

Beeson Creek and Tributaries Stream Restoration Opportunities

Ivey M. Redmon Sports Complex **Kernersville, North Carolina**

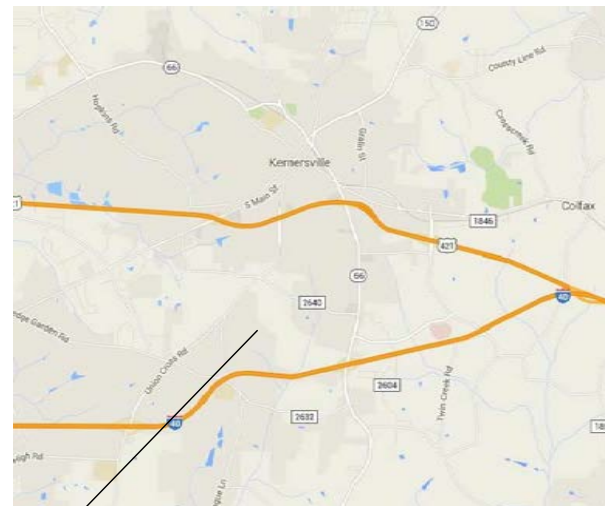
Sheet Index

Prepared for:

Town of Kernersville, North Carolina

Prepared by:

Jennings Environmental, LLC
1209 Blackburn Road
Apex, North Carolina 27502



Site

Site Coordinates:

Latitude 36.092293, Longitude -80.082053

1. Cover and Sheet Index
2. Site Overview
3. Existing Cross-sections
4. Reach 1 Conceptual Plan
5. Reach 2 Conceptual Plan
6. Reach 3 Conceptual Plan
7. Reach 4 Conceptual Plan (Option 1)
8. Reach 4 Conceptual Plan (Option 2)
9. Reach 5 Conceptual Plan (Option 1)
10. Reach 5 Conceptual Plan (Option 2)
11. Reach 6 Conceptual Plan
12. Reach 6 Conceptual Plan (Details)
13. Reach 7 Conceptual Plan
14. Potential Stormwater Control Measures
15. Typical Detail: Regenerative Stormwater Conveyance
16. Typical Detail: Longitudinal Profiles and Cross-sections



COVER AND SHEET INDEX

Designed By: GDJ

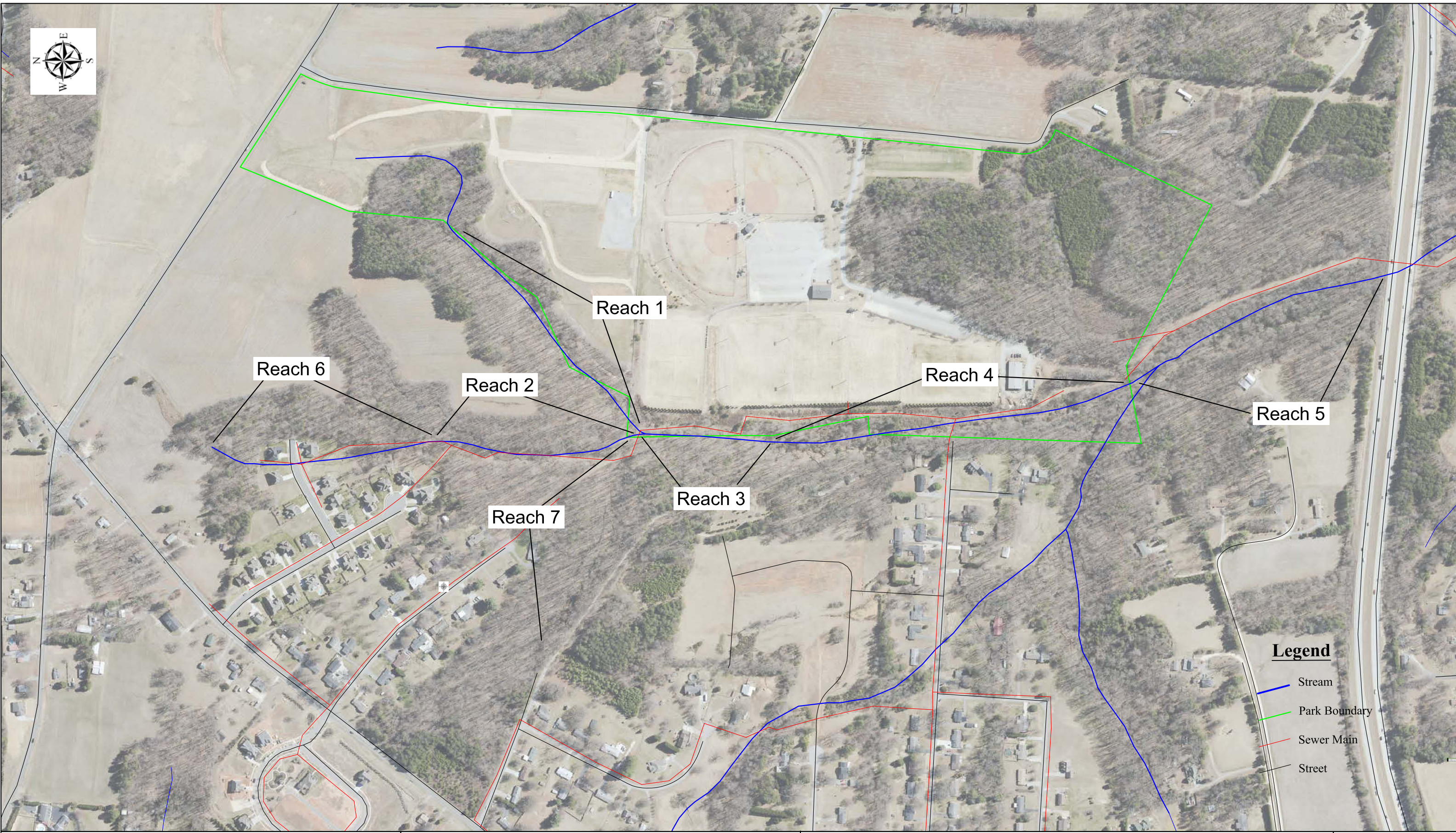
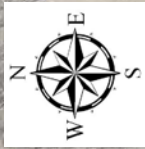
Date:
November 21, 2016

