

SITE LOCATION MAP

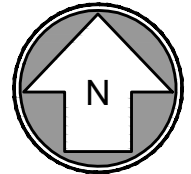
VILLAGE AT MARKETPLACE
MOON TOWNSHIP, ALLEGHENY COUNTY, PENNSYLVANIA

TAKEN FROM 7.5 MINUTE USGS TOPOGRAPHY - OAKDALE QUADRANGLE



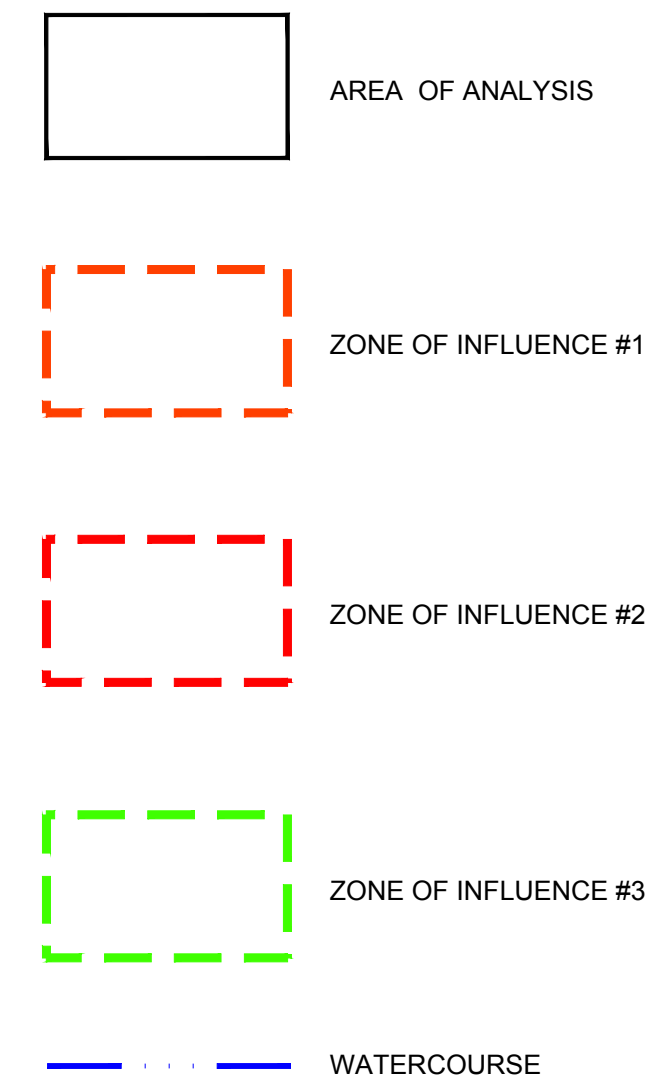
Waterfront Corporate Park III, Suite 101 P: 724-444-1100
2000 Georgetowne Drive F: 724-444-1104
Sewickley, PA 15143 www.pve-llc.com

Civil Engineering | Land Development | Planning
Landscape Architecture | Structures | Environmental



DATE:	06-04-2018
SCALE:	1"=2000'
PROJECT NUMBER:	161459

FIGURE 1



Drawing Scale:
 1" = 120'
 NORTH
NOT FOR CONSTRUCTION

ISSUED FOR TWP. SUBMISSION

Waterford Corporate Park II, Suite 101
 2020 Georgetown Drive
 Sewickley, PA 15143
 P: 724-444-1100
 F: 724-444-1104
 www.pve-nc.com



Civil Engineering | Land Development | Structure Design
 Land Planning | Landscape Architecture | Environmental

Prepared For:
 Village At Marketplace, LLC
 2000 Georgetown Drive, Suite 100
 Sewickley, PA 15143

THIS PLAN HAS BEEN PREPARED SOLELY FOR THE BENEFIT OF THE PERSONS NAMED HEREON AND FOR THE PROJECT NOTED ON THE DRAWING. THE USER OF THIS PLAN BY ANY THIRD PARTY, OR FOR ANY OTHER PURPOSE OTHER THAN SPECIFIED, IS PROHIBITED WITHOUT WRITTEN CONSENT FROM PVE ENGINEERING.



THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCURRED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

DATE ISSUED: NOVEMBER 7, 2018

PLAN REVISIONS	
DATE	DESCRIPTION
1-2-19	REV PER TWP & LSSE COMMENT LETTERS
2	3-19-19 REV PER LSSE COMMENT LETTER
3	
4	
5	
6	
7	
8	
9	
10	

Situate In: Moon Township, Allegheny County, PA

Project Name:
VILLAGE AT MARKETPLACE
RESIDENTIAL LAND DEVELOPMENT

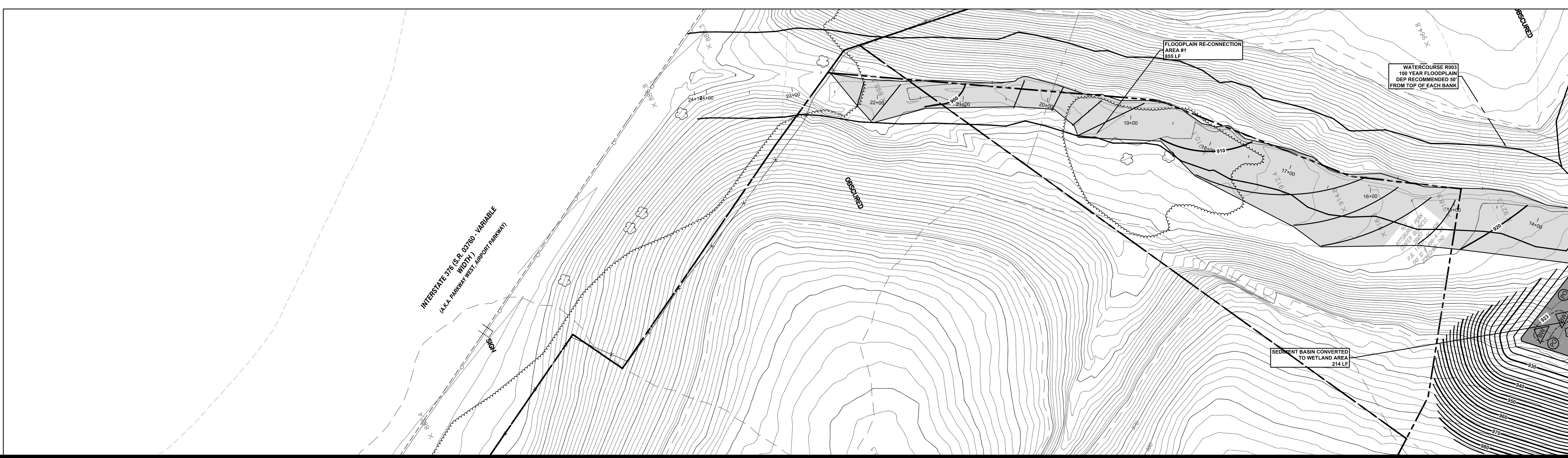
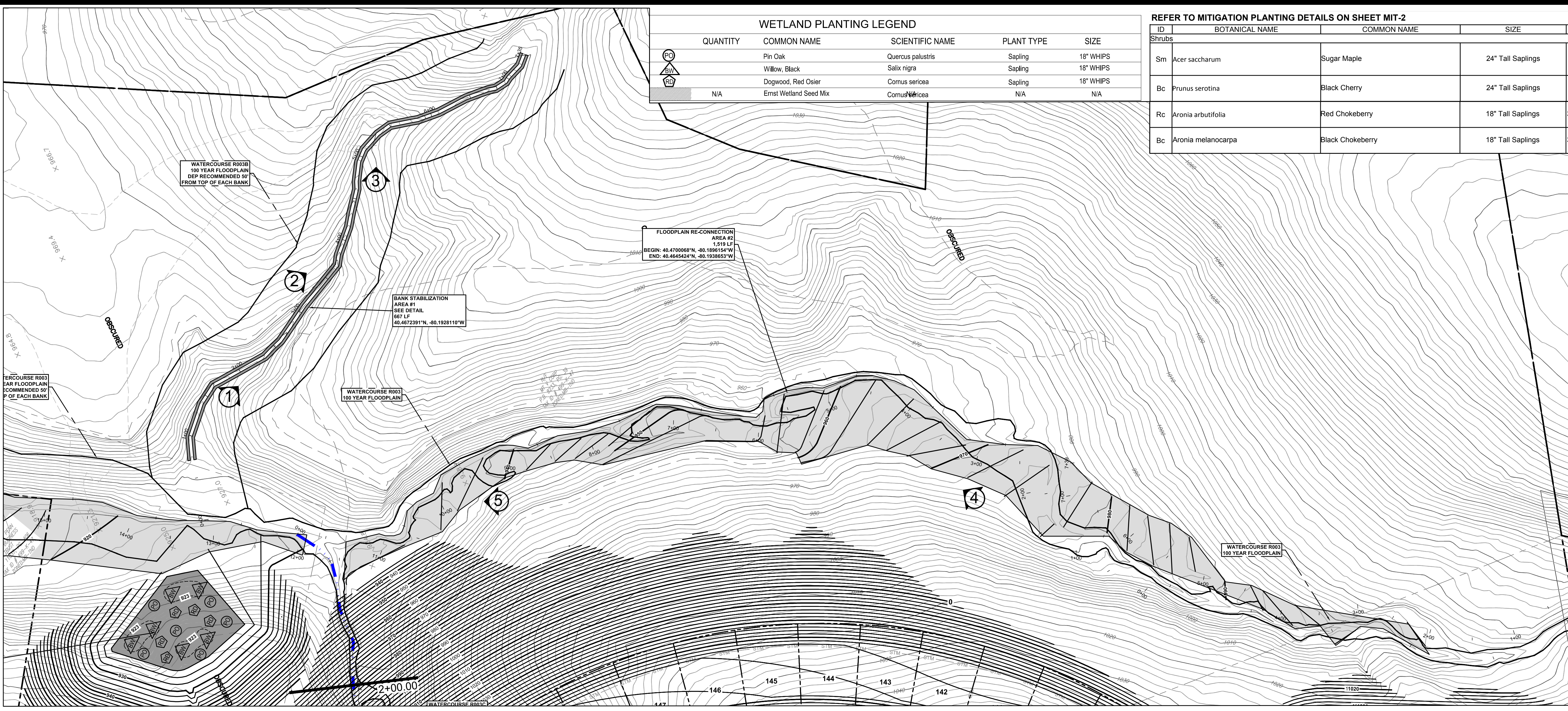
Drawing Name:
LEVEL 2 AA/ZOI PLAN

