

Message

**From:** Cordes, Mary  
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**Sent:** 4/3/2025 9:39:51 PM  
**To:** Abboud, Michael  
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**Subject:** FW: [EXT] Chemours WW AAIP  
- Chemours Submission  
**Attachments:** Chemours Response to EPA Ltr  
3.24.2025 AOC CWA-03-2023-  
0025DN.pdf; FINAL -  
Supplement to  
AAIP\_20250403.pdf

**Caution:** This email originated from outside EPA, please exercise additional caution when deciding whether to open attachments or click on provided links.

Hi Michael -- sharing the attached and below context about our submission to Region 3, HQ, and WVDEP. Please call with any questions.

Thanks,  
Mary

**Mary Cordes**  
Head of Federal Government Affairs  
**The Chemours Company**

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**Subject:** [EXT] Chemours WW AAIP - Chemours Submission

External email. Confirm links and attachments before opening.

Dear Ms. DeSandro –  
Attached please find a cover letter and a revised AA&IP that addresses your concerns. As we state in our letter, we would very much appreciate a prompt answer.  
Best,  
Allison

Allison B. Rumsey  
Partner | [Bio](#)

## Arnold & Porter

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**Subject:** Chemours WW AAIP - EPA Second Response

External E-mail

Dear Mr. Coomes,

Please see the attached letter regarding EPA's second response for the Chemours Washington Works AAIP.

Best,



**Erin DeSandro**  
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April 3, 2025

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**Re: The Chemours Company FC, LLC, Administrative Order on Consent  
EPA Docket No. CWA-03-2023-0025DN**

Dear Ms. Duffy, Ms. DeSandro, and Mr. Bahk,

This is in response to Ms. Duffy's March 24, 2025 letter, concerning Chemours' revised Supplement to Alternatives Analysis & Implementation Plan for Outlets 001, 002, 005, and 006 Chemours Washington Work (the "Plan"), submitted January 22, 2025 pursuant to the above-referenced Administrative Order on Consent ("AOC") relating to the Chemours Washington Works facility in West Virginia and prepared by Chemours' consultant Geosyntec. Ms. Duffy's letter informed Chemours that the revised Plan of January 22, 2025 should be resubmitted in a form separate from Chemours' pending NPDES permit renewal application. Enclosed is a further revised Plan pursuant to such request. We ask that you promptly approve our enclosed submission so that Chemours can move forward expeditiously with implementing the

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projects identified therein and thereby address the remaining compliance issues with its existing NPDES permit (West Virginia NPDES Permit No. WV0001279). If you have any remaining concerns with the enclosed Plan, we ask that you identify them promptly, so they can be addressed and the Plan can be approved and implemented as soon as possible.

Chemours entered into the AOC with EPA on April 26, 2023, for the specific purpose of addressing ongoing compliance issues. The AOC required, among other things, that Chemours submit an Alternatives Analysis and Implementation Plan within 120 days of the AOC. Chemours submitted the required Plan within 120 days, on August 24, 2023. While EPA provided some informal feedback on Chemours' initial Plan, it did not provide any formal or complete comments until December 23, 2024, 16 months following the submission of Chemours' response. At that time, EPA conditionally accepted portions of the Plan, rejected others, and asked that Chemours respond to EPA's comments on the Plan within 30 days.

Chemours responded within 30 days, on January 22, 2025, and provided a revised Plan that does not rely on the approaches that EPA had rejected. Because of EPA's delays in responding to the initial Plan, Chemours had by the time of the January 22, 2025 response already submitted a NPDES permit renewal application to the West Virginia Department of Environmental protection ("WVDEP"), in which it proposed a number of projects to reduce PFAS discharges from its outfalls. In the interest of assuring consistency in its regulatory communications, Chemours referenced and incorporated into the revised Plan the description and schedule for the compliance projects in its permit renewal application. Thereafter, Chemours assumed that EPA was reviewing that revised Plan as it did not receive any communication from the Agency for over two months. Only on March 24, after a follow-up letter and phone calls, did Chemours get a response through which EPA rejected the revised Plan on the grounds that it referenced and incorporated parts of the permit renewal application. This came as a surprise to Chemours, as this form-over-substance rejection should not have taken two months to deliver.

As we have mentioned before, the compliance issues that were the basis of the AOC have resulted in a citizens suit action in the United States District Court for the Southern District of West Virginia, in which the plaintiff, the West Virginia Rivers Coalition ("WVRC"), is now asking the Court for a preliminary injunction that seeks, among other things, to order Chemours to reduce or stop its manufacturing operations on WVRC's assertion that such actions will address the intermittent non-compliance events. WVRC's filings make clear that its December 2024 complaint and its February 2025 motion for preliminary injunction stem from delays in the AOC process. WVRC's

April 3, 2025

Page 3

complaint notes that “Chemours submitted its Alternatives Analysis and Implementation Plan to EPA in August 2023. Over a year has passed and EPA has yet to formally act on Chemours’s submitted Plan.” In its recently filed Reply on its preliminary injunction Motion, WVRC dismissed the idea that the AOC process can be relied on to achieve permit compliance, arguing that “the media reports the Trump Administration has indefinitely frozen all of EPA’s enforcement litigation. Thus, Chemours’s compliance plan is vaporware.”

Given the amount of time that has passed since Chemours first submitted its initial Plan to EPA, Chemours asks that EPA immediately review and approve the enclosed revised Plan. This will allow Chemours, which entered into the AOC in good faith to address compliance issues, to come into compliance as soon as possible. Accordingly, Chemours respectfully asks EPA to inform us as quickly as possible if EPA is not willing to approve the revised Plan and to thereafter constructively work with us so that we can produce a revised Plan that EPA can approve within 30 days.

Thank you for your attention to this important matter.

Sincerely,

A handwritten signature in black ink that reads "James W. Hollingsworth". The signature is written in a cursive style with a large, stylized initial "H".

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# **Supplement to Alternatives Analysis & Implementation Plan for Outlets 001, 002, 005, and 006**

## **Chemours Washington Works**

*Prepared for*

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*Prepared by*

*Geosyntec Consultants, Inc.  
828 E Market Street  
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Project Numbers TR1234A

April 3, 2025

## EXECUTIVE SUMMARY

Geosyntec Consultants, Inc., (Geosyntec) has prepared this Supplement to Alternatives Analysis and Implementation Plan (Supplemental Plan) for The Chemours Company, FC, LLC (Chemours) Washington Works facility in Washington, West Virginia (WV; the Site). On August 24, 2023 the Alternatives Analysis & Implementation Plan (AA&IP) was submitted pursuant to paragraph 46 of the Administrative Order on Consent (AOC; EPA Docket No. CWA-03-2023-0025DN) between Chemours and the United States Environmental Protection Agency (EPA) Region III. Chemours received a response from the EPA on December 23, 2024, approving in part and rejecting in part the AA&IP. This Supplemental Plan modifies the implementation portions of the AA&IP to address components that were rejected. Further, this Supplemental Plan is based on the proposed actions Chemours shared during comment review meetings with EPA that are aimed at achieving mass loading reductions at the Site.

The Supplemental Plan describes proposed actions including a Pollutant Minimization Program (PMP) that Chemours will perform at the Site such that discharges from Outlets 001, 002, 005 and 006 (the outlets) meet the Site's 2018 West Virginia National Pollutant Discharge Elimination System (NPDES) permit (No. WV0001279) numeric effluent limits for hexafluoropropylene oxide dimer acid (HFPO-DA) and perfluorooctanoic acid (PFOA).

The characterization of discharges described herein builds on the assessment included in the AA&IP and also assesses mass loading to understand load contributions from the outlets and flow sources within those outlets. This Supplemental Plan is focused on identifying controllable water flows that contribute mass loading to the outlets; therefore, the treatment approach was developed by focusing on achieving mass loading reductions from the Site.

Table ES-1 below summarizes the types/sources of flow to each outlet and describes the treatment approach planned for implementation. The planned treatment measures are estimated to result in a 50% reduction of HFPO-DA mass loading and 29% reduction of PFOA mass loading from the Site during a year with average rainfall (i.e., average year). This represents a significant reduction in existing loading from the Site to receiving waters.

After completion of the actions described herein, 2018 NPDES permit average monthly limits (AMLs) are anticipated to be met based on evaluations performed and described herein for outlets that were quantitatively evaluated assuming long-term average precipitation conditions. Additional concentration reductions in stormwater flows are also anticipated based on implementing a PMP, which will propose evaluations and follow-on actions to reduce outlet concentrations during wet weather. The PMP will include investigations and potential actions such as isolating and addressing identified sources of HFPO-DA and PFOA wet weather loading to certain outlets. If during PMP action implementation outlet sampling data shows compliance with 2018 permit maximum daily limits (MDLs) is not being achieved, additional treatment approaches will be evaluated and the PMP will be executed as an iterative process of evaluations, investigations, and implementations to lead to compliance with 2018 permit limits.

**Table ES-1: Summary of Treatment Approach at Outlets 001, 002, 005, and 006**

Outlet	Average Flow (MGD)	Outlet Flow Description	Treatment Approach Planned for Implementation
001	0.13	Predominately stormwater (with minor dry weather flows)	Capture stormwater <sup>1</sup> from the East Pad and adjacent area to the north (~11 acres within Outlet 001 drainage area), in addition to an adjacent area (~3 acres within Outlet 011 drainage area) in a stormwater basin and treat via a gravity flow granular activated carbon (GAC) treatment system prior to discharge via Outlet 011
002	8.7	Predominately dry weather flows (with minor stormwater contributions)	Divert and treat the following process flow streams: W9 Line 1, Monomer Neutralization tank, Dryer Belt Wash Water <sup>2</sup> , and targeted process water from Building 162
005	43	Predominately dry weather flows (with minor stormwater contributions)	Divert and treat the following process flow streams: Granular sump, Building 184 sump, Building 22 sump, W9 permeate, and Fine Powder Knock-out Pot <sup>3</sup>
006	0.035	Stormwater <sup>4</sup>	Install a “cap” over the West pad (0.75 acres) to reduce the potential of historical contamination on the pad from contacting stormwater. Capture stormwater <sup>1</sup> from the drainage area to Outlet 006 in a stormwater basin and treat via a gravity flow GAC treatment system.
Groundwater intake			Treat intake water from the East Well field (up to 1,350 gpm) and the West Well field (up to 1,500 gpm) with GAC treatment system prior to use at the Site.
Site-wide (stormwater)			Develop and implement a Pollutant Minimization Program to further reduce concentrations in stormwater

Note: MGD = million gallons per day; gpm = gallons per minute

<sup>1</sup> The Site plans to capture stormwater from up to approximately the 2-year, 24-hour design storm, which is the 24-hour rainfall depth with a 2-year recurrence interval. However, this may be refined based on feasibility in the design phase.

<sup>2</sup> Currently treated with two GAC beds; another GAC bed will be added to provide additional treatment.

<sup>3</sup> Flow from the Fine Powder Knock-out Pot will be removed and disposed of off-site.

<sup>4</sup> Outlet 006 has also discharged steam condensate from building heating at an average flowrate of approximately 0.001 MGD. The Site plans to modify infrastructure to convey the condensate flow for discharge via Outlet 003, instead of Outlet 006. Therefore, Outlet 006 will only discharge stormwater flows.

<sup>5</sup> Load reductions anticipated from the West pad cap are shown in Section 4. The capture and treatment of stormwater from the Outlet 006 drainage area has not yet been quantified. However, it is anticipated that a large portion of existing loading to Outlet 006 will be removed as a result of these measures. Because stormwater from up to approximately the 2-year, 24-hour design storm is proposed to be captured, discharge of surge flows (i.e., untreated stormwater) is expected only in large, but infrequent, rain events.

Four treatment technologies were evaluated in the AA&IP submitted in August 2023. In that submittal, GAC and Regen-IX were considered as options for treatability testing. Of these four technologies, GAC was found to be most favorable in all aspects and is the most commonly selected treatment technology for fluorinated organics, the proposed treatment systems in this Supplemental Plan will use GAC as the selected treatment technology.

The selected treatment measures for the four outlets will be implemented expeditiously. Additionally, Chemours will continue to implement improved source control/good housekeeping measures that are outlined in the Site’s Stormwater Pollution Prevention Plan (SWPPP).

The full implementation of the proposed treatment approach is estimated to require approximately 21 months with a 6-month optimization period, resulting in 27 months in total following EPA approval. The exact duration may need to be adjusted, subject to factors such as permit approvals and supply chain availabilities. Elements for each outlet will be advanced after approvals, and certain components of the projects may be completed and operational before the optimization period begins.

The implementation plan consists of the following steps:

**Table ES-2 Implementation Schedule for Proposed Treatment Systems**

<b>Project Stage</b>	<b>Stage Duration (month)</b>	<b>Cumulative Duration (months)</b>
Agency Approval	0	0
Engineering Design	0 - 14	14
Contracting, Procurement, and Permitting	10 - 19	19
Construction	11 - 20	20
Commissioning	16 - 21	21
Optimization	21 - 27	27

**Notes**

1. Durations shown correspond to the expected durations from the effective date of agency approval.

In addition to compliance monitoring conducted under the current NPDES permit, after system commissioning, performance monitoring sampling will also be conducted to evaluate the removal efficiency of HPFO-DA and PFOA. Performance monitoring will include measurements of flow and water quality at treatment system(s) influent and effluent locations.

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## ACRONYMS AND ABBREVIATIONS

µg/L	micrograms per liter
AOC	Administrative Order on Consent
AA&IP	Alternatives Analysis and Implementation Plan
AML	average monthly limit
BMP	best management practice
Chemours	The Chemours Company, FC, LLC
EPA	United States Environmental Protection Agency
FP	fine powder
Geosyntec	Geosyntec Consultants, Inc.
GAC	granular activated carbon
HFPO-DA	hexafluoropropylene oxide dimer acid
IX	ion exchange
KO	knock-out
lbs/d	pounds per day
lbs/year	pounds per year
MDL	maximum daily limit
MGD	million gallons per day
NCCW	non-contact cooling water
NPDES	National Pollutant Discharge Elimination System
PCSWMM	USEPA's Storm Water Management Model
PFOA	perfluorooctanoic acid
PFA	perfluoroalkoxy alkane
PFAS	per- and polyfluoroalkyl substances
PTFE	polytetrafluoroethylene
POR	period of record
QA/QC	quality assurance / quality control
Regen-IX	regenerable ion exchange
RFP	Request for Proposal

## ACRONYMS AND ABBREVIATIONS (CONT'D)

RO	reverse osmosis
the Site	Washington Works facility in Washington, West Virginia
SWPPP	Stormwater Pollution Prevention Plan
WV	West Virginia
WVDEP	West Virginia Department of Environmental Protection

## 1. INTRODUCTION

Geosyntec Consultants, Inc., (Geosyntec) have prepared this Supplement to Alternatives Analysis and Implementation Plan (Supplemental Plan) for The Chemours Company, FC, LLC (Chemours) Washington Works facility in Washington, West Virginia (WV; the Site). The Alternatives Analysis & Implementation Plan (AA&IP) was submitted on August 24, 2023 pursuant to paragraph 46 of the Administrative Order on Consent (AOC; EPA Docket No. CWA-03-2023-0025DN) between Chemours and the United States Environmental Protection Agency (EPA) Region III. Chemours received a response from the EPA on December 23, 2024, approving in part and rejecting in part the AA&IP. This Supplemental Plan modifies the implementation portions of the AA&IP to address components that were rejected. Further, this Supplemental Plan is based on the proposed approach Chemours developed during discussions with EPA aimed at achieving mass loading reductions at the Site.

