

TO

Mark Borenstein, PE | Corridor Program Office

FROM

Travis Kaatz, PE, CFM | EDGE Engineering

CC

Arnold Ashburn, PE | AECOM

DATE

April 13, 2023

SUBJECT

Slaughter Lane Segment C2 Pond/Rain Garden U01 Placement Summary

This document is for interim review
and not for construction, bidding or
permit purposes.

Engineer: Travis Kaatz, PE

TBPE No. 124859

Date: April 13, 2023

TECHNICAL MEMORANDUM

PURPOSE

The purpose of this technical memorandum (memo) is to summarize the history of Pond/Rain Garden U01, outline why the pond location was chosen, and detail the design restrictions. The design team analyzed over 16 different treatment options and numerous combinations to design a water quality (WQ) plan for Slaughter Lane Segment C2 (SLGT-C2) that meets both the Barton Springs Save Our Spring (SOS) requirements, TCEQ water quality requirements, and the City Drainage and Environmental Criteria. The designed WQ controls including Pond/Rain Garden U01 were the only solution that met all the projects WQ and environmental requirements and Watershed Protection Department (WPD) Staff's requests.

HISTORY

The WPD Staff shared the "Urban Sinkhole Evaluation and Mitigation Preliminary Engineering Report" dated January 31, 2020 with the SLGT-C2 design team during initial WQ meetings in February 2020. The PER identified four potential WQ pond locations along SLGT-C2 just west of Brodie Lane that would treat existing untreated runoff from SLGT-C2 before entering the Brodie Wild Tract which contains the Brodie Cave, see Attachment A. EDGE Engineering (EDGE) evaluated the four PER pond locations along with other combinations of water quality treatment. In a meeting on May 6, 2020 with the SLGT-C2 design team, the Capital Program Office (CPO), and WPD Staff it was determined that Pond/Raingarden U01 and Pond W, which were two of the four ponds analyzed, were the most feasible and beneficial to be incorporated into the SLGT-C2 Project. Meeting minutes are provided in Attachment B.

POND U01 PLACEMENT

Six critical elements determined the location of Pond/Rain Garden U01.

1. Minimize impacts to the floodplain as much as feasible while also meeting all the project WQ and environmental requirements.
2. Providing treatment for untreated runoff from SLGT-C2 to the Brodie Wild Tract at the request of WPD Staff. It was determined that WQ ponds needed to be placed on either side of Culvert V which is located near the sag of SLGT-C2. Storm drain ponding calculations showed runoff needed to be captured west of Culvert V. This runoff cannot be conveyed east across Culvert V and therefore must be treated in a pond to the west of the Culvert.
3. Throughout meetings over the three-year history of the project, WPD Staff expressed desires to minimize excavation in the karst areas surrounding the SLGT-C2 corridor. Pond/Rain Garden U01 was designed to closely match the natural contours in its placement area to minimize excavation and avoid disturbance of the karst area.
4. Retaining walls were avoided to limited footing excavation and keep the pond design as natural as possible. Additionally, the abrupt vertical elements of retaining walls would be more likely to cause localized erosion and undermining as well as limit maintenance access around and into the rain garden.
5. Pond/Rain Garden U01 was placed to avoid protected heritage trees just west of the proposed location. These trees can be seen at the edge of the Pond U01 Pond Layout in Attachment C.

6. The placement of Pond/Rain Garden U01 was also very much controlled by storm drain ponding criteria. Pond/Rain Garden U01 received storm water runoff from Inlet U-00. Flow bypass inlet U-00 continues east to the sag inlet east of Culvert V that drains into Pond W. The placement of Inlet U-00 was optimized to meet ponding criteria approaching the sag as well as capturing as much runoff as possible to meet ponding criteria at the sag. Additionally, due to the limited space available for Pond/Rain Garden U01 and Pond W, capture volume and drainage area to each pond had to be balanced in order to optimize WQ treatment. This meant placing Pond/Rain Garden U01 as far east as possible.

