Remedy Selection Report

Omaha Public Power District

North Omaha Station
NOS Ash Disposal Area

Omaha, Nebraska

December 13, 2021

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Acronyms/Abbreviations:

ug/L	micrograms per liter
mg/L	milligrams per liter
ACM	Assessment of Corrective Measures
AMSL	Above Mean Sea Level
ASD	Alternate Source Demonstration
BTV	Background Threshold Value
CCR	Coal Combustion Residual
CFR	Code of Federal Regulations
GMSMC	Groundwater Monitoring Statistical Methods Certificate
GWPS	Groundwater Protection Standards
HDR	HDR Engineering, Inc.
LCL	Lower Confidence Level
MCL	Maximum Contaminant Level
MDL	Method Detection Limit
NDEE	Nebraska Department of Environment and Energy
NES	Nature & Extent Study
NOS	North Omaha Station
OPPD	Omaha Public Power District
ORP	Oxidation Reduction Potential
RCRA	Resource Conservation and Recovery Act
RSR	Remedy Selection Report
SSL	Statistically Significant Level
UCL	Upper Confidence Level
UPL	Upper Prediction Limit
USEPA	United States Environmental Protection Agency

Note this is a comprehensive list of common acronyms. All acronyms listed above may not have been used in the following report.

Certification by a Professional Engineer

I hereby certify that this engineering document was prepared by me or under my direct personal supervision and meets the requirements of 40 CFR §257.97 and that I am duly licensed Professional Engineer under the laws of the State of Nebraska.

Print Name: Megan B. Seymour

Signature: Megan B. Seymour

Date: 12-13-21

License #: E-15931

My license renewal date is December 31, 2022.

1.0 Introduction

HDR Engineering, Inc. (HDR), on behalf of the Omaha Public Power District (OPPD) North Omaha Station (NOS), has produced this Remedy Selection Report (RSR) for the NOS Ash Disposal Area, a regulated coal combustion residuals (CCR) landfill in Omaha, Nebraska. The NOS Ash Disposal Area is regulated under the current United States Environmental Protection Agency's (USEPA) CCR Rule (40 Code of Federal Regulations [CFR] 257 Subpart D) and permitted under the Nebraska Department of Environment and Energy (NDEE) Title 132 Chapter 4 (Criteria for Fossil Fuel Combustion Ash Disposal Areas) and Chapter 7 (Groundwater Monitoring and Remedial Action) regulations. In accordance with these regulations, groundwater monitoring is required to assess potential impacts of CCR activities to groundwater.

Assessment monitoring was initiated in June 2018 to determine Appendix IV detected constituents and establish groundwater protection standards (GWPS). Results from the subsequent sampling event in October 2018 indicated multiple Appendix IV constituents at statistically significant levels (SSLs) above the GWPS. A notification of the exceedances was published on February 14, 2019 (OPPD, 2019). In compliance with the USEPA's CCR regulations, an Assessment of Corrective Measures Report (ACM) was published for the NOS Ash Disposal Area on July 5, 2019 (HDR, 2019a). Additional site information to better understand the hydrogeologic system near the NOS Ash Disposal Area was obtained through the following studies and reports:

- Title 132: Nature and Extent Investigation Report (HDR, 2019b)
- Hydrogeologic and Geochemical Conceptual Site Model (HDR, 2020b)
- Groundwater Flow Model and Corrective Measures Evaluation Report (HDR, 2020c)
- Evaluation of Potential Groundwater Impacts to Missouri River (HDR, 2021b)
- Groundwater Fate & Transport Model and Corrective Measures Evaluation Report (HDR, 2021c)

1.1 CCR Unit Description

OPPD owns and operates a five-unit fuel-fired generating plant at NOS, herein referenced as "Station" or "Site", in Omaha, Nebraska (**Figure 1**). The Station has one retired landfill that was closed in 1994 and one existing active CCR landfill, known as the NOS Ash Disposal Area, as shown in **Figure 2**. The active CCR landfill is an unlined landfill that is regulated under both federal and state regulations (i.e., 40 CFR §257 and NDEE Title 132). The NOS Ash Disposal Area covers approximately 18 acres for active disposal and an additional 1.4 acres that is undeveloped but within the permitted boundary for ash disposal. The active NOS Ash Disposal Area receives ash that was not sold as beneficial material from the facility. The ash in the landfill consists of dry fly ash and bottom ash, conditioned for dust control with water prior to disposal. **Figure 2** identifies site features including the NOS Ash Disposal Area and the supporting groundwater monitoring network.

1.2 Purpose and Scope

This Remedial Selection Report, or RSR, has been prepared in accordance with 40 CFR §257.97 and was developed to select remedial measures for addressing elevated constituents of interest (COIs) above the GWPS (arsenic, cobalt, lithium, molybdenum, and selenium) in Site groundwater. This RSR was based on site-specific data and information obtained and described in the Site investigation and groundwater modeling reports conducted between 2019 and 2021 (HDR, 2019b; HDR, 2020b; HDR, 2020c; HDR, 2021c) and the ACM Report (HDR, 2019a). These reports were used to focus the selection of remedial technologies that will achieve the most efficient and reliable method of reducing concentrations of COIs below the GWPS while considering existing environmental factors such as avoiding inappropriate disturbance of sensitive ecosystems and existing site constraints. The RSR presents the selected remedial strategies for the reduction of COIs present in Site groundwater to acceptable regulatory cleanup levels in accordance with 40 CFR §257.97.

1.3 Remedial System Requirements

Per 40 CFR §257.97(b)1 through §257.97(b)5, the selected remedial system is required to, at minimum:

- Be protective of human health and the environment.
- Attain the groundwater protection standards pursuant to 40 CFR §257.95(h).
- Control the source of the releases so as to reduce or eliminate, to the maximum extent feasible, further releases of constituents in Appendix IV to 40 CFR §257.
- Remove from the environment as much of the contaminated material that was released from the CCR unit as is feasible, taking into account factors such as avoiding inappropriate disturbance of sensitive ecosystems.
- Comply with standards for management of wastes as specified in 40 CFR §257.98(d).

The effectiveness of the selected remedy in meeting these requirements is discussed in **Section 4.**

2.0 Site Background

2.1 Site Operational History

OPPD owns and operates the North Omaha Station located east of Pershing Drive and Craig Street, approximately 3.5 miles northwest of Eppley Airfield, along the west bank of the Missouri River at river mile 625.2 (**Figure 1**). The first generating unit was placed in service in July 1954, and the fifth unit was placed in operation in 1968. Units 1, 2, and 3 were retired from coal-burning operation (converted to natural gas), while units 4 and 5 were retrofitted with air pollution control equipment and are in operation as coal-burning units. Beneficial use and disposal of the fossil fuel combustion ash has occurred on the Site since the 1950s.