This Supplemental Plan describes proposed actions including a Pollutant Minimization Program (PMP) that Chemours will perform at the Site such that discharges from Outlets 001, 002, 005, and 006 (the outlets) meet the Site's 2018 West Virginia National Pollutant Discharge Elimination System (NPDES) permit (No. WV0001279) numeric effluent limits for hexafluoropropylene oxide dimer acid (HFPO-DA) and perfluorooctanoic acid (PFOA).

Alternatives that were considered, in addition to the alternatives previously selected for implementation, are presented in the AA&IP submitted in August 2023 (Geosyntec and AECOM, 2023). This Supplemental Plan outlines the approach that Chemours intends to implement. The Implementation Plan, outlined in Section 5 of this document, shows the schedule for implementing this Plan, contingent on approval from EPA.

Similar to the 2023 AA&IP, this Supplemental Plan was developed by analyzing outlet and internal Site concentration and flow data to evaluate which controllable flows have the potential to cause exceedances of permit limits in the 2018 National Pollutant Discharge Elimination System (NPDES) permit. Concentrations and flows from those identified flows were used to estimate mass loading of HFPO-DA and PFOA and subsequently, mass loading reductions anticipated to be achieved by treating the flows. Additionally, this Supplemental Plan includes a proposed implementation plan, a description of the technology selection process, and a sampling plan to evaluate HFPO-DA and PFOA removal efficiency.

This Supplemental Plan was developed based on the effluent limits in the 2018 permit. Should new permit limits for the four outlets either be proposed or become effective, then Chemours will inform EPA and the WV Department of Environmental Protection (WVDEP) if potential impacts are anticipated to the selected alternatives and implementation schedules presented in this Supplemental Plan.

The actions identified in this document will further build upon the beneficial actions Chemours has taken to date to reduce HFPO-DA and PFOA concentrations in stormwater and discharged to outlets, including: (i) implementing improved source control/good housekeeping measures outlined in the Site's updated Stormwater Pollution Prevention Plan (SWPPP) (ii) installation of a

tertiary granular activated carbon (GAC) air abatement system in the polytetrafluoroethylene (PTFE) and perfluoroalkoxy alkane (PFA) areas to reduce air deposition and subsequent stormwater loads, and (iii) installation of GAC water treatment on the Ranney Well and Dryer Belt Washwater, which combined results in approximately 375 pounds per year (lb/yr) of HFPO-DA removal and upwards of 83 lb/yr of PFOA removal from Site outlets. The Dryer Belt Washwater system commenced operation on September 14, 2021 and the Ranney Well system commenced operation on November 16, 2021.

The remainder of this Supplemental Plan is organized as follows:

- **Section 2: Characterization of Discharges** – which describes the flows, concentrations and loads from outlets included in this Plan;
- **Section 3: Treatment Approach Overview** – which describes the proposed approach for treatment of flows, including the treatment technologies;
- **Section 4: Benefits of Treatment Approach** – which describes the estimated mass load reductions and resulting future concentrations at the outlets after implementation of the proposed approach;
- **Section 5: Implementation Plan** – which describes an implementation schedule for the proposed treatment approach;
- **Section 6: Sampling Plan** – which describes a plan to evaluate the removal efficiency for the selected treatment technology; and
- **Section 7: References**

## 2. CHARACTERIZATION OF DISCHARGES

### 2.1 Site Overview

The Site uses two primary water sources, Ohio River water primarily used for non-contact cooling water (NCCW) and extracted groundwater<sup>1</sup> used for process water including uses such as contact process water, NCCW, and demineralized water production which in turn is used for steam production. Upstream HFPO-DA concentrations in the Ohio River (instream) ranged from not detected to 0.0048 micrograms per liter (µg/L) between February 2022 to February 2023 and not detected to 0.0074 µg/L for PFOA over the same date range. Meanwhile, the concentrations in Site groundwater are relatively higher and range from 0.01 µg/L to 23 µg/L for HFPO-DA and 0.12 µg/L to 45 µg/L for PFOA when including production wells and Ranney well influent data. Groundwater extracted from the Ranney Well is treated before use at Site. After use at Site, the groundwater and Ohio River water flows combine with stormwater and process wastewater discharges at the various Site outlets.

As summarized below in Table 1, the four outlets discharge directly to the Ohio River except for Outlet 006, which discharges to Pages Run, an Ohio River tributary. The outlets vary in size and amount of dry and wet weather flow, with Outlet 001 drainage area being the largest at 77 acres while Outlet 002 is the smallest at 8.2 acres. The outlet with the greatest flow is Outlet 005 at an average of 43.2 million gallons per day (MGD) while Outlet 006 has the smallest average flow at 0.035 MGD (Table 1). Flow at Outlet 001 is predominately stormwater, while dry weather flows comprise most of the flow at Outlets 002 and 005 (Table 2). Dry weather flows occur independent of stormwater and can include process wastewater, manufacturing contact water streams, NCCW, steam condensate, cooling tower blowdown, and boiler blowdown.

Outlet 006 has previously discharged predominately stormwater and a small amount (0.001 MGD) of steam condensate from building heating. However, the Site plans to modify infrastructure to convey the condensate flow for discharge via Outlet 003, instead of Outlet 006. Therefore, Outlet 006 will only discharge stormwater flows (Table 2).

The Site also plans to discharge stormwater from the East Pad area which previously discharged to Outlet 001 (approximately 11 acres within the drainage area to Outlet 001) via Outlet 011 after the stormwater undergoes treatment.

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<sup>1</sup> Groundwater extraction wells for Site use include the Ranney Well, Gallery Well, West Field Wells, East Field Wells and Blennerhassett Island Wells. In this approach, the Gallery Well is standby and only used when the West Field Well is off-line. Total extracted flow rates are approximately 12,400 gpm (~17.9 MGD).

**Table 1: Summary of Outlet Details**

Outlet Details	Outlet			
	001	002	005	006
Receiving Water	Ohio River	Ohio River	Ohio River	Pages Run
Area (acres)	77	8.2	26	59
Total Average Flows (MGD)	0.13	8.7	43.2	0.035

-MGD - million gallons per day

-Data based on the 2024 NPDES Permit Renewal Application (Chemours, 2024).

**Table 2: Summary of Outlet Flows**

Flow Components	Outlet Flows (MGD)			
	001	002	005	006
Non-Contact Cooling Water (NCCW)	0.0023	6.0	38.6	--
Process Wastewater <sup>1</sup>	--	2.7	4.2	--
Steam Condensate	--	0.047	0.34	-- <sup>2</sup>
Groundwater	0.043	--	--	--
Backwash Water	0.033	--	--	--
Stormwater	0.048	0.010	0.029	0.035
<b>Total</b>	<b>0.13</b>	<b>8.7</b>	<b>43.2</b>	<b>0.035</b>

<sup>1</sup> Outlet 002 process wastewater flows include boiler blowdown

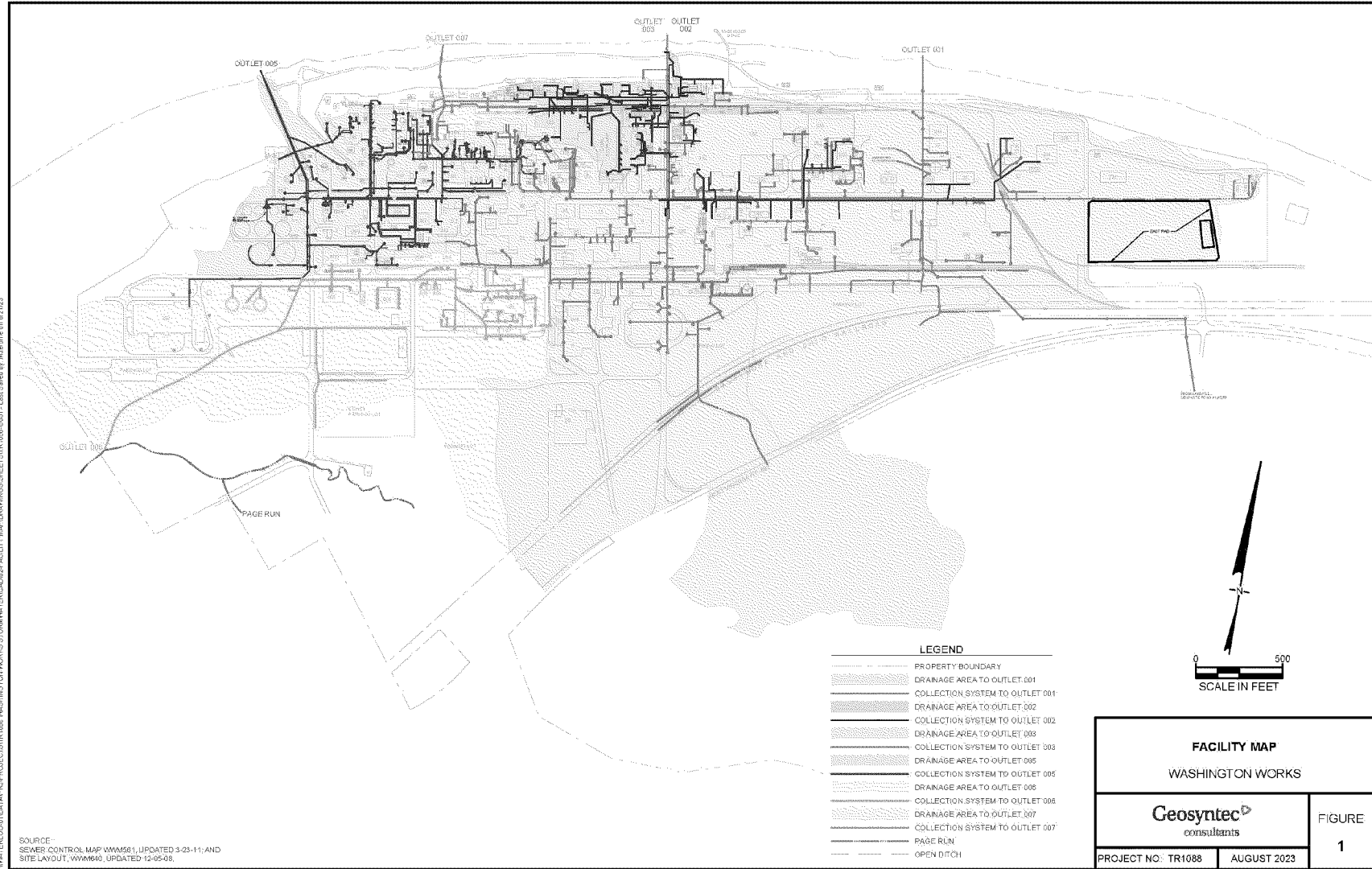
<sup>2</sup> Outlet 006 previously discharged 0.001 MGD of steam condensate from building heating. However, the Site plans to modify infrastructure to convey the condensate flow for discharge via Outlet 003, instead of Outlet 006.

- MGD = million gallons per day

- Data based on the 2024 NPDES Permit Renewal Application (Chemours, 2024).

A map showing the outlets at the Site, including the stormwater catchments for each outlet and the combined collection system for conveying dry weather flows and stormwater flows to each outlet, is shown in Figure 1.<sup>2</sup>

<sup>2</sup> Figure 1 also shows Outlets 003 and 007, which are not part of the AOC.



**Figure 1: Site Outlets and Combined Stormwater and Dry Weather Flow Collection System**

## 2.2 Outlet Concentrations

Section 2 of the 2023 AA&IP includes a characterization of sampling data from monitoring programs at the Site. This includes sample data from the outlets, along with additional samples within the internal collection systems to the outlets to provide further characterization data. The 2023 AA&IP also describes how outlet concentrations vary with weather conditions (i.e., rainfall) and presents a comparison of outlet concentrations and the 2018 NPDES permit average monthly limit (AML) and maximum daily limit (MDL) values.

## 2.3 Outlet Mass Loading

In this Supplemental Plan, mass loading of HFPO-DA and PFOA was assessed at the Site to understand load contributions from the outlets and flow sources within those outlets.

### 2.3.1 Mass Load by Outlet

Although the AA&IP addresses Site Outlets 001, 002, 005, and 006, an assessment of total mass loading from the 2018 NPDES permit Site outlets was assessed for the Supplemental Plan to understand the relative loading contributions. As shown in Table 3, the Site has a total of 18 outlets that discharge flows to a receiving water (Ohio River or tributary to the river - Pages Run and Coal Hollow Stream).

**Table 3: Overview of Site Outlets**

Outlet	Receiving Water	Drainage Area Size (acre)	Stormwater	Contact / Process Wastewater	Non-Stormwater / Non-Contact Cooling Water
001	Ohio River	80	X		X
002	Ohio River	8.7	X	X	X
003	Ohio River	5.4	X		X
005	Ohio River	47	X	X	X
006	Pages Run	59	X		X <sup>1</sup>
007	Ohio River	1.6	X		X
011	Coal Hollow Stream	16	X		
016	Ohio River	2.5	X		
019	Ohio River	0.39	X		
022	Pages Run	13	X		
023	Pages Run	16	X		
025	Pages Run	4.3	X		
030	Ohio River	5.6	X		
031	Ohio River	1.9	X		
032	Ohio River	1.5	X		
033	Ohio River	2.4	X		
034	Ohio River	2.2	X		
036	Ohio River	1.9	X		

<sup>1</sup> The steam condensate will be diverted such that Outlet 006 conveys only stormwater.

The mass loading by outlet was estimated by calculating the average NPDES outlet sampling (i.e., Discharge Monitoring Report [DMR]) concentrations at Site outlets from January 2022<sup>3</sup> through March 2024. Available measured flow data at the outlets were used to compute the 95th percentile average monthly flow (i.e., the average daily flow rate averaged over a calendar month) at each outlet where flows are measured. For stormwater-only outlets, for which flows have not been measured or flow data were limited, a long-term continuous simulation hydrologic model was developed using the U.S. EPA Storm Water Management Model (PCSWMM) (version 5.2.3) to assess stormwater runoff volumes from the outlet drainage areas<sup>4</sup>.

The estimates of current loading based on 95th percentile monthly average flows and average concentrations at the Site outlets are shown in Table 4, ordered by descending HFPO-DA load.

