ARCADIS Design & Consultancy for natural and built assets

PacifiCorp and Union Oil Company of California

2020 UPLAND CAP INSPECTION AND MAINTENANCE REPORT

Former Petroleum Terminal #0022 And Manufactured Gas Plant

DEQ ECSI #1646
256 Marine Drive
Astoria, Oregon

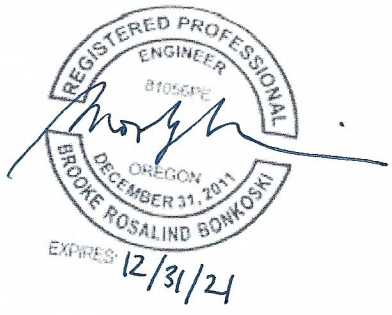
January 15, 2021

2020 UPLAND CAP INSPECTION AND MAINTENANCE REPORT

Former Petroleum Terminal #0022 And Manufactured Gas Plant

Nicole Monroe, PE
Project Environmental Engineer

Brooke Bonkoski, PE 80156
Principal Civil Engineer



Prepared for:

PacifiCorp and Union Oil Company of California

Prepared by:

Arcadis U.S., Inc.
111 SW Columbia Street
Suite 670
Portland
Oregon 97201
Tel 503 220 8201

Our Ref.:

30018762.00005

Date:

January 15, 2021

CONTENTS

TABLES

FIGURES

APPENDICES

ACRONYMS AND ABBREVIATIONS

Arcadis	Arcadis U.S., Inc.
AROD	Amended Record of Decision
CCR	Upland Cap Construction Completion Report
CH2M	CH2M HILL, Inc.
City	City of Astoria
COC	constituent of concern
DEQ	Oregon Department of Environmental Quality
ECSI	Environmental Cleanup Site Information
FS	feasibility study
LNAPL	light nonaqueous phase liquid
LOF	Locality of Facility
MFA	Maul Foster & Alongi, Inc.
MGP	manufactured gas plant
OMMP	Operation, Monitoring and Maintenance Plan
parties	Union Oil Company of California and PacifiCorp
RAO	remedial action objective
RBC	risk-based concentration
RI	remedial investigation
ROD	Record of Decision
site	former Petroleum Terminal #0022 and manufactured gas plant, located at 256 Marine Drive, Astoria, Oregon
Union Oil	Union Oil Company of California
upland areas	on- and off-site upland areas

1 INTRODUCTION

Arcadis U.S., Inc. (Arcadis) prepared this 2020 Upland Cap Inspection and Maintenance Report (report) on behalf of PacifiCorp and Union Oil Company of California (Union Oil) (collectively, the parties), for the former Petroleum Terminal #0022 and manufactured gas plant (MGP), located at 256 Marine Drive, Astoria, Oregon (site) and adjacent properties to the north, northeast, and northwest including submerged land within the Columbia River (Figure 1). The Oregon Department of Environmental Quality [DEQ] assigned Environmental Cleanup Site Information (ECSI) #1646 to the site.

The site is divided into three areas:

- On-site upland
- Off-site upland, which includes upland areas north and northeast of the city block denoted as the site
- Off-site in water, which includes the intertidal zone of the Columbia River north of the site.

Collectively, these areas comprise the Locality of Facility (LOF). The on- and off-site upland areas are referred to as the upland areas and are the subject of this report.

This report describes monitoring and maintenance of the upland cap in 2020. In February 2019, Arcadis submitted a draft Upland Cap Operations, Monitoring, and Maintenance Plan (OMMP) to DEQ. DEQ approved and commented on the OMMP in a letter dated August 29, 2019. Arcadis submitted draft responses to the DEQ comments on September 12, 2019 and a revised OMMP on October 25, 2019. DEQ approved the final OMMP in a letter dated January 27, 2020. This report was prepared in accordance with the final OMMP (Arcadis 2019b).

