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Environmental Appeal Board

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DECISION NO. 2016-EMA-065(a)

In the matter of an appeal under section 100 of the *Environmental Management Act*, S.B.C. 2003, c. 53.

BETWEEN:	City of Burnaby	**APPELLANT**
AND:	Director, *Environmental Management Act*	**RESPONDENT**
AND:	Suncor Energy Inc.	**THIRD PARTY**
BEFORE:	A Panel of the Environmental Appeal Board Alan Andison, Chair	
DATE:	Conducted by way of written submissions concluding on September 4, 2018	
APPEARING:	For the Appellant:	Richard Bereti, Una Radoja, and Adam R. Way, Counsel
	For the Respondent:	Dennis Doyle and Jeff Van Hinte, Counsel
	For the Third Party:	Christopher Hirst and Sharon Urquhart, Counsel

APPEAL

[1] The City of Burnaby (the "City") appealed a certificate of compliance ("CoC") issued to Suncor Energy Inc. ("Suncor") on December 22, 2015, by Peter Kickham, delegate for the Director, *Environmental Management Act* (the "Director"), Ministry of Environment (the "Ministry"), in relation Suncor's remediation of contamination on land owned by the City. The remediated City-owned land consists of portions of the road right-of-ways at Imperial Street and Kingsway Avenue (the "City Lands") in Burnaby, BC. The City Lands are adjacent to land owned by Suncor.

[2] The Environmental Appeal Board has the authority to hear this appeal under section 100(1) of the *Environmental Management Act*, S.B.C. 2003, c. 53 (the "*Act*"), which provides that a person aggrieved by a decision of a director or a district director may appeal the decision to the Board. Section 103 of the *Act* gives the Board the power to confirm, reverse or vary the decision being appealed, send the matter back to the person who made the decision, or make any decision the person whose decision is appealed could have made and that the Board considers appropriate in the circumstances.

[3] The City submits that the Director should not have issued a CoC for the City Lands. The City alleges that Suncor failed to properly delineate and remediate some of the contamination that originated from Suncor's land, and that certain reports which Suncor provided in support of its application for the City Lands CoC were deficient. The City submits that those reports are deficient, and requests that the Board order Suncor to address the deficiencies, before issuing a revised CoC for the City Lands.

[4] The appeal was heard by way of written submissions.

BACKGROUND

[5] The background information below is derived from information that was provided by the parties, including a Preliminary Site Investigation, Detailed Site Investigation, and Confirmation of Remediation Report dated June 15, 2015 (the "DSICOR Report"), all of which were prepared by Suncor's environmental consultant, Parsons Canada Ltd. ("Parsons"). The DSICOR Report includes over 3,000 pages of information, and discusses the results of Suncor's site investigations and remediation activities. It includes numerous tables, maps, drawings, and appendices, which contain field data, laboratory results, and analyses. Although the City's appeal challenges some of the findings in the DSICOR Report, the background information below is generally not in dispute.

[6] Suncor's land is a triangular piece of property located at the east corner of Imperial Street and Kingsway Avenue ("Kingsway"). Imperial Street lies along the north boundary of Suncor's land, and residential properties are located along the north boundary of this portion of Imperial Street. Further west along Imperial Street is an automobile dealership with an automotive service garage. Adjacent to the east boundary of Suncor's land is an automobile dealership that also has an automotive service garage. Kingsway lies along the southwest boundary of Suncor's land. Across Kingsway from Suncor's land are various automotive service businesses.

[7] Suncor and its corporate predecessors operated a retail fuel station and automotive service garage on Suncor land's from approximately 1963 to 1995. Previous to that, the land was occupied by a motel.

[8] Suncor's land is currently vacant, but there were several structures and other facilities on the land while it operated as a fuel station and garage. A building containing the garage and an office was located in the northeast portion of Suncor's land. The garage had two in-ground hoists. Two fuel pump islands and a propane tank were located to the south of the building, along Kingsway. At the time of decommissioning, three underground fuel storage tanks were located approximately in the middle of Suncor's land. A November 1963 insurance map in an appendix to the DSICOR Report shows an underground storage tank in the southeast corner of Suncor's property, near Kingsway. That tank is not discussed in the DSICOR Report and is not shown on later maps that show other former facilities. When the fuel station and garage were operating, the western portion of Suncor's land was landscaped, as were some narrow strips adjacent to Imperial Street. Most of the remaining area was paved.

[9] Page 3 of the DSICOR Report states that, according to topographic maps of the area and reconnaissance of the site, Suncor's land is "located on a topographic high point, with the regional ground surface sloping down to the north towards Deer Lake and down to the south towards the Fraser River." According to a topographic map presented in the City's submissions, the area slopes 2% from west to east up to Suncor's land, and then dips 1.5% toward the northeast (towards Imperial Street) once it reaches Suncor's land. Also, Suncor's land is north of the regional watershed boundary.

[10] A site investigation report dated May 2, 1996, states that surface runoff "has historically been directed toward on-site catch basins." A February 28, 1997 site map shows three catch basins on Suncor's land and two catch basins on Kingsway adjacent to Suncor's land: catch basin 1 ("CB1") on Kingsway northwest of the former pump islands; catch basin 2 ("CB2") on Suncor's land at the southeast end of the former pump islands and adjacent to Kingsway; catch basin 3 ("CB3") on Kingsway near the southeast corner of Suncor's land; catch basin 4 ("CB4") on Suncor's land approximately three metres west of the former building and a similar distance away from Imperial Street; and, catch basin 5 ("CB5") on Suncor's land adjacent to Imperial Street approximately 15 metres west of the former building.

[11] On pages 47 – 49, the DSICOR Report summarizes the hydrogeological zones beneath Suncor's land and the adjacent areas that were investigated. A shallow zone of glacial till with intermittent perched groundwater exists within the top nine to ten metres below ground surface ("mbgs"). Water in the shallow zone appears to migrate downwards. Perched groundwater is not found beneath the entire area, as some shallow monitoring wells were consistently dry during groundwater monitoring, but if water was present in a shallow well, it was typically measured between four and six mbgs. Below the shallow zone is an intermediate zone of glacial till with perched intermittent groundwater. Variations in water levels in this zone are influenced by differences in silt/clay content in the till. Water within this zone was detected at depths of six to 18 mbgs, and appears to migrate downwards to the deeper regional aquifer, which begins at approximately 25 mbgs. The regional aquifer consists of sand and gravel, and is known as the Vancouver Quadra Sands aquifer. There is conflicting evidence between the parties experts regarding whether the regional aquifer is confined or only partially confined in the area that was investigated.

[12] Starting in 1995, Suncor conducted initial environmental investigations on Suncor's land and drilled six boreholes ("BH"). This revealed elevated concentrations of petroleum hydrocarbons in the soils and groundwater on Suncor's land. In late 1995, Suncor decommissioned the fuel station and garage.

[13] In February 1996, Suncor demolished and removed the building, fuel pump islands, and other surface facilities on Suncor's land. Suncor also removed three steel underground fuel storage tanks and approximately 20 cubic metres of soil from Suncor's land. A May 2, 1996 investigation report states that two of the tanks were in good visual condition and indicated that they were manufactured in 1984, but the third tank was in poor visual condition with significant pitting and rusting, and had no indicated date of manufacture. Soil samples taken near the tank nest and underground fuel distribution lines showed benzene, toluene, ethyl benzene,

xylenes, light hydrocarbons, and volatile petroleum hydrocarbons in excess of applicable standards. Five test holes ("TH") were dug. Soil samples from TH1 (2.4 metres deep) located a few metres west of the former underground storage tanks, and TH4 (3.0 metres deep) located at the fuel pump island nearest to Kingsway, contained ethyl benzene, xylenes, light hydrocarbons, and volatile petroleum hydrocarbons well above applicable standards. TH3 (1.8 metres deep) located in or near the former garage hoists contained low levels of xylenes.

[14] In October and November 1996, approximately 2,300 cubic metres of soil was removed from Suncor's land. The main area excavated (to a depth of two to four metres) was approximately in the middle of Suncor's land, and included the area of the former underground storage tanks, extending towards the fuel pump islands and associated underground piping, and a contiguous area extending to Imperial Street. A second area was excavated in and around the former building (to a depth of 1.8 metres), including part of the rear west corner of the building footprint and the adjacent area behind the building along Imperial Street. Also, approximately 22,500 litres of water from the excavation pit was pumped and transported to a Petro-Canada refinery for treatment and disposal. The excavations were backfilled with imported fill. According to a site report dated April 24, 1997, the backfill material consisted of "river bed sand, rock, and pit run gravel."

[15] According to a site report dated April 24, 1997 (in the appendices to the DSICOR Report), two catch basins (CB4 and CB5) and their associated piping were also removed from Suncor's land in October/November 1996. Those catch basins are shown on a map dated February 28, 1996, but do not appear on later maps showing former facilities that were removed from Suncor's land. The map dated February 28, 1996, shows three catch basins on Suncor's land (CB2, CB4 and CB5), and two on Kingsway (CB1 and CB3). None of the three former catch basins on Suncor's land are shown on Drawing 2.1 in the DSICOR Report, titled "Former Facilities Plan", dated September 15, 2014.

[16] In 1997, 14 additional boreholes were drilled on Suncor's land. Sampling of the excavation limits and subsurface investigations identified petroleum hydrocarbon contaminants in soil, groundwater and soil vapours on Suncor's land that exceeded the applicable standards.

[17] On November 23, 1998, Suncor sent a notice of independent remediation to the Ministry regarding Suncor's land.

[18] From August 1999 through July 2005, a dual-phase extraction system recovered subsurface groundwater and vapours from portions of Suncor's land. The system consisted of 14 recovery wells ("RW"), 12 of which were screened at approximately five to 15 mbgs in the zone of perched groundwater. Two recovery wells (RW 13 and RW14) were screened at approximately 21 to 28 mbgs, in or near the regional aquifer. RW13 was located near the western corner of Suncor's land, and RW14 was located within the area of the former underground storage tanks. No recovery wells were located in the footprint of the former building.

[19] From 2003 to 2005, eight more boreholes were drilled on Suncor's land, and monitoring wells ("MW") were installed in seven of those boreholes.

[20] In January 2002 and March 2006, hydraulic conductivity was tested on Suncor's land. Hydraulic conductivity is used to determine the speed at which fluids move through pores or fractures. The 2002 testing included RW14, and the 2006 testing included BH18, both of which are located in the area of the former underground storage tanks and screened at the depth of the regional aquifer. In Appendix Q of the DSICOR Report, the hydraulic conductivity calculations indicate that a "confined" aquifer model was used to determine the hydraulic conductivity at RW14, but an "unconfined" aquifer model was used to determine the hydraulic conductivity at BH18.

[21] In April 2006, Suncor provided the City with a notice of likely or actual migration of certain petroleum hydrocarbons from Suncor's land to the City Lands. The notice did not mention other contaminants.

[22] In July/August 2006, four boreholes were drilled on the City Lands, and monitoring wells were installed in those boreholes.

[23] By the end of 2007, Parsons identified a number of data gaps in the site investigations. Among other things, the DSICOR Report states at page 35 that volatile organic compounds ("VOCs") had not been assessed in the area of the former garage, hydrocarbon contamination had not been fully delineated on Suncor's land, potential contaminants of concern had not been fully assessed in the regional aquifer, and a soil vapour assessment had not been conducted.

[24] Parsons identified VOCs as potential contaminants of concern because of the former garage on Suncor's land. VOCs include chlorinated light hydrocarbons such as tetrachloroethylene ("PERC" or "PCE"), trichloroethylene ("TCE"), 1,1,1-trichloroethane ("TCA"), and 1,1-dichloroethelyne ("DCE"), which are solvents. PERC has commonly been used in dry cleaning, but may also be used to degrease automotive parts. TCE and TCA were historically used to degrease automotive parts, but TCE was sometimes used in dry cleaning, and TCA has been used in electronics manufacturing. DCE has been used in electronics manufacturing. Also, according to Suncor's submissions, PERC breaks down into TCE in its first stage of degradation, and TCE breaks down into DCE. TCA also breaks down into DCE in its first stage of degradation. These substances are denser than water, and have low solubility in water. They tend to descend through soil and groundwater, coating soil particles along the way, until they encounter a layer that they are slow to permeate such as clay.

[25] From 2008 to 2014, Parsons conducted further site investigations. Additional boreholes were drilled, further groundwater monitoring wells were installed, and groundwater was sampled on Suncor's land and the City Lands. For example, BH48 and BH49 were installed on the west side of the intersection of Imperial and Kingsway, and were the westernmost locations to be sampled. Also, from 2011 to 2014, nine vapour monitoring wells ("VMW") were installed, and vapour sampling occurred. The additional sampling on Suncor's land and the City Lands is summarized on pages 77 – 78 of the DSICOR Report: between 2008 and 2014, approximately 100 soil samples and 15 soil field duplicate samples were collected and submitted for chemical analysis at a laboratory; between 2008 and 2013, 158 groundwater samples with 31 field duplicate samples were collected and submitted for chemical analysis; and, between 2008 and 2014, 19 soil vapour samples and

eight field duplicate samples were collected and submitted for chemical analysis. Parsons conducted quality assurance/quality control measures with respect to the laboratory and field data obtained between 2008 and 2014.

[26] In particular, according to table 4.18 in the DSICOR Report, groundwater sampling and testing for VOCs occurred between July 2011 and October 2013 in several boreholes and monitoring wells, and two recovery wells (RW13 and RW14). According to table 4.7 in the DSICOR Report, soil sampling and testing for VOCs occurred between May 2012 and October 2013 at BH29, BH36, BH39, BH40, BH41, BH42, BH45, BH48, and BH49.

[27] Parsons' further investigations identified TCE and DCE in the deep groundwater below Suncor's land and the City Lands at concentrations exceeding drinking water use standards. PERC and TCA were also found in groundwater samples from the regional aquifer, but not at concentrations exceeding the drinking water use standard. Certain petroleum hydrocarbon contaminants were also found on the City Lands. Specifically, Parsons' further investigations identified the following remaining petroleum hydrocarbon and VOC contaminants:

- benzene in soil beneath the City Lands at BH38 (beneath Imperial Street) at concentrations exceeding industrial standards at a depth of 4.3 metres below ground surface;
- benzo(a)pyrene at concentrations exceeding drinking water use standards in the intermittent perched groundwater beneath the south edge of Imperial Street on the City Lands;
- ethylbenzene at concentrations exceeding drinking water use standards in the intermittent perched groundwater beneath the north edge of Kingsway on the City Lands; and
- TCE and DCE in the regional aquifer (approximately 25 metres below ground surface) beneath Imperial Street on the City Lands and Suncor's land, at concentrations exceeding drinking water use standards.

[28] On October 28, 2013, groundwater measurements were conducted in certain boreholes and monitoring wells screened in the regional aquifer, to determine the potentiometric elevation of the groundwater in the aquifer. Based on those measurements, elevation contours of the aquifer's potentiometric surface were extrapolated and mapped, and this information was used to determine the direction of groundwater flow. The October 28, 2013 measurements and resulting contours are shown in drawing 4.3 in the DSICOR Report. At pages 48 - 49, the DSICOR Report states:

> ... The inferred direction of groundwater flow in the regional aquifer, based on potentiometric contouring, is to the east. Contours of the potentiometric surface from the monitoring event conducted on October 28, 2013 are presented on Drawing No. 4.3.
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> ...
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> The seasonal fluctuation of the deep groundwater table is less than one metre. The hydraulic gradient of the potentiometric surface within the regional aquifer

on the October 23, 2013 monitoring event was 0.012 m/m. The calculated effective linear velocity of groundwater flow, based on the higher of the two hydraulic conductivity values calculated for the regional aquifer (1.6×10^{-5}), was approximately 30.1 m/year. …

[underlining added]

[29] Based on the conclusion that groundwater flows from west to east in the regional aquifer, together with three lines of evidence that are set out below, Parsons concluded that the VOC contamination originated from an unidentified source located to the west of Suncor's land (i.e., up-gradient in the aquifer, according to Parsons). In that regard, the DSICOR Report states at pages 62 – 64:

… There are three lines of evidence supporting that the [Suncor] Property is a flow-through site for the VOC contamination in the regional aquifer that originated from an up-gradient source located off-Property. These lines of evidence include:

- Spatial distribution of the dissolved VOCs
- Absence of VOCs detected in soil at the Property
- Absence of dissolved VOCs detected within the perched groundwater at the Property

…

TCE and [DCE] are typically associated with solvents, often used for cleaning mechanical parts in automotive garages, or in the dry cleaning industry, and are hereinafter referred to as "solvents". … Elevated concentrations of the solvents were detected on-Property and off-Property, with the highest concentrations detected in BH39 beneath the Imperial ROW [right-of-way] to the north of the Property. The solvents were also detected at elevated levels up-gradient of the Property (BH41, BH45), including up to more than 100 m away from the western Property edge (BH49).

If the solvents were sourced from the former facilities at the Property, they would be expected to be observed at high concentrations near the former service garage… solvent concentrations were observed in this area but at lower concentrations than at off-Property locations, which is inconsistent with what would be expected if the solvents were sourced from the former … service garage.

The potentiometric contours mapped for the regional aquifer at varying seasons indicate that the groundwater flow direction is to the east. If the source of the solvents was the former … service garage, the detection of solvents up-gradient of this former facility would not be expected.

… BH39 is located off the Property in a cross-gradient direction from the location of the former … service garage. This observation also supports that the former … service garage was not the source of the solvents.

… These contaminants appear to be sourced from an up-gradient location and not from the former [Suncor] facility. The evidence from this includes the fact that the contaminants have not been detected beneath the Property at

> elevated concentrations in the shallower zones of groundwater situated above the regional aquifer, even at locations in the area of the former … service garage. Nor have concentrations of the solvent been detected in soil above the analytic detection limits. In addition, the highest concentrations of these contaminants have been detected off-Property, and the plume extends at least 100 m up-gradient from the Property.
>
> …
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> In summary, while subsurface investigations have not confirmed the source of the elevated solvent concentrations detected in the regional aquifer beneath the Property and adjacent lands, the evidence presented above indicates that the source is located off-Property…. As such, Parsons believes that Suncor is absolved from the requirement to horizontally delineate the VOC plume in the regional aquifer beneath the City Roadways and Suncor will not be taking responsibility for the TCE and [DCE] contamination. …
>
> [underlining added]

[30] Based on this reasoning, Parsons concluded that Suncor's land is a 'flow-through' site for the VOC contamination. Given this conclusion, Parsons took steps to delineate and risk-assess the VOC contamination on Suncor's land, but not on the City Lands, in accordance with the statutory scheme discussed below. The DSICOR states at pages 64 – 68 that Parsons completed a vertical delineation of the VOC contamination below Suncor's land, but did not complete a horizontal delineation of the VOC contamination below the City Lands, because Suncor's land was considered a flow-through site for the VOC contaminants.

[31] In February 2015, Parsons provided the City with a report containing the results of Parsons' investigations on the City Lands, and stating that its investigations and report were in furtherance of obtaining CoCs. Parsons' report also stated that the VOCs appeared to have originated from an up-gradient property, and therefore, Suncor took no responsibility for the VOCs on the City Lands.