**Table 4: Existing Site Loading by Outlet**

Outlet	Existing 95th Monthly Average Flow (MGD)	Average HFPO-DA (ng/L)	Average PFOA (ng/L)	Existing HFPO-DA Load (lbs/yr)	Existing PFOA Load (lbs/yr)
005	50	640	170	98	26
002	6.4	2,000	630	39	12
007	1.8	950	130	5.2	0.72
003	4.4	230	170	3.1	2.3
011	0.018	33,000	600	1.8	0.033
001	0.19	2,300	450	1.4	0.27
006	0.10	2,000	740	0.61	0.23
030, 031, 032, 033, 034, 036, 016, 019	0.018	7,500	930	0.42	0.051
022, 023, 025	0.048	990	280	0.14	0.041
<b>Total</b>	<b>63</b>	-	-	<b>150</b>	<b>42</b>

- MGD = million gallons per day

- ng/L = nanograms per liter

- lbs/yr = pounds per year

- Grey Text – outlets that are not a part of the AA&IP scope

- Black Text – outlets that are part of the AA&IP scope

<sup>3</sup> Treatment of groundwater used at the Site from the Ranney well began in late 2021, so outlet concentrations prior to this date are not representative of existing conditions.

<sup>4</sup> The hydrologic models simulated historical rainfall from a 32-year period of record (POR) of hourly data, utilizing historical local evaporation data and the Curve Number infiltration method, a simple and widely used method for approximating precipitation runoff based on land use and underlying soil characteristics of a given area. The simulated 32-year POR, between January 1, 1950, and December 31, 1981, corresponds with hourly rainfall depths measured at Station COOP466859 PARKERSBURG WV US and was selected for its near 100 percent completeness of sub-daily rainfall data at a representative rainfall gage. Input variables for the hydrologic models are included in Appendix A and included as a work product in the original AA&IP.

### 2.3.2 Permitted Mass Loading

The current allowable, or permitted, mass loading from the Site, based on 95th percentile monthly average flows at the Site outlets and AMLs in the 2018 NPDES permit, are shown in Table 5, ordered by descending HFPO-DA load.

**Table 5: Allowable Permitted Site Loading by Outlet**

Outlet	Existing 95th Monthly Average Flow (MGD)	Current HFPO-DA AML (ng/L)	Current PFOA AML (ng/L)	Permitted HFPO-DA Load (lbs/yr)	Permitted PFOA Load (lbs/yr)
005	50	1,100	300	168	46
002	6.4	1,400	2,000	27	39
007	1.8	1,400 <sup>1</sup>	2,000 <sup>1</sup>	7.7	11
003	4.4	1,400 <sup>1</sup>	2,000	19	27
011	0.018	33,000 <sup>3</sup>	600 <sup>3</sup>	1.8	0.03
001	0.19	1,400	2,000	0.85	1.2
006	0.10	140	70 <sup>2</sup>	0.043	0.021
030, 031, 032, 033, 034, 036, 016, 019	0.018	7,500 <sup>3</sup>	930 <sup>3</sup>	0.42	0.051
022, 023, 025	0.048	990 <sup>3</sup>	280 <sup>3</sup>	0.14	0.041
<b>Total</b>	<b>63</b>	-	-	<b>225</b>	<b>124</b>

- AML: average monthly limitation

- MGD: million gallons per day

- ng/L = nanograms per liter

- lbs/yr = pounds per year

<sup>1</sup> The 2018 NPDES permit does not include AMLs for HFPO-DA at 007 and 003 or for PFOA at 007. Therefore, monthly average value was assigned as the AML for Outlet 002.

<sup>2</sup> The 2018 NPDES permit does not include an AML for PFOA at 006. Therefore, the monthly average value was assigned as the water quality target of 70 ng/L (ppt), similar to value of 140 ng/L assigned as the limit for HFPO-DA at Outlet 006.

<sup>3</sup> For stormwater-only outlets, the monthly average value was assigned as the average measured concentration, shown in Table 4.

### 2.3.3 Mass Load by Flow Type

Water quality and flow data were analyzed by outlet to characterize concentrations, flows, and loading attributed to the various flow types discharged via each outlet (e.g., process wastewater, stormwater, NCCW sourced from groundwater, and NCCW sourced from river water). For non-stormwater flows, flows measured at the outlets during dry weather conditions were assessed. Process wastewater flows were generally measured individually to separate the magnitudes of these flows from NCCW flows. Stormwater runoff volumes were determined for each outlet drainage area from the long-term continuous simulation executed in the hydrologic models (as previously described).

Concentrations from each flow stream contributing discharge to an outlet were then assessed. Individual process wastewater flows were sampled as feasible, and then remaining non-stormwater flows (i.e., NCCW) were characterized as sampled concentrations at the outlets during dry weather conditions with the quantified mass contributions from process wastewater removed.

To predict stormwater concentrations at outlets that discharge combined stormwater and non-stormwater flows, a mass balance approach was used, based on continuity equations to maintain the mass balance of pollutants. Measured outlet concentrations and flows during dry weather conditions were used to characterize non-stormwater flows, and then a mass balance was used during wet weather conditions to estimate stormwater concentrations and flows. For stormwater-only outlets, measured concentrations at the outlets were used to characterize stormwater flows.

These analyses resulted in a discretization of estimated flows<sup>5</sup> and concentrations for process wastewater, NCCW, and stormwater from each outlet, presented in Table 6. This allowed for the current mass loading to be subdivided into flow type (e.g., process wastewater, stormwater, NCCW sourced from river water, and NCCW sourced from groundwater). Table 6 shows the estimated 95th percentile average monthly flows and existing mass loading for HFPO-DA and PFOA for Outlets 001, 002, 005, and 006, subdivided by flow type for each outlet.

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<sup>5</sup> Increases of flow rates for each type to yield the total 95th percentile monthly average outlet flows were based on best available data and knowledge of typical Site operations, with the greatest increases applied to NCCW sourced from river water.

**Table 6: Average Annual Mass Loading by Outlet and Flow Type**

Outlet	Flow Stream	95 <sup>th</sup> Percentile Flow (MGD)	HFPO-DA Existing Load (lbs/yr)	PFOA Existing Load (lbs/yr)
001	East Pad and Adjacent Stormwater (001)	0.01	1.1	0.01
	Other Stormwater	0.1	0.2	0.12
	NCCW from groundwater <sup>1</sup>	0.1	0.2	0.14
<b>Total Outlet 001 Loading</b>			<b>1.4</b>	<b>0.27</b>
002	NCCW from river water	1.8	1.3	2.1
	NCCW from groundwater (East Field)	1.0	1.8	2.1
	Other NCCW from groundwater	0.9	0.2	1.1
	Stormwater	0.01	14.9	0.9
	Bldg. 162 Targeted Process (process wastewater)	0.07	0.6	0.1
	B514 W9 Line 1 (process wastewater)	0.2	3.5	0.0
	Monomer Neut. Tank (process wastewater)	0.2	1.7	0.3
	Dryer Belt Wash Water (process wastewater)	0.3	0.5	0.0
	Other Process Water	2.0	3.9	1.7
	Undifferentiated Mass	-	10.9	4.1
<b>Total Outlet 002 Loading</b>			<b>39</b>	<b>12</b>
005	Stormwater	0.04	12.9	2.6
	NCCW from river water	43	2.3	4.5
	Other NCCW from groundwater	4.9	1.0	
	NCCW from groundwater (West Field)	0.4	0.4	7.5
	B22 Sump (process wastewater)	0.06	38	0.2
	Granular Sump (process wastewater)	0.16	16.9	0.1
	B184 Sump (process wastewater)	0.16	2.8	0.0
	FP KO Pot (process wastewater)	0.0	2.7	0.0
	W9 Permeate (process wastewater)	0.26	4.0	0.0
	Other Process Water	1.2	1.0	8.0
	Undifferentiated Mass	-	15.6	2.9
<b>Total Outlet 005 Loading</b>			<b>98</b>	<b>26</b>
006	West Pad Stormwater	0.004	0.02	0.01
	Other Stormwater	0.1	0.54	0.16
	Steam Condensate	0.005	0.05	0.06
<b>Total Outlet 006 Loading</b>			<b>0.61</b>	<b>0.23</b>

- lbs/yr: pounds per year

- MGD: million gallons per day

- DMR: discharge monitoring report

- W9 Permeate is also referred to as GenX Permeate.

- When loads only shown to the nearest tenth of a pound (0.1 lbs/yr). Values less than 0.05 when rounded are displayed as 0.0.

- Outlet mass loading estimates are based on average outlet DMR concentrations (Jan. 2022 – Mar. 2024) and 95th percentile monthly average flows. Mass loading was speciated between stormwater, river water cooling water and groundwater cooling water based on measured concentrations of these flows and known contact water flow volumes.

- Where the mass balance was not closed, excess mass is referred to as undifferentiated mass.

<sup>1</sup> Groundwater Cooling Water represents NCCW and backwash water.

The process wastewater flows (discharging to Outlets 002 and 005) were then quantified further, as data were available, by the individual process wastewater streams. The majority of these individual flow streams were sampled, such that average sampled concentrations and high measured or design flows were used to characterize loading from each process flow stream.<sup>6</sup>

Appendix B shows the detailed loading subdivision of identified process flow streams, for both existing and predicted future (to be described) conditions.

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<sup>6</sup> Within Outlet 002, additional sampling and flow measurement was performed to further characterize the major network “legs” within the infrastructure conveying flows to Outlet 002 (as described in Section 2 of the 2023 AA&IP). These additional flow measurements were limited and approximate in nature, and water quality samples collected were also limited, and these data were used to calculate approximate loads for each major leg in the network to Outlet 002. Estimated loads for each leg were used as a verification, such that the sum of loads for individual flow streams draining through a given leg were not quantified as a greater total load than that of the major network leg.

### **3. TREATMENT APPROACH OVERVIEW**

The response received by the EPA in December 2024 on the 2023 AA&IP noted that EPA, in consultation with WVDEP, did not accept shallow underground injection of stormwater with subsequent recovery and treatment via groundwater production wells as a viable management option for Outlets 001 and 006. Therefore, the treatment approach outlined in this Supplemental Plan does not include infiltration of stormwater. The treatment approach was developed by focusing on achieving mass loading reductions from the Site in addition to reliably meeting the existing permit limit.

For Outlets 002 and 005, the approach focused on diverting and treating process flows with the most significant mass loading. For Outlets 001 and 006, the approach focused on capturing and treating stormwater, and further focusing on the drainage area with higher stormwater concentrations compared to the remainder of the drainage area at Outlet 001. Additionally, intake water from the East and West Well fields will be treated prior to use at the Site, which will reduce concentrations and loads throughout the Site.

#### **3.1 Treatment Approach by Outlet**

The following subsections outline the proposed treatment approach at the outlets. The probable capital cost, in the range of +100%/-50% as estimated by Chemours, are provided in Appendix C, and the conceptual process flow diagrams are included in Appendix D. Figure 2 illustrates the proposed treatment approach at the Site.

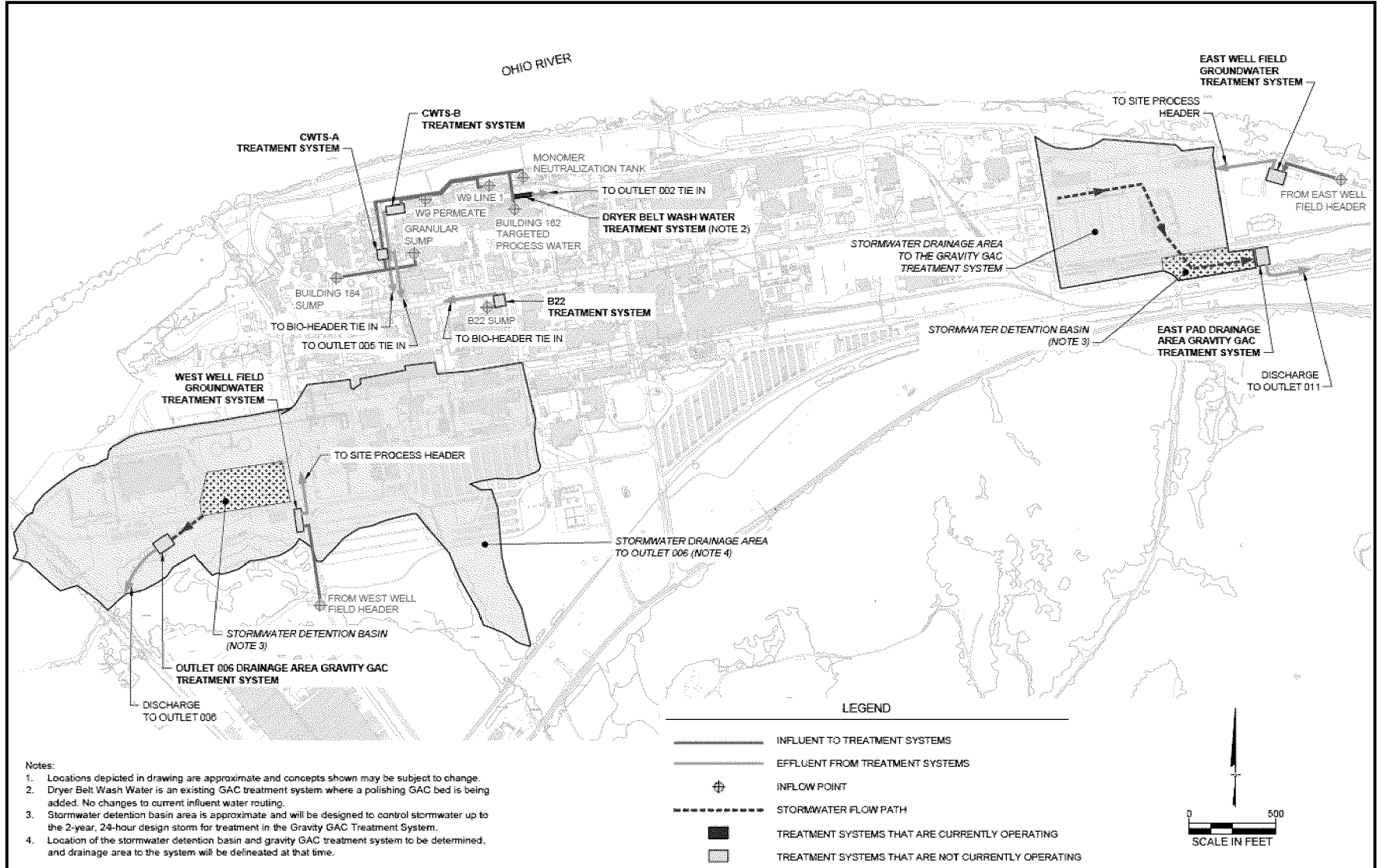


Figure 2: Treatment System Site Layout

### 3.1.1 Outlet 001

The treatment approach at Outlet 001 involves capturing stormwater from the East Pad and adjacent area to the north (approximately 11 acres within the drainage area to Outlet 001), in addition to a small area adjacent to the East Pad to the east and south (approximately three acres within the drainage area to Outlet 011). Stormwater from up to approximately the 2-year, 24-hour design storm, which is the 24-hour rainfall depth with a 2-year recurrence interval, will be captured in a stormwater basin and treated via gravity flow with granular activated carbon (GAC) prior to discharge via Outlet 011. Capture and treatment of East Pad stormwater will prevent discharge of loading in stormwater from this highest HFPO-DA concentration area. Housekeeping best management practices (BMPs) in the East Pad area will also be improved, as described in the SWPPP, but benefits were not quantified nor included in the estimated mass reductions.