In accordance with the OMMP (Arcadis 2019b), the required upland cap monitoring frequency was reduced to annually in 2020. However, upland inspections were performed more frequently in 2020 due to the presence of Arcadis personnel that were onsite to conduct light non-aqueous phase liquid (LNAPL) monitoring in accordance with the adaptive management approach described in the LNAPL Pilot Scale Study and Recovery Report (Arcadis 2014) and the Final MW-15 Installation Field and Data Summary Report (Arcadis 2015b). As described in Section 3.1, a total of 6 visual upland cap inspections were performed in 2020.

The property at 256 Marine Drive, Astoria, Oregon (on-site upland) is currently paved and used as a parking lot. It has some remnants of historical structures including concrete foundations and on-grade concrete slabs. The site is relatively flat, with a grade similar to that of surrounding properties. Potential future land uses are anticipated to stay consistent with current land use. Commercial businesses are adjacent to the site to the west, south, and east. The off-site upland area is located on the City of Astoria's (City's) riverwalk, which consists of a multiuse path and a trolley line. The Columbia House Condominiums are located to the north of the site on a pier over the Columbia River shoreline. The pier also has a parking lot for condominium residents.

2 REGULATORY BACKGROUND

Historically, the site was used as an MGP and a petroleum storage/distribution terminal. The MGP, which was owned and operated by Astoria Coal and Gas Company (a predecessor company of PacifiCorp), occupied the northeastern portion of the site between 1888 and 1921. By 1905, concurrent with MGP operations, Union Oil operated a petroleum storage/distribution terminal (#0022) in the northwestern portion of the site. Operations had expanded to the southwestern portion of the site by 1917. Union Oil purchased the entire block by 1921 and operated from approximately 1927 to 1977. Union Oil also had bulk fuel storage on the block immediately east of the site from 1921 to 1977. The Spokane, Portland, and Seattle Railway Company (later Burlington Northern Santa Fe Railroad) operated a rail line and siding north of the site in the late 1800s and 1900s. Currently, the City maintains the rail line and operates a passenger trolley.

In 1995, the DEQ placed the site on the Confirmed List and Inventory. The parties entered the DEQ Voluntary Cleanup Program as co-contributors by signing a letter agreement in May 1996. The parties entered into a joint remediation agreement for the project to act as co-responsible parties. PacifiCorp signed a voluntary cleanup agreement (WMCVC-NWR-97-06) with the DEQ on October 1, 1997, as the performing party solely for project logistics. The parties conducted a remedial investigation (RI)/feasibility study (FS) at the site pursuant to the 1997 agreement (CH2M HILL, Inc. [CH2M] 2001, 2002). An off-site upland and in-water RI/FS (Maul Foster & Alongi, Inc. [MFA] 2008, 2010) was conducted pursuant to a Voluntary Agreement (DEQ Number LQVC-NWR-02-12, effective October 9, 2002) among the DEQ, Union Oil, and PacifiCorp.

In December 2011, the DEQ issued a remedial action Record of Decision (ROD; DEQ 2011) for the LOF. In May 2012, the DEQ amended the ROD (DEQ 2011) to incorporate responses to two sets of comments (DEQ 2012). In 2015, surface soil sampling was conducted as outlined in the Surface Soil Sampling Field and Data Summary Report (Arcadis 2015a) to inform the limits and extents of the upland cap described in the AROD (DEQ 2012). In June 2016, the Final Upland Cap Design (Arcadis 2016) was completed. In October and November 2018, the upland cap was constructed in accordance with the Final Upland Cap Design (Arcadis 2016), as described in the Upland Cap Construction Completion Report (CCR; Arcadis 2019a). In October 2019, an OMMP (Arcadis 2019b) and Contaminated Material Management Plan (CMMP) were submitted to DEQ. DEQ approved the OMMP and CMMP in a letter dated January 27, 2020.