ATTACHMENTS:

- Attachment A: Pages from the Urban Sinkhole Evaluation and Mitigation PER
- Attachment B: Meeting Minutes from May 6, 2020 with CPO and WPD Staff
- Attachment C: Pond U01 Pond Layout

ATTACHMENT A: PAGES FROM THE URBAN SINKHOLE EVALUATION AND
MITIGATION PER



City of Austin
Watershed Protection Department

Urban Sinkhole Evaluation and Mitigation Preliminary Engineering Report



Prepared by

Geosyntec 
consultants

PRELIMINARY / DRAFT
FOR INTERIM REVIEW ONLY
NOT FOR BIDDING, CONSTRUCTION,
OR PERMIT PURPOSES
MARTIN C. CHRISTMAN
P.E. TEXAS NO. 94737

In Association With
Glenrose Engineering, Inc.,
Michael Barrett, Ph.D, P.E., and
MWM DesignGroup, Inc.

31 January 2020

CIP Subproject # 6660.075

into the existing berm. The design also includes minor grading in the vicinity of the proposed notch to promote drainage.

The primary design objective for this option is to restore recharge to the karst feature. The design would allow treated stormwater from the adjacent Sendera 15B Wet Pond to enter the sinkhole. The existing wet well that is designed to pump water from the area would remain, but it would only be needed when the infiltration capacity of the sinkhole is exceeded.

4.1.8 Brodie Cave Biofilters

The proposed design option for Brodie Cave is shown on Drawing 8. The proposed design consists of four separate biofilters. Biofilter A and Biofilter B are located on the north side of Slaughter Lane within an existing drainage easement on property owned by Austin Independent School District. Biofilters C and D are located on the south side of Slaughter Lane on City of Austin water quality protection land (Brodie Wild). Each of the biofilters is sized with a water quality volume of 400 cubic feet. The proposed biofilters include limestone block borders and are lined with geomembrane. Treated stormwater is discharged via an underdrain with a raised outlet. The proposed outlet pipes include ball valves that can be manually closed in the event of a spill.

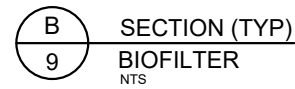
The primary design objective for the biofilters is to intercept and confine potential hazardous material spill on Slaughter Lane. The existing storm drain system routes untreated roadway runoff from approximately 2.3 acres directly into the Slaughter Creek tributary channel, which includes Brodie Cave and another karst feature in the Brodie Wild tract. The biofilter designs would also capture and treat runoff from smaller storms.






Biofilters A and B would receive runoff from the westbound lanes of Slaughter Lane via existing curb inlets. The back walls of the curb inlets would require retrofitting to include orifices to convey stormwater to the biofilters. The biofilters would include sedimentation chambers and splitters and would be designed to overflow to the adjacent stream channel.

Biofilters C and D would receive runoff from the eastbound lanes of Slaughter Lane via proposed curb cuts. The biofilters are designed with level spreaders to discharge sheet flow to down-gradient areas to the benefit of existing vegetation. The curb cuts will be sized to limit erosive flows. Excessive flows will bypass the curb cuts.

4.1.9 Kentucky Sinkhole Biofilter

The proposed design for the Kentucky Sinkhole biofilter is shown on Drawing 9. The biofilter is located on the east side of Brodie Lane within an existing drainage easement on property owned by the Brodie Springs Home Owners Association. The biofilter is sized with a water quality volume of 1,180 cubic feet. The proposed biofilter includes a limestone block border and is lined



- | LEGEND | |
|---|--|
|  | EXISTING GROUND ELEVATION
CONTOUR (FT, MSL)(NOTE 1) |
|  | EXISTING BUILDING |
|  | EXISTING ROAD |
|  | EXISTING STORMSEWER / DRAINAGE PIPE |
|  | MITIGATION MEASURE DRAINAGE AREA |

FOR INTERIM REVIEW
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MARTIN C. CHRISTMAN,
P.E. TEXAS NO.
94737



BRODIE CAVE
BIOFILTER



TX ENG. FIRM REGISTRATION NO. 1182

JANUARY 2020

DRAWING

8

PRELIMINARY ENGINEERING DRAWING
NOT FOR BID OR CONSTRUCTION

ATTACHMENT B: MEETING MINUTES FROM MAY 6, 2020 WITH CPO AND WPD
STAFF

WHEN

May 6, 2020

WHO

Greg Weems (CPO), Lee Sherman (WPD), Randy Harvey (CPO), Erich Schroeder (WPD), Charles Kaough (CPD), Arnold Ashburn (AECOM), Chad Cormack (EDGE), Leigh Ruhnau (EDGE)