It is estimated that this approach will result in approximately 1.1 lb/yr and 0.0091 lbs/yr of HFPO-DA and PFOA load removed from discharge to Outlet 001, respectively, in an average annual rainfall year. This represents approximately 79% and 3% of the average annual loading from Outlet 001 for HFPO-DA and PFOA, respectively.

The sizing component (i.e., design storm) is important where capture and treatment of stormwater is targeted, as the variation in rain events (in rainfall depth, intensity, and duration) results in a wide range of resulting stormwater flows. Stormwater control measures are typically sized to capture stormwater up to a designated design storm. Large rain events, greater than the design storm, which occur infrequently, are therefore not fully captured.

### 3.1.2 Outlet 002

The approach at Outlet 002 involves diverting and treating process flow streams, including the following: W9 Line 1, Monomer Neutralization tank, effluent of treatment system for Dryer Belt Wash Water (which is currently treated with two GAC beds; therefore, another GAC bed will be added to provide additional treatment), and targeted process water from Building 162.

Treatment of these process flow streams is estimated to remove 6.2 lb/year and 0.40 lb/year of HFPO-DA and PFOA, respectively, discharged via Outlet 002. This represents an estimated 16% and 3% of the average annual loading to Outlet 002, for HFPO-DA and PFOA, respectively.

### 3.1.3 Outlet 005

The approach at Outlet 005 involves diverting and treating process flow streams, including the following: Granular sump, Building 184 (B184) sump, Building 22 (B22) sump, and W9 permeate. Additionally, loads from the Fine Powder Knock-out Pot will be reduced as the contact process water will be disposed of off-site rather than discharged via Outlet 005.

Treatment of these process flow streams is estimated to remove 64 lb/year and 0.35 lb/year of HFPO-DA and PFOA, respectively, discharged via Outlet 005. This represents an estimated 66% and 1% of the average annual loading to Outlet 005, for HFPO-DA and PFOA, respectively.

### 3.1.4 Outlet 006

The treatment approach at Outlet 006 involves first installing a “cap” over the West pad, which encompasses approximately 0.75 acres within the drainage area to Outlet 006. This is aimed at reducing the potential of historical contamination on the pad from contacting stormwater. The treatment approach at Outlet 006 also involves capturing stormwater from the drainage area to Outlet 006 in a proposed stormwater basin (or a portion of the drainage area, based on feasibility and siting of the proposed stormwater basin, to be determined during the design process) and treating the captured stormwater with a gravity flow GAC treatment system prior to discharge via Outlet 006. It is anticipated that stormwater from up to approximately the 2-year, 24-hour design storm, will be captured; however, this will be refined during the design process based on available space for the stormwater basin. Housekeeping in the Outlet 006 drainage area will also be improved, but benefits were not quantified.

Load reductions anticipated from the West pad cap were estimated and are shown in Section 4. The capture and treatment of stormwater from the Outlet 006 drainage area has not yet been quantified. However, it is anticipated that a large portion of existing loading to Outlet 006 will be removed as a result of these measures. Because stormwater up to approximately the 2-year, 24-hour design storm is proposed to be captured, which is the 24-hour rainfall depth with a 2-year recurrence interval, discharge of surge flows (i.e., untreated stormwater) via Outlet 006 is expected only in significant rain events.

The sizing component (i.e., design storm) is important where capture and treatment of stormwater is targeted, as the variation in rain events (in rainfall depth, intensity, and duration) results in a wide range of resulting stormwater flows. Stormwater control measures are typically sized to capture stormwater up to a designated design storm. Large rain events, greater than the design storm, which occur infrequently, are therefore not fully captured.

As previously described, Outlet 006 predominately discharges stormwater, but has also discharged steam condensate from building heating at an average flowrate of approximately 0.001 MGD. Because of this discharge of non-stormwater flow, the 2018 NPDES permit contains numeric effluent limitations for HFPO-DA.<sup>7</sup> The Site plans to modify infrastructure to convey the condensate flow for discharge via Outlet 003, instead of Outlet 006. Therefore, Outlet 006 will only discharge stormwater flows.

The treatment approaches proposed at Outlet 006 are anticipated to remove a large portion of loading to Outlet 006 and achieve compliance with 2018 permit limits (with the potential exception of large storm events that occur infrequently),.

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<sup>7</sup> The 2018 permit also contains numeric limits at Outlet 006 for total suspended solids (TSS), pH, and total residual chlorine. Additionally, monitoring and reporting are required for copper, lead, zinc, mercury, selenium, arsenic, antimony, phenolics, temperature, total organic carbon, sulfate, thallium, and PFOA.

### 3.1.5 Groundwater Intake

Groundwater is used at the Site as NCCW and as a source of water for site utilities and some production processes (as demineralized water). Chemours proposes as part of the site treatment approach to add treatment systems to treat intake water from the East Well field (up to 1,350 gpm) and the West Well field (up to 1,500 gpm) prior to use at the Site. This will reduce loading of HFPO-DA and PFOA to Site outlets that utilize NCCW sourced from groundwater from the East and West Well fields. The anticipated load reductions resulting from this groundwater treatment may be measured at multiple outlets, described in Section 4.

### 3.1.6 Pollutant Minimization Program

Chemours also proposes to develop and implement a PMP, as part of this Supplemental Plan. Chemours will begin implementing the PMP within six months of EPA approval of this Supplemental Plan, to minimize the discharge of PFOA and HFPO-DA. The PMP will include activities such as:

- Continued implementation of the Stormwater Pollution Prevention Plan (SWPPP);
- Continued assessment of housekeeping and key performance indicators;
- Continued BMPs for stormwater in the process area;
- Continued application of a stormwater model for the Site to estimate stormwater outlet flows;
- Upstream and downstream monitoring in the Ohio River;
- Track down studies to isolate sources of PFOA and HFPO-DA for specific outlets when appropriate;
- East Pad improvements;
- Treatment of stormwater for Outlet 006 with a flow-through GAC cell;
- Continued modeling of impacts of discharges on Ohio River water quality;
- Non-targeted PFAS analyses; and
- Developing additional treatment approaches as necessary.

The PMP will be an iterative process to identify and reduce discharge of PFOA and HFPO-DA and will include key anticipated milestones for implementing proposed activities, if necessary.

## 3.2 Treatment Technology Evaluation

Section 5 of the 2023 AA&IP included an evaluation of four treatment technologies as potential alternatives to remove HFPO-DA and PFOA from captured flows: GAC, reverse osmosis (RO), ion exchange (IX), and regenerable ion exchange (Regen-IX). The summary of the evaluation from that report is summarized in Table 7 below.

**Table 7: Treatment Technology Evaluation**

PFAS Treatment Technology	Granular Activated Carbon (GAC)	Ion Exchange Resins (IX)	Regenerable IX (Regen-IX)	Reverse Osmosis (RO)
Potential Treatment Effectiveness	1	1	1	2
Technology Maturity	1	1	2	1
Degree of Adoption for PFAS	1	2	2	3
Potential Applicability	1	1	1	3
Waste Generation	1	2	1	3
Complexity	1	2	3	3
Commercial Availability	1	1	3	1

*Legend:*

*1 – most favorable; 2 – intermediate; 3 – least favorable*

Previously GAC and Regen-IX were considered as options for treatability testing. However, as GAC was found to be most favorable in all aspects and is the most commonly chosen treatment technology for fluorinated organics, the proposed treatment systems and treatability studies will use GAC as the treatment technology.

The remainder of this section briefly summarizes the key conclusions about the applicability of the technologies to process wastewater treatment and describes planned treatability testing and conceptual layouts of treatment systems for each outlet.

### **3.2.1 Treatment Technologies Description and Comparison**

The four technologies evaluated as part of the original AA&IP are briefly described in the subsections below and the key conclusions about the applicability of the technologies to process wastewater treatment in the new proposed approach are emphasized.

#### **3.2.1.1 Granular Activated Carbon (GAC)**

GAC is a mature technology within the water treatment and remediation industries and is widely used to treat various organic constituents of concern, commonly including PFAS. The term GAC refers to media that is manufactured from carbonaceous raw materials, such as coal, peat, wood, or coconut shells, which is ‘activated’ by treating it thermally or chemically under anoxic (low oxygen) conditions. This removes volatile organic matter and creates an intricate internal porous structure and surface charges which promote sorption. Different combinations of raw material and activation conditions will tend to select for different ranges of adsorbable organic species.

The sorptive capacity of GAC media is finite and once exceeded, constituents of concern will break through into the treated effluent requiring the periodic replacement of the GAC media. GAC media can either be single-use sacrificial, where it is disposed after being expended, or reactivated, where it is specially treated under high temperature to remove previously adsorbed contaminants and regain its sorptive capacity to be reused.

GAC is the most commonly chosen treatment technology for fluorinated organics. It is broadly commercially available, has easily implementable residuals management options, and also treats other organic pollutants that may be present in water sources.

### ***3.2.1.2 Ion Exchange and Regenerable Ion Exchange***

IX uses small beads of a polymeric resin matrix which incorporate molecular functional groups that act as contaminant exchange sites to treat target ionic constituents. Prior to treatment, the exchange sites are bonded with a common and relatively benign ion ( $\text{Cl}^-$ ,  $\text{OH}^-$ ,  $\text{Na}^+$ ,  $\text{H}^+$ , etc.) whose affinity for the functional group on the resin at the anticipated operating conditions is less than that of the target ionic constituents to be treated. In operation, ions are exchanged at the functional group, where target contaminant ions with higher affinity for the exchange site displace those of a lesser affinity. The hierarchy of affinity for the exchange site is referred to as the selectivity.

For most fluorinated organics, IX and GAC provide equivalent treatment removal capabilities, though IX resins tend to provide better treatment capacity per unit of media than GAC. Most of the resins used for fluorinated organics treatment are single use sacrificial applications and generate a solid waste (i.e., expended resin) which must be disposed. The expended resin is typically incinerated in a cement kiln operating at very high (greater than 3,000 degrees Fahrenheit) temperatures compared to GAC reactivation systems which operate at around 1,200 degrees Fahrenheit and where the media can be re-used after thermal treatment. Disposal of IX resins therefore tend to be more energy intensive.

RIX has the potential to reduce the volume of the waste products generated relative to single-use sacrificial media, whether IX resins or GAC. Regeneration of expended resin for fluorinated organics treatment is available and typically involves the use of solvents such as methanol, which can introduce health and safety concerns, and produces a concentrated liquid waste stream that still requires disposal through incineration, deep well injection, or some other method such as distillation and solvent recovery.

### ***3.2.1.3 Reverse Osmosis***

RO membrane systems in water treatment are a separation technology consisting of a semi-permeable layer that allows water to flow through while rejecting other dissolved constituents in the water. The technology is non-selective and removes most constituents from water to a high degree, with some minor exceptions, such as dissolved gases and small non-ionic polar molecules. This characteristic is highly beneficial in applications where the goal is producing high purity water, but less beneficial when the treatment produces a large volume stream of contaminant-enriched reject which then has to be further handled and treated.

One potential disadvantage of using RO membrane systems is the strict influent water quality requirements. RO membranes have minimal tolerance for chemical oxidants and are easily fouled by dissolved organics or inorganic ions that can form sparingly soluble salts or hydroxide/oxide precipitates (e.g., calcium, strontium, barium, iron, manganese, carbonate, sulfate, phosphate,

etc.). Special care is required in designing RO systems and the upstream pretreatment to achieve treatment objectives and minimize operational challenges.

Another potential disadvantage with RO membrane systems in a PFAS removal application is that they only concentrate the PFAS, along with most of the other dissolved constituents, into a liquid reject stream, called either the reject or the concentrate. The proportion of reject generated will vary based on the design of the membrane system and its operation but will typically range from 5 to 50% of the influent flow rate. This waste stream must either be further treated or disposed as a liquid waste. In the absence of further treatment, the volume of liquid waste generated and the logistical challenge for its disposal can be significant.

#### **3.2.1.4 Treatment Technology Conclusions**

GAC is recommended for further evaluation given its proven ability to consistently reduce concentrations of fluorinated organics, including PFOA and HFPO-DA, in similar water streams. GAC has been used successfully implemented in many applications at this Site and other Chemours facilities and is commonly used for water treatment and groundwater remediation applications for removal of fluorinated organics (ITRC, 2023; EPA, 2024(a); EPA, 2024(b)).

#### **3.2.2 Treatability Testing**

Treatability testing is planned, to determine the projected performance of GAC based on the Site-specific water chemistry. Typically, a benchtop studies include adsorption isotherm tests and possibly Rapid Small-Scale Column Tests using sample water shipped from the site. Vendors may be engaged and representative water samples from individual or blended sources will be prepared to match the expected influent water characteristics at each treatment location and tested to propose the appropriate combination of vessel size, design, and media selection. Additionally, testing may be conducted on one or more pretreatment programs to preferentially remove contaminants which would negatively affect the ultimate treatment of the contaminants of concern.

#### **3.2.3 Conceptual Treatment System Design Considerations**

Conceptual treatment system process flow diagrams have been developed for the proposed mass load reduction approaches for Outlets 001, 002, and 005 and are provided in Appendix D. Screening level (+100/-50%) opinions of probable capital cost as estimated by Chemours are provided in Appendix C. The Process Flow Diagrams are conceptual in nature and may change between this report and the detailed design phase described later in Section 5, Implementation Plan.

The conceptual Process Flow Diagrams in Appendix D are based on GAC as the treatment technology. The specifics of conveyance design, pretreatment, media selection, and treated water management will be developed during the detailed design phase of the project. A brief process narrative for the proposed treatment approach at each outlet is provided below.

**Outlet 001.** Stormwater and runoff from the East Pad area in Outlet 001 flows by gravity to stormwater ditches and is collected in a stormwater detention basin. This stormwater detention basin is designed to contain the volume of runoff generated from a 2-year 2.54-inch storm event and safely maintain operations during larger events while bypassing stormwater flows that exceed the design capacity. The water is impounded in the stormwater detention basin to create hydraulic head. This allows the stormwater to enter the gravity GAC treatment system and then percolate downward through the GAC beds and treat the PFAS impacts via adsorption. The treated effluent will be released to Outlet 011. Refer to Figure 2 for a site plan of the proposed treatment systems.

Additionally, the East wells extract groundwater in this area of the Site and convey it to treatment. The water undergoes pretreatment in a green sand filter vessels to remove iron and manganese, and through GAC vessels to remove PFAS. Treated water is conveyed under system pressure to the existing water process header for use at the Site.