The Station has a retired landfill that was used prior to the federal CCR regulations and one existing active landfill (NOS Ash Disposal Area) that serves for disposal of CCR (**Figure 2**). The retired landfill is no longer used and has a soil cap. Currently, CCR generated at the Station is sold for beneficial reuse or disposed in the NOS Ash Disposal Area (as previously described in **Section 1.1**).

2.2 Hydrogeologic Site Conditions

The topography of the Site is characterized by gently rolling upland hills bisected by the broad valley of the Missouri River. The Missouri River forms the northern and eastern boundaries of the Site. The western boundary of the Site is marked by Pershing Drive (which was built along the bluffs). The top of the bluff on the western boundary of the Site is at an approximate elevation of 1,040 feet above mean sea level (AMSL). The area immediately surrounding the Site is primarily a mix of commercial and residential properties.

Site geologic and hydrogeologic information was obtained from site investigation activities and supplemented by the Hydrogeologic Investigation completed as part of the original Title 132 permit application (HDR, 2019b; SCS, 1995). The hydrogeologic characterization of the Site focuses on two primary types of geologic materials: 1) Quaternary age unconsolidated fill and alluvium, and 2) Pennsylvanian age limestone and shale bedrock. Most of the Site is underlain by approximately 15 to 20 feet of clayey and silty fill material. Beneath the fill, the subsurface is comprised of unconsolidated alluvium consisting of laterally and vertically discontinuous fine-grained, cohesive clayey sands and sandy clays, and non-cohesive silts and fine sands. The unconsolidated deposits (alluvium) were primarily derived from deposition of sediments by the Missouri River. In general, grain size increases with depth, and coarse sand and gravel are typically found in the lowermost portions of the alluvium. Coarser grained soils are generally found below elevations of approximately 970 and 980 feet above NGVD and are comprised primarily of medium to coarse sand with minor gravel. Based on site investigations, the bedrock surface beneath the Site ranges from approximately 35 feet below ground surface (bgs) near the Missouri River to approximately 77 feet bgs at upgradient locations (bluffs). The bedrock consisted of several feet of limestone with a zone of fractured limestone/gravel overlaying gray or gray/black shale interbedded with limestone.

On the regional scale, the river serves as a discharge zone, and for most of the year the Missouri River is a gaining water body. Groundwater recharge is from precipitation, runoff from

bluffs, infiltration from tributary streams and overland flow. During high river stages, groundwater recharge is from infiltration of river water. One primary aquifer underlies the Site, comprised of coarse-grained Missouri River alluvium. The depth to groundwater at the Site (i.e., depth to the uppermost aquifer, Missouri River Alluvium) is 10 to 15 feet bgs near the Missouri River and at 30 to 35 feet bgs near the bluffs.

2.3 Groundwater Movement

Groundwater flow velocity in the upper-most aquifer at the Site has been calculated based on a hydraulic conductivity range of 1.92 $x10^{-5}$ cm/sec (0.0544 ft/day) to 1.33 $x10^{-3}$ cm/sec (3.77 ft/day), as reported by Terracon in 2016 slug tests, and an estimated porosity of 0.3. The range of hydraulic conductivities is due to the heterogeneous nature of subsurface soils across the Site.

Based on the most recent static groundwater measurements obtained in April 2021 and October 2021, groundwater elevations indicate a groundwater flow direction generally towards the east towards the Missouri River (refer to **Figure 3** and **Figure 4**), which is the historically observed groundwater flow direction. For April 2021 data, based on a hydraulic gradient of 0.02 ft/ft, a representative best estimate for average groundwater velocity across the site ranges from 0.00363 to 0.251 ft/day. For October 2021 data, based on a hydraulic gradient of 0.023 ft/ft, a representative best estimate for average groundwater velocity across the site ranges from 0.00417 to 0.289 ft /day.

3.0 Selected Remedy

3.1 Overview

The selected remedy for the Site to mitigate and remediate SSLs within groundwater consists of source control through landfill capping and removal of the onsite coal pile. Landfill capping will include the closure of both the NOS Ash Disposal Area and the retired landfill. At the end of coal generating operations, the remaining coal pile above the ground surface as well as excavated unusable coal from beneath the remaining pile will be placed in the NOS Ash Disposal Area prior to landfill capping. Additionally, the continuation of groundwater monitoring will be conducted in accordance with the EPA and NDEE regulations. The following sections further discuss the selected remedy.

3.2 Remedy Selection Process

An initial screening of remedial measures was conducted as part of the ACM Report (HDR, 2019a). The initially screened remedial measures were evaluated to determine applicability to address COIs in groundwater near the NOS Ash Disposal Area. Following the initial ACM Report, a groundwater flow model (HDR, 2020c) was used to simulate the movement of groundwater at NOS. The groundwater flow model was used as a base to develop a transient model that simulated the fate and transport of COIs at the Site (HDR, 2021c). These models helped further understand the hydrogeologic system at the Site and which remedial alternatives would be applicable to address COIs based on site-specific hydrogeological conditions. It was determined that four remedial measures would be evaluated to address the COIs (HDR, 2021c). Each of the four measures included capping the NOS Ash Disposal Area and the retired landfill and excavation of remaining coal and disposal in the ash landfill. The four corrective measures evaluated for the fate and transport of COIs included:

- Measure 1 – Source Control (landfill cap) and coal-pile removal
- Measure 2 – Groundwater Extraction and Treatment using a Trench Drain (with landfill cap + coal pile removal)
- Measure 3 – Permeable Reactive Barrier (with landfill cap + coal pile removal)
- Measure 4 – Encapsulating Wall (with landfill cap + coal pile removal)

The corrective measure alternatives were evaluated based on the criteria provided in 40 CFR §257.96(c). Prior to the selection of the remedy, the results of the ACM Report, site investigations, and groundwater models were presented at a public meeting with interested and affected parties on September 22, 2021. The public meeting was held at least 30 days prior to the selection of the remedy as required by 40 CFR §257.96.

The conclusions of the previous investigation studies, reports, and evaluation of corrective measures in accordance with 40 CFR §257.97(c) resulted in Measure 1 – Source Control through landfill capping and coal pile removal as the selected remedial approach, as detailed in **Section 3.3**.

