
EXHIBIT D-2

Overview of Environmental and Geotechnical Issues

City of Minneapolis Impound Lot/Former Irving Avenue Dump Site/Linden Yard Area Limited Environmental and Geotechnical Data Review, March 13, 2000

Executive Summary

A limited review of available environmental and geotechnical data for the City of Minneapolis Impound Lot/Former Irving Avenue Dump Site/Linden Yard Area (*Site*) was conducted for the MCDA by Braun Intertec Corporation. The objective was to summarize available environmental and geotechnical records pertaining to the *Site* and assess the potential impact of the recognized environmental and geotechnical conditions on potential future re-development scenarios for the *Site*.

I. *Site* History

Former Irving Avenue Dump Site. The former Irving Avenue Dump (Dump Site) is approximately bounded on the north by Bassett Creek, and on the south by Burlington Northern/Santa Fe railroad tracks. The known limits of the former dump area extend westward to approximately the hillslope near Cedar Lake Road and eastward to approximately Colfax Avenue. According to the MPCA, the limits of the former dump may extend north of the creek and west of Cedar Lake Road.

The former Dump Site had operated as a dump since the 1930s. The eastern portion of the former Dump Site is part of the City of Minneapolis Impound Lot, which is accessible via Colfax Avenue. Approximately 50 percent of the Impound Lot is considered to be within the boundaries of the former Dump Site. The central and western portion of the former Dump Site are accessible via the Irving Avenue bridge over Bassett Creek.

The former Dump Site was used in the 1950s and 1960s as a storage area for batteries, oil, gasoline and surplus equipment. Tons of pried open batteries were reported next to the creek. The former Dump Site has been used as a demolition and debris site for concrete, bricks, cinders and other materials since 1964. It is alleged that barrels of waste were disposed of at the site. The Dump Site property, which was purchased by the City of Minneapolis in March 1987, is on the Minnesota Superfund Permanent List of Priorities.

In 1992, the U. S. Army Corps of Engineers (U.S. COE) completed a flood control project for the Bassett Creek watershed. The former Dump Site was used for disposal of the fill material (spoils) generated from the tunnel and creek channel excavation. The spoils were found to contain hazardous levels of lead contamination.

Impound Lot. Aerial photographs taken in the late 1930s indicate that the current Impound Lot portion of the *Site* was used as a landfill with railroad tracks present to the south. By 1938, the northeast quarter was occupied by a building and piles of coal or soil, the northwest quarter was occupied by soil piles, and the southern half was occupied by a railyard. By 1953 the Impound Lot portion of the *Site* was used as a railroad yarding area. By 1978, half of the railroad spurs on the northwest corner had been removed. By 1993, the existing original (pre-expansion) Impound lot was located at this portion of the *Site*.

Linden Yard. As of 1885, the Linden Yard portion of the *Site* was developed as a rail yard with railroad tracks running the length of this portion of the *Site* from the northeast to the southwest. By 1993, all of the railroad lines had been removed, except for one line on the northern boundary. From at least 1885 to 1974, a grain elevator was located on the eastern side of the Linden Yard portion of the *Site* near Lyndale Avenue. By 1938, Laurel Avenue bisected the center of this portion of the *Site* from east to west. By 1974 the street had been removed. This portion of the *Site* is currently utilized by the Department of Public Works and contains stockpiles of gravel, concrete rubble, topsoil and compost material. Construction materials and equipment are also stored at Linden Yard.

II. *Site* Geotechnical and Environmental Conditions

Impound Lot/Former Irving Avenue Dump Site Generalized Subsurface Soil and Hydrogeologic Conditions. The generalized subsurface conditions depicted by soil boring logs from the Impound Lot and former Dump Site portion of the *Site* indicate mixed fill overlying peat and/or swamp deposits overlying coarse alluvium.

The mixed fill is generally 10 to 20 feet thick and covers most of this portion of the *Site*. The mixed fill, which was placed as part of the uncontrolled dumping at the former Dump Site, is composed of sand, gravel, ashes and cinders, concrete, brick, asphalt, metal, glass, wood, tar, decorator stone fragments, domestic rubbish and other demolition debris.

Underlying the fill is a layer of swamp deposits including peat, marl, silt and organic clay ranging in thickness from 10 to 40 feet. A lacustrine deposit of fat clay underlies the swamp deposits. The unit ranges from 10 to 20 feet thick near the eastern boundary of the former Dump Site, up to 40 feet thick in the central and western portion of the former Dump Site, and appears to be discontinuous north of the Impound Lot.