**Outlet 002.** Targeted process water streams from Outlet 002 area will be rerouted to receive treatment at one of three treatment systems. Process water that will be routed to treatment includes W9 Line 1, Monomer Neutralization tank, targeted process water from Building 162, and effluent of the treatment system for Dryer Belt Wash Water. The Dryer Belt Wash Water effluent will have an additional GAC vessel installed to achieve a higher degree of treatment. The other process wastewater streams will use pumps to convey the process wastewater, using overhead pipe racks, or surface pipe supports, to the respective treatment locations. Using a combination of gravity flow and booster pumps, the wastewater will be treated through GAC vessels. Treated water will be conveyed under system pressure to the either the Biopond, Outlet 005, or Outlet 002 discharge. Refer to Figure 2 for a site plan of the proposed treatment systems.

**Outlet 005.** The wastewater from four individual process wastewater sources (Granular sump, Building 184 (B184) sump, Building 22 (B22) sump, and W9 permeate) will be conveyed in overhead pipe racks or surface pipe supports, using pumps, to the respective treatment locations. Additionally, Fine process water from this Powder Knock-out Pot will be removed and disposed of off-site. Using a combination of gravity flow and booster pumps for conveyance, the wastewater will be treated through GAC vessels. Treated water will be conveyed under system pressure to the either the Biopond or Outlet 005. Refer to Figure 2 for a site plan of the proposed treatment systems.

**Outlet 006.** Stormwater and runoff from the Outlet 006 drainage area and flows by gravity to stormwater ditches and will be collected in a stormwater detention basin. This stormwater detention basin is designed to contain the volume of runoff generated from approximately a 2-year 2.54-inch storm event and safely maintain operations during larger events while bypassing stormwater flows greater than the design capacity. The water is impounded in the stormwater detention basin to create hydraulic head for to allow the stormwater to enter the gravity GAC treatment system and then percolate downward through the GAC beds in series and treat the PFAS impacts via adsorption. The treated effluent will be released to Outlet 006. Refer to Figure 2 for a site plan of the proposed treatment systems.

Additionally, the West wells will extract groundwater in this area of the Site and convey it to treatment. The water will undergo treatment through GAC vessels to remove PFAS. In contrast to the East wells, groundwater in this area is not expected to contain sufficient iron and manganese to necessitate pretreatment with green sand. Treated water will be conveyed under system pressure to the existing water process header for use at the Site.

## **4. BENEFITS OF TREATMENT APPROACH**

This section describes the anticipated benefits of the treatment approach planned for implementation. The approach presented herein provides conceptual treatment and flow management details. During the design process, described in Section 5, Implementation Plan, the approaches will be refined in terms of treatment technology, design storm sizing criteria, etc.

### **4.1 Estimated Load Reductions**

Table 8 shows the estimated load reductions expected to be achieved with the proposed treatment projects. The mass loading estimates are based on average concentrations for the various flow streams or drainage areas and design flows. For stormwater flows, the long-term average flows from the hydrologic model were used.

**Table 8: Estimated Load Reductions of Treatment Approach**

Project	Treatment System ID	Project Component	Flow (MGD)	Existing Discharge Outlet	Future Discharge Outlet	Anticipated Average Treatment System HFPO-DA and PFOA Discharge Concentration	Estimated HFPO-DA Load Reduction (lbs/yr)	Estimated PFOA Load Reduction (lbs/yr)
<b>Additional Process Water Treatment/ Elimination</b>	CWTS-A	Granular Sump	0.16	005	005	< 10 and < 4 ppt	17	0.087
		B184 Sump	0.16	005	005	< 10 and < 4 ppt	2.7	0.039
		Monomer Neutralization Tank	0.22	002	005	< 10 and < 4 ppt	1.7	0.26
		B162 Targeted Process Water	0.072	002	005	< 10 and < 4 ppt	0.55	0.088
	B22 Treatment System	B22 Sump	0.058	005	005	2,316 ppt and 9.5 ppt	38	0.22
	FP KO Pot Offsite Disposal	FP KO Pot	0.0000030	005	005	-	2.7	0.00018
	Dryer Belt Wash Water Treatment System	Dryer Belt Wash Water	0.29	002	002	< 10 and < 4 ppt	0.46	0.033
	CWTS-B	W9 Line 1	0.16	002	005	< 10 and < 4 ppt	3.5	0.017
W9 Permeate		0.26	005	005	< 10 and < 4 ppt	4.0	0.0086	
<b>Targeted Stormwater Treatment</b>	East Pad Drainage Area Gravity GAC Treatment System	Portion of 001 East Pad Stormwater	0.0086	001	011	-	1.1	0.0091
		Portion of 011 East Pad Stormwater	0.0036	011	011	-	0.36	0.0067
	West Pad Cap by Outlet 006	West Pad Cap	0.0039	006	006	-	0.023	0.0086
	Outlet 006 Drainage Area Gravity GAC Treatment System	006 Stormwater	0.035	006	006	-	Not yet quantified	
<b>Additional Groundwater Treatment</b>	East Well Field Groundwater Treatment System	East Well Field	1.9	002, 003	002, 003	< 10 and < 4 ppt	3.6	4.1
	West Well Field Groundwater Treatment System	West Well Field	0.36	005	005	< 10 and < 4 ppt	0.41	7.5
<b>Estimated Future Annual Load Reductions</b>							<b>76</b>	<b>12</b>

- lbs/yr = pounds per year; MGD = million gallons per day

## 4.2 Resulting Future Mass Loading

As described in previous sections, existing Site mass loading for HFPO-DA and PFOA was estimated for each outlet, by flow source, and further discretized by individual process wastewater streams. Estimated future loading discretization's were calculated by accounting for mass reductions associated with the proposed projects and individual water types. A significant reduction in loading from the site to the receiving waters is estimated.

Total outlet mass loading and mass accounting by flow type and stream are based on differing datasets and collections thereof. Outlets, internal outlets, individual and grouped stormwater, and non-stormwater streams and processes have been sampled at varying frequencies. Additionally, sampled conditions and data points vary by location (e.g., sumps, valves, wells, roof drains, combined sewers). This variation in datasets led to instances where the outlet mass balances could not be completely closed. Where a mass balance was not closed, excess mass is referred to as undifferentiated mass<sup>8</sup>. Sitewide characterization of mass contributions by outlets and streams is based on the best available data, and complete mass balance agreement is not expected.

Table 9 shows the estimated 95th percentile average monthly flows and predicted future mass loading (for both HFPO-DA and PFOA), subdivided by flow type for each outlet. Where data were available, data for individual process flow streams are shown.

Planned treatment measures are estimated to result in a 50% reduction of HFPO-DA mass loading, and 29% reduction of PFOA mass loading from the Site during a year with average rainfall (i.e., average year).

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<sup>8</sup> Undifferentiated mass contributing to unclosed mass balances may result from underestimated flows, concentrations, or a combination of both. Underestimated mass may be associated with an unidentified or not fully quantified stream, or more likely, a combination of underestimated flows and concentrations. In the event of a potential mass deficit for a specific flow stream type, the mass reduction for a proposed project was limited to the available mass reduction.

**Table 9: Estimated Future Annual Mass Loading by Outlet and Flow Type**

Outlet	Flow Stream	95 <sup>th</sup> Percentile Flow (mgd)	HFPO-DA Future Estimated Load (lbs/yr)	PFOA Future Estimated Load (lbs/yr)
001	East Pad and Adjacent Stormwater (001)	0.01	0.0	0.00
	Other Stormwater	0.1	0.2	0.12
	NCCW from groundwater <sup>1</sup>	0.1	0.2	0.14
	Undifferentiated Mass	-	0.2	0.00
<b>Outlet 001 Loading</b>			<b>0.6</b>	<b>0.26</b>
002	NCCW from river water	1.8	1.3	2.1
	NCCW from groundwater (East Field)	1.0	0	0
	Other NCCW from groundwater	0.9	0.2	1.1
	Stormwater	0.01	14.9	0.9
	Bldg. 162 Targeted Process (process wastewater)	0.07	0.0	0.0
	B514 W9 Line 1 (process wastewater)	0.2		
	Monomer Neut. Tank (process wastewater)	0.2		
	Dryer Belt Wash Water (process wastewater)	0.3	0.0	0.0
	Other Process Water	2.0	3.9	1.7
	Undifferentiated Mass	-	10.9	4.1
<b>Outlet 002 Loading</b>			<b>31</b>	<b>10</b>
005	Stormwater	0.04	12.9	2.6
	NCCW from river water	43	2.3	4.5
	Other NCCW from groundwater	4.9	1.0	
	NCCW from groundwater (West Field)	0.4	0.0	0.0
	B22 Sump (process wastewater)	0.06	0.4	0.0
	Granular Sump (process wastewater)	0.16		
	B184 Sump (process wastewater)	0.16		
	FP KO Pot (process wastewater)	0.0		
	W9 Permeate (process wastewater)	0.26		
	Other Process Water	1.2	1.0	8.0
	Undifferentiated Mass	-	15.6	2.6
<b>Outlet 005 Loading</b>			<b>33</b>	<b>18</b>
006	West Pad Stormwater	0.004	0.0	0.0
	Other Stormwater <sup>4</sup>	0.1	0.52 <sup>4</sup>	0.15 <sup>4</sup>
	Steam Condensate <sup>3</sup>	0.005	0.05 <sup>3</sup>	0.06 <sup>3</sup>
<b>Outlet 006 Loading</b>			<b>0.59<sup>3,4</sup></b>	<b>0.22<sup>3,4</sup></b>
007	Stormwater	0.005	1.1	0.05
	NCCW from river water and Steam Condensate <sup>2</sup>	1.8	4.1	0.68
<b>Outlet 003 Loading</b>			<b>2.3</b>	<b>1.1</b>
<b>Outlet 007 Loading</b>			<b>5.2</b>	<b>0.72</b>
<b>Outlet 011 Loading</b>			<b>1.5</b>	<b>0.027</b>
<b>Outlets 030, 031, 032, 033, 034, 036, 016, 019 Loading</b>			<b>0.42</b>	<b>0.051</b>
<b>Outlets 022, 023, 025 Loading</b>			<b>0.14</b>	<b>0.041</b>
<b>ESTIMATED FUTURE LOADING FROM SITE</b>			<b>74</b>	<b>30</b>

- lbs/yr: pounds per year; MGD: million gallons per day; DMR: discharge monitoring report

- Loads only shown to the nearest tenth of a pound (0.1 lbs/yr). Values less than 0.05 when rounded are displayed as 0.0.

- Outlet mass loading estimates are based on average outlet DMR concentrations (Jan. 2022 – Mar. 2024) and 95th percentile monthly average flows. Mass loading was speciated between stormwater, river water cooling water and groundwater cooling water based on measured concentrations of these flows and known process water flow volumes.

- Where the mass balance was not closed, excess mass is referred to as undifferentiated mass.

<sup>1</sup> Groundwater (GW) Cooling Water represents NCCW and backwash water.

<sup>2</sup> The NCCW from river water and Steam Condensate flow stream to Outlet 007 is primarily cooling water sourced from river water with known steam condensate contributions.

<sup>3</sup> The steam condensate flow stream to Outlet 006 is planned to be re-routed to Outlet 003 and no longer discharged via Outlet 006.

<sup>4</sup> Stormwater from the drainage area to Outlet 006, from up to approximately the 2-year, 24-hour design storm, will be captured in a stormwater basin and treated via a gravity flow GAC treatment system prior to discharge via Outlet 006. Anticipated load reductions from this project have not yet been quantified and are therefore not incorporated into analyses herein. However, a large portion of the existing stormwater loading to Outlet 006 is anticipated to be removed as a result of this treatment. Discharge of surge flows (i.e., untreated stormwater) via Outlet 006 is expected to occur only in significant rain events larger than the planned 2-year, 24-hour design storm.

Detailed accounting of process flow streams for Outlets 002 and 005 was also performed. Appendix B presents the more detailed discretization of identified process flow streams and their mass loads with and without proposed treatment.

### 4.3 Resulting Future Outlet Concentrations

Table 10 shows the estimated predicted average concentrations by outlet for the future conditions (for both HFPO-DA and PFOA). As shown in Table 10, 2018 NPDES permit average monthly limits (AMLs) are anticipated to be met based on evaluations performed and described herein for outlets that were quantitatively evaluated assuming long-term average precipitation conditions. Additional concentration reductions in stormwater flows are anticipated based on implementing a PMP, which will propose evaluations and follow-on actions to reduce outlet concentrations during wet weather. If during PMP action implementation outlet sampling data shows compliance with 2018 permit maximum daily limits (MDLs) is not being achieved, additional treatment approaches will be evaluated and the PMP will be executed as an iterative process of evaluations, investigations, and implementations to lead to compliance with 2018 permit limits.

**Table 10: Future Predicted Average Concentrations by Outlet**

Outlet	HFPO-DA		PFOA	
	2018 Permit AML	Estimated Future Average Concentration (ng/L)	2018 Permit AML	Estimated Future Average Concentration (ng/L)
001	1,400	1,030	2,000	260
002	1,400	1,020 <sup>3</sup>	2,000	520
005	1,100	220	300	120
006	140 <sup>1</sup>	To be determined <sup>2</sup>	Report only	To be determined <sup>2</sup>

- ng/L = nanograms per liter

<sup>1</sup> As previously described, Outlet 006 will convey stormwater only, where benchmarks should be used as opposed to numeric concentration limits.

<sup>2</sup> Stormwater from the drainage area to Outlet 006, from up to approximately the 2-year, 24-hour design storm, will be captured in a stormwater basin and treated via a gravity flow GAC treatment system prior to discharge via Outlet 006. Estimates of load reductions from this project have not yet been quantified; therefore, future predicted outlet concentrations have not yet been estimated. However, a large portion of the existing stormwater loading to Outlet 006 is anticipated to be removed as a result of this treatment. Discharge of surge flows (i.e., untreated stormwater) via Outlet 006 is expected to occur only in rain events larger than the planned 2-year, 24-hour design storm.

<sup>3</sup> Two successive dry weather samples had anomalously high results compared to the entire data set. The data set did not meet the criteria for a formal statistical test (a normal or lognormal distribution) and therefore an outlier test could not be performed. The

result shown in Table 10 is the result of the model predicting outlet concentrations using all available outlet data (post-Ranney Well treatment) and calibrated based on the number of historical days where outlet concentrations have been greater than 2018 permit limits. When the two anomalous results are included and outlet loading is estimated as described in the previous subsections, the predicted average outlet concentration at Outlet 002 is 1,560 ng/L for HFPO-DA.

## 5. IMPLEMENTATION PLAN

This section describes the proposed implementation plan for the mass reduction approach developed during discussions with EPA aimed at achieving mass loading reductions at the Site. The selected treatment approaches will be implemented expeditiously. First, Chemours intends to implement short-term measures prior to completion of the schedule outlined below that are anticipated to result in water quality benefits. These include treating process flows from the Building 22 sump (which is part of the selected alternative for Outlet 005 and has been implemented as of February 2025). Additionally, Chemours will continue to implement improved source control/good housekeeping measures that are outlined in the Site’s SWPPP.