3.3 Selected Remedial System

In addition to the selected remedies discussed below, groundwater will continue to be monitored at the Site during and after source control measures are implemented and evaluated to assess the effectiveness of the remedy. Groundwater upgradient and downgradient/cross-gradient to the NOS Ash Disposal Area will continue to be monitored semiannually in accordance with the groundwater monitoring program as required in 40 CFR §257.96(b) and with the site-specific CCR Groundwater Monitoring System (HDR, 2020a). Details of groundwater monitoring evaluation are provided in **Section 4.2.1**.

3.3.1 Source Control – Landfill Capping

Source control measures consist of capping the NOS Ash Disposal Area and the retired landfill with a low-permeability vegetated soil cover (cap). The cap will be constructed and installed in accordance with the NDEE Title 132 regulations. Results of groundwater modeling indicate that rate of groundwater flow through the ash within the landfill is very low, with an approximate groundwater flow rate through the ash of only four (4) gallons per minute (gpm), and a flow rate reaching the Missouri River of only 15 to 17 gpm across the entire river frontage. The placement of a low-permeability cap over the active and closed CCR landfills reduces the flow rate further; by about 50 percent.

Coordination with the NDEE will be required for landfill capping. Additionally, prior to installation of the cap, site preparation would be required which includes the preparation of work plans, permitting, the installation of erosion and sediment control features and rough grading. Site restoration activities would include final grading and the construction of stormwater drainage features, seeding, and the placement of mulch and/or erosion control mats until vegetation is established.

3.3.2 Coal Pile Removal

The coal pile is located near the northeast property boundary and southeast of the NOS Ash Disposal Area. It is generally located hydraulically downgradient of the landfill. A survey of coal quality was done in 2017 and found that old unusable coal is located beneath the active coal pile with the base of the coal ranging in elevation between 984 and 987 feet AMSL (Mikon, 2017), which is on average beneath the water table (ranging from 979.34 feet to 994.68 feet AMSL in the vicinity of the coal pile. The coal pile run-off pond, a crescent shaped pond on the west side of the coal pile, receives run off from the coal pile, which is then pumped to the lined process water pond. The selected remedy includes the excavation of the remaining coal pile and disposal in the NOS Ash Disposal Area.

4.0 Effectiveness of Selected Remedy

In accordance with 40 CFR §257.97(b), this section provides an evaluation of the effectiveness of the selected remedy at protecting human health and the environment, attaining groundwater protection standards, controlling the source, removing released material, and managing wastes during the implementation of the remedy. Additionally, this section addresses the consideration of the evaluation factors listed in 40 CFR §257.97(c).

4.1 Protection of Human Health and the Environment

Under 40 CFR §257.97(b)(1), the selected remedy must be protective of human health and the environment. The risk to human health and the environment from exposure to CCR-related constituents in groundwater at the Site was assessed as part of the Nature and Extent Investigation Report (NES) (HDR, 2019b) and the ACM Report (HDR, 2019a). The NES included an initial exposure assessment and a screening-level risk evaluation. Groundwater modeling also evaluated the mass flux of COIs to the Missouri River (HDR, 2020c). The purpose of these evaluations was to identify potential exposure pathways by which human or ecological receptors may contact COIs in groundwater.

Based on modeling flow rates discussed in **Section 3.3.1**, the resultant mass flux of Site-related constituents was determined to be very low, and the Site would not pose a threat to human health or the environment. Additionally, previous studies which collected upstream and downstream surface water samples did not find increasing downstream concentrations of the constituents found in the groundwater at the Site (EA, 2019). In addition, a mass balance calculation was used to compare COI concentrations from groundwater flow, discharging from the Site, to the surface water standards for the Missouri River (HDR, 2021a). The NDEE conducted additional modeling to determine if groundwater concentrations at the NOS Ash Disposal Area would negatively impact the water quality of the Missouri River and determined the groundwater pollutant concentrations modeled by NDEE are not anticipated to impair the drinking water quality and water quality of the Missouri River using their modeling techniques (NDEE, 2021).

Based on these results the Site groundwater is unlikely to pose an unacceptable risk to human or ecological receptors in the vicinity of the Site under current or near-term future conditions. Until the remedy can be implemented, additional actions are not necessary to protect human health and the environment. Anticipated remedy implementation and resulting site conditions are expected to further reduce these risks.

4.2 Ability to Attain the Groundwater Protection Standards

Under 40 §CFR 257.97(b)(2), the selected remedy must be able to attain the GWPS developed for the Site pursuant to 40 CFR §257.95(h). GWPS must be established for each detected Appendix IV constituent. The GWPS shall be the greater of the background concentration and the maximum contaminant level (MCL) established by the USEPA for that constituent. The established GWPS were provided in the most recent 2020 NOS Landfill Annual Groundwater Report (HDR, 2021b). The GWPS are set at the MCL established by the USEPA except for arsenic and lithium which are site-specific GWPS in accordance with 40 CFR §257.95(h).

Through groundwater modeling and constituent fate and transport modeling, a landfill cap with remaining coal excavation was shown to be an effective corrective measure for remediation of most of the COIs. Modeling showed a decrease of COIs below the GWPS within the modeled timeframe except for arsenic (MW-2 and MW-13) and molybdenum (MW-13). As discussed in the modeling reports (HDR, 2020c & HDR, 2021c), arsenic is naturally occurring at the Site and becomes mobilized in areas of low oxidation reduction potential (ORP) such as the areas along the Missouri River. Therefore, arsenic is not considered a COI originating from the landfill and instead is naturally occurring at the Site.

Given the nature of arsenic, molybdenum in MW-13 is the only constituent and location attributable to the landfill that did not exhibit concentrations below the GWPS during the modeled timeframe. However, modeling showed a significant decrease in concentration (about 85% reduction) during the modeled timeframe. Given the conservative nature of the modeling and the significant reduction in molybdenum concentrations, the selected remedy of capping and excavation of the remaining coal was chosen. Evaluation of whether the remedy has achieved the GWPS will follow the statistical approach outlined in **Section 4.2.1**.

4.2.1 Corrective Action Effectiveness Evaluation

Following implementation of remedial activities, a corrective action groundwater monitoring program will be established in accordance with 40 CFR §257.98(a)(1). The effectiveness of the corrective action will be evaluated by comparing groundwater monitoring results to the site-specific GWPS. A Groundwater Monitoring Statistical Methods Certificate (GMSMC) has been prepared for the Site in accordance with the CCR Rule (HDR, 2021d) and USEPA's *Statistical Analysis of Groundwater monitoring Data at RCRA Facilities, Unified Guidance* (USEPA, 2009). The GMSMC incorporates a logic process regarding the appropriate statistical analysis of groundwater data collected in compliance with the CCR Rule. Additionally, the GMSMC describes the statistical procedures to be used to establish background conditions and GWPS. The GMSMC has been updated to reflect the corrective action statistical methods which will be used during the remedial action period.