The Parties worked with Oregon Department of Justice (DOJ) to develop the final form of the Consent Judgement (CJ), Scope of Work (SOW), and Easement and Equitable Servitude Agreement (EES) for the site. The CJ was executed by DOJ on July 14, 2020 and entered in Clatsop County on July 16, 2020.

2.1 Remedial Action Objectives

The following remedial action objectives (RAOs) were established in the AROD (DEQ 2012):

- RAO #1. Protect current and future occupational workers, construction workers, and excavation workers at the site from unacceptable risk posed through incidental ingestion, dermal contact, and inhalation exposure to soil, LNAPL, or groundwater containing constituents of concern (COCs) at concentrations exceeding DEQ generic risk-based concentrations (RBCs).

- RAO #2. Protect potential future occupational workers at the site from unacceptable risk posed by inhalation of COCs in indoor air exceeding DEQ generic RBCs.
- RAO #3. Remediate sediment posing significant toxicity to aquatic organisms.
- RAO #4. Minimize the release of light nonaqueous phase liquid (LNAPL) from site soil and groundwater to the Columbia River sediment and surface water.
- RAO #5. Remediate LNAPL hot spots of contamination to the extent feasible.

The AROD (DEQ 2012) established the selected remedy to meet RAOs for the LOF, as summarized below.

2.2 Selected Remedy

The selected remedy for the upland areas is presented in the AROD (DEQ 2012) and includes remedies for the upland and in-water areas. The selected remedy for the upland areas consists of the following elements:

- Capping or maintaining the existing caps in upland areas to prevent direct contact with soil containing hazardous substances at concentrations exceeding RBCs protective of human health. The remedy consists of placing a vegetated soil cap or an asphalt cap on uncapped areas and maintaining the existing asphalt and concrete caps on site and in off-site areas, to the north and northeast of the site, as shown on Figure 2.
- Enhanced LNAPL recovery through the installation of a new extraction well with physical removal of LNAPL. Enhanced LNAPL recovery actions were developed for the MW-12 area, as described in the LNAPL Pilot Scale Study and Recovery Report (Arcadis 2014), to achieve the RAOs.
- Monitoring to assess depletion of LNAPL to residual levels. Monitoring and LNAPL removal are ongoing in accordance with the adaptive management approach described in the LNAPL Pilot Scale Study and Recovery Report (Arcadis 2014) and the Final MW-15 Installation Field and Data Summary Report (Arcadis 2015b).
- Institutional controls. Institutional controls for the upland areas may be implemented, as discussed in the AROD (DEQ 2012) where applicable, to mitigate exposure to subsurface soil by future construction or excavation workers.

2.3 Upland Cap Limits

The extent of the upland cap areas presented in the AROD (DEQ 2012) was delineated using data collected between 1987 and 2009, and included areas with exceedances of RBCs for direct contact with soil by current and reasonably likely human receptors. In 2015, surface soil sampling was conducted as discussed in the Surface Soil Sampling Field and Data Summary Report (Arcadis 2015a) to inform the limits and extents of the upland cap described in the AROD (DEQ 2012).

The on-site upland cap area is a parking lot and consists of asphalt pavement and concrete, curbing and planters within the parking lot, and vegetated areas along the north, northeast, and northwest site boundaries. The off-site upland cap area consists of the areas north of the site, between the site and the

trolley line, and between the trolley line and the Columbia River. The off-site upland cap consists of the following subareas:

- Paved areas
- Trolley line cap
- Upland vegetated cap
- No additional cap areas.

Figure 2 shows the limits and extents of upland cap areas. Construction of the trolley line cap and upland vegetated cap was conducted between October 22 and November 7, 2018. A demarcation geosynthetic consisting of a woven geotextile was placed at the base of the upland vegetated cap. Construction activities are described in the CCR (Arcadis 2019a).