Project No: **161459**
 Drawing No: **AA/ZOI**

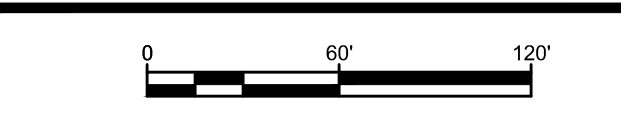
WETLAND PLANTING LEGEND					
QUANTITY	COMMON NAME	SCIENTIFIC NAME	PLANT TYPE	SIZE	
PO	Pin Oak	Quercus palustris	Sapling	18" WHIPS	
SW	Willow, Black	Salix nigra	Sapling	18" WHIPS	
RL	Dogwood, Red Osier	Cornus sericea	Sapling	18" WHIPS	
	N/A	Ernst Wetland Seed Mix	Cornus sericea	N/A	N/A

REFER TO MITIGATION PLANTING DETAILS ON SHEET MIT-2

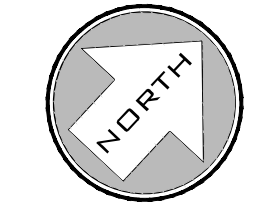
ID	BOTANICAL NAME	COMMON NAME	SIZE	SPACING	SYMBOL	AMOUNT
Shrubs						
Sm	Acer saccharum	Sugar Maple	24" Tall Saplings	20' on centers - 6' from top of bank		120
Bc	Prunus serotina	Black Cherry	24" Tall Saplings	20' on centers - 6' from top of bank		120
Rc	Aronia arbutifolia	Red Chokeberry	18" Tall Saplings	3' on centers along bank		222
Bc	Aronia melanocarpa	Black Chokeberry	18" Tall Saplings	3' on centers along bank		222



1 PHOTO LOCATION



Drawing Scale:
1" = 60'



Waterford Corporate Park II, Suite 101
2000 Georgetown Drive
Sewickley, PA 15143



Civil Engineering | Land Development | Structure Design
Land Planning | Landscape Architecture | Environmental

Prepared For:
Village At Marketplace, LLC
2000 Georgetown Drive, Suite 100
Sewickley, PA 15143

811 Know what's below.
Call before you dig.
POCS SER. # -----

THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCURRED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

DATE ISSUED: NOVEMBER 7, 2018

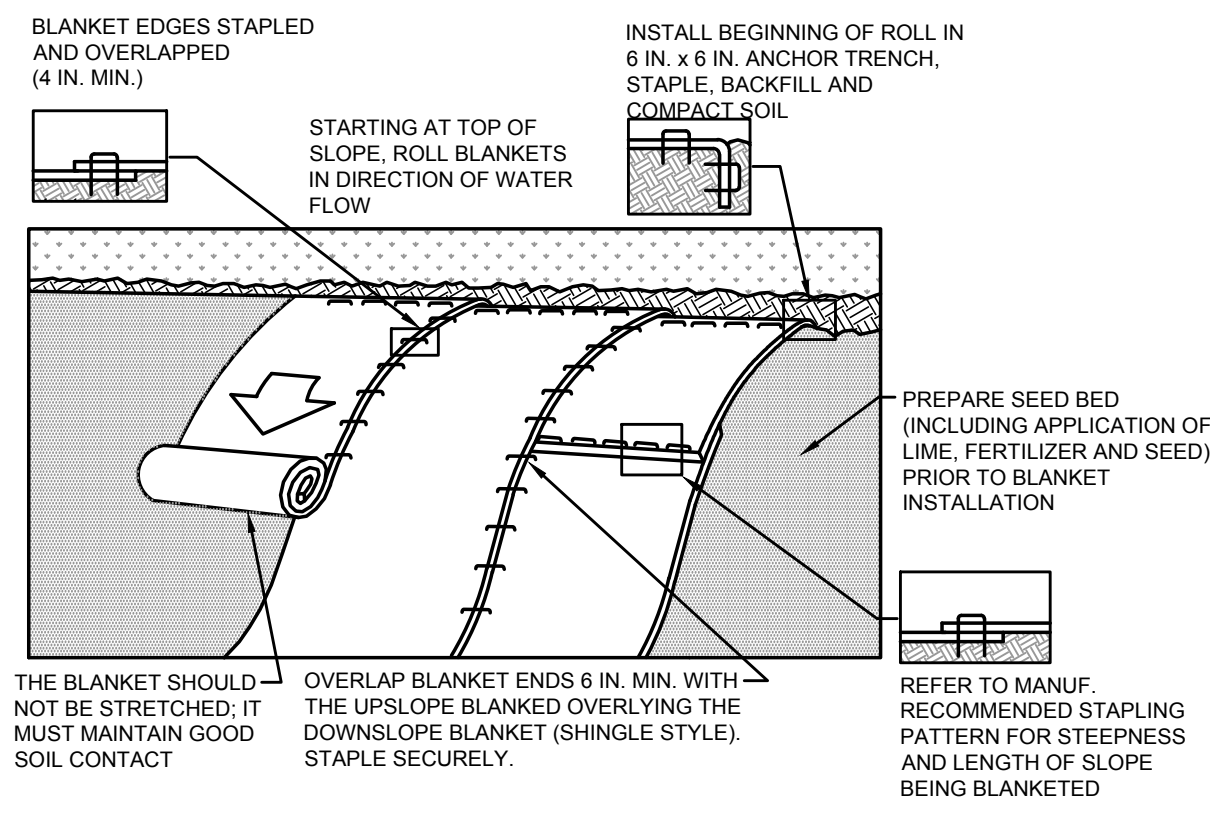
PLAN REVISIONS	
DATE	DESCRIPTION
1-2-19	REV PER TWP & LSSE COMMENT LETTERS
2-3-19-19	REV PER LSSE COMMENT LETTER
3	
4	
5	
6	
7	
8	
9	
10	

Situate In:
Moon Township, Allegheny County, PA

Project Name:
**VILLAGE AT MARKETPLACE
RESIDENTIAL LAND DEVELOPMENT**

Drawing Name:
MITIGATION PLAN

Project No: **161459** Drawing No: **MIT-1**



NOTES:

SEED AND SOIL AMENDMENTS SHALL BE APPLIED ACCORDING TO THE RATES IN THE PLAN DRAWINGS PRIOR TO INSTALLING THE BLANKET.

