7.0 QUALITATIVE HUMAN AND FISH/WILDLIFE EXPOSURE ASSESSMENT

A qualitative human health exposure risk assessment was performed for both current and future on-Site and off-Site conditions, in accordance with the May 2010 NYSDEC Final DER-10 Technical Guidance for Site Investigation and Remediation. The assessment includes an evaluation of potential sources and migration pathways of Site contamination, potential receptors, exposure media, and receptor intake routes and exposure pathways.

In addition to the human health exposure assessment, NYSDEC DER-10 requires an on-Site and off-Site Fish and Wildlife Resources Impact Analysis (FWRIA) if certain criteria are met. All NAPL and groundwater impacts are delineated to the west such that contamination is confirmed not to be migrating into the adjacent Dutch Kills Creek. No significant natural communities, rare plants or animals, or regulated wetlands are located within close proximity to the Site. Based on the requirements of Section 3.10 and Appendix 3C of DER-10, completion of an FWRIA is not required for the Site.

7.1 Current Conditions

The Site is located in the Long Island City neighborhood of Queens, New York and is identified as Block 294 Lot 106. The Site is an approximately 192,792-square foot parcel bound to the north by an asphalt-paved parking lot, to the east by 29th Street followed by an asphalt-paved parking lot associated with a four-story storage facility, to the south by at-grade railroad tracks associated with the MTA LIRR followed by the Sims Metal Recycling Center, and to the west by the Dutch Kills Creek. The Site is currently vacant and was most recently occupied by two single-story warehouse structures that operated as automotive repair facilities. The Site is comprised of asphalt-paved and asphalt milling-covered parking areas utilized by month-to-month tenants for vehicle storage, with several office trailers and storage containers present onsite. Vehicle storage ranges from passenger cars to tractor trailers. The only sensitive receptor (as defined in DER-10) located with a half mile of the Site is the Robert F. Wagner, Jr. Secondary School for Arts and Technology (approximately 2,000-feet northeast of the Site).

7.2 Proposed Conditions

All onsite buildings have been demolished as part of the proposed Site redevelopment. The proposed future use of the Site will be for industrial purposes; however, the final development plans have not been identified at this time. Final plans will be provided in the forthcoming Remedial Action Work Plan.

7.3 Summary of Environmental Conditions

7.3.1 Site Chemistry

VOCs, SVOCs, PCBs, pesticides, and metals were detected at concentrations above the NYSDEC Unrestricted Use SCOs, Commercial RUSOCs, Industrial RUSCOs, and/or Protection of Groundwater SCOs in soil samples collected from historic fill. The compound distribution and contaminant concentrations detected are typical of fill material in New York City; however, some compounds present may also be the result of historical site operations. VOCs, SVOCs, PCBs, and metals were detected at concentrations above the NYSDEC Unrestricted Use SCOs, Commercial RUSCOs, Industrial RUSCOs, and/or Protection of Groundwater SCOs in soil samples collected from the native material. These exceedances are attributed to a combination of impacts from historical site use and/or impacts from the overlying fill of unknown origin. The majority of the Site is covered by asphalt pavement and access to the Site is limited by fencing.

VOCs, SVOCs, and metals were detected in groundwater at concentrations above the NYSDEC SGVs. Exceedances of VOCs, particularly petroleum-related VOCs, are attributed to historical site use. Exceedances of SVOCs are attributable to historical site use and sediment entrainment of historic fill in the samples collected. Detections of total metals are attributable to sediment entrainment of historic fill in the samples collected, and detections of dissolved metals are attributed to naturally occurring background concentrations.

Soil vapor sample analytical results revealed CVOCs at concentrations above the NYSDOH soil vapor intrusion guidance levels which would require monitoring or mitigation in addition to petroleum-related VOCs (BTEX) for which there are no NYSDOH guidance values.

7.3.2 NAPL Impacts

LNAPL and DNAPL impacts extend laterally across an approximately 38,000 square foot area and vertically between approximately 6 feet below existing ground surface and 15 to 20 feet below existing ground surface (corresponding to depths at the groundwater interface and below the groundwater interface) in the southwestern portion of the Site. Well gauging has revealed the presence of LNAPL in five Site monitoring wells, measured between 0.01- to 1.27-feet thick on top of groundwater; the thickest layer of LNAPL was measured at VEE-01 in the northern portion of the plume.