The conclusion that the remedy has successfully decreased concentrations below the GWPS is made when monitoring well-constituent pairs where an SSL has previously been identified are less than the GWPS as determined by statistical analysis (i.e., when the upper confidence limit [UCL] is less than the GWPS). Further, a remedy is considered complete when confidence intervals constructed for Appendix IV constituents for monitoring wells identified with SSLs have not exceeded the GWPS for three consecutive years [40 CFR §257.98(c)(2)]. The GMSMC includes a discussion for calculating the UCL for the monitoring well-constituent pairs based on the nature of the data (i.e., seasonality, distribution of data, significant non-detects, etc.). The corrective action monitoring program meets the requirements of the assessment monitoring program (40 CFR §257.98(a)(1)(i)).

Once the UCL for COIs drops below the site-specific GWPS, confidence intervals will continue to be analyzed for three consecutive years pursuant to 40 CFR §257.98(c)(2) (HDR, 2021c), at which point the remedy will be considered complete and the monitoring network will return to the assessment monitoring program.

4.3 Source Control

In accordance with 40 CFR §257.97(b)(3), the remedy must control the source such that further releases are reduced to the "maximum extent feasible". The selected remedy is anticipated to control further releases by reducing flow through the ash and thereby decreasing COI concentrations being released. Groundwater monitoring will continue to evaluate and assess the effectiveness of the remedy. In accordance with EPA and NDEE regulations, groundwater monitoring will continue for a minimum of 30 years post-closure of the landfill. Additionally, post-closure visual inspections will be conducted throughout the minimum of 30-year post-closure period to determine if any maintenance activities or repairs to the final cover are necessary. Visual inspections will include evaluation for evidence of settlement, surface erosion, vegetative damage, cracks or desiccation, or biotic intrusion of the cover such as burrowing rodents or animals.

4.4 Removal of Released Material

Under 40 CFR §257.97(b)(4), the selected remedy must remove from the environment as much of the contaminated material that was released from the CCR unit as is feasible while taking into account factors such as avoiding inappropriate disturbance of sensitive ecosystems.

Based on the proximity of the NOS Ash Disposal Area to the Missouri River, the removal of material impacted with COIs from groundwater transport between the landfill area the River would not be feasible. Source removal consisting of excavation and disposal of the CCR to an off-site lined facility was evaluated as part of the initial ACM Report (HDR, 2019a). Dewatering of the lower portion of the landfill would be required and additional dewatering or dredging equipment would be necessary. Disposal would be required to an off-site lined facility due to the limited space available onsite to construct a new on-site lined landfill. As discussed in the ACM Report, significant limitations would impact the ability to implement source removal due to the very close proximity of the landfill to the Missouri River, dewatering the lower portion of the landfill, the amount of CCR material in the landfill and transport of the material offsite.

The potential environmental risk posed by the presence of COIs in the groundwater at the NOS Ash Disposal Area is considered low as shown by groundwater fate and transport modeling (HDR, 2021b; HDR, 2021c) as well as NDEE modeling (NDEE, 2021). Based on the low potential environmental risk and the significant limitations of source removal, the selected remedy of capping and removal of the coal pile meets the requirements to control the source such that further releases are reduced to the "maximum extent feasible". The CCR material will continue to be managed in compliance with applicable RCRA requirements as required under 40 CFR §257.98(d). Groundwater at the Site will continue to be monitored to assess the groundwater concentrations in the vicinity of the CCR unit following implementation of the selected remedy.

4.5 Evaluation Factors

In selecting the remedy, the evaluation factors listed in 40 CFR §257.97(c) were considered. A summary of each evaluation is provided below.

4.5.1 Long-Term and Short-Term Effectiveness and Protectiveness

In accordance with 40 CFR §257.97(c)(1), the long-term and short-term effectiveness and protectiveness of the potential remedy was evaluated, along with the degree of certainty that the remedy will be successful based on consideration of multiple factors. The risk evaluation found that COIs in and around the NOS Ash Disposal Area groundwater is unlikely to pose an unacceptable risk to human or ecological receptors in the vicinity of the Site under current or near-term future conditions (HDR, 2020b; HDR, 2020c). Source control (landfill capping) and coal pile removal is anticipated to reduce most COIs at the Site to levels below the site-specific GWPS within the modeled timeframe as discussed in **Section 3.1**.

Capping the landfill is implementable using traditional construction techniques and equipment. Short-term impacts associated with this corrective measure are moderate, and include noise, the generation of dust and an increase in truck traffic within the surrounding community to import clay and topsoil necessary; however, these impacts may be addressed with standard engineering practices and health and safety techniques.

4.5.2 Effectiveness of the Remedy

In accordance with 40 CFR §257.97(c)(3), the effectiveness of the remedy in reducing further releases should include consideration of the extent to which containment practices will reduce further releases and the extent to which treatment technologies may be used. The selected remedy uses industry-standard landfill capping which is anticipated to reduce the potential for further releases. Continued groundwater monitoring will monitor the effectiveness of the Source Control measures. The use of groundwater treatment technologies was evaluated for the COI detections at the Site and found to provide little to no benefit beyond the capping and unusable coal excavation and disposal (HDR, 2021c).

4.5.3 Ease or Difficulty of Implementation

The NOS Ash Disposal Area is permitted under NDEE Title 132 regulations for the construction, operation, closure, and monitoring of a waste management unit. To implement the removal of the unusable coal and placement of that material into the landfill, coordination with the NDEE and amendments to the Title 132 permit are required.

4.5.4 Public Meeting Outreach

Prior to the selection of the remedy, the results of the site investigations and groundwater modeling (HDR 2020a; HDR, 2020b; HDR 2020c, HDR 2021c) and the ACM Report (HDR, 2019a) were presented at an online public meeting with interested and affected parties on September 22, 2021. A public notice informing the public of the meeting date, time and how to access and login to the online meeting through Webex™ was placed in the local newspaper (Omaha Star and Omaha World Herald) on September 3, 2021. Direct contact was made with key stakeholders. The comment period opened on September 8, 2021 and remained open until October 8, 2021. Members of the public could submit comments prior to or after the public meeting through OPPD's online engagement platform, OPPDCommunityConnect, or through direct email. The public was also given the ability to verbally express a question or comment during the public meeting. No comments were received during the meeting or submitted in writing during the public comment period.