WHERE

Microsoft Teams Meeting

WHAT

SLGT Slaughter Lane Corridor C2 WQ Concepts

MEETING MINUTES

DISCUSSION TOPIC

1. Chad introduced the meeting objective to determine a path forward for the water quality design of the Slaughter Lane Segment C2.
2. Chad described that efforts to date have resulted in some roadblocks. So, EDGE reviewed the entire corridor again and tried to identify all potential solutions for water quality treatment including new ponds within new ROW, existing ponds maintained by WPD, existing ponds maintained by private HOA or developments, and ponds outside of the project area.
 - a. This resulted in approximately 16 different treatments options that can be combined to meet the treatment requirements of the corridor.
3. Chad noted that there are three regulatory entities that must be satisfied with the water quality solution for the project to move forward:
 - a. The City of Austin: Including WPD and DSD
 - Must meet requirements outlined in the SOS Ordinance
 - b. The TCEQ
 - Must remove 80% of the incremental increase in annual TSS loading
 - c. USFWS
 - Will need to show through either of the two calculations above that the project will not result in an impact to endangered species (i.e. Barton Springs Salamander)
 - d. It was noted that each entity has its own lens and that a solution that satisfies one may not satisfy the other.
4. Chad described each of the 16 different treatments options with a focus on the three large Sendera ponds:
 - a. Pond O: Sendera South Wetpond
 - EDGE came up with three options for improvements to Pond O:

- Infiltration Rain Garden within Pond O – In previous meetings this was a front-runner due to the small footprint and lack of ROW or easement required. However, the last meeting with BCCP and TxDOT staff indicated that the entirety of Pond O was located on a sinkhole and digging on the sinkhole any further would be of concern to TCEQ. For this reason, this option was not recommended for further investigation. The group agreed.
- Irrigate approximately 1.8 ac near Pond O – This option would irrigate Pond O on the adjacent AISD property. This mitigates the environmental concern with the sinkhole and provides substantial treatment for the project (about 60% of Zinc). This is the recommended option for Pond O. The group agreed.
- Fully irrigate Pond O – This option would require additional easement from AISD of approximately 6.8 ac. The additional treatment provided through full irrigation is not enough to justify the additional easement cost. The group agreed.

b. Pond 15B:

- EDGE is exploring the option of infiltrating Pond 15B by intercepting the existing pumped discharge, providing a level spreader and infiltrating in the Karst Preserve.
- Chad described that many previous discussions of this pond have led us to believe it may not be a feasible option due to an existing level spreader, the existing sinkhole and a diverse set of interests surrounding this area.
 - However, EDGE still thinks this is a good idea for the project because it is inexpensive and achieves approximately 31% of the zinc removal for the project.
 - Challenges include getting a waiver from the infiltration testing requirements on the Karst Preserve, existing level spreader, pump condition, and the interests of other divisions of WPD to enhance recharge to the existing sink hole.
 - The group all agreed that this idea was still worth pursuing.
 - Lee noted that the concept shows an improvement in water quality and that the existing gabion does not have a water quality benefit today. He stated his willingness to help discuss with DSD.
 - Charles suggested that the project could also propose to improve the level spreader along the entire parcel line as there is no evidence that it is functioning as intended today.
 - Charles stated the need to understand the contents of the PER surrounding the sinkhole and that he would help coordinate with Lindsey.

c. Pond 11B:

- EDGE described a new concept to provide infiltration for Sendera Pond 11B north of Davis Lane.
- One of the project outfalls discharges to a storm drain system that conveys runoff to Pond 11B.
- The existing pond is a large sedimentation filtration pond that discharges into a large detention pond. The concept would be to dig down in the detention pond to provide an infiltration rain garden where the sedimentation filtration pond would outfall.
- Some concerns with the concept was the cost for that large of a rain garden facility, approval from the Sendera HOA (noted that local residents use the pond as a “dog park”), difficulty in excavating in limestone since this is already a large excavation, potential to unearth features when excavating a large area in the limestone.
- Lee suggested irrigation instead of rain garden and potential to get a waiver.
- The pond does have potential to provide significant water quality benefit to the project up to about 70% of the zinc removal.
- The pond also provides a potential benefit being in the Williamson Creek watershed while all other facilities are within the Slaughter Creek watershed.