Based on the location of the NAPL plume, the impacts are concentrated around, and are attributed to historic discharges from the tanks. NAPL impacts are delineated to the west (LSB-67 and LSB-68) such that NAPL is confirmed to not be migrating into the adjacent Dutch Kills Creek. NAPL is also delineated to the north (LSB-12, LSB-7, LSB-40, LSB-4, LSB-42, and LSB-1) and east (LSB-34 LSB-63, LSB-22, LSB 9, and LSB-12). As shown on Profile F-F' presented as Figure 3G, 20 soil borings have been advanced along the southern Site boundary. Soil sampling at these locations identified the presence of NAPL between approximately 7 and 19 feet below ground surface in 13 of these soil borings. The thickest and deepest petroleum impacts are located on the western edge of the plume, at the downgradient extent from the former ASTs. NAPL impacts have not been identified below the clay confining layer existing on-Site.

As discussed in Section 6.3.4, Langan has conducted monthly NAPL gauging and oil-absorbent sock replacement since September 2020. Gauging has revealed the presence of LNAPL in four wells and both LNAPL and DNAPL in one well installed during the SRI.

As discussed in Section 6.8, a vacuum enhanced extraction pilot test was implemented in December 2020, to evaluate remedial options. Vacuum was applied at well locations in three different test areas, and approximately 420 gallons of water were extracted and recovery of water and NAPL assessed at each location. The results of the testing

identified no measurable recovery of free product in any of the test or monitoring wells.

Well gauging revealed the presence of NAPL in only five of the 13 monitoring wells at which product was observed in soil during the SRI. Fingerprint testing of the NAPL identified the material as a weathered heavy fuel oil and gasoline that is sorbed to saturated Site soils in the immediate vicinity and downgradient of the former Site ASTs. Based on these findings, the NAPL at the site consists primarily of a heavy fuel oil discharged from the former ASTs that is not recoverable by active pumping to the extent required to effectively remediate, due to the immobile nature and limited thickness present.

7.4 Conceptual Site Model

A conceptual site model (CSM) was developed based on the findings of the SRI and previous investigations to produce a simplified framework for understanding the distribution of impacted materials, potential migration pathways, and potentially complete exposure pathways.

7.4.1 Potential Sources of Contamination

Potential sources of contamination have been identified and include past uses of the Site and contaminated historic fill material. Historical on-Site use for gasoline filling, gasoline and heavy petroleum distillate ASTs, an automotive garage, and a trucking terminal are potential sources of VOCs in soil, groundwater, and soil vapor, potentially select SVOCs, PCBs, and metals in soil and groundwater, and NAPL in soil and groundwater in the central and southwestern portion of the Site. The Site-wide presence of historic fill has been established as a source of SVOCs, pesticides, and metals in soil. Detections of total metals are attributable to sediment entrainment of historic fill in the samples collected; detections of dissolved metals are attributed to naturally occurring background concentrations. Detection of CVOCs in soil vapor are attributed to an unknown offsite source; petroleum-related VOCs in soil vapor are attributed to historical Site operations.

7.4.2 Exposure Media

Impacted media include soil, groundwater, and soil vapor. Analytical data indicates that historic fill material contains VOCs, SVOCs, pesticides, PCBs, and metals at concentrations greater than the Unrestricted Use SCOs, Commercial RUSCOs, Industrial RUSCOs, and/or the Protection of Groundwater SCOs. PFAS is present in groundwater at concentrations exceeding NYSDEC guidance thresholds. NAPL is present at the groundwater interface and in saturated soil in the central and southwestern portion of the Site, which is attributed to historical heavy petroleum distillate storage (AOC-4). Soil vapor at the Site is impacted with petroleum-related VOCs and the CVOCs carbon tetrachloride, vinyl chloride, and PCE, each of which were detected at concentrations above the NYSDOH soil vapor intrusion guidance levels which would require monitoring or mitigation.

7.4.3 Receptor Populations

The Site currently consists of an asphalt-paved parking surface. The Site is enclosed by fencing, and access is restricted to employees of the onsite businesses, personnel completing site investigations related to Site redevelopment, and other authorized guests. During Site development and remediation, human receptors will be limited to construction and remediation workers, authorized guests, design team members visiting the Site; exposures to properties adjacent to the site as described below will be mitigated by the implementation of a health and safety and soil management measures discussed herein. Under future conditions, receptors will include those that would have access to the new development.