PROVIDE ANCHOR TRENCH AT TOE OF SLOPE IN SIMILAR FASHION AS AT TOP OF SLOPE.

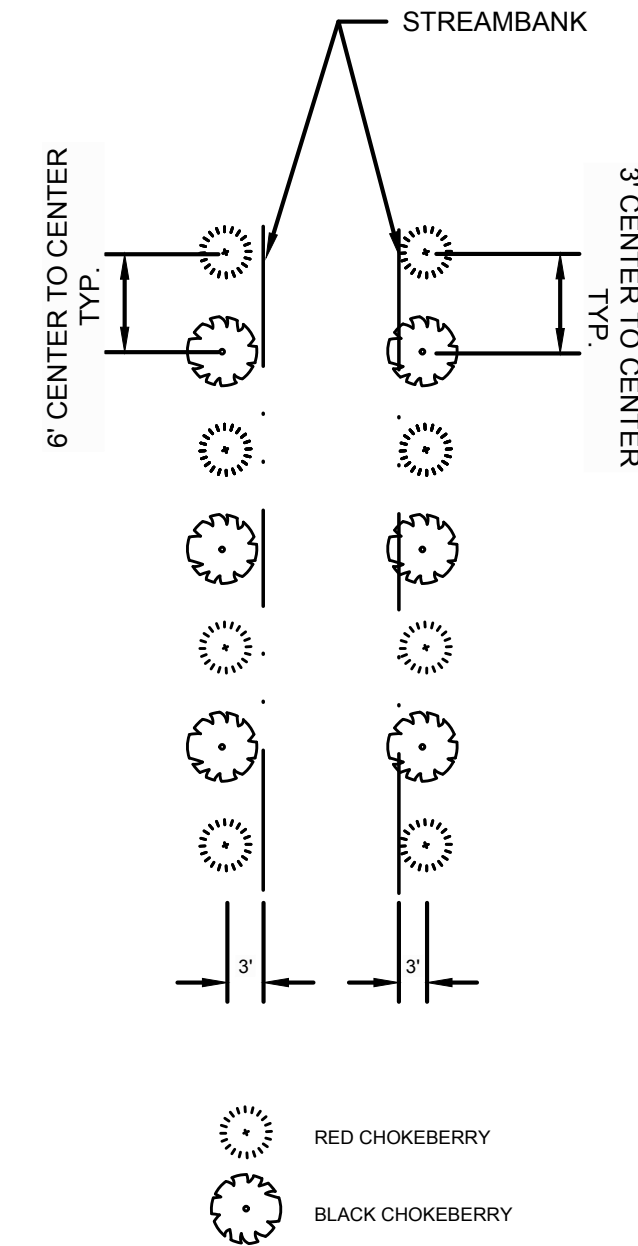
SLOPE SURFACE SHALL BE FREE OF ROCKS, CLODS, STICKS, AND GRASS.

BLANKET SHALL HAVE GOOD CONTINUOUS CONTACT WITH UNDERLYING SOIL THROUGHOUT ENTIRE LENGTH. LAY BLANKET LOOSELY AND STAKE OR STAPLE TO MAINTAIN DIRECT CONTACT WITH SOIL. DO NOT STRETCH BLANKET.

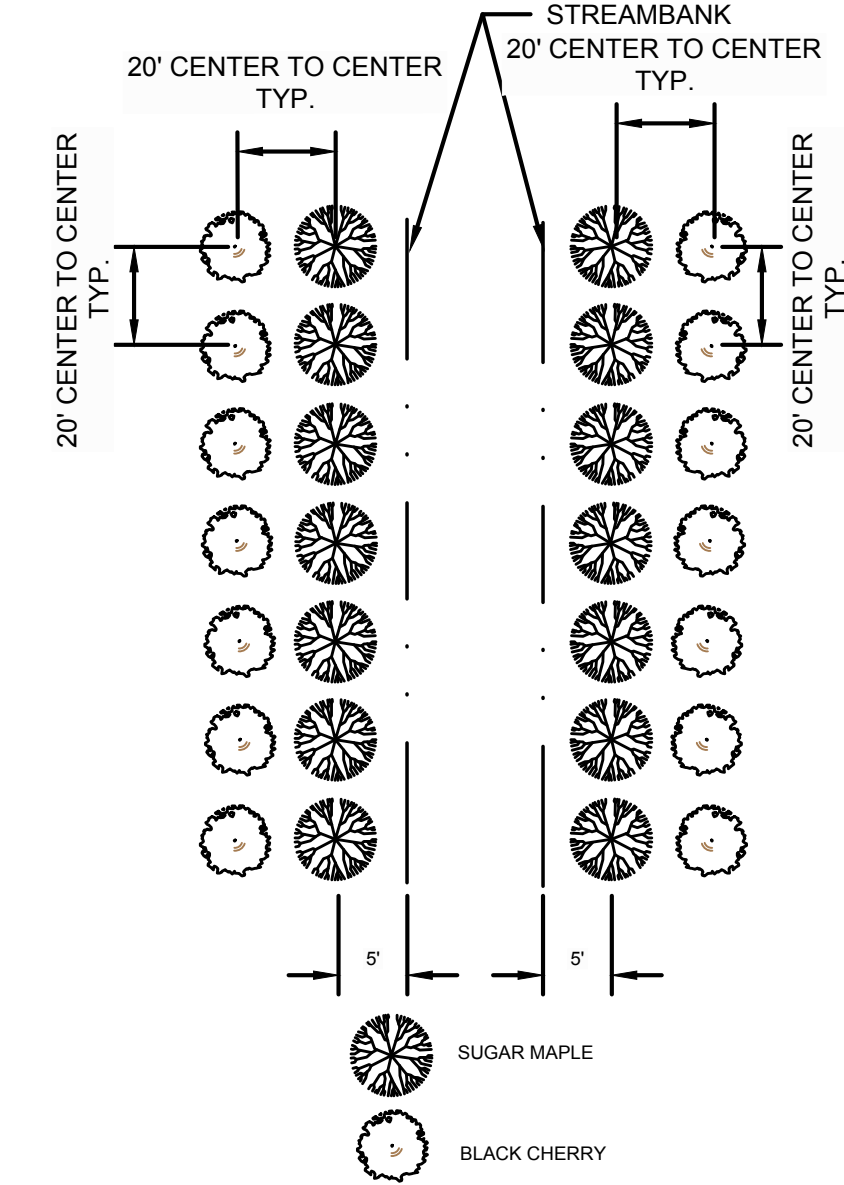
THE BLANKET SHALL BE STAPLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

BLANKETED AREAS SHALL BE INSPECTED WEEKLY AND AFTER EACH RUNOFF EVENT UNTIL PERENNIAL VEGETATION IS ESTABLISHED TO A MINIMUM UNIFORM 70% COVERAGE THROUGHOUT THE BLANKETED AREA. DAMAGED OR DISPLACED BLANKETS SHALL BE RESTORED OR REPLACED WITHIN 4 CALENDAR DAYS.