4.6 Remedy Completion

The remedy will be considered complete when compliance with the site-specific GWPS has been achieved at all groundwater monitoring system wells, and confidence intervals calculated for Appendix IV constituents in wells identified with SSLs have not exceeded the site-specific GWPS for three consecutive years. Upon completion of the remedy, a notification that the remedy has been completed will be prepared. The notification will be certified by a qualified professional engineer or approved by the State Director or USEPA and placed in the operating record (40 CFR §257.98(e)).

As previously discussed, the modeling assumes all the COIs originate either at the landfill or from the coal pile; however, that is not the case for naturally occurring arsenic. The arsenic concentrations may persist beyond the corrective measures if the low ORP conditions adjacent to the river do not change. However, the removal of unusable coal below the water table may result in an increase of oxygen in the groundwater causing a change of ORP and reprecipitation of the naturally occurring arsenic, specifically if the area is replaced with a more porous media. Additionally, elevated arsenic concentrations above the GWPS are generally localized to monitoring wells adjacent to the Missouri River. Although selected remedies may decrease the arsenic concentrations, the naturally occurring arsenic is not a result of a release of arsenic from the landfill.

5.0 Remedy Implementation

The proposed remedy implementation schedule was developed in accordance with 40 CFR §257.97(d).

5.1 Schedule of Remedial Activities

As discussed within **Section 4**, the implementation of a landfill cap over both the NOS Ash Disposal Area and the retired landfill along with removal of the coal pile is expected to provide source control measures suitable to limit impacts to groundwater. The removal of the coal pile and construction of the landfill cap on the NOS Ash Disposal Area and the retired landfill is anticipated to be completed in two phases.

The first step of implementation of the selected remedy will be coordination with the NDEE to determine the applicable state regulated permit amendments necessary. Multiple phases of permit revisions may be required. The first permit revision will be required for the addition of unusable coal and excavated materials into the NOS Ash Disposal Area. Draft permit revisions are anticipated to be submitted to the NDEE in March 2022. The NDEE will require a period to review and provide any comments before final approval. Prior to final approval from the NDEE, the coal pile will be consolidated in preparation of removal of unusable coal. Phase 1 will include the design, permitting, and construction of closure cap for of a portion of the landfill and removal of a portion of the unusable coal. Phase 2 will include the design, permitting, and construction of the remaining portion of the landfill cap and removal of the remaining portion of the coal pile.

Continuation of semiannual groundwater sampling in compliance with both the CCR regulations and NDEE groundwater monitoring regulations will be conducted. COI trends in groundwater monitoring data will be evaluated to determine if the source control measures are resulting in decreased COI concentrations in the downgradient monitoring wells.

The selected remedy will be implemented in stages as shown in the proposed schedule below. The schedule may shift based on the response and approval from the NDEE on permit revisions.

Anticipated Timeline	Remedial Activity Description
1/1/2022 – 3/2/2022	Provide draft permit revisions to NDEE for coal disposal in the ash landfill
1/1/2022 – 3/25/2022	Coal Pile Consolidation
3/2/2022 – 11/3/2023	Permit & Construct Phase 1 Closure
7/3/2023 – 11/28/2024	Permit & Construct Phase 2 Closure

5.2 Schedule Implementation Factors

The proposed remedy implementation schedule considers the factors established in 40 CFR §257.97(d), as discussed below. Timing for implementation of the remedy is dependent on approval from the NDEE for permit amendments.

5.2.1 Extent and Nature of Contamination

The extent of groundwater impacts with COIs detected as SSLs above the GWPS has been delineated to the area directly downgradient of the NOS Ash Disposal Area. Modeling and mass balance calculations have shown the concentrations of COIs in the groundwater measured at the North Omaha Station are significantly lower than the concentrations necessary to impact the Missouri River based on surface water standards or a change in existing conditions (HDR, 2020c; HDR, 2021c; NDEE, 2021). Groundwater conditions at the North Omaha Station would not negatively impact water quality or cause the Missouri River to exceed the Title 117 Public Drinking Water Numerical Criteria for those COIs not already exceeded in each of the surface water samples collected from the Missouri River (EA, 2019).

The selected remedy is anticipated to achieve compliance with the site-specific GWPS as previously discussed in **Section 4.2**. Continued monitoring of groundwater will evaluate COI trends in monitoring wells downgradient of the NOS Ash Disposal area to determine if source control measures are decreasing COI concentrations.

5.2.2 Availability of Treatment or Disposal

Based on the discussion in **Section 4.4**, treatment and/or disposal of affected areas provide little to no benefit in meeting the site-specific GWPS.

5.2.3 Potential Risks to Human Health and the Environment

The risk evaluation concluded that COIs in Site groundwater is unlikely to pose an unacceptable risk to human or ecological receptors in the vicinity of the Site under current or near-term future conditions (HDR, 2020c; HDR,2021c). Until the remedy can be implemented, additional actions are not necessary to protect human health and the environment; therefore, potential risks to human health and the environment do not strongly influence the remedy implementation schedule.

5.2.4 Resource Value of the Aquifer

Impacts of COIs at concentrations above the GWPS at the Site have been evaluated to determine the Site groundwater is unlikely to pose an unacceptable risk to human or ecological receptors in the vicinity of the Site and no off-site migration or impacts were observed. The NDEE has assigned the “groundwater pollution occurrence at the NOS ash landfill a Remedial Action Class (RAC) of 3” (NDEE, 2020). The classification of RAC-3 determined because 1.) the absence of registered domestic wells in the area, 2.) drinking water is supplied by the local municipality, and 3.) the unlikeliness of future drinking water receptors in the area. Additionally, fate and transport modeling (HDR, 2021c) as well as NDEE modeling determined the groundwater concentrations are not anticipated to impair the drinking water quality and water quality of the Missouri River, as discussed in **Section 4.1**. Because there are no off-site impacts and there are no current or future uses of groundwater from the impacted area of the aquifer on-site, the resource value of the aquifer is not affected in a way that would influence the remedy implementation schedule.

6.0 References

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HDR, 2019a. Assessment of Corrective Measures for Groundwater at Omaha Public Power District (OPPD) North Omaha Station. Omaha, Nebraska. July 5, 2019.