[32] Ultimately, Suncor took a risk-based approach to the remaining contaminants, meaning that Suncor concluded that the remaining contaminants did not pose an unacceptable risk to human health or the environment if certain conditions or precautions were in place.

Statutory and administrative scheme: certificates of compliance

[33] Once the remediation process was complete in Suncor's view, Suncor applied for CoCs for Suncor's land and the City Lands. CoCs are issued under section 53(3) of the *Act*. In order to obtain a CoC following independent remediation, section 53(3) of the *Act* requires an applicant to provide the Ministry with certain information including preliminary and detailed site investigation reports, and a confirmation of remediation report which describes the sampling and analyses carried out after remediation. The necessary contents of a detailed site investigation report are prescribed in the *Contaminated Sites Regulation*, B.C. Reg. 375/96 (the "*Regulation*"). Various schedules to that regulation also prescribe remediation standards, criteria, and conditions.

[34] In some cases, a recommendation from an "approved professional" must be provided with an application for a CoC. Section 49(6) of the *Regulation* provides that a director may require that an application for a CoC, in relation to a contaminated site classified as low or moderate risk under a director's protocol, include a report and recommendation of an approved professional that the application be approved.

[35] Pursuant to section 64 of the *Act*, a director may establish protocols consistent with the *Act* and regulations, in relation to various matters pertaining to contaminated sites including CoCs. One such protocol is "Protocol 6 – Eligibility of Applications for Review by Approved Professionals". Version 8.0 of Protocol 6, effective April 1, 2013 ("Protocol 6"), which applied when Suncor applied for the CoC. Section 4.4 of Protocol 6 requires that applications for CoCs for non-high risk contaminated sites must be accompanied by a recommendation from an Approved Professional.

[36] Section 39(1) of the *Act* provides that, for the purposes of contaminated sites, "approved professional" means a person who is named on a roster established under section 42(2) of the *Act* (an "Approved Professional"). Under section 42(1), Approved Professionals are a class of persons designated by a director, who are qualified to perform classes of activities, prepare classes of reports and other documents, or make classes of recommendations that, under the *Act*, may be or are required to be performed, prepared or made by an Approved Professional. In BC, the Contaminated Sites Approved Professional Society ("CSAP") accredits Approved Professionals to review environmental certification applications, including applications for CoCs.

[37] Also, according to section 4.5 of Protocol 6, an applicant for a CoC who is a responsible person for the source of contamination in relation to an application for a CoC is responsible for delineating and remediating the entire area of contamination, including contamination at a parcel for which the person is a responsible person, as well as any contamination which has migrated from that parcel to neighbouring parcels. However, there is no requirement for such a person to delineate and remediate contamination on neighbouring parcels that originated from a parcel for which the person is not a responsible person.

Suncor's applications for certificates of compliance

[38] In 2015, Suncor applied for risk-based CoCs for Suncor's land and the City Lands. In support of each application, Parsons prepared a package of documents including the DSICOR Report, a Detailed Risk Assessment Report dated June 15, 2015 (the "Risk Assessment"), a Performance Verification Plan dated June 15, 2015, a Summary of Site Condition dated June 15, 2015, and other documents.

[39] The Risk Assessment considered the potential risks to human health and the environment associated with the contamination remaining on Suncor's land and, to some extent, the City Lands. The conclusions in the Risk Assessment are based on the information and analyses in the DSICOR Report. In that regard, the Risk Assessment states at page 1 that the "data and results presented in the [DSICOR] are considered reliable for the purposes of this risk assessment."

[40] The Risk Assessment's executive summary states, in part, as follows:

> … Contamination of the regional aquifer (situated 25 metres below ground surface [mbgs]) by trichloroethylene and 1,1-dichloroethelyne was detected and determined to have originated from an unknown upgradient source not associated with the former activities at the [Suncor] Property. As these two contaminants were not sourced from the Property, they are not the responsibility of the Property owner and were not delineated laterally. As such, the risks associated with their potential migration to a surface water body were not evaluated.
>
> The results of the human health risk assessment indicated that there would be no unacceptable risks to occupants of a future building constructed at the Property due to vapour inhalation with a foundation not exceeding 1.0 mbgs, or 1.9 mbgs if perimeter drain tile is installed that gravity drains. There would also be no unacceptable risks to occupants of a future building constructed within the City [Land] Management Area due to vapour inhalation with the foundation not exceeding 2.9 mbgs … [and] there would be no unacceptable risks for workers in a trench excavated to 3.6 mbgs. … Trench workers occupying a trench deeper than 3.6 mbgs may potentially be exposed to soil vapours containing unacceptable concentrations of volatile petroleum hydrocarbons (VPH), and therefore an appropriate health and safety plan to mitigate such risks would be required.
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> [underlining added]

[41] The City Lands were classified as a non-high risk site based on a Site Risk Assessment form that Parsons completed on June 15, 2015. Therefore, Protocol 6 applied, and Suncor's application for a CoC with respect to the City Lands had to include the recommendation of an Approved Professional. Suncor's application included a recommendation, signed by two Approved Professionals on July 24, 2015 following a screening review of Suncor's application package under the CSAP process, that a CoC be issued.

[42] On August 4, 2015, Suncor's application for a CoC for the City Lands was submitted to the Ministry. A separate application for a CoC for Suncor's land was also submitted to the Ministry.

Certificates of compliance

[43] According to an affidavit provided by the Director, he undertakes a limited administrative review of CoC applications, such as Suncor's, that are submitted through the CSAP process, but he does not review the content of technical reports that are prepared and reviewed by Approved Professionals. He attests that he placed "substantial consideration" on the work of the Approved Professionals and the quality control mechanisms in the CSAP process regarding the technical details of the investigation and remediation of the City Lands.

[44] On December 22, 2015, the Director issued CoCs to Suncor for the City Lands (the "City Lands Certificate") and Suncor's land (the "Suncor Land Certificate").

[45] The City Lands Certificate makes no reference to VOCs. Schedule C attached to the City Lands Certificate indicates that:

- benzene was remediated in soil to meet risk-based remediation standards for industrial land use;
- benzene and xylenes were remediated in water to numerical remediation standards for drinking water use; and
- ethylbenzene and benzo(a)pyrene were remediated in water to risk-based remediation standards for drinking water use.

[46] Schedule B attached to the City Lands Certificate contains a number of conditions and requirements which state, in part:

> ...
>
> 2. The principal risk controls which must be present or implemented and must be maintained at the site include the following:
>
> (a) the site is to remain as roadways (i.e. buildings with foundations below 2.9 metres below ground surface must not be constructed);
>
> (b) there are to be no drinking water wells installed at the site;
>
> (c) in the event that a trench or excavation is conducted (and intended for human entry) deeper than 3.6 metres below ground surface at the site, an appropriate worker health and safety plan must be implemented to address potential exposure to petroleum hydrocarbons in soil vapours.

[47] On January 21, 2016, the City appealed the issuance of both the Suncor Land Certificate and the City Lands Certificate.

Appeal of the Suncor Land Certificate

[48] On February 3, 2016, Suncor applied to have the appeal of the Suncor Land Certificate dismissed on the grounds that the City was not "a person aggrieved" by that CoC within the meaning of section 100(1) of the *Act*.

[49] On April 22, 2016, the Board dismissed the appeal of the Suncor Land Certificate on the basis that the City was not "a person aggrieved" by that CoC (Decision No. 2016-EMA-064(a)).

[50] Subsequently, the City filed a petition in the BC Supreme Court seeking judicial review of the Board's decision. At the City's request, the Board ordered that the appeal of the City Lands Certificate be held in abeyance pending the outcome of the judicial review proceedings.

[51] On December 8, 2017, the BC Supreme Court issued a decision (*Burnaby (City) v. Environmental Appeal Board*, 2017 BCSC 2267) dismissing the City's petition and upholding the Board's decision.

Appeal of the City Lands Certificate

[52] The City's Notice of Appeal raised three main grounds of appeal; however, two of those grounds appear to have been abandoned. The City's appeal

submissions address only one of the grounds; namely, that Suncor failed to investigate and remediate the City Lands in accordance with applicable regulatory requirements and standards.

[53] The parties' positions on the appeal have been summarized by the Panel as follows.

[54] The City submits that Suncor did not investigate or remediate all of the contamination that migrated from Suncor's land to the City Lands in accordance with the applicable requirements of the *Act* and the *Regulation*, and the Director's requirements (i.e., Protocol 6). The City argues that the DSICOR Report and the associated Risk Assessment are deficient regarding the VOC contamination and some aspects of the hydrocarbon contamination, and that Parsons improperly concluded that Suncor's land was not the source of the VOCs. The City submits that the risks to human health and the environment associated with the VOCs are unknown, because the VOCs were not investigated on the City Lands. The City also submits that Suncor failed to investigate vapours on the City Lands that originate from VOCs and residual hydrocarbons, and failed to properly delineate xylenes in soils and benzo(a)pyrene and ethylbenzene in groundwater on the City Lands which originated from Suncor's land. Furthermore, the City argues that Suncor failed to give preference to remediation alternatives that provide permanent solutions to the maximum extent practicable, and that the Director failed to consider whether permanent solutions were given preference to the maximum extent practicable, contrary to section 56 of the *Act*.

[55] The City requests that the Board:

i) declare that the DSICOR Report and the Risk Assessment are deficient; and

ii) order the Director to require Suncor to address the deficiencies by:

- delineating and remediating VOCs in all media on the City Lands;
- delineating and, if necessary, remediating, xylenes in soils;
- investigating and, if necessary, remediating, all hydrocarbon parameters in soil vapour at the City Lands; and
- remediating all remaining hydrocarbon parameters on the City Lands to applicable numerical standards,

following which the Director shall issue a revised CoC for the City Lands.

[56] In its final reply submission, the City also challenged the admissibility of two reports that Suncor filed in support of its submissions on the appeal.

[57] The Director submits that the City's evidence raises valid concerns about the basis for some conclusions in the DSICOR Report, particularly regarding the accuracy and completeness of the information that Parsons relied on to determine the direction of groundwater flow in relation to the VOC contamination. The Director "invites" the Board to decide whether the requirements for issuance of the City Lands Certificate were met, or alternatively, remit the matter back to the Director for reconsideration, with or without directions.

[58] Suncor submits that the City Lands were investigated and remediated in accordance with all applicable requirements and standards. Suncor maintains that Parsons correctly identified Suncor's land as a flow-through site for the VOC contamination, and therefore, Suncor was not required to delineate or remediate VOCs on the City Lands. Suncor further submits that it is unnecessary to remediate residual hydrocarbons on the City Lands to numerical standards, because it would be extremely expensive and provide little additional benefit, and the risks from any remaining contamination are acceptable.

[59] Suncor requests that the Board dismiss the appeal. Alternatively, Suncor requests that the Board order the Director to identify the specific technical deficiencies in Suncor's application for a CoC for the City Lands, provide Suncor with a reasonable opportunity to address those deficiencies, and issue a CoC for the City Lands once the deficiencies are addressed, without requiring Suncor to re-submit an application in its entirety.

RELEVANT LEGISLATION

[60] The following sections of the *Act* are relevant to the appeal:

53 (3) A director, in accordance with the regulations, may issue a certificate of compliance with respect to remediation of a contaminated site if

(a) the contaminated site has been remediated in accordance with

(i) the numerical or risk based standards prescribed for the purposes of the definition of "contaminated site",

(ii) any orders under this Act,

(iii) any remediation plan approved by the director, and

(iv) any requirements imposed by the director,

...

56 (1) A person conducting or otherwise providing for remediation of a site must give preference to remediation alternatives that provide permanent solutions to the maximum extent practicable, taking into account the following factors:

(a) any potential for adverse effects on human health or for pollution of the environment;

(b) the technical feasibility and risks associated with alternative remediation options;

(c) remediation costs associated with alternative remediation options and the potential economic benefits, costs and effects of the remediation options;

(d) other prescribed factors.

(2) When issuing an approval in principle or a certificate of compliance, a director must consider whether permanent solutions have been given

preference to the maximum extent practicable as determined in accordance with any guidelines set out in the regulations.

[61] The following sections of the *Regulation* are relevant to the appeal:

49 (1) A person may apply for a certificate of compliance under section 53 (3) of the Act by submitting a request in writing to a director.

(2) In support of the application referred to in subsection (1), the person requesting the certificate of compliance must provide to the director the reports described in paragraphs (a) and (b) and ensure that the director has information on the items described in paragraphs (c) and (d):

(a) preliminary and detailed site investigation reports;

…

59 (2) A detailed site investigation must provide information necessary for conducting a risk assessment, if applicable, and for developing a remediation plan, and must, without limitation, include procedures to

(a) identify which substances may cause or threaten to cause adverse effects and provide any applicable information on their form,

(b) identify the specific areas, depths and degree of contamination on the site including areas and extent of migration if applicable, and

(c) evaluate contamination relative to the standards in this regulation.

ISSUES

[62] This appeal raises several issues:

1. Whether two reports provided by Suncor's experts are inadmissible, or alternatively, should be given less weight than the City's expert reports.
2. Whether the DSICOR Report failed to meet the requirements of section 53(3) of the *Act*, sections 49(2) and 59(2) of the *Regulation*, and/or requirements that were imposed by the Director (i.e., Protocol 6) with respect to:
   (i) determining that Suncor's land is a flow-through site for VOC contamination (i.e., whether Suncor's land is a source of the VOC contamination, and is not a flow-through site);
   (ii) failing to delineate xylenes on the City Lands;
   (iii) failing to properly investigate soil vapours for hydrocarbons and VOCs; or
   (iv) failing to properly delineate VOCs on Suncor's land.
3. Whether Suncor failed to give preference to remediation alternatives that provide permanent solutions to the maximum extent practicable, and/or the Director failed to consider whether permanent solutions were given preference to the maximum extent practicable, as required by section 56 of the *Act*.

DISCUSSION AND ANALYSIS

1. Whether two reports provided by Suncor's experts are inadmissible, or alternatively, should be given less weight than the City's expert reports.

[63] The City provided two expert reports in support of its initial submissions, and a third expert report with its reply submissions. The reports were prepared by Reg North, who is a Senior Hydrogeologist with Core6 Environmental Ltd., a Professional Engineer and Professional Geoscientist, and a member of the roster of Approved Professionals with the CSAP. Mr. North states that he has over 27 years of experience in environmental consulting focused on contaminated sites investigation and remediation, and applying hydrogeological principles to determining groundwater flow direction and contaminant transport.

[64] Mr. North's reports dated June 7, 2016 (the "North Report #1") and April 20, 2018 (the "North Report #2") draw into question the adequacy of the DSICOR Report as a detailed site investigation report, and challenge the basis of certain conclusions in the DSICOR Report, particularly regarding the direction of groundwater flow, and the three lines of evidence that Parsons relied on in concluding that Suncor's land was not a source of the VOC contamination. The North Report #1 contains most of Mr. North's comments on the DSICOR Report, and the North Report #2 sets out his supplemental opinions regarding residual benzene in soil, and benzo(a)pyrene and ethylbenzene in groundwater, on the City Lands.

[65] In support of its submissions, Suncor provided two expert reports from Dr. James Malik, who is an Executive Vice President and Senior Ecologist with SLR Consulting (Canada) Ltd., a Professional Agrologist and Professional Biologist, and a member of the roster of Approved Professionals with the CSAP. Dr. Malik's Ph.D. is in Stream Fish and Insect Ecology. Dr. Malick states that he has 44 years of experience in a wide range of environmental assessments, and his areas of expertise include contaminant assessment, and mitigation/remediation design. Dr. Malick's report dated June 7, 2016 (the "SLR Report #1") contains opinions on the completeness and adequacy of the DSICOR Report, and generally confirms that the investigations and remediation undertaken by Parsons met the regulatory requirements. Dr. Malick's report dated June 28, 2018 (the "SLR Report #2") criticizes or questions some of the opinions expressed in the North Reports #1 and #2.

[66] Suncor also provided a report by Ian Mitchell, who is a Principal Hydrogeologist with SLR Consulting (Canada) Ltd., a Professional Geoscientist, and a member of the roster of Approved Professionals with the CSAP. Mr. Mitchell states that he has 32 years of experience in hydrogeological and geological investigations, and his areas of expertise include groundwater modelling, remediation/mitigation, and geological interpretation. Mr. Mitchell's report dated June 28, 2018 (the "SLR Report #3") states that he reviewed the SLR Report #2, provided comments on the portions of it that pertain to hydrogeology, hydrogeological characterizations, and hydrogeological principles, and his comments were incorporated into the SLR Report #2.

[67] In its final reply submissions, the City provided a third report from Mr. North, dated August 24, 2018 (the "North Report #3"), which comments on the SLR Reports #1 and #2. The City also challenged the admissibility of the SLR Reports #2 and #3. The City argues that those reports are inadmissible, or alternatively, should be given little weight and the opinions in Mr. North's Reports should be preferred by the Board.

[68] Specifically, the City submits that the SLR Report #3 is inadmissible because it contains no expert opinion or other relevant evidence. In addition, the City submits that the SLR Report #2 is inadmissible as expert opinion evidence, because Mr. Mitchell changed parts of the SLR Report #2 with respect to hydrogeology, hydrogeological characterizations, and hydrogeological principles, but it is unclear what specific changes he made or why. Consequently, the City submits that key parts of the expert opinion being attributed to Dr. Malick in the SLR Report #2 are not actually his opinion, which renders the report inadmissible as expert opinion evidence. Although the City acknowledges that the strict evidentiary rules of court do not apply to the Board, the City argues that an expert report is generally admissible as expert opinion evidence if it is impossible to determine whose opinions are expressed in the report: *Heidebrecht v. Fraser-Burrard Health Societ*y, [1995] B.C.J. No. 2996 (S.C.) [*Heidebrecht*], at para. 11.

[69] Moreover, the City submits that the SLR Report #3 states that Mr. Mitchell reviewed only the SLR Report #2 before he made changes to it. Mr. Mitchell did not review the DSICOR Report or the North Reports #1 and #2 before modifying the SLR Report #2. As such, the City argues that Mr. Mitchell's changes to the SLR Report #2 were formulated without the benefit of reviewing the underlying documents that the SLR Report #2 relates to.

[70] The City also submits that Dr. Malick is not a hydrogeologist and has no specific education in hydrogeology, whereas Mr. North has specific education and professional experience in hydrogeology, and the appeal involves the application of hydrogeological principles and information to determine the source and transport of VOC contamination. The City argues that Suncor appears to have recognized that Mr. North has superior qualifications than Dr. Malick in this regard, given that Suncor had Mr. Mitchell review and make changes to the SLR Report #2. For these reasons, the City maintains that even if the SLR Report #2 is admissible, Mr. North's opinions should be given more weight than those expressed in the SLR Reports.

The Panel's findings

[71] The issue in *Heidebrecht* concerned the admissibility of an expert report tendered under Rule 40A(2) of the BC *Supreme Court Civil Rules* (the "BCSC Civil Rules"). At para. 11 in *Heidebrecht*, the Court held that the report was inadmissible because the BCSC Civil Rules made no provision for the admission of joint expert opinions.