The treatment approaches selected for implementation will follow the steps outlined below, which are estimated to require approximately 27 months in total following EPA approval of this new approach. Elements for each outlet will be advanced, and certain components of the project may be completed and operational before the full 27 months elapse.

The schedule for these steps is provided as the estimated duration in months, as dates cannot be provided until EPA approval is received. Additionally, the presented durations are anticipated and are presented as a range due to the early stages of alternative design and permitting, resulting in a range in the estimated time to completion, and subject to factors such as permit approvals, supply chain availabilities and other factors.

A summary of the high-level steps of the implementation plan sequence is described and shown below (Table 11).

**Table 11: Implementation Schedule for Proposed Treatment Systems**

Project Stage	Stage Duration (month)	Cumulative Duration (months)
Agency Approval	0	0
Engineering Design	0 - 14	14
Contracting, Procurement, and Permitting	10 - 19	19
Construction	11 - 20	20
Commissioning	16 - 21	21
Optimization	21 - 27	27

**Note:** Durations shown correspond to the expected durations from the effective date of agency approval.

### 1. *Agency approval*

Durations shown above are contingent on timely approval from the EPA to advance to the next steps of the implementation plan.

### 2. *Engineering Design*

Pre-design effort includes additional detailed investigation and characterization efforts which enable the preparation of detailed designs. This step may include:

- hydrologic model calibration,
- treatability studies and treatment technology selection, and
- establishing and optimizing siting and water treatment flow plans.

Analytical data and bench testing results will form a basis of design for the treatment system. Engineering design may then commence to finalize the treatment flowsheet, sizing and placement of mechanical equipment, arrangement of interconnecting piping and hoses, and furnishing power to major equipment. Engineering design will also provide instrumentation and controls for process monitoring. The design stages typically conclude with a complete drawing and specification package suitable for construction tendering or turnkey supply from an appropriately selected equipment vendor.

### 3. *Contracting, Procurement, and Permitting*

The contracting process will be used to select a qualified vendors and/or contractors and to establish terms and responsibilities between the implementation parties for the proposed projects. The process may include:

- Request for Proposal (RFP) preparation
- Bid Evaluation
- Vendor selections
- Contract Award
- Contract Execution

Permitting will be conducted coincident with the detailed design, bidding and contracting steps. Permitting may include efforts for:

- Land disturbance permits
- NPDES permits / permit modifications
- Building permits
- Electrical permits
- Well permits

### 4. *Construction*

As contracting, procurement, and permitting are completed for specific projects, construction of the treatment systems will begin. Due to the number of projects being advanced, construction will be advancing for some projects while contracting and permitting is occurring for other projects.

Construction will include site and water conveyance system preparation, alongside treatment system installation and assembly. The details of the construction sequence will be dependent on the final detailed design of the systems, but will likely include considerations for civil, electrical, and mechanical construction. Construction Quality Assurance and Quality Control (QA/QC) will be conducted as required in the detailed design or technical specifications. It is possible that considerations for operational shutdowns or turnaround periods may need to be accounted for to

construct some components of the selected treatments. This will have to be addressed and accounted for as detailed designs are developed. The duration of this phase may be affected by the selection of rental equipment versus installed capital assets.

#### 5. *Commissioning*

Treatments systems and water conveyance infrastructure will undergo commissioning, functional checkout and startup processes after construction is complete. The mechanical, electrical, and instrumentation components will be integrated together and verified for proper installation. Functional checkout activities will be performed prior to startup. Once the system is confirmed to be fully functional, startup activities will commence. Startup of the systems will be considered substantially complete when the systems are confirmed to be operating consistent with the design specifications. The system startup will be concluded by a handover phase where the systems will transition into operational phase and appropriate training and documentation will be completed.

#### 6. *Optimization*

Once the treatment systems have been commissioned, an initial period of operation will identify possible opportunities to improve performance of the system. This may result in identification of potential design optimizations for the system to facilitate more effective long-term operation.

The optimization period will also be used to refine operational procedures and review the influent and effluent sample results to develop an appropriate media changeout schedule (leading indicator conditions and approximate frequency). Media changeouts may introduce new phenomena into the treatment process that may need to be managed with extra precaution. The optimization period will allow these phenomena to be identified, and plans and procedures can be developed to iteratively address them, continuously improving system performance. Data management and reporting strategies will also be developed and refined during this interval. The optimization period will occur over six (6) months.

It is assumed for the gravity GAC systems treating stormwater, that during this optimization period there will be sufficient rainfall events such that these systems are operational in order to conduct optimization. Additional optimization time may be required for the stormwater systems if conditions result in periods without sufficient rainfall to undergo system optimization.

## 6. SAMPLING PLAN

This section outlines the approach and components for the Sampling Plan which may be updated during the detailed design component of the implementation plan to incorporate specific sample locations and methods.

### 6.1 Objectives

The Sampling Plan has been developed to achieve the following objectives:

- Evaluate the flow rate and water quality of flows influent to the future treatment system(s). Influent water quality parameters to be evaluated include HFPO-DA and PFOA;
- Evaluate the water quality of the flows effluent from the future treatment system(s). Effluent water quality parameters to be evaluated include HFPO-DA and PFOA; and
- Assess the concentration removal efficiency of the selected treatment technology for the treatment system(s) for HFPO-DA and PFOA.

The planned scope outlined below may be modified based on changes in Site conditions or adjustments in understanding of Site conditions. This plan may also be modified or superseded by potential sampling requirements in future permits, such as a NPDES permit.

### 6.2 Components of the Sampling Plan

The sampling plan involves collecting influent and effluent samples from the treatment system(s) during system operation until incorporated into the site NPDES permit. The sampling will assess effectiveness of HFPO-DA and PFOA removal at the future treatment systems treating process wastewater and stormwater.

#### 6.2.1 Sampling Schedule

Sampling will be performed when the treatment systems are operating and discharging treated water. Sampling will be conducted up to four times per month for approximately the first six months after the treatment systems begin operation, assuming that sufficient rainfall events occur during each of these six months such that the systems are operational. After this initial period, sampling may be reduced to up to two times per month. Sampling events will occur at least three days apart.

#### 6.2.2 Sample Types and Locations

Samples will be collected from the influent and the effluent to the treatment system(s), and each will be analyzed for HFPO-DA and PFOA. If subsamples are required, they will be composited into one sample for analysis.

QA/QC samples may be collected for the program including the following types of field and laboratory QA/QC samples:

- Equipment Blanks
- Field Blanks
- Field Duplicates
- Matrix Spike/Matrix Spike Duplicate (laboratory QA/QC)

All non-dedicated or non-disposable sampling equipment will be decontaminated immediately before sample collection using proper protocols.

### 6.2.3 Flow Measurement

Flow measurements will be collected to represent flow being treated by the treatment system(s), either from the effluent from equalization storage, influent into the treatment system(s), or effluent/discharge from the treatment system(s). Flow are anticipated to be measured using a flow meter for the process wastewater treatment systems and will be measured using a pressure transducer and weir for the gravity GAC treatment systems. Flows potentially may be measured using some other equivalent measurement method based on detailed design specifications.

## 6.3 Data Evaluation

Treatment System(s) influent and effluent will be monitored to assess removal efficiency of HFPO-DA and PFOA. The calculation for removal efficiency is shown in Equation 1 below. Non-detect influent and effluent sample results will be assigned a value of zero for the calculation and the values from duplicate samples will be averaged together.

### *Equation 1: System Removal Effectiveness*

$$E_{TS,i} = \left( 1 - \frac{c_{eff,i}}{c_{inf,i}} \right) \times 100\%$$

Where,

$E_{TS-i}$  = is the Treatment System removal efficiency for the given parameters,  $i$  (HFPO-DA or PFOA);

$c_{eff,i}$  = is the volume weighted effluent concentration for a given evaluation period for the given parameters,  $i$  (HFPO-DA or PFOA); and

$c_{inf,i}$  = is the volume weighted influent concentration for a given evaluation period for the given parameters,  $i$  (HFPO-DA or PFOA).

## 7. REFERENCES

- AECOM. 2022. 2021 Routine Monitoring and Corrective Measures Assessment Report. Chemours Washington Works Plant, Washington, WV. March.
- DuPont Corporate Remediation Group. 2003. Revised Groundwater Flow Model. DuPont Washington Works, Washington Works, WV. January.
- EPA, 2024(a). Technologies and Costs for Removing Per- and Polyfluoroalkyl Substances (PFAS) from Drinking Water. Office of Water, EPA 815R24012.
- EPA, 2024(b). Best Available Technologies and Small System Compliance Technologies for Per- and Polyfluoroalkyl Substances (PFAS) in Drinking Water. [https://www.epa.gov/system/files/documents/2024-04/2024-final-pfas-bat-ssct\\_final-508.pdf](https://www.epa.gov/system/files/documents/2024-04/2024-final-pfas-bat-ssct_final-508.pdf)
- Geosyntec Consultants and AECOM, 2023. Alternatives Analysis & Implementation Plan for Outfalls 001, 002, 005 and 006. August 2023.
- Interstate Technology Research Council (ITRC), 2022. PFAS — Per- and Polyfluoroalkyl Substances: Section 12 - Treatment Technologies [https://pfas-1.itrcweb.org/12-treatment-technologies/#12\\_2](https://pfas-1.itrcweb.org/12-treatment-technologies/#12_2)
- WVDEP. 2015. Final Decision and Response to Comments. DuPont Washington Works. Washington, WV. July.

# **Appendix A**

## **Hydrologic Model Inputs**

**Table 1 - Hydrologic Model Input Variables**

Outlet	Sub-Area ID	Area (acres)	Width (feet)	Flow Length (feet)	Slope (%)	Curve Number
001	WW-001A	27.98	2059	592	4.3	83
	WW-001B	0.94	160	256	1.9	98
	WW-001C	19.51	1381	615	3.0	93
	WW-001D	5.14	511	438	2.7	92
	WW-001E	11.47	1071	467	1.8	90
	WW-001F	1.36	314	189	3.4	94
	WW-001G	1.06	136	338	3.4	88
	WW-001H	1.86	235	344	1.7	97
	WW-001I	7.31	562	566	2.1	93
002	WW-002A	5.90	1141	225	2.6	95
	WW-002B	0.43	97	195	2.8	93
	WW-002C	0.26	131	86	1.3	93
	WW-002D	1.53	170	391	3.9	90
003	WW-003A	87.01	3657	1036	9.5	81
	WW-003B	5.04	1114	197	2.2	95
	WW-003C	5.06	897	246	2.2	95
	WW-003D	6.06	912	289	1.4	94
	WW-003E	5.30	891	259	2.3	94
	WW-003F	3.71	1028	157	2.6	98
005	WW-005A	12.25	787	678	3.0	92
	WW-005B	3.12	489	278	2.8	94
	WW-005C	1.53	213	312	3.0	94
	WW-005D	5.76	573	438	2.0	95
	WW-005E	0.64	195	142	2.3	94
	WW-005F	1.76	117	656	8.4	71
	WW-005G	0.84	266	138	0.9	95
006	WW-006A	15.71	561	1219	1.9	86
	WW-006B	9.08	1000	396	2.0	96
	WW-006C	6.04	1151	228	0.9	95
	WW-006D	11.29	1086	452	4.2	81
	WW-006E	16.69	1031	705	5.0	73
007	WW-007A	0.44	132	144	4.5	93
	WW-007B	0.80	301	116	1.0	94
	WW-007C	1.58	265	260	2.7	96
011	WW-011A	3.62	282	558	4.2	75
	WW-011B	7.93	548	630	4.9	81
	WW-011C	4.66	449	452	3.5	81
016	WW-016A	2.55	412	269	16.4	76
019	WW-019A	0.39	99	172	6.1	65
022	WW-022A	12.58	563	973	2.9	63
023	WW-023A	15.72	2167	316	2.0	91
025	WW-025A	4.28	246	760	2.4	78
030	WW-030A	5.55	992	244	14.7	76
031	WW-031A	1.86	263	309	18.3	75
	WW-031B	0.04	26	65	4.0	79
032	WW-032A	1.45	383	165	21.6	69
	WW-032B	0.03	50	24	24.8	70
033	WW-033A	2.35	709	145	21.8	70
	WW-033B	0.03	26	48	20.9	68
034	WW-034A	2.13	442	210	17.9	71
	WW-034B	0.05	34	60	15.1	74
036	WW-036A	1.93	391	215	13.5	76
	WW-036B	0.02	69	14	26.0	63

**Notes:**

Select outlets and their associated sub-areas were grouped and modeled to discharge at a centralized location. These outfalls and their groupings are as follows:

030, 031, 032, 033, 034, 036, 016, 019

001, 011

006, 022, 023, 025

**Appendix B**  
**Detailed Loading Subdivision of Identified**  
**Process Flow Streams**

**Table B**  
**Outlets 002 and 005 Process Wastewater Flows**  
**Chemours Washington Works**

Outlet	Network Leg	Stream Type	Additional Treatment Proposed	Stream Description	Approximate Flow (gpm)	HFPO-DA		PFOA	
						Present (lbs/yr)	Future (lbs/yr)	Present (lbs/yr)	Future (lbs/yr)
002	Portion of 002-03	Process wastewater	yes	Monomer Neutralization Tank	200	2.2	0.0	0.4	0.0
	B162 Targeted Process water								
	002-12			W9 Line 1	110	3.5		0.02 <sup>1</sup>	
				Dryer Belt Wash Water	200	0.5		0.04	
						<b>Present (lbs/yr)</b>		<b>Present (lbs/yr)</b>	
	Other 002-03	other process	no	CaF <sub>2</sub> Filtrate Press	20	0.02 - 0.03		0.003 - 0.003	
	002-05	other process (Celanese-tenant)		Filaments process	130	0.9 - 1.2 <sup>1</sup>	0.9 - 1.0 <sup>1</sup>		
				EPC - East process	210				
				Nylons Resins process	640				
				Nylons Resins steam condensate	10				
Filaments steam condensate				5					
002-13	other process	Other steam condensate		5					
Outlet 002	Boiler blowdown	35	0.2 - 0.2 <sup>1</sup>	0.2 - 0.2 <sup>1</sup>					
		P&S Neutralization System	310	1.4 - 2.5 <sup>1</sup>	0.4 - 0.6 <sup>1</sup>				
<b>Untreated Subtotal for Outlet 002</b>						<b>± 2.5 - 3.9</b>		<b>± 1.5 - 1.7</b>	
005	B22 Sump	Process-contact	yes	Main research building	440	64	0.4	0.4	0.0
	Granular Sump			Lines 1 and 2, Sluice and other					
	B184 Sump			PFA Extruder vacuum pump, PFA Extruder sluice water					
	FP KO Pot			Outdoors near B162, 3 gal 1x per day					
	W9 Permeate			Nanofiltration permeate stream after GAC beds <sup>2</sup>					
						<b>Present (lbs/yr)</b>		<b>Present (lbs/yr)</b>	
	Bldg 110 Eductor	Process-contact	no	River water eductor	720	0.03 - 0.03		0.01 - 0.01	
	FEP Sluice & Adjacent Drainage			FEP Sluice, adjacent roof drains, contact water to sump	6	0.06 - 0.24		0.7 - 1.4 <sup>1</sup>	
	PFA Autoclave Vent Drain			Ongoing assessment <sup>2</sup>	1	unknown		unknown	
	Other B184			B184 flows not directed to building sump	not yet known	unknown		unknown	
	Cooling Tower Blowdown	Other process	no	Blowdown water collection from 2 cooling tower drainages	100	0.20 - 0.20		2.2 - 2.2 <sup>1</sup>	
	Leachate (Dry Run LF)			2-3x truckloads per week	2	0.002 - 0.005		0.33 - 0.42	
	Sanitary			TSS, BOD, Ammonia considerations	92	0.44 - 0.44		0.35 - 0.35	
Remaining Bio Pond Influent	(Non-Chemours) Other contributions to Bio Pond <sup>3</sup>			880	0.0 - 0.0		3.6 - 3.6 <sup>1,3</sup>		
<b>Untreated Subtotal for Outlet 005</b>						<b>± 0.8 - 1.0</b>		<b>± 7.2 - 8.0</b>	

**Notes:**

gpm: gallons per minute

lbs/yr: pounds per year; certain loads only shown to the nearest tenth of a pound (0.1 lbs/yr) – future values less than 0.01 when rounded are displayed as 0.0.

