State of Oregon
Department of Environmental Quality Memorandum

Date: January 6, 2020

To: **Jim Orr**
Project Manager, NWR Cleanup Program

From: **Henning Larsen, R.G.**
Senior Hydrogeologist

Subject: **Zenith Energy – Proposed Storm Water Infiltration System**
5501 NW Front Avenue, Portland, Oregon 97201

I issued a technical memorandum dated October 14, 2020, regarding a proposal to infiltrate stormwater at the Zenith Energy facility in northwest Portland. In a December 16, 2020 email, Apex project engineer Sam Jackson clarified elements of the plan and provided new information regarding the source and quality of stormwater to be infiltrated. I have revised my October 14, 2020 memo to reflect the new information. For future use and reference, please replace the October 14, 2020 memo with this document.

Background

Zenith Energy operates a petroleum bulk storage and distribution facility at 5501 NW Front Avenue in Portland, Oregon (Figure 1 - attached). They propose to construct a "renewable fuels" distribution facility (RFDF) on 13.6 acres of vacant land in the southeast area of the property (Figure 2). The development will utilize three existing Above Ground Storage Tanks (ASTs) and includes the construction of a railroad spur with 10 tracks and a rail off-loading area (Figure 3). The off-loading area will be covered by a 24,030 ft^2 canopy and located within an epoxy-coated concrete containment area. The project overview indicates rail operations in the RFDF may handle non-fuel petroleum products and are not limited to "renewable" fuels.

Overview of Stormwater Management at Zenith Facility

The majority of the 31.3 acre property is occupied by tanks farms, pipe and loading racks and active operational areas interspersed with paved and graveled areas. Precipitation falling in this area either directly infiltrates the soil or is collected and discharged to the City of Portland's stormwater system under an NPDES permit. A smaller portion is pretreated and diverted to the City of Portland's sanitary sewer. The Apex report indicates all the stormwater generated in the currently developed portion of the facility will continue to be managed under existing NPDES and City of Portland permits and will not discharge to the infiltration basins.

To manage stormwater in the 13.6 acre RFDF, Zenith proposes to: 1) collect runoff from the 3.7 acre tank farm area (TFA) and batch discharge it to the City's stormwater system (the current practice); 2) construct infiltration basins and swales to dispose of stormwater falling on the 0.5

acre canopy and to manage infrequent overland flow from the 9.4 acres of exposed rail area; and 3) pump-out incidental stormwater draining to the containment structure, pretreat it, and discharge it to the City's sanitary sewer. The separate stormwater management areas of the RFDF are depicted in Figures 4, 5 and 6.

With respect to surrounding land uses, the new railyard expands the existing railyard lying immediately west (Figure 2) of the Zenith facility.

Importantly from a hydraulic loading perspective, no sources of stormwater outside the RFDF will be directed to the new infiltration facilities, thus, average groundwater recharge rates below the RFDF are effectively unchanged from current conditions.

Groundwater Protection

The disposal of stormwater runoff through infiltration facilities is an acceptable practice provided it does not adversely impact groundwater or its highest beneficial uses. DEQ requested Zenith evaluate the potential for the infiltration system to adversely impact groundwater quality and/or exacerbate existing plumes of contamination based on the following information:

- The Zenith facility has operated as a petroleum refinery and bulk storage facility since 1947 and historical information on past activities and hazardous substance releases may not be complete;
- Petroleum releases at the facility as documented in ECSI File #1281, including a naptha spill in 2011, have impacted groundwater;
- The site is 600 ft. away from the Willamette River and within the boundaries of the Portland Harbor Superfund site.
- Other hazardous substance cleanup projects within the Portland Harbor are located in the vicinity of the proposed infiltration facility.

In an August 17, 2020 e-mail to Apex Consulting, DEQ identified state regulations protecting groundwater quality applicable to infiltration systems. The email also provided the objectives and recommended content for a report addressing the Agency's concerns.