[72] The Panel finds that the Board's powers and procedures with respect to admitting evidence are more flexible than those in the BCSC Civil Rules. Section 40 of the *Administrative Tribunals Act* ("*ATA*") provides the Board with the broad discretion to accept information that the Board considers to be "relevant, necessary

and appropriate", regardless of whether the information would be admissible in court, with the exception of information that is "privileged" according to the law of evidence. Section 40 of the *ATA* states:

> **40** (1) The tribunal may receive and accept information that it considers relevant, necessary and appropriate, whether or not the information would be admissible in a court of law.
>
> (2) Despite subsection (1), the tribunal may exclude anything unduly repetitious.
>
> (3) Nothing is admissible before the tribunal that is inadmissible in a court because of a privilege under the law of evidence.
>
> (4) Nothing in subsection (1) overrides the provisions of any Act expressly limiting the extent to or purposes for which any oral testimony, documents or things may be admitted or used in evidence.
>
> [underlining added]

[73] Further to section 40 of the *ATA*, the Board's *Practice and Procedure Manual* states as follows at page 43:

> The rules of evidence that apply to a hearing before the Board are less formal than the rules applied by the courts. Section 40 of the *Administrative Tribunals Act* states that the Board "may receive and accept information that it considers relevant, necessary and appropriate, whether or not the information would be admissible in a court of law." The Board may admit hearsay and circumstantial evidence if it is considered relevant.
>
> Relevance is the primary consideration for the Board when deciding whether to admit evidence. Relevant evidence can be described as evidence (oral or written) that will shed some light on a disputed matter or tends to prove or disprove a fact in issue.
>
> The Board may also exclude evidence. Section 40(2) of the *Administrative Tribunals Act* allows the Board to exclude anything unduly repetitious. In addition, in accordance with general legal principles, the Board may exclude evidence if it is of minimal relevance, is unreliable, may confuse the issues, or may prejudice the other parties. The Board may be obligated to exclude evidence that is privileged or is restricted by a statute such as the *Evidence Act*.
>
> …
>
> All evidence admitted during the hearing will be assessed by the Board to determine what weight, if any, should be given to the evidence. Generally speaking, evidence that is not sufficiently reliable for the Board's purposes will be given less weight when the Board is making its decision on the merits of the appeal.
>
> [underlining added]

[74] Also, regarding expert opinion evidence, the Board's *Practice and Procedure Manual* states at page 45:

> … To be "qualified" to give expert opinion evidence on a particular subject matter(s), the Board must be satisfied that the witness has the appropriate experience and training to be an expert in the matters for which he or she is giving expert opinion evidence.
>
> If a person is not qualified to give expert evidence on a particular subject matter, the Board may still receive the witness's evidence. The Board will determine what weight should be given to each witness's testimony. The qualifications and experience of the witness will be a factor in determining the weight to be given to that witness's testimony.
>
> [underlining added]

[75] Given the differences in the evidentiary requirements in the BCSC Civil Rules, versus the Board's enabling legislation and the Board's *Practice and Procedure Manual*, the Panel finds that *Heidebrecht* is neither applicable nor relevant to this appeal.

[76] The issues in this appeal relate to the adequacy of Suncor's investigation and remediation of the contamination on the City Lands, whether Suncor's land was a source of the VOC contamination such that Suncor is responsible for the VOC contamination on the City Lands, and the degree of risk associated with the remaining contamination on the City Lands. These issues require the Panel to consider, among other things, the parties' evidence and submissions based on a large amount of technical data obtained over many years of site investigations, including information about contaminant levels in soil, groundwater, and vapours, and the application of hydrogeological principles to determine how groundwater moves through hydrogeological zones. The Panel finds that the SLR Report #2, and to a lesser extent the SLR Report #3, are relevant to those issues, and are not privileged documents. The Panel finds that the City's concerns regarding the reliability of those reports can be taken into account when deciding how much weight should be accorded to the reports. For these reasons, the Panel finds that the SLR Reports #2 and #3 are admissible.

[77] However, the Panel finds that the SLR Report #3 contains no substantive information or expert opinion regarding the issues in the appeal. It simply sets out Mr. Mitchell's qualifications and states that he reviewed and made changes to the SLR Report #2 pertaining to "hydrogeology, hydrogeological characterizations and hydrogeological principles." As such, the Panel finds that the SLR Report #3 contains no expert opinion evidence or technical evidence. It is only relevant and admissible insofar as it explains Mr. Mitchell's qualifications and involvement in editing the SLR Report #2.

[78] In contrast, the SLR Report #2 (and the SLR Report #1) contains substantive information and opinions that are relevant to the issues in the appeal, and particularly, the merits of the analyses and conclusions in the DSICOR Report and the North Reports #1 and #2. In preparing the SLR Report #2, Dr. Malick reviewed not only the North Reports #1 and #2, but also the DSICOR Report and numerous other documents related to the investigative and remedial activities at the site. However, Dr. Malick is a Senior Ecologist with advanced education in ecology. Although he has experience with the remediation of contaminated sites, he is not a

Professional Geoscientist and has no specialized training in hydrogeology. The Panel finds that opinions about hydrogeology, hydrogeological characterizations and hydrogeological principles do not fall within Dr. Malick's area of expertise, but do fall within Mr. Mitchell's area of expertise. The Panel finds that Mr. Mitchell's qualifications with respect to hydrogeology, hydrogeological characterizations and hydrogeological principles are at least equal to those of Mr. North, and are superior to those of Dr. Malick.

[79] The SLR Reports #2 and #3 do not indicate exactly what changes Mr. Mitchell made to the SLR Report #2. Although that this does not mean that the SLR Report #2 is inadmissible as expert opinion evidence, the Panel notes that the SLR Report #3 states that Mr. Mitchell only reviewed the SLR Report #2. Mr. Mitchell did not review the North Reports #1 and #2, the DSICOR Report, or other documents or data about the site before making changes to the SLR Report #2. The DSICOR Report is over 3,000 pages long and contains a vast amount of data including borehole and monitoring well logs, potentiometric elevation readings, laboratory test results, hydraulic conductivity test results, and numerous maps and drawings. This means that Mr. Mitchell made changes to key portions of the SLR Report #2 without reviewing any of the reports or data that the SLR Report #2 discusses and provides opinions on.

[80] Mr. North is a Professional Geoscientist with expertise in contaminated sites investigation and remediation, and applying hydrogeological principles to determine groundwater flow direction and contaminant transport. The Panel has already found that Mr. Mitchell's qualifications with respect to hydrogeology, hydrogeological characterizations and hydrogeological principles are at least equal to those of Mr. North. However, in contrast to Mr. Mitchell, Mr. North's reports state that he reviewed the DSICOR Report, the SLR Reports #1 and #2, and numerous other documents relating to Suncor's investigations and remediation. This means that Mr. North's opinion evidence benefits from more direct knowledge about the analysis in the DSICOR Report, and investigative data relating to the site itself.

[81] In conclusion, the Panel finds that these considerations generally tend to strengthen the expert opinion evidence provided the North Reports #2 and #3 compared to that in the SLR Report #2 with respect to hydrogeology, hydrogeological characterizations and the application of hydrogeological principles. However, this does not necessarily mean that the evidence in the SLR Report #2 will always be given less weight than that in the North Reports. Furthermore, the expert reports are not the only evidence before the Panel. The Panel has considered the merits of the appeal based on the entire body of the evidence, including the information and data in the DSICOR Report itself.

2. Whether the DSICOR Report failed to meet the requirements of section 53(3) of the *Act*, sections 49(2) and 59(2) of the *Regulation*, and the requirements that were imposed by the Director (i.e., Protocol 6)

The City's submissions

[82] The City submits that the Director erred in accepting the DSICOR Report and Risk Assessment, and concluding that all of the contamination originating from Suncor's land had been delineated and remediated in accordance with the applicable provisions in the *Act*, the *Regulation*, and the requirements imposed by the Director under Protocol 6.

[83] The City submits that the DSICOR Report is deficient with regard to:

i) the determination that Suncor's land is a flow-through site for VOC contamination;

ii) failing to delineate xylenes on the City Lands;

iii) failing to properly investigate soil vapours for hydrocarbons and VOCs; and

iv) failing to properly delineate VOCs on Suncor's land.

[84] Each alleged deficiency is discussed below.

i) Whether Suncor's land is a flow-through site for VOC contamination

[85] The City submits that the three lines of evidence presented in the DSICOR Report in support of the conclusion that Suncor's land was a flow-through site for VOC contamination are technically flawed and based on inappropriate assumptions and data gaps.

[86] Firstly, the City maintains that Parsons incorrectly concluded that Suncor's land was a flow-through site based on the spatial distribution of the VOCs together with incorrect assumptions about the direction of groundwater flow. The City submits that the highest VOC concentrations in groundwater were found in BH39, located on Imperial Street to the north of Suncor's land. VOCs were also identified in groundwater from boreholes drilled near the former service garage (BH29, BH40, BH43-S and BH43-D), but in lower concentrations than on Imperial Street. Parsons viewed this spatial pattern as being inconsistent with Suncor's land being the source of the VOCs, but the City notes that Parsons did not test groundwater for VOCs until 2011, long after Suncor's land was remediated by excavation and the dual-phase extraction system. No such remedial activities occurred on the City Lands. The City argues that the concentrations of contaminants on a remediated source parcel, such as Suncor's land, would be lower than on unremediated adjacent land such as the City Lands, and therefore, the higher VOC concentrations in groundwater on Imperial Street are not inconsistent with Suncor's land being the source of VOCs.

[87] In addition, the City challenges Parsons' conclusion that groundwater only flows from west to east within this area of the regional aquifer. The City refers to the North Report #1, which states that Parsons ignored local topography, watershed boundaries, and certain aspects of the contaminant distribution pattern.

The North Report #1 states at pages 20 – 21 that Kingsway is a topographic high point and a major watershed boundary, and although the aquifer is at least 20 mbgs, it is affected by topography because it is unconfined in this area. The North Report #1 also states at page 21 that Parsons' conclusion on the direction of groundwater flow was based on incomplete groundwater elevation data, as no data was obtained from the southeast part of Suncor's land and the adjacent portion of Kingsway. The North Report #1 states that the limited groundwater elevations obtained from wells on Kingsway (BH46 and BH34) are higher than those on Imperial Street, which is consistent with a northeast direction of groundwater flow on Suncor's land. Based on these factors, the North Report #1 concludes that groundwater generally flows from west to east up to Suncor's land, at which point it diverts towards the northeast towards Imperial Street. The North Report #1 concludes that the highest levels of VOCs that were actually observed match what would be expected based on a north/northeast direction of groundwater flow from Suncor's land, because VOCs would have migrated onto Imperial Street from Suncor's land, rather than from a source to the west.

[88] Secondly, the City disputes Parsons' conclusion that the absence of VOCs in soil on Suncor's land indicates that Suncor's land was not the source of the VOC contamination. The City submits that Parsons did not test the soil on Suncor's land for VOCs until 2012, after Suncor's land had been remediated, and there is no pre-remediation data regarding the presence or concentrations of VOCs on Suncor's land (or the City Lands). According to the North Report #1, this is a significant data gap that makes the DSICOR Report deficient as a detailed site investigation and as a basis for concluding that Suncor's land was a flow-through site. According to the North Report #1, Parsons should have investigated for the presence of VOCs much earlier, because between 1996 and 2005, VOCs were standard parameters for investigation at sites where solvents may have been used, and automotive garages use solvents to clean automobile parts.

[89] Also, the City notes that only two soil samples, collected in 2012, were tested for VOCs. They were taken from 17 and 25 mbgs at two locations in the area of the former garage, based on the assumption that this was the only area where solvents may have been used, stored, or spilled. The City submits that solvents could have been spilled, stored in leaky drums, dumped, or poured into drains or sumps anywhere on Suncor's land, which could have introduced VOCs onto Suncor's land and adjacent lands.

[90] Thirdly, the City disputes Parsons' conclusion that, if the former garage on Suncor's land was a source of VOCs, the perched groundwater above the regional aquifer in the area of the former garage would have been contaminated with VOCs. Although VOCs were below drinking water standards in samples from the perched groundwater on Suncor's land, the City submits that those samples were taken after Suncor's land was remediated, and therefore, the absence of VOC contamination in the perched groundwater is not indicative that Suncor's land was not the source of VOCs. As a comparison, the City notes that significant petroleum hydrocarbon contamination was identified in the perched groundwater on Suncor's land before remediation, but this contamination was not present in the perched groundwater after remediation. The City also notes that the DSICOR Report states at page 66 that hydrocarbon-contaminated perched intermittent groundwater

appeared to be migrating into the regional aquifer before Suncor's land was remediated. The City argues that perched groundwater contaminated with VOCs may have similarly impacted the regional aquifer prior to remediation.

[91] In summary, the City submits that flaws in the lines of evidence that the DSICOR Report relied on should have led the Director to reject Parsons' flow-through theory, and to require Suncor to delineate and remediate/risk-assess VOCs on the City Lands before issuing the City Lands Certificate.

[92] Moreover, the City maintains that further evidence which was not considered in the DSICOR Report disproves Parsons' flow-through theory. The City submits that PERC, a parent compound of TCE and DCE, was identified in two of the four shallow soil vapour samples from Suncor's land that were tested for PERC after remediation. The two vapour monitoring wells were located just outside of the area that was excavated in 1996. DCE was also detected in one of the samples that tested positive for PERC. The City submits that the presence of PERC in shallow soil vapour on Suncor's land after remediation is evidence of a historical source of chlorinated solvents on Suncor's land.

ii) Whether Suncor failed to delineate xylenes in soil

[93] The City submits that xylenes contamination in soil was not properly delineated by Parsons, and xylenes may be present in excess of the applicable standards on the City Lands south of Suncor's land (i.e., Kingsway). The City refers to drawing 5.2 in the DSICOR Report, which is a map showing the inferred extent of xylenes (and other hydrocarbon) contamination following remedial excavations, along with charts showing contaminant levels at certain depths and locations. The City maintains that a location near the southern boundary of Suncor's land, where the 1996 excavation bordered Kingsway, showed a significant exceedance of xylenes at 1.8 mbgs ("South Wall #1"). According to Parsons, this contamination was delineated by BH17, located on Suncor's land between South Wall #1 and Kingsway. The North Report #1 challenges this conclusion, on the basis that the shallowest soil sample from BH17 was collected at a depth of 10.7 mbgs, which is almost 9 mbgs deeper than the xylene exceedance at South Wall #1. The City submits that, given the difference in those depths and the lack of investigation in the area between those two samples, xylenes have not been delineated on the City Lands along Kingsway, and xylenes exceeding applicable standards may exist in the area between South Wall #1 and the closest borehole on the City Lands, which is 10 metres away.

iii) Whether Suncor failed to properly investigate soil vapours for hydrocarbons and VOCs

[94] The City argues that the DSICOR Report is also deficient because soil vapour contamination was not sufficiently investigated across the City Lands or Suncor's land. According to the North Report #1, no soil vapour wells were located southwest of the former underground storage tanks, where the highest original and remaining levels of hydrocarbon contamination were found in the soil, and where contaminated groundwater migrated from Suncor's land to the City Lands. The North Report #1 states that soil vapours should have been investigated in this area,

and additional soil vapour wells should have been installed in two other areas on Suncor's land.

[95] Moreover, the City submits that the biggest deficiency in the soil vapour investigations was the lack of investigation on the City Lands. The North Report #1 states at page 22 that at least one soil vapour well should have been installed on Imperial Street in the vicinity of BH38, where hydrocarbon contamination in soils was identified and left in place. The City also maintains that, since the highest VOC concentrations were found in groundwater below Imperial Street, the lack of soil vapour investigation for VOCs on the City Lands is a major data gap. The City submits that soil vapours could be present in utility corridors under Imperial Street and on residential properties north of Imperial Street, which may present an unacceptable risk to City workers and/or residents.

iv) Whether Suncor failed to properly delineate VOCs on Suncor's land

[96] The City disputes the conclusion in the DSICOR Report that the TCE and DCE contamination was vertically delineated on Suncor's land. The City submits that this conclusion was based on samples from the regional aquifer that were taken on only one occasion at two wells (BH42 and BH43D). According to the North Report #1 at page 16, a single sampling event is insufficient to confirm vertical delineation, and at least one more sampling event should have been completed in a different season than the first event. However, the North Report #1 states that this deficiency in the DSICOR Report relates to Suncor's land.

Summary

[97] In summary, due to the alleged deficiencies in the DSICOR Report, the City submits that the Director should have rejected the theory that Suncor's land was a flow-through site for VOCs, and should have required Suncor to delineate and remediate VOC's before issuing the City Lands Certificate or the Suncor Land Certificate. The City maintains that pursuant to Protocol 6, Suncor, as an applicant for a CoC and a responsible person for the source of contamination, should have delineated and remediated the entire area of contamination, including any area of contamination that resulted from migration to neighbouring parcels. The City submits that the most significant concern regarding VOCs is the potentially unacceptable risk that TCE, a carcinogen, in soil vapour poses to City workers and residents along Imperial Street.

[98] In addition, the City maintains that the DSICOR Report is deficient because Suncor failed to delineate xylenes in soil on the City Lands, and completed no soil vapour investigations on the City Lands.

The Director's submissions

[99] The Director's affidavit states that he undertook a limited administrative review of Suncor's application for the City Lands Certificate. His review consisted of:

- ensuring that, on the date of the application, the Approved Professionals were members in good standing of the CSAP;
- reviewing CSAP's administrative screening documentation (a spreadsheet);

- reviewing the June 15, 2015 summary of site condition;
- reviewing records of communications with affected property owners including the City;
- reviewing the June 15, 2015 performance verification plan; and
- reviewing land title documents that were provided with the application.

[100] Regarding the technical details of the investigation and remediation, the Director states that he placed "substantial consideration" on the work of the Approved Professionals and the quality control mechanisms in the CSAP process. He signed the City Lands Certificate because he was satisfied that Suncor's application was complete, and the recommendation to issue a CoC was supported by two Approved Professionals who confirmed that the requirements in section 53(3) of the *Act* and sections 49(2) and 59 of the *Regulation* were met. The Director submits that his administrative review and reliance on the recommendations of the Approved Professionals was consistent with the process provided in Protocol 6 for CoC applications for non-high risk sites.

[101] However, the Director submits that the North Reports #1 and #2 raise some valid concerns about the basis of Parsons' flow-through analysis for VOCs, particularly regarding the accuracy and completeness of the information that was relied on to determine the direction of groundwater flow in relation to VOC contamination. Specifically, the Director submits that the North Reports #1 and #2 raise the following valid concerns:

- Reliance on the relative comparison of contaminant concentration data between a remediated potential source parcel (i.e., Suncor's land) and an adjacent affected parcel is not a valid line of evidence for determining whether the contamination originated on, or flowed through, the potential source property.
- Deeper wells located in the southeast corner of Suncor's land were not measured, and this presents a significant data gap in understanding groundwater flow direction.

[102] In addition, the Director submits that seasonal variations in groundwater flow direction were not presented in the DSICOR Report, which could potentially eliminate gaps in the groundwater flow interpretation.