- d. Chad suggested continuing to pursue all the large ponds (Pond O, Pond 15B and Pond 11B). That way if the project hits a roadblock with one, the other two are still options to achieve treatment.
5. Chad walked through the remaining pond options that included:
 - a. Retrofit of existing ponds Q-R and S-T adjacent to the AISD practice fields: EDGE explored full infiltration of both facilities or doubling the size of both facilities.
 - b. Pond M02 + Infiltration: New Pond on the Continental Homes property – does not provide much benefit, challenging to get enough runoff to that location.
 - c. Pond U01 + Infiltration: New Pond on AISD property north of Slaughter and east of Pond S-T. Provides benefit – treats previously untreated runoff.
 - d. Pond W + Infiltration: New Pond on AISD property north of Slaughter and west of Brodie. Provides benefit – treats previously untreated runoff.
 - e. Pond X + Infiltration: New Pond on Brodie Wild tract – treats Brodie south of Slaughter. Very little benefit. Challenging with the Brodie Wild tract.
 - f. Pond Y + Infiltration: New Pond north of Slaughter and east of Brodie – Provides benefit – treats previously untreated runoff. A little outside of the project C2 limits and requires new ROW or easement.
 - g. Pond O-Q + Infiltration: New Pond roughly in the middle of the project. North of Slaughter opposite of Pond O. Provides benefit but requires new ROW or easement.
6. Chad then walked through various options to achieve treatment based on the fewest number of facilities, fewest required property owner coordination meetings and options mostly likely to satisfy all (COA, TCEQ and USFWS).
 - a. If feasible: Option C includes Pond 15B, Pond O, and Pond Q-R retrofit with infiltration. This option requires only easement from AISD, and retrofit of existing facilities maintained by WPD. This is likely to be the most cost-effective option if the project can get buy off from each entity. This option would likely then include biofilters from the PER on the Brodie Wild site.
 - b. Option J is the option that EDGE feels is most likely to satisfy all parties and includes improvements to Pond 11B, Pond O and two new ponds; Pond W and Pond U01. This option provides treatment in both named watersheds and would provide two new facilities that could be easily calculated to show removal rates in terms of both City and TCEQ regulations.
 - c. The group discussed the Brodie Wild PER. Randy asked Lee if WPD would prefer to do their own project.
 - Lee said that it would be cleaner to do the project as provided in the PER since this has been vetted through all the stakeholders. WPD would like to piggy back that project on to the corridor project and pay for it as long as the CPO doesn't need it for compliance.
7. The group agreed to continue to pursue Pond options for Pond 11B, Pond 15B, Pond O and all potential facilities located on AISD property to determine the best path forward
 - a. Randy noted that AISD has been amenable to the conversations thus far and Lee stated that watershed has a good relationship with AISD.