Deposits of alluvial sand lenses are present beneath the fat clay unit over much of this portion of the *Site*. The poorly graded, fine- to medium-grained, waterbearing sand lenses are approximately 11 to 18 feet thick in the western, southern and northeastern portion of the former Dump Site.

Across much of this portion of the *Site*, sandy lean clay tills underlie the swamp deposits, lacustrine clays and alluvial sands. Where encountered, the till unit ranged from 28 to at least 70 feet thick.

The water table generally occurred at an elevation of about 805 feet above mean sea level (MSL); the average elevation of the former Dump Site is approximately 810 feet MSL. Horizontal groundwater flow within the uppermost waterbearing zone is generally towards the east. Groundwater elevation data collected in 1994 and 1995 indicated that the elevation of the water table was 4 to 6 feet lower than that observed in 1990. The decrease in groundwater elevations was principally attributed to the lowering of the Bassett Creek base flow elevation by the U.S. COE as part of the 1992 of the Bassett Creek Flood Control project in this area.

Physical characteristics of this portion of the *Site* impose several restrictions on potential re-development. Unfavorable soil conditions make it difficult to provide adequate foundation for the construction of structures. A portion of the *Site* lies within the Bassett Creek regional 100-year floodplain. Floodplain regulations may require that development not decrease the 100-year flood storage of the *Site*.

Due to the historical uncontrolled fill placement activities at the Impound Lot and former Dump Site, and the presence of compressible swamp deposits, construction of footings without remedial measures would likely result in very large total and differential settlements and possibly bearing failure of building footings.

Impound Lot/Former Irving Avenue Dump Site Environmental Information. Numerous environmental investigations and phases of investigation have been performed at the Impound Lot/Former Irving Avenue Dump portion of the *Site* since 1987. Soil and groundwater contamination has been identified at the former Dump Site and Impound Lot.

Contaminants identified within soil include heavy metals, volatile organic compounds (VOCs), polynuclear aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs). High levels of PAHs have been found in soil samples. PCBs and low levels of VOCs were detected in some soil samples. The primary metal contaminant in soils is lead; concentrations of lead are high enough to be considered hazardous waste. Elevated concentrations of cadmium, copper, lead, mercury and zinc have also been detected in soil samples.

Testing of soil and stream sediment samples from along the creek channel determined that lead concentrations in some of the samples exceeded the Resource Conservation Recovery Act (RCRA) criteria for hazardous waste designation.

Eight groundwater monitoring wells currently are present at the Impound Lot/Former Irving Avenue Dump portion of the *Site*. Groundwater sample analytical results showed low level contamination by heavy metals and VOCs; and concentrations of PAHs exceeding regulatory standards.

Upstream and downstream samples of water collected from Bassett Creek had detectable levels of PAH compounds. The sampling indicated some slight contamination of the creek originating upstream of the Impound Lot/Former Irving Avenue Dump portion of the *Site*. Results did not indicate any negative effect of the Impound Lot/Former Irving Avenue Dump portion of the *Site* on the surface water quality in Bassett Creek.

Two temporary monitoring wells were installed near seeps along the southern bank of Bassett Creek. Groundwater samples collected from the wells were analyzed for dissolved RCRA metals, chloride and PAHs. The inorganic compounds iron, zinc and chloride were detected. Iron was detected at concentrations exceeding drinking water criteria and Class 2A chronic surface water standards. Concentrations of carcinogenic PAHs exceeded drinking water criteria and, in some cases, surface water standards. Some noncarcinogenic PAHs also exceeded surface water standards.

Environmental conditions that may affect development of the Impound Lot/Former Irving Avenue Dump portion of the *Site* include the presence of soil and groundwater contamination, and the inclusion of the former Dump Site within the Minnesota Superfund Permanent List of Priorities program.

Soil sampling and analysis has indicated that concentrations of PAHs and heavy metals exist, which may be considered hazardous. Excavated soils would have to be managed in accordance with state and federal regulations. Excavated soils that contain regulated concentrations of contaminants would have to be properly managed on site, treated and disposed off site, or disposed in a hazardous waste landfill.

If dewatering during development activities is necessary, the resulting water generated would likely be contaminated and would likely require special treatment and permitting to allow extraction and disposal.

Because the Irving Avenue Dump portion of the *Site* is listed as a Minnesota Superfund site, future uses of this portion of the *Site* may be limited due to constraints imposed by the final MPCA-approved remedy chosen and implemented. According to the MPCA, future activities concerning the former Dump Site will likely include delisting (removal from the Superfund Permanent List of Priorities). Hennepin County will implement a phytoremediation pilot project at the seeps. The final remedy for the former Dump Site will likely include a restrictive covenant placed on the deed, which will concern future actions to be taken if site soils are disturbed during construction or other intrusive activities. Depending on the future use of the former Dump Site, fencing of the entire site may be required. Future actions with respect to groundwater contamination at this portion of the *Site* will likely consist of a long-term groundwater monitoring program. With respect to possible future development scenarios at this portion of the *Site*, potential exposure to contaminated soils will be the main environmental issue.

