May 12, 2020

Garin Schrieve
Washington State Department of Ecology
Southwest Regional Office
PO Box 47600
Olympia, Washington 98504

Via email: garin.schrieve@ecy.wa.gov

Regarding: Annual Monitoring Report
Ecology Facility Site ID #28, Cleanup Site ID #2272
Nippon Dynawave Packaging – former Weyerhaeuser Chlor-Alkali Plant Site
3535 Industrial Way
Longview, Washington
PBS Project 17814.001, Phase 0001

Dear Mr. Schrieve:

This letter report serves as the annual report for the Nippon Dynawave Packaging Company (NDP) former Weyerhaeuser Chlor-Alkali site (site) located at 3535 Industrial Way in Longview, Washington. The Compliance Monitoring Plan specifies that an annual compliance monitoring report is to be prepared summarizing the results of groundwater monitoring, additional work, and notable changes to site conditions for the monitoring period.[1] This report provides a summary of work completed at the site from April 1, 2019 to March 31, 2020.

SITE LOCATION

The Chlor-Alkali site is located within the Nippon Dynawave Packaging mill complex, which consists of the Kraft pulp and paper mill, as well as the liquid packaging paper and extruder operations. The Nippon Dynawave Packaging facility is surrounded by industrial facilities, including the North Pacific Paper Corporation (NORPAC) facility and Weyerhaeuser lumber mill to the east and the Weyerhaeuser truck shop to the west. A portion of the site is currently leased by Westlake Chemical (Westlake) from Nippon Dynawave Packaging. Westlake acquired this site as part of their 2016 acquisition of Axiall Corporation. Westlake subleases a portion of their site to Hasa Inc. as a sodium hypochlorite packaging facility.

The entire facility is zoned as heavy industrial. Figure 1 shows the site location.

The Chlor-Alkali site comprises the area within the Agreed Order and associated Restrictive Covenant related to historical mercury contamination.[2] The area under the Restrictive Covenant includes the entire portion of the site leased to Westlake, a portion of the truck shop parcel owned by Weyerhaeuser, and portions of the Nippon Dynawave Packaging mill complex. The extent of the Restrictive Covenant and the properties within the area are shown in Figure 2.

[1] CH2M HILL. (September 2004). *Chlor-Alkali Plant – Compliance Monitoring Plan*. Prepared for Weyerhaeuser Company. Longview, Washington.
[2] Washington State Department of Ecology. (2004). Agreed Order No. DE 1037.

OPERATIONAL HISTORY

As a result of the historical operations prior to 1976 (production of chlorine and sodium hydroxide for use by the pulp and paper industry), mercury was released to the site from equipment and process leaks and spills. Historical operations and contaminant sources were removed when chlorine production in the No. 1 Cell Room ceased in 1975 (remediation of surface impoundments began in 1972). In 1976, the mercury cells in the No. 2 Cell Room were converted to diaphragm cells (a non-mercury-based process). Cell Room No. 1, where historical mercury processing occurred, was demolished in 1991 and Cell Room No. 2 continued to operate until 1999. Chlor-Alkali production ceased at the facility in March 1999.

In 1985, the Washington State Department of Ecology (Ecology) designated the Chlor-Alkali plant as a medium priority on the Washington hazardous waste site list (Cleanup Site #2272, Facility Site ID #28) due to mercury concentrations exceeding the Environmental Protection Agency (EPA) maximum contaminant level (MCL) in groundwater wells. Groundwater has been sampled at the site since 1991. Mercury at the site is inorganic, has relatively low mobility, and is considered the only constituent of concern at the site.

In 2005, Ecology approved a long-term monitoring plan. After reviewing the 2010 Groundwater Monitoring Report, a revised monitoring schedule was proposed by Ecology in 2011. Under the revised schedule, one year of quarterly sampling was to be completed once every five years. The western monitoring wells (MW wells) would only be sampled once during the sample year. Groundwater sampling under this schedule was completed in 2014.

In December 2015, Ecology approved decommissioning of the western monitoring wells (MW-1 to MW-4) and they were decommissioned in March 2016. In 2019, Ecology approved changing the monitoring frequency to one sampling event to be conducted in the first quarter once every five years for the remaining twelve wells. The first monitoring event under the 2019 revised schedule was conducted in March 2019.

The current Compliance Monitoring Plan for the site specifies that an annual compliance monitoring report is to be prepared summarizing the results of groundwater monitoring, additional work, and notable changes to site conditions for the monitoring period.

