Logan Aluminum, Inc.

Water Resources Plan

6920 Lewisburg Rd, Russellville, Ky 42276

12-17-2024

Table of Contents

Background

Site Location and Operations

Logan Aluminum Inc. (Logan) owns and operates an aluminum remelt and rolling facility located at 6920 Lewisburg Road in Russellville, Kentucky (Russellville facility). The Russellville facility is located on Highway 431 north of Russellville, Kentucky (Logan County) on approximately 1,100 acres of land.

The Russellville facility produces aluminum coils from aluminum ingots supplied from recycled materials from external sources or produced internally. The facility originally commenced construction in 1980 and started production in 1983. The aluminum ingots are rolled in a series of both hot and cold rolling units that convert the ingot first into slabs and then into rolled aluminum coils. The raw coils are then finished to customer specifications through a process of leveling (unrolling and re-rolling the coils to level the metal surface), slitting (trimming the edges of the coils), and coating. The facility is classified under Standard Industrial Classification (SIC) code 3341, “Secondary Smelting and Refining of Nonferrous Metals,” which covers establishments primarily engaged in recovering nonferrous metals and alloys from new and used scrap and dross or in producing alloys from purchased refined metals, and SIC code 3353, “Aluminum Sheet, Plate, and Foil,” which covers establishments primarily engaged in flat rolling aluminum and also producing similar products by continuous casting. The Russellville facility holds a KPDES Permit No. KY0072630 (the Permit) for water discharges from the site. The Permit includes the following authorized discharges:

- Outfall 004 – Combined filter backwash, cooling water, process water, stormwater runoff, landfill leachate and stormwater runoff (pumped from the collection pond – Outfall 005), sanitary wastewater (from Outfall 006), and occasional runoff from the drying impoundment area and sludge dewatering. Effluent is treated by a wetland system prior to discharge at Outfall 004.
- Outfall 005 – Stormwater runoff from the on-site landfill. This Outfall is being maintained for emergency and maintenance purposes only and is treated by sedimentation if this outfall was to discharge. Under normal operating conditions these wastewaters are collected in the pond and pumped to Outfall 004.
- Outfall 006 - Sanitary waste is treated by sedimentation, screening, grinding, aeration, and UV disinfection prior to discharge to be used in the Main Plant Cooling Tower Water and ultimately discharged to the wetlands system (Outfall 004).

Additionally, runoff from the site stormwater retention ponds discharges through Outfalls 001, 002, 003, 007, and 008. These stormwater outfalls are managed using appropriate Best Management Practices (BMPs) to prevent the discharge of pollutants from those areas.

Below summarizes the permitting outfalls from the Russellville Facility.

Outfall	Discharge Type	Receiving Water
001	Retention pond, stormwater runoff, groundwater, forebay runoff from CM4	Austin Creek
002	Retention pond, stormwater runoff, condensate	Austin Creek

LOGAN ALUMINUM

003	Retention pond, stormwater runoff, condensate	Austin Creek
004	Treated process wastewater and stormwater to wetlands outfall (KPDES Monitoring Point)	Austin Creek
005	Landfill sedimentation basin (discharged in emergency only)	Austin Creek
006	Sanitary package plant, internal outfall discharged through Outfall 004(KPDES Monitoring Point)	Austin Creek
007	Detention pond at DC4, stormwater runoff	Austin Creek
008	Retention pond at DC4, stormwater runoff	Austin Creek

A map of the wastewater permitted outfalls is included as Figure 1 of Appendix B. A map of the stormwater permitted outfalls is included as Figure 4 of Appendix B.

Water Stewardship

The Aluminum Stewardship Initiative (ASI) Performance Standard Guidance Document provides the following background on water stewardship:

Water is a precious shared resource used by communities, ecosystems, and economic activities. Increasing pressure on water resources due to increasing population and food demand, increased economic activity, changes to land use, climate change, pollution of waterways, and other challenges, is having major impacts on our collective social, economic, and environmental well-being.

The term 'water stewardship' is being increasingly used to describe actions to improve the efficiency and cleanliness of Business operations and supply chains, while also facilitating the sustainable management of shared freshwater resources through collaboration. It recognizes that both Business and societal risks are increased when water is poorly managed or over-exploited.

Logan has recently become a part of the ASI and as such is committed to specific goals surrounding Water Stewardship (Section 7 of ASI). This Water Resources Plan documents how the Russellville Facility shall withdraw, use, and manage water responsibly to support the stewardship of shared water resources.

This original plan was created with the Ramboll group. In addition to the ASI, the following standards were reviewed when developing this Water Resources Plan:

- Alliance for Water Stewardship (AWS), International Water Stewardship Standard
- International Council on Mining and Metals (ICMM), Water Stewardship Framework
- American Water Works Associate (AWWA) Utility Risk and Resilience Certificate Program

Water Assessment

Water Sources

The ASI Standard requires Logan Aluminum to identify, document, and publicly disclose its water withdrawal and use by source and type on an annual basis. This Water Resources Plan will serve as the basis for identifying and documenting the sources of water for the Russellville Facility.

Logan Aluminum obtains water from three sources: Spa Lake, Lake Herndon, and North Logan Water District.

- Logan Aluminum's primary source of raw water is Spa Lake in Lewisburg, Kentucky, approximately seven miles from the facility. A water withdrawal permit was established in 1983, Permit No. 0908. A revision to Permit No. 0908 was approved in 2006 to increase the allowable daily withdrawal. Spa Lake is a large, surface water impoundment. Logan Aluminum is the only source user of this lake, which is approximately 2,210 acre-ft (roughly 720,130,710 million gallons) on the Wolf Lick Creek, which is part of the Mudd River Watershed.
- A secondary source of raw water is Lake Herndon in Russellville, Kentucky. A water withdrawal permit was established in 2024, listing Herndon as a secondary source, Permit No. 1788. This source of water could be used in the event of a planned or unplanned outage to Spa Lake.
- North Logan Water District provides potable water mainly for site domestic use. Potable water is also available for other intermittent or emergency uses: eyewash stations, safety showers, wall hydrants, etc.

US Army Corps of Engineers (ACE) Waters of the United States (WOTUS) Compliance

A regulated waters delineation (including wetlands, streams, and other open waters located at the Logan Aluminum Study Area in Logan County) was performed on April 19-20, 2022. The Study Area, approximately 960.4 acres, included industrial development, second growth woodlots and maintained turf. In the study, 24 wetlands, 37 streams, and 20 surface ponds were identified. A regulated waters delineation report was submitted to the USACE in June 2022 to update the Jurisdictional Determination (JD) in preparation for any regulated waters permit requirements. The JD, approved in November 2022, will provide guidance for the next five-year period.

A second regulated water delineation was completed in October 2024 to account for an additionally purchased piece of land across Edwards Road from the existing facility. The study, conducted on September 25, 2024, included approximately 91.4 acres of land with 4 streams, 7 wetlands, and 1 pond.

Water Discharges

Sanitary Wastewater Discharges

Sanitary wastewater from the facility is treated in the on-site sanitary package plant and discharged through Outfall 006 for reuse in the Main Plant Cooling Tower Water system or to the process ponds and through Outfall 004 to Austin Creek.

