ENVIRONMENTAL MANAGEMENT PLAN
6312 - 50 STREET
EDMONTON, ALBERTA

Submitted To:

WORTHINGTON PROPERTIES INC.
Edmonton, Alberta

Submitted By:

AMEC EARTH & ENVIRONMENTAL LIMITED
Edmonton, Alberta

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1.0 INTRODUCTION

AMEC Earth and Environmental Limited (AMEC) is pleased to provide this Environmental Management Plan (EMP) for the property located at 6312 - 50th Street in Edmonton, Alberta ("the site"). The EMP includes both onsite and offsite issues. It is AMEC's understanding that Worthington Properties Inc. (Worthington) intends to develop the site for commercial business operations.

The site is approximately 36.4 hectares in size and is zoned IM (Medium Industrial) and IB (Industrial Business). The adjacent properties include industrial, residential and vacant, undeveloped lands. There are 15 buildings on the site, which were most recently occupied by Alberta Transportation and were used for maintenance of road maintenance and construction equipment and supplies.

2.0 ENVIRONMENTAL ISSUES

The environmental issues that have been identified include:

1. Potential asbestos-containing materials, lead-based paint and polychlorinated biphenyls (PCBs) in buildings onsite.
2. Onsite hydrocarbon contamination originating from hydraulic oil storage tanks associated with hydraulic hoists.
3. Onsite hydrocarbons impacted soils originating from former underground storage tanks.
4. Salt contamination resulting in:
   (a) onsite soil and groundwater impacts; and
   (b) offsite soil and groundwater impacts.

2.1 POTENTIAL ASBESTOS CONTAINING MATERIALS, LEAD-BASED PAINT AND POLYCHLORINATED BIPHENYLS

The potential exists for these materials to be present in the existing buildings onsite. It is recommended that a hazardous materials survey of the building interiors be undertaken and remedial measures be implemented if appropriate.

2.2 ONSITE HYDROCARBON CONTAMINATION

Onsite hydrocarbon contamination originates from two sources: the former underground fuel storage tanks associated with the service station (decommissioned); and the hydraulic oil associated with the hydraulic hoists located in the Storage and Repair Shop and in the Sign, Carpentry and Paint Shop.

Soils located under the footprint of buildings and impacted by hydraulic oil may be left in-situ with appropriate risk management methods in place until such time in the future as the building is removed. A monitoring program consisting of three to five monitoring wells located around the perimeter of the impacted area may be utilized to ensure that offsite migration of contaminants is not occurring.

2.3 ONSITE AND OFFSITE SALT CONTAMINATION

Salt contamination on the site originates from two sources: historical onsite salt storage and handling practices and ongoing offsite salt/sand storage and handling southeast of the property at an adjacent City of Edmonton road maintenance facility. Runoff from this facility impacts the site on an ongoing basis.

Based on the site environmental information generated to date, the potential receptors associated with salt contamination consist of:

- Onsite vegetation related to landscaping or potential landscaping as part of site development;
- Offsite vegetation in areas where depth of groundwater is within the root zone of the existing vegetation; and
- Offsite discharge of groundwater into Mill Creek and downstream receptors.

Onsite groundwater users are not a potential concern as potable water for the site and surrounding properties is obtained from the City of Edmonton municipal water supply system.

2.3.1 Onsite Environmental Management - Construction Phase

Soil Management

The proposed development of the site is for commercial/light industrial business. This will result in approximately 90% of the site being covered in either concrete or asphalt pavement.

Some salt impacted soils may require relocation during construction. While not representing a potential environmental risk to human receptors, these soils may not be suitable for use as general purpose fills or on residential sites, and should be either disposed offsite at an appropriate facility or reused onsite beneath concrete/asphalt pavement structures.

Underground Services

It is recommended that any underground services and concrete that could be negatively impacted by corrosion be separated from salt impacted soils. It is recommended that a synthetic liner is installed around any such steel services and the appropriate concrete type is used in these areas.

Landscaping Areas

It is recommended that soils underlying any proposed landscaping in salt-impacted areas be excavated and replaced to a depth of 1.5 m or to the base of the surficial clay soils, whichever is deeper. The proposed landscaping should consist of salt-tolerant shallow rooted species.

2.3.2 Onsite Environmental Management - Post-Construction Monitoring

Three post-construction monitoring programs are recommended for incorporation into the EMP, these being:

- Down-gradient groundwater monitoring at the property line;
- Pavement structure assessment monitoring; and
- Underground services maintenance.

Groundwater Monitoring

AMEC recommends that a down-gradient groundwater-monitoring program be implemented following site development to monitor long-term groundwater quality trends for the site. Groundwater monitoring should be completed in surficial clay tills. It is recommended that the number of monitoring locations be determined after completion of site redevelopment in the event that soils impacted by salts are relocated within the property.

However, the minimum number of groundwater monitoring locations recommended based on current conditions is six, along the south and east property lines adjacent to the southeast former of the site and in the northeast of the site downgradient of the impacted area. It is proposed that twice-yearly annual groundwater monitoring be conducted until a significant trend in improving groundwater quality is observed, at which time monitoring frequency may be reduced.