The Dutch Kills Creek is located adjacent to the Site to the west. The adjacent property to the north is an asphalt paved parking lot that services the FedEx Facility located north of the Queens Midtown Expressway. Potential receptor populations for this property is limited to the FedEx employees that use the lot. The adjacent property to the east is a self-storage facility that consists of a commercial building and associated paved parking areas. Potential receptor populations for this property are limited to the employees of the self-storage facility and users of the facility. Active at-grade MTA LIRR railroad tracks are located to the south

of the subject property in an area of elevated topography. According to a survey prepared by Langan dated September 2019, the elevation of the rail tracks immediately adjacent to the south of the Site are approximately 6 to 7 feet above the adjacent Site grades. Potential receptor populations of this property is limited to employees of the LIRR. Adjacent to the south of the active LIRR rail tracks is the Sims Metal Recycling Center, which consists primarily of asphalt-pavement and buildings. Potential receptor populations of this property is limited to employees of Sims.

Potential exposure pathways for on-Site and off-Site receptors are discussed in detail below.

7.5 Qualitative Exposure Assessment – On-Site

7.5.1 Current Conditions

Human exposure to contaminated soil is currently limited by the presence of asphalt pavement; therefore, exposure to contaminated soil in the near surface is possible only during a breach of the asphalt. There could be a complete exposure pathway for dermal and ingestion exposure if the authorized personnel were not adhering to the HASP during work that allows contact with soil beneath the asphalt. Human exposure to deeper NAPL impacts that start at approximately 6 feet below ground surface is limited by the present of the asphalt pavement and depth of the impacts. There could also be a complete exposure pathway for dermal and ingestion exposure if excavation were to occur at the site to a depth that would encounter the NAPL and the authorized personnel were not adhering to the HASP which addresses potential contact with groundwater and NAP during work.

Due to the depth of groundwater, and the fact that groundwater in New York City is not used as a potable water source, there is no complete exposure pathway to groundwater and NAPL through ingestion or direct contact under current Site conditions. There could be a complete exposure pathway for dermal and ingestion exposure if excavation were to occur at the site to a depth that would encounter the groundwater and the authorized personnel were not adhering to the HASP during work that allows contact with groundwater.

As there are no buildings present on Site, there are no current on-Site exposure pathways for soil vapor intrusion. Soil vapor that may penetrate through the paved surface on the Site primarily migrates vertically through the subsurface and will dissipate and dilute with ambient air. Any remaining potential exposure pathways through dermal absorption and inhalation is controlled through the implementation of a HASP during ground-intrusive work.

In localized areas where human exposure to contaminated soil, groundwater, NAPL, and soil vapor is possible during soil, groundwater and soil vapor sampling, the potential exposure pathways for dermal absorption, inhalation and ingestion are controlled through implementation of a HASP.

7.5.2 Construction/Remediation Conditions

Construction and remediation may result in potential exposures to Site contaminants in the absence of a Health and Safety Plan (HASP), a Community Air Monitoring Plan (CAMP), and a Soil/Materials Management Plan (SMMP). Construction and remedial activities will likely include removal of the existing asphalt pavement, site grading, soil mixing for construction of an in-situ stabilization system (ISS), off-Site disposal of limited quantities of impacted soil, and construction of a yet-to-be determined development. In the absence of a HASP and CAMP, this scenario presents the potential for exposure of soil, groundwater, NAPL, and soil vapor contaminants to construction and remediation workers via dermal absorption, ingestion, and inhalation of vapors and particulate matter. This exposure pathway will be minimized through the implementation of the HASP, CAMP, SMMP, and vapor and dust suppression techniques.

7.5.3 Proposed Future Conditions

The proposed future use of the Site is anticipated to consist of yet-to-be determined industrial development. New development will incorporate a cover system across the Site, which will prevent human exposure to impacted soil and groundwater, an in-situ stabilization system that will prevent human exposure to NAPL, and a soil vapor mitigation system

beneath any future buildings to mitigate potential soil vapor intrusion concerns following implementation of the remedy.

There is no pathway for ingesting groundwater contaminants, since the Site and surrounding areas obtain their drinking water supply from surface water reservoirs located upstate and not from groundwater.

Based on results of the previous investigations and this SRI and the proposed remediation plan, which will include a Site-wide cover system, soil vapor mitigation, and NAPL stabilization, it is anticipated that a Track 4 cleanup will be achieved; institutional controls and/or engineering controls will be included in the remedy to reach a Track 4 cleanup and to prevent exposure to any remaining residual contamination.