Linden Yard Geotechnical Information. The generalized subsurface conditions consist of fill overlying swamp deposits, alluvial deposits and glacial deposits. Soil borings have encountered up to 37 feet of fill consisting of sands with various amounts of silts and clays. Debris such as plastic, cinders, bituminous, wood, brick, limestone and concrete were encountered in the fill.

Swamp deposits consisting of organic clays and peat were encountered below the fill to depths up to 24 feet below the surface. The penetration resistances of the organic clays and peat indicated that these soils are soft.

Alluvial deposits consisting of sands with various amounts of silts and clays were encountered from 11 to 64 feet below the surface. The penetration resistances of the sand indicated those soils were very loose to medium dense and the alluvial clays were rather soft to medium.

Glacial deposits were encountered below the strata mentioned above. These soils typically consisted of sands with various amounts of silt, and clays with various amounts of sand. The penetration resistances of the glacial sands indicated those soils were loose to medium dense and the clay glacial soils were soft to very stiff.

Groundwater was typically encountered at 11 to 14 feet below the surface. Seasonal and annual fluctuations in the groundwater levels should be anticipated.

In general, the soil conditions were geotechnically worse in the western two-thirds portion and the best soil conditions were encountered in the northeast corner of the Linden Yard portion of the *Site*. The existing fill, swamp deposit and most of the alluvial soils at the Linden Yard portion of the *Site* are typically not suitable to support single- or multi-level structures designed based on a typical shallow foundation system. Because these deposits are so deep, deep foundation systems will most likely be required for new buildings in these areas. Utilities will also most likely need to be placed on piles to prevent excessive movement of the utilities that would cause them to fail.

The potential exception to this is the very northeast corner of the Linden Yard portion of the *Site*; the soils in this area could potentially be corrected so that a shallow foundation system could be used. However, a fairly significant soil correction would need to be made and additional deep borings would be needed in this area to further define this potential. The box culvert containing Bassett Creek crosses this portion of the Linden Yard and may restrict development of this area.

New fill placed on the site will most likely consolidate the soft underlying clays and the existing fill soils may also realize some additional settlement. For that reason, it is anticipated that differential settlement will occur between the buildings and the utilities, exterior slabs and pavements that are not supported on a deep foundation system.

Additional debris could be encountered during construction such as foundations, basement slabs and floor slabs from previous structures that were located on the Linden Yard portion of the *Site*.

Linden Yard Environmental Information. The results of a limited Phase II environmental site assessment (ESA) indicated that all parameters detected in the soil samples were below the applicable MPCA residential soil reference values (SRVs) and no RCRA metals were detected at concentrations above naturally-occurring background levels. Also, none of the groundwater samples that were analyzed had concentrations greater than or equal to the laboratory method detection limits for diesel range organics (DRO), gasoline range organics (GRO), VOCs, PAHs, Minnesota Department of Agriculture (MDA) List 1 and 2 pesticides and organophosphorous pesticides. However, the groundwater samples did contain concentrations of RCRA metals that exceeded applicable drinking water criteria.

Suspected asbestos-containing materials (ACM) were observed in site debris. Positive identification of this material as ACM has yet to be determined.

III. Future Development Scenarios for the *Site*

Recognized environmental and geotechnical implications of potential future development scenarios for the Impound Lot/Former Irving Avenue Dump and Linden Yard portions of the *Site* were cursorily evaluated. The following four potential scenarios were briefly evaluated: continue to utilize the *Site* for its present uses, develop the *Site* for light industrial uses, utilize the *Site* as green space, and develop the *Site* for residential uses.

The MPCA has indicated that a long-term groundwater monitoring program likely will be required at the former Irving Avenue Dump portion of the *Site*. As part of the final remedy for this portion of the *Site*, the MPCA likely will require a restrictive covenant placed on the deed, which will concern future actions to be taken if soils are disturbed during construction or other intrusive activities. Long-term groundwater monitoring and a restrictive covenant for the former Dump Site apply to all four potential development scenarios discussed below.