Apex Groundwater Protection Report

In September 10, 2020, Apex submitted a Groundwater Protection Report (Report) on behalf of Zenith Energy. Consistent with DEQ direction, the objectives of the report can be summarized by the following:

1. *Evaluate the potential for stormwater infiltration to pollute groundwater or impair its beneficial uses*.[1]

[1] Groundwater Protection Rules – OAR 340-40. Particularly relevant are 340-040-0010 (1)(5)(9)(10); -040-020-(1)(2)(3); -040-030(1).

2. *Evaluate the potential for stormwater infiltration to exacerbate groundwater contamination on adjacent and hydraulically downgradient properties* [2]

Information in the Apex Report Supporting the First Objective

The potential for infiltration facilities to impact groundwater quality is primarily a function of the chemistry and dissolved-phased contaminant load of the infiltrated water, and the rates of contaminant attenuation in the underlying vadose zone. For the Zenith facility, the potential for leaching of contamination from undocumented hazardous substance releases was also considered.

Influent Storm Water Quality

The Apex Groundwater Protection report indicates data presented in Tables 2 and 3 "*are expected to be representative of future stormwater concentrations that will enter the proposed infiltration basin*." The 2019 stormwater sampling detected several PAHs including benzo(a)pyrene, which was measured at levels approximately equivalent to its Maximum Contaminant Level of 0.002 ug/L. Stormwater sampling data from 2020, reflect upgrades to the stormwater management system. Storm water quality currently meets MCLs and other relevant screening values for PAHs.

TPH analytical data was limited to "oil and grease" analyses. Nothing was detected in the samples at the Method Reporting Limit (MRL) of 4.76 mg/L. This MRL exceeds the most conservative DEQ human health Risked Based Concentration of 0.080 mg/L by a factor of 50. The stormwater quality, with respect to TPH, is not well defined.

Other regulated contaminants including trace levels of total cyanide (6 ppb) and dissolved lead (1.3 ppb) were detected in 2019 stormwater samples, well below their respective MCL and action level. These contaminants were not detected during the 2020 sampling events.

Revision to Stormwater Quality Information

In a December 16, 2020 email, Apex revised their characterization of stormwater quality indicating: "…….*we have no reason to anticipate that Facility operations will impact stormwater reporting to the infiltration areas*."

The revised description indicates infiltrating stormwater will be of higher quality than that reported in the September 2020 report. This is based on a clarification that the primary source of infiltrating stormwater is from a large canopy over the rail loading area that is not anticipated to be affected by facility operations. In contrast, the data provided in the report represents industrial stormwater runoff from a different area of the facility. In a subsequent discussion,

[2] ORS 465.255 – Strict Liability for remedial action costs for injury or destruction of natural resources. Particularly relevant: 465.255 (1)(d).

Apex clarified that the stormwater represented by that data will continue to be managed under an NPDES permit and will not be discharged to the basins.

Overland Flow to Basins

Design plans included in the Groundwater Protection report also indicate overland flow of stormwater from the new rail spurs will discharge to the basins, however, the volume and frequency of the flow is anticipated to be low (See attached Table 1). The quality of this stormwater was not discussed or characterized in the report (i.e. composition of stormwater running off a railyard associated with a petroleum distribution facility).

Separation Distance between the Bottom of the Basin and the Water Table

Contaminant attenuation improves with increasing vertical separation between the point of infiltration and underlying groundwater. Groundwater elevation measurements from onsite wells indicate the minimum separation between the bottom of the proposed basin and groundwater was 6.8 ft. and averaged 9.3 ft. Boring logs indicate the soils are composed of sands (fill) with minor amounts of silt. The soil texture and thickness is both conducive to stormwater infiltration and treatment. Previous work by the City of Portland concluded 5 ft. of separation ensured adequate treatment of storm water runoff from streets and public rights-of-way[3]. This suggests that stormwater of equivalent or better quality or better should be adequately treated in the vadose zone prior to reaching the water table.