3 MONITORING AND MAINTENANCE

The objectives of monitoring and maintenance of the upland cap are to ensure that the upland cap integrity is maintained and that the upland cap is mitigating potential exposure to subsurface soils that may exceed RBCs. Figure 2 shows cap areas associated with the upland cap. Paved areas consist of parking lots, sidewalks, roads, and other concrete surfaces. Additional cap areas consist of unpaved areas where COC concentrations in surface soil are less than RBCs and this surface soil is functionally serving as a 1-foot vegetated cap, as described in the AROD (DEQ 2012). The CCR (Arcadis 2019a) presents the as-built drawings of the completed trolley line cap and upland vegetated cap.

The OMMP (Arcadis 2019b) provides for semi-annual upland cap monitoring beginning the first year after construction completion to verify that vegetation is established within the footprint of the upland vegetated cap, followed by annual monitoring. If feasible, future upland cap monitoring will be conducted concurrent with monitoring of the in-water remedy. After the first 5-year review, cap monitoring frequency may be reduced to occur once per 5-year review period and/or following a seismic event, tsunami, flooding event, or another significant force majeure.

3.1 Cap Monitoring

In 2020, visual inspections were conducted more frequently than required by the approved OMMP (Arcadis 2019b) and were generally conducted concurrent with LNAPL monitoring activities. Upland cap monitoring consisted of visual inspections of the cap for signs of damage and photographic documentation of the cap condition.

Upland cap monitoring was conducted on January 29, March 6, May 19, July 16, September 24, and November 24, 2020. Table 1 summarizes observations from these monitoring events. The upland cap was observed to be intact and functioning. No significant erosion features were present during monitoring events. Photographic documentation of the upland cap monitoring conducted during the monitoring events detailed in Table 1 below, are provided in Appendix A.

Table 1. Upland Cap Monitoring Summary

Monitoring Date	Summary of Observations
January 29, 2020	• Overall, cap appears to be in good condition • No signs of erosion, loss of ballast, or vole damage • Vegetation appears to have established since construction • No asphalt/concrete damage
March 6, 2020	• Overall, cap appears to be in good condition • No signs of erosion, loss of ballast, or vole damage • Vegetation continues to appear established • No asphalt/concrete damage
May 19, 2020	• Overall, cap appears to be in good condition • No signs of erosion, loss of ballast, or vole damage • Vegetation continues to appear established • No asphalt/concrete damage
July 16, 2020	• Overall, cap appears to be in good condition • No signs of erosion, loss of ballast, or vole damage • Vegetation continues to appear established • No asphalt/concrete damage
September 24, 2020	• Overall, cap appears to be in good condition • No signs of erosion, loss of ballast, or vole damage • Patchy vegetation in small portions of the upland vegetated cap. Otherwise vegetation appears to match surrounding conditions. • No asphalt/concrete damage
November 24, 2020	• Overall, cap appears to be in good condition • No signs of erosion, loss of ballast, or vole damage • Vegetation continues to appear established • No asphalt/concrete damage

3.2 Cap Maintenance

The OMMP (Arcadis 2019b) states that if there are visual signs of upland cap damage, the cause of damage will be assessed and recommendations will be proposed for mitigating future damage to the cap. Repairs to the upland cap will be made under the following scenarios:

- Loss of more than 25% of vegetation in vegetated areas
- Loss of more than 3 inches of soil over 25% or more of the vegetated cap surface.
- Observed vole damage
- Asphalt or concrete potholed or lost down to exposed subsurface soil.

2020 monitoring did not indicate evidence of upland cap damage or conditions that would warrant repairs to the upland cap. Grass seed was placed in areas where patchy vegetation was observed during the September 24, 2020 monitoring event. Additional grass seed will be placed on an as-needed basis in areas where vegetation appears patchy during the upland cap inspection conducted during 2021.