Process Wastewater Discharges

Process wastewater is treated and discharged to the various process related treatment facilities. Following the required treatment, and in accordance with the facility's KPDES discharge permit, process related wastewaters are discharged through the constructed wetlands to Austin Creek as Outfall 004. Process wastewater discharges are comprised of the following operations:

- Raw Water Filtration
- Demineralized Water Production
- Main Plant Cooling Water
- Cold Rolling 4 Expansion Cooling Water Use
- Caster Cooling Water – Remelt
- Caster Cooling Water Expansion – DC4
- Coating Line/Level Clean Line Wastewater Treatment
- Industrial Waste (Oil) Treatment System
- Landfill Leachate & Sanitary Plant Sludge Dewatering
- 005 Internal Outfall - Landfill Stormwater Basin

Stormwater Discharges

The plant site is drained on the west side by a series of storm drains that flow into a retention basin located at the northwest corner of the plant. This basin is equipped with below surface drainage and manual valves that are to be shut off in the case of a spill. The basin would then act as a holding impoundment to prevent migration of the spill and facilitate clean up. The discharge is Outfall 003.

The plant is drained along the south end and southwest side by a storm drainage system that leads to a retention basin located to the northeast of the plant. The east side of the plant is drained by a storm drainage system that also leads to the northeast retention basin. This basin is equipped with below surface drainage and manual valves that are to be shut off in the case of a spill. The basin would then act as a holding impoundment to prevent migration of the spill and facilitate clean up. This discharge is Outfall 001.

The plant is drained at the north end by a storm drainage system that leads to a retention basin located at the north end of the plant. This basin is equipped with below surface drainage and manual valves that are to be shut off in the case of a spill. The basin would then act as a holding impoundment to prevent migration of the spill and facilitate clean up. This discharge is Outfall 002.

The DC4 expansion on the east side of the operations is drained by a storm drainage system that leads to two retention basins located on the west and north side of the expansion. The west basin is equipped with a water quality unit to separate oil & grease and solids and the discharge is Pond 1 - Outfall 007. The north basin is equipped with below surface drainage and manual valves that are to be shut off in the case of a spill. This discharge is Pond 2 - Outfall 008.

The CM4 expansion on the east side of the operations is drained by a storm drainage system that leads to a detention basin located on the north side of the expansion. The basin is equipped with manual valves that are to be shut off in the case of a spill. This forebay discharges to 001 Pond.

Water Balance

The Russellville Facility has prepared a water flow diagram and water balance (Appendix 3), which details the average water use at the site.

Water Risk Assessment

Aluminum Stewardship Initiative (ASI)

This Water Resources Plan was developed to align with the ASI. The ASI outlines the performance standard criteria for evaluating water stewardship at a Facility. The principle of the initiative is for a facility to withdraw, use, and manage water responsibly to support the stewardship of shared water resources. The required criteria include:

- Identify, document, and publicly disclose water withdrawal and use by source and type on an annual basis.
- Undertake an assessment and, where material, publicly disclose water-related risks in watersheds in the entity's areas of influence on an annual basis.
- Implement water management plans, developed in conjunction with affected populations and organizations with time-bound, contextual targets that address material risks identified.
- Review the plans at least every 5 years.
- Review the plans on any changes to the business that alter material water-related risks.
- Review the plans for any indication of a control gap.
- Publicly disclose the latest version of the management plans.

Water Risks from Supply

Logan County, Kentucky historically has not suffered from critical drought conditions. As shown in Figure 2 in Appendix B, the Palmer Modified Drought Index shows that there has not been more than a moderate drought in Logan County for almost 100 years.

Safe yield (for surface water) means a sustainable withdrawal that can be continuously supplied from a surface water supply source without adverse effects throughout a critical dry period. The dry period in some instances is considered to be an event with a 1% chance of occurrence, or one that is equivalent to the drought of record.

Logan Aluminum generally calculates based on an average withdrawal rate of 1,000,000 gallons per day (or 133,681 cubic feet). This is calculated to approximately 1.5 cfs. In USGS data, stored within the Kentucky Watershed Explorer, Spa Lake shows that the mean annual flow is 18.8 cfs, while the 10-year low flow is 0.4 cfs. This in conjecture with the Palmer Modified Drought index shows that in normal conditions Logan's withdrawal should not strain the primary source (Spa). Additionally, based on risk assessments completed with the WWF Scenario Maps, water scarcity is not expected to raise in risk for our region in reaching outlooks.

However, though risk is relatively low for this scenario to occur, Logan recognizes the vital importance of water resources for both our processes as well as the local environment. For this reason, Logan also sought the ability to withdrawal from Lake Herndon as a secondary source in the case of emergency or severe drought. USGS data shows that Herndon has a mean annual flow of 8 cfs and a 10-year low flow of 0.2 cfs. With these sources' availability joined

LOGAN ALUMINUM

with an existing 2,000,000-gallon storage capacity, Logan is prepared for the potential of drought conditions in the area.

Spa Lake

Logan Aluminum's primary source of raw water is Spa Lake in Lewisburg, Kentucky, approximately seven miles from the facility. Spa Lake is classified by the United States Environmental Protection Agency (USEPA) as a Category 2 water: Assessment supports designated use(s) but not all designated use(s) assessed. The designated uses associated with Spa Lake include:

- Warm water aquatic habitat
- Primary contact recreation
- Secondary contact recreation
- Domestic water supply

Lake Herndon

A secondary source of raw water is Lake Herndon in Russellville, Kentucky. Water withdrawal application has been completed to access this source water in the event of a planned or unplanned outage to Spa Lake.

Risks associate with Intake Pipeline

The Russellville Facility currently operates and maintains a 7-mile pipeline from Spa Lake to the facility. Due to deterioration of this pipeline due to age of the system, this area was previously identified as high risk for our operational use of water. Due to this, a project was enacted to replace the existing line with a new line in 3 phases. Phase 1 was completed in 2024, and phases 2 & 3 are slated to finish in 2025.

Surface Water Quality Risks from Discharge

Both the wastewater and stormwater discharges from the Russellville Facility discharge to Austin Creek. Austin Creek is classified as a warm water aquatic habitat, primary / secondary contact recreation, and domestic water supply stream. The segment of Austin Creek that Logan discharges to, mile point 2.6 to 3.6, was listed as impaired in Kentucky's 2024 integrated report for the warmwater aquatic habitat use. The pollutants of concern are unknown at the time of the report but are suspected to be associated with an industrial point source discharge.

To protect surface water quality from process wastewater contamination at Outfall 004, a variety of pretreatment processes are utilized for oil demulsification, metals precipitation, demineralized water generation, and cooling tower chemistries. The surface flow wetlands natural treatment system is the final treatment step prior to discharge through Outfall 004. A pretreatment study was completed in 2021 to evaluate pretreatment enhancements. Various recommendations were made because of this study. Coating Line pretreatment with pH adjustment for metals precipitation was enhanced. Logan conducted an MBBR (moving bed bioreactor) study to determine if this technology is appropriate for COD removal in the treatment process prior to natural wetlands treatment.

In addition to the known discharges and potential pollutants, in the event of a major spill at Logan Aluminum, contents could discharge to Austin Creek. Discharges leaving Logan Aluminum's property enter Austin Creek at approximately 36°57'15" latitude and 86° 55'45" longitude. To assess the spill potential of the Logan plant, all areas of oil and solvent use and storage were reviewed. These include areas in and outside the manufacturing buildings using or storing oil, aboveground bulk storage tanks, and loading and unloading facilities for bulk quantities of raw materials. Spills occurring within the Hot Rolling and Cold Rolling Business Units, CM4 and DC4, are diverted to internal sumps, which drain to or are pumped to industrial sumps, which drain to or are pumped to the industrial waste sump located at the Northeast corner of the facility.