ACTION ITEMS

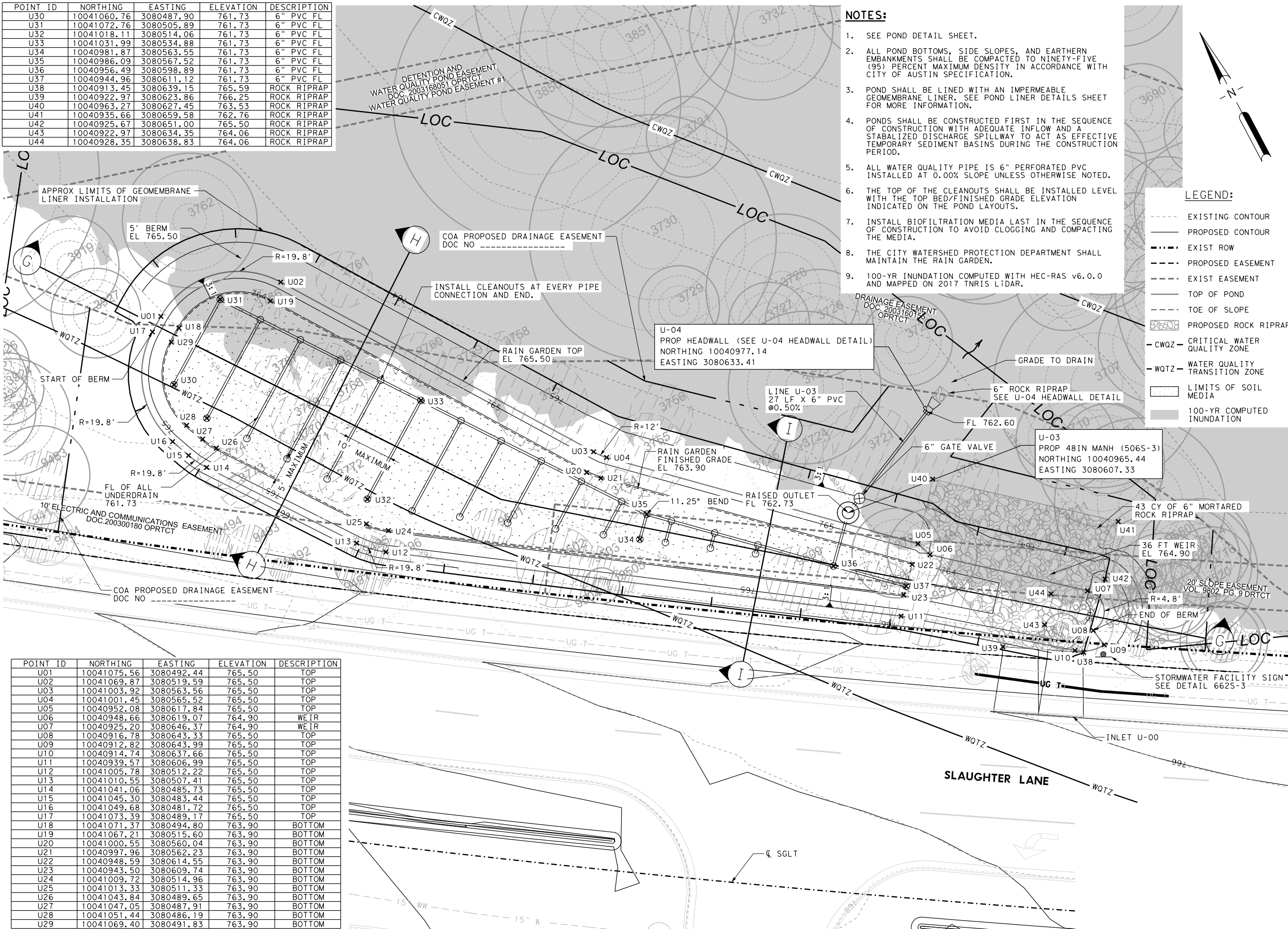
Responsible Party	Action Item
Charles Kaough	Coordinate with Lindsey to set up a meeting and get thoughts on 15B improvements.
EDGE	Create exhibits for CPO to use in coordination meetings with Sendera HOA and AISD
Greg Weems	Set up meetings with: Sendera HOA, AISD. For Pond 15B: DSD and Karst Preserve

ATTACHMENT C: POND U01 POND LAYOUT

POINT ID	NORTHING	EASTING	ELEVATION	DESCRIPTION
U30	10041060.76	3080487.90	761.73	6" PVC FL
U31	10041072.76	3080505.89	761.73	6" PVC FL
U32	10041018.11	3080514.06	761.73	6" PVC FL
U33	10041031.99	3080534.88	761.73	6" PVC FL
U34	10040981.87	3080563.55	761.73	6" PVC FL
U35	10040986.09	3080567.52	761.73	6" PVC FL
U36	10040956.49	3080598.89	761.73	6" PVC FL
U37	10040944.96	3080611.12	761.73	6" PVC FL
U38	10040913.45	3080639.15	765.59	ROCK RIPRAP
U39	10040922.97	3080623.86	766.25	ROCK RIPRAP
U40	10040963.27	3080627.45	763.53	ROCK RIPRAP
U41	10040935.66	3080659.58	762.76	ROCK RIPRAP
U42	10040925.67	3080651.00	765.50	ROCK RIPRAP
U43	10040922.97	3080634.35	764.06	ROCK RIPRAP
U44	10040928.35	3080638.83	764.06	ROCK RIPRAP