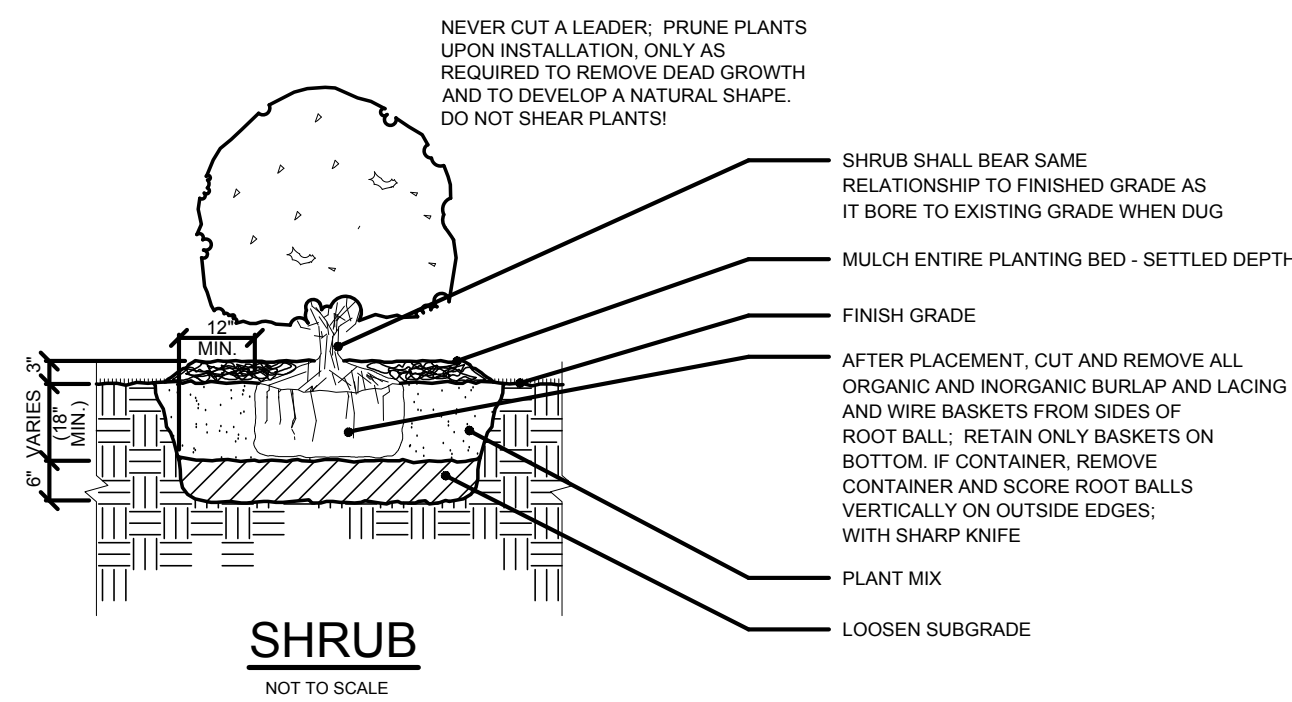
STANDARD CONSTRUCTION DETAIL #11-1
EROSION CONTROL BLANKET INSTALLATION
 NOT TO SCALE



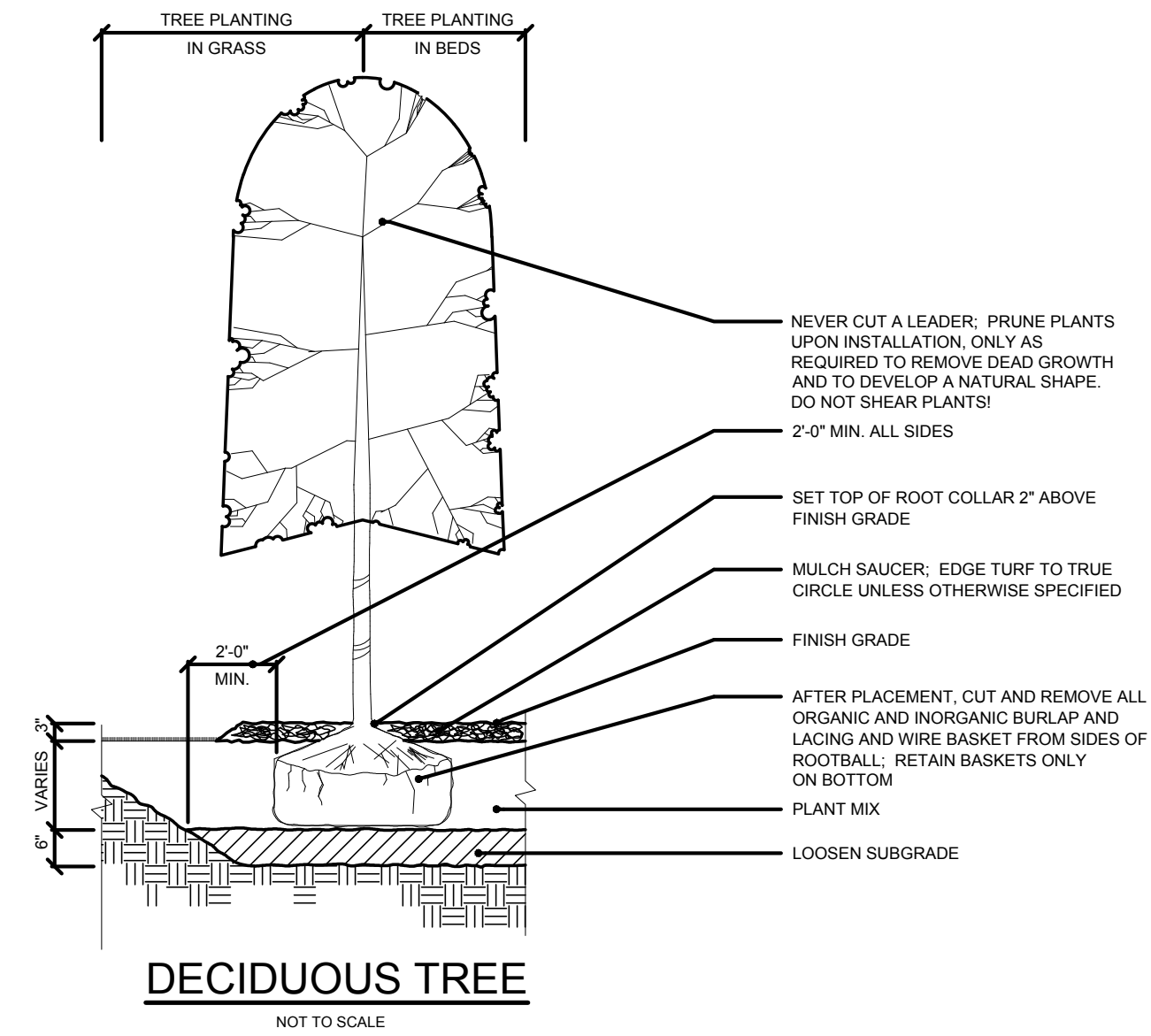
BANK STABILIZATION AREA PLANTING DETAIL
 NOT TO SCALE



FLOODPLAIN RECONNECTION AREA PLANTING DETAIL
 NOT TO SCALE



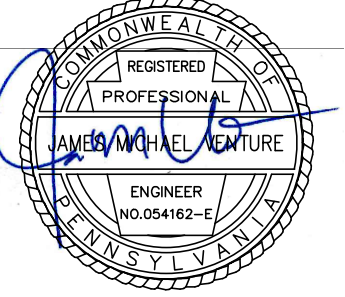
SHRUB
 NOT TO SCALE



DECIDUOUS TREE
 NOT TO SCALE

ISSUED FOR PERMIT REVIEW

Drawing Scale:
 AS SHOWN



Waterford Corporate Park III, Suite 101
 2000 Georgetown Drive
 Sewickley, PA 15143
 P: 724-444-1100
 F: 724-444-1104
 www.pve-llc.com



Civil Engineering | Land Development | Structure Design
 Land Planning | Landscape Architecture | Environmental

Prepared For:
Village At Marketplace, LLC
 2000 Georgetown Drive, Suite 100
 Sewickley, PA 15143

THIS PLAN HAS BEEN PREPARED SOLELY FOR THE BENEFIT OF THE PERSON(S) NAMED ABOVE AND FOR THE PROJECT NOTED ON THE DRAWING. THE USE OF THIS PLAN BY ANY THIRD PARTY, OR FOR ANY OTHER PURPOSE OTHER THAN SPECIFIED, IS PROHIBITED WITHOUT WRITTEN CONSENT FROM PVE ENGINEERING.



THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND ADOPTS TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

DATE ISSUED: **NOVEMBER 7, 2018**

PLAN REVISIONS	
DATE	DESCRIPTION
1-2-19	REV PER TWP & LSSE COMMENT LETTERS
3-19-19	REV PER LSSE COMMENT LETTER
4	
5	
6	
7	
8	
9	
10	

Situate In:
 Moon Township, Allegheny County, PA

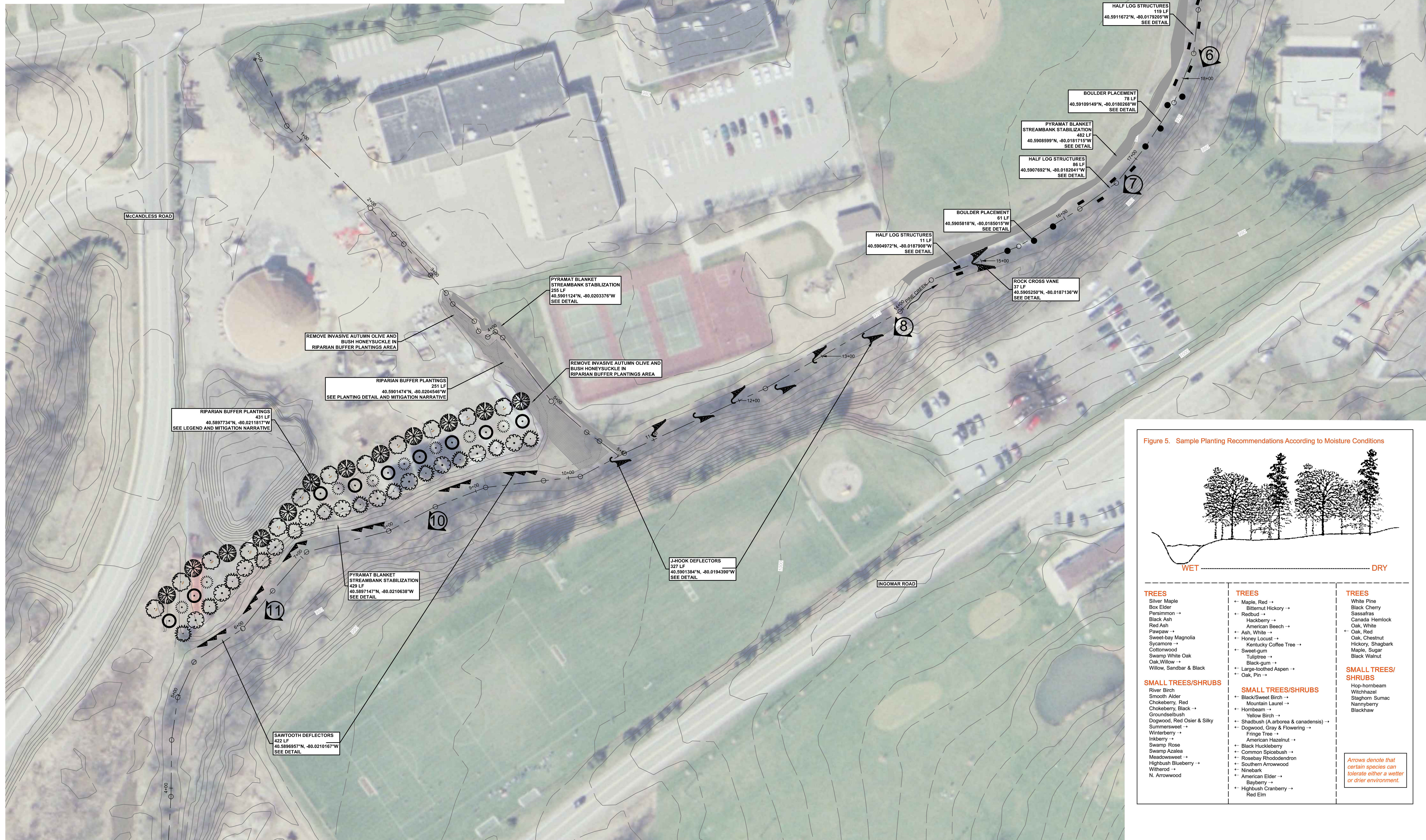
Project Name:
VILLAGE AT MARKETPLACE
RESIDENTIAL LAND DEVELOPMENT

Drawing Name:
JOINT PERMIT APPLICATION
DETAILS

Project No: **161459** Drawing No: **JP-7**

REFER TO MITIGATION PLANTING DETAIL ON SHEET OMIT-2

ID	BOTANICAL NAME	COMMON NAME	SIZE	SPACING	SYMBOL	AMOUNT
Shrubs						
Bb	Cephalanthus occidentalis	Buttonbush	18" Tall Saplings	4' on centers - See Detail on Sheet OMIT-2		32
Rc	Aronia arbutifolia	Red Chokeberry	18" Tall Saplings	4' on centers - See Detail on Sheet OMIT-2		136
Bc	Aronia melanocarpa	Black Chokeberry	18" Tall Saplings	4' on centers - See Detail on Sheet OMIT-2		139
Fd	Cornus Florida	Flowering Dogwood	18" Tall Saplings	4' on centers - See Detail on Sheet OMIT-2		44
Bb	Myrica pensylvanica	Bayberry	18" Tall Saplings	4' on centers - See Detail on Sheet OMIT-2		45
Hc	Viburnum opulus	Highbush Cranberry	18" Tall Saplings	4' on centers - See Detail on Sheet OMIT-2		42
Po	Quercus palustris	Pin Oak	18" Tall Saplings	20' on centers	See Legend	12



LEGEND

	PHOTO LOCATION		BUTTONBUSH		FLOWERING DOGWOOD
	RED CHOKEBERRY		BAYBERRY		HIGHBUSH CRANBERRY
	BLACK CHOKEBERRY		PIN OAK		

0 50' 100'

Drawing Scale:
1" = 50'

NOT FOR CONSTRUCTION

ISSUED FOR TWP. SUBMISSION

Waterford Corporate Park III, Suite 101
2000 Georgetown Drive
Sewickley, PA 15143
P: 724-444-1100
F: 724-444-1104
www.pve-nc.com



Civil Engineering | Land Development | Structure Design
Land Planning | Landscape Architecture | Environmental

Prepared For:
Village At Marketplace, LLC
2000 Georgetown Drive, Suite 100
Sewickley, PA 15143

THIS PLAN HAS BEEN PREPARED SOLELY FOR THE BENEFIT OF THE PERSONS NAMED ABOVE AND FOR THE PROJECT NOTED ON THE DRAWING. THE USER OF THIS PLAN BY ANY THIRD PARTY, OR FOR ANY OTHER PURPOSE OTHER THAN SPECIFIED, IS PROHIBITED WITHOUT WRITTEN CONSENT FROM PVE ENGINEERING.