[103] The Director submits that, had he received the North Reports #1 and #2 before the City Lands Certificate was issued, he would have sent those reports to Suncor's Approved Professionals for a response before making his decision. In the circumstances, the Director advises that he is unable to form a conclusion about the reasonableness of the flow-through assumption, because he did not have the benefit of reviewing a response from Suncor or its Approved Professionals. The Director submits that, if it is determined that Suncor's land is a source of VOC contamination, Suncor would be obligated to delineate and remediate the VOC contamination on neighbouring adjacent sites.

[104] Regarding the delineation of xylenes on the City Lands, the Director submits that although additional wells can always be installed and sampled to more finely

delineate the boundaries of contamination, this does not necessarily mean it is necessary to do so.

Suncor's submissions

[105] In general, Suncor submits that:

- its investigation and remediation of the City Lands, and the reports submitted in support of its application for the City Lands Certificate, met all regulatory requirements;
- the City's contention that VOC contamination originated on Suncor's land is speculative and has no scientific basis; and
- the groundwater flow methodology relied on in the North Reports #1 and #2 is not an accepted methodology to determine groundwater flow direction.

[106] In addition, Suncor submits that the City has the onus of proving, on a balance of probabilities, the points that it asserts, and it has failed to do so. Suncor argues that the City has merely proposed speculative possibilities, and has not proved that Parsons' conclusions are incorrect.

i) Whether Suncor's land is a flow-through site for VOC contamination

[107] Suncor acknowledges that the Director applied Protocol 6 and required Suncor to delineate the contamination for which it was responsible, but Suncor submits that this only applied to the hydrocarbon contamination originating on Suncor's land, and not the VOC contamination originating from an unknown source. Suncor submits that, in addition to the requirements in Protocol 6, section 46(1)(j) of the *Act* exempts responsible persons from responsibility for contamination resulting from the migration of contaminants from another property.

[108] Suncor submits that although the VOCs detected in this case are occasionally used in general automotive service garages like the one that operated on Suncor's land, this type of garage would commonly use lower cost solvents than PERC, TCE, and TCA. Suncor submits that according to the SLR Report #2: PERC is primarily used in dry cleaning; TCE is primarily used to degrease metal parts in metal manufacturing, electronics, and high end automotive repair where the higher cost of this solvent is not a concern; DCE is not used in service garages, but is used in semiconductor manufacturing; and, TCA has been used as an alternative solvent to TCE, especially during the 1970s and 1980s.

[109] In addition, Suncor argues that it is unlikely that the remedial excavation and dual phase extraction system had any effect on the VOC contamination. Suncor submits that the remedial excavation near the former garage was two metres deep and removed a small wedge of soil from the northwest corner of the building footprint, leaving most of the footprint untouched. In addition, this area was at least 20 metres away from the nearest vapour/perched groundwater extraction well in the dual phase extraction system, and the area of the former garage hoists was at least 30 metres from the nearest deep groundwater extraction well in the dual phase extraction system. Suncor submits that it is highly unlikely that TCE, if used on Suncor's land, would have been improperly stored or disposed of elsewhere on

Suncor's land, as the western area was landscaped and most of the rest of the site was paved or covered by buildings.

[110] Suncor maintains that no detectable VOC contamination was found in soil samples taken within or outside the former garage area, or in the area of the former fuel storage tanks and pump islands.

[111] Regarding soil vapour samples, Suncor submits that no TCE was detected. According to the SLR Report #2, if TCE was spilled or dumped on Suncor's land, it would have been detected in soil vapours in the vicinity of the former garage, which is the most likely place where this could have occurred. Also, Suncor argues that much of this area was not excavated, and this area was not affected by the dual-phase recovery system. TCA was detected in one vapour sample, but Suncor submits that this result is unreliable because it was at or below the detection limit. PERC and DCE were detected at two vapour wells some distance away from the former garage, but Suncor argues that PERC is not used in general service garages, and therefore, it could not have originated on Suncor's land. The SLR Report #2 dismisses the detection of PERC on the basis that it is a dry cleaning solvent that must have originated elsewhere.

[112] Regarding the direction of groundwater flow in the aquifer, Suncor submits that Mr. North incorrectly determined that it flows to the north after reaching Suncor's land. According to the SLR Report #2, topographic contours are an invalid basis for determining flow patterns in deep aquifers, especially if they are confined. Also, according to the SLR Report #2, the aquifer in this case is regionally extensive, extends on both sides of the watershed boundary, and is periodically confined; therefore, groundwater flow direction in the aquifer is controlled by the potentiometric pressure in the aquifer, and not topography or surface water/shallow groundwater flow patterns. Thus, Suncor submits that Parsons correctly determined that the deep groundwater flows from west to east across both Suncor's land and Imperial Street, and does not divert towards the north at Suncor's land.

[113] Regarding the absence of VOCs in soil samples, Suncor acknowledges that soils were not sampled until after remedial activities occurred, but Suncor maintains that the remediation would not have affected VOC contamination in the most probable location for it to have existed: the area of the former garage. Suncor acknowledges that only three soil samples (not two, as stated by Mr. North) were tested for VOCs, but it submits that groundwater or soil vapour sampling are more useful than soil sampling for detecting a source of VOC contamination, because VOCs are heavier than water and pass through soil and groundwater when spilled on the ground surface. Some soil particles will be coated with VOCs, but most of the VOC contamination will descend until it reaches a layer that it cannot easily pass through. Thus, Suncor submits that sampling groundwater, and particularly deep groundwater, is a better method for determining VOC contamination.

[114] Regarding the perched groundwater, Suncor submits that no VOCs were detected in the two shallow groundwater wells in the area of the former garage.

[115] Regarding the aquifer, Suncor maintains that the deep groundwater wells downgradient (to the east) of the former garage contained TCE and DCE in

concentrations that were no higher than in up-gradient wells. On this basis, Suncor argues that the former garage was not the source of the VOCs.

[116] Suncor also maintains that the presence of TCE and DCE in the aquifer below Suncor's land is not an indication of TCE use on Suncor's land. Suncor argues that TCE is a degradation product of PERC, DCE is a degradation product of TCA (the Panel notes that the SLR Report #2 states at page 10 that DCE is also a degradation product of TCE), and TCA and PERC (and TCE) are present below, and to the west and north of, Suncor's land. In addition, the SLR Report #1 states that the highest concentrations of VOCs were found under Imperial Street (wells BH41 and MW06-35B), and VOC concentrations decrease from north to south in the wells on Merritt Avenue (BH48 and BH49), which are the furthest wells up-gradient (to the west) from Suncor's land. According to the SLR Reports #1 and #2, the pattern of VOC contamination in the deep groundwater shows increasing concentrations from south to north at locations west of Suncor's land, and extending from Kingsway across Suncor's land to the north side of Imperial Street, with consistent relative concentrations of VOC compounds throughout.

[117] In summary, according to the SLR Report #2, the deep groundwater shows a consistent pattern of increasing VOC concentrations from south to north, and from west to east, which indicates that the source of the plume is to the west (up-gradient, according to Suncor) and north of Suncor's land. Suncor submits that this shows that Suncor's land is not a source of TCE in particular, or PERC, DCE, and TCA.

ii) Whether Suncor failed to delineate xylenes in soil

[118] Suncor submits that xylenes in soils were delineated. Suncor also submits that the operation of the dual phase extraction system for six years, along with natural biodegradation over time, likely removed the low concentrations of xylenes that remained after the excavation. According to the SLR Report #2, the source of xylenes was removed by excavation, and afterwards, only a small exceedance in soil was found at one location. A recovery well that was part of the dual phase extraction system, RW10 (screened at a depth of 6.6 to 15.2 mbgs), was located near the exceeding soil sample.

[119] The SLR Report #2 states that in 1997, soil vapour was sampled at BH17 (which, on the ground surface, is located one to two metres away from the exceeding soil sample), and it did not repeat the elevated level of xylenes found in soil vapour at South Wall #1 on the edge of the excavation in 1996.

iii) Whether Suncor failed to properly investigate soil vapours for hydrocarbons and VOCs

[120] Regarding the lack of hydrocarbon vapour sampling on the City Lands, the SLR Report #2 states that Parsons completed vapour sampling for hydrocarbons across Suncor's land, focusing on the source area for hydrocarbons, and in all cases the vapour samples met residential and commercial indoor air standards for all parameters. Suncor submits, therefore, that it was unnecessary to test other areas (i.e., the City Lands) with lesser hydrocarbon concentrations.

[121] With respect to VOC vapour sampling on the City Lands, Suncor argues that it was not obliged to do such sampling because its land was a flow-through site for VOCs. Suncor also refers to the SLR Report #2, which states that soil vapour was tested for VOCs across Suncor's land, and low concentrations of PERC, DCE and TCA were found, and TCE was not detected in the area of the former garage. The SLR Report #2 concludes that the soil vapour results provide no evidence of a potential source of PERC, DCE and TCA on Suncor's land, and are consistent with there being a groundwater plume containing these compounds below Suncor's land that originated from a source to the west.

[122] In addition, Suncor submits that if soil vapour containing VOC contamination is present around utility corridors on the City Lands, it is incumbent on the City to investigate the risk to City workers or residents, since Suncor's land was not the source of the VOCs.

iv) Whether Suncor failed to properly delineate VOCs on Suncor's land

[123] Suncor submits that the Suncor Land Certificate is not under appeal, and the City cannot appeal it indirectly through the present appeal. In any case, the SLR Report #2 states that further vertical sampling of VOCs is unnecessary.

The City's reply submissions

[124] The City acknowledges that it has the burden of proving, on a balance of probabilities, that the DSICOR Report is deficient and the Director erred in issuing the City Lands Certificate. However, the City argues that it has identified numerous deficiencies in the DSICOR Report, and it needs to prove only one of those deficiencies to succeed in the appeal. Moreover, the City argues that it need not prove that Suncor's land was the source of the VOC contamination on the City Lands; rather, it must show that the lines of evidence that Parsons relied on in the DSICOR Report in support of the flow-through determination are flawed or inadequate, such that the Director erred by issuing the City Lands Certificate without requiring Suncor to investigate and remediate VOCs on the City Lands. The City maintains that not only has it discredited the lines of evidence relied on by Parsons, it has also proved that Suncor's land was the source of the VOC contamination. In support, the City refers to the North Report #1 at pages 2, 17, and 19, where it concludes that Suncor's land is "a primary source" of the VOC contamination in the deep groundwater on Suncor's land and the City Lands.

[125] Regarding the decision-making process that led to the City Lands Certificate, the City submits that the CSAP screened the application and supporting documents against checklists to ensure that all necessary documents were included, and the Director's administrative review involved no substantive review of the technical documents. Thus, the City submits that neither the CSAP nor the Director substantively reviewed the technical documents to ensure that the conclusions were sound; rather, they relied on the recommendations of Suncor's Approved Professionals. The City notes that the Director attested that the North Reports #1 and #2 raise "valid concerns" about the lines of evidence presented in the DSICOR Report to support the flow-through determination, and had he known about those reports before making his decision, he would have referred the North Reports to

Suncor's Approved Professionals for a response before issuing the City Lands Certificate. The City maintains, therefore, that it cannot be assumed that Suncor's application met all of the applicable requirements, or that the City Lands Certificate should have been issued.

[126] The City submits that Suncor has provided no convincing evidence to address the flaws in the DSICOR Report that were identified by Mr. North. In support of that argument, the City refers to the North Report #3, which provides comments on the SLR Reports #1 and #2. In particular, the City submits that, like the DSICOR Report, the SLR Reports #1 and #2 rely on the lack of VOCs in soil on Suncor's land as an indication that it was not the source of the VOCs, without either noting that the data was obtained after Suncor's land was remediated, or explaining why the data would still be relevant.

[127] Similarly, the City submits that lower post-remediation VOC concentrations in the aquifer below Suncor's land, compared to Imperial Street (to the north of Suncor's land), is not an appropriate basis for concluding that Suncor's land is not the source of the VOCs. The City maintains that it is inappropriate to compare VOC concentrations on a remediated potential source site to those on unremediated neighbouring areas. The City submits that the remedial excavation and dual phase extraction system would have reduced the VOC concentrations on Suncor's land, with less impact on the City Lands to the north. The City submits that the lack of pre-remediation data regarding VOCs in soils or groundwater is fatal to the flow-through theory, and a lack of VOC contaminants post-remediation except in the deep aquifer cannot form the basis for concluding that Suncor's land was not the source of the VOCs.

[128] In addition, the City submits that, according to the North Report #3, the similar relative concentrations of VOCs in MW05-32B, an intermediate depth well, as in wells screened in the deep aquifer, do not indicate that the VOCs originated from the deep aquifer. The North Report #3 states that similar relative concentrations would be expected if the VOCs originated on Suncor's land, because the contaminants were introduced to the ground surface decades ago, and the remediation focused on soil and groundwater at shallow and intermediate depths.

[129] The City disputes Suncor's assertion that PERC was not used at the former garage. The City submits that, while TCE was commonly used as a degreaser in the automotive service industry, PERC was also used, as noted on page 15 of the CSAP's June 2018 document titled "Potential Contaminants of Concern at Select Commercial and Industrial Land Uses" (attached to the North Report #3). Moreover, the City submits that the fact that PERC was detected post-remediation in soil vapour on Suncor's land at VMW1 and VMW2, and DCE was detected post-remediation in VMW2, indicates a source on Suncor's land. Although the SLR Report #2 states that the VOCs detected in shallow soil vapour must have originated from contaminated deep groundwater, the North Report #3 states at page 7 that it is "not feasible for contaminated groundwater situated at 20 to 25 mbgs at the Suncor Site to cause PERC and 1,1 DCE detections in soil vapour at 1.5 mbgs." The North Report #3 also states that the density of the soils near the surface and the presence of perched groundwater in the soil would inhibit the upward migration of vapours from the deep groundwater. Moreover, the North

Report #3 states that no PERC was detected in groundwater in the southeast portion of Suncor's land, below VMW1. The City submits that the only reasonable explanation for the detection of VOCs in soil vapour is that these substances existed on Suncor's land. Also, according to the North Report #3, the absence of PERC in soil vapour at VMW5 in the footprint of the former garage is not surprising given that VMW5 is located in "clean" fill that was added after excavation of the original surface soils.

[130] The City also submits that the SLR Report #2 is incorrect where it states that BH48 and BH 49 had higher concentrations of VOCs than the wells "at" or "near" Suncor's land. According to the North Report #3, TCE and DCE were found at higher concentrations in deep groundwater at, and adjacent to, Suncor's land as compared to the west of Suncor's land. Specifically, on Suncor's land, BH18, BH27, BH40, BH43S and RW13 had higher concentrations of TCE than BH48 and BH49 on Kingsway to the west of Suncor's land. Similarly, higher concentrations of DCE were found at BH18, BH27 and RW13 on Suncor's land than at BH48 and BH49. Also, BH34 and BH45 immediately to the south of Suncor's land had higher concentrations of DCE and TCE than BH48, and BH41 immediately to the north of Suncor's land. According to the North Report #3, this VOC concentration pattern supports the proposition that a source of VOCs existed on Suncor's land, and the VOCs did not originate from an unknown source to the west. Furthermore, the North Report #3 states that the remediation of Suncor's land would have affected concentrations of VOCs in the deep aquifer on Suncor's land, and VOC concentrations would be expected to be higher to the north of Suncor's land due to the north/northeast flow of groundwater.

[131] In addition, the City submits that Suncor misstates the basis of Mr. North's opinion regarding the direction of groundwater flow, as he did not rely solely on the local topography and watershed boundary; rather, he also considered the groundwater elevation data collected by Parsons. The City argues that Parsons ignored the limited groundwater elevation data, which supports Mr. North's opinion that the groundwater flows to the north/northeast below Suncor's land. In particular, the North Report #3 states that the theory that the aquifer is confined in this area is based on two of nine groundwater elevation measurements that were obtained in December 2012 and May 2013 from only one of the 14 wells being monitored (MW06-38B on Kingsway just south of Suncor's land), which had groundwater elevations approximately four to five metres higher than the other seven measurements taken at that well. Mr. North opines that those two measurements are anomalies, because they are much higher than the other seven measurements at that well, and the other 13 wells on Suncor's land and the City Lands ranged from 3.5 to 4.5 metres lower than the two anomalous measurements from MW06-38B over approximately five years of monitoring.

[132] According to the North Report #3, the total range in groundwater elevation in all 14 wells over roughly five years of monitoring averaged less than one metre (versus the range of 5.5 metres in MW06-38B), and this limited range would be expected if the aquifer is permeable with limited recharge, rather than being confined as proposed by Suncor. Furthermore, the City submits that Parsons' geologic cross-sections in the DSICOR Report show the aquifer as being unconfined

(i.e., the water elevation is below the bottom of the overlying till, within the sand aquifer unit).

[133] The City argues that the contaminant distribution pattern is also consistent with groundwater flowing to the north/northeast from Suncor's land. The City maintains that the higher VOC concentrations observed post-remediation in the aquifer on Imperial Street, which is unremediated, compared to Suncor's land, which was remediated, would be expected if Suncor's land was the source of the VOCs and Imperial Street is down gradient of Suncor's land.

The Panel's findings

[134] The Panel finds that each party has the burden of proving, on a balance of probabilities, the facts that they assert. This is consistent with the Board's *Procedure Manual*, which states as follows at page 31:

> The general rule is that the burden or responsibility for proving a fact is on the person who asserts it. The fact is to be proved on a "balance of probabilities".

[135] The City's submissions on this issue mainly focus on Suncor's alleged failure to comply with requirements imposed by the Director under Protocol 6, which requires Suncor to delineate and remediate any contamination on the City Lands that originated from Suncor's land. The City has the burden of proving, on a balance of probabilities, that the VOC contamination originated on Suncor's land, such that Suncor is obligated under Protocol 6 to delineate and remediate the VOC contamination on the City Lands. The City also has the burden of proving that Suncor's delineation of xylenes in soil, and investigation of soil vapours on the City Lands, were inadequate, such that the DSICOR Report fails to comply with the requirements in sections 49(2) and 59(2) of the *Regulation* regarding detailed site investigation reports, and Protocol 6. In particular, section 59(2) provides that a detailed site investigation "must provide information necessary for conducting a risk assessment…."

[136] It is important to note that section 53(3) provides that a director "may" issue a CoC if the applicable requirements are met. In addition, section 53(1) provides that in exercising powers under section 53, a director "may rely on <u>any information the director considers sufficient for the purpose</u>, including, but not limited to, … a detailed site investigation, a risk assessment, … or a summary of site condition" [underlining added]. Thus, while the legislation prescribes certain general requirements for detailed site investigation reports, the Director has the discretion to determine whether the information provided by the applicant for a CoC, including the information in the detailed site investigation report, is sufficient for the purposes of issuing a CoC. In the case of an application for a risk-based CoC, when section 53(1) of the *Act* is read together with sections 49(2) and 59(2) of the *Regulation*, they provide that the Director (and now the Board) must be satisfied that the DSICOR Report contains sufficient information "for conducting a risk assessment".