POINT ID	NORTHING	EASTING	ELEVATION	DESCRIPTION
U01	10041075.56	3080492.44	765.50	TOP
U02	10041069.87	3080519.59	765.50	TOP
U03	10041003.92	3080563.56	765.50	TOP
U04	10041001.45	3080565.52	765.50	TOP
U05	10040952.08	3080617.84	765.50	TOP
U06	10040948.66	3080619.07	764.90	WEIR
U07	10040925.20	3080646.37	764.90	WEIR
U08	10040916.78	3080643.33	765.50	TOP
U09	10040912.82	3080643.99	765.50	TOP
U10	10040914.74	3080637.66	765.50	TOP
U11	10040939.57	3080606.99	765.50	TOP
U12	10041005.78	3080512.22	765.50	TOP
U13	10041010.55	3080507.41	765.50	TOP
U14	10041041.06	3080485.73	765.50	TOP
U15	10041045.30	3080483.44	765.50	TOP
U16	10041049.68	3080481.72	765.50	TOP
U17	10041073.39	3080489.17	765.50	TOP
U18	10041071.37	3080494.80	763.90	BOTTOM
U19	10041067.21	3080515.60	763.90	BOTTOM
U20	10041000.55	3080560.04	763.90	BOTTOM
U21	10040997.96	3080562.23	763.90	BOTTOM
U22	10040948.59	3080614.55	763.90	BOTTOM
U23	10040943.50	3080609.74	763.90	BOTTOM
U24	10041009.72	3080514.96	763.90	BOTTOM
U25	10041013.33	3080511.33	763.90	BOTTOM
U26	10041043.84	3080489.65	763.90	BOTTOM
U27	10041047.05	3080487.91	763.90	BOTTOM
U28	10041051.44	3080486.19	763.90	BOTTOM
U29	10041069.40	3080491.83	763.90	BOTTOM

Slaughter Lane



NOTES:

- SEE POND DETAIL SHEET.
- ALL POND BOTTOMS, SIDE SLOPES, AND EARTHEN EMBANKMENTS SHALL BE COMPACTED TO NINETY-FIVE (95) PERCENT MAXIMUM DENSITY IN ACCORDANCE WITH CITY OF AUSTIN SPECIFICATION.
- POND SHALL BE LINED WITH AN IMPERMEABLE GEOMEMBRANE LINER. SEE POND LINER DETAILS SHEET FOR MORE INFORMATION.
- PONDS SHALL BE CONSTRUCTED FIRST IN THE SEQUENCE OF CONSTRUCTION WITH ADEQUATE INFLOW AND A STABILIZED DISCHARGE SPILLWAY TO ACT AS EFFECTIVE TEMPORARY SEDIMENT BASINS DURING THE CONSTRUCTION PERIOD.
- ALL WATER QUALITY PIPE IS 6" PERFORATED PVC INSTALLED AT 0.00% SLOPE UNLESS OTHERWISE NOTED.
- THE TOP OF THE CLEANOUTS SHALL BE INSTALLED LEVEL WITH THE TOP BED/FINISHED GRADE ELEVATION INDICATED ON THE POND LAYOUTS.
- INSTALL BIOFILTRATION MEDIA LAST IN THE SEQUENCE OF CONSTRUCTION TO AVOID CLOGGING AND COMPACTING THE MEDIA.
- THE CITY WATERSHED PROTECTION DEPARTMENT SHALL MAINTAIN THE RAIN GARDEN.
- 100-YR INUNDATION COMPUTED WITH HEC-RAS v6.0.0 AND MAPPED ON 2017 TNRIS LIDAR.

LEGEND:

- EXISTING CONTOUR
- PROPOSED CONTOUR
- EXIST ROW
- PROPOSED EASEMENT
- EXIST EASEMENT
- TOP OF POND
- TOE OF SLOPE
- PROPOSED ROCK RIPRAP
- CWQZ --- CRITICAL WATER QUALITY ZONE
- WQTZ --- WATER QUALITY TRANSITION ZONE
- LIMITS OF SOIL MEDIA
- 100-YR COMPUTED INUNDATION



SLAUGHTER LANE IMPROVEMENT PROJECT
LOOP 1 TO BRODIE LN (C2)
POND U01
POND LAYOUT
FULL FILTRATION RAIN GARDEN



CITY OF AUSTIN
CORRIDOR PROGRAM OFFICE



EDGE
ENGINEERING

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0' 10' 20'
SCALE IN FEET

SP-2022-0336D
1 OF 1