811 Know what's below.
Call before you dig.
POCS SER. # _____

THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND ACCEPTS TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCURRED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

DATE ISSUED: **NOVEMBER 7, 2018**

PLAN REVISIONS

DATE	DESCRIPTION
1-2-19	REV PER TWP & LSSE COMMENT LETTERS
2-3-19-19	REV PER LSSE COMMENT LETTER
3	
4	
5	
6	
7	
8	
9	
10	

Situate In:
Moon Township, Allegheny County, PA

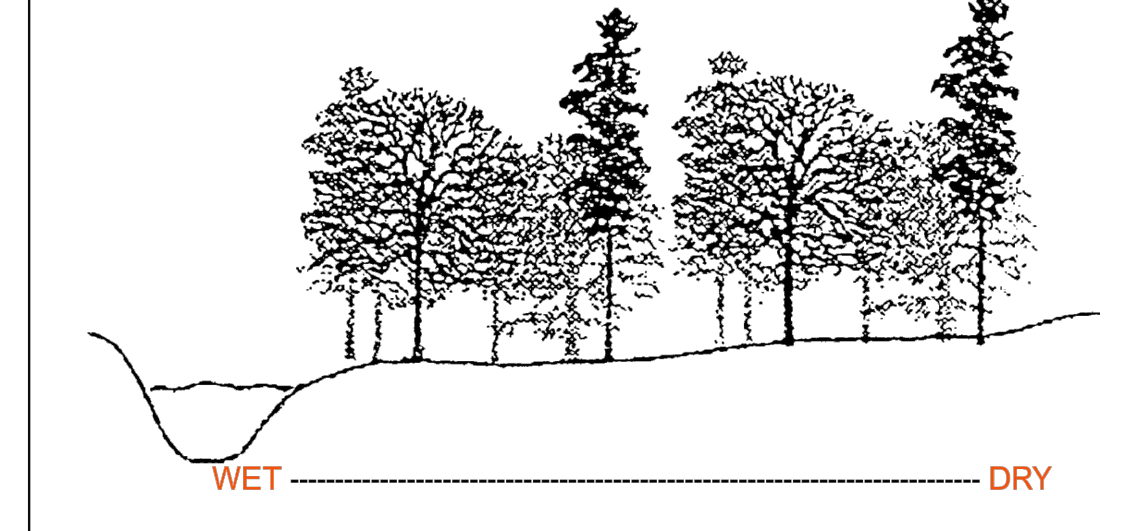
Project Name:
**VILLAGE AT MARKETPLACE
RESIDENTIAL LAND DEVELOPMENT**

Drawing Name:
OFFSITE MITIGATION PLAN

Project No:
161459

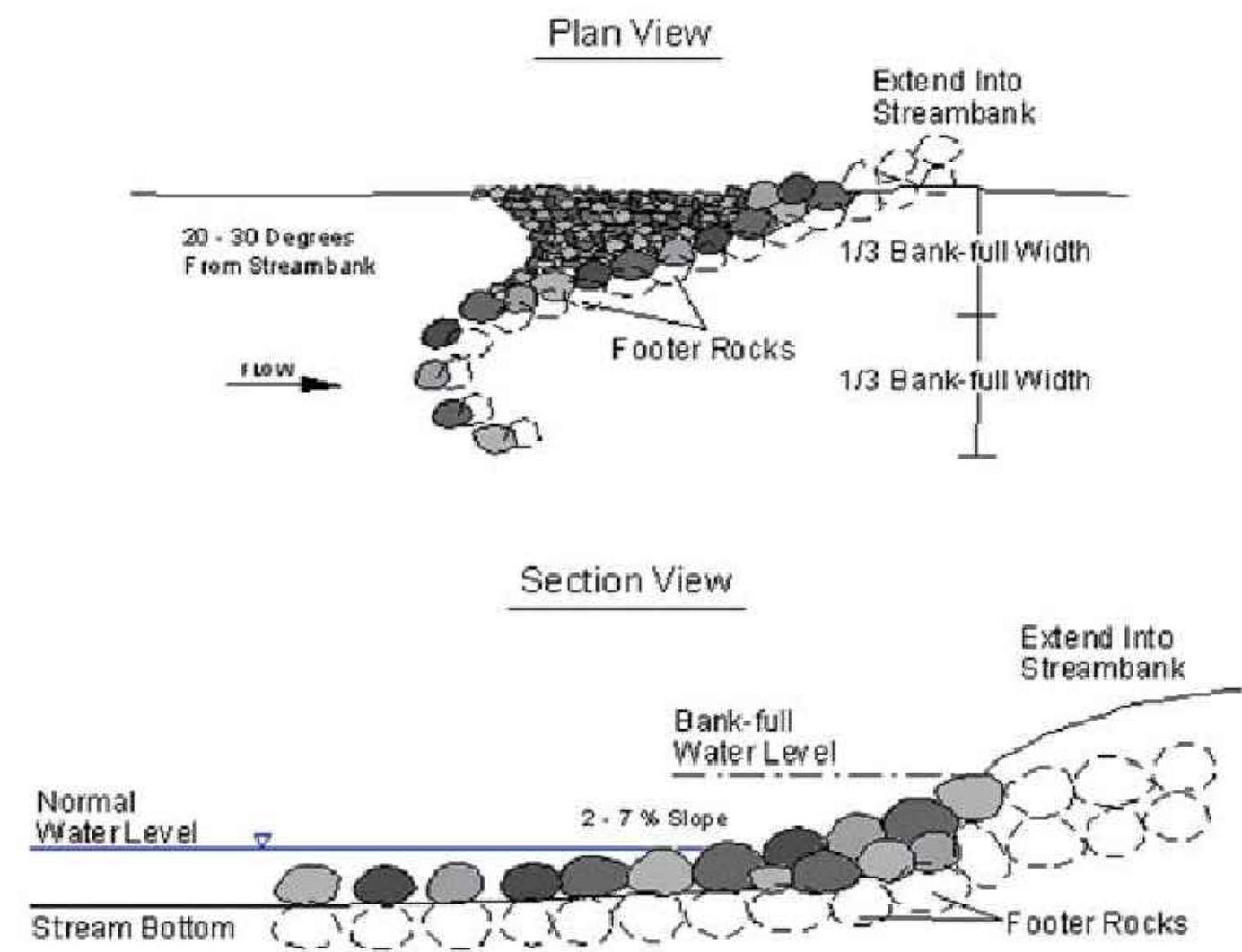
Drawing No:
OMIT 1

Figure 5. Sample Planting Recommendations According to Moisture Conditions



<p>TREES</p> <ul style="list-style-type: none"> Silver Maple Box Elder Persimmon → Black Ash Red Ash Pawpaw → Sweet-bay Magnolia Sycamore → Cottonwood Swamp White Oak Oak, Willow → Willow, Sandbar & Black <p>SMALL TREES/SHRUBS</p> <ul style="list-style-type: none"> River Birch Smooth Alder Chokeberry, Red Chokeberry, Black → Groundselbush Dogwood, Red Osier & Silky Summersweet → Winterberry → Inkberry → Swamp Rose Swamp Azalea Meadowsweet → Highbush Blueberry → Witcherd → N. Arrowwood 	<p>TREES</p> <ul style="list-style-type: none"> Maple, Red → Bitternut Hickory → Redbud → Hackberry → American Beech → Ash, White → Honey Locust → Kentucky Coffee Tree → Sweet-gum Tulipree → Black-gum → Large-toothed Aspen → Oak, Pin → <p>SMALL TREES/SHRUBS</p> <ul style="list-style-type: none"> Black/Sweet Birch → Mountain Laurel → Hornbeam → Yellow Birch → Shadbush (A. arborea & canadensis) → Dogwood, Gray & Flowering → Fringe Tree → American Hazelnut → Black Huckleberry Common Spicebush → Rosebay Rhododendron Southern Arrowwood Ninebark American Elder → Bayberry → Highbush Cranberry → Red Elm 	<p>TREES</p> <ul style="list-style-type: none"> White Pine Black Cherry Sassafras Canada Hemlock Oak, White Oak, Red Oak, Chestnut Hickory, Shagbark Maple, Sugar Black Walnut <p>SMALL TREES/SHRUBS</p> <ul style="list-style-type: none"> Hop-hornbeam Witchhazel Staghorn Sumac Nannyberry Blackhaw <p>Arrows denote that certain species can tolerate either a wetter or drier environment.</p>
--	--	--