SITE GEOLOGY AND HYDROGEOLOGY

Geology

The site is located on the floodplain of the Columbia River. Over the years, dredged sediment and gravel fill have been placed across portions of the site at a thickness of between 2 and 20 feet. Alluvium underlying the fill consists of silt, sandy silt, and silty sand. Fine-grained alluvial deposits predominate to a depth of approximately 200 feet, where the alluvium becomes generally a coarse-grained mixture of sand, gravel, and cobbles. Flows of the Columbia River Basalt Group underlie the alluvium.

The site is flat and overlies a remnant of Mt. Coffin, an isolated basalt erosional peak that was leveled and covered with a thin layer of fill before the plant was built. Basalt at the site is encountered at variable depths because of the buried remnant of Mt. Coffin, ranging from less than 5 feet at the Mt. Coffin remnant to greater than 300 feet elsewhere.

Hydrogeology

Groundwater occurring in alluvium is referred to as alluvial (or alluvial zone) groundwater, and groundwater occurring in basalt as basalt (or basalt zone) groundwater. These zones do not exist in a “layer cake” arrangement

at the site. Instead, the buried but steep relief associated with the remnant of Mt. Coffin allows basalt groundwater and alluvial groundwater to occur side-by-side in the southern portion of the site. Groundwater in both of these zones discharges to the Columbia River, which lies on the west boundary of the site and which controls the base level of the local and regional hydrologic systems.

Groundwater occurs in the upper part of the fill and alluvium deposits under unconfined conditions at depths of 8 to 15 feet below ground surface (bgs) in the west area and 2.5 to 4.5 feet bgs in the more easterly former No. 1 Cell Room area. Groundwater elevations in the upper finer-grained part of the alluvium, as determined by site monitoring wells, are controlled by seasonal variations in precipitation and, to a lesser extent, by fluctuations in the Columbia River stage. Figure 2 presents the location of existing monitoring wells at the site.

In general, groundwater elevations tend to be highest in spring and lowest in late summer or early fall. Based on the Remedial Investigation (RI) findings, the hydraulic gradient in the alluvium ranges from 0.04 to 0.008 feet per foot, the hydraulic conductivity is estimated at 28 feet per day, and the horizontal groundwater flow velocity ranges from 1 to 6 feet per day.

The direction of groundwater flow varies across the site but is generally toward the river, as is the stormwater flow direction. In the central and western portions of the site, groundwater generally flows to the west-southwest. In the eastern portion of the site, groundwater in the alluvium flows around the less permeable, buried remnant of Mt. Coffin, with south-southeasterly flow east of Mt. Coffin and west to southwesterly flow west of Mt. Coffin. The area where the elevation of basalt exceeds 10 feet (that is, basalt is present within 10 feet of the surface) exhibits a greater effect on shallow groundwater flow, as noted in the RI. Based on RI findings, the hydraulic gradient in the basalt zone is estimated at 0.03 feet/feet, the hydraulic conductivity is estimated at 6×10^3 feet/day, and the horizontal groundwater flow velocity is estimated at approximately 0.004 feet/day.

Below a depth of approximately 200 feet, groundwater occurs in a confined alluvial aquifer. The total thickness of this aquifer is poorly documented but is at least 130 feet thick.

NATURE AND EXTENT OF CONTAMINATION IN GROUNDWATER

The mercury released to the environment at the Chlor-Alkali plant was elemental and inorganic, with relatively low mobility. Elemental mercury is very dense and readily sinks under gravity through openings in media through which it travels (e.g., large pores, fractures, joints). Mercury stops moving when it encounters a pore or fracture too small for it to enter. The residual mercury will then slowly dissolve into groundwater or soil pore water. In the unsaturated zone, mercury will enter the vapor phase. Because of its density, high surface tension, presence as a separate-phase liquid, and accumulation in basalt fractures, active mercury remediation at the site is inherently complex and difficult.

Use of mercury at the plant ceased in 1976, and the processes and equipment that used mercury have been either converted to another type of process or removed. As a result, there are no remaining sources of mercury other than the residual from the earlier releases.