Present Use Scenario. Under this scenario, the Impound Lot/Former Irving Avenue Dump portion of the *Site* would continue to be utilized as an Impound Lot and soils stockpile/staging area. MPCA Industrial SRVs would apply to soil in this portion of the *Site*. The MPCA has indicated that Impound Lot 2, which overlies a portion of the consolidated, lead-impacted spoils generated by the U.S. COE during the Bassett Creek flood control project, will need to be capped with an impervious paved surface. If other portions of the former Dump Site are to be used for vehicle storage they also should be paved to prevent potential human exposure to soil contaminants and limit leaching of the soil contaminants.

Portions of the former Dump Site that may be used for material stockpiling and staging should be paved to prevent underlying, potentially contaminated soils from being inadvertently excavated during stockpile removal, etc.

To restrict public access to this portion of the *Site* and reduce the potential for public exposure to soil contaminants, the remainder of the former Dump Site should be fenced to restrict access. If the remainder of this portion of the *Site* will not be enclosed by fencing, consideration should be given to placing a clean fill/soil cover over the unpaved portions of the *Site*.

Under this scenario, the Linden Yard portion of the *Site* would continue to be utilized as a construction materials storage, equipment storage and soil/gravel/concrete rubble stockpile site. Evaluation of the suspected ACM would be warranted. There does not appear to be any other future environmental or geotechnical implications associated with the present use of this portion of the *Site*.

Light Industrial Use Scenario. Under this scenario, the Impound Lot/Former Irving Avenue Dump portion of the *Site* would be developed for light industrial usage. MPCA Industrial SRVs would apply to soil in this portion of the *Site*. Contaminated soils excavated during construction, including the lead-contaminated tunnel and creek channel excavation spoil pile, would either have to be reused on the *Site* (with MPCA approval), treated and disposed of off site, or directly disposed of off site at an appropriately permitted facility. The concentration of leachable lead in the soil in portions of the Impound Lot/Former Irving Avenue Dump Site have been characterized as being a hazardous waste and would likely have to be handled and disposed of as such. Earthwork at this portion of the *Site* would require the use of 40-hour HAZWOPER-trained workers.

Due to geotechnically poor soil conditions at the Impound Lot/Former Irving Avenue Dump portion of the *Site*, deep pilings would most likely be required for support of buildings and utilities. A large portion of the former Dump Site resides within the 100-year floodplain of Bassett Creek, which may pose limitations on development. City of Minneapolis flood plain regulations may require that development not decrease the 100-year flood storage on this portion of the *Site*.

At the Linden Yard portion of the *Site*, additional Phase II ESA work and evaluation of the suspected ACM would be warranted to further define the identified environmental conditions. Deep pilings would most likely be required for support of buildings and utilities, except for the northeastern-most portion of the Linden Yard where shallow foundations may be possible after rather extensive geotechnical soil correction.

Green Space Use Scenario. Under this scenario, the Impound Lot/Former Irving Avenue Dump portion of the *Site* would be utilized as green space. If accessible to the public, MPCA Residential SRVs likely would apply to soil in this portion of the *Site*. For example, the MPCA would likely require that the lead-impacted spoils generated by the U.S. COE during the Bassett Creek flood control project be at least capped with an engineered soil cover or pavement.

To restrict public access and reduce the potential for public exposure to soil contaminants, the former Dump Site should be fenced to restrict access. If accessible to the public, a clean fill/soil cover should be placed over the unpaved portions of the former Dump Site. In addition, the seeps from the former Dump Site into Bassett Creek should be intercepted and managed with engineering controls or at least restricted from public access.

At the Linden Yard portion of the *Site*, additional Phase II ESA work and evaluation of the suspected ACM would be warranted to further define the identified environmental conditions.

Residential Use Scenario. Under this scenario, the Impound Lot/Former Irving Avenue Dump portion of the *Site* would be developed for residential usage. MPCA Residential SRVs would apply to soil in this portion of the *Site*. The MPCA likely would not allow residential development with hazardous concentrations of any contaminants in soil. Removal of all soil exhibiting hazardous concentrations of contaminants from the former Dump Site would not be technically or economically feasible.

Due to geotechnically poor soil conditions at the Impound Lot/Former Irving Avenue Dump portion of the *Site*, deep pilings would most likely be required for support of buildings and utilities. The expense of deep foundation systems may be cost-prohibitive for single-family and low-rise residential buildings. A large portion of the former Dump Site resides within the 100-year floodplain of Bassett Creek; floodplain regulations may require that development not decrease the 100-year flood storage on this portion of the *Site*.

At the Linden Yard portion of the *Site*, additional Phase II ESA work and evaluation of the suspected ACM would be warranted to further define the identified environmental conditions. Deep pilings would most likely be required for support of buildings and utilities, except for the northeastern-most portion of this parcel, where shallow foundations may be possible after rather extensive geotechnical soil correction.