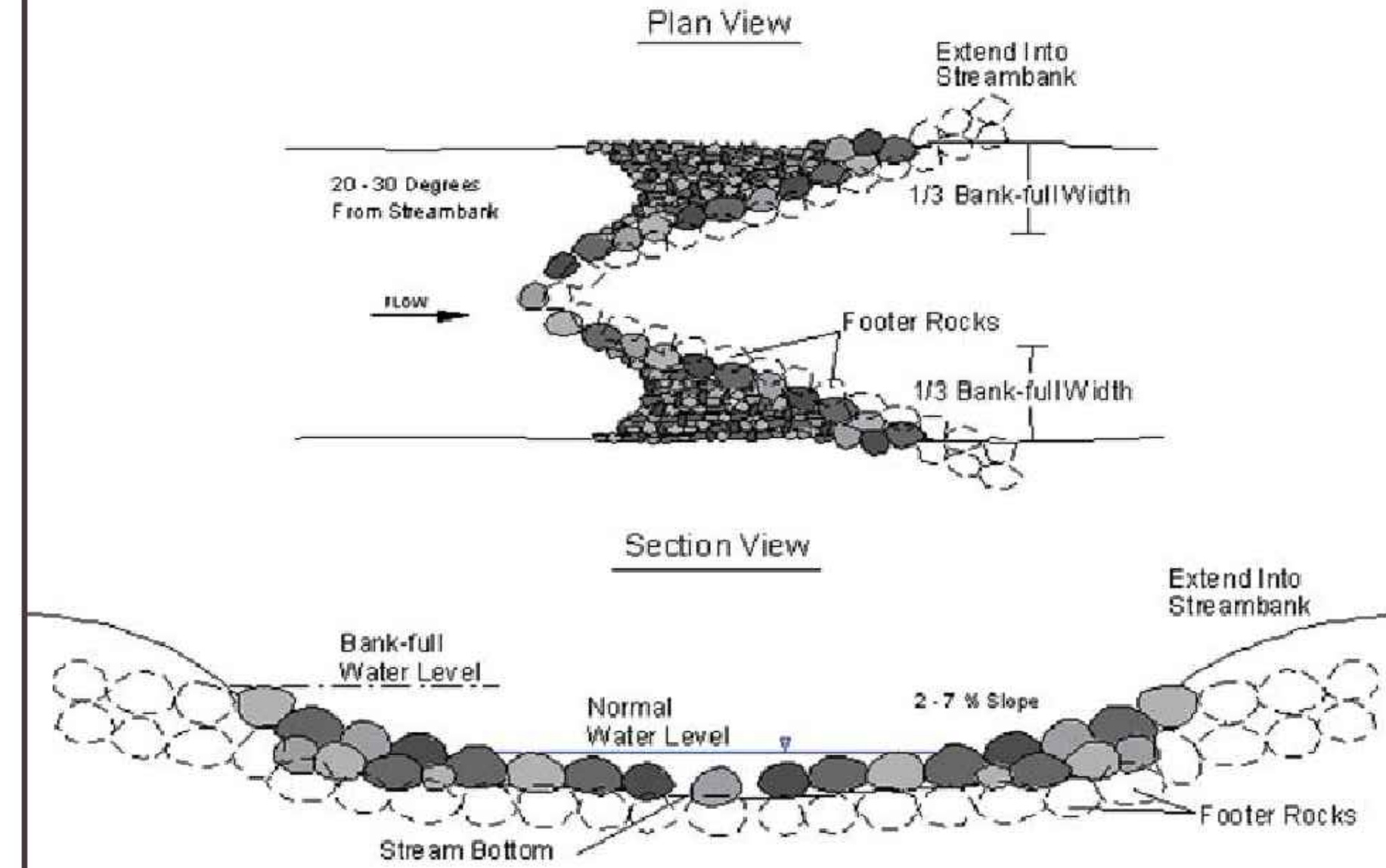
J-HOOK ROCK VANE DEFLECTOR



J-HOOK ROCK VANE DEFLECTOR DETAIL

NOT TO SCALE
SOURCE: PA FISH AND BOAT COMMISSION

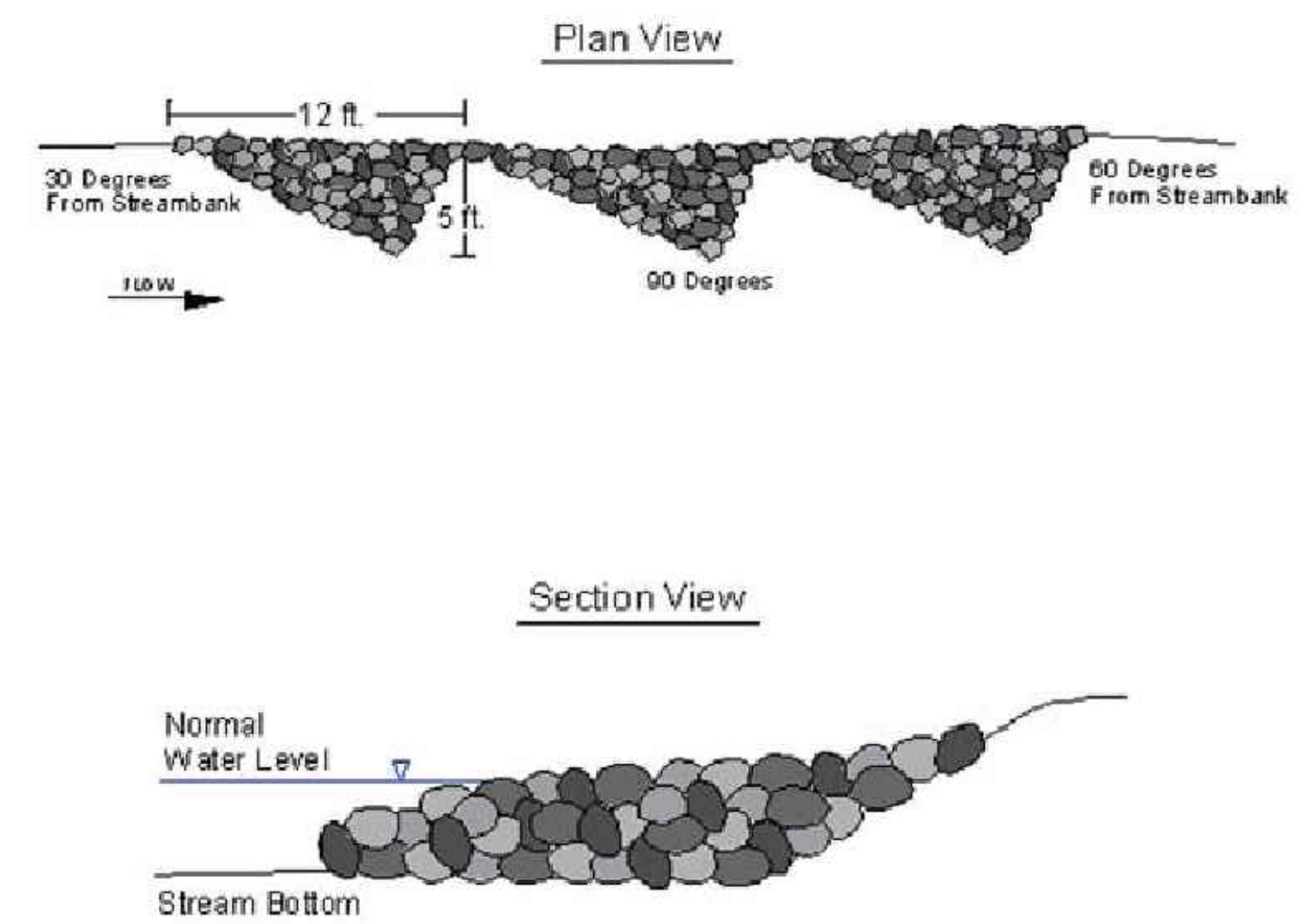
**ROCK CROSS VANE
(LOW FLOW CHANNEL STRUCTURE)**