Scale:
NONE

Beeson Creek Stream Restoration Opportunities

Ivey M. Redmon Sports Complex
Kernersville, North Carolina

Sheet
1



Legend

-  Stream
-  Park Boundary
-  Sewer Main
-  Street



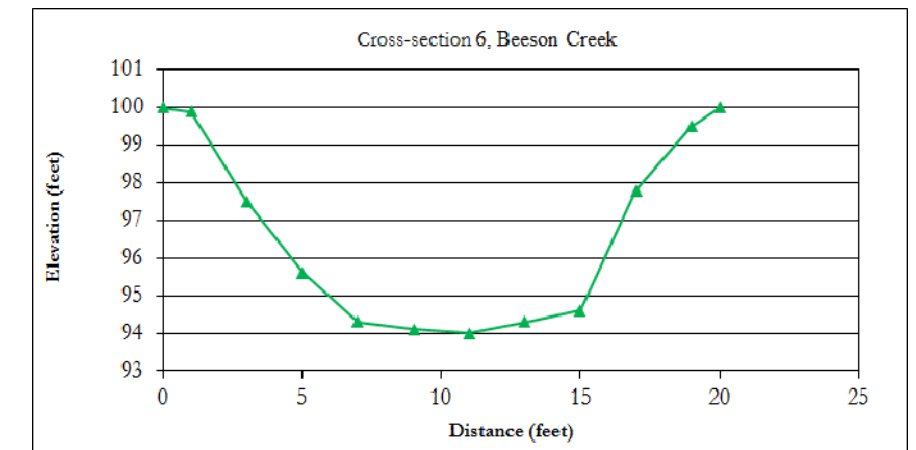
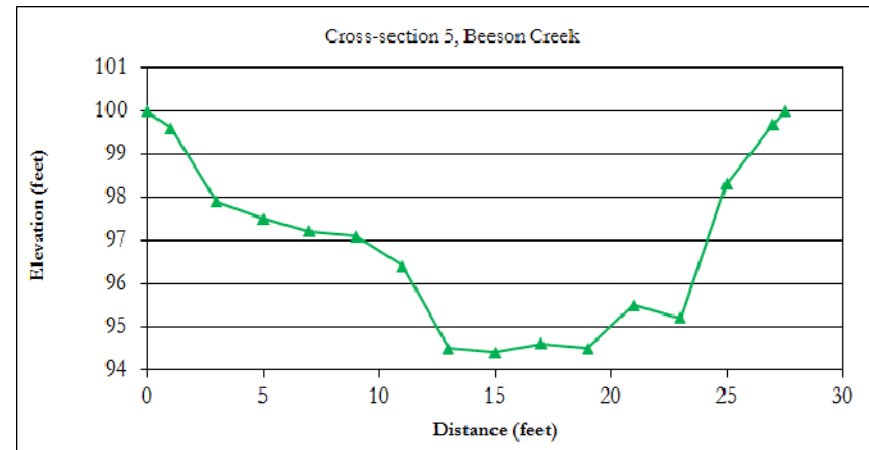
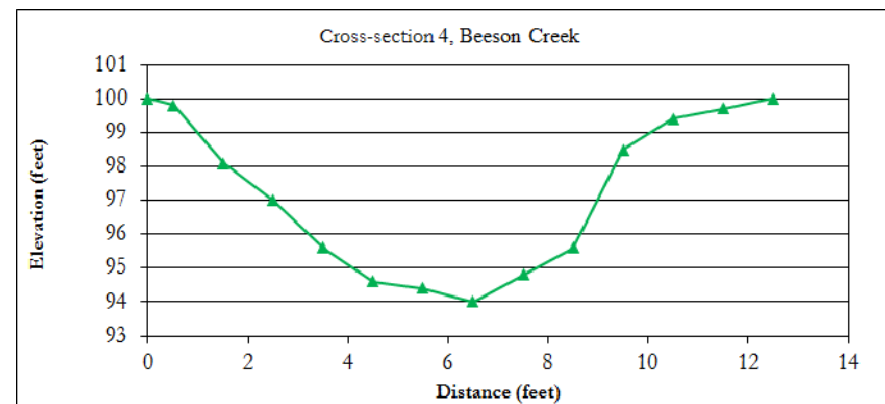
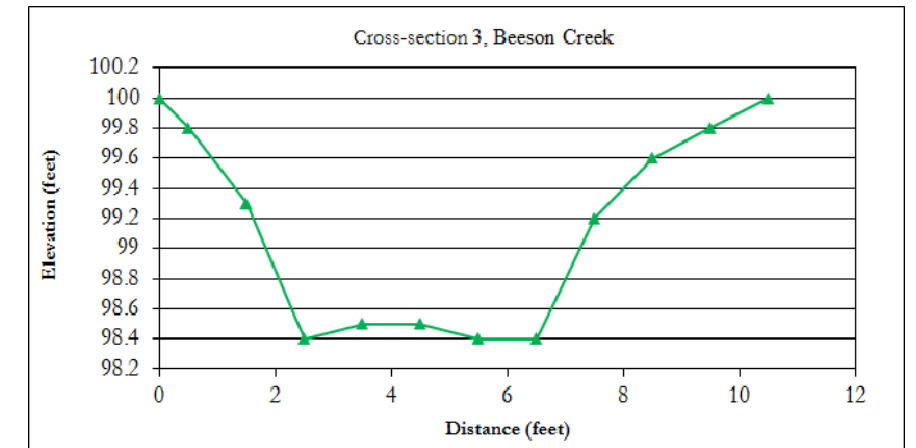
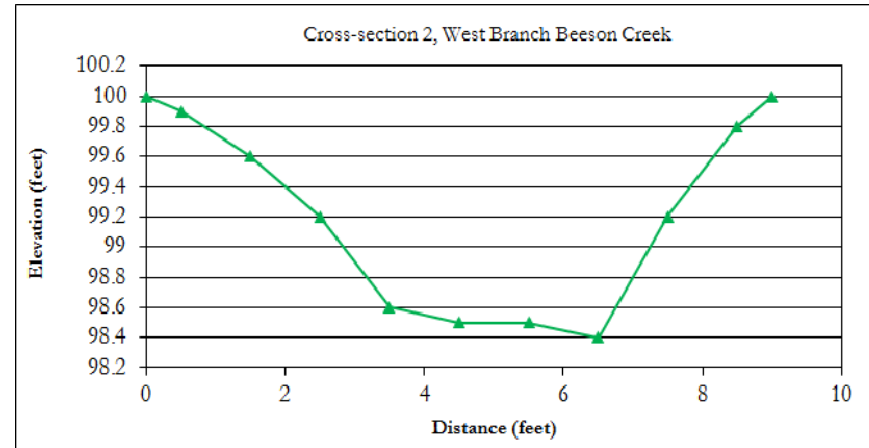
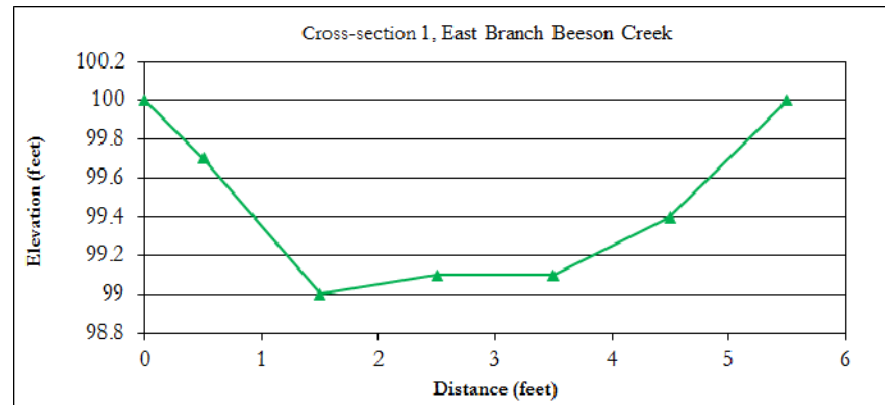
SITE OVERVIEW

Designed By: GDJ

Date:
November 21, 2016

Scale:
1" = 400'

Beeson Creek Stream Restoration Opportunities
Ivey M. Redmon Sports Complex
Kernersville, North Carolina



EXISTING CROSS-SECTIONS

Designed By: GDJ

Date:
November 21, 2016

Scale:
NONE

Beeson Creek Stream Restoration Opportunities

Ivey M. Redmon Sports Complex
Kernersville, North Carolina



- Legend**
- Stream (Existing)
 - Park Boundary
 - Sewer Main
 - Top of Bank (Design)
 - Log Boulder Structure

Start Reach 1

Leave stream channel in existing planform position

End Reach 1

As needed, grade streambanks to reduce erosion, provide floodplain access, and maintain 6-7 foot channel width

As needed, install log and boulder structures to provide grade control, protect streambanks, and promote sediment transport

Notes:
Localized stream realignment can be considered to mitigate eroding streambanks.
Vegetate bare areas and areas of disturbance with native riparian vegetation.

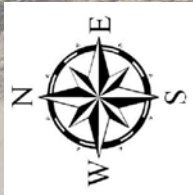


REACH 1
CONCEPTUAL PLAN

Designed By: GDJ	Date: November 21, 2016	Scale: 1" = 100'
------------------	----------------------------	---------------------

Beeson Creek Stream Restoration Opportunities
Ivey M. Redmon Sports Complex
Kernersville, North Carolina

Sheet
4



Legend

- Stream (Existing)
- Park Boundary
- Sewer Main
- Top of Bank (Design)
- Log/Boulder Structure

Start Reach 2

Leave stream channel in existing planform position

End Reach 2

As needed, grade streambanks to reduce erosion, provide floodplain access, and maintain 8-9 foot channel width

As needed, install log and boulder structures to provide grade control, protect streambanks, and promote sediment transport

Notes:
Localized stream realignment can be considered to mitigate eroding streambanks.
Vegetate bare areas and areas of disturbance with native riparian vegetation.