The Finishing Unit Coating Line spill containment consists of in-floor drains that gravity flow into the coating line sump through a flow-through process tank that is pumped to the CL Building at Water Services for treatment. The LCL spill containment consists of in-floor drain and sumps, which pump to the Evaporator Tank Farm for treatment. Spills occurring in the Water-based coating mix room, coating room, and tank farm are channeled to a floor sump, which is pumped to the waste coating tank. Spills in the other areas of the plant will either be contained in sumps located by the piece of equipment or will have to be contained using booms or other containment methods.

All outside diked areas capable of capturing stormwater are equipped with manual drains and/or manually activated pumps. All valves are normally closed, and all pumps are in the "off" position until such time as the captured stormwater can be inspected for the presence of oil and discharged if none is present.

Outfall 004 is regulated under the KPDES individual permit and is sampled weekly to demonstrate compliance with the Water Quality legal standards to which the facility is regulated.

Potable Water Quality Risks

Potable water at Logan Aluminum is supplied from North Logan Water District. Approximately 60K gallons of water per day are drawn from the water district for use a Logan. To minimize the risk of contamination to the potable water supply from industrial process water systems, the following plan and procedures were developed and are followed.

- Potable Water Cross-Connection Policy and Control Plan – Plan 2-17
- Potable Water Supply Interruption – Water 3-08
- Potable Water Tie-In Procedure – 6.02.002.01

Stormwater Risks

The Logan property consists of an area of approximately 1,000 acres, which has low topographic relief. The area of industrial activity at the site that is exposed to stormwater is approximately 50 acres.

The site is situated in an area of residual soils overlying limestone and shale bedrock, on the edge of the Dripping Springs Escarpment with several karst features. The drainage pattern for the immediate plant site is due north with several small streams converging into Austin Creek just before the creek exits Logan owned property. Most of the tributaries surrounding the manufacturing building are continuous flow due to karst activity around the plant. The stream runoff from all four sides of the manufacturing building is conveyed to five retention ponds equipped with sluice gates to provide containment if the need ever arises.

Asphalt perimeter roads surround the production buildings. Located at various points around the production buildings are storm grates that accept flow from both outside the building and from the roofs of the building itself. The outside drains are located between the perimeter road and the building at various points around the entire facility. The drains from the roof either flow directly onto the ground or they are piped directly into a stormwater pipe under the manufacturing floor. The stormwater from the grates and the flow exits the plant area in one of five outfalls that carry the flow off to the north where it eventually combines into Austin Creek with the plant's treated wastewater discharge and exits plant site.

Logan uses a variety of oils, lubricants, coolants, greases, solvents, and paints in conjunction with its manufacturing processes that are stored in and around the facility. These materials are all handled in a responsible manner to minimize the potential for any of this material reaching the storm drain. All of Logan's outside bulk tanks are above ground and are situated in concrete containment. Most of the storage tanks are located under roof, or they are completely inside a building where spills will enter the wastewater treatment system. Drums are also stored in contained pads or inside a building.

Logan also has a lined landfill equipped with a leachate system and is contoured to direct any storm flow into a silt basin located downstream. All manufacturing, except for some refractory repairs, takes place indoors, within the buildings in the seven units.

Logan Aluminum maintains a site Stormwater Pollution Prevention Plan, which details the BMPs the site implements to protect stormwater from contamination.

Groundwater Risks

Published geologic information indicates that Mississippian Haney Limestone Formation underlies the entire manufacturing building, including where borings and wells were drilled. This formation consists of yellowish-brown to yellowish-gray limestone. It is locally cherty, shaley and thin bedded and weathers readily, leaving red soil and conspicuous chert. Prior to natural chemical weathering (in-situ), the thickness of the Haney Limestone ranged from 25 to 35 feet. This formation is underlain by the Big Clifty Sandstone Member. The Big Clifty Sandstone consists of sandstone, interbedded siltstone and shale. The thickness of this formation is generally between 140 and 170 feet. The Haney Limestone is representative of a typical karst terrain with numerous sinkholes and cave streams. The Big Clifty Sandstone does not exhibit karst features and the shale layer at the top of this formation likely inhibits the downward percolation of groundwater. During subsurface investigations performed at the facility, depths to bedrock ranged from 13.2 feet to 18.5 feet below ground surface (bgs). In the general vicinity of the rolling mills, native material has been removed to bedrock and replaced with limestone gravel backfill. The backfill is associated with excavation for basements and equipment trenches at the facility.

The primary zone of groundwater movement through the Haney Limestone is by solution channels, fractures, and along the bedding planes of interwoven shale layers. Groundwater is channeled by the above listed pathways to the underlying shale layer of the Big Clifty Sandstone. The groundwater movement in the area is classified as "confined flow" due to low permeability and migrates along the contact of the Haney Limestone and the Big Clifty Sandstone to surface water features or springs on or around Logan's 1,100 acres. The flow systems are very local in nature, and no groundwater is used in the immediate area.

Logan Aluminum maintains a site Groundwater Protection Plan that details the groundwater protection practices the site implements to protect groundwater from contamination.

Area of Influence

The Russellville Facility withdrawals water from Spa Lake in the Wolf Lick Creek Watershed and discharges to Austin Creek part of the Austin Creek-Mud River Watershed. Logan Aluminum has determined its area of influence to include these two watersheds as shown on Figure 3 of Appendix B.

The facility is in southern Kentucky in Logan County between the cities of Lewisburg and Russellville. Additionally, the Russellville Facility both directly and indirectly affects the following entities:

- North Logan Water District (potable water supply)
- Auburn APEX facility (off-site solidification/solid waste transfer) and landfill to Hopkins County (solid waste)
- Railroads (product/material transfer)

Water Management

Risk Awareness

Through completion of risk assessment from both WWF and WRI, Logan recognizes the highest risks to the surrounding watersheds are water quality (TSS, BOD, conductivity, and general eutrophication) as well as impacts to local biodiversity. For the area and region Logan Aluminum is situated in, the risk of flood outweighs the risk of drought, and the primary concern is the improvement of existing infrastructure to support the outline risks.

Through our water quality monitoring (both internal and with regulatory bodies) Logan aims to meet or surpass all applicable water quality standards. Logan is dedicated to evaluating the effectiveness of our water treatment systems, as well as the efficiency of our water consuming processes in order to integrate projects which materially improve water stewardship.

Logan Aluminum works in conjecture with their owners to develop goals relating to water stewardship. Logan monitors water discharge as an intensity and reports values relating to consumption on the Logan Website and Annual Sustainability report. Additional internal plans which support the progress of water stewardship include the Spill Prevention Control and Countermeasures Plan, the Stormwater Pollution Prevention Plan, and the Groundwater Protection Plan.

Plan Updates

Logan Aluminum will review and update this Water Resources Plan, when changes occur that materially alter water usage, annually, as well as with any changes to the business that alter material water-related risks and with any indication of a control gap.