Historical Use of Proposed Infiltration Area

The area proposed for infiltration was used for shipyard worker housing in the 1940s and was later removed. Since the removal of the housing it has been used intermittently for equipment storage. There is no history of petroleum or hazardous substance storage, use, or releases in this area of the facility.

Onsite Soil and Groundwater Data

Figure 2 and Figure 5 of the Groundwater Protection report indicate known historical releases are approximately 1,000 -1,500 ft. cross-gradient from the proposed infiltration area and the nearest detections of petroleum contamination in groundwater are greater than 600 ft. cross-upgradient to the infiltration area.

No soil data has been collected within the footprint of the proposed infiltration facility, however, two shallow groundwater monitoring wells, U-North and U-South, are located along the presumed downgradient boundary of the infiltration area. The wells were sampled in July 2020 and the only detection was the PAH anthracene, at a concentration of 0.05 ug/L. Total Petroleum Hydrocarbons (TPH) were not detected[4] and metals concentrations appeared to be within the

[3] City of Portland UIC Protectiveness Demonstration, GSI

[4] (Method Reporting Limits were below the DEQ Risk Based Concentration of 100 ug/L)

range of natural background. Based on the data, there is no indication or evidence of a significant

Information in the Apex Report Supporting the Second Objective

The second objective was evaluated by determining the direction and magnitude of the shallow groundwater gradient and identifying ECSI sites that are either downgradient or in close proximity and crossgradient (and potentially within the hydraulic influence) of the infiltration system.

Monitoring data indicate groundwater flows to the north-northeast under current conditions and intersecting the Willamette River approximately 1200-2400 ft. downgradient.

- Based on Figure 6 and a north-northeastern flow direction, the Great Western Chemical (LUST # 26-89-0173), Tube Forgings/Front LP (ECSI # 1239), and Hampton Lumber (ECSI #5761) sites are presumed to be hydraulically downgradient from the proposed infiltration area. No significant plumes of groundwater contamination have been identified on these sites.

- Groundwater plumes on the western portion of the Zenith facility ECSI site# 1291 are located 800-1200 ft. up-cross gradient of the infiltration area. The most significant impacts appear to be in the vicinity of Tanks T-113 and T-114 where LNAPL has been observed in a limited, localized area.

- Another cleanup site, Kittridge Distribution, is located immediately east and cross-gradient of the infiltration areas. It is sufficiently close to the infiltration area that the gradient and flow direction of groundwater on the Kittridge site could be affected. However, previous investigations concluded no significant groundwater contamination is present on the Kittridge site and DEQ issued a No Further Action determination in 2007.

<u>Important Clarification Regarding Infiltration Rates and Volumes</u>

The stormwater management plan indicates no stormwater from outside the RFDF will be discharged to the infiltration facilities. This is significant since there will be no increase in the hydraulic loading and groundwater recharge rates (on average) beyond the current rates of natural recharge. Thus, no significant change in the groundwater flow field (e.g. mounding, increased flow rates) is anticipated.

Primary Apex Finding

> Based on our review of available information pertaining to the Site and vicinity history, local geology and hydrogeology, and project design as described above, the proposed operations within the Renewable Fuels Project Area will not result in pollution of groundwater or impairment of its highest potential use. The project will not contribute contamination to stormwater or groundwater, and the proposed infiltration facility is designed to operate without adversely affecting Site and vicinity groundwater quality. In addition, the proposed project will not exacerbate the limited existing contamination on-site (to the west) or on adjacent and nearby sites.

My Conclusions

- Contaminant loading from stormwater infiltration appears low. Runoff calculations indicate the primary source of stormwater discharging to the basins is roof runoff from the canopy over the rail loading area. The quality of this water is expected to be high and relatively unaffected by facility operations.