REACH 2
CONCEPTUAL PLAN

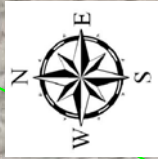
Designed By: GDJ






Date:
November 21, 2016

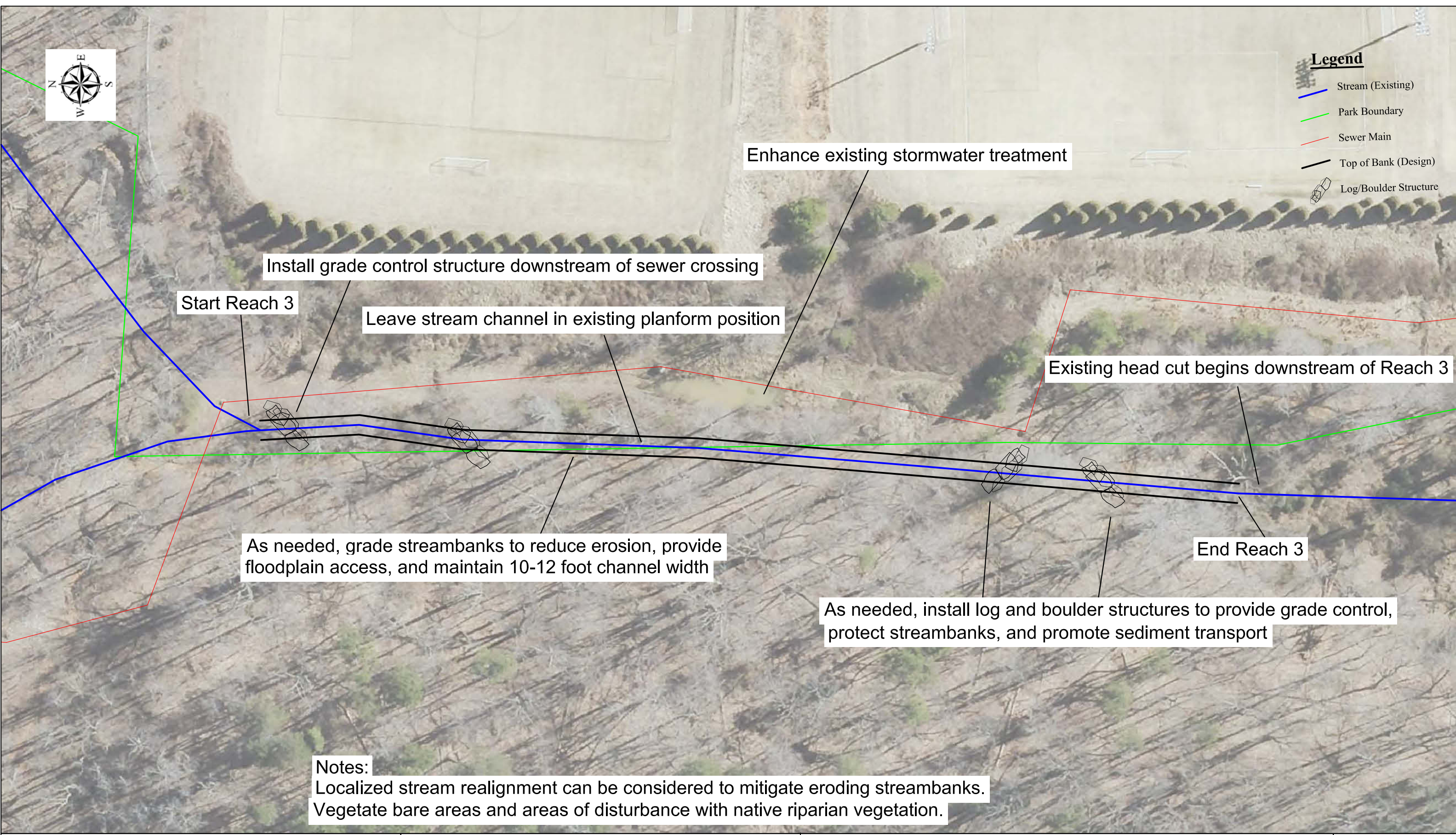
Scale:
1" = 100'

Beeson Creek Stream Restoration Opportunities
Ivey M. Redmon Sports Complex
Kernersville, North Carolina

Sheet
5



- Legend**
-  Stream (Existing)
 -  Park Boundary
 -  Sewer Main
 -  Top of Bank (Design)
 -  Log/Boulder Structure



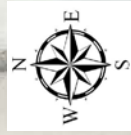
Notes:
 Localized stream realignment can be considered to mitigate eroding streambanks.
 Vegetate bare areas and areas of disturbance with native riparian vegetation.



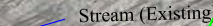
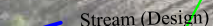
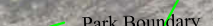
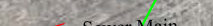

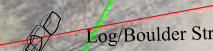
REACH 3
 CONCEPTUAL PLAN

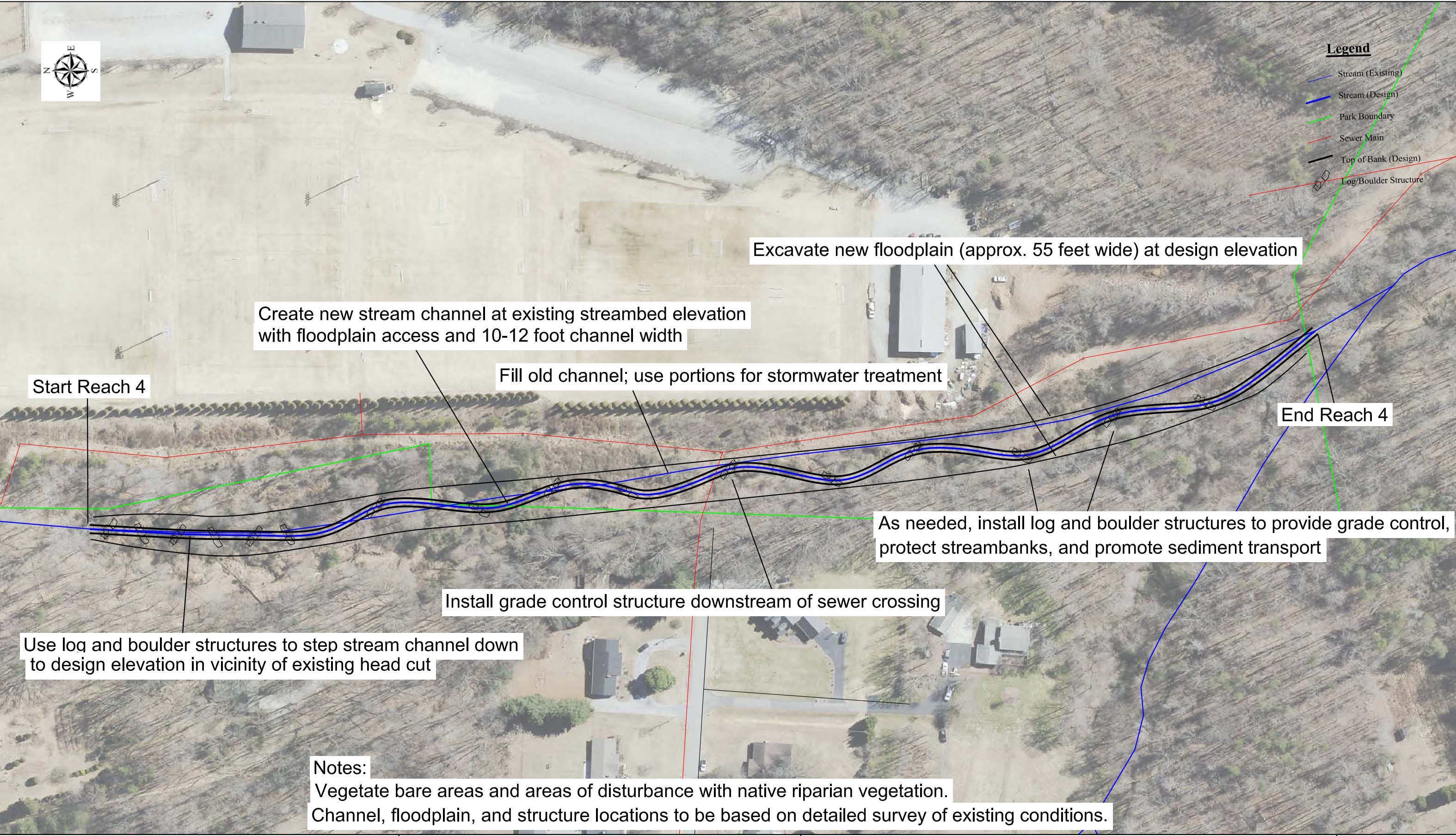
Designed By: GDJ	Date: November 21, 2016	Scale: 1" = 50'
------------------	----------------------------	--------------------

Beeson Creek Stream Restoration Opportunities
 Ivey M. Redmon Sports Complex
 Kernersville, North Carolina



Legend

-  Stream (Existing)
-  Stream (Design)
-  Park Boundary
-  Sewer Main
-  Top of Bank (Design)
-  Log/Boulder Structure



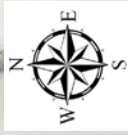
Notes:
 Vegetate bare areas and areas of disturbance with native riparian vegetation.
 Channel, floodplain, and structure locations to be based on detailed survey of existing conditions.



REACH 4
 CONCEPTUAL PLAN (OPTION 1)

Designed By: GDJ	Date: November 21, 2016	Scale: 1" = 120'
------------------	----------------------------	---------------------

Beeson Creek Stream Restoration Opportunities
 Ivey M. Redmon Sports Complex
 Kernersville, North Carolina



Legend

- Stream (Existing)
- Stream (Design)
- Park Boundary
- Sewer Main
- Top of Bank (Design)
- Log/Boulder Structure

Limited floodplain excavation throughout; existing ground to provide floodplain after channel is elevated

Create new stream channel at elevation above existing streambed with 10-12 foot channel width

Fill old channel; use portions for stormwater treatment

Start Reach 4

End Reach 4

Use log and boulder structures to step stream channel down to existing elevation at end of Reach 4

Install grade control structure downstream of sewer crossing

As needed, install log and boulder structures to provide grade control, protect streambanks, and promote sediment transport

Notes:

Vegetate bare areas and areas of disturbance with native riparian vegetation. Channel, floodplain, and structure locations to be based on detailed survey of existing conditions.