Appendix A: Tables

Table 1: Logan County Metrics on WWF Water Risk Filter (September 2024)

Risk Indicator	Color	Metric Description
Basin Physical Risk		Represents both natural and human-induced conditions of river basins. It comprises four risk categories covering different aspects of physical risks: water availability, drought, flooding, water quality, and ecosystem services status.
1.0 Water Availability		The physical abundance or lack of freshwater resources.
1.1 Water Depletion		Water depletion measures the ratio of surface and ground water consumptive use to available renewable water.
1.2 Baseline Water Stress		Baseline water stress measures the ratio of total surface and groundwater withdrawals to available renewable water.
1.3 Blue Water Scarcity		Blue water scarcity measures the ratio of the blue water footprint to the total blue water availability.
1.4 Groundwater		This indicator presents the change in groundwater levels from the first five years
2.0 Dought		It is characterized by the absence of precipitation long enough to cause a serious hydrological imbalance, impacting various sectors of the economy slowly over time.
2.1 Drought Frequency Probability		This indicator is based on the Standardized Precipitation and Evaporation Index (SPEI).
2.2 World Atlas of Desertification		This indicator is from the World Atlas of Desertification (WAD3) convergence of evidence layer, which maps land degradation and environmental change across 14 different categories.
3.0 Flooding		The Water Risk Filter risk category flooding considers historical patterns based on empirical evidence of large flood events since 1985 to present.
3.1 Estimated Flood Occurrence		This indicator is based on the recurrence of floods within the 35-year time frame period of 1985 to 2021.
3.2 Flood Hazard		
4.0 Water Quality		Water quality indicates whether water resources are fit for human use and ecosystems alike.
4.1 Costal Eutrophication Potential		Coastal eutrophication potential measures the potential for riverine loadings of nitrogen (N), phosphorus (P), and silica (Si) to stimulate harmful algal blooms in coastal waters.

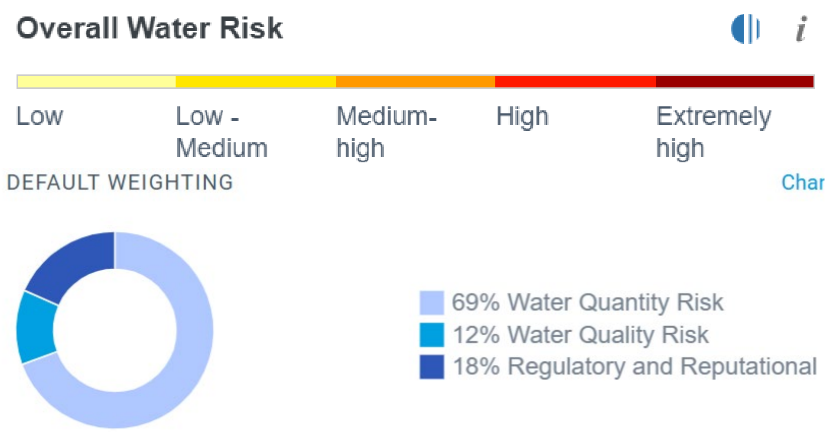
4.2 Nitrate-Nitrite Concentration		This indicator is based on predictions of nitrogen (nitrate/nitrite) in rivers, as an annual average.
4.3 Periphyton Growth Potential		Periphyton Growth Potential is based on global model of dissolved and total nitrogen (N) and phosphorus (P) concentrations and ratios to determine which nutrient is limiting periphyton proliferation during the growing season.
4.4 Toxicity Stress		Toxicity Stress is a measure of the negative effects experienced by the aquatic system due to chemicals and mixtures of chemicals that are transported through and accumulate in freshwater ecosystems and negatively affect the aquatic ecosystem.
4.5 Mismanaged Plastic Waste		The values presented in this indicator are mismanaged plastic waste in kg/y/sqkm for 2015.
4.6 Risk of Pesticide Pollution		Risk of pesticide pollution is composed of two datasets: pesticide pollution risk score and number of (pesticide) active ingredients posing a risk to the environment.
4.7 Total Dissolved Solids		This indicator represents salinity for the ten-year period of January 2010 - December 2019.
4.8 Surface Water Quality Index BOD		This indicator is based on the results of the dynamical surface water quality model (DynQual) monthly results for the period of 2010-2019.
4.9 Surface Water Quality Index Electrical Conductivity		Electrical conductivity (EC) is a proxy for salinity balance and pH alteration as it relates to the concentration of dissolved solids in water. This indicator is based on the Electrical Conductivity (EC) parameter of the World Bank's Environmental Water Quality Index.
5.0 Ecosystem Services Status		This parameter is informed by indicators of fragmentation status of rivers (i.e. Connectivity Status Index – CSI); catchment degradation (i.e. forest loss, as forests play an essential role in terms of water regulation, supply and pollution control); wetland degradation, freshwater invasive species and river extent change.
5.1 Catchment Ecosystem Services Degradation Level		For this indicator, tree cover loss was applied as a proxy to represent catchment ecosystem services degradation.
5.2 Violation of Environmental Flows		This indicator shows the percentage change in frequency of Environmental Flow Envelope (EFE) lower-bound violations from the pre-industrial period to present-day conditions.
5.3 Wetland Degradation		This indicator is derived from maps of wetland loss through human conversion between 1700 and 2020.
5.4 Invasive Species		This indicator is based on the presence of some of the world's worst invasive species.
5.5 River Extent Change		This indicator is based on the magnitude of river extent change over the past 4 decades derived from Landsat satellite imagery.
5.6 Fragmentation of Rivers		This indicator uses the CSI to calculate the percentage of the river basins' volume considered as fragmented (CSI greater than 95%).

Basin Regulatory Risk		The Water Risk Filter regulatory risk layer is heavily tied to the concept of good governance and that businesses thrive in a stable, effective and properly implemented regulatory environment.
6.0 Enabling Environment		Enabling environment measures existing policies, laws and plans to support Integrated Water Resources Management (IWRM) implementation.
6.1 Freshwater Policy Status (SDG 6.5.1)		This indicator is based on SDG 6.5.1. Degree of Integrated Water Resource Management (IWRM) Implementation "National Water Resources Policy"
6.2 Implementation Status of Water Management Plans (SDG 6.5.1)		This indicator is based on SDG 6.5.1. Degree of Integrated Water Resource Management (IWRM) Implementation "National IWRM Plans" indicator
7.0 Institutions & Governance		Institutions & Governance measures the range and roles of political, social, economic and administrative institutions, and the ability to convene and engage other stakeholder groups that help to support Integrated Water Resources Management (IWRM) implementation.
7.1 Control of Corruption		This indicator is based on the Worldwide Governance Indicators for the year 2022 produced by the World Bank.
7.2 Private Sector Participation in Water Management (SDG 6.5.1)		This indicator is based on SDG 6.5.1. Degree of Integrated Water Resource Management (IWRM) Implementation "Private Sector Participation in Water Resources Development, Management and Use" indicator.
8.0 Management Instruments		Management instruments measures data availability, tools and activities that enable decision-makers and users to make rational and informed choices between alternative actions that help to support Integrated Water Resources Management (IWRM) implementation.
8.1 Management Instruments for Water Management (SDG 6.5.1)		This indicator is based on SDG 6.5.1. Degree of Integrated Water Resource Management (IWRM) Implementation "Sustainable and efficient water use management" indicator.
8.2 Density of Runoff Monitoring Stations		This indicator measures the density of monitoring stations as water management decisions rely strongly on data availability.
9.0 WASH Infrastructure		Access to safe drinking water, adequate sanitation and hygiene awareness (WASH) is critical for water resources development and management.
9.1 Access to Safe Drinking Water		This indicator measures the percentage of people using at least basic water services.
9.2 Access to Basic Sanitation		This indicator measures the percentage of people using at least basic sanitation services, that is, improved sanitation facilities that are not shared with other households.
Basin Reputational Risk		The Water Risk Filter reputational risk layer represents stakeholders" and local communities" perceptions on whether companies conduct business sustainably or responsibly with respect to water