The distribution of mercury in the two water-bearing zones (alluvial groundwater and basalt groundwater) is predominantly a result of the proximity of the zones to historical sources (particularly, the former No. 1 Cell Room and former surface impoundment area) and of groundwater flow. Site groundwater sampling results have shown that mercury concentrations are generally below detection limits except at the former No. 1 Cell Room and former surface impoundment area. In these areas, 2019 groundwater sampling results indicate that mercury

concentration in alluvial and basalt groundwater range from below the detection limit of 0.2 microgram per liter (µg/L) to up to 130 µg/L.

Results from the RI include the following additional information:

- Mercury concentrations in groundwater are remaining steady or decreasing with time. The rate of decrease is slowest in the area of the former No. 1 Cell Room and the former surface impoundments. Except for in these areas, mercury concentrations are at or below the drinking water maximum contaminant level (MCL) of 2 µg/L for mercury.
- Potential explanations for the slow decrease in mercury concentrations in the area of the former No. 1 Cell Room include the following:
    - The amount of groundwater flux (and therefore the rate of flushing) is limited because the asphalt cap reduces rainfall infiltration, and the permeability of the basalt and alluvium fill above the basalt is very low.
    - It is possible that small amounts of elemental mercury may be present below the water table as isolated globules in basalt fractures. If present, these globules could serve as an ongoing source of dissolved mercury in basalt groundwater.
- Although transient fluctuations in mercury concentrations may occur as a result of unusually high groundwater levels and rainfall conditions, concentrations in groundwater are not expected to increase substantially over time. The original mercury sources were removed from the plant 35 years ago. Additional mercury sources were addressed in subsequent removal actions. Furthermore, results from soil and groundwater sampling suggest that leaching of mercury from soil to groundwater by infiltration and percolation of precipitation is not a major factor influencing mercury concentrations in groundwater.
- Mercury is not present in groundwater upgradient of the former No. 1 Cell Room and former surface impoundment area based on semiannual groundwater sampling data from monitoring wells CH-7 and CH-8 collected from 1998 to 2009.
- The basalt portion of the shallow aquifer contains higher mercury concentrations than the alluvial aquifer, but transmits less groundwater flow; therefore, mercury flux contributed by the basalt aquifer constitutes a relatively insignificant amount of mercury to the surrounding groundwater and Columbia River.

RECENT SITE ACTIVITIES

The following section summarizes recent site activities, including the current groundwater monitoring program and recent site redevelopment activities.

Groundwater Monitoring Program

In accordance with the long-term monitoring program for the site, groundwater monitoring activities were not conducted for the current reporting period (April 1, 2019 to March 31, 2020). Groundwater monitoring activities conducted in March 2019 are detailed in last year's Annual Report dated June 10, 2019. The current groundwater monitoring program calls for one monitoring event to be conducted once every five years. The next groundwater monitoring event will be conducted in the first quarter of 2024.

Westlake Fire Water Valve Repair Work

On June 24, 2019, a 10-inch underground fire water line ruptured under the Westlake salt storage pile and water was discharged to Nippon's process sewer system, and then pumped directly to the river outfall. On July 11, 2019, Westlake conducted subsurface excavation work to install a replacement fire water valve. The depth of the excavation was approximately 5 feet bgs. PBS conducted mercury air monitoring and collected one five-point composite soil sample. No significant levels of mercury were monitored in air or soil. Soil sample results showed a total mercury concentration of 0.402 mg/kg. The concentration was significantly below the action level of 4 mg/kg triggering additional analysis of leachable mercury; therefore, no additional analysis was conducted, and the material was determined to be suitable for disposal as nonhazardous solid waste.

Westlake Brine Equipment Upgrade Project

In July 2019, Westlake completed soil excavation work as part of a future brine equipment upgrade project. PBS and licensed driller, Pacific Soil and Water Drilling of Tualatin, Oregon, mobilized to the site on July 22, 2019. Sampling was conducted consistent with the Ecology-approved *Subsurface Site Preparation Work Plan* dated April 30, 2019. Five borings were advanced to 4 feet below ground surface (bgs) using direct-push drilling technology. Soil recovered from the borings was field screened for the presence of elemental mercury by visual observation and for mercury vapors using a Jerome Mercury Vapor Analyzer (model 431-X). Several low detections of mercury were measured with the mercury meter, however, none of the detected concentrations exceeded the action levels specified in the site-specific health and safety plan (HASP). No visual impacts were detected in soils collected from the borings. Neither groundwater nor construction materials (e.g., asphalt and concrete) were encountered during sampling activities.