REACH 4
CONCEPTUAL PLAN (OPTION 2)

Designed By: GDJ

Date:
November 21, 2016








Scale:
1" = 120'

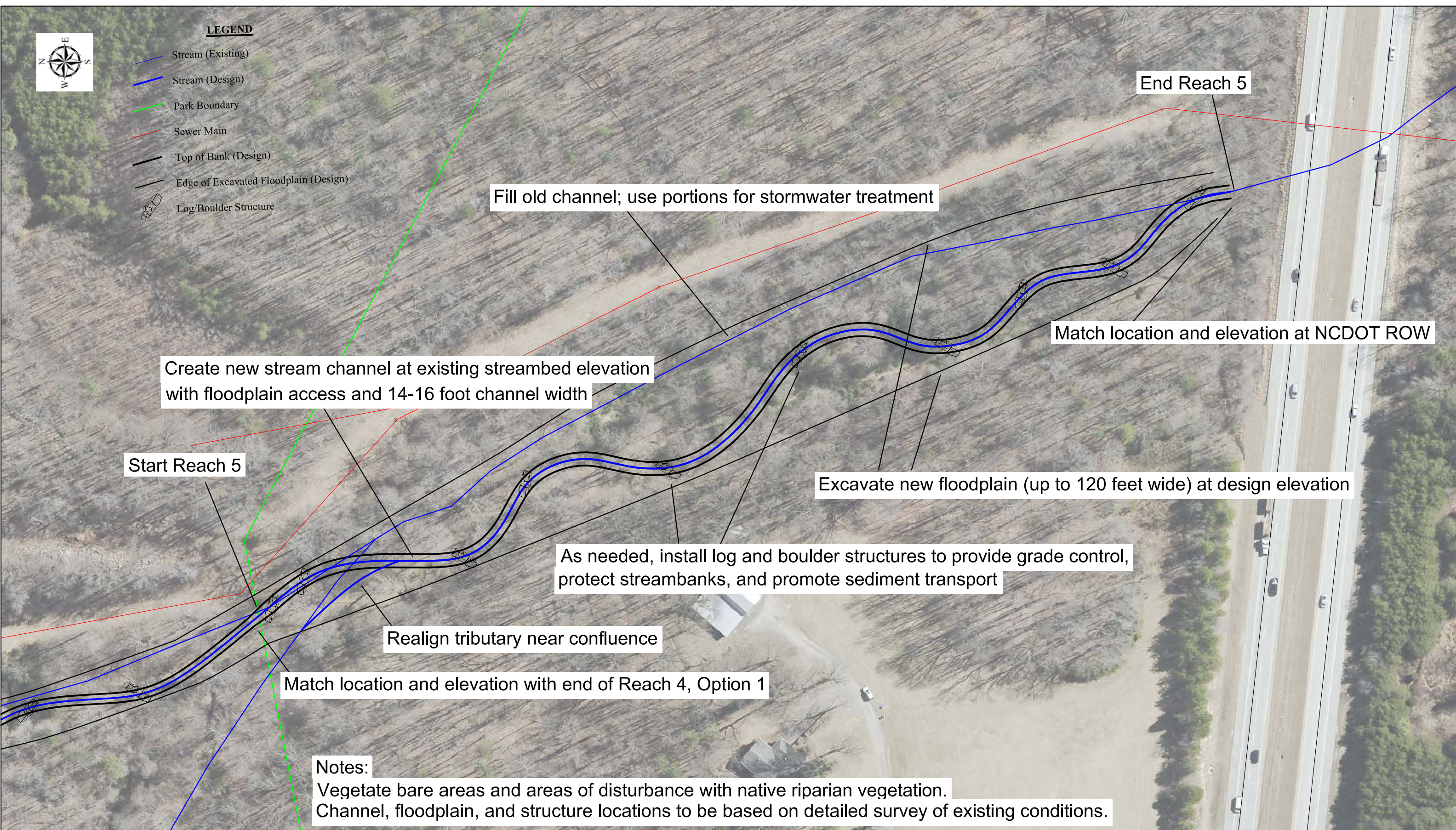
Beeson Creek Stream Restoration Opportunities
Ivey M. Redmon Sports Complex
Kernersville, North Carolina

Sheet
8



LEGEND

-  Stream (Existing)
-  Stream (Design)
-  Park Boundary
-  Sewer Main
-  Top of Bank (Design)
-  Edge of Excavated Floodplain (Design)
-  Log/Boulder Structure









REACH 5
CONCEPTUAL PLAN (OPTION 1)

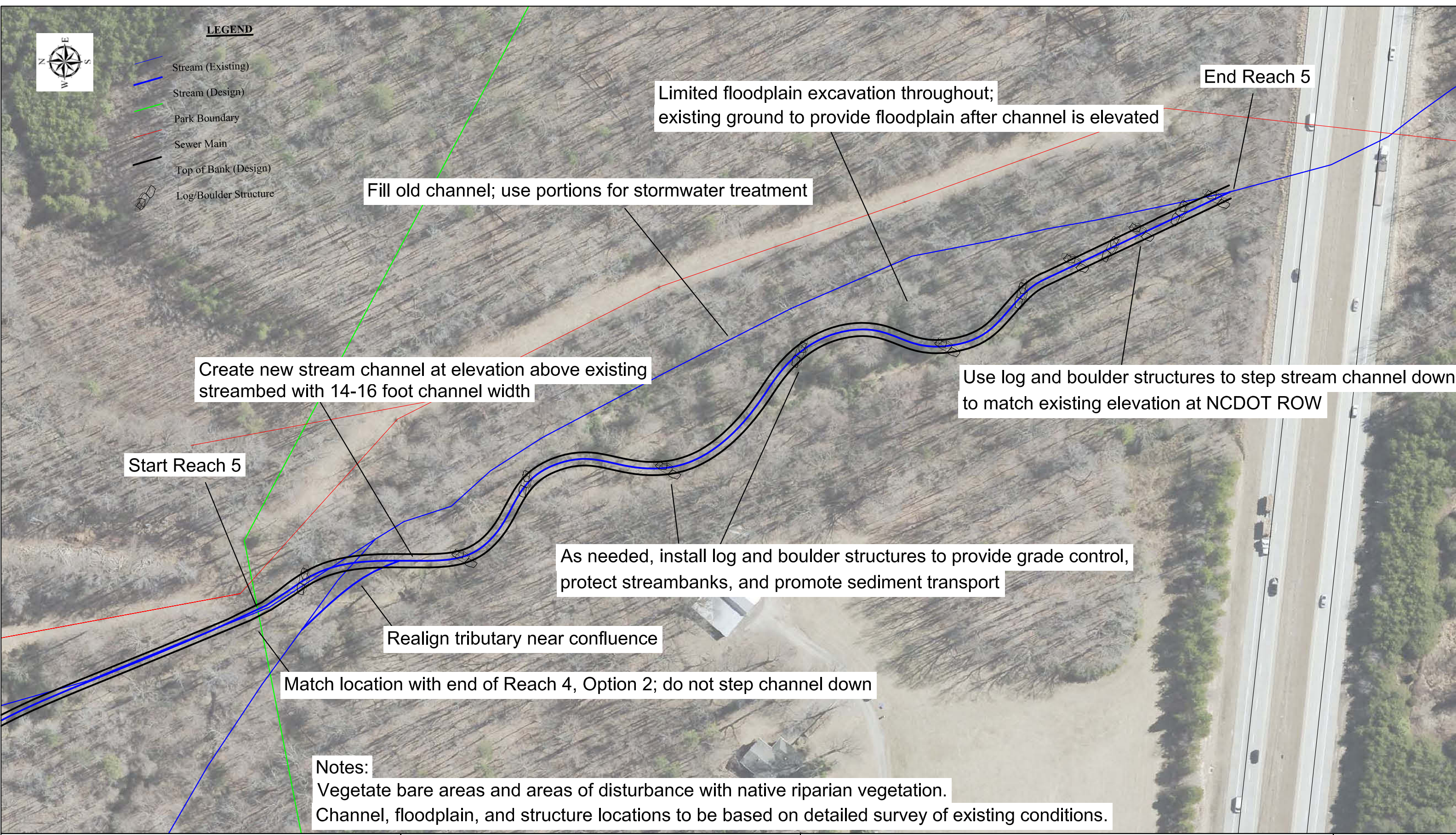
Designed By: GDJ	Date: November 21, 2016	Scale: 1" = 100'
------------------	----------------------------	---------------------

Beeson Creek Stream Restoration Opportunities
Ivey M. Redmon Sports Complex
Kernersville, North Carolina



LEGEND

-  Stream (Existing)
-  Stream (Design)
-  Park Boundary
-  Sewer Main
-  Top of Bank (Design)
-  Log/Boulder Structure



Limited floodplain excavation throughout; existing ground to provide floodplain after channel is elevated

End Reach 5

Fill old channel; use portions for stormwater treatment

Create new stream channel at elevation above existing streambed with 14-16 foot channel width

Use log and boulder structures to step stream channel down to match existing elevation at NCDOT ROW

Start Reach 5

As needed, install log and boulder structures to provide grade control, protect streambanks, and promote sediment transport

Realign tributary near confluence

Match location with end of Reach 4, Option 2; do not step channel down

Notes:
 Vegetate bare areas and areas of disturbance with native riparian vegetation.
 Channel, floodplain, and structure locations to be based on detailed survey of existing conditions.