7.6 Qualitative Exposure Assessment – Off-Site

7.6.1 Potential for Migration of Site Impacts

Historical on-Site use for bulk heavy petroleum distillate storage in ASTs from circa 1936 through circa 1970 is a source of NAPL in saturated soil and groundwater at the Site. LNAPL and DNAPL impacts extend laterally across an approximately 38,000 square foot area and vertically starting at approximately 6 feet below existing ground surface and extending to approximately 15 to 20 feet below existing ground surface (corresponding to depths at the groundwater interface and below the groundwater interface) in the southwestern portion of the Site. As discussed in Section 7.3.2, NAPL impacts in saturated soil and groundwater are delineated to the north, west, and east; soil borings advanced along the southern Site boundary revealed the presence of NAPL in saturated soil between approximately 7 and 19 feet below ground surface.

During the vacuum enhanced extraction pilot test discussed in Section 6.8, which was implemented to evaluate remedial options, vacuum was applied in three different test areas and approximately 420 gallons of water were extracted. Following the testing at each location, no measurable recovery of free product was detected in any of the test or monitoring wells. Based on the findings of the vacuum enhanced extraction pilot test and historical fingerprint analysis, NAPL at the Site

consists of a combination of weathered heavy fuel oil and gasoline that is sorbed to saturated Site soils in the immediate vicinity and downgradient of the former Site ASTs, and exists in an immobile condition. Monthly well gauging revealed the presence of NAPL in only five of the 13 monitoring wells at which product was observed in soil during the SRI, which confirms that NAPL is not entering the well screens and is therefore in an immobile condition.

Although an off-site assessment was not completed as part of this RI due to physical constraints (heavily vegetated steeps slopes) and site access restrictions on the LIRR property to the south, NAPL was observed in saturated soil the borings advanced along the southern Site boundary, and there is potential that NAPL may have historically migrated off-Site as a result of the historical AST releases. However, NAPL has not been detected during monthly gauging in the wells located in closest proximity to the southern Site boundary. Based on the findings of the pilot test and monthly well gauging, NAPL exists in an immobile condition and off-Site migration is unlikely under current conditions. However, for the purposes of completing the off-site qualitative exposure assessment for the adjacent property to the south, it has been conservatively assumed that NAPL and impacted groundwater have migrated onto LIRR property.

7.6.2 Off-Site Impacts

NYSDEC notified Langan of the presence of NAPL at the Sims Metal Recycling Facility (Sims), an active scrap metal recycling and processing facility located to the south of the Site beyond the adjacent MTA LIRR tracks. The site is identified in the NYSDEC PBS database under Site No. 2-095354 for 24 petroleum ASTs and USTs; ten 275- to 4,000-gallon ASTs remain in service and ten ASTs and four USTs are listed as closed. The facility is also being remediated through the NYSDEC Spills program as Spill No. 1200318.

Based on the review of documentation provided to Langan by NYSDEC in response to a Freedom of Information Law (FOIL) request, a tank test failure was reported to NYSDEC for a 150,000-gallon diesel fuel oil AST located in the northwestern corner of the Sims site in 2012. An evaluation of the underground piping, which consisted of a pair of steel

lines (feed and return) that extended to the east along the northern property line (adjacent to the LIRR property) from the AST into an adjacent building where they connected to a diesel-powered generator, revealed that the piping was corroded and in overall poor condition.

Soil borings advanced in the vicinity of the ASTs revealed that the most significant petroleum impacts, including the presence of LNAPL, staining, odors, and elevated PID readings were present at or above the groundwater table (approximately 4 to 7 feet bsl). Monitoring well MW-1 was advanced immediately adjacent to the impaired piping near the AST, and 3.81 feet of LNAPL was measured floating on groundwater in July 2012. The thickness of the LNAPL diminished to the west toward Dutch Kills Creek (3.81 feet to 2.28 feet at MW-2) and to the east along the piping adjacent to the northern property boundary (3.81 feet to 0.11 feet at MW-9, near the second location of impaired piping). The impacts in this area were identified as Plume A and were confined to the north side of the AST and bound by the location of the impaired piping (beyond which no measurable LNAPL was detected) to the east and Dutch Kills Creek to the west.

Borings advanced to the east of the AST along the piping and adjacent to the northern property boundary revealed petroleum impacts consistent with those observed around the AST at MW-20 and MW-19, where LNAPL thickness on groundwater was measured from 0.12 feet to 0.28 feet ("Plume B"). Deeper petroleum impacts (up to 9 feet bsl) were identified in the easternmost borings and wells (SB-24/MW-15, SB-25/MW-16, and SB-27/MW-18) advanced near a piping elbow where the piping entered the generator building. LNAPL thickness in these wells was 0.43 feet to 0.50 feet. The NAPL in this area appeared to be concentrated in the former pipeline trench and was referred to as a separate plume ("Plume C"); the source of the plume was reportedly being evaluated at the time the Remedial Investigation Report was submitted in 2012.