4 PLANNED ACTIVITIES AND RECOMMENDATIONS

Results of monitoring activities show that vegetation has established over the surface of the upland vegetated cap and that the paved sections of the on-site and off-site cap are intact and effectively functioning as a cap. Grass seed will be placed in areas where vegetation appears patchy, if observed, during upland cap inspections conducted during spring of 2021. No routine maintenance and/or development was conducted within the footprint of the upland cap in 2020. As stated in the OMMP (Arcadis 2019b), annual upland cap monitoring will be conducted until the first 5-year review. Future monitoring events will include documenting signs of routine maintenance and/or development within the upland cap footprint, if any, in accordance with the OMMP and CMMP (Arcadis 2019b).

5 REFERENCES

Arcadis. 2014. LNAPL Pilot Scale Study and Recovery Report, Former Petroleum Terminal No. 0022 and Manufactured Gas Plant, Astoria, Oregon (DEQ ECSI File No. 1646). October 24.

Arcadis. 2015a. Surface Soil Sampling Field and Data Summary Report, Former Union Oil/PacifiCorp Astoria Site, DEQ ECSI No. 1646. September.

Arcadis. 2015b. Final MW-15 Installation Field and Data Summary Report, Former Union Oil/PacifiCorp Astoria Site, DEQ ECSI No. 1646. September.

Arcadis. 2016. Upland Remedy Final (100%) Design Report, Former Petroleum Terminal #22 and Manufactured Gas Plant (MGP), DEQ ECSI #1646.June.

Arcadis. 2019a. Upland Cap Construction Completion Report, Former Petroleum Terminal #0022 and Manufactured Gas Plant (MGP), DEQ ECSI #1646. August 23.

Arcadis 2019. Upland Cap Operation, Monitoring, and Maintenance Plan, Former Petroleum Terminal #0022 and Manufactured Gas Plant (MGP), DEQ ECSI #1646. October 25.

CH2M. 2001. Onsite Shallow Soil Remedial Investigation for the Former Petroleum Terminal and Manufactured Gas Plant, Astoria, Oregon. Prepared for PacifiCorp and Unocal. October.

CH2M. 2002. Onsite shallow soil risk assessment for the former petroleum terminal and manufactured gas plant, Astoria, Oregon. Prepared for PacifiCorp and Unocal. September.

DEQ. 2011. Record of Decision for Former Unocal/PacifiCorp Astoria Site, Astoria, Oregon, ECSI No. 1646.

DEQ. 2012. Amended Remedial Action Record of Decision for Former Unocal/PacifiCorp Astoria Site, Astoria, Oregon, ECSI No. 1646. May.

DEQ. 2020. Approval Final Upland Cap Operation, Monitoring, and Maintenance Plan, Former Petroleum Terminal No. 0022 and Manufactured Gas Plant, 256 Marine Drive, Astoria, Oregon, DEQ ESCI Number 1646. January 27.

MFA. 2008. Remedial Investigation/Risk Assessment Report for Off-Site Soil, Groundwater, and Columbia River Sediment, Former Petroleum Terminal No. 0022 and Manufactured Gas Plant, Astoria, Oregon, DEQ ECSI No. 1646. March 28.

MFA. 2010. Feasibility Study Report, Former Petroleum Terminal No. 0022 and Manufactured Gas Plant, Astoria, Oregon, DEQ ECSI No. 1646. March 12.

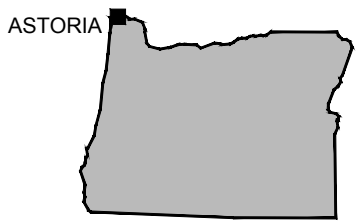
PacifiCorp. 2013. Former Unocal/PacifiCorp Astoria Site, DEQ ECSI #1646; Extension of Voluntary Cleanup Agreement to Remedial Design. July 11.

