

BIOSWALE AND DITCH INLET IN BASIN

BLOCK E

BLOCK A

EXISTING TREES TO BE PRESERVED

SNOW FENCING PROTECTION FOR EXISTING TREES

STONE DUST PATHWAY 1m

APPROXIMATE LOCATION OF EXISTING PATHWAY

EXISTING PATHWAY TO MEET AND MATCH PROPOSED PATHWAY, SMOOTH AND FLUSH

7m DIA. CONCRETE CIRCLE WITH 1.2m DIA. FIRE PIT AND SEATING LOGS (x4)

ABORIGINAL PAVILLION

FLATTENEND 6m LONG LOG TABLE IN THE PAVILION

STONE DUST PATHWAY 1m

3-5 m WIDE ASPHALT PATHWAY

APPROXIMATE LOCATION OF EXISTING PATHWAY

EXISTING PATHWAY TO MEET AND MATCH PROPOSED PATHWAY, SMOOTH AND FLUSH

APPROXIMATE LOCATION OF EXISTING PATHWAY

EXISTING PATHWAY TO MEET AND MATCH PROPOSED PATHWAY, SMOOTH AND FLUSH

3m ASPHALT PATHWAY

LEGEND

- SERVICE DOG RELIEF AREA (3 TOTAL)
- FLAT BOULDERS ON NORTH-SOUTH ASPHALT PATH
- WASTE RECEPTACLE (7 TOTAL)
- BENCH (14 TOTAL)
- GALVANIZED WATER TROUGH AS RAISED PLANTER (12 TOTAL)
- LOG SEATING AT FIREPIT
- COVERED BIKE SHELTER WITH POST & RING RACKS ON CONCRETE SLAB (8 SHELTERS WITH 9 RACKS= 144 BIKES + 4 UNDER BUILDING OVERHANG= 152 TOTAL BIKE SPACES)
- MEET AND MATCH
- PROPERTY LINE
- LIMIT OF WORK
- EXISTING TREE TO BE PROTECTED AND PRESERVED

-SEE ELECTRICAL FOR LIGHTING
-SEE L3 PLANTING ZONES FOR SPECIES ASSOCIATIONS

0 5m 10m 20m 25m

SCALE: 1:250 (HORIZONTAL)

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SEAL:

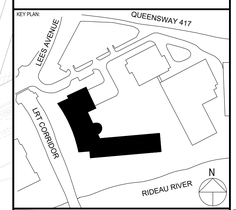
CLIENT: uOttawa

RFP #: 2020-40369 CLIENT REF. #: BT20-18477

PROJECT:

University of Ottawa - Faculty of Health Sciences Building

KEY PLAN:



ISSUED FOR - REVISION:

NO.	DATE	DESCRIPTION
1	2021-04-15	ISSUED FOR TECHNICAL SUBMISSION

PROJECT NO: 211-01094-00
DATE: 2021-04-15
ORIGINAL SCALE: 1 : 250
DESIGNED BY: JW
DRAWN BY: GM
CHECKED BY: JW / JL

IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE. 25mm

DISCIPLINE: LANDSCAPE ARCHITECTURE

TITLE: LANDSCAPE MATERIALS

SHEET NUMBER: L200

SHEET # 2 OF 3

ISSUE: REV #: 001

DATE OF: 2021-04-15

ISSUE DESIGN TECHNICAL SUBMISSION

Parc Laroche Park

COLIZZA BRUNI architecture

Ruhland & Associates Ltd
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Jp2g Consultants Inc.
ENGINEERS · PLANNERS · PROJECT MANAGERS

wood.

Recommendations

- The City is planning to implement a risk management program to isolate the underlying impacted fill across the park
- Designed to prevent direct contact with the underlying fill using an approach referred to as ‘soil capping’. Involves placement of 0.5 m of clean imported soil placed over a geotextile fabric.
- City will retain an environmental consultant to be on-site for the duration of the soil excavation and capping portion of the project.
- A dust control plan and traffic management plan will be developed.
- Site will be routinely inspected following completion to ensure integrity of soil cap.