Approximately 120 feet of underground piping connecting the AST to the generator were removed in 2012. NAPL recovery via skimmers was conducted at the Sims site around the AST footprint between 2012 and 2014. In 2014, a stormwater retention basin was installed at the Sims

site in the location of the former AST with soil removal completed under the oversight of NYSDEC. The Spill Closure Report documented PAH impacts in post-excavation soil samples consistent with the presence of historic urban fill. Groundwater samples collected from wells along the former piping and undisturbed by the excavation revealed the presence of petroleum-related VOCs including 1,2,4-trimethylbenzne, 1,3,5-trimethylbenzene, isopropylbenzene, n-propylbenzene, and naphthalene; PAHs were also detected in the groundwater samples. The Spill Closure Report documented that exposure to site contaminants is restricted by the infrastructure and concrete pavement at the site and also noted that there is no exposure and no risk connected to groundwater as it is not used for drinking purposes.

Spill No. 1200318 was administratively closed on 15 April 2016; however, the presence of NAPL was identified in the easternmost well (MW-16) in August 2016 and the spill was re-opened in January 2017. As part of the case reactivation, NYSDEC required that the plume in the vicinity of MW-16 be completely delineated via the collection of soil and groundwater samples, including both on-site and off-site delineation. No record of completion of this additional work was available in the NYSDEC files.

Gauging data revealed the presence of a 0.04- to 0.65-foot thick layer of LNAPL on groundwater and an oil recovery system was installed and began operation in January 2020. No measurable oil was detected in MW-16 by July 2020, although a monitoring report submitted to NYSDEC in July 2021 revealed that, as of May 2021, 0.55 feet of product was measured in MW-16 and a total of 2,301,120 gallons of oil and water had been removed by the system since January 2020.

A fingerprint sample collected at the Sims Metal Recycling Facility in July 2018 revealed that the NAPL in MW-16 consists of a mixture of degraded No. 2 fuel oil and lubricating, motor, or waste oil, which is consistent with the contents of the former 150,000-gallon AST located at the Sims site (diesel fuel oil) and the nine USTs and ASTs registered as containing waste oil, lube oil, and motor oil located at the Sims site throughout the site's history. As discussed in Section 4.0, fingerprint sampling completed at the Site in 2009 revealed the presence of a

combination of heavy fuel oil and gasoline, which is consistent with the contents of former 275,000-gallon ASTs historically located at the Site (crude oil, Navy fuel oil, kerosene, naphtha, and gasoline).

Although it is possible that NAPL impacts may have historically migrated off-site to the south, the fingerprint sample collected from the Sims Metal Recycling Facility in 2018 does not match the results of the fingerprint sample collected from the Site in 2009. As such, the NAPL present on the two properties is associated with different historical sources which indicates that the NAPL present on the Site has not migrated beyond the extents of the adjacent LIRR property.

7.6.3 Potential Off-Site Exposure Pathways

The potential off-Site migration of Site groundwater and NAPL contaminants is not expected to result in a complete exposure pathway under the current conditions, during construction and remediation activities, or future conditions for the following reasons:

- NAPL impacts in saturated soil and groundwater are delineated On-Site to the north, west, and east. NAPL and groundwater impacts have not been completely delineated to the south; however, based on the discussion of the Sims investigation above, the only potential exposure pathway exists for the active at-grade railroad tracks associated with the MTA LIRR to the south of the Site. As noted, above for the purposes of completing the off-site qualitative exposure assessment for the adjacent property to the south, it conservatively assumed that NAPL and impacted groundwater have migrated onto LIRR property but have not migrated onto the Sims property. Regarding the LIRR tracks, the property contains a heavily wooded steep slope with the four to five active rail lines located at the top of the slope.

  If NAPL does exist beneath the active LIRR rail lines it would likely be encountered approximately 13 to 14 feet below the existing lines (based on the presence of NAPL on the southern property boundary as shallow as approximately 7-feet below grade). As such, human exposure to potential NAPL and groundwater impacts is limited by the depth of the impacts and the site use under current conditions.

It is also anticipated that the current use of the LIRR property will remain consistent in the future.

Under current and anticipated future site conditions, a complete exposure pathway for dermal and ingestion exposure would exist only if significant excavation were to occur at the site to a depth that would encounter the NAPL and groundwater (i.e; 13 to 14-feet below existing grades).