10.0 Environmental Factors		This risk category comprises the following indicators: 1) Freshwater Endemism, 2) Freshwater Biodiversity Richness, 3) Ramsar Wetlands, 4) Ecosystem Condition, and 5) Free Flowing Rivers.
10.1 Freshwater Endemism		This indicator is based on the Freshwater Ecoregions of the World (FEOW) 2015 data developed by WWF and TNC. The rationale is that companies operating in river basins with higher number of endemic fish species are facing higher reputational risks.
10.2 Freshwater Biodiversity Richness		This indicator is based on the Freshwater Ecoregions of the World (FEOW) 2015 data developed by WWF and TNC, and the count of fish species is used as a representation of freshwater biodiversity richness.
10.3 RAMSAR wetlands		This indicator is based on the Ramsar sites found in the List of Wetlands of International Importance.
10.4 Ecosystem Condition		Ecosystem condition indicates whether the natural environment is intact and connected.
10.5 Free Flowing Rivers FFR		This indicator is based on the data set by Grill et al. (2019) mapping the world's free-flowing rivers.
11.0 Socioeconomic Factors		This risk category comprises the following indicators: 1) Water Conflicts, 2) Labor/Human Rights, and 3) Financial Inequality.
11.1 Water Conflicts		This indicator shows the total number of conflict events per country from the last 100 years (1923-2023).
11.2 Labor/ Human Rights		The indicator is based on the V-Dem civil liberties index, which provides an estimate of the extent to which people are free from government torture, political killings, and forced labour, they have property rights, and enjoy the freedoms of movement, religion, expression, and association.
11.3 Financial Inequality		This indicator uses the GINI index to estimate financial inequality.
12.0 Additional Reputational Factors		This risk category comprises the following indicators: 1) Media Scrutiny, 2) Risk Preparation, and 3) Sites of International Interest
12.1 Media Scrutiny		This indicator is based on 2023 data collected by RepRisk on counts and registers of documented Coal-fired power plants, Fracking, Hydropower (dams), Land grabbing, Oil sands, Wastewater management, Water management and Water Scarcity that can affect a company's reputational risk.
12.2 Risk Preparation		This indicator is based on the assessment of humanitarian crises and disasters. It can support decisions about prevention, preparedness and response.
12.3 Sites of International Interest		This indicator is based on the World Heritage List sites produced by UNESCO with the aim to identify, protect, and preserve sites around the world with outstanding significance to the cultural and natural heritage of humanity.

Source: All information and metrics available for review at WWF's Water Risk Filter

Table 2: Logan Aluminum & Withdrawal Sources Metrics on WRI Aqueduct Water Risk Analysis



Risk Indicator	Risk	Metric Description
Overall Water Risk	Low-Medium	Overall water risk measures all water-related risks, by aggregating all selected indicators from the Physical Quantity, Quality and Regulatory & Reputational Risk categories.
Physical Risks Quantity	**Medium-High**	**Physical risks quantity measures risk related to too little or too much water, by aggregating all selected indicators from the Physical Risk Quantity category.**
Water Stress	Medium-High	Baseline water stress measures the ratio of total water demand to available renewable surface and groundwater supplies. Water demand include domestic, industrial, irrigation, and livestock uses. Available renewable water supplies include the impact of upstream consumptive water users and large dams on downstream water availability.
Water Depletion	Low-Medium	Baseline water depletion measures the ratio of total water consumption to available renewable water supplies. Total water consumption includes domestic, industrial, irrigation, and livestock consumptive uses.
Interannual Variability	Medium-High	Interannual variability measures the average between year variability of available water supply, including both renewable surface and groundwater supplies. Higher values indicate wider variations in available supply from year to year.
Seasonal Variability	Low-Medium	Seasonal variability measures the average within-year variability of available water supply,

		including both renewable surface and groundwater supplies. Higher values indicate wider variations of available supply within a year.
Groundwater Table Decline	Data Not Available	
Riverine Flood Risk	Low	Riverine flood risk measures the percentage of population expected to be affected by Riverine flooding in an average year, accounting for existing flood-protection standards. Flood risk is assessed using hazard (inundation caused by river overflow), exposure (population in flood zone), and vulnerability.
Costal Flood Risk	Low	Coastal flood risk measures the percentage of the population expected to be affected by coastal flooding in an average year, accounting for existing flood protection standards. Flood risk is assessed using hazard (inundation caused by storm surge), exposure (population in flood zone), and vulnerability.
Drought Risk	Medium	Drought risk measures where droughts are likely to occur, the population and assets exposed, and the vulnerability of the population and assets to adverse effects.
Physical Risks Quality	**Low - Medium**	**Physical risks quality measures risk related to water that is unfit for use, by aggregating all selected indicators from the Physical Risk Quality category.**
Untreated Connected Wastewater	Low	Untreated connected wastewater measures the percentage of domestic wastewater that is connected through a sewerage system and not treated to at least a primary treatment level.
Coastal Eutrophication Potential	Medium to High	Coastal eutrophication potential (CEP) measures the potential for riverine loadings of nitrogen (N), phosphorus (P), and silica (Si) to stimulate harmful algal blooms in coastal waters.
Regulatory and Reputational Risk	**Low - Medium**	**Regulatory and reputational risks measures risk related to uncertainty in regulatory change, as well as conflicts with the public regarding water issues.**
Unimproved/ No Drinking Water	Low to Medium	Unimproved/no drinking water reflects the percentage of the population collecting drinking water from an unprotected dug well or spring, or directly from a river, dam, lake, pond, stream, canal, or irrigation canal (WHO and UNICEF 2017).
Unimproved/ No Sanitation	Low	Unimproved/no sanitation reflects the percentage of the population using pit latrines without a slab or platform, hanging/bucket

		latrines, or directly disposing human waste in fields, forests, bushes, open bodies of water, beaches, other open spaces, or with solid waste (WHO and UNICEF 2017).
Peak RepRisk Country Risk Index	Low	The Peak RepRisk country ESG risk index quantifies business conduct risk exposure related to environmental, social, and governance (ESG) issues in the corresponding country.

Source: WRI's Water Risks Tool: Aqueduct

Table 3: 2023 Logan County Physical Metrics on WWF Scenario Maps

Risks and scenarios are based on what risks will look like in a world similar to current socio-economic development trends (SSP2) and intermediate GHG emission levels, in the scenario where the global mean surface temperature will raise approximately 2°C by the end of the 21st century.

Risk Indicator	Color	Metric Description
Basin Physical Risk		The Water Risk Filter physical risk layer comprises four risk categories: water scarcity, flooding, water quality, and ecosystem services status. See the specific risk category layers for more details.
1. Water Scarcity		This scenario is derived from the Water Risk Filter water scarcity risk in the year 2020 (baseline), added with projected changes from the International Institute for Applied Systems Analysis (IIASA) Water program, and from the Water Scarcity Atlas' futures tool.
2. Flooding		Water depletion measures the ratio of surface and ground water consumptive use to available renewable water.
3. Water Quality		This scenario is derived from the Water Risk Filter water quality risk in the year 2020 (baseline), added with projected changes from the International Food Policy Research Institute (IFPRI), covering nitrogen, phosphorus, and BOD loading.
4. Ecosystem Services		This scenario is derived from the Water Risk Filter ecosystem services status risk in the year 2020 (baseline), added with projected changes in environmental flow from the National Institute for Environmental Studies (NIES Japan) as well as Global Dams Watch's future hydropower reservoirs and dams.