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Figures

hdrinc.com 1917 S 67th Street, Omaha, NE 68106-2973
(402) 399-1000

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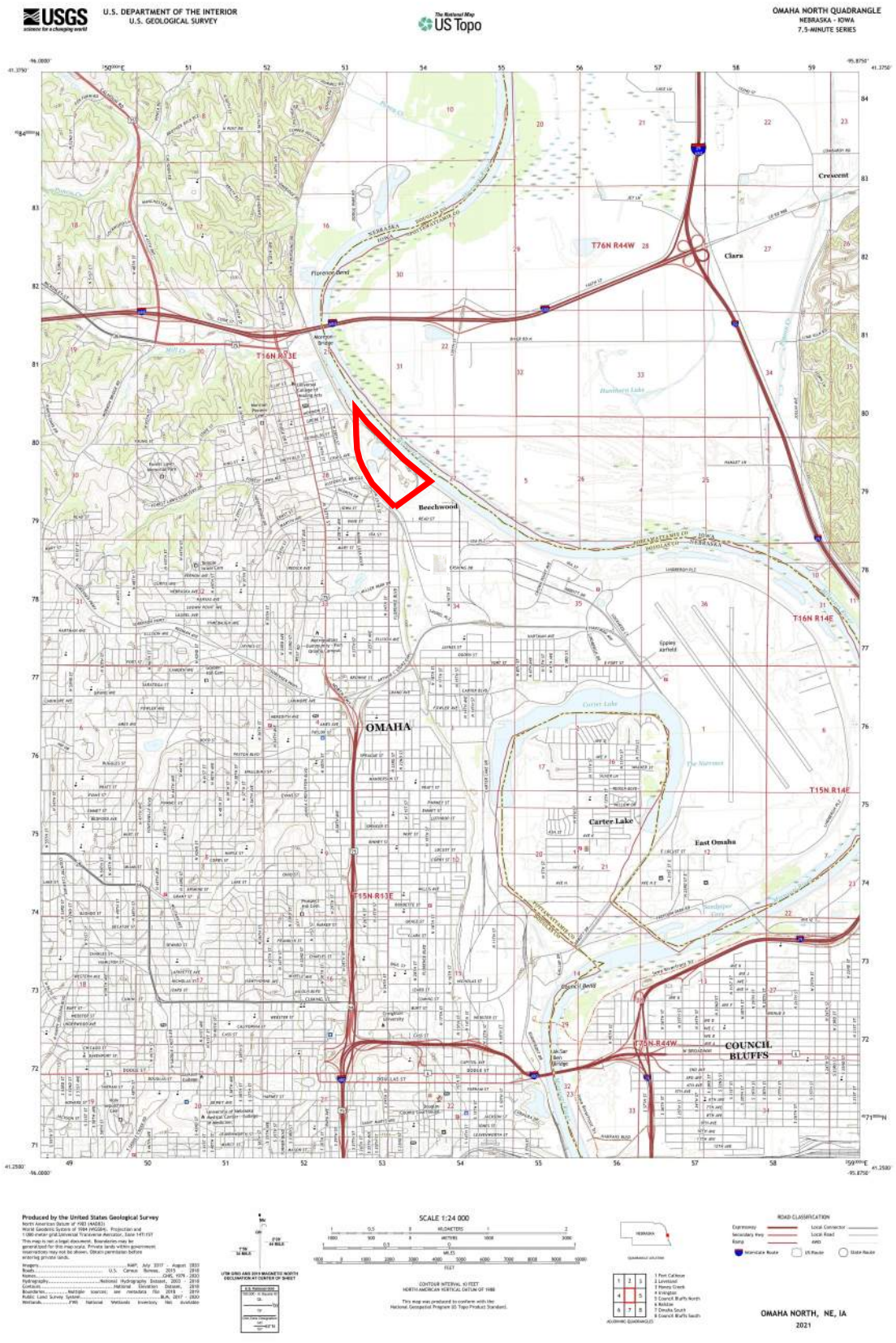
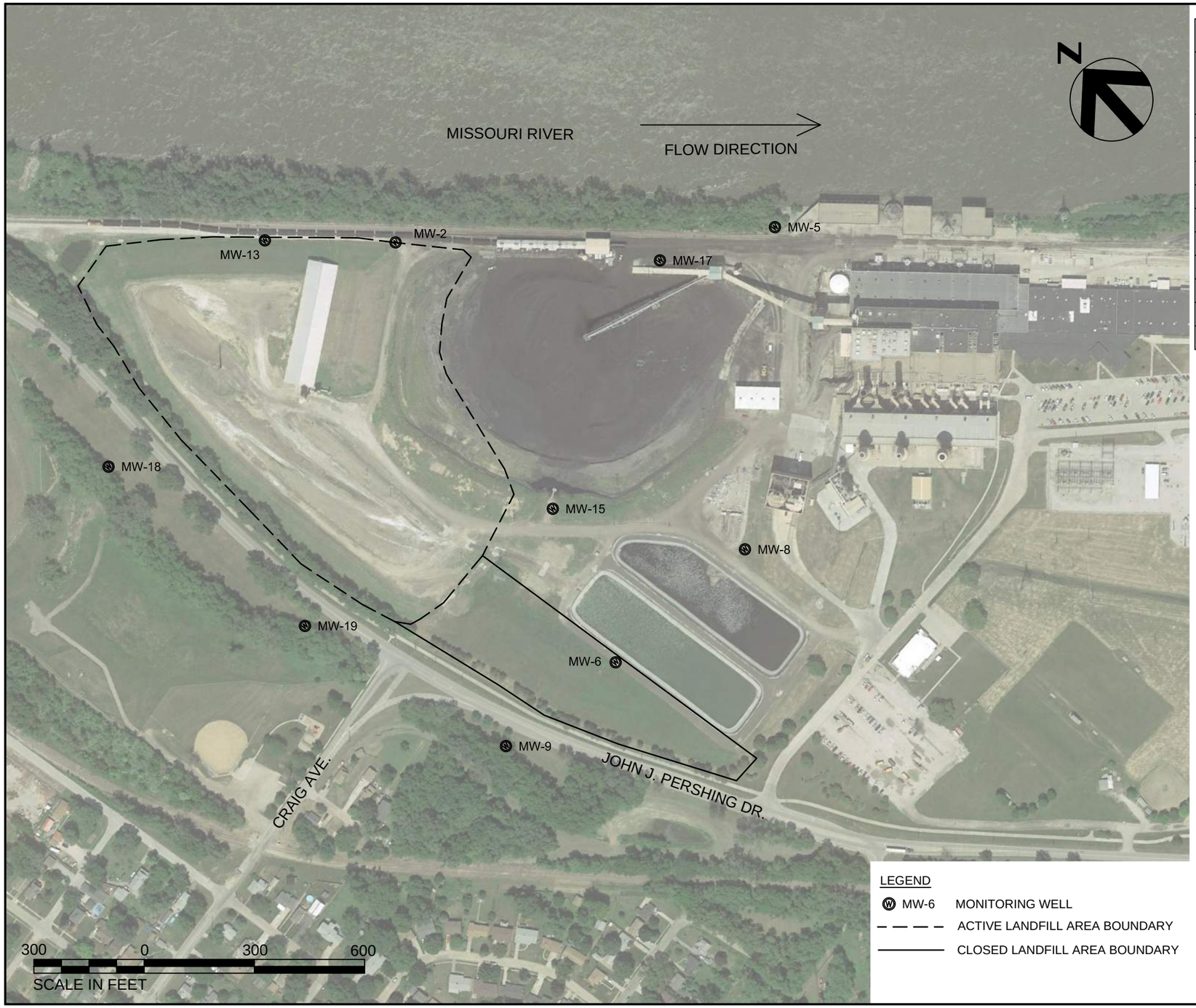