REACH 5
 CONCEPTUAL PLAN (OPTION 2)

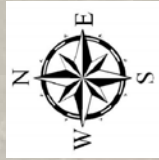
Designed By: GDJ

Date:
November 21, 2016

Scale:
1" = 100'

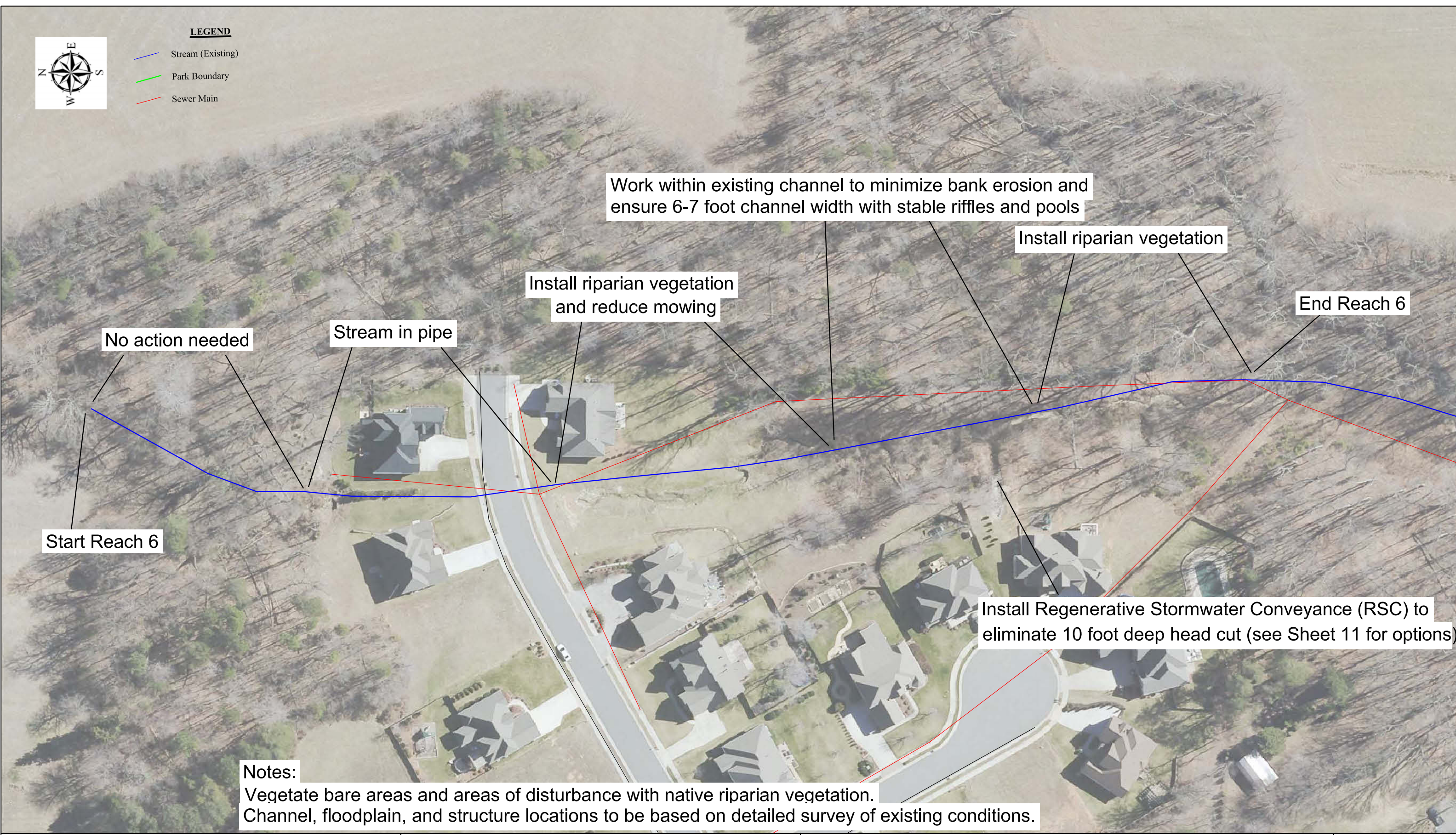
Beeson Creek Stream Restoration Opportunities
 Ivey M. Redmon Sports Complex
 Kernersville, North Carolina

Sheet
10



LEGEND

- Stream (Existing)
- Park Boundary
- Sewer Main



Notes:

Vegetate bare areas and areas of disturbance with native riparian vegetation.
 Channel, floodplain, and structure locations to be based on detailed survey of existing conditions.



REACH 6 CONCEPTUAL PLAN

Designed By: GDJ

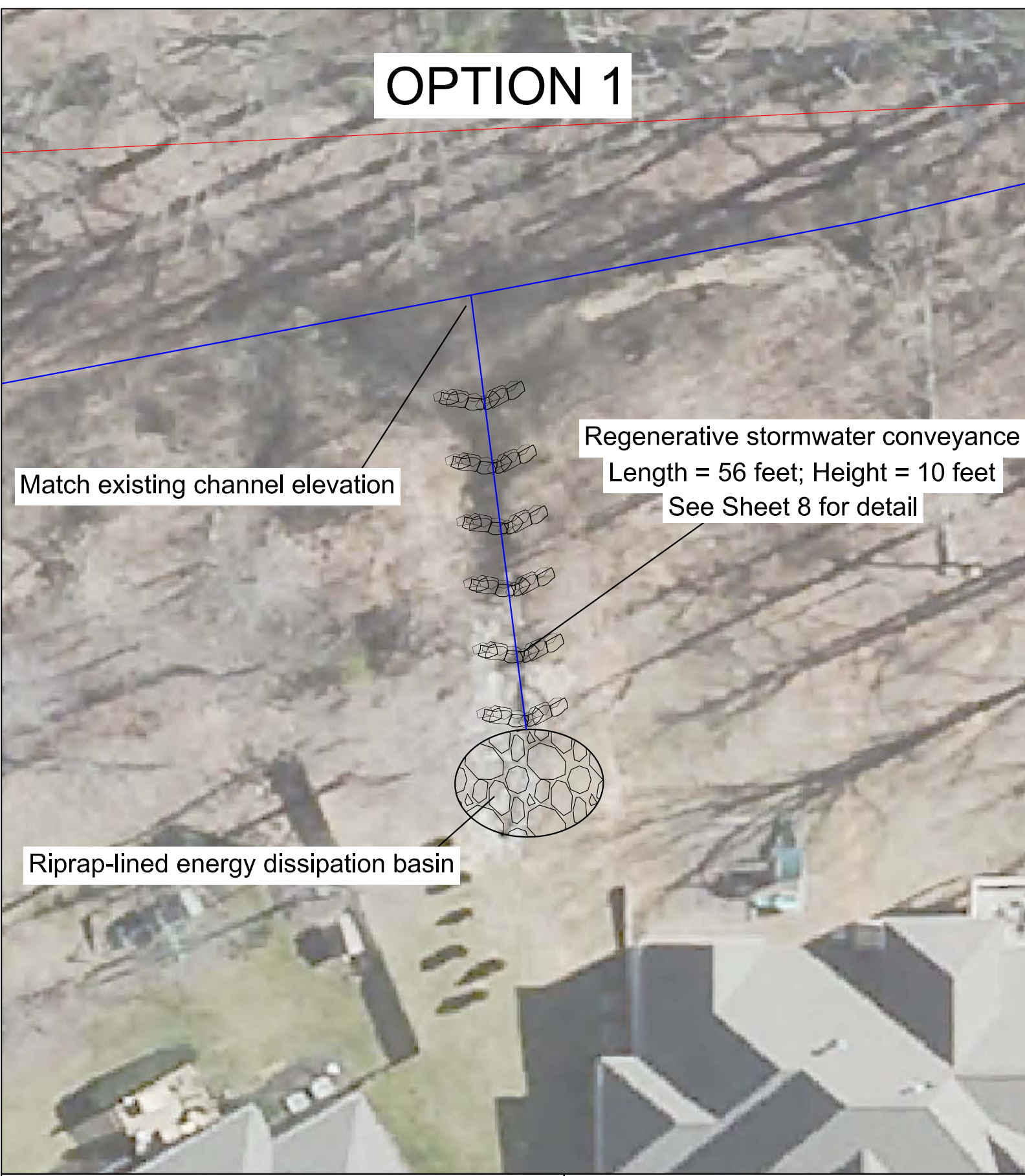
Date:
November 21, 2016

Scale:
1" = 80'