- The most significant change to the property is the construction of 10 spur rail lines supporting the petroleum distribution facility. These lines will occupy the majority of the undeveloped portion of the property. The impact this development may have on underlying groundwater quality is unknown to me, however, it should be noted this is the current land use immediately west of the Zenith facility.

- There is sufficient separation between the base of the infiltration basin and the water table to achieve adequate treatment of stormwater runoff typical of public ROWs.

- Stormwater from outside the footprint of the RFDF will not be discharged to the infiltration basins, therefore recharge and mounding of groundwater and significant changes to the direction and magnitude of groundwater flow, are not expected due to infiltration activities.

- The nearest documented groundwater contamination is in the northwest portion of the Zenith facility, 800-1200 ft. from the proposed infiltration area. Based on the separation distance and its orientation relative to the infiltration basins, I do not expect plumes of contamination to be affected by the proposed infiltration activities.

- Based on the September 10, 2020 report and additional information on nearby cleanup sites, I concur with Apex that the proposed infiltration of storm water at the Zenith Energy facility is unlikely to impact groundwater quality or exacerbate existing conditions at neighboring cleanup sites. Therefore, from a groundwater protection standpoint, it appears to be an acceptable method of storm water management.

Recommendations

- Retain monitoring wells U-North and U-South for future sampling should conditions change or a hazardous substance spill occurs within the RDFD.

- Notify the DEQ Cleanup Program of reportable hazardous substance spills entering the basins or swale.
- Provide a copy of this memo to DEQ Water Quality.

If new information becomes available or future hazardous substance releases occur at the facility, this conclusion will need to be revisited.

References

Apex Environmental, *Stormwater Management Report, Zenith Energy,* July 2, 2020

Apex Environmental, *Groundwater Protection Report, Zenith Energy,* September 10, 2020

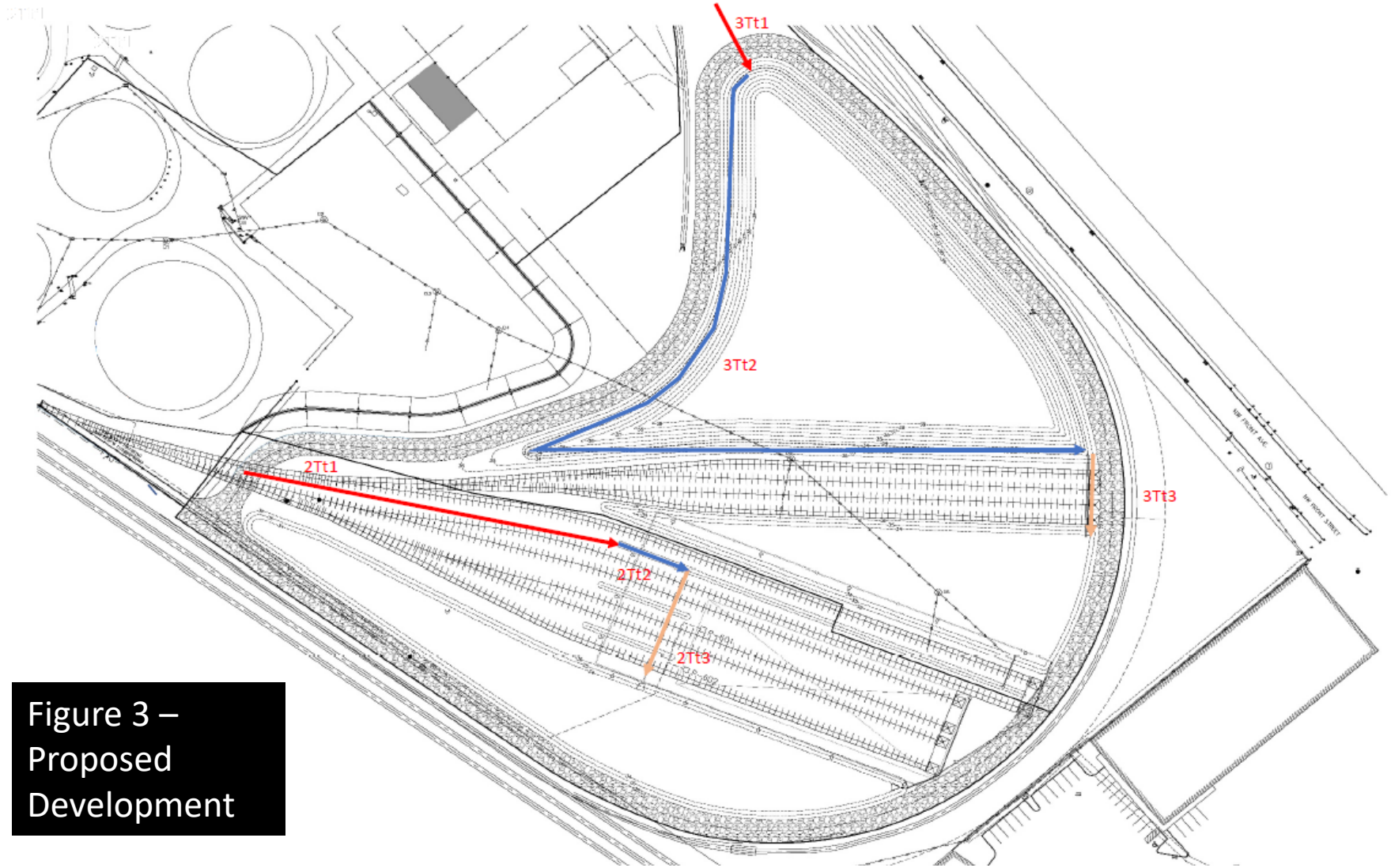
Apex Environmental, email from Sam Jackson, December 16, 2020