- Sims Metal Recycling Center, beyond the MTA LIRR tracks to the south, appears to consist primarily of asphalt-pavement and buildings; human exposure to deeper NAPL impacts is prevented by the presence of the asphalt pavement and depth of the impacts. Human exposure is also controlled at the Sims Facility by the regulatory oversight and management of the existing spill case.
- During Site redevelopment remediation and construction, the following protective measures will be implemented to prevent off-Site human exposure to dust and vapor:
    - A Site-specific HASP including a CAMP will be implemented to protect on-Site personnel and to monitor the perimeter of the Site to mitigate off-Site migration of particulates and VOCs during construction.
    - Air monitoring will be conducted for particulates (i.e., dust) and VOCs during intrusive activities as part of a CAMP. Dust and/or vapor suppression techniques will be employed to limit potential for off-Site migration of soil and vapors.
    - Vehicle tires and undercarriages will be washed as necessary prior to leaving the Site to prevent tracking material off-Site.
    - A soil erosion/sediment control plan will be implemented during construction to control off-Site migration of soil.

Soil vapor may migrate off-Site vertically through the subsurface and dissipate and dilute with ambient air in instances where the Site surface is compromised or during Site construction/remediation.

7.6.4 Potential Off-Site Exposed Receptors

Under the current conditions, the potential exposure pathway for encountering NAPL or impacted groundwater is limited to the adjacent property to the south, and only during the performance of extensive excavation that would extend approximately 13 to 14-feet below active rail line grades. Based on this, the only potential receptors would be construction workers performing the excavation activities and the duration of any potential exposure would be limited to that required to complete the excavation activities. Any potential exposure pathway that is completed during these activities would be mitigated by implementing proper health and safety protocols for the handling of impacted materials during site excavation/construction activities.

7.7 Qualitative Evaluation of Human Health Exposure

Based upon the CSM and the review of environmental data, partial on-Site exposure pathways appear to be present under current conditions and, in the absence of institutional and engineering controls, complete on-Site exposure pathways could potentially exist in construction/remediation and future conditions.

Complete exposure pathways have the following five elements: 1) a contaminant source; 2) a contaminant release and transport mechanism; 3) a point of exposure; 4) a route of exposure; and 5) a receptor population.

7.7.1 Current Conditions

On-Site contaminant sources include contaminated historic fill with elevated levels of VOCs, SVOCs, metals, PCBS, and pesticides; VOCs, SVOCs, and metals impacted groundwater; and VOC-impacted soil vapor. LNAPL and DNAPL is also present in saturated soil and groundwater.

On-Site contaminant release and transport mechanisms include contaminated soil transported as dust (dermal, ingestion, inhalation) and existing soil vapor contaminants (inhalation). Under current conditions, the likelihood of human exposure is limited, as the Site is covered with asphalt pavement and Site access is restricted to tenant employees, ownership, and authorized personnel.

Off-Site contaminant migration is limited to potential groundwater and NAPL impacts onto the LIRR property to the south. Under current conditions, the likelihood of human exposure is limited due to the current use and the depth of the impacts.

7.7.2 Construction/Remediation Activities

During remedial construction, points of exposure include disturbed and exposed soil during Site work, dust and organic vapors generated during Site work, and disturbance of groundwater and NAPL during installation of the stabilization system. Routes of exposure include ingestion and dermal absorption of contaminated soil, groundwater, and NAPL inhalation of organic vapors arising from contaminated soil, groundwater, and NAPL, and inhalation of dust arising from contaminated soil. The receptor population includes construction and remediation workers. Potential exposures to the properties adjacent to the site as described in Section 7.4.3 will be mitigated by the implementation of a HASP, CAMP, and SMMP as discussed below.

The potential for completed exposure pathways is present since all five elements exist; however, the risk will be minimized by limiting Site access and through implementation of appropriate health and safety measures, such as work zone and perimeter air monitoring for organic vapors and dust, using vapor and dust suppression measures, maintaining Site security, and wearing the appropriate personal protective equipment (PPE) and through implementation of SMMP measures including cleaning truck undercarriages before they leave the Site to prevent off-Site soil tracking.

7.7.3 Proposed Future Conditions

Remedial construction will include installation of a Site-wide cover system and a NAPL stabilization system. After construction, contaminants will remain on-Site beneath the development. Contaminant release and transport mechanisms include penetrations through the asphalt pavement and any remaining exposed soil. If protective measures and remediation are not implemented, points of exposure include potential cracks in the yet-to-be determined industrial development and exposure during any future soil-disturbing activities.

Routes of exposure may include inhalation of vapors or dust during any soil-disturbing work. The receptor population includes those that would have access to the new industrial development. The possible routes of exposure can be avoided or mitigated by construction and maintenance of a composite cover system and implementation of a Site Management Plan.