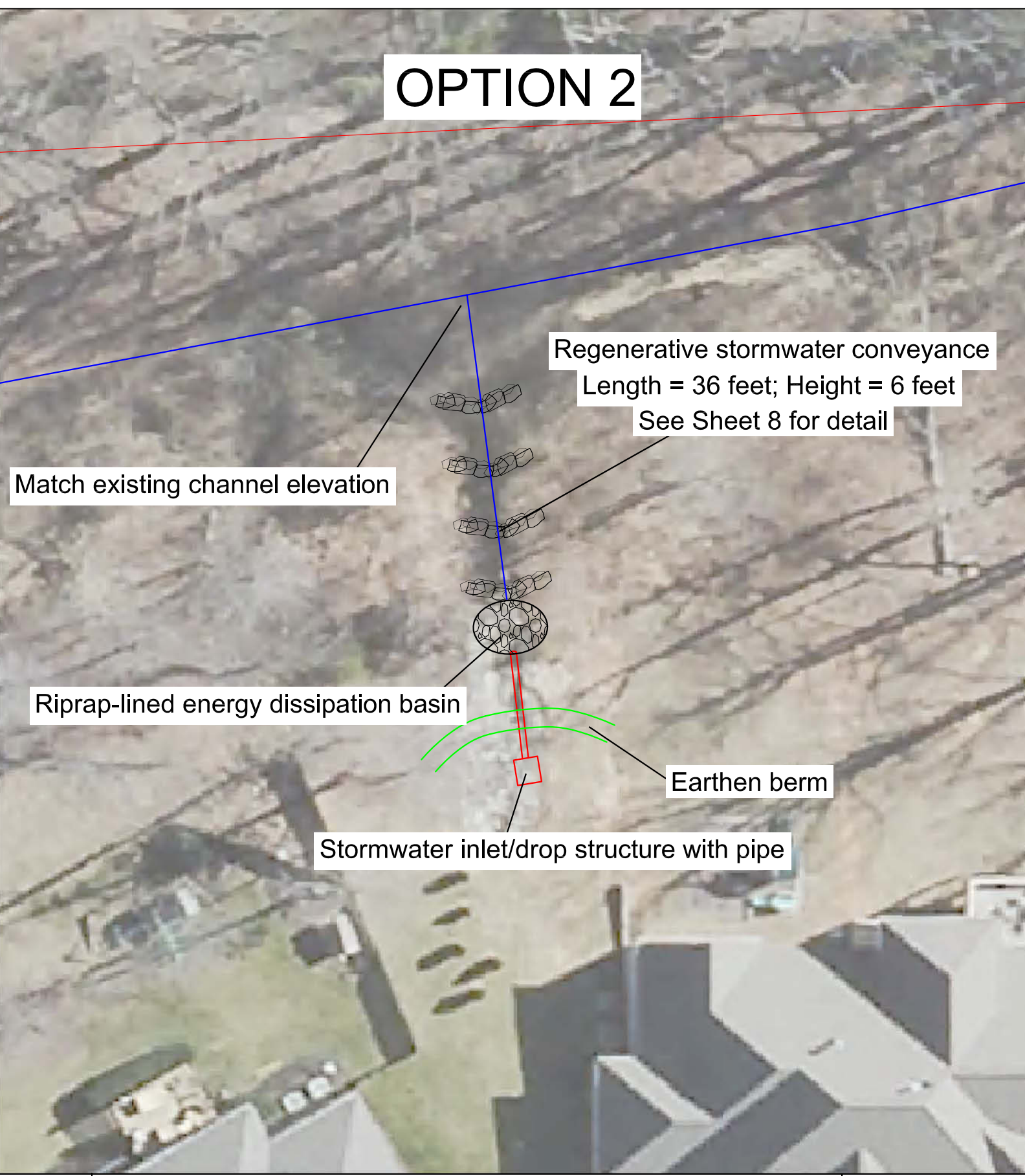
Beeson Creek Stream Restoration Opportunities

Ivey M. Redmon Sports Complex
 Kernersville, North Carolina

OPTION 1



OPTION 2



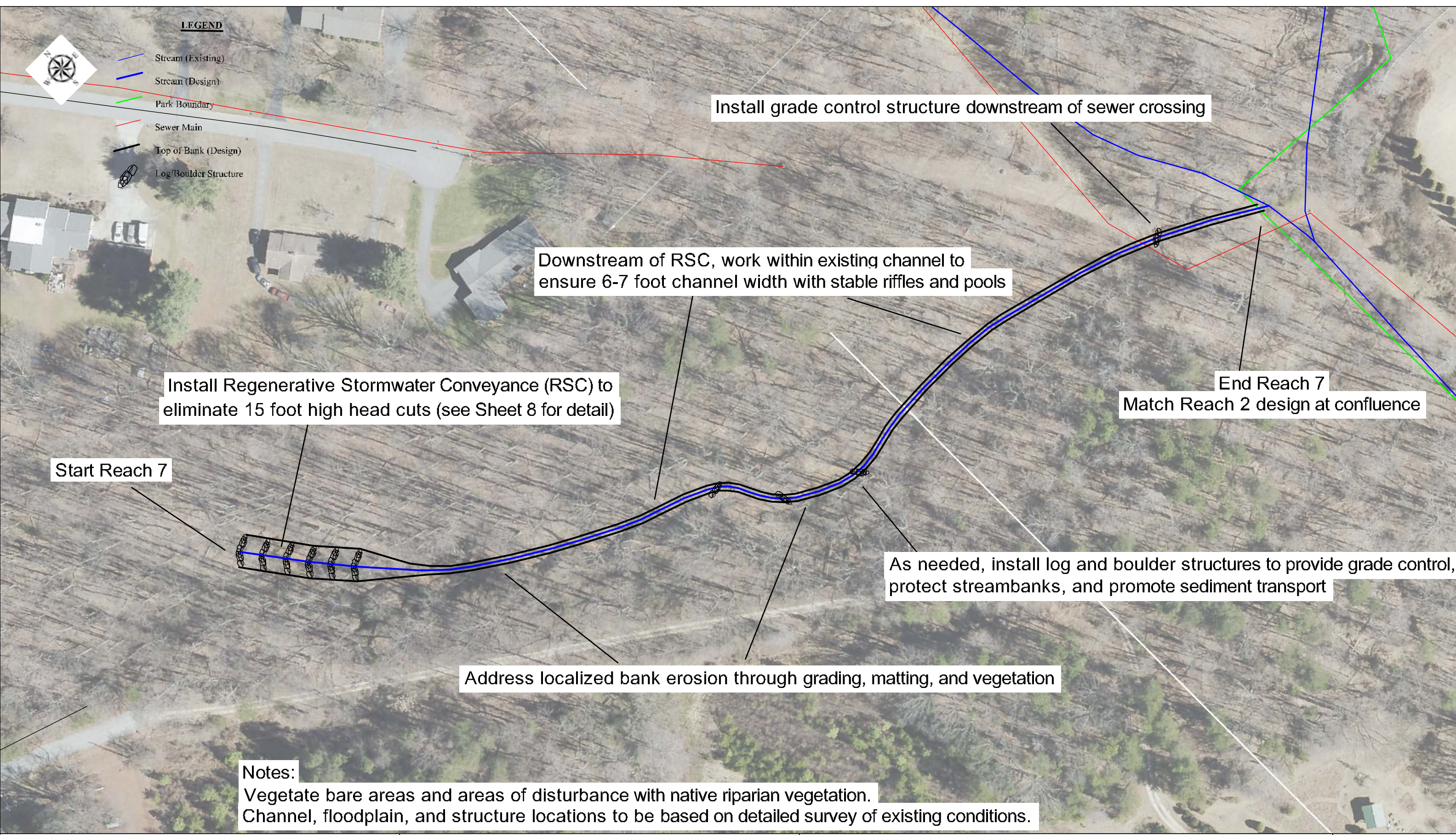
REACH 6 CONCEPTUAL PLAN
HEAD CUT OPTIONS

Designed By: GDJ Date: November 21, 2016 Scale: 1" = 20'

Beeson Creek Stream Restoration Opportunities
Ivey M. Redmon Sports Complex
Kernersville, North Carolina

LEGEND

- Stream (Existing)
- Stream (Design)
- Park Boundary
- Sewer Main
- Top of Bank (Design)
- Log/Boulder Structure



Install grade control structure downstream of sewer crossing

Downstream of RSC, work within existing channel to ensure 6-7 foot channel width with stable riffles and pools

Install Regenerative Stormwater Conveyance (RSC) to eliminate 15 foot high head cuts (see Sheet 8 for detail)

End Reach 7
Match Reach 2 design at confluence

Start Reach 7

As needed, install log and boulder structures to provide grade control, protect streambanks, and promote sediment transport

Address localized bank erosion through grading, matting, and vegetation

Notes:
Vegetate bare areas and areas of disturbance with native riparian vegetation.
Channel, floodplain, and structure locations to be based on detailed survey of existing conditions.