Soil obtained from each boring was composited to obtain one soil sample representing soil from the surface to 4 feet bgs at each location. The composite soil samples were analyzed for total mercury using EPA Method 6020A and leachable mercury using the toxicity characteristic leaching procedure (TCLP). Mercury concentrations were detected in all samples and ranged from 0.378 mg/kg to 3.02 mg/kg. No concentrations of TCLP mercury were detected above method reporting limits. Results showed that the soil was suitable to be managed as nonhazardous solid waste.

Westlake Asphalt Repair Work

On September 24, 2019, Westlake conducted subsurface excavation work in the salt pile area. PBS was onsite to conduct mercury vapor air monitoring. Several low detections of mercury were measured with the mercury meter, however, none of the detected concentrations exceeded the action levels specified in the site-specific HASP.

Westlake Leaking Sewer Pipe

On October 24, 2019, Westlake conducted subsurface excavation work to repair a leaking sewer pipe located adjacent to a sewage pump station. The trench excavation measured approximately 3 feet wide by 5 feet long and was 3 feet deep. PBS conducted mercury air monitoring and collected one five-point composite soil sample. Several low detections of mercury were measured with the mercury meter, however, none of the detected concentrations exceeded the action levels specified in the HASP. The soil sample showed a mercury concentration of 10.5 mg/kg and was subsequently analyzed for TCLP mercury. The result of the TCLP analysis was non-detect.

Westlake Asphalt Sampling

On January 9, 2020, PBS mobilized to the site to collect two samples from asphalt materials excavated from the cap area. Sample results showed mercury concentrations of 0.220 mg/kg and 0.257 mg/kg. Results showed that the asphalt material was suitable to be managed as nonhazardous solid waste.

Westlake Salt Wall Construction

On January 22 and 23, 2020, Westlake conducted excavation activities in the salt storage area as part of a salt wall construction project. PBS provided air monitoring for mercury vapors and collected one five-point composite soil sample. No significant levels of mercury were monitored in air or soil. Soil sample results showed a total mercury concentration of 0.496 mg/kg. The concentration was significantly below the action level of 4 mg/kg triggering additional analysis of leachable mercury; therefore, no additional analysis was conducted, and the material was determined to be suitable for disposal as nonhazardous waste.

Nippon Woodstave Effluent Pipe Project

Nippon is currently preparing to replace an upland section of the existing aboveground woodstave effluent pipe with a new HDPE pipe in May 2020. Replacing the pipe will require excavating in the area covered under the Agreed Order and restrictive covenant. Nippon submitted notification and request for approval to Ecology on April 24, 2020. Ecology has requested that soil in which the footings will be excavated be characterized prior to construction. Additionally, air will be monitored during construction and soil that is generated will be profiled. A summary of this project will be included in next year's annual report.

Impervious Conditions

Site activities associated with the several Westlake projects resulted in replacement of approximately 200 to 500 square feet of impervious surface. The projects did not affect the total amount of impervious area at the site. The total impervious area remains unchanged (approximately 28.2 acres) from that reported last year. The extent of existing impermeable surfaces is shown in Figure 3.

Please feel free to contact me at 503.806.2253 or Lizbeth Saldivar at 503.935.5515 with any questions or comments.

Sincerely,

Digitally signed by Mark Leece
Date: 2020.05.12 16:57:09 -07'00'

Mark Leece, PE
Principal Engineer

Digitally signed by Lizbeth Saldivar
Date: 2020.05.12 16:20:28 -07'00'