SITE LOCATION MAP

OPPD - NORTH OMAHA STATION

FIGURE 1



COMPLIANCE AND BACKGROUND MONITORING WELLS

WELL ID	NORTHING	EASTING	SURFACE ELEVATION (FEET AMSL)	TOP OF CASING ELEVATION (FEET AMSL)	INSTALL DATE	COMMENTS
MW-2	572580	2753258	998.30	1001.41	3/6/1995	DOWNGRADIENT
MW-5	571959.9	2754084	998.10	1000.96	3/2/1995	DOWNGRADIENT
MW-6	571316.1	2753000	999.60	1002.65	3/8/1995	DOWNGRADIENT
MW-8	571331.8	2753467	1000.30	1003.59	3/7/1995	DOWNGRADIENT
MW-9	571328	2752624	1027.10	1026.47	5/4/1996	BACKGROUND
MW-13	572808.9	2752986	999.02	1001.91	4/12/2001	DOWNGRADIENT
MW-15	571747.9	2753132	1002.80	1005.39	4/12/2001	DOWNGRADIENT
MW-17	572087.4	2753785	999.60	1002.54	5/10/2007	DOWNGRADIENT
MW-18	572600.9	2752267	1037.10	1037.00	12/1/2015	BACKGROUND
MW-19*	571927.2	2752407	1037.30	1037.10	1/20/2016	BACKGROUND

NOTES:

1. * FLUSH MOUNT WELL.
2. AMSL - ABOVE MEAN SEA LEVEL.

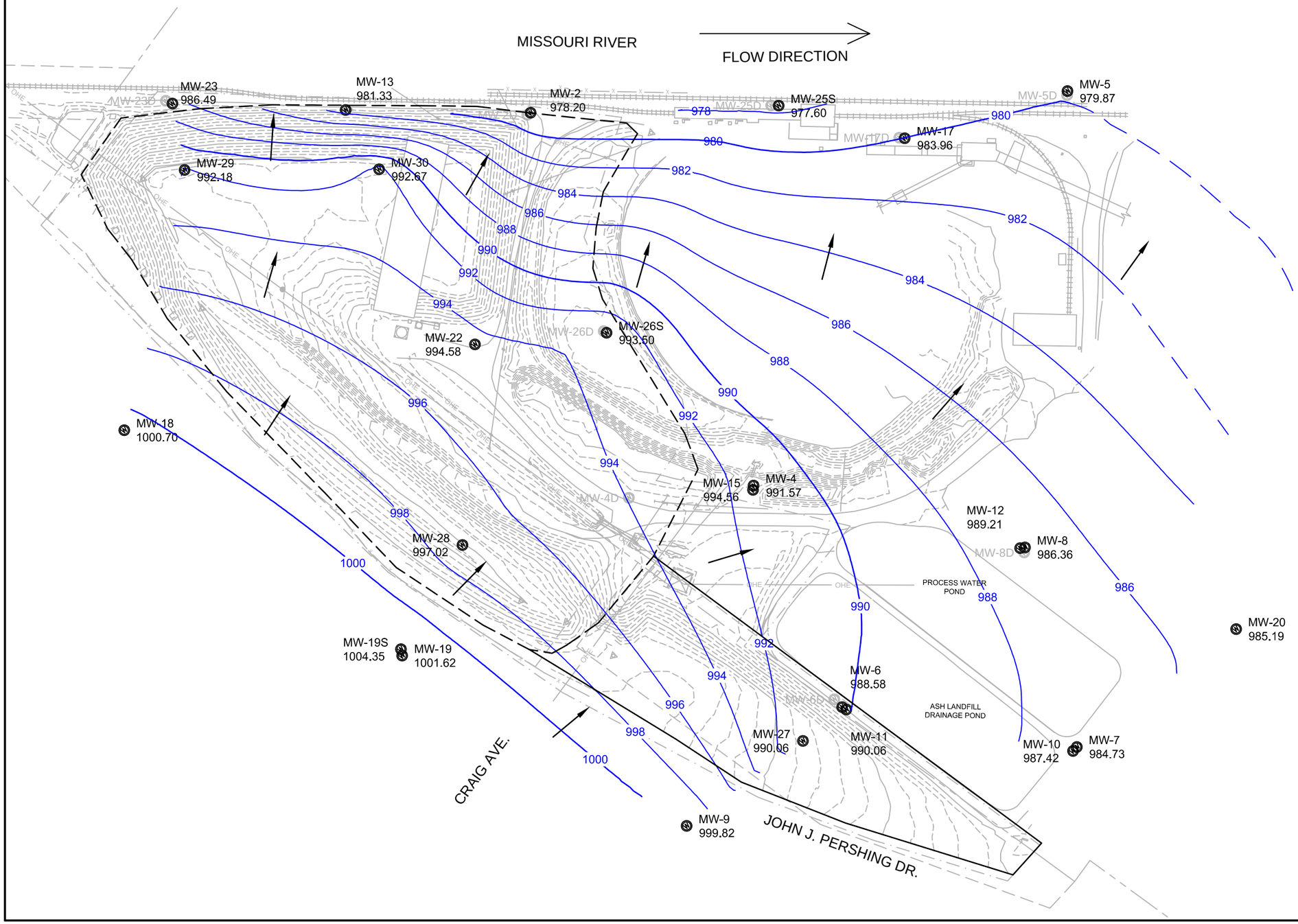
Omaha Public Power District

OMAHA PUBLIC POWER DISTRICT
NORTH OMAHA STATION - ASH LANDFILL
MONITORING WELL LOCATION MAP

REMEDY SELECTION REPORT

DATE
DECEMBER 2021

FIGURE
2



N

ACTIVE LANDFILL AREA BOUNDARY

CLOSED LANDFILL AREA BOUNDARY

RAILROAD TRACKS

MW-4 990.18 — MONITORING WELL AND GROUNDWATER ELEVATION

MW-4D — BEDROCK MONITORING WELL

990 — GROUNDWATER CONTOURS (AMSL) *DASHED WHERE INFERRED

EXISTING CONTOURS

INFERRED GROUNDWATER FLOW DIRECTION

NOTES

1. CONTOURS WERE DEVELOPED USING COMPLIANCE & BACKGROUND MONITORING WELLS AND WATER LEVEL ONLY WELLS. BEDROCK WELLS ARE NOT INCLUDED IN THE CONTOURS.
2. GROUNDWATER ELEVATIONS IN MW-6, MW-7, MW-12, MW-15, MW-17, and MW-19S WERE NOT USED FOR CONTOUR GENERATION DUE TO ANOMALOUS READINGS COMPARED TO SURROUNDING WELLS.