FIGURES

REFERENCE: BASE MAP USGS 7.5 MINUTE QUADRANGLE, ASTORIA, OREGON, 2014

0 2000' 4000'

GRAPHIC SCALE



OREGON

FORMER PETROLEUM TERMINAL #0022 AND
MANUFACTURED GAS PLANT (MGP) DEQ ECSI #1646
256 MARINE DRIVE, ASTORIA, OREGON

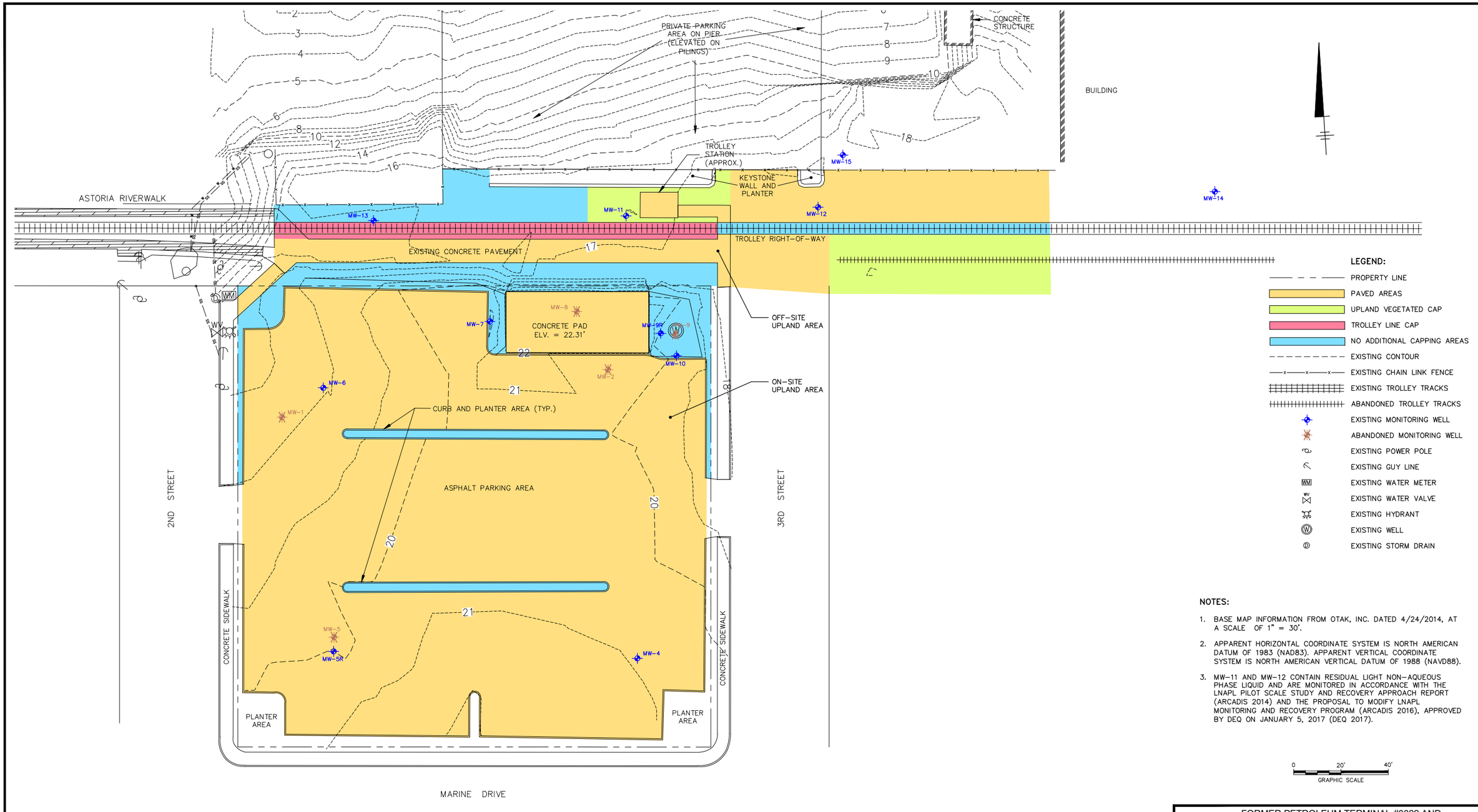
UPLAND CAP ANNUAL OPERATION, MONITORING AND MAINTENANCE REPORT

SITE LOCATION MAP

ARCADIS Design & Consultancy for natural and built assets

FIGURE 1

CITY: SAN RAFAEL, CA (TAMPA) DIV/GROUP: ENVCAD DB: M. VIVES, J. HARRIS
C:\Users\jharris\Desktop\ENVCAD\PO100006\0000\0023\DWG\PO100006N01.dwg LAYOUT: 1 SAVED: 5/23/2016 6:00 PM ACADVER: 19.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 5/24/2016 6:35 AM BY: HARRIS, JESSICA
XREFS:
IMAGES:
Astoria 2014.jpg



LEGEND:

- PROPERTY LINE
- PAVED AREAS
- UPLAND VEGETATED CAP
- TROLLEY LINE CAP
- NO ADDITIONAL CAPPING AREAS
- EXISTING CONTOUR
- EXISTING CHAIN LINK FENCE
- EXISTING TROLLEY TRACKS
- ABANDONED TROLLEY TRACKS
- EXISTING MONITORING WELL
- ABANDONED MONITORING WELL
- EXISTING POWER POLE
- EXISTING GUY LINE
- EXISTING WATER METER
- EXISTING WATER VALVE
- EXISTING HYDRANT
- EXISTING WELL
- EXISTING STORM DRAIN

NOTES:

1. BASE MAP INFORMATION FROM OTAK, INC. DATED 4/24/2014, AT A SCALE OF 1" = 30'.
2. APPARENT HORIZONTAL COORDINATE SYSTEM IS NORTH AMERICAN DATUM OF 1983 (NAD83). APPARENT VERTICAL COORDINATE SYSTEM IS NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