Source: All information and metrics available for review at WWF's

Appendix B: Figures

Figure 1: Permitted Wastewater Outfalls

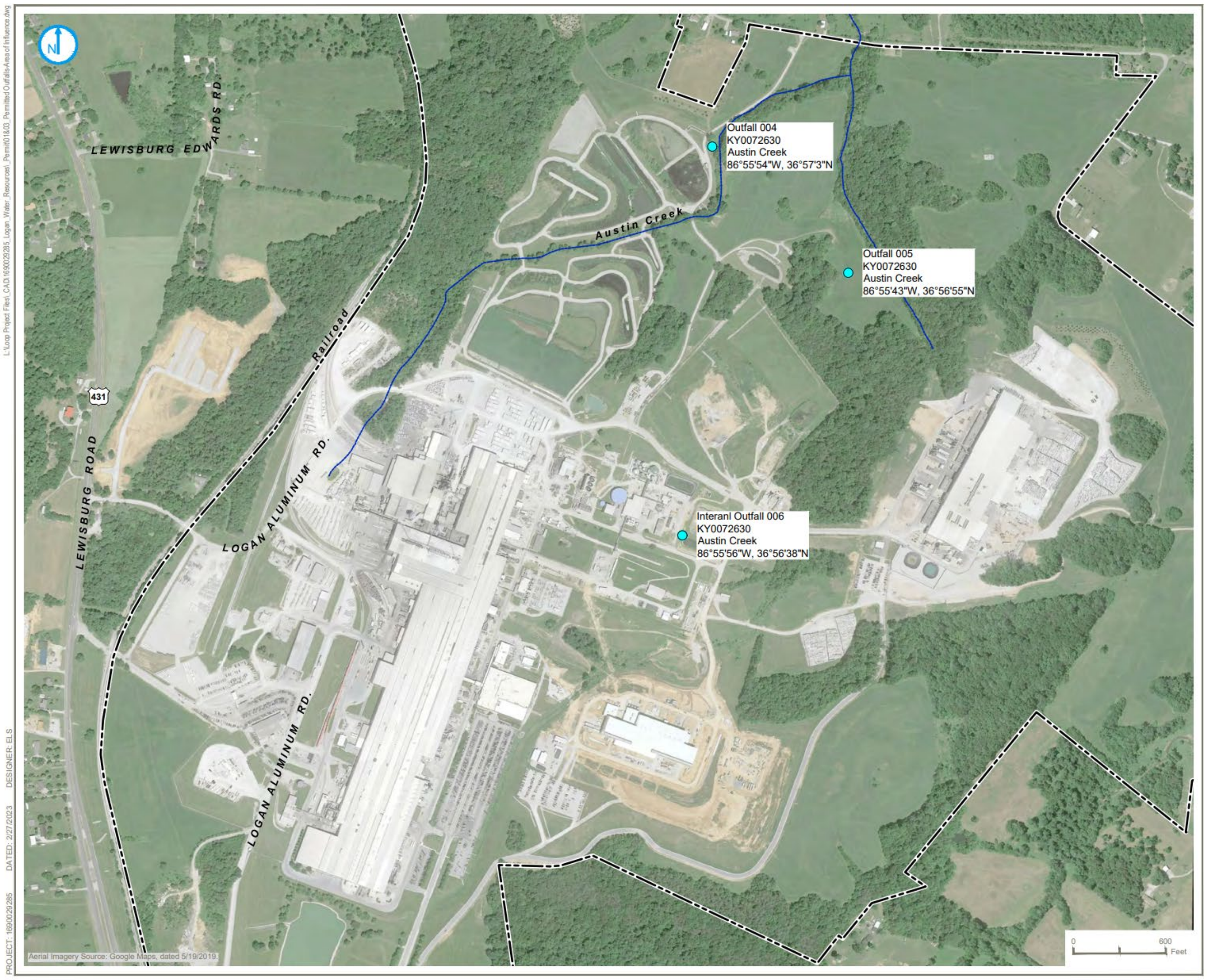


Figure 2: Palmer Modified Drought Index

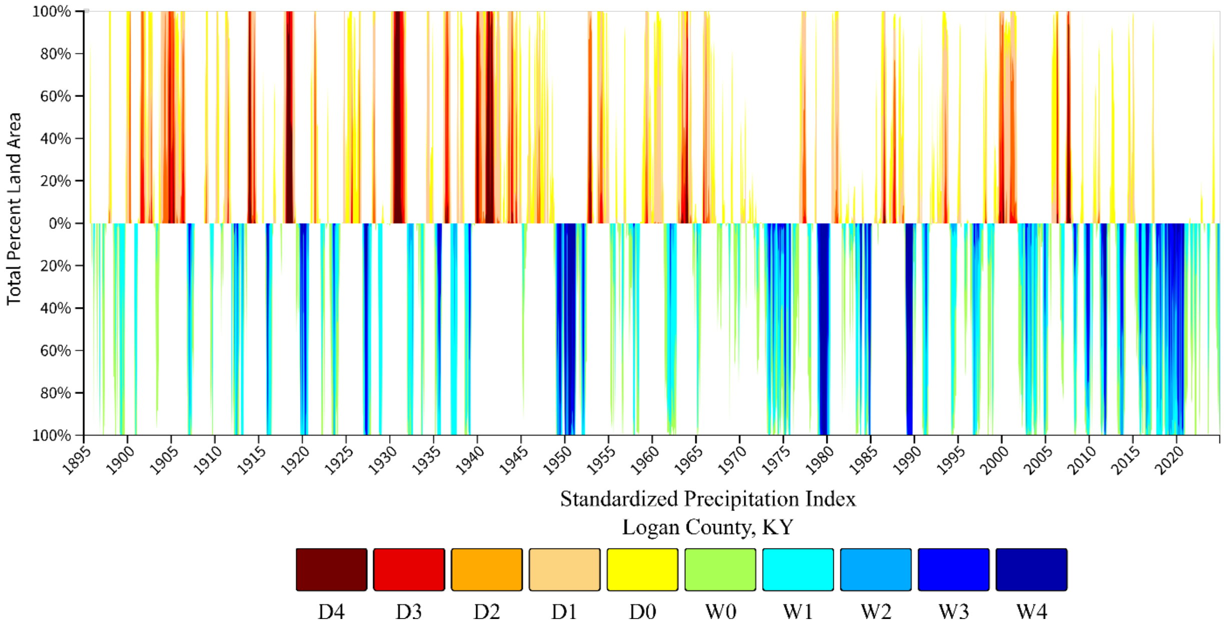
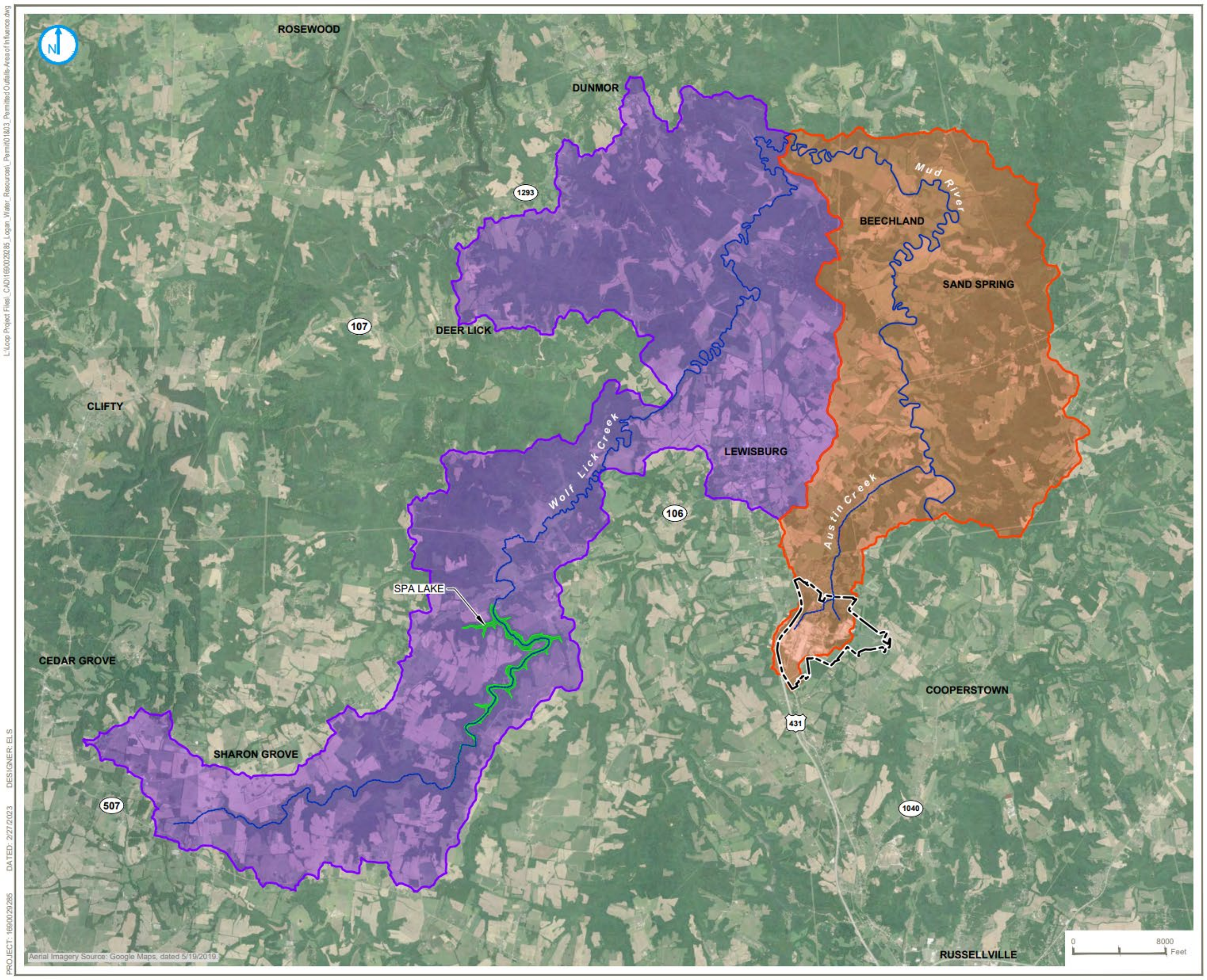