Lizbeth Saldivar, EIT
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cc: Greg Bean, Nippon Dynawave Packaging Co.
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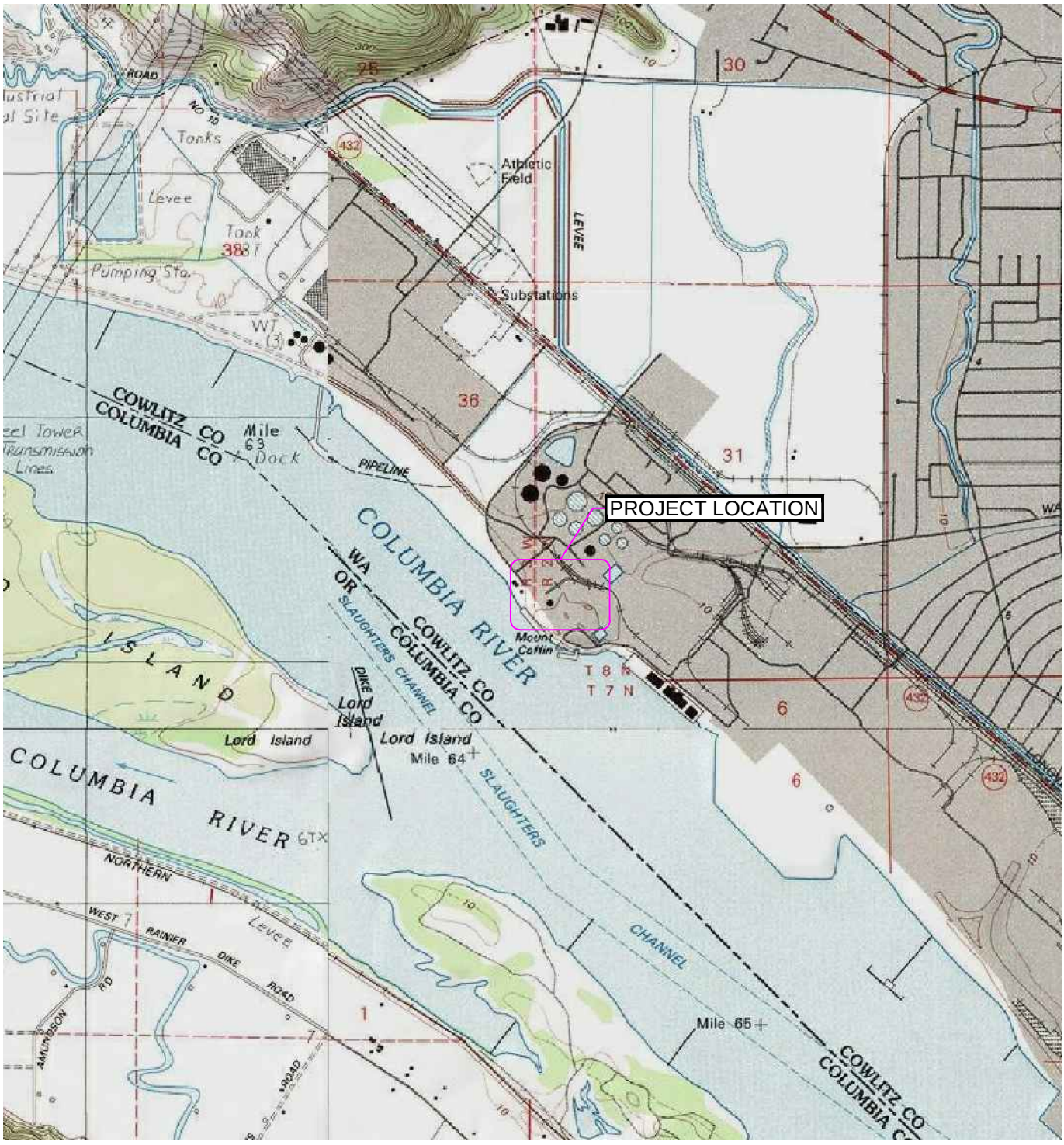
Carol Wiseman, Weyerhaeuser
Paul Gianotti, Weyerhaeuser
Anthony Rizzo, Weyerhaeuser
Jack Carter, Weyerhaeuser
Kim Wigfield, Ecology

Attachments: Figure 1. Vicinity Map
Figure 2. Groundwater Monitoring Well Locations
Figure 3. Impervious Surfaces

LS:CS

Figures



SOURCE: USGS KELSO WA OR QUADRANGLE 1990.

SCALE: 1" = 2,000'

0' 1,000' 2,000' 4,000'