REACH 7 CONCEPTUAL PLAN

Designed By: GDJ

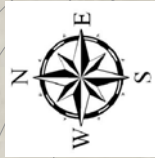
Date:
November 21, 2016

Scale:
1" = 80'

Beeson Creek Stream Restoration Opportunities

Ivey M. Redmon Sports Complex
Kernersville, North Carolina

Sheet
13



SCM 10: Bare area stabilization (1.8 acres)

SCM 9: Vegetated swale (180 ft)

SCM 8: Retrofit/enlarge existing basin as stormwater wetland with level spreader (5800 sq ft)

SCM 7: Vegetated swale (260 ft)

SCM 6: Infiltration swale (250 ft)

SCM 5: Bioretention area (9800 sq ft)

SCM 1: Sediment basin and/or bioretention area at maintenance area (3600 sq ft)

SCM 4: Wet swale (250 ft)






SCM 2: Enhance/enlarge existing riparian basin (6300 sq ft)

SCM 3: Create multiple floodplain wetlands as part of stream restoration project

Notes:
Contour interval 2 feet.

Sizes and locations of SCMs are estimated, and should be confirmed with detailed survey prior to design.

Legend

-  Stream
-  Park Boundary
-  Sewer Main
-  Street
-  Potential SCM



POTENTIAL
STORMWATER CONTROL MEASURES

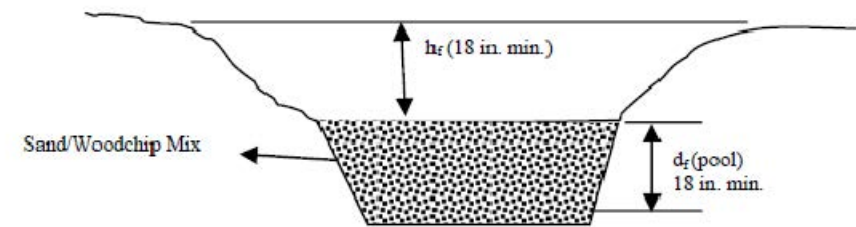
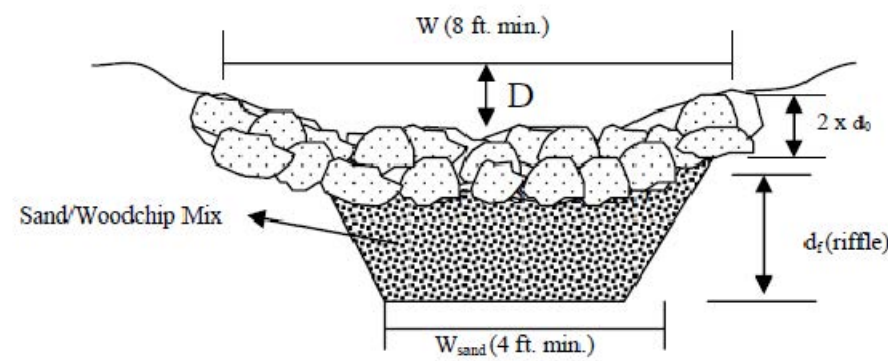
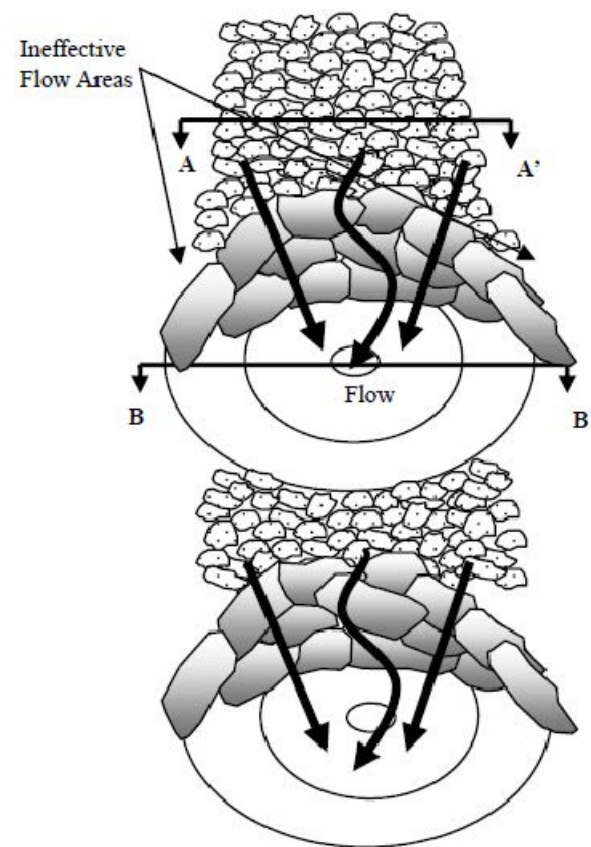
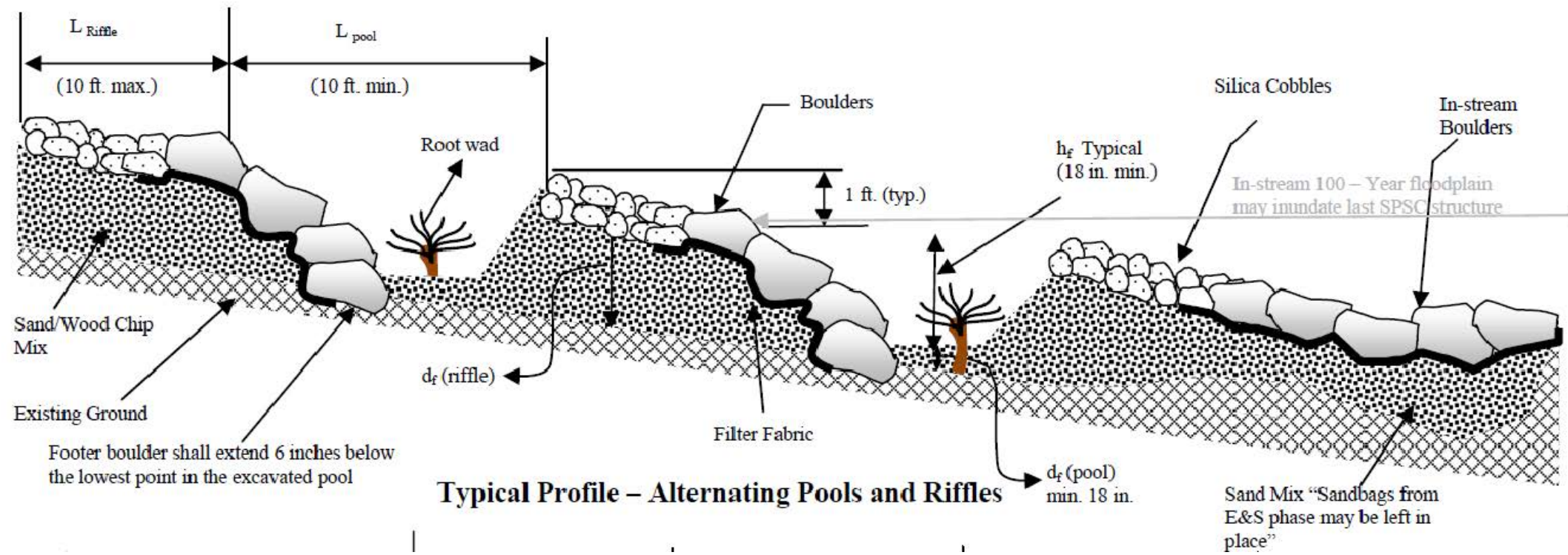
Designed By: GDJ

Date:
November 21, 2016

Scale:
1" = 300'

Beeson Creek Stream Restoration Opportunities
Ivey M. Redmon Sports Complex
Kernersville, North Carolina

Sheet
14



Note: Details to be adapted to fit site conditions.