[137] Given that the Director issued the City Lands Certificate, the Panel assumes that he found the information in Suncor's application to be "sufficient" for the purposes of issuing a risk-based CoC for the City Lands. In this case, the Director

put significant weight on the fact that, as required by Protocol 6, two Approved Professionals had recommended that a CoC be issued for the City Lands. However, it is notable that the Director now submits that the North Reports #1 and #2 raise valid concerns about data gaps and flawed analysis the DSICOR Report with respect to the flow-through determination and assumptions about the direction of groundwater flow in the aquifer, and he would have asked the Approved Professionals to respond to the North Reports #1 and #2 (if he had known about those reports) before deciding whether to issue the City Lands Certificate. In essence, it appears that the Director is acknowledging that, in light of the City's new evidence, he is no longer satisfied that the information in Suncor's application is "sufficient for the purpose" of issuing the City Lands Certificate.

i) Whether Suncor's land is a flow-through site for VOC contamination

[138] The DSICOR Report identifies VOCs (including PERC, TCA, and TCE) as potential contaminants of concern (on page 20 and in Table 2.3) because an automotive service garage operated on Suncor's land. At page 62, the DSICOR Report states that TCE and DCE "are typically associated with solvents, often used for cleaning mechanical parts in automotive garages, or in the dry cleaning industry…." The Panel notes that no dry cleaning operations (historical or current) are identified in the land use records for properties surrounding Suncor's land, according to the DSICOR Report. Automotive service garages have operated on the properties to the west, east, and south of Suncor's land since the 1960s, but none of them were identified in the DSICOR Report as the likely source of the VOC contamination. Ultimately, the DSICOR Report did not identify a specific source of the VOC contamination.

[139] No historical records were disclosed regarding which solvent(s) were actually used at the former garage. The City and Suncor each offer different theories about the likelihood that PERC, TCE, TCA, or DCE may, or may not, have been used at the former garage. According to Suncor's evidence, TCE is used to degrease metal parts in metal manufacturing, electronics, and high end automotive repair. TCA was used as an alternative solvent to TCE, especially during the 1970s and 1980s. PERC is commonly used in dry cleaning operations, but may be used in garages to degrease automotive parts. Suncor's theory is that cheaper solvents than TCE, TCA or PERC would have been used at a general automotive service garage such as the one on Suncor's land. The City's theory is that the use of TCE, TCA, or PERC as solvents at the garage cannot be ruled out. The parties agree that PERC breaks down over time to become TCE, and then DCE. TCA also breaks down into DCE.

[140] The City and Suncor also propose differing theories about where potential spills, leaks, or dumping of solvents could have occurred on Suncor's land. The DSICOR Report, and the SLR Reports #1 and #2, assume that the former garage is the only likely location where solvents could have been spilled, leaked or dumped. However, there are no historic records that would confirm (or refute) that assumption, and the City theorizes that solvents could have been spilled, leaked or dumped anywhere on Suncor's land. The North Report #3 states at page 13, that "Since both Dr. Malick and I <u>can only speculate</u> where dumping occurred, VOCs should have been investigated across the entire Suncor Site" [underlining added].

[141] Given that there is no historical information about solvent use at the former garage, and no pre-remediation data regarding the spatial distribution or concentrations of VOC contamination, the DSICOR Report attempted to deduce the likely source of the VOCs based on evidence that was available. The DSICOR Report relied on three lines of evidence: (1) the spatial distribution of the dissolved VOCs observed in the aquifer, based on data from 2011 to 2014 and the conclusion that groundwater flows from west to east in the aquifer; (2) the absence of VOCs in soil on Suncor's land; and, (3) the absence of dissolved VOCs in the shallow/intermediate groundwater zones on Suncor's land.

DSICOR Report line of evidence: absence of VOC's in soil on Suncor's land

[142] The Panel finds that Table 4.7 in the DSICOR Report shows that sampling for VOCs in soil occurred between May 2012 and October 2013 at BH29, BH36, BH39, BH40, BH41, BH42, BH45, BH48, and BH49, at depths ranging from 17.1 to 25.6 mbgs. Thus, no shallow soil samples were tested for VOCs, and only three samples plus one duplicate (BH29, BH40, and BH42) were taken on Suncor's land; the other samples were from Imperial Street or Kingsway.

[143] Of the three locations on Suncor's land where soil was tested for VOCs, two (BH40 and BH42) were within or adjacent to the areas where surface soils were excavated. Specifically, BH40 (sampled at 25.6 mbgs) is behind the former garage near the area where the shallow soil was excavated. BH42 (sampled at 26.8 mbgs) is where the former underground storage tanks were located, within the area where shallow soil was excavated. Also, BH42 was only a few feet away from, and within the depth range of, a recovery well connected to the dual-phase extraction system (RW14, screened at a depth of 23.1 to 27.7 mbgs). These samples were taken approximately 15 years after Suncor's land was excavated, and several years after the dual-phase extraction system had operated for six years. Therefore, the Panel finds that the soil taken from BH40 and BH42 may have been affected by the remedial activities that occurred on Suncor's land several years before the soil samples were taken, and the Panel concurs with the North Report #1 that it is "not surprising" that no VOCs were detected in soil samples from these two locations.

[144] The third location on Suncor's land, BH29 (sampled at 17.1 mbgs), is located on the front edge of the footprint of the former garage. BH29 is the least likely of the three locations on Suncor's to have been affected by the remedial activities, as it was neither below an area where surface soil was excavated, nor near a recovery well. However, the Panel finds that a single sample from one intermediate-depth location on Suncor's land is not indicative of the soil conditions across Suncor's land, and is insufficient to determine whether Suncor's land may have been a source of VOCs.

[145] The Panel concludes that the available soil data, in itself, is insufficient to support a determination that Suncor's land was not a source of the VOC contamination. The absence of VOCs in soil sampled from one intermediate-depth well and two deep wells on Suncor's land, two of which may have been affected by previous remediation activities, does not support a conclusion that Suncor's land was not a source of the VOC contamination. However, the Panel also finds that the soil data does not assist in proving that a source of VOC contaminants existed on Suncor's land prior to the remediation activities.

[146] The lack of pre-remediation testing for VOCs in soil is a gap in the data, but the Panel finds that soil data is less useful than vapour and groundwater data when trying to determine the source of VOCs. The parties' experts concur that VOCs are more likely to be discovered in groundwater or soil vapour than in soil. According to the SLR Report #1, soil sampling near the surface, or even at depth, is not the most effective way of determining whether solvents were historically spilled or dumped on the ground. These substances are heavier than water, and tend to descend through soil and groundwater, coating soil particles along the way, until they reach a low-permeability layer such as clay. The SLR Report #1 states at page 9 that "These compounds are most likely to be discovered in groundwater or sometimes soil vapour" and "the most reliable method of determining the presence of VOCs in association with a potential source is to investigate the groundwater in the potential source area or just downgradient of that area." At page 5 of the North Report #1, Mr. North concurs that "VOCs are more likely to be discovered in groundwater or soil vapour than in soil". Consequently, the Panel finds that the limited data regarding VOCs in soil, and the lack of pre-remediation investigation of VOCs in soils, do not necessarily render the DSICOR Report deficient as a detailed site investigation report.

DSICOR Report line of evidence: absence of VOCs in shallow/intermediate groundwater zones on Suncor's land

[147] In concluding that Suncor's land was not a source of the VOC contamination, Parsons also relied on the fact that VOCs were below drinking water standards in the perched groundwater on Suncor's land. The DSICOR Report states on page 63 that evidence of elevated "solvent concentrations in groundwater wells screened within the shallow and intermediate zones… has not been observed".

[148] Map 4.18 in the DSICOR Report shows results for VOCs in groundwater from wells sampled in July 2011 and March 2012, based on the data in Table 5.18. VOCs were tested in one sample from each of five wells (with duplicate samples from two of those wells): MW04-23B, MW04-28B, MW05-30, MW05-31 (plus a duplicate), and MW05-32B (plus a duplicate). As discussed below, these wells were screened at depths ranging from 11 mbgs to 19 mbgs, which corresponds to the intermediate perched groundwater zone. On page 48, the DSICOR Report defines that zone as approximately 10 to 19 mbgs. Thus, there was no testing for VOCs in groundwater within the shallow perched groundwater zone, which is defined on page 47 of the DSICOR Report as the top nine to ten mbgs. Consequently, the Panel finds that the DSICOR Report is misleading where it states that evidence of elevated "solvent concentrations in groundwater wells screened within the shallow and intermediate zones… has not been observed" [underlining added].

[149] Groundwater samples from four of the five intermediate-depth wells (MW04-23B, MW04-28B, MW05-30, MW05-31) contained no detectable VOCs. For the reasons provided below, the Panel finds that the groundwater samples taken in 2011/2012 from three of those four wells are likely to have been affected by the remedial activities on Suncor's land: MW05-31; MW04-28B; and MW04-23B. Those three wells are located in or near excavated areas, and/or near recovery wells, and were sampled several years after Suncor's land was remediated.

[150] Although the lack of pre-remediation sampling for VOCs makes it difficult to ascertain the effect that the remedial activities had on any VOC contamination that may have been present in the perched groundwater before remediation, it is helpful to compare the effects that the remedial activities had on petroleum hydrocarbon contamination, since there is pre-remediation data on those contaminants. The evidence shows that the petroleum hydrocarbon contamination in perched groundwater on Suncor's land before remediation was either dramatically reduced or no longer detected after remediation. For example, groundwater from MW05-31 (13.7 – 16.8 mbgs), located on the edge of the area where shallow soil was excavated in and around the footprint of the former building, showed low levels (below drinking water standards) of benzene and xylenes when it was first tested in July 2005, but those substances were not detected later. Similarly, in 1997 through 1998, liquid hydrocarbons were observed in BH19 (DSICOR Report, Table 4.2), and groundwater from BH19 showed exceedances for numerous hydrocarbon contaminants from 1999 to 2010. By 2011, only benzene exceeded the drinking water standard (DSICOR Report, Table 4.14) in groundwater from BH19. BH19 (screened at 7.3 – 15.2 mbgs) is in the middle of the excavated area above the former underground storage tanks, and within a few metres of RW8 and RW9 (both screened at 6.6 – 15.2 mbgs).

[151] Turning to the four intermediate depth wells where no VOCs were detected in groundwater, MW05-31 (13.7 – 16.8 mbgs) is on the edge of, and MW04-28B (11.7 – 14.6 mbgs) is within, the area where surface soil was excavated in and around the footprint of the former building. The Panel finds that it is likely that groundwater sampled in 2011 and 2012 from those wells would have been affected by the excavation of the overlying surface soil in 1996, and the subsequent years of surface water percolating through clean fill. The third well, MW04-23B (11.5 – 14.6 mbgs), located adjacent to Kingsway, is just outside of the area where the top four metres of soil was excavated in 1996 around the former underground storage tanks, and is within approximately five metres of two recovery wells screened at depth ranges encompassing the screened depth of MW04-23B (RW8 at 6.6 – 15.2 mbgs, and RW10 at 6.6 – 15.2 mbgs). Consequently, the Panel finds that it is likely that groundwater sampled in 2011 at MW04-23B was affected by the remedial excavation of overlying soil, followed by six years of operation of the dual-phase recovery system, and the subsequent years of surface water percolating through remediated soil. Therefore, the results from these three wells do not provide a basis for conclusions about whether a source of VOCs may, or may not, have existed in the vicinity of these wells before remediation occurred.

[152] The fourth well, MW05-30 (13.7 – 16.8 mbgs) is located in the western corner of Suncor's land, and is some distance beyond the areas where overlying soils were excavated. Laterally, MW05-30 is approximately one metre away from RW13 (21.6 – 26.2 mbgs), but RW13 is screened in the aquifer at least 4.8 metres below MW05-30. Also, it appears that recovery well RW13 only operated for approximately one year. According to a report dated March 2, 2001 (in the Appendices to the DSICOR Report), RW13 was not reactivated as a recovery well after it was found to be inoperative on September 8, 2000. Consequently, the Panel finds that it is unlikely that intermediate-depth groundwater sampled from MW05-30 in 2011 was affected by the remediation activities on Suncor's land.

Therefore, the results from MW05-30 support a conclusion that no source of VOCs was present in the vicinity of this well before remediation occurred.

[153] VOCs (TCE, DCE, and TCA at concentrations below the drinking water standard) were detected in the intermediate-depth groundwater samples (original and duplicate) from one well: MW05-32B (screened at 16 - 19 mbgs). MW05-32B is located in the eastern part of Suncor's land, a few metres south of the former building, and adjacent to the former pump islands. It is some distance beyond the areas that were excavated, and any recovery wells. As such, the Panel finds that MW05-32B is unlikely to have been affected by the remediation activities on Suncor's land. The question then becomes: what is the possible source of the VOCs detected in intermediate-depth groundwater in MW05-32B?

[154] The SLR Reports #1 and #2 theorize that the presence of VOCs in groundwater in MW05-32B was caused by contaminated deep groundwater rising up from the aquifer. The bottom of MW05-32B, at 19 mbgs, is near the zone where the aquifer begins. The SLR Reports #1 and #2 state that the relative concentrations of TCE, DCE, and TCA in groundwater from MW05-32B were similar to those in the aquifer, and that groundwater from "upgradient and downgradient wells contained at least an order of magnitude higher concentrations". However, Mr. North rejects this explanation for the presence of VOCs in groundwater from MW05-32B. On page 19, the North Report #1 states that VOCs "tend to migrate downward through the shallow/intermediate soils more readily with infiltration to the deeper groundwater". On page 6, the North Report #3 states that the similar relative concentrations of TCE, DCE, and TCA in groundwater from both MW05-32B and the aquifer "is not unexpected as it has been decades since the contamination was introduced above and extensive remediation has occurred during this time."

[155] Thus, there is conflicting expert evidence regarding the possible source of the VOCs detected in intermediate-depth groundwater in MW05-32B, and whether it is possible that groundwater in the aquifer sometimes moves upwards into the bottom of the intermediate groundwater zone, perhaps on a seasonal basis. The Panel finds that the DSICOR Report did not assess seasonal data about the level of groundwater in the aquifer, and the expert evidence is conflicting as to whether groundwater from the aquifer may migrate upwards into the intermediate zone at times. Analysis of the seasonal variations in groundwater levels in the aquifer may help to resolve this question.

[156] Also, given that MW05-32B is located in the eastern part of Suncor's land, a few metres south of the former building, additional data on the presence of any VOCs in other groundwater wells in the southeast portion of Suncor's land could shed some light on the possible source of the VOCs detected in MW05-32B. Unfortunately, Suncor did not test for VOCs in wells in the southeast portion of Suncor's land, such as BH16 (7.2 – 16.4 mgbs), MW04-21 (4 - 7 mbgs), and MW04-22B (10 – 11.5 mbgs). It is unclear how any VOC contaminants that may have originated on the ground surface in the east portion of Suncor's land would disperse laterally as they descended through the perched groundwater zone. The DSICOR Report states at page 66 that "a continuous groundwater table with identifiable groundwater flow direction is not present in" the zone of perched groundwater. However, a May 18, 2005 site report states that "groundwater flow

was determined to be towards the southeast using information collected in the newly installed monitoring wells" (i.e., MW04-21 to 24A/B and MW26A/B to 28A/B), all of which were installed in shallow to intermediate zones (ranging from 3 – 14.8 mbgs). Based on this information, the Panel finds that testing for VOCs in groundwater from shallow to intermediate wells in the southeast portion of Suncor's land (such as BH16, MW04-21, and MW04-22B) may also help to clarify the source of the VOCs identified in MW05-32B, and whether there was a source of VOCs in this portion of Suncor's land.

[157] In summary, for the reasons provided above, the Panel finds that the absence of VOCs in 2011 in groundwater from intermediate-depth well MW05-30, located in the western corner of Suncor's land, is evidence that there was probably not a source of VOCs on Suncor's land in the vicinity of that well. However, the Panel finds that the absence of VOCs in 2011/2012 in groundwater from intermediate-depth wells MW05-31, MW04-28B, and MW04-23B is not reliable evidence that there was no source of VOCs on Suncor's land in the vicinity of those wells, and the results from these wells would likely be affected by remedial activities conducted before the samples were taken. Conversely, the results from those three wells also provide no evidence that there was a source of VOC's in the vicinity of those wells. Finally, the evidence is conflicting as to whether presence of VOCs in the groundwater from MW05-32B is evidence that there was a source of VOCs in that part of Suncor's land. However, analysis of seasonal data on the groundwater level in the aquifer, along with testing for VOCs in groundwater from the wells in the southeast portion of Suncor's land, such as BH16, MW04-21, and MW04-22B, may assist in clarifying whether there was a historic source of VOCs on this part of Suncor's land.

DSICOR Report line of evidence: spatial distribution of dissolved VOCs in deep groundwater, and direction of deep groundwater flow

[158] The data itself regarding the spatial distribution VOCs in the aquifer is not a significant point of dispute between the parties; rather, the parties disagree on how to interpret the data. The parties' dispute about the likely source of the VOCs stems primarily from differing conclusions about the direction of groundwater flow in the aquifer below Suncor's land, and how it could explain the direction in which VOCs migrated from their source and dispersed laterally over time. The parties' experts generally agree that groundwater in the aquifer flows from west to east up to Suncor's land. However, they disagree on the direction of flow in the aquifer below Suncor's land. The DSICOR Report and the SLR Reports #1 and #2 maintain that groundwater in the aquifer continues to flow from west to east through and beyond Suncor's land, whereas Mr. North opines that groundwater in the aquifer deflects to the north/northeast once it reaches Suncor's land. A related point of disagreement between Mr. North and the authors of the SLR Reports is whether the aquifer is unconfined, such that topography and surface water/shallow groundwater flow patterns have an effect on the groundwater flow direction in the aquifer, or alternatively, whether the aquifer is confined such that the direction of groundwater flow is controlled by potentiometric pressure.

[159] The Panel finds that Mr. North did not base his opinion on the direction of groundwater flow solely on the local topography and the regional watershed

boundary. Rather, he also considered the potentiometric data. His opinion is that topography and the watershed boundaries affect the direction of groundwater flow in the aquifer, as the aquifer is unconfined in this area, and that this conclusion is confirmed by the groundwater elevation data. The North Report #1 states at pages 20 – 21 that the topography slopes 2% from west to east up to Suncor's land, and then dips 1.5% toward the northeast (towards Imperial Street) once it reaches Suncor's land, and Suncor's land is north of the regional watershed boundary. The North Report #1 also states on page 20 that the aquifer is unconfined, "meaning that the water table is located within the aquifer" and not confined under pressure. According to the North Report #3, the total range in groundwater elevation in all 14 wells over roughly five years of monitoring averaged less than one metre (versus the range of 5.5 metres in MW06-38B, which Mr. North says is an anomaly), and this limited range would be expected if the aquifer is permeable with limited recharge, rather than confined.

[160] The Panel finds that the analysis in the DSICOR Report, including the models that were used to calculate hydraulic conductivity of the aquifer, implies that its authors may have thought that the aquifer was only partially confined below Suncor's land. Both confined (at RW14) and unconfined (at BH18) models were applied to measurements taken from the aquifer, as set out Appendix Q. At pages 48 - 49 of the DSICOR Report, the discussion about hydraulic conductivity mentions a range of conductivity based on both values. Furthermore, the geologic cross-sections in the DSICOR Report show the aquifer as being unconfined (i.e., the water elevation is below the bottom of the overlying till, within the sand aquifer unit). Also, on page 4, the DSICOR Report states that the aquifer's vulnerability is "moderate", which is typically associated with aquifers that do not have a protective layer against contamination introduced at the ground surface.

