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CITY OF NEW WESTMINSTER

Human Health and Detailed Ecological Risk Assessment

224 Front Street, New Westminister, BC

09216

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EXECUTIVE SUMMARY

This executive summary is intended only as a synopsis of the assessment undertaken. The entire report should be read in order to fully understand conclusions of the HHRA and DERA for the Site.

General

WorleyParsons Canada Services Ltd. (WorleyParsons) was retained to complete a Human Health Risk Assessment (HHRA) and Detailed Ecological Risk Assessment (DERA) for 224 Front Street located in the City of New Westminister (CoNW), British Columbia (BC; the "Site"). The CoNW requested the completion of the HHRA and DERA based on results of investigations and remedial activities on the Site. The CoNW requires the HHRA and DERA to assess potential residual risks associated with contamination remaining on the Site. The assessment is required to confirm that contamination in soil, groundwater, nearshore groundwater, soil vapour and/or sediments meet risk-based standards outlined by the BC Ministry of Environment (MOE) for redevelopment of the property into a public park. The HHRA and DERA cover the entire Site although only a portion of the property is being developed during this first phase of development.

The HHRA and DERA were completed in accordance with published guidance. Various sources of information were consulted including BC MOE, Health Canada, the Science Advisory Board for Contaminated Sites (SABCS) and the United States Environmental Protection Agency (US EPA). As previous risk assessments had not been completed for the Site, the approach taken in the assessment of human and ecological health risks was generally conservative.

HHRA

The HHRA included assessment of contaminants of potential concern (COPCs) in soil and soil vapour. An exemption from evaluation of drinking water was provided for the Site by BC MOE (Appendix 1). Additionally, direct contact and ingestion of water and sediment were excluded based on engineering controls that have been implemented during park construction to mitigate potential public safety risks associated with access to the Fraser River along this reach.

Receptors of potential concern (ROPCs) were identified as workers and the general public. Exposure pathways included soil ingestion and dermal contact, inhalation of fugitive dust, inhalation of indoor and outdoor air and fish ingestion.

Generally, predicted human health risks met risk-based standards with the following exceptions:

- soil ingestion of benzo(b&j)fluoranthene by the general public toddler (incremental lifetime cancer risk [ILCR] = 1.31×10^{-5}) and exposure for the general public toddler across multiple pathways (total ILCR = 1.53×10^{-5});
- exposure to benzo(a)anthracene for the general public toddler across multiple pathways (total ILCR = 1.12×10^{-5});



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- soil ingestion of vinyl chloride based on estimated potential future concentrations for the general public toddler (ILCR = 4.22×10^{-5} ; total ILCR = 4.91×10^{-5});
 - exposure to carcinogenic PAHs with similar mode of action was predicted to be slightly higher than risk based standards for the scenario of soil ingestion and total exposure by a toddler (total ILCR = 2.88×10^{-5} and 3.37×10^{-5} , respectively);
 - exposure to mercury via fish ingestion was predicted to exceed risk-based standards for non-carcinogenic endpoints (hazard quotient [HQ] exceeding 1); and
 - exposure to arsenic via fish ingestion was predicted to exceed risk-based standards for carcinogenic endpoints (ILCR exceeding 1×10^{-5}).

These potential risks to human health from exposure to soils were mitigated through use of exposure control by construction of permanent features. This eliminates potential exposure pathways and therefore potential risks to human health. Potential risks to human health from exposure to mercury and arsenic in fish tissue were not attributed to Site activities based on data collected from the Fraser River.

Therefore, the Site is considered to meet risk-based standards for human health as defined by BC MOE.

Aquatic DERA

The aquatic DERA included assessment of COPCs in groundwater, nearshore groundwater and sediment. Surface water was excluded since dilution in the Fraser River is anticipated to be significant and therefore not representative of Site conditions. ROPCs were identified as both freshwater and marine aquatic organisms from various trophic levels including primary producers, water column invertebrates, benthic and epibenthic invertebrates, planktivorous, insectivorous and piscivorous fish, mammals, waterfowl and carnivores. The identification of ROPCs was based on Site observations, ecological setting, valuable ecosystem components, trophic levels and known listed species. Exposure pathways included groundwater, nearshore groundwater and sediment ingestion and direct contact, and ingestion of prey. Groundwater and nearshore groundwater were assessed in lieu of surface water since the point of compliance on contaminated sites is prior to the point of discharge.

Results from the aquatic DERA were evaluated using a weight of evidence (WOE) approach. A WOE approach considers multiple lines of evidence (LOE) and draws an overall conclusion about probability, magnitude and scale of harm, and ecological relevance. The WOE approach predicted a low overall risk to aquatic ROPCs. This conclusion was based on:

- multiple LOE within each AEC;
- Site-specific physico-chemical data and observations;
- engineering controls put in place during remediation (WorleyParsons, 2011c) including the Jet Grout containment wall and sediment capping; and
- anticipated improvements in groundwater and nearshore groundwater quality post remediation based on source isolation and/or removal.

Therefore, the Site is considered to meet risk-based standards for aquatic life as defined by BC MOE.

Terrestrial DERA

The terrestrial DERA did not proceed past the problem formulation phase. Screening of COPCs considered surface and subsurface soils. ROPCs were identified as microbes, invertebrates, plants, small mammals, small birds and carnivores. Exposure pathways were identified as inoperable based on the rooting depth of vegetation (receptor specific, based on the design within the Landscaping Tender), burrowing depth of soil invertebrates (1.5 m), depth to contamination post construction and the location of permanent features to be installed during construction (e.g. sidewalk). This results in a low overall risk to terrestrial ROPCs.

Therefore, the Site is considered to meet risk-based standards for terrestrial life as defined by BC MOE.

Assumptions, Uncertainties and Limitations

Several assumptions were incorporated into the HHRA and DERA. This introduces uncertainty into the assessment. Additionally, the HHRA and DERA are limited by data collected to date and assumptions incorporated within the document. A detailed list of assumptions, uncertainties and limitations are provided within the HHRA and DERA and should be considered when reviewing the conclusions of the executive summary presented herein.

Risk Management Plan

A Risk Management Plan (WorleyParsons, 2011d) has been prepared which outlines future monitoring requirements and associated reporting. These monitoring requirements are linked to the assumptions made in relation to the HHRA, DERA, mitigation features (Jet Grout Containment wall, sediment capping) and park construction features.