Pavement Structure Assessment

The primary feature of environmental management onsite is the placement of a low-permeability barrier at surface (concrete/asphalt paving) which will significantly reduce the potential to mobilize salts in the vadose zone. To ensure that the integrity of the pavement structure is properly maintained, AMEC recommends that annual pavement structure inspections be completed.

The inspections will be directed at providing the necessary due diligence documentation of the pavement conditions and identifying any areas of structural disturbance requiring repair to ensure that the low permeability barrier is effective.

Underground Structure Maintenance

All site work involving underground services will be monitored by an environmental professional and will be summarized in an annual report.

2.3.3 Reporting

An integral component of the proposed environmental management plan will be the implementation of a regulatory reporting to include annual summary and individual incident reports. The annual report will detail the results of the proposed monitoring programs presenting the results of site inspection observations, analytical testing and receptor risk assessment. In addition, recommendations will be presented for EMP modifications considered necessary to maintain receptor protection requirements.

Individual incident reports will be submitted on an as required basis to notify local regulators of potential receptor exposures resulting from reaches in the EMP receptor protection systems. Annual reports will be submitted to Alberta Environment and to the Capital Health Authority.

Groundwater Monitoring

The specifics of the groundwater monitoring events will be presented in the annual report, with specific information to include:

- Water levels within individual monitoring wells;
- Groundwater flow contour map;
- Results of water quality analyses with comparison to the applicable regulatory criteria; and
- Conclusions regarding water quality compliance and recommendations for future groundwater management actions.

Paving Structure Assessment

The results of the semi-annual paving structure assessment will be presented in the annual report to include an overall evaluation of the pavement performance, detail any areas which underwent repair work during the monitoring period, and provide recommendations for future actions to ensure that the pavement structure integrity is maintained.

Underground Services Maintenance

The information that is provided in this report will include:

- Details regarding the nature of the work undertaken;
- Disposition of any soils excavated during the completion of the work;
- Confirmation that utilities potentially subject to corrosion were protected upon completion of the work; and
- Summary of the site inspection observations, soil management actions and final restoration of site conditions.

2.3.4 Offsite Environmental Management

The existing information has identified that salt-impacted runoff originating from a salt/sand pile at the City of Edmonton Maintenance yard located at the southeast corner of the site has been draining onto the site. The recommended EMP for salt contamination originating from offsite sources and impacting the subject site includes confirmation of the areal extent of the potential salt plume; monitoring and reducing ecological risks associated with the contamination; and implementing a long-term management program. Human receptors are not a concern as potable water is provided by the City of Edmonton municipal water supply system.

In order to obtain confirmation of the extent of the salt plume an EM survey was completed along with confirmatory shallow soil sampling to 1.5 m below grade in depth. Groundwatermonitoring wells should be selected for long-term monitoring of groundwater quality. The most likely ecological risk associated with the ongoing presence of the adjacent sand/salt pile is impact to Mill Creek, either through surficial runoff or through discharge of impacted groundwater into the creek. This could be controlled somewhat by regrading and diversion of surface runoff and groundwater flow-through. The extent and location of the contaminant plume will determine the degree of ecological risk.

Drainage controls should be implemented on the subject site along portions of the south and east property lines proximal to the City's sand/salt pile. These could include grading to minimize runoff onto the site and installation of a cut-off trench incorporating an impermeable barrier and weeping tile drainage system, as well as installation of an impermeable surface barrier (concrete/asphalt paving) to prevent infiltration into the subsoil.

Subsequent to these observations regarding offsite saline drainage from the City of Edmonton maintenance yard, the relevant portion of the city yard appears to have been paved and bermed. However, this does not preclude the recommendations noted above with regard to implementation of drainage controls in the southeast portion of the site.

3.0 CONCLUSIONS

The management techniques proposed in this environmental management plan include the following:

- A hazardous materials survey of building interiors and removal or control of potential impacts;
- Removal of hydrocarbon and/or salt impacted soils where practical;
- Initiation of control measures to prevent future impacts where possible (drainage controls, impermeable barriers, replacement of salt-impacted soils in landscaped areas);
- Long-term monitoring programs to maintain an audit of subsurface conditions where impacted materials have been left in-situ;
- Periodic site inspections to document site conditions; and
- A reporting program which would detail the results of the proposed monitoring programs, present the results of the site inspection observations, and provide recommendations for EMP modifications considered necessary to maintain compliance with receptor protection requirements.

4.0 REPORT LIMITATIONS

This report has been prepared for the exclusive use of Worthington Properties Inc. and authorized users for specific application to this project site. Any use which a third party makes of this report, of any reliance or decisions to be based on it, are the responsibility of such third parties.

5.0 CLOSURE

We trust that the above information meets with your present requirements. Should you have any questions or comments, please contact the undersigned at your convenience.

Yours truly,

AMEC Earth **and Environmental Limited**

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