[161] In any event, the Panel finds that there are gaps in the groundwater analysis in the DSICOR Report, and filling those gaps could help resolve the conflicting evidence regarding the likely direction of groundwater flow in the aquifer below Suncor's land. Firstly, the Panel agrees with the Director that seasonal variations in groundwater flow direction were not presented in the DSICOR Report, and such information could resolve gaps in the groundwater flow interpretation. The Panel finds that the analysis in the DSICOR Report relies largely on potentiometric readings taken on one day, October 28, 2013, to determine the direction of groundwater flow in the aquifer. Those measurements, and the groundwater elevation contours that were extrapolated from them, are displayed in Drawing 4.3 in the DSICOR Report. Based on those potentiometric measurements and contours, the DSICOR Report concludes at pages 48 – 49 that the "inferred direction of groundwater flow" in the aquifer is to the east, and that the "hydraulic gradient of the potentiometric surface within the regional aquifer on the October 23, 2013 monitoring event was 0.012 m/m." Although the DSICOR Report further states that "seasonal fluctuation of the deep groundwater table is less than one metre", it is unclear what information led to this conclusion, given that the related discussion in the DSICOR Report focused on the data from a single day.

[162] The Panel finds that a greater temporal and spatial range of potentiometric data was available to the authors of the DSICOR Report, but they did not fully discuss that data. In particular, Table 4.1 of the DSICOR Report includes

potentiometric elevation measurements not only from October 23, 2013, but also earlier dates ranging over several years (in most cases) for numerous boreholes, monitoring wells, and recovery wells that were screened in the aquifer. Indeed, the DSICOR Report states at page 47 that the potentiometric surface elevations measured in selected wells between 2008 and 2014 are presented in Table 4.1, and historic groundwater monitoring information is included in Appendices F and O. It is unclear why the DSICOR Report's discussion of the groundwater flow direction in the aquifer only focused on the data from October 28, 2013. The Panel finds that additional potentiometric data was available, but not fully considered, in the DSICOR Report. The Panel finds that such information, and the possibility that it might reveal variations in flow direction, should have been taken into account in the DSICOR Report's discussion about groundwater flow in the aquifer.

[163] In addition, the North Report #1 identified a spatial gap in the potentiometric data. It states that such data is missing for the aquifer below the southeast part of Suncor's land and the adjacent part of Kingsway. The Panel finds that Drawing 4.3 in the DSICOR Report, titled "Elevation of Groundwater Potentiometric Surface, Deep Aquifer, October 28, 2013" shows no potentiometric contours, and limited potentiometric data, for the southeast part of Suncor's land and the adjacent part of Kingsway. The Panel finds that potentiometric data and contour mapping for the aquifer in the southeast part of Suncor's land and the adjacent part of Kingsway would address this gap, and may help resolve the conflicting expert opinions on whether groundwater in the aquifer flows, at least part of the time, to the north/northeast below Suncor's land.

Further evidence regarding the potential source of VOCs: shallow soil vapours

[164] There was no testing for VOCs in soil vapours on the City Lands. However, low levels of VOCs were detected in soil vapours at two locations on Suncor's land, and the City points to this as evidence that the VOC's on the City Lands originated on Suncor's land. In particular, PERC and DCE were detected in shallow soil vapours (up to one metre deep) at VMW1 and VMW2 on Suncor's land. VMW1 is located in the southeast portion of Suncor's land, near the property boundary adjacent to Kingsway. PERC concentrations below commercial land use standards were detected in VMW1 in September 2011 (PERC was not analyzed in the subsequent sample from VMW1 taken in June 2012). VMW2 is located on Suncor's land a few metres west of the former underground storage tanks, approximately five metres away from Kingsway. DCE was detected in vapour samples from VMW2 in September 2011 (PERC was not analyzed in that sample). In February 2013, DCE was not detected in vapour samples taken from VMW2, but PERC was detected at levels below commercial land use standards. Both VMW1 and VMW2 are located adjacent to the area where the top four metres of soil was excavated. VMW2 is also near an intermediate-depth recovery well (RW2).

[165] The parties' experts disagree regarding whether the detection of PERC and DCE in shallow soil vapours at VMW1 and VMW2, many years after remedial activities were completed nearby, provides evidence of a historical source of VOCs on Suncor's land at these locations. The SLR Report #2 dismisses the presence of PERC in soil vapours (and DCE, as a degradation product of PERC), on the basis that PERC is used in dry cleaning and must have originated from an up-gradient

site. However, the Panel rejects the assumption that the PERC could only have come from a dry cleaning business. PERC is identified on page 20 of the DSICOR Report as a contaminant of concern at this site on the basis that PERC may be used to degrease automotive parts. Also, the information in the DSICOR Report regarding surrounding properties of potential environmental concern (at pages 17 to 21 and Tables 2.2 and 2.3) identifies no historic or existing dry cleaning businesses within 150 metres of Suncor's land.

[166] The SLR Report #2 also states that the VOCs detected in shallow soil vapour must have originated from the contaminated groundwater in the aquifer. Conversely, the North Report #3 states that it is "not feasible" for contaminated groundwater located 20 to 25 mbgs to cause PERC and DCE detections in shallow soil vapour. The North Report #3 opines that the density of soils near the surface, and presence of perched groundwater, would inhibit the upward migration of vapours from the aquifer. The North Report #3 also notes that no PERC was detected in the deep groundwater near VMW1.

[167] The Panel agrees with the North Report #3 that no PERC was detected in the deep groundwater near VMW1, and therefore, deep groundwater could not have been the source of the PERC detected in shallow soil vapours at VMW1 in September 2011. Specifically, no PERC or other VOCs were detected in the deep groundwater in BH24 (24.1 to 27.1 mbgs) on July 20, 2011 (an original and a duplicate sample were taken). BH24 is located in the southeast portion of Suncor's land between the former fuel pump islands, approximately five metres away from VMW1. Based on the absence of PERC and other VOCs in the deep groundwater in the vicinity of VMW1, the Panel finds that the most likely explanation for the presence of PERC in soil vapours at VMW1 is that there was a source of PERC on or near the ground surface at or near VMW1.

[168] Having said that, it is important to note that the levels of PERC detected in vapours at VMW1 (4.2 micrograms[1] per cubic metre) were far below the numerical standards for commercial and residential land use, which are 2,000 and 600 micrograms per cubic metre, respectively. This means that the concentration of PERC detected in soil vapours at VMW1 did not constitute "contamination" as defined in Part 4 of the *Act*.

[169] Regarding VMW2, where DCE was detected in shallow soil vapours in 2011, and PERC was detected in shallow soil vapours in 2013, the Panel notes that DCE and PERC (and TCE) were detected in the deep groundwater in the vicinity of VMW2, particularly at BH25 located approximately six metres away from VMW2. Specifically, in July and August 2011, DCE and TCE were detected at BH25 in concentrations exceeding the drinking water standard, and PERC was detected at BH25 in concentrations below the drinking water standard. In February, May, August, and October 2013, BH25 was not tested for PERC, but DCE and TCE were detected at BH25 in concentrations below the drinking water standard.

[170] Thus, according to the theory proposed in the SLR Report #2, the deep groundwater could be the source of the DCE detected in vapour at VMW2 in

[1] A microgram is one millionth of a gram.

September 2011 (PERC was not analyzed), and possibly the PERC detected in vapour at VMW2 in February 2013 (although only based on the detection of PERC at BH25 in 2011, since PERC was not tested at BH25 in 2013). However, the Panel finds that the SLR Report #2 does not explain how contaminated groundwater at least 20 mbgs would cause PERC and DCE to be detected in shallow soil vapours near the ground surface. On the other hand, the Panel also finds that the North Report #3 does not explain how surface soils and perched groundwater would inhibit the upward migration of VOC vapours from the aquifer. The perched groundwater is intermittent, varying both spatially and seasonally, and it is unclear whether any perched groundwater was present below VMW2 when vapours were sampled in September 2011 and February 2013. The Panel also finds that it is unclear how the density of surface soil at VMW2 would inhibit the upward migration of DCE vapours from the deep groundwater, given that the soils generally consist of sand, gravel, cobbles and some silt. Thus, on balance, the Panel finds that the evidence with respect to the likely source of the DCE and PERC vapours detected at VMW2 is contradictory and inconclusive.

[171] Suncor relies on the absence of TCE in soil vapours as evidence that the VOCs in the groundwater did not originate on Suncor's land. According to the SLR Report #2, if TCE was spilled or dumped on Suncor's land, it would have been detected in soil vapour in the vicinity of the former garage; i.e., VMW5 located in the north corner of the former building's footprint. However, the Panel finds that VMW5 is within the area where the top two metres of soil was excavated and replaced with fill, and the testing of soil vapours for VOCs occurred 15 to 16 years afterwards. Consequently, the Panel finds that the absence of VOCs in shallow soil vapours at VMW5 is not evidence that Suncor's land was not a source of the VOCs detected in the groundwater.

[172] In addition, the Panel finds that there is no evidence to support Suncor's assumption that solvents could only have entered the ground at or near the footprint of the former garage. As discussed below, the Panel finds that during the decades when the garage operated on Suncor's land, pavement covered most of the surface of Suncor's land, and surface drainage was directed towards catch basins. It is possible that solvents entered the catch basins located on, and adjacent to, Suncor's land as a result of spills, leaks, or inappropriate disposal, but neither the DSICOR Report nor the parties' experts considered that possibility. The Panel notes that VMW1 (where PERC was detected in 2011) is very close to the former CB2 (as shown on a February 28, 1997 site map). Also, VMW2 is a few metres away from the former CB1 (as shown on the February 28, 1997 map). The former CB1 is labelled as CB2 on Drawing 2.1, dated September 15, 2014 and titled "Former Facilities Plan", in the DSICOR Report.

[173] For these reasons, the Panel concludes that the presence of low levels of PERC in shallow soil vapours at VMW1, many years after remedial activities were completed nearby, is possible evidence of an historic source of VOCs on Suncor's land at or near VMW1. Regarding VMW2, the expert evidence is conflicting and inconclusive as to whether vapours from contaminated deep groundwater below VMW2 could be the source of the DCE and PERC detected in shallow soil vapours at VMW2. The Panel finds that more information is needed about the soil density and presence of perched groundwater in the vicinity of VMW2 to determine whether the

PERC and DCE vapours could have originated from contaminated groundwater in the aquifer below VMW2. Finally, the absence of VOCs in vapours at VMW5, in an area that was remediated, is not evidence that there was no historic source of VOCs on Suncor's land.

Further information that should be considered regarding possible source(s) of VOC contamination

[174] The North Report #1 states on page 20 that "preferential pathways such as high permeability soils around utilities" should be considered when assessing groundwater flow on contaminated sites, but Mr. North dismisses utility corridors as a factor in the present case, stating that "the groundwater is below the utilities at least in the area of the Suncor Property". Similarly, the DSICOR Report states on page 55 that the contaminated soil and groundwater are located beneath, and not intersecting, utility lines, and "the likelihood of contaminated groundwater to migrate towards utility lines is considered small." Also, on page 55, the DSICOR Report refers to Drawing 2.1 dated September 15, 2014, titled "Former Facilities Plan". Drawing 2.1 shows the locations of utilities such as storm sewers, sanitary sewers, and water lines on the City Lands, as well as some former facilities that were on Suncor's land, such as the building, underground fuel storage tanks, and fuel pump islands.

[175] The Panel finds that the possibility of solvents entering catch basins, and storm/sewer pipes that may have connected to catch basins, was not considered in the DSICOR Report. According to historical site reports in the Appendices to the DSICOR Report, surface runoff on Suncor's land was historically directed towards on-site catch basins. The site reports also indicate that Suncor's land was mostly paved when the garage was operating, except for some landscaped areas in the western portion of Suncor's land and a few small strips beside the roadways.

[176] For example, the earliest site report, dated May 2, 1996, in the Appendices to the DSICOR Report, states on page 1:

> Surface runoff has historically been directed towards on-site catch basins. Regionally, the ground surface near the site slopes northward.

[177] Similarly, a site report dated April 24, 1997, states on page 2 that "Surface drainage across the site is directed primarily to on-site catch basins." Consequently, any other liquids on paved surfaces, such as spilled or leaked solvents, would also have drained towards on-site catch basins. The North Report #3 states on page 5 that given the number of years that the garage operated on Suncor's land, "even if only small quantities [of solvents] were spilled per year, the cumulative effect of the contamination would likely be significant."

[178] A site map dated February 28, 1996, shows five catch basins in total: two on Kingsway; and, three on Suncor's land. The catch basins on Suncor's land are labelled CB2, CB4 and CB5. CB2 was located on the southeast edge of Suncor's land adjacent to Kingsway, near the former fuel pump islands. CB4 and CB5 were located on the north edge of Suncor's land adjacent to Imperial Street. CB4 was approximately three metres away from the west side of the former building. CB5 was approximately 14 metres away from the west side of the former building.

[179] Based on the statement in the May 2, 1996 report that "the ground surface near the site slopes northward", it appears that most surface runoff and any other liquids would have drained towards the catch basins located on the northern part of Suncor's land; i.e., CB4 and CB5. This is consistent with site reports dated July 30, 1997 (page 5) and September 24, 1997 (page 5), which state that the principal direction of shallow groundwater flow appeared to be towards the north. The Panel notes that the highest concentrations of TCE and DCE in the aquifer (as shown in Figures 1 and 2 in the North Report #1, and Drawing 4.19 in the DSICOR Report) are found to the north of Suncor's land below Imperial Street, and along the northern edge of Suncor's land adjacent to Imperial Street.

[180] Based on the historical maps/drawings in the Appendices to the DSICOR Report, it is unclear whether CB4 or CB5 were connected to storm (or sewer) pipelines, or simply drained into the ground. None of the maps/drawings show a pipe connected to CB4 or CB5. The map dated February 28, 1996, and several subsequent maps, show a line labelled "Storm" perpendicular to Imperial Street, running from Suncor's land, midway between CB4 and the former building, to the middle of Imperial Street, but the "Storm" line does not connect to CB4 or CB5. The "Storm" line also does not connect to any pipeline continuing along Imperial Street. Some subsequent maps of the former facilities, including Drawing 2.1 in the DSICOR Report, show a storm drain pipeline running parallel to the north side of Imperial Street, but no maps show a connection between a storm drain pipeline and CB4 or CB5.

[181] However, there is one reference to piping associated with CB4 and CB5. An April 24, 1997 site report, titled "Re: Excavation Monitoring at Former Service Station at Kingsway and Imperial", states on page 3 that "C4 and C5 and associated piping" were removed from the site. The reason for their removal is not stated, but the report states that their removal was one of the activities carried out in October/November 1996 "associated with the excavation of impacted soils at the site". Thus, the removal of CB4 and CB5 coincided with the remedial excavations on Suncor's land.

[182] It is notable that CB4 and CB5 do not appear on subsequent maps showing former facilities on Suncor's land. For example, page 2 of a site report dated July 30, 1997, refers to an attached map 1.2 illustrating the former site facilities, but the map (dated May 15, 1997) does not show CB4 or CB5. Similarly, CB4 and CB5 are not included in the former facilities shown on Drawing 2.1 in the DSICOR Report.

[183] It also appears that CB2 was removed from Suncor's land sometime after June 2007, and subsequent site maps do not show a former catch basin in that location. A map dated June 13, 2007, shows CB1 and CB2 in the same locations as on the February 28, 1996 map. However, Drawing 2.1 in the DSICOR Report does not show CB2 in that same location. Drawing 2.1 shows three catch basins in total, all of which are on Kingsway. It appears that a new catch basin, labelled CB1 on Drawing 2.1 in the DSICOR Report, was installed on Kingsway near the west corner of Suncor's land at a location that was previously labelled as a manhole (MH2) on earlier maps. The former CB1 on earlier maps is labelled CB2 on Drawing 2.1 in the DSICOR Report. CB3 remains in its original location.

[184] Until late 2006, maps of the former facilities continued to show a line labelled "Storm" (or in some cases "ST") running from Suncor's land to the middle of Imperial Street. A site map dated March 13, 2006, shows that line, but a site map dated December 5, 2006, and all subsequent maps, do not. Drawing 2.1 in the DSICOR Report does not show the former "storm" line running from Suncor's land to the middle of Imperial Street.

[185] Similar to the fact that the former catch basins and storm line on Suncor's land are not shown on Drawing 2.1 in the DSICOR Report, the DSICOR Report states on page 3 that "precipitation is expected to infiltrate the subsurface" because the site is unpaved, and "surface runoff would likely be directed to the nearby catch basins located on City property." While this may be an accurate description of the site's surface runoff and drainage pattern as of June 2015 when the DSICOR Report was completed, the failure to mention or discuss historic runoff patterns and drainage facilities on Suncor's land is a gap in the DSICOR Report. The DSICOR Report should have mentioned that, during the decades when the garage operated and solvents could have been spilled or dumped, surface runoff on Suncor's land drained across primarily paved surfaces into on-site catch basins, and primarily to the north, and those catch basins may (or may not) have been connected to storm pipes on the City Lands.

[186] The Panel finds that neither the DSICOR Report, nor the reports provided by Suncor and the City in this appeal, consider whether the former catch basins on Suncor's land may have received solvents originating from Suncor's land, from spills/leaks that drained into the catch basins, or due to improper disposal of solvents into catch basins. If solvents entered the former catch basins, they could have leaked into the ground around the catch basins, or into utility corridors (if the catch basins were connected to storm pipes) that may have provided preferential pathways for contaminants, which could have descended over time into the aquifer. The Panel finds that the former catch basins on Suncor's land should have been considered as locations where, historically, solvents from the garage could have entered the soil and groundwater on Suncor's land and/or the City Lands. This gap in the DSICOR Report and the parties' expert reports with respect to a possible source of VOC contamination should be addressed.

Conclusion - whether Suncor's land is a flow-through site for VOC contamination

[187] The Panel finds that the evidence as a whole leaves some key questions unanswered. The Panel has identified deficiencies and gaps in some key aspects of the DSICOR Report with respect to the VOC contamination, which are not entirely resolved by the parties' evidence, much of which is conflicting and/or inconclusive with respect to the likely source and direction of migration of the VOC contamination. While there is some evidence that Suncor's land could possibly have been a historic source of the VOC contamination on the City Lands, the evidence is currently insufficient to prove this on a balance of probabilities. The Panel finds that addressing the deficiencies and gaps that have been identified may help to resolve the questions that remain about the likely source and direction of migration of the VOC contamination, which may ultimately clarify whether Suncor's land is, on a balance of probabilities, a flow-through site for the VOC contamination.

ii) Whether Suncor failed to delineate xylenes in soil

[188] During the 1996 excavation in the vicinity of the former underground fuel tanks, xylenes in excess of the soil standard for commercial land use were found at South Wall #1 on the southern edge of the excavation (near Kingsway), at a depth of 1.8 mbgs. The soil at South Wall #1 contained xylenes at a concentration of 34.7 micrograms per gram, and the numerical standard for commercial land use is 20 micrograms per gram.