Figure 3: Area of Influence



LOGAN ALUMINUM

Figure 4: Stormwater Layout

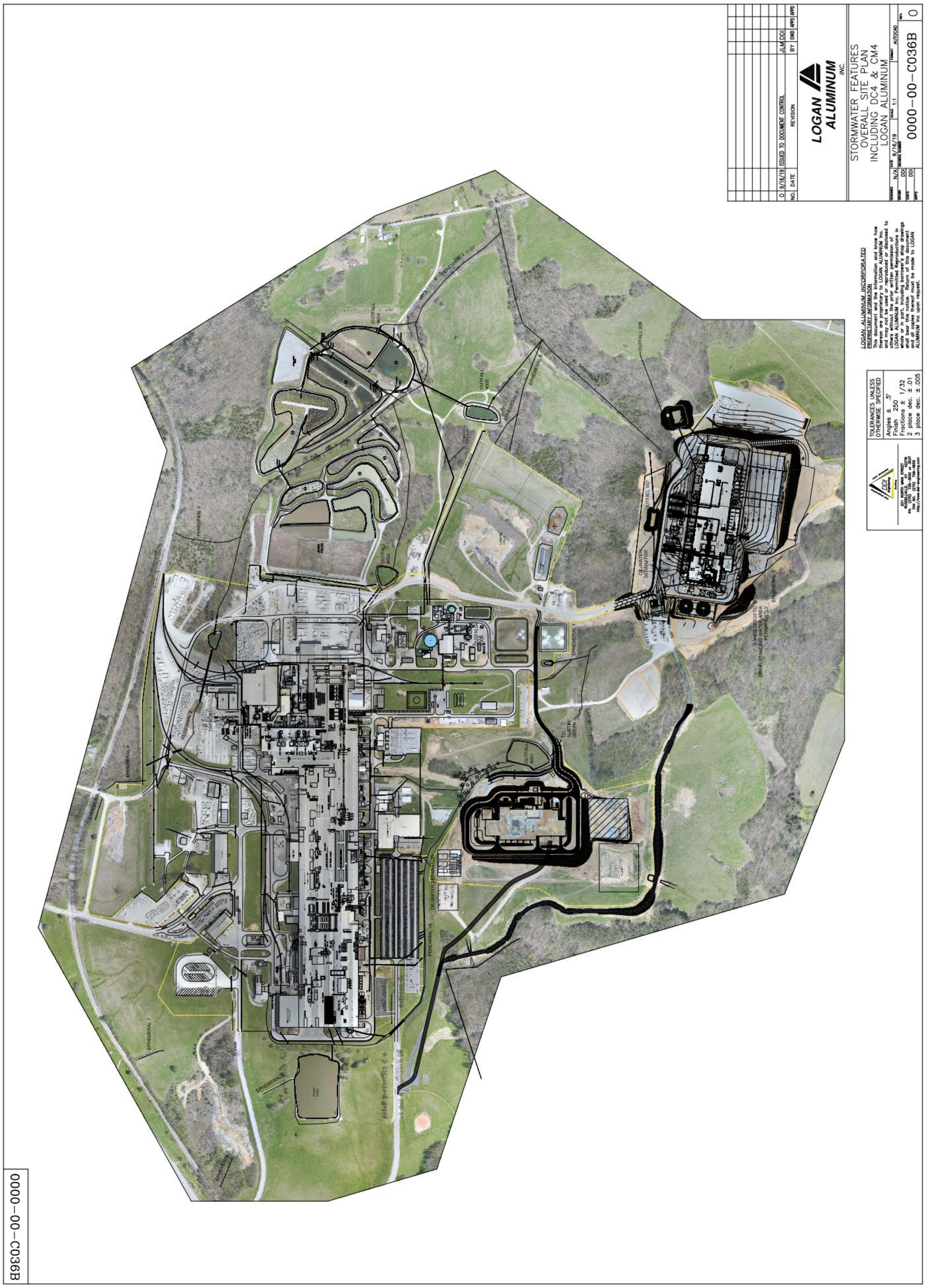


Figure 5: US Army Corps of Engineers Regulated Waters Delineation Logan Property

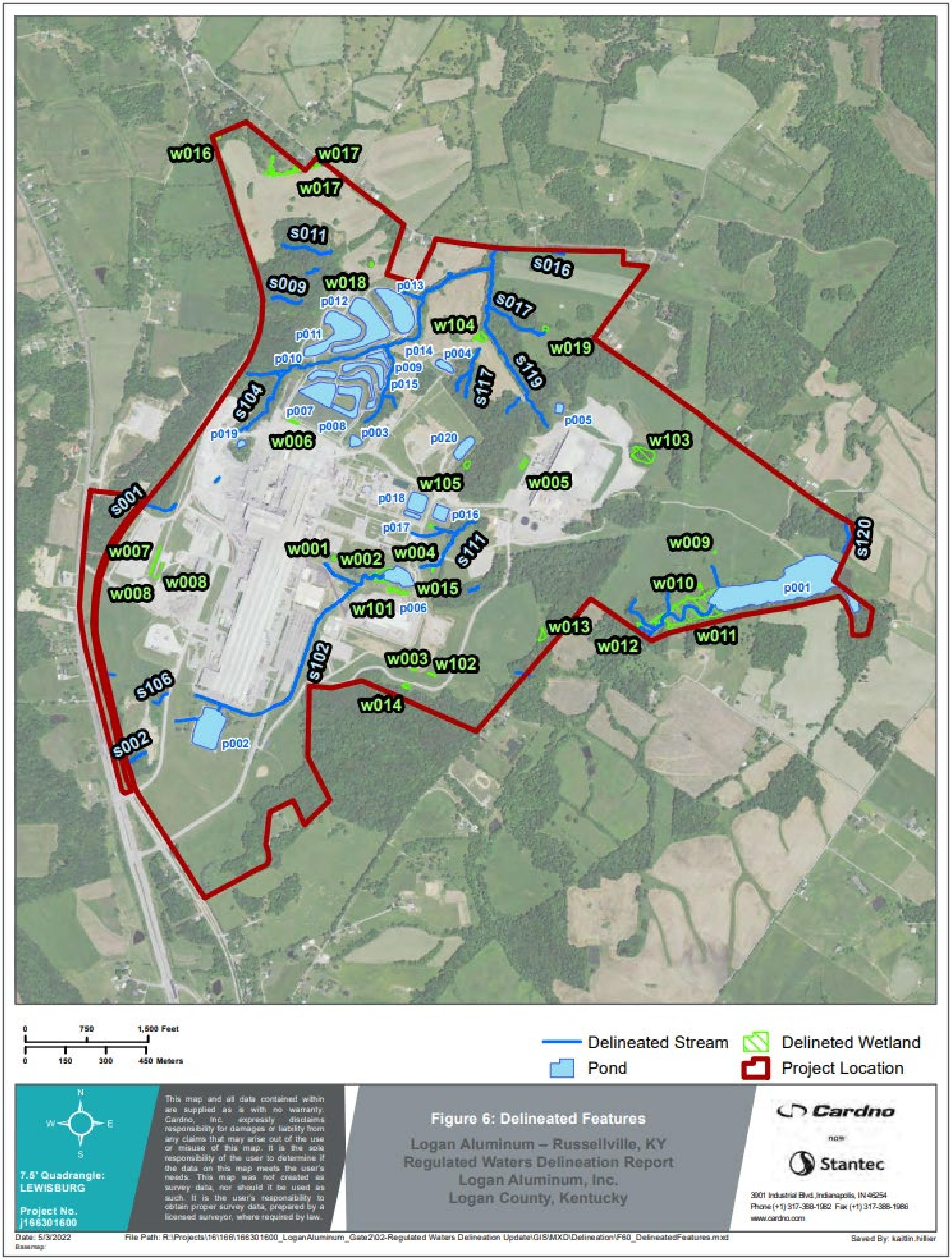
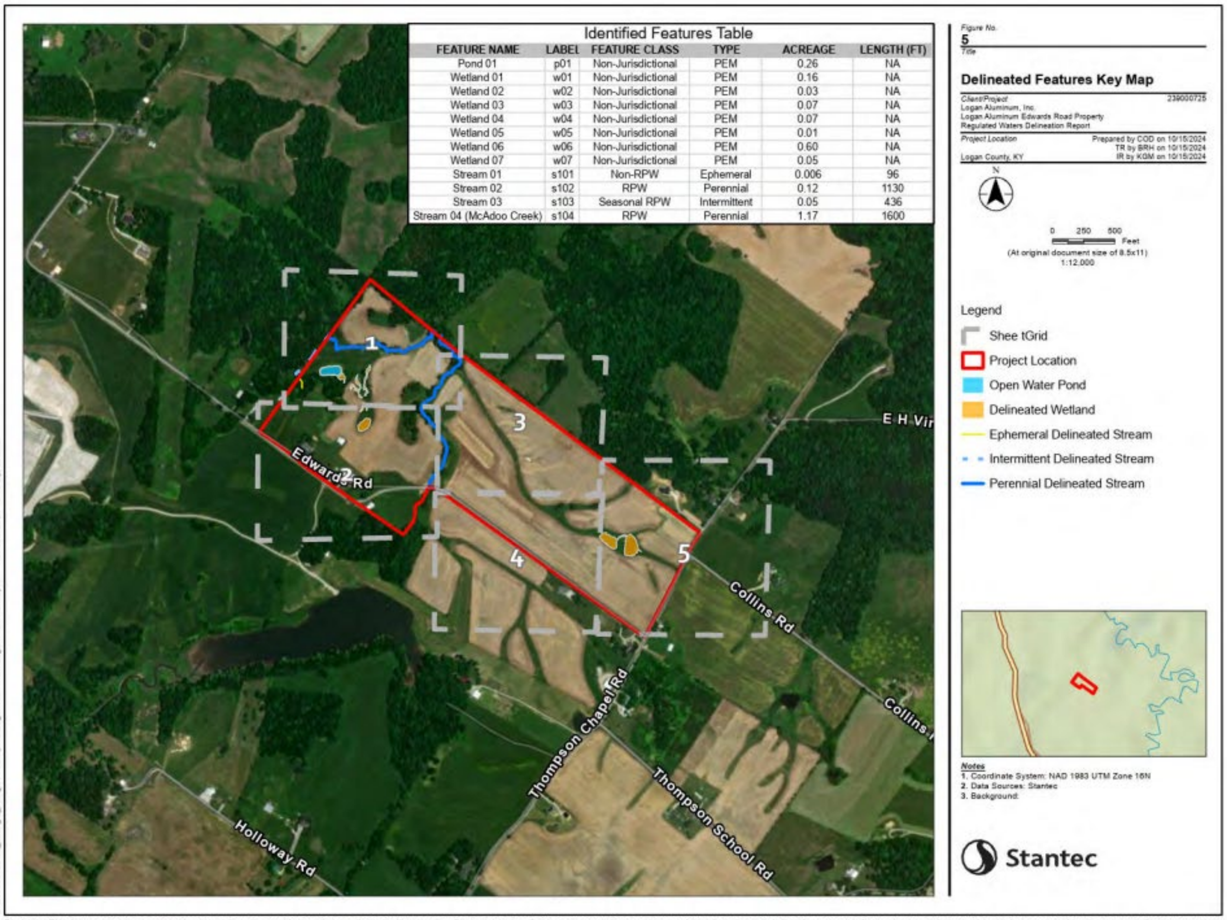


Figure 6: US Army Corps of Engineers Regulated Waters Delineation Logan Property (Additional)



Identified Features Table

FEATURE NAME	LABEL	FEATURE CLASS	TYPE	ACREAGE	LENGTH (FT)
Pond 01	p01	Non-Jurisdictional	PEM	0.26	NA
Wetland 01	w01	Non-Jurisdictional	PEM	0.16	NA
Wetland 02	w02	Non-Jurisdictional	PEM	0.03	NA
Wetland 03	w03	Non-Jurisdictional	PEM	0.07	NA
Wetland 04	w04	Non-Jurisdictional	PEM	0.07	NA
Wetland 05	w05	Non-Jurisdictional	PEM	0.01	NA
Wetland 06	w06	Non-Jurisdictional	PEM	0.60	NA
Wetland 07	w07	Non-Jurisdictional	PEM	0.05	NA
Stream 01	s101	Non-RPW	Ephemeral	0.006	96
Stream 02	s102	RPW	Perennial	0.12	1130
Stream 03	s103	Seasonal RPW	Intermittent	0.05	436
Stream 04 (McAdoo Creek)	s104	RPW	Perennial	1.17	1600

Figure 7: Water Flow Diagram