Future conditions on the LIRR property are anticipated to remain consistent, which will limit adverse human health exposures due to the lack exposure pathways.

7.7.4 Human Health Exposure Assessment Conclusions

1. Under current conditions, there is a marginal risk for exposure on-Site and off-site. The primary on-Site exposure pathways are for dermal contact, ingestion and inhalation of soil or soil vapor by tenant employees, personnel completing site investigations, and other authorized personnel. Exposure to NAPL and groundwater is limited to those completing investigation activities. The exposure risks can be avoided or minimized by limiting Site access and implementing the appropriate health and safety and vapor and dust suppression measures outlined in a Site-specific HASP and CAMP during ground-intrusive activities
2. In the absence of protective measures, there is a moderate risk of on-Site exposure during the construction and remediation activities. The primary exposure pathways are:
    a. Dermal contact, ingestion and inhalation of contaminated soil, groundwater, NAPL, or soil vapor by Site visitors and construction and remediation workers.
    b. Dermal contact, ingestion and inhalation of soil (dust) and inhalation of soil vapor by the community in the vicinity of the Site.

    These exposure pathways can be avoided or minimized by performing community air monitoring, by implementing soil management measures, by following the appropriate health and safety plans, implementing vapor and dust suppression techniques, and using Site security to control access.

3. A complete exposure pathway is possible for the migration of Site contaminants to off-Site human receptors during the remedial construction phase. During this phase, Site access will be limited to authorized visitors and workers and protective measures will be used during construction to prevent completion of this pathway, including following a Site-specific HASP and implementation of a CAMP and SMMP.

4. The existence of a complete on-Site exposure pathway for Site contaminants to human receptors during proposed future conditions is unlikely, as construction of a composite cover will be completed. Regional groundwater is not used as a potable water source in this part of New York City. Potential soil vapor intrusion concerns will be addressed by the implementation of the remedy at the site.

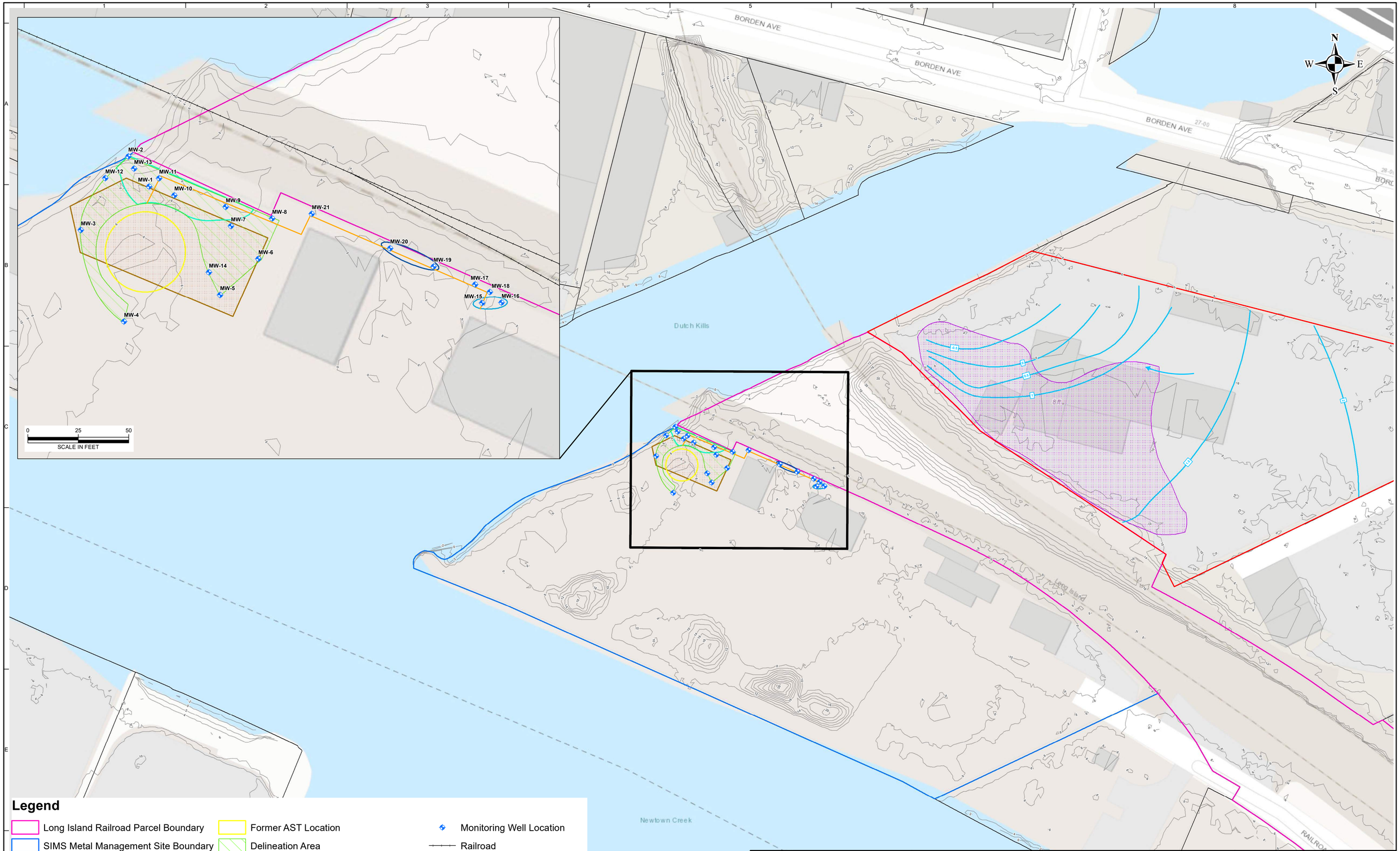
5. The documentation reviewed for the Sims Metal Recycling Facility revealed a known source for the LNAPL impacts at the Sims site (150,000 diesel fuel oil AST and impaired piping) and documented the declining thickness of the LNAPL measured moving away from that source to the west and east along the northern property boundary. The fingerprint sample collected from the Sims Metal Recycling Facility in 2018 does not match the results of the fingerprint sample collected from the Site in 2009. As such, the LNAPL impacts at the Sims facility are attributed to historical releases of petroleum products stored on the Sims facility property and are unrelated to the Site. As noted above, NYSDEC has required further delineation of NAPL related to the Sims site to assess offsite migration from that facility.