[189] According to Parsons, the xylenes contamination at this part of the site was delineated by BH17, located approximately one to two metres away from South Wall #1, between South Wall #1 and Kingsway. BH17 was drilled in 1997 and screened at a depth of 7.2 to 16.4 mbgs. In 1997, soil sampled at a depth of 10.7 to 10.8 mbgs in BH17 contained xylenes levels of 4.85 micrograms per gram, which is well below the commercial land use standard. Soil sampled at a depth of 16.5 to 16.8 mbgs in BH17 contained no detectable levels of xylenes (i.e., less than 0.05 micrograms per gram). However, as the City has pointed out, the shallowest soil sample at BH18 was 10 metres below the contamination found at South Wall #1.

[190] Following remedial activities, soil from several boreholes on Suncor's land adjacent to Kingsway, and on Kingsway itself, was tested for xylenes. In 2006, 11 samples (including one duplicate) were taken from MW06-38B at depths ranging from 4.6. to 29.3 mbgs. MW06-38B is located on Kingsway adjacent to Suncor's land, approximately seven metres southwest of BH17. The samples from MW06-38B contained no measurable xylenes (i.e., less than 0.1 micrograms per gram). Similarly, in 2004, four soil samples taken from MW04-22 at depths ranging from 2.3 to 11 mbgs also contained no measurable xylenes concentrations. MW04-22 is located near the edge of Suncor's land, adjacent to Kingsway, approximately seven metres southeast of BH17.

[191] Although the soil samples from BH17 in 1997 were at least 10 metres below the contamination found at South Wall #1 in 1996, the Panel finds the results from BH17 vertically delineate the xylenes found at South Wall #1, and have some relevance to the horizontal delineation of xylenes, especially when considered together with the post-remediation results from other locations along the south edge of Suncor's land and on Kingsway, particularly MW06-38B and MW04-22. Except for the 1997 sample taken from BH17 at 10.7 to 10.8, in which xylenes were below the commercial numerical standard, the samples from shallow and intermediate depth soils in BH17, MW06-38B and MW04-22 contained no detectable amounts of xylenes. Although more sampling could have been done to more finely delineate the xylenes contamination found at South Wall #1, the Panel finds that Suncor adequately delineated the xylenes contamination in soil around South Wall #1, for the purposes of its application for a risk-based CoC for the City Lands.

[192] In addition, the Panel finds that the removal of soil adjacent to South Wall #1 to a depth of approximately four metres, followed by the recovery of vapours and groundwater through RW10 (located approximately two metres away from South Wall #1, and screened at a depth of 6.6 to 15.2 mbgs) for six years, appear to have remediated the xylenes contamination identified in soil at South Wall #1 in 1996, based on the post-remediation results for xylenes. The Panel finds that the risk associated with any xylenes that may remain in soil on Kingsway near South

Wall #1 appears to be low, and further investigation or delineation of xylenes on the City Lands is not warranted.

iii) Whether Suncor failed to properly investigate soil vapours for hydrocarbons and VOCs

[193] No soil vapour monitoring wells were installed on the City Lands, but some of the nine vapour monitoring wells on Suncor's land are located near the City Lands. VMW1 is adjacent to Kingsway in the southeast part of Suncor's land, and VMW5 and VMW6 are adjacent to Imperial Street along the northern edge of Suncor's land. The question is whether the lack of soil vapour investigation on the City Lands, particularly on Imperial Street, is a data gap that Suncor should have to address. Suncor accepts responsibility for delineating and remediating petroleum hydrocarbon contamination on the City Lands, and acknowledges that residual petroleum hydrocarbon contamination was detected in BH38 (on Imperial Street) and left in place, but Suncor claims that any soil vapours associated with this residual contamination need not be investigated. Suncor rejects responsibility for investigating soil vapours arising from VOC contamination in the City Lands.

[194] The nature of the residual petroleum hydrocarbon contamination detected at BH38 is as follows. On May 4, 2012, benzene concentrations of 0.17 micrograms per gram were detected in soil at a depth of 4.3 mbgs in BH38 on Imperial Street. For benzene in soil, the numerical standard for commercial land use is 0.04 micrograms per gram. The sample taken at 4.3 mbgs in BH38 also contained detectable amounts of toluene and ethylbenzene, but at concentrations that were well below the commercial land use standards for those substances. A deeper soil sample taken from BH38, at a depth of 7.9 mbgs, contained no detectable concentrations of benzene, toluene, ethylbenzene, or any other hydrocarbon parameter that was tested.

[195] Soil vapour samples were not taken at BH38 or anywhere else on Imperial Street. However, shallow soil vapour was sampled at VMW6, located approximately five metres away from BH38, and adjacent to the presumed area of residual petroleum hydrocarbon contamination on Imperial Street. According to Table 4.21A in the DSICOR Report, soil vapours from VMW6 were tested for petroleum hydrocarbon parameters (and TCE and DCE) at a depth of approximately one mbgs on June 6, 2012 and September 16, 2013. In the June 2012 sample, all substances were below the detection limits. In the September 2013 sample, all substances except toluene were below the detection limits. Toluene was detected at a concentration of 12 micrograms per cubic metre, and the commercial numerical standard is 15,000 micrograms per cubic metre. The Panel finds that the toluene detected in soil vapour at VMW6 was well below both the commercial standard, and the residential numerical standard of 5,000 micrograms per cubic metre.

[196] The detection limits for benzene vapour in VMW6 were 3.3 and 5 micrograms per cubic metre, respectively, in the 2012 and 2013 tests. If benzene was present in those vapour samples just below the detection limits, the predicted indoor air concentration would be 0.066 for the 2012 test, and 0.1 for the 2013 test (a vapour attenuation factor of 0.02 was applied in the DSICOR Report to estimate indoor air concentrations). Consequently, any benzene vapour that may have been present below the detection limits was well below the commercial numerical standard of 4

micrograms per cubic metre, and the residential numerical standard of 1.5 micrograms per cubic metre.

[197] The Panel has also considered the fact that the soil vapour sample in VMW6 was taken at a depth of approximately one mbgs, but the contaminated soil in BH38 was detected at 4.3 mbgs, and the City is concerned that City workers may be exposed to vapours in utility corridors below Imperial Street. At page 55, the DSICOR Report states that the deepest utility corridor on Imperial Street is a communication line at approximately 2.4 mbgs. Therefore, the benzene contamination detected in soil at BH38 is approximately two metres deeper than the deepest utility corridor on Imperial Street. No benzene was detected in soil vapours at a depth of one mbgs. Based on the evidence, the Panel finds that any benzene that may exist in soil vapours at the depth of the utility corridors would likely meet the numerical standards for indoor air that apply to commercial land use.

[198] In summary, for all petroleum hydrocarbon vapour parameters that were tested at VMW6, including benzene, the Panel finds that the risk associated with soil vapours arising from the residual petroleum hydrocarbons in soil at BH38 appears to be low, as vapour levels are likely below the numerical standards for commercial land use, and even for residential land use. Based on the evidence, the Panel finds that investigating soil vapours on Imperial Street for petroleum hydrocarbons is not warranted in the circumstances, assuming that a CoC based on risk-based remediation (rather than remediation to numerical standards) is appropriate in this case, which is discussed under Issue 2.

[199] Regarding the lack of testing for VOCs in soil vapour on Imperial Street, which the City asserts is the biggest gap in the vapour data, the Panel has considered the fact that TCE and DCE concentrations in excess of drinking water standards were found during 2011 to 2013 in the deep groundwater below Imperial Street at depths of 21.9 or more mbgs (BH36, BH39, BH41, and MW06-35B). The Panel has also considered the fact that the deepest utility corridor on Imperial Street is at approximately 2.4 mbgs, at least 19.5 metres above the contaminated groundwater.

[200] In addition, the Panel has considered the fact that TCE and DCE were not detected in shallow soil vapours at VMW6 or VMW5, located in the north part of Suncor's land near Imperial Street. The detection limits for DCE vapour in VMW6 and VMW5 ranged from 3.3 to 5 micrograms per cubic metre in the 2012 and 2013 tests. If DCE was present in the vapour samples just below the detection limits, the predicted indoor air concentration would range from 0.066 to 0.1 micrograms per cubic metre. Consequently, any DCE that may have been present below the detection limit was well below the numerical standard of 1 microgram for both residential and commercial land use. Similarly, any TCE that may have been present below the detection limit of 0.65 to 1 micrograms per cubic metre would correspond to a predicted indoor air concentration of 0.013 to 0.02 micrograms per cubic metre, which is well below the commercial and residential numerical standard of 0.5 micrograms per cubic metre.

[201] Concentrations of TCA at the detection limit of 3.3 micrograms per cubic metre were identified at VMW5 on June 22, 2012. Suncor claims this result is an

anomaly since the detection limit for TCA was 3.3 micrograms per cubic metre, and TCA was only detected in the duplicate sample, not the original sample. The Panel finds that even if the TCA detected in the duplicate sample was an accurate result, this concentration of TCA corresponds to a predicted indoor air concentration of 0.066 micrograms per cubic metre, which is well below the commercial and residential numerical standards of 6,500 micrograms per cubic metre and 2,000 micrograms per cubic metre, respectively.

[202] Based on the evidence, and the fact that the deepest utility corridor on Imperial Street is at least 19.5 metres above the VOC contaminated groundwater, the Panel finds that even if VOCs are present in shallow soil vapours on Imperial Street (although none were detected in vapours from VMW6, and no DCE or PERC vapours were detected in VMW5, both on the northern edge of Suncor's land), their concentrations are likely below the numerical standards for commercial and residential indoor air. Consequently, the Panel finds that even if Suncor's land was a source of the VOC contamination (which has not been determined), the risk associated with any VOCs in soil vapours appears to be low. Testing for VOCs in soil vapour on Imperial Street is not warranted in these circumstances, assuming that a CoC based on risk-based remediation (rather than remediation to numerical standards) is appropriate in this case, which is discussed under Issue 2.

[203] For these reasons, the Panel concludes that Suncor's investigations of soil vapours for hydrocarbons and VOCs were adequate for the purposes of seeking a risk-based CoC for the City Lands.

iv) Whether Suncor failed to properly delineate VOCs on Suncor's land

[204] The Panel finds that this argument goes to the merits of the Suncor Land Certificate, which is not the subject of this appeal. Indeed, the North Report #1 states that this alleged deficiency in the DSICOR Report relates to Suncor's land. The Panel further finds that questions regarding the merits of the DSICOR Report as it pertains to the Suncor Land Certificate are outside of the Board's jurisdiction in the present appeal. Consequently, the Panel makes no findings on this sub-issue.

Summary of findings on Issue 1

[205] The Panel's specific findings regarding the likely source(s) and migration of the VOC contamination are summarized as follows:

- The absence of the VOCs in intermediate to deep soil samples from three locations on Suncor's land, two of which have likely been affected by remediation activities, does not support a conclusion that Suncor's land was not a source of the VOC contamination. However, the soil data also does not assist in proving, on a balance of probabilities, that a source of VOCs existed on Suncor's land prior to the remediation.
- The limited data regarding VOCs in soil, and the lack of pre-remediation investigation of VOCs in soils, does not in itself render the DSICOR Report deficient as a detailed site investigation report. Testing for VOCs in groundwater and soil vapour are better methods for determining the likely source of the VOCs.

- The DSICOR Report is misleading at page 63 where it states that evidence of elevated "solvent concentrations in groundwater wells screened within the shallow and intermediate zones… has not been observed" [underlining added]. There was no testing for VOCs in shallow perched groundwater.
- The absence of VOCs in post-remediation groundwater from intermediate-depth well MW05-30, in the western corner of Suncor's land, is evidence that there was probably not a source of VOCs on Suncor's land in the vicinity of that well, as this area probably was not affected by remedial activities. However, the absence of VOCs in post-remediation groundwater from intermediate-depth wells MW05-31, MW04-28B, and MW04-23B is not evidence that there was, or was not, a source of VOCs on Suncor's land in the vicinity of those wells, as these areas were affected by remedial activities. The evidence is conflicting as to whether the presence of VOCs in groundwater just above the aquifer in MW05-32B, in the southeast part of Suncor's land, is evidence of a historical source of VOCs on the ground surface in this area, or whether this was caused by contaminated groundwater from the aquifer. Reviewing seasonal data on the groundwater level in the aquifer may help resolve the conflicting evidence regarding whether groundwater contaminated from the aquifer migrates upward into the intermediate zone at times. Also, testing for VOCs in groundwater from other shallow to intermediate-depth wells in the southeast part of Suncor's land may assist in determining whether there was an historic source of VOCs in this area.
- Seasonal variations in groundwater flow direction were not presented in the DSICOR Report. This gap should be addressed, as such information could clarify the groundwater flow interpretation, which may help determine the likely source(s) of the VOC contamination.
- Potentiometric data for the aquifer in the southeast part of Suncor's land and the adjacent part of Kingsway is not properly presented or discussed in the DSICOR Report. This gap should be addressed, as it may help resolve the conflicting evidence on whether groundwater in the aquifer flows, at least part of the time, to the north/northeast below Suncor's land.
- The presence of low levels of PERC in shallow soil vapours at VMW1, many years after remedial activities were completed nearby, appears to be evidence that an historical source of VOCs existed on Suncor's land at or near that location. However, this evidence alone is insufficient to establish, on a balance of probabilities, that Suncor's land is the source of the VOCs detected in the aquifer below the City Lands. Regarding the presence of PERC and DCE in shallow soil vapours at VMW2, more information is needed to determine whether the PERC and DCE vapour originated from contaminated groundwater in the aquifer.
- Neither the DSICOR Report, nor the reports provided by Suncor and the City, consider whether the catch basins that existed on, and adjacent to, Suncor's land during the decades when the garage operated may have received solvents originating from Suncor's land, either from spills/leaks that drained into the catch basins, or due to the improper disposal of solvents into catch

> basins. If solvents entered the catch basins, they could have leaked into the adjacent ground or utility corridors, and then descended over time into the aquifer. The catch basins, and any associated piping, that existed when the garage was operating should be assessed as possible locations where solvents from the garage could have historically entered the soil and groundwater on Suncor's land and/or the City Lands.

[206] The question of whether Suncor failed to properly delineate VOCs on Suncor's land goes to the merits of the Suncor Land Certificate, and is beyond the Board's jurisdiction in this appeal.

[207] The Panel directs the Director to require Suncor to address the above-mentioned deficiencies in the DSICOR Report regarding the possible source and direction of migration of the VOC contamination that exists on the City Lands. If new information establishes that Suncor's property is likely a source of the VOC contamination, section 60 of the *Act* authorizes the Director to exercise any of his powers or functions under Part 4 of the *Act*, despite the existence of the City Lands Certificate.

[208] The Panel finds that Suncor adequately delineated xylenes in soil on the City Lands, as required by the legislation and Protocol 6. The Panel also finds that the information in the DSICOR Report is sufficient for the purposes of assessing the potential risks posed by xylenes in soil, and issuing a risk-based CoC for the City Lands. The Panel finds that the remedial activities on Suncor's land are likely to have mitigated the xylenes contamination that originated on Suncor's land, and the risk associated with any residual xylenes in soil on Kingsway adjacent to Suncor's land appears to be low.

[209] Suncor's investigations of shallow soil vapours for petroleum hydrocarbons and VOCs were adequate for the purposes of assessing the potential risks associated with soil vapours from those contaminants, and seeking a risk-based CoC for the City Lands. The risk associated with shallow soil vapours from residual petroleum hydrocarbons on Imperial Street appears to be low. Also, even if it is determined, based on further information, that Suncor's land is a source of VOC contamination on the City Lands, any risk associated with shallow soil vapours from the VOC contamination on Imperial Street appears to be low.

[210] With respect to the petroleum hydrocarbon contamination on the City Lands, the Panel concludes that the DSICOR Report met the requirements of section 53(3) of the *Act*, and sections 49(2) and 59(2) of the *Regulation*, and Suncor complied with the requirements imposed by the Director under Protocol 6.

3. Whether Suncor failed to give preference to remediation alternatives that provide permanent solutions to the maximum extent practicable, and/or the Director failed to consider whether permanent solutions were given preference to the maximum extent practicable, as required by section 56 of the *Act*.

The City's submissions

[211] The City submits that section 56 of the *Act* required Suncor to give preference to remediation alternatives that provide permanent solutions to the maximum extent practicable, and required the Director to consider whether permanent solutions were given preference to the maximum extent practicable before he issued the City Lands Certificate. The City submits that the DSICOR Report is deficient, and the Director should not have issued the City Lands Certificate, because Suncor failed to give preference to permanent solutions for remediating benzo(a)pyrene and ethylbenzene in groundwater, and benzene in soil, on the City Lands, to the maximum extent practicable. The City argues that Suncor could have remediated those contaminants to numerical standards with minimal additional effort, and should have done so.

[212] The City submits that benzo(a)pyrene in groundwater on the City Lands was not found to exceed the applicable standards. Parsons inferred this to be so based on an exceedance on Suncor's land (MW04-26B) which was sampled twice in 2005. The City submits that another well on Suncor's land (MW05-29) that showed benzo(a)pyrene contamination in initial investigations did not show this contamination in subsequent investigations, which suggests that the contaminant attenuated over time. Based on the North Report #2, the City argues that MW04-26B should have been re-sampled at a later date, to see if benzo(a)pyrene had also attenuated there. The City argues that, if further sampling had occurred and benzo(a)pyrene was no longer present in concentrations that exceeded the applicable standards, it would not have been listed on the City Lands Certificate.

[213] Similarly, the City submits that ethylbenzene was never confirmed to exist in groundwater on the City Lands in excess of the applicable standards. Parsons inferred this to be so based on exceedances found on Suncor's land (BH17 and MW04-23B) in 2010. Yet, the City Lands Certificate lists ethylbenzene as having been remediated to risk-based standards in groundwater on the City Lands. The City argues that Suncor could have taken additional steps to investigate and remediate ethylbenzene to numerical standards on the City Lands, including installing a well on the City Lands to confirm whether it was present, monitoring the groundwater for a few additional years (since Suncor did not apply for the City Lands Certificate until 2015) to see if ethylbenzene attenuated over time, and if necessary, extending the dual phase extraction system to Kingsway through a shallow trench that would not have affected traffic or pedestrians. The City submits that the concentrations of ethylbenzene were relatively low, and remediation to numerical standards could have been achieved in less than the six years that the dual phase extraction system operated on Suncor's land.

[214] The City submits that a minor exceedance of benzene was identified in soil at BH38 on Imperial Street, and Suncor should have drilled and collected additional

samples between BH38 and Suncor's land to confirm the extent of the plume. If contamination was confirmed, Suncor should have extended the dual phase extraction system to the City Lands, and remediated the benzene to numerical standards. The City argues that the concentration of benzene was relatively low, and remediation to numerical standards would have been achieved in less than the six years that the dual phase extraction system operated on Suncor's land.