3. MW-11 AND MW-12 CONTAIN RESIDUAL LIGHT NON-AQUEOUS PHASE LIQUID AND ARE MONITORED IN ACCORDANCE WITH THE LNAPL PILOT SCALE STUDY AND RECOVERY APPROACH REPORT (ARCADIS 2014) AND THE PROPOSAL TO MODIFY LNAPL MONITORING AND RECOVERY PROGRAM (ARCADIS 2016), APPROVED BY DEQ ON JANUARY 5, 2017 (DEQ 2017).

0 20' 40'
GRAPHIC SCALE

FORMER PETROLEUM TERMINAL #0022 AND
MANUFACTURED GAS PLANT (MGP) DEQ ECSI #1646
256 MARINE DRIVE, ASTORIA, OREGON
UPLAND CAP ANNUAL OPERATION, MONITORING AND MAINTENANCE REPORT

UPLAND CAP LIMITS

ARCADIS Design & Consultancy for natural and built assets

FIGURE
2

APPENDIX A

Upland Cap Monitoring Photographic Log

PHOTOGRAPH LOG

Photograph 1: Trolley Line and Vegetated Cap Facing West, Jan 2020

Photograph 2: Asphalt Cap Facing North, Jan 2020

Photograph 3: Trolley Line and Vegetated Cap Facing West, March 2020

Photograph 4: Trolley Line and Vegetated Cap Facing North, May 2020

Photograph 5: Trolley Line and Vegetated Cap Facing West, July 2020

Photograph 6: Trolley Line and Vegetated Cap Facing East, July 2020

Photograph 4: Trolley Line and Vegetated Cap Facing Southwest, July 2020

Photograph 8: Asphalt Cap Facing Northeast, July 2020

Photograph 9: Trolley Line and Vegetated Cap Facing West, September 2020

Photograph 10: Trolley Line and Vegetated Cap Facing Southwest, September 2020

Photograph 11: Trolley Line and Vegetated Cap Facing East, November 2020

Photograph 12: Trolley Line and Vegetated Cap Facing West, November 2020

Arcadis U.S., Inc.

111 SW Columbia Street

Suite 670

Portland, Oregon 97201

Tel 503 220 8201

www.arcadis.com