   Based on the findings of the vacuum enhanced extraction pilot test and monthly well gauging, NAPL at the Site consists of weathered heavy oil that is sorbed to saturated Site soils in the immediate vicinity and downgradient of the former Site ASTs, and it currently exists in an immobile condition such that any off-Site migration is unlikely under current conditions.

   The existence of a complete exposure pathway for Site contaminants to off-Site human receptors is unlikely. NAPL impacts in saturated soil and groundwater are delineated on-Site to the north, west, and east, and NAPL at the Site is currently immobile and primarily sorbed to

saturated Site soils. Furthermore, adjacent properties to the north and east are capped with asphalt-pavement and buildings. If contaminant migration has historically occurred off-Site to the south, the at-grade railroad tracks associated with the MTA LIRR located immediately adjacent to the south of the Site are located in an area of elevated topography preventing access to the subsurface. Access to the south of the Site is severely limited by the significant elevation change and heavy vegetation that exists between the Site and the rail lines such that access to perform any additional investigation to determine if the NAPL impacts observed on the southern boundary of the Site would be limited to drilling within the existing rail beds. As such, further evaluation of the potential presence of NAPL beneath the southern property is infeasible and would not alter the results of this qualitative evaluation.

Based on the above, there is limited potential for off-Site receptors to be exposed to NAPL should it have historically migrated off-Site, and the qualitative human health exposure assessment for off-Site receptors is completed.



Legend

- Long Island Railroad Parcel Boundary
- SIMS Metal Management Site Boundary
- Site Boundary
- On-Site NAPL Impacts
- Tax Parcel Boundary
- Former AST Location
- Delineation Area
- Excavation Extents
- Approximate Extents of Plume A
- Approximate Inferred Extents of Plume B
- Approximate Inferred Extents of Plume C
- Monitoring Well Location
- Railroad
- Suction/Return Lines
- Lidar Contour - 2ft. Interval
- On-Site Groundwater Contour
- Groundwater Flow Direction

LANGAN

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Langan Engineering & Environmental Services, Inc.
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
Langan International LLC
Collectively known as Langan

NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project	28-90 REVIEW AVENUE BLOCK No. 294, LOT No. 106 LONG ISLAND CITY QUEENS COUNTY NEW YORK
Drawing Title	ADJACENT SITES
Project No.	100652601
Figure	1
Date	7/15/2021
Scale	1"=50'
Drawn By	IHB
Submission Date	

Path: \\langan.com\data\PAR\data\100652601\ArcGIS\ArcMap_Documents\2021-07\Figure 14 - Nature and Extent of Contamination.mxd Date: 7/15/2021 User: ibaker Time: 3:57:39 PM