Figure 1 – Zenith Energy Facility

Figure 2 – area proposed for development

Portland, OR 97210

Figure A-2, Drainage Areas for SSIB and NSIB



TFA Area	3.73 Acre
1Tt1=	300 ft
2Tt1=	160 ft
SSIB Area	3.64 Acre
2Tt1=	250 ft
2Tt2=	50 ft
2Tt3=	120 ft
NSIB Area	6.23 Acre
3Tt1=	100 ft
3Tt2=	875 ft
3Tt3=	85 ft

Overland Flow
Storm Pipe Flow
Swale Flow
or Shallow Concentrated Flow

Figure 3 – Proposed Development

Figure 4- Stormwater Management Areas

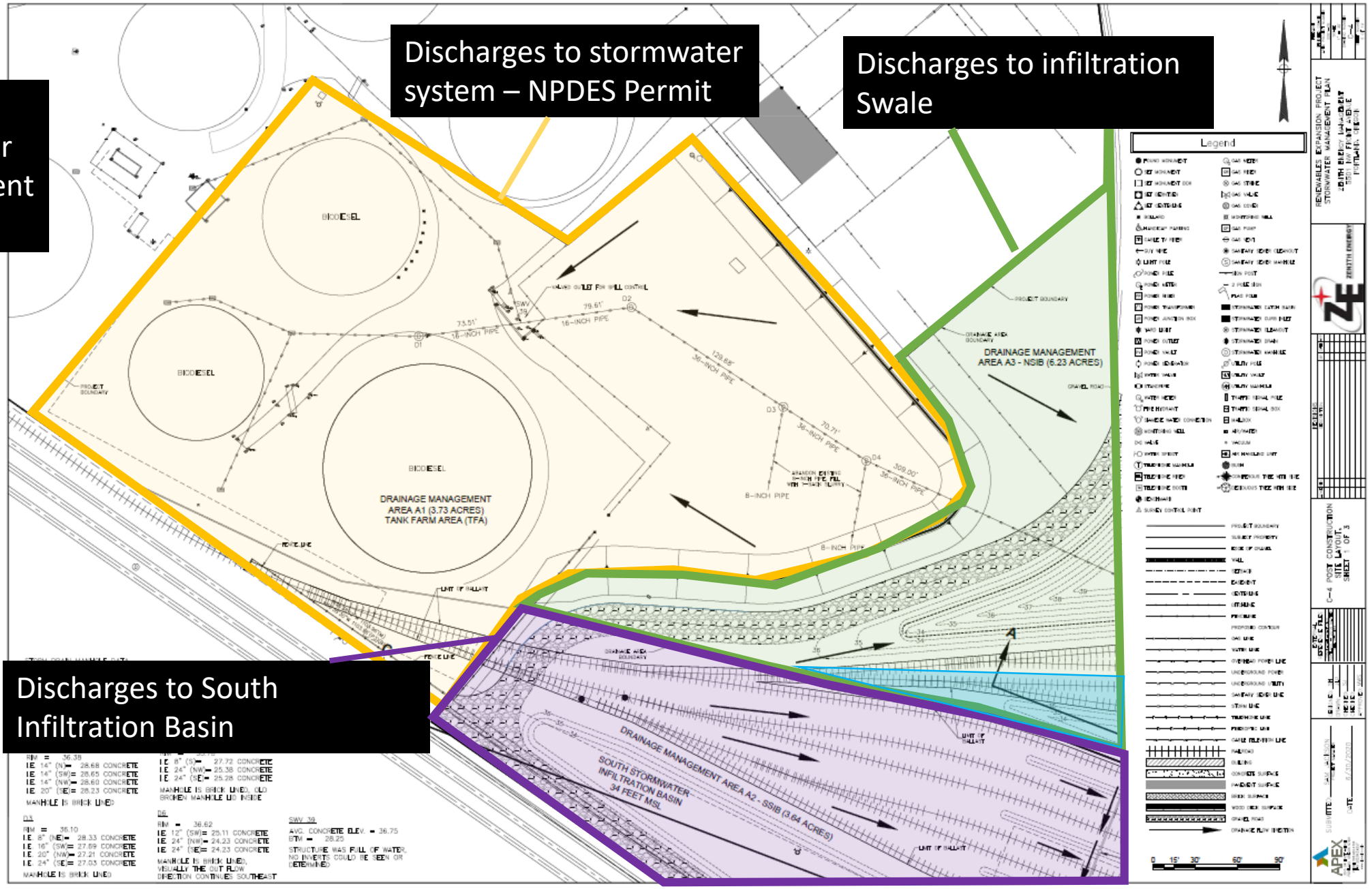
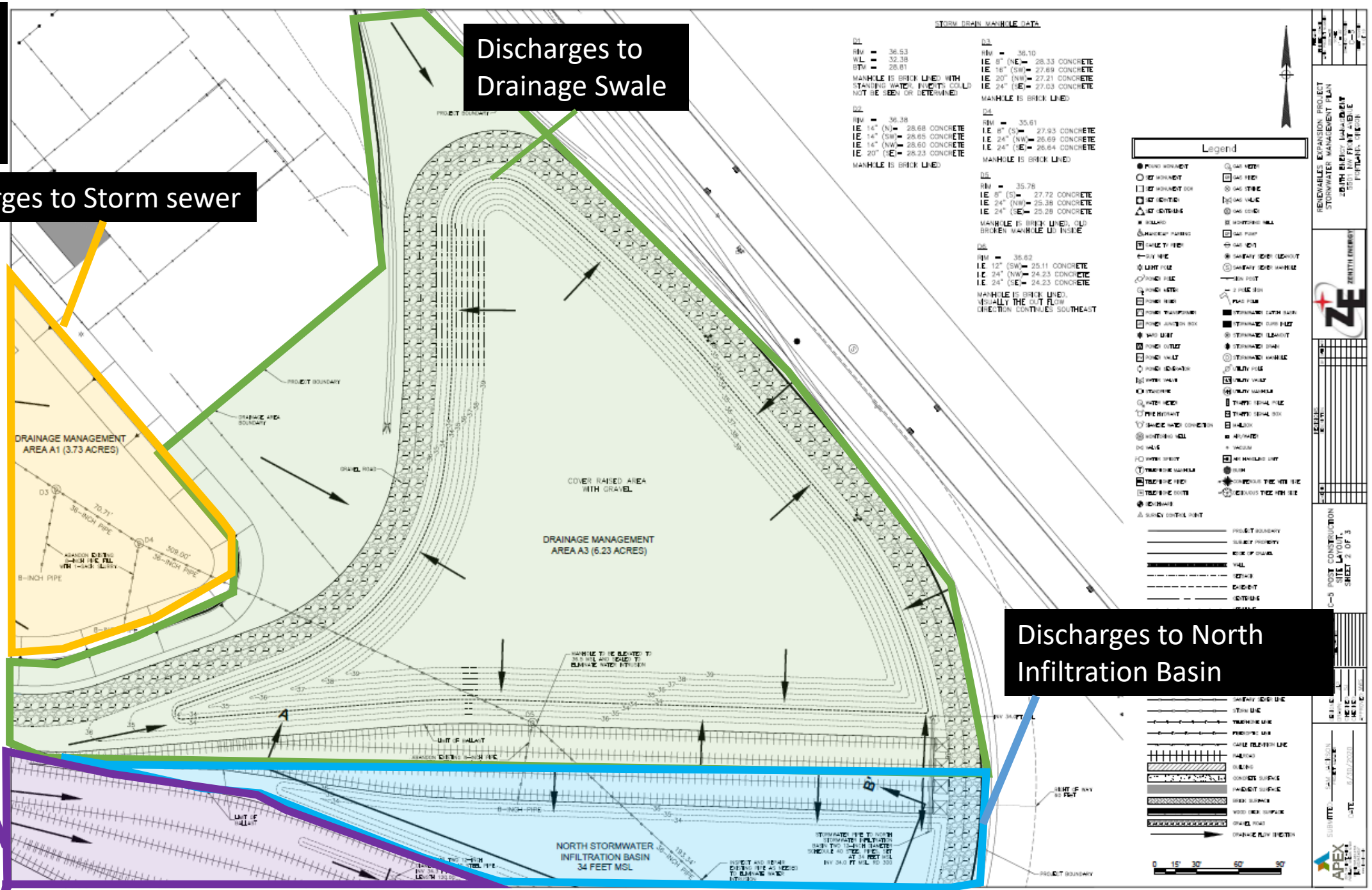