Individual streams were sampled at varying frequencies and points in time. Actual mass contributions of each stream may be less than or greater than estimated.

Present ranges of estimated mass loads from untreated streams are based on average and high measured concentrations. Where the range values are the same, there is only one sample result.

<sup>1</sup> Source water intake includes groundwater, some mass from which would be mitigated through groundwater treatment.

<sup>2</sup> Low-flow stream cannot safely be sampled; concentrations and mass loads are unknown.

<sup>3</sup> Non-Chemours; Bio Pond influent mass from contributions other than B22 Sump, W9 Permeate, Leachate (Dry Run), and Sanitary.

Assumed non-contact process wastewater primarily sourced from groundwater, some mass from which would be mitigated through proposed groundwater treatment.

# **Appendix C**

## **Cost Estimates**



**Table C**  
**Treatment System Cost Estimates**  
**Chemours Washington Works**

Treatment System	Capital Cost
West Well Field Groundwater	\$462,000
East Well Field Groundwater	\$899,000
Outfall 006 Drainage Area Stormwater	\$1,342,000
East Pad Outfall 001/011 Stormwater	\$2,050,000
Process Contact Water Treatment CWTS-A	\$377,000
Process Contact Water Treatment CWTS-B	\$864,000
Total	\$5,994,000

**Notes:**

Costs presented here are estimates with a probable cost range of -50% to +100%  
Costs prepared by Chemours