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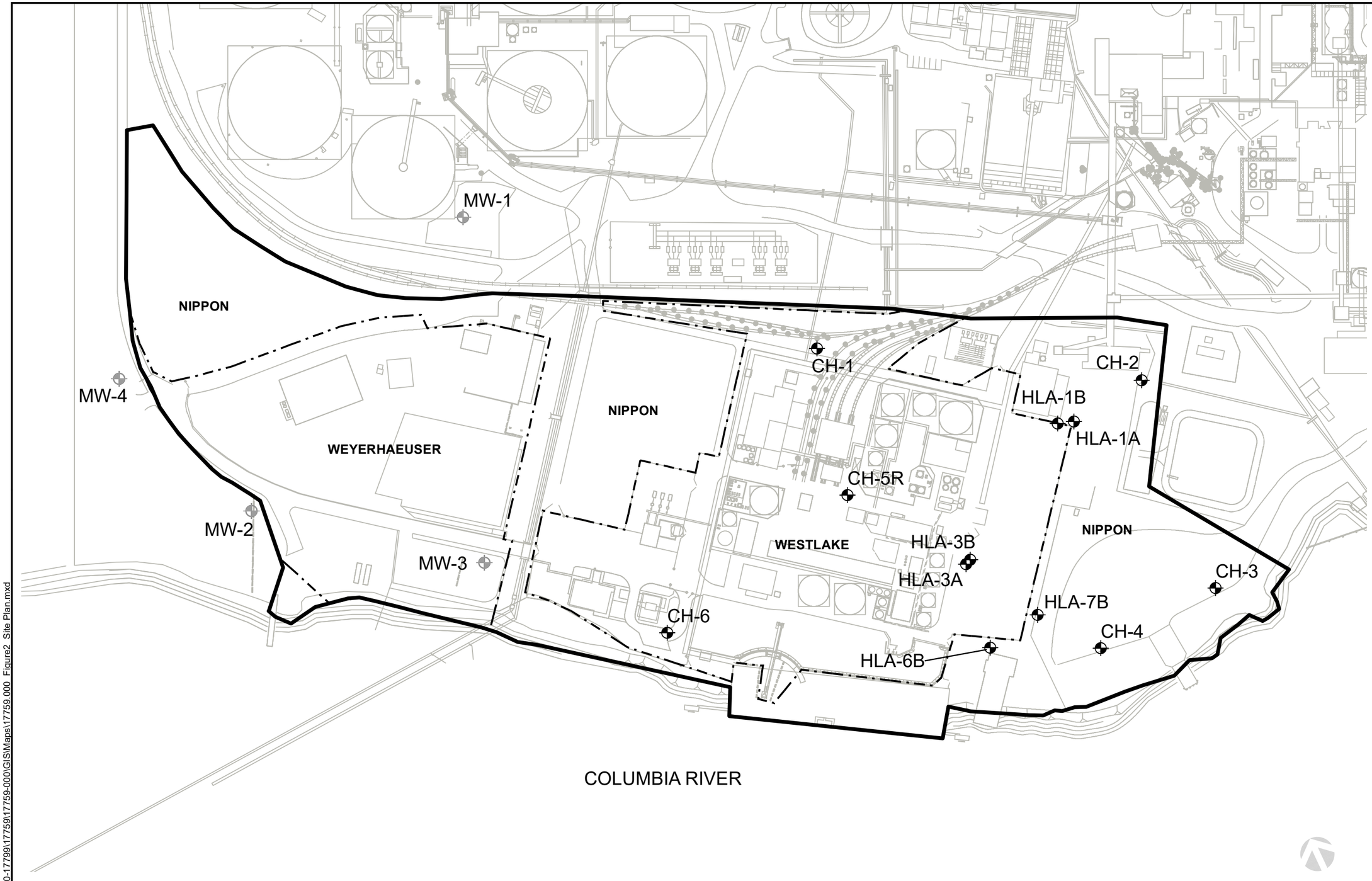
VICINITY MAP

3535 INDUSTRIAL WAY
LONGVIEW, WASHINGTON

MAY 2020
17814.001

FIGURE
1

Filename: L:\Projects\17000\17700-17799\17759\17759-000\DWG\17745.000_FIG 1.dwg Layout Tab: FIG 1 User: Lizbeth Saldivar CAD Plot Date/Time: 5/12/2017 11:26:19 AM



LEGEND

Extent of Restrictive Covenant

Property Boundaries

Monitoring Well

Monitoring Wells Decommissioned in March 2016

1 inch = 200 feet

0 100 200 400'

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PBS

GROUNDWATER MONITORING WELL LOCATIONS
CHLOR-ALKALI PLANT
3535 INDUSTRIAL WAY, LONGVIEW, WASHINGTON

PROJECT
17814.001
DATE
MAY 2020
FIGURE
2

L:\Projects\17000\17700-17799\17759\17759-000\GISMaps\17759.000_Figure2_Site Plan.mxd

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EXTENT OF IMPERMEABLE SURFACES
CHLOR-ALKALI PLANT
3535 INDUSTRIAL WAY, LONGVIEW, WASHINGTON

FIGURE 3

DATE MAY 2020

PROJECT 17814.001

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