Figure 5 - Stormwater Management Areas



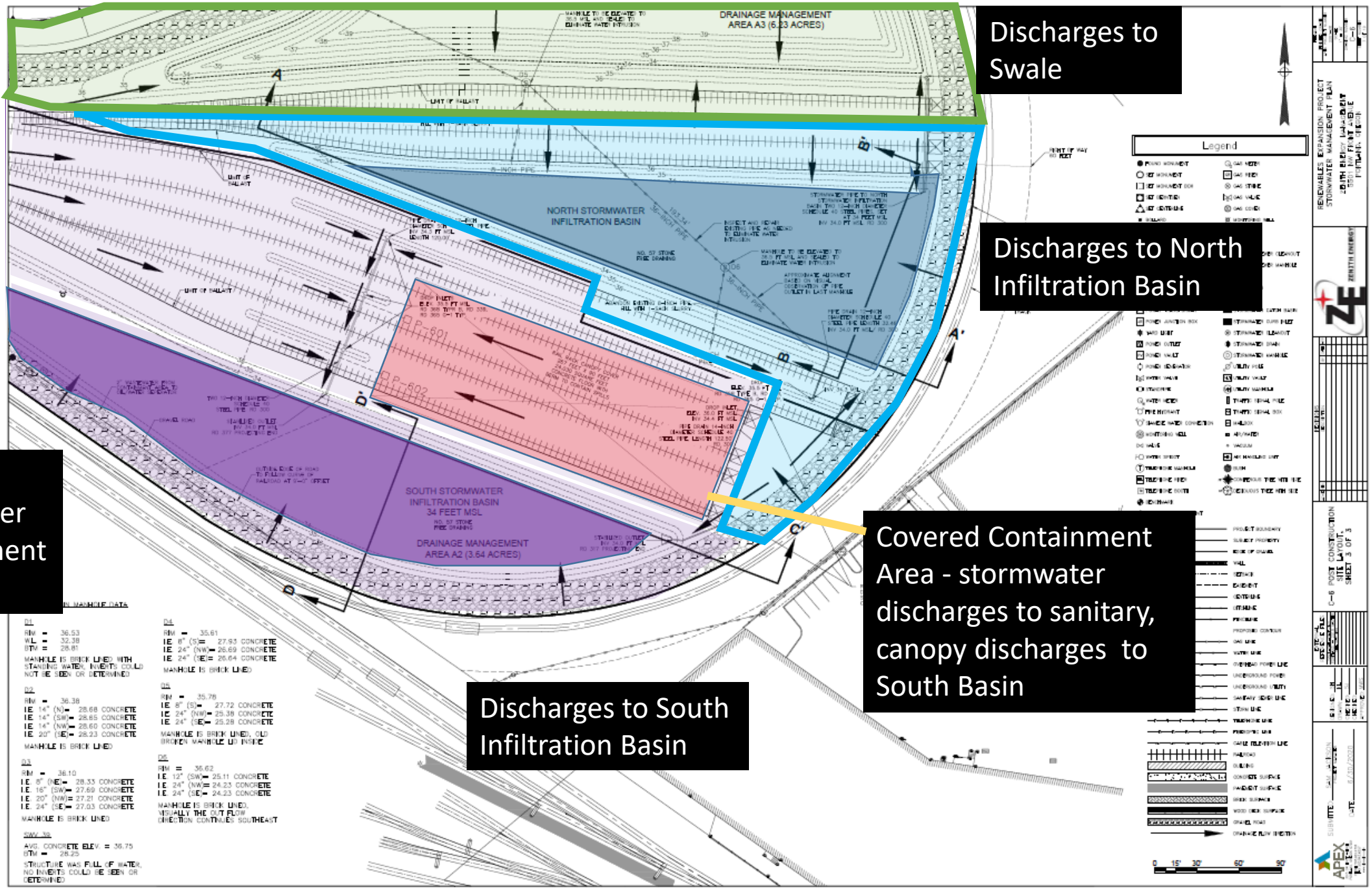


Figure 6 - Stormwater Management Areas

Post-development Summary Table		
Reoccurence Interval (Years)	24-Hour Rainfall Depth (Inches)	Total Run off Q (cfs)
2	2.4	2.5
5	2.9	3.4
10	3.4	4.2
25	3.9	5.3
100	4.4	6.8

Storm water flow summary	2 YR, 24 HR				
	Drainage	Run-off	Time of Conc. Tc	Runoff Depth	Run-off Q
Area	Area (acres)	Coefficient	(minutes)	(inches)	(CFS)
A1. TFA	3.70	98	9.25	2.17	2.2
A2. SSIB	3.64	76	10.35	0.63	0.1
A3. NSIB	6.23	76	18.98	0.63	0.2
				Total	2.5

Storm water flow summary	5 YR, 24 HR				
	Drainage	Run-off	Time of Conc. Tc	Runoff Depth	Run-off Q
Area	Area (acres)	Coefficient	(minutes)	(inches)	(CFS)
A1. TFA	3.70	98	8.62	2.67	2.7
A2. SSIB	3.64	76	9.73	0.95	0.3
A3. NSIB	6.23	76	18.81	0.95	0.4
				Total	3.4

Table 1 – Estimated flow rates