GROUNDWATER FLOW VELOCITY

TRACER VELOCITY = $V_T = \frac{Ki}{n}$

K = HYDRAULIC CONDUCTIVITY (SEE TABLE BELOW)

i = GRADIENT = $\frac{1ft}{50ft}$ = 0.02 FT/FT

n = POROSITY = 0.3

K	V_T
0.0544 FT/DAY	0.00363 FT/DAY
3.77 FT/DAY	0.25133 FT/DAY

200 0 200 400

SCALE IN FEET

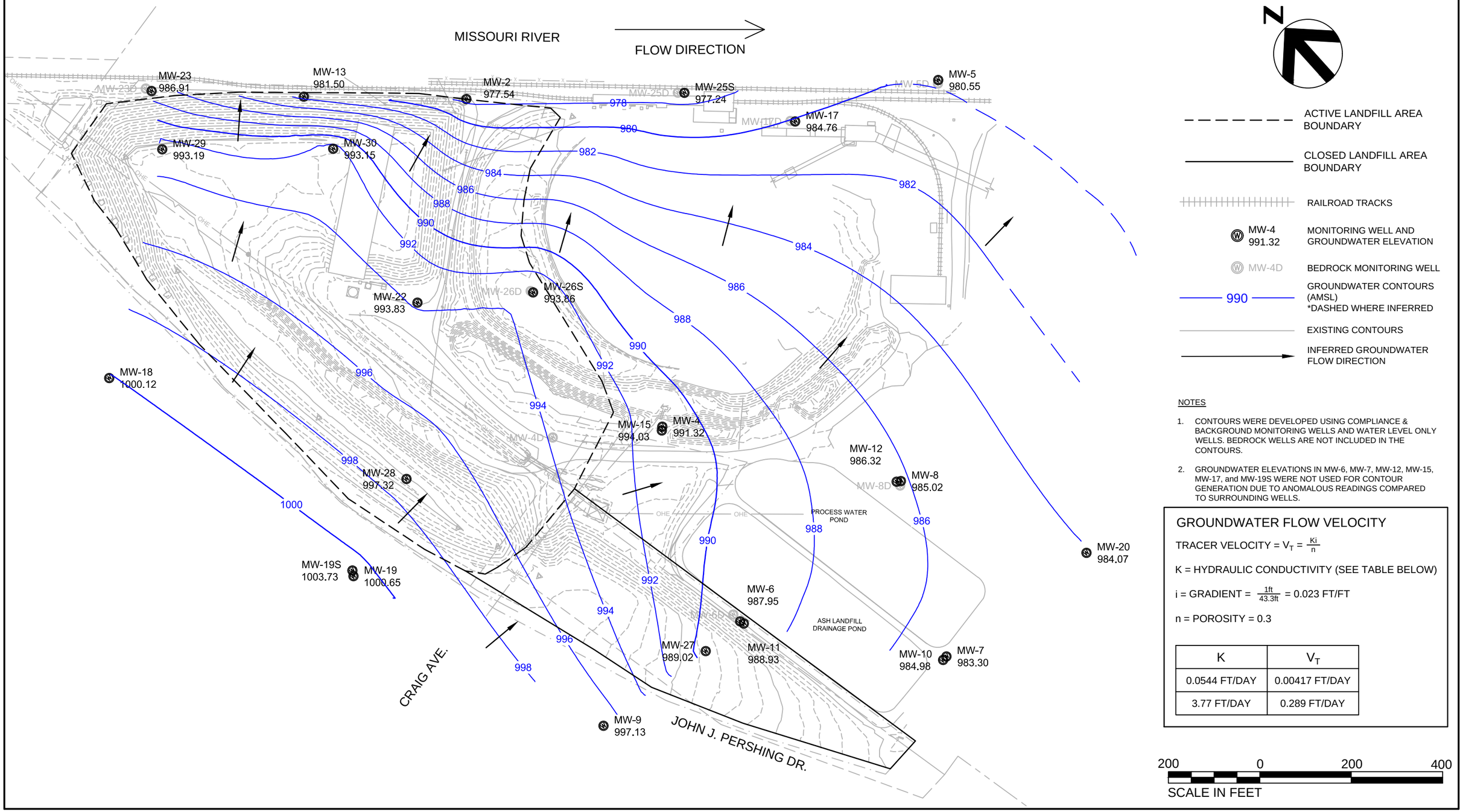
Omaha Public Power District

OMAHA PUBLIC POWER DISTRICT
NORTH OMAHA STATION - ASH LANDFILL
GROUNDWATER CONTOUR MAP - APRIL 2021

REMEDY SELECTION REPORT

DATE
DECEMBER 2021

FIGURE
3



NOTES

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2. GROUNDWATER ELEVATIONS IN MW-6, MW-7, MW-12, MW-15, MW-17, and MW-19S WERE NOT USED FOR CONTOUR GENERATION DUE TO ANOMALOUS READINGS COMPARED TO SURROUNDING WELLS.

GROUNDWATER FLOW VELOCITY

TRACER VELOCITY = $V_T = \frac{Ki}{n}$

K = HYDRAULIC CONDUCTIVITY (SEE TABLE BELOW)

i = GRADIENT = $\frac{1ft}{43.3ft}$ = 0.023 FT/FT

n = POROSITY = 0.3

K	V_T
0.0544 FT/DAY	0.00417 FT/DAY
3.77 FT/DAY	0.289 FT/DAY

200 0 200 400
SCALE IN FEET

Omaha Public Power District

OMAHA PUBLIC POWER DISTRICT
NORTH OMAHA STATION - ASH LANDFILL
GROUNDWATER CONTOUR MAP - OCTOBER 2021

REMEDY SELECTION REPORT

DATE
DECEMBER 2021

FIGURE
4