[215] According to the North Report #2, the additional cost to extend the dual phase extraction system to the City Lands and remediating the benzene (under Imperial Street) and ethylbenzene contamination (under Kingsway) to numerical standards would have been relatively minor - $10,000 to $20,000 – since the dual extraction system was already in place for six years on Suncor's land. The North Report #2 states that the benefits of doing so would have included eliminating the restrictions that the City Lands Certificate places on the City Lands, and eliminating health and safety concerns, and associated costs to the City, related to these remaining contaminants.

[216] In these circumstances, the City argues that not requiring Suncor to remediate benzo(a)pyrene and ethylbenzene in groundwater, and benzene in soil, to numerical standards on the City Lands was contrary to section 56(2) of the *Act*.

The Director's submissions

[217] The Director submits that risk management of contaminants in accordance with appropriate conditions in a CoC can provide a permanent solution. The Director submits that the residual petroleum hydrocarbons on the City Lands are minor in extent and magnitude, are located under established roadways at depths greater than 4.3 mbgs, and appear to have a low potential to cause adverse effects on human health or the environment. In these circumstances, the Director argues that there is no justification to require Suncor to incur additional costs to achieve a minor reduction in concentrations to achieve the numerical standards.

Suncor's submissions

[218] Suncor submits that either numerical or risk-based remediation standards may provide permanent solutions, based on the common meaning of the word "permanent", because both approaches are intended to provide an enduring, stable state without marked change. Suncor also submits that even if a site is remediated to numerical standards, residual amounts of the contaminants will remain.

[219] Furthermore, Suncor argues that while it may have been possible to remediate benzo(a)pyrene and ethylbenzene in groundwater, and benzene in soil, to numerical standards, it would have cost at least $235,000 to attempt such remediation on the City Lands, and it may not have succeeded in remediating the City Lands to numerical standards, according to the SLR Report #2. Specifically, according to the SLR Report #2, investigating the benzene on Imperial Street would have required two additional boreholes, and would have cost approximately $15,000. Addressing the soil and groundwater contamination on the City Lands would have required five additional shallow recovery wells (three on Suncor's land and two on Imperial Street), and two deep recovery wells (one on Suncor's land and one on Imperial Street). The SLR Report #2 estimates that installing the

recovery wells would have cost at least $30,000, permits for drilling and road repairs would have cost $20,000, additional piping, pumps and treatment facilities for water would have cost $75,000 and for vapour would have cost $50,000, and increased operation and maintenance costs would have been $60,000.

[220] Suncor maintains that the source of the petroleum hydrocarbon contamination has largely been removed, these contaminants were at low levels on the City Lands, and further remediation of these contaminants would be expensive and provide little additional benefit. Also, it is uncertain whether extending the dual phase extraction system as suggested by the City would have resulted in remediating the City Lands to numerical standards, given that risk assessment was still used on Suncor's land for petroleum hydrocarbons in soil and groundwater.

[221] Moreover, Suncor submits that the risks from any remaining contamination are acceptable given that the City Lands are used as roadways, which is unlikely to change, the utility corridors are approximately 2.4 mgbs, and it is unlikely that a trench would be excavated deeper than 3.6 mgbs. Suncor maintains that the conditions in the City Lands Certificate pose no practical detriments to the City.

[222] Regarding the City's argument that benzo(a)pyrene in groundwater should not have been included in the City Lands Certificate because no such contamination was detected on the City Lands, Suncor submits that benzo(a)pyrene in excess of drinking water standards was detected in well MW04-26B, located on the boundary between Suncor's land and the City Lands, after remediation concluded. According to the SLR Report #2, it was necessary to assume that an area around MW04-26B was contaminated with benzo(a)pyrene. Suncor argues that it is speculative to assert that further sampling at a later date may have found no benzo(a)pyrene.

[223] Similarly, regarding ethylbenzene in groundwater, which was detected in two wells on Suncor's land within one to two metres of Kingsway, Suncor submits that it was necessary to include the City Lands in the area containing ethylbenzene in groundwater, as stated in the SLR Report #2.

[224] Regarding the benzene contamination in soil at BH38, Suncor submits that the benzene was not shallow, was below Imperial Street, and considerable excavation or an expensive remediation system would have been required to remove this minor amount of contamination. Suncor maintains that further remediation of the benzene was unnecessary in the circumstances.

The City's reply submissions

[225] The City submits that there is no technical justification for taking one sample from MW04-26B, the only well on the City Lands in which benzo(a)pyrene slightly exceeded the numerical standards. The City maintains that favourable results were obtained from other wells that were re-sampled. The City argues that a clean result probably would have been obtained if MW04-26B had been re-sampled at a later date, which would have eliminated the need to include benzo(a)pyrene in the City Lands Certificate. Similarly, additional investigation would have likely confirmed that ethylbenzene in groundwater on the City Lands had declined post-2010, such that it could have been removed from the City Lands Certificate.

[226] Finally, the City disputes Suncor's claim that it would have been costly to remediate the petroleum hydrocarbon contamination on the City Lands to numerical standards. The City argues that the area in question is relatively small (less than approximately 10 metres by 10 metres), there was no need to install deep recovery wells because the soil contamination was at 4.3 mbgs, and the contamination was at lower concentrations than on Suncor's land. The City maintains that this would have provided a more permanent solution to the contamination on the City Lands, and the risk-management conditions in the City Lands Certificate would be unnecessary.

The Panel's findings

[227] Section 56(1) of the *Act* provides that Suncor "must give preference to remediation alternatives that provide permanent solutions to the maximum extent practicable, taking into account" the factors listed in subsections (a) to (d). Similarly, section 56(2) requires that, when issuing a CoC, a director must consider "whether permanent solutions have been given preference to the maximum extent practicable…." The Panel finds that the phrase "permanent solutions" in section 56 must be considered in its statutory context, including the factors listed in subsections 56(1)(a) to (d), which are as follows:

> (a) any potential for adverse effects on human health or for pollution of the environment;
>
> (b) the technical feasibility and risks associated with alternative remediation options;
>
> (c) remediation costs associated with alternative remediation options and the potential economic benefits, costs and effects of the remediation options;
>
> (d) other prescribed factors.

[228] Thus, in determining whether Suncor and the Director complied with section 56 of the *Act*, the Panel must consider not only any potential for adverse effects on human health or the environment, but also the technical feasibility, risks, and remediation costs associated with alternative remediation options. In essence, the potential for any adverse effects on human health or the environment must be balanced against the technical feasibility, risks, and costs associated with alternative remediation options.

[229] There is no indication in section 56, or any associated statutory provisions, that remediation to numerical standards should be considered a more "permanent" or lasting solution than remediation to risk-based standards. Throughout the contaminated site remediation provisions in Part 4 of the *Act* and the *Regulation*, remediation to either numerical standards or risk-based standards is contemplated. For example, section 16 of the *Regulation* is titled "Remediation options", and states that "The numerical standards, or the risk based standards prescribed in section 18 or 18.1, may be used in relation to the remediation of a contaminated site" [underlining added]. The phrase "remediation standards" is defined in Part 4 of the *Act* to mean "numerical standards relating to concentrations of substances and standards relating to risk assessment, as prescribed in the regulations" [underlining added]. Consequently, the Panel finds that either numerical or risk-

based remediation standards may provide "permanent solutions" in the context of section 56 of the *Act*.

[230] The parties agree that no benzo(a)pyrene contamination in groundwater was detected the City Lands, but Parsons inferred such contamination to exist based on the benzo(a)pyrene contamination found in groundwater at MW04-26B in 2005. MW04-26B (screened at 11.5 to 14.7 mbgs) is located on the boundary between Suncor's land and Imperial Street. On February 16 and May 26, 2005, respectively, benzo(a)pyrene concentrations of 0.00005 mg/L and 0.00002 mg/L were detected at MW04-26B. The drinking water standard is 0.00001 mg/L. Groundwater from MW04-26B was again sampled on April 13, 2009, but this sample was not tested for benzo(a)pyrene.

[231] Another intermediate-depth well on Suncor's land, MW05-29, showed benzo(a)pyrene contamination in groundwater sampled on July 20, 2005, but no benzo(a)pyrene was detected in subsequent samples taken in 2006 and 2007. MW05-29 (screened at 13.4 to 15 mbgs) is located close to the boundary with Imperial Street, about 12 metres east of MW04-26B.

[232] No benzo(a)pyrene was detected in groundwater when intermediate-depth well MW05-33, on Suncor's land, was sampled in July 2005. MW05-33 (screened at 9 to 12 mbgs) is located approximately five metres west of MW04-26B. Similarly, no benzo(a)pyrene was detected in groundwater when intermediate-depth well BH37, on Imperial Street, was sampled in May 2012. BH37 (screened at 13.4 to 15 mbgs) is located approximately three metres north of MW04-26B.

[233] The DSICOR Report does not explain why the 2009 groundwater sample from MW04-26B was not tested for benzo(a)pyrene. It would have been logical to test that sample for benzo(a)pyrene to see if it was no longer detected, just as in MW05-29. It would have been logical to test a post-2005 sample from MW04-26B for benzo(a)pyrene, especially given that the benzo(a)pyrene exceedance in MW04-26B was relatively minor, benzo(a)pyrene was no longer detected by 2006 at MW-05-29, and intermediate-depth wells MW05-33 and BH37 located a few metres west and north, respectively, of MW04-26B contained no detectable concentrations of benzo(a)pyrene when they were sampled. If this had been done and there were no detectable concentrations of benzo(a)pyrene, it need not have been included in the City Lands Certificate. However, given the Panel's findings below, it would likely provide the City with little or no benefit if benzo(a)pyrene was not included in the City Lands Certificate.

[234] Ethylbenzene contamination was also never detected in groundwater on the City Lands, but it was inferred to exist on Kingsway based on contamination found at BH17 and MW04-23B in 2010. Those wells are located on Suncor's land adjacent to Kingsway. Groundwater from MW04-23B (screened at 11.5 to 14.6 mbgs) was tested for ethylbenzene 15 times (including five duplicate samples) between January 11, 2005 and May 19, 2010. Eleven of those samples (including three duplicates) contained ethylbenzene in excess of the drinking water standard, including the final sample (and duplicate) taken on May 19, 2010. The concentration of ethylbenzene in the May 2010 sample was actually higher than in the previous sample, taken in April 2009.

[235] Similarly, groundwater at BH17 (screened at 7.2 to 16.4 mbgs) was tested for ethylbenzene 19 times (including four duplicate samples) between July 29, 1997 and May 19, 2010. Twelve of those samples (including two duplicates) contained ethylbenzene in excess of the drinking water standard, including the final sample taken on May 19, 2010. No ethylbenzene was detected in the samples taken on January 16 and October 25, 2006, but ethylbenzene was detected in the next sample taken on May 13, 2009. The ethylbenzene concentration increased in the subsequent, and final, sample taken on May 19, 2010.

[236] Based on the close proximity of MW04-23B and BH17 to Kingsway, the Panel finds that it was logical to infer that this contamination extended to Kingsway. Based on the relatively consistent presence of ethylbenzene contamination in those wells for five to ten years, up to and including the final samples taken in May 2010, even after the remedial activities on Suncor's land, the Panel further finds that it was also logical to infer that this contamination would not have declined below the numerical standard between May 2010 and June 2015, when the DSICOR Report was finalized. The Panel finds that there is no basis to conclude that additional investigation post-2010 would have likely confirmed that the ethylbenzene in groundwater on the City Lands had abated, such that it could have been removed from the City Lands Certificate.

[237] The Panel has already discussed in detail, under Issue 1, the nature of the benzene contamination detected in soil at BH38 on Imperial Street. In summary, in May 2012, benzene contamination was detected at 4.3 mbgs, but a deeper soil sample taken at 7.9 mbgs contained no detectable concentrations of benzene. The City acknowledges that the benzene concentration in soil at BH38 was only "marginally above the standard", and the "minor exceedance at BH38 was localized." If so, this is consistent with the fact that no benzene was detected in shallow soil vapours in VMW6, located approximately five metres away from BH38, in 2012 or 2013. Assuming that Suncor's land was the source of the benzene contamination found at BH38, the source of the contamination had been remediated, and benzene would no longer be migrating to the City Lands in a significant way. In addition, for the reasons provided below, the Panel finds that the benzene contamination identified at BH38 poses little or no risk to human health or the environment. Based on these considerations, it is unclear to the Panel why Suncor should have been required to drill additional boreholes and collect additional soil samples close to BH38, and between BH38 and Suncor's land, to confirm the extent of the benzene contamination. Further investigations to more finely delineate the benzene contamination would have been unnecessary in these circumstances.

[238] Finally, after considering the factors listed in section 56(1)(a) through (d) of the *Act*, the Panel finds that permanent solutions have been achieved, to the maximum extent practicable, for the benzo(a)pyrene and ethylbenzene contamination in groundwater, and benzene contamination in soil, on the City Lands. These contaminants were located below established roadways which are unlikely to be used for any other purpose in the foreseeable future. The City acknowledges that the concentrations of ethylbenzene in groundwater adjacent to Kingsway were relatively low, and the benzene exceedance at BH38 was minor and localized. In addition, the benzene contamination was at least two metres below

the deepest utility corridor on Imperial Street, no benzene was detected in shallow soil vapours five metres away from BH38. The benzo(a)pyrene contamination detected in 2005 (if any remains) adjacent to Imperial Street was located even deeper, at least 11.5 mbgs. Similarly, the ethylbenzene contamination detected adjacent to Kingsway was at least 7.2 mbgs, several metres below the deepest utility corridor. Consequently, assuming that these contaminants remain on the City Lands, the Panel finds that they have low potential to cause adverse effects on human health or the environment.

[239] Also, given that the exceedances of these contaminants on the City Lands were relatively low, the Panel finds that only a slight reduction in any remaining benzo(a)pyrene, ethylbenzene, and benzene on the City Lands might be achieved by remediating to numerical standards. Further, any reduction in the already low risks posed by those contaminants would be minimal. Given that these contaminants pose little or no risk to City workers in utility corridors, and were located below established roadways which are unlikely to be used for any other purpose in the foreseeable future, it is unclear how the City would benefit from remediating these contaminants to numerical standards. Similarly, the City would receive little benefit from removing these contaminants and the associated risk-management conditions from the City Lands Certificate.

[240] Finally, regarding the estimated cost of remediating these contaminants to numerical standards on the City Lands, the Panel finds that even if the City is correct that no deep recovery wells would need to be installed since these contaminants were not detected beyond intermediate depths, the Panel finds that the City's estimates are too low. The City's estimated cost of extending the dual phase recovery system to the City Lands is based on what it would have cost when the system was operating on Suncor's land. However, the system was shut down in June 2005. Given that the City is asking the Board to now order Suncor to remediate all remaining hydrocarbon contaminants on the City Lands to numerical standards, the system would need to be re-started after being dormant for 13 years. Thus, the cost of extending the system now is likely to be greater than the City's estimate when the system was still operating. In addition, the City's estimate does not include the potential cost of remediating benzo(a)pyrene to numerical standards, because the City assumes that benzo(a)pyrene no longer exists above the applicable standards. However, that has not been confirmed. Consequently, when estimating the potential cost of remediating "all remaining" hydrocarbon parameters on the City Lands to numerical standards, as requested by the City, it should be assumed that this would also include remediating benzo(a)pyrene.

[241] In conclusion, the Panel finds that the requirements of section 56 of the *Act* have been met. Permanent solutions have been achieved, to the maximum extent practicable, with respect to the risk-based remediation of beno(a)pyrene and ethylbenzene in groundwater, and benzene in soil, on the City Lands. Based on the factors listed in section 56(1)(a) through (d), these contaminants already pose little or no risk to human health and the environment, and any slight reduction that might be achieved by remediation to numerical standards, does not justify the expense of attempting to do so. The circumstances do not warrant ordering Suncor

to further investigate the benzene contamination on Imperial Street, or further remediate these contaminants on the City Lands to numerical standards.

DECISION

[242] In making this decision, the Panel has considered all of the evidence and submissions before it, whether or not specifically reiterated herein.

[243] For the reasons provided above, the Panel finds that:

- There are deficiencies and gaps in some key aspects of the DSICOR Report with respect to the likely source and direction of migration of the VOC contamination on the City Lands, which are not entirely resolved by the parties' evidence. The Panel directs the Director to require Suncor to address the deficiencies in the DSICOR Report regarding the possible source and direction of migration of the VOC contamination on the City Lands, as follows:
    - Seasonal data on the groundwater level in the aquifer should be reviewed and presented, as it may help resolve the conflicting evidence regarding whether groundwater contaminated from the aquifer migrates upward into the intermediate zone at times. Also, testing for VOCs in groundwater at more shallow to intermediate-depth wells in the southeast part of Suncor's land should have been done, as it may assist in determining whether there was a historic source of VOCs in this area.
    - Seasonal variations in groundwater flow direction were not presented in the DSICOR Report. Such information should be provided, as it could clarify the groundwater flow interpretation, which may help determine the likely source(s) of VOC contamination.
    - Potentiometric data for the aquifer in the southeast part of Suncor's land and the adjacent part of Kingsway is not properly presented or discussed in the DSICOR Report. This gap should be addressed, as it may help resolve the conflicting evidence on whether groundwater in the aquifer flows, at least part of the time, to the north/northeast below Suncor's land.
    - The presence of low levels of PERC in shallow soil vapours at VMW1, many years after remedial activities were completed nearby, appears to be evidence that an historic source of VOCs existed on Suncor's land at or near that location. However, this evidence alone is insufficient to establish, on a balance of probabilities, that Suncor's land is the source of the VOCs detected in the aquifer below the City Lands. Regarding the presence of PERC and DCE in shallow soil vapours at VMW2, more information needs to be provided about the soil density and whether perched groundwater was present, to determine whether the PERC and DCE vapour originated from contaminated groundwater in the aquifer.
    - The DSICOR Report, and the reports provided by Suncor and the City, overlooked the question of whether the catch basins that existed on, and adjacent to, Suncor's land during the decades when the garage operated

may have received solvents originating from Suncor's land, which could have leaked into the adjacent ground or utility corridors, and then descended into the aquifer. The catch basins, and any associated piping, that existed when the garage was operating should be assessed as possible locations where solvents from the garage could have historically entered the soil and groundwater on Suncor's land and/or the City Lands.

- Suncor's investigation of soil vapours for VOCs was adequate for the purposes of assessing the potential risks associated with such vapours, and seeking a risk-based CoC for the City Lands. Even if it is determined, based on further information, that Suncor's land is a source of VOC contamination on the City Lands, any risk associated with shallow soil vapours from the VOC contamination on Imperial Street appears to be low.
- With respect to the petroleum hydrocarbon contamination on the City Lands, the DSICOR Report met the requirements of section 53(3) of the *Act*, and sections 49(2) and 59(2) of the *Regulation*, and Suncor complied with the requirements imposed by the Director under Protocol 6.
- The requirements of section 56 of the *Act* have been met with respect to the risk-based remediation of beno(a)pyrene and ethylbenzene in groundwater, and benzene in soil, on the City Lands. Permanent solutions have been achieved for these contaminants, to the maximum extent practicable.

[244] Accordingly, pursuant to section 103 of the *Act*, the matter is sent back to the Director with the above noted directions. The appeal is allowed, in part.

"Alan Andison"

Alan Andison, Chair
Environmental Appeal Board

December 7, 2018