Source: Anne Arundel County, Maryland



TYPICAL DETAIL
REGENERATIVE STORMWATER CONVEYANCE

Designed By: GDJ

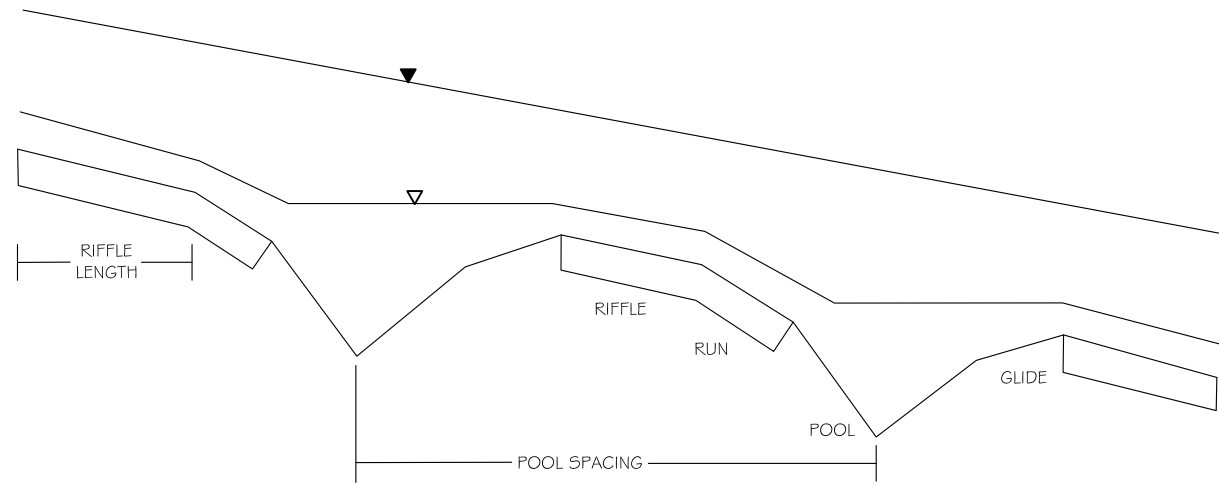
Date:
November 21, 2016

Scale:
NOT TO SCALE

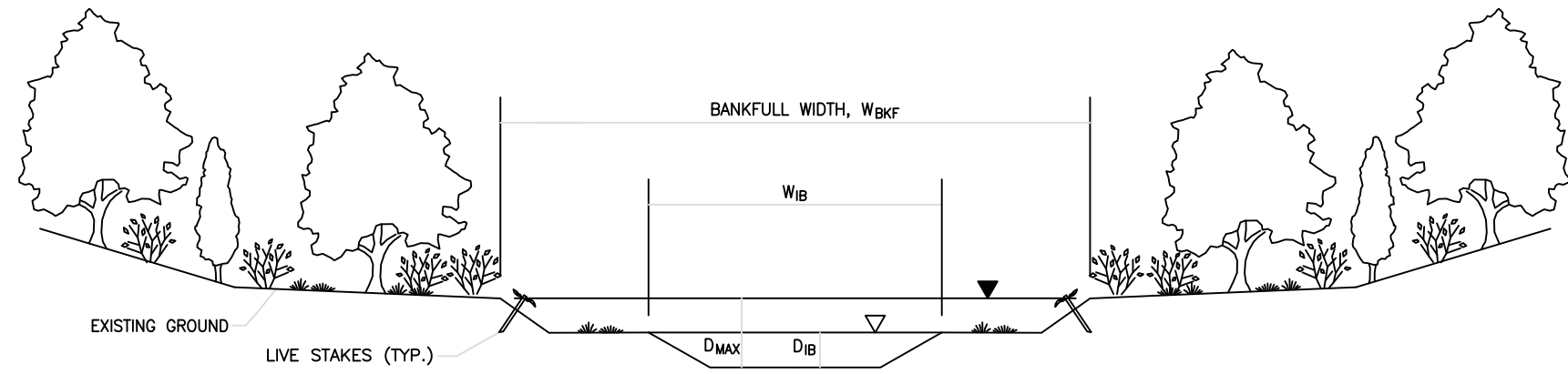
Beeson Creek Stream Restoration Opportunities
Ivey M. Redmon Sports Complex
Kernersville, North Carolina

Sheet
15

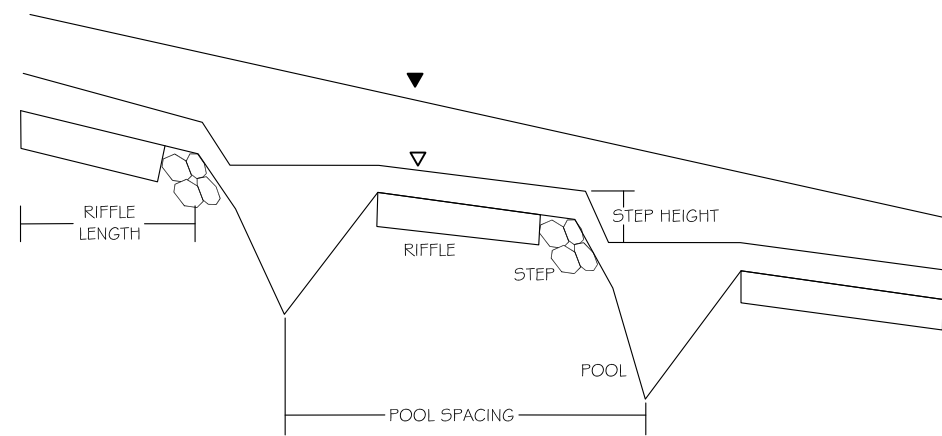
LONGITUDINAL PROFILE: RIFFLE/POOL (MEANDERING) STREAM



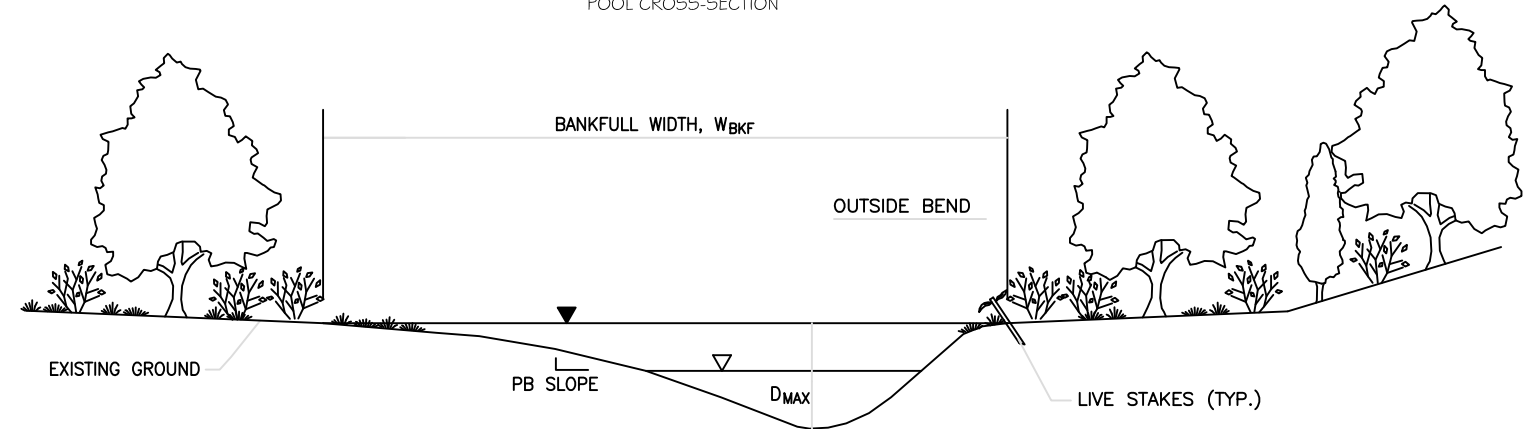
RIFFLE CROSS-SECTION



LONGITUDINAL PROFILE: RIFFLE/STEP/POOL STREAM



POOL CROSS-SECTION



▼ BANKFULL WATER SURFACE
 ▽ LOW-FLOW WATER SURFACE



TYPICAL DETAIL
 LONGITUDINAL PROFILES AND CROSS-SECTIONS

Designed By: GDJ

Date:
 November 21, 2016

Scale:
 NOT TO SCALE

Beeson Creek Stream Restoration Opportunities
 Ivey M. Redmon Sports Complex
 Kernersville, North Carolina

Sheet
 16