**Appendix D**  
**Conceptual Process Flow Diagrams for**  
**Proposed Treatment Systems**

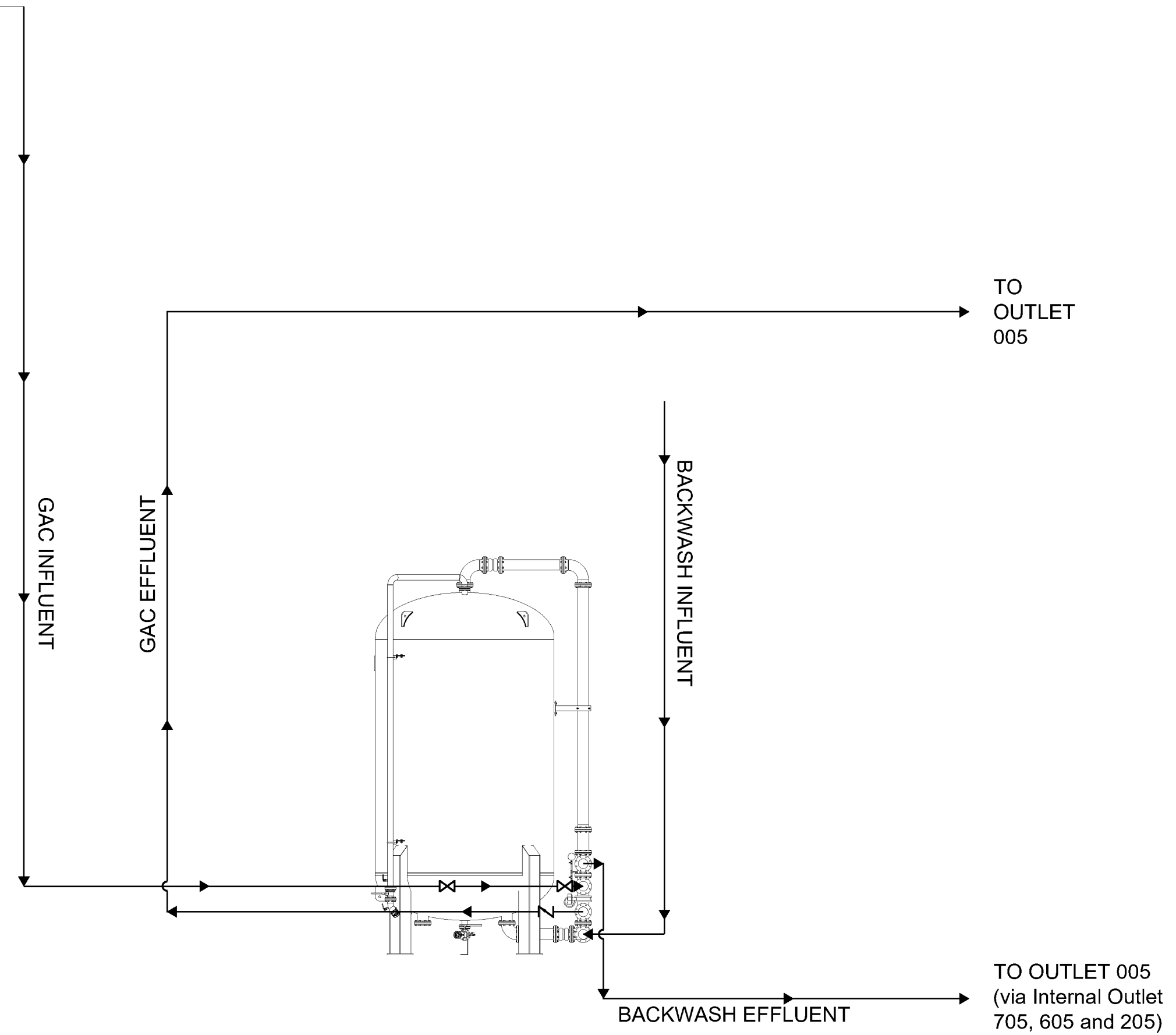
# CWTS-A Treatment System

GRANULAR SUMP LINES 1 AND 2 TREATMENT

B184 SUMP TREATMENT

MONOMER NEUTRALIZATION TANK TREATMENT

B162 TARGETED PROCESS TREATMENT

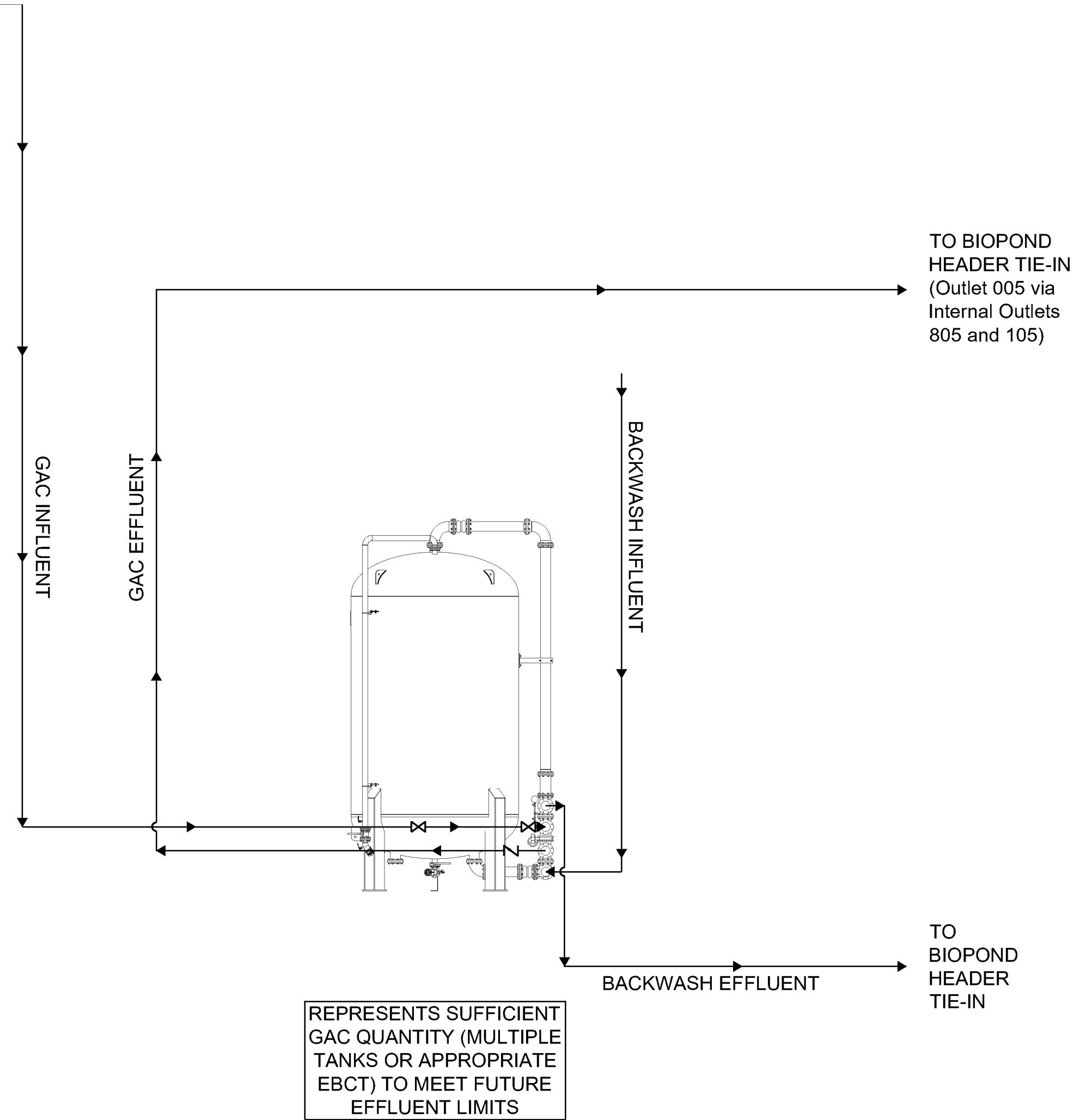


REPRESENTS SUFFICIENT  
GAC QUANTITY (MULTIPLE  
TANKS OR APPROPRIATE  
EBCT) TO MEET FUTURE  
EFFLUENT LIMITS

# CWTS-B Treatment System

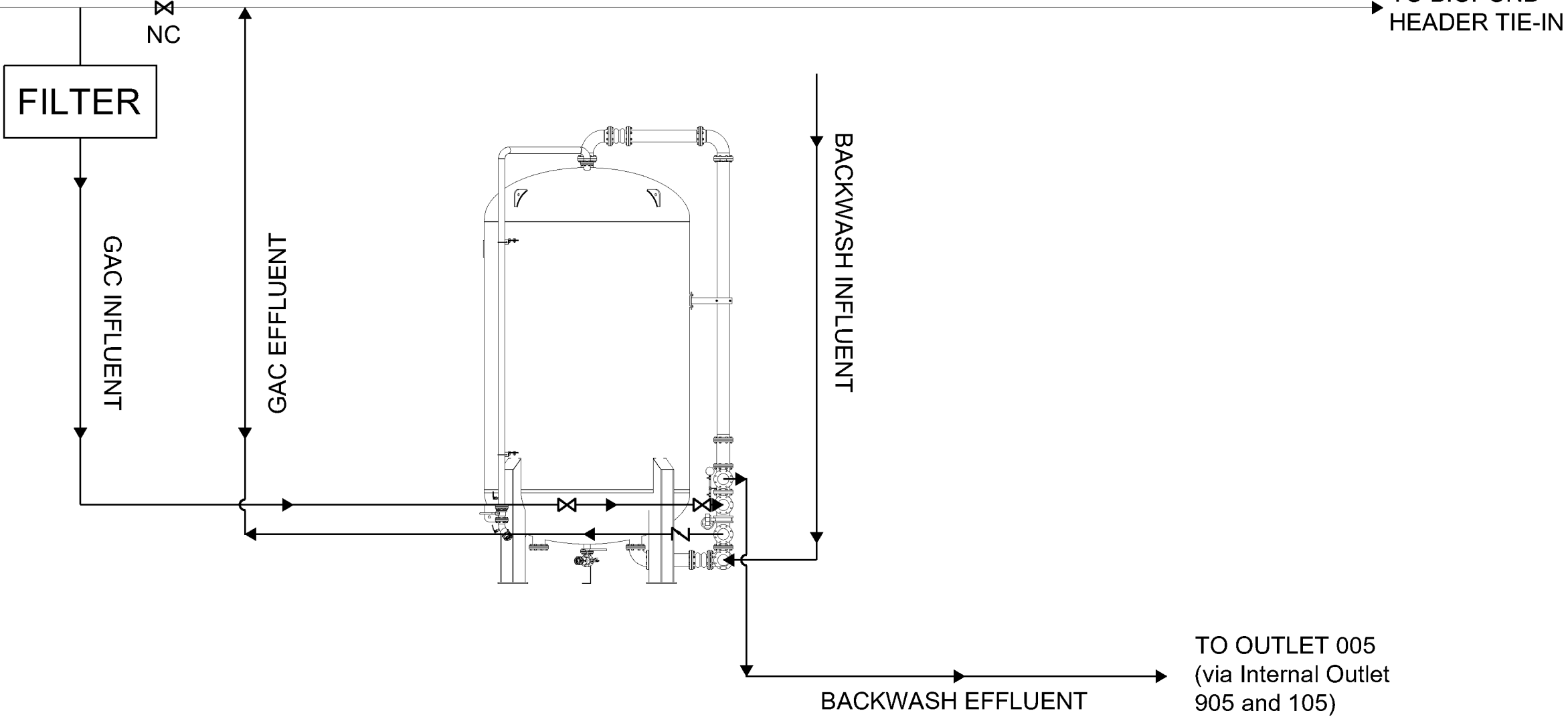
B514 W9 LINE 1

W9 PERMEATE



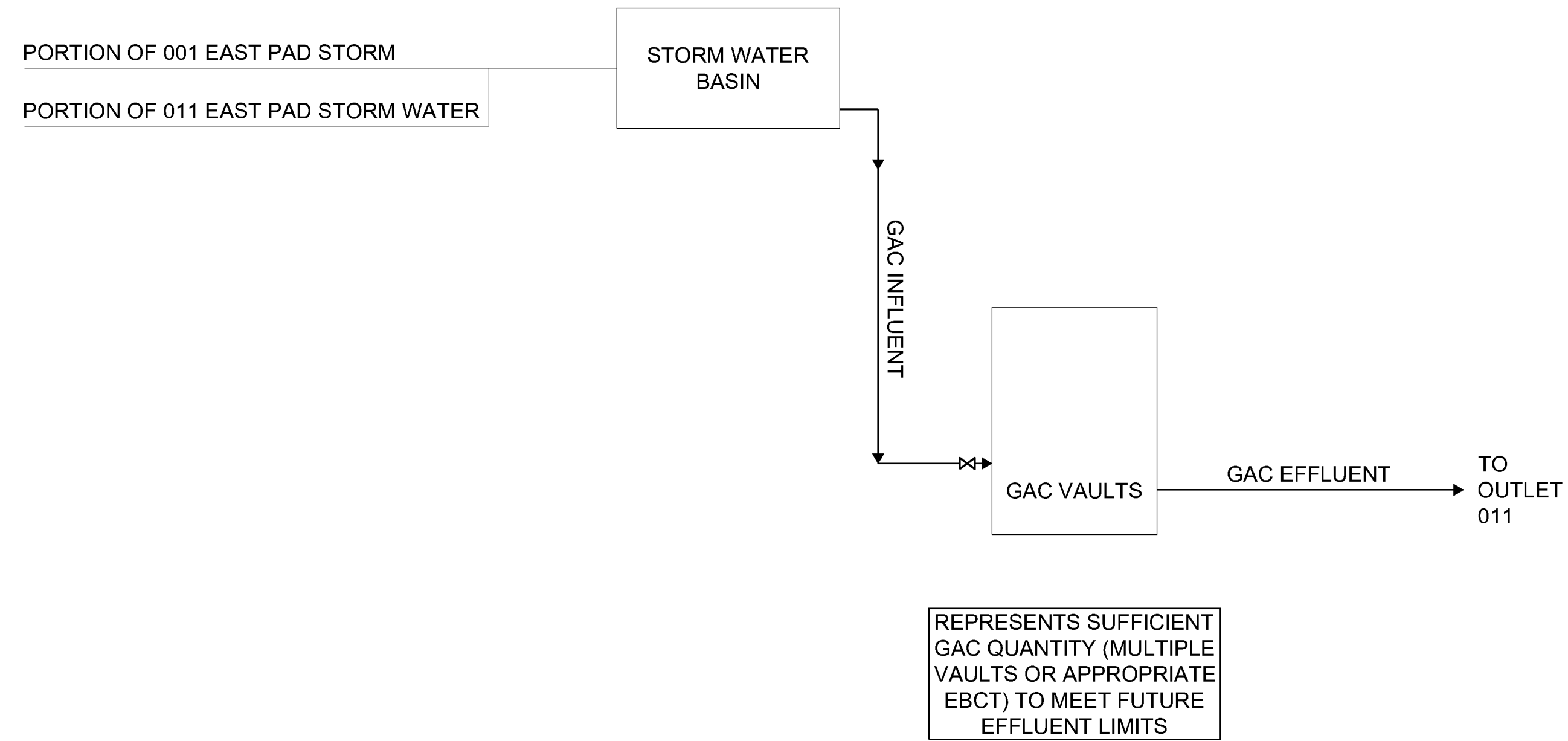
# B22 Treatment System

B22 SUMP

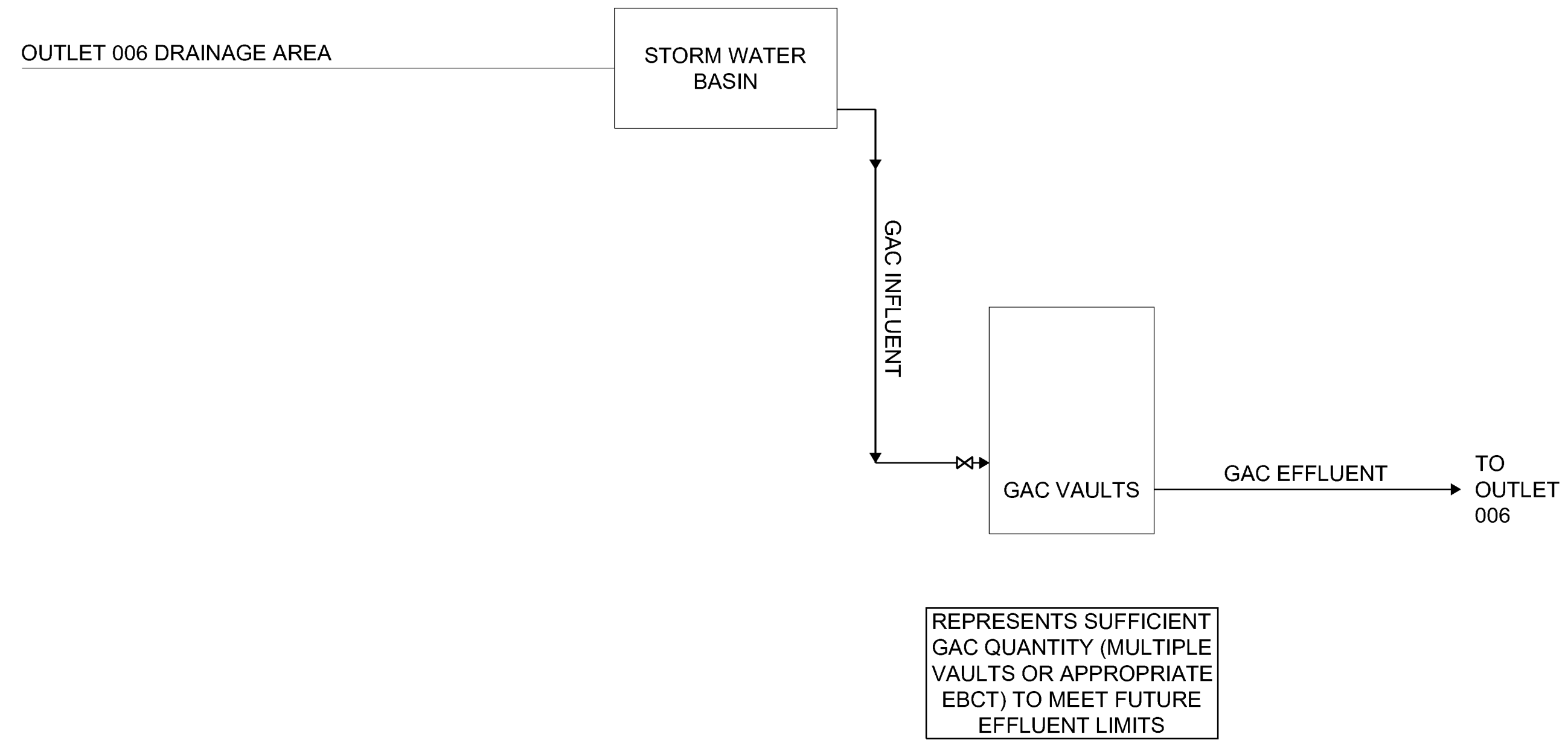


REPRESENTS SUFFICIENT GAC QUANTITY (MULTIPLE TANKS OR APPROPRIATE EBCT) TO MEET FUTURE EFFLUENT LIMITS

# East Pad Drainage Area Gravity GAC Treatment System



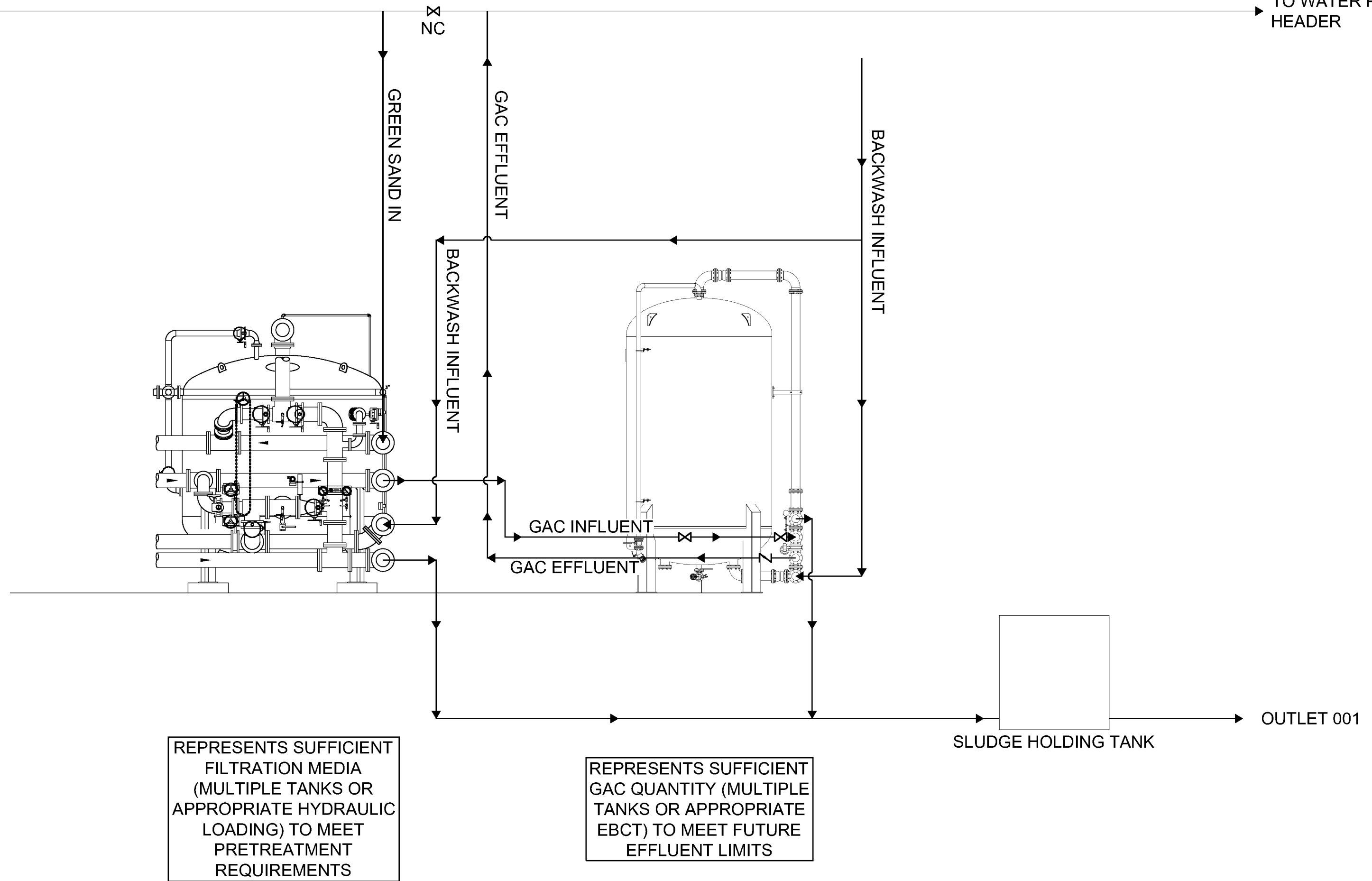
# Outlet 006 Drainage Area Gravity GAC Treatment System



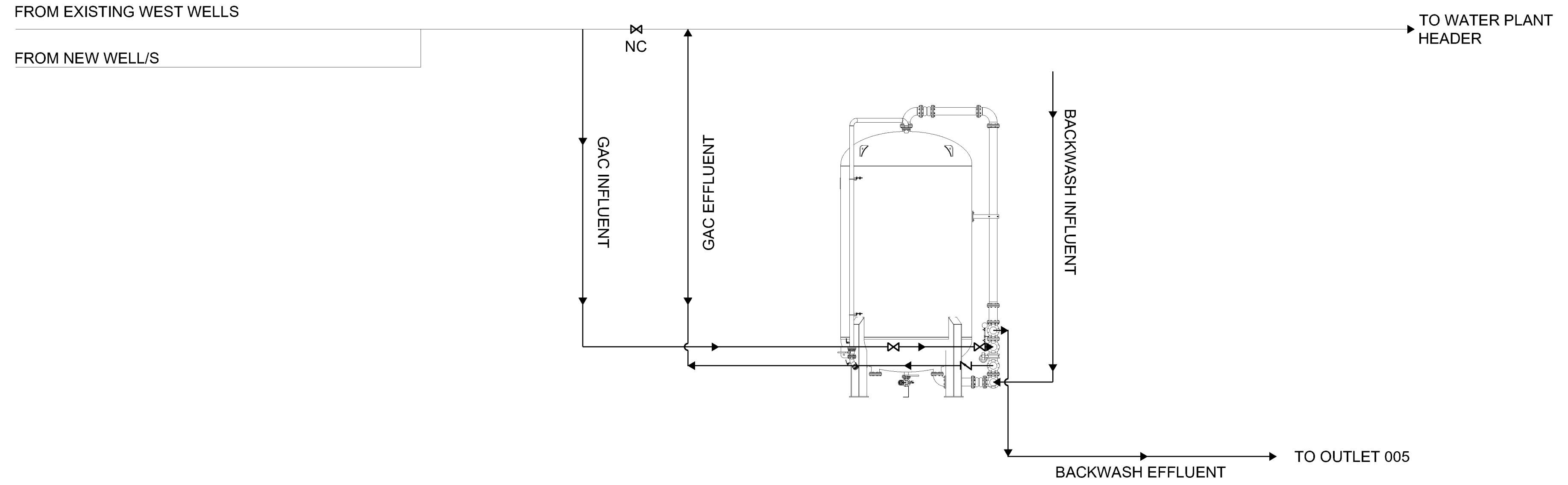
# East Well Field Ground Water Treatment System

FROM EAST WELLS

TO WATER PLANT  
HEADER

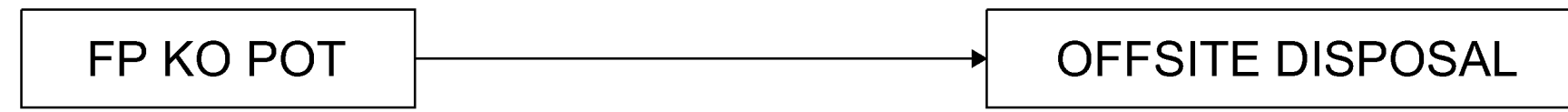


# West Well Field Ground Water Treatment System



REPRESENTS SUFFICIENT GAC QUANTITY (MULTIPLE TANKS OR APPROPRIATE EBCT) TO MEET FUTURE EFFLUENT LIMITS

# FP KO POT Offsite Disposal



# West Pad Cap by Outlet 006