ROCK CROSS VANE DETAIL

NOT TO SCALE
SOURCE: PA FISH AND BOAT COMMISSION

SAW-TOOTH DEFLECTORS

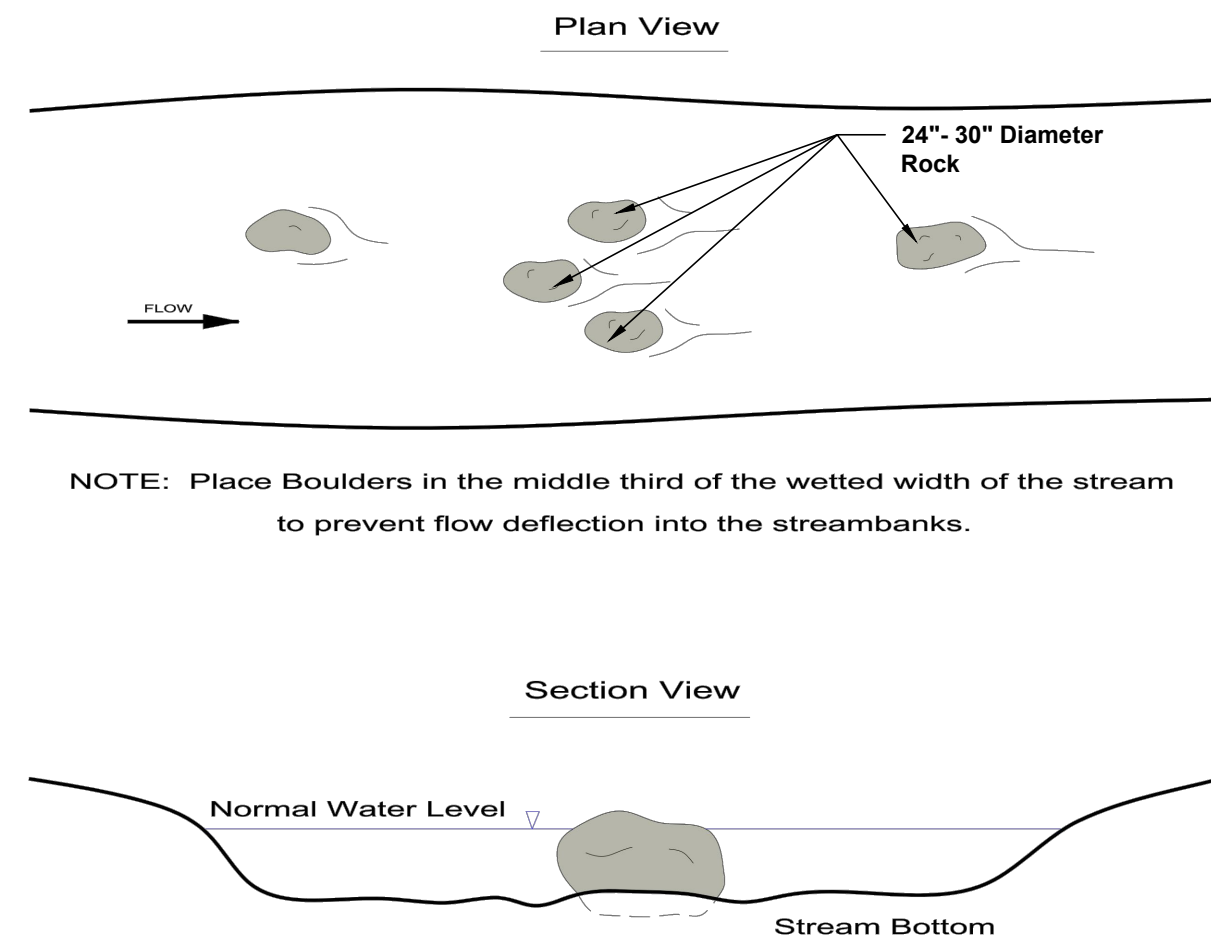


SAWTOOTH DEFLECTOR DETAIL

NOT TO SCALE
SOURCE: PA FISH AND BOAT COMMISSION

RANDOM BOULDER PLACEMENT

NOTE: SEE SHEET OMIT-1 FOR BOULDER PLACEMENT



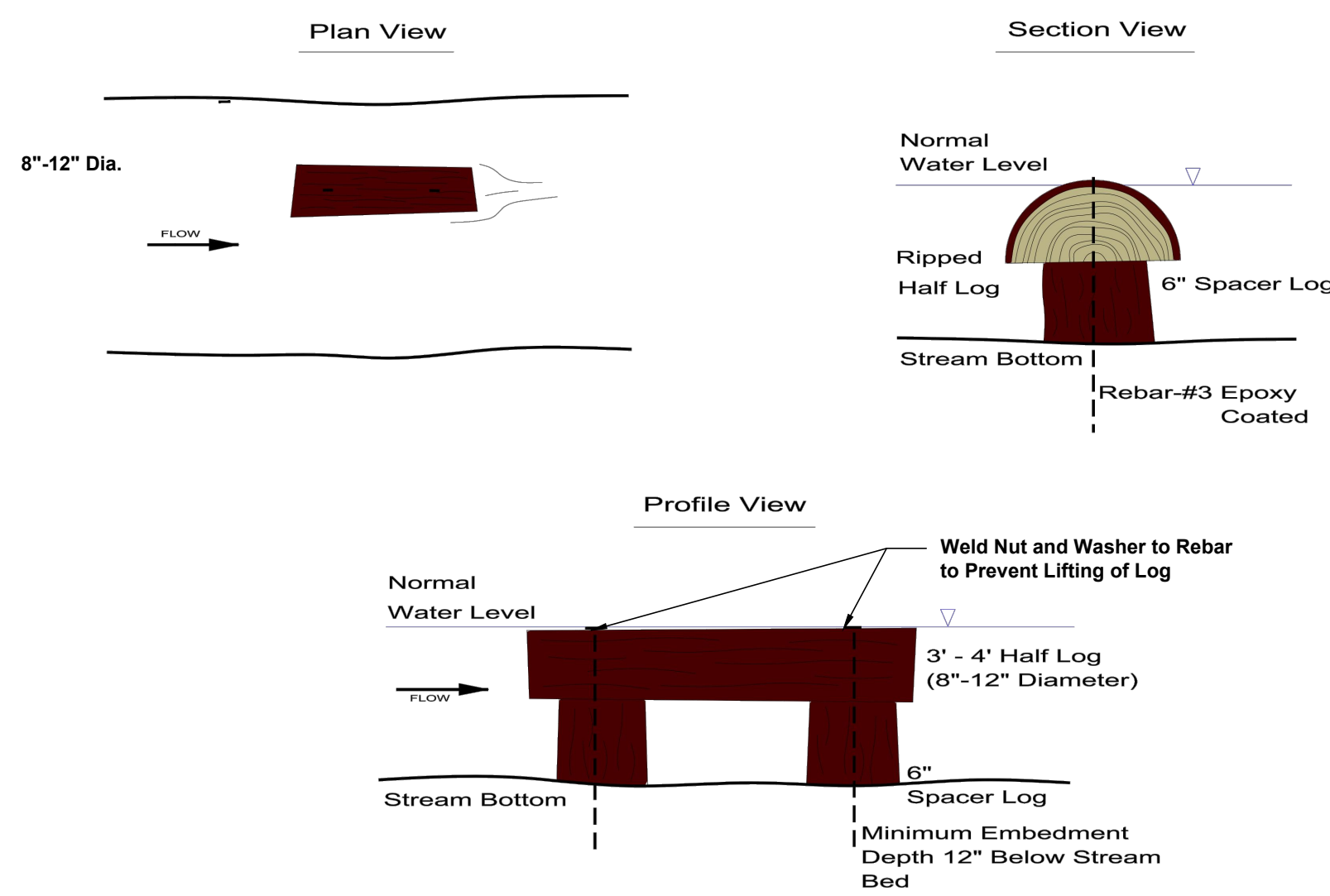
NOTE: Place Boulders in the middle third of the wetted width of the stream to prevent flow deflection into the streambanks.

NOTE: Boulder should match existing substrate and be large enough not to be displaced during high flow periods.

RANDOM BOULDER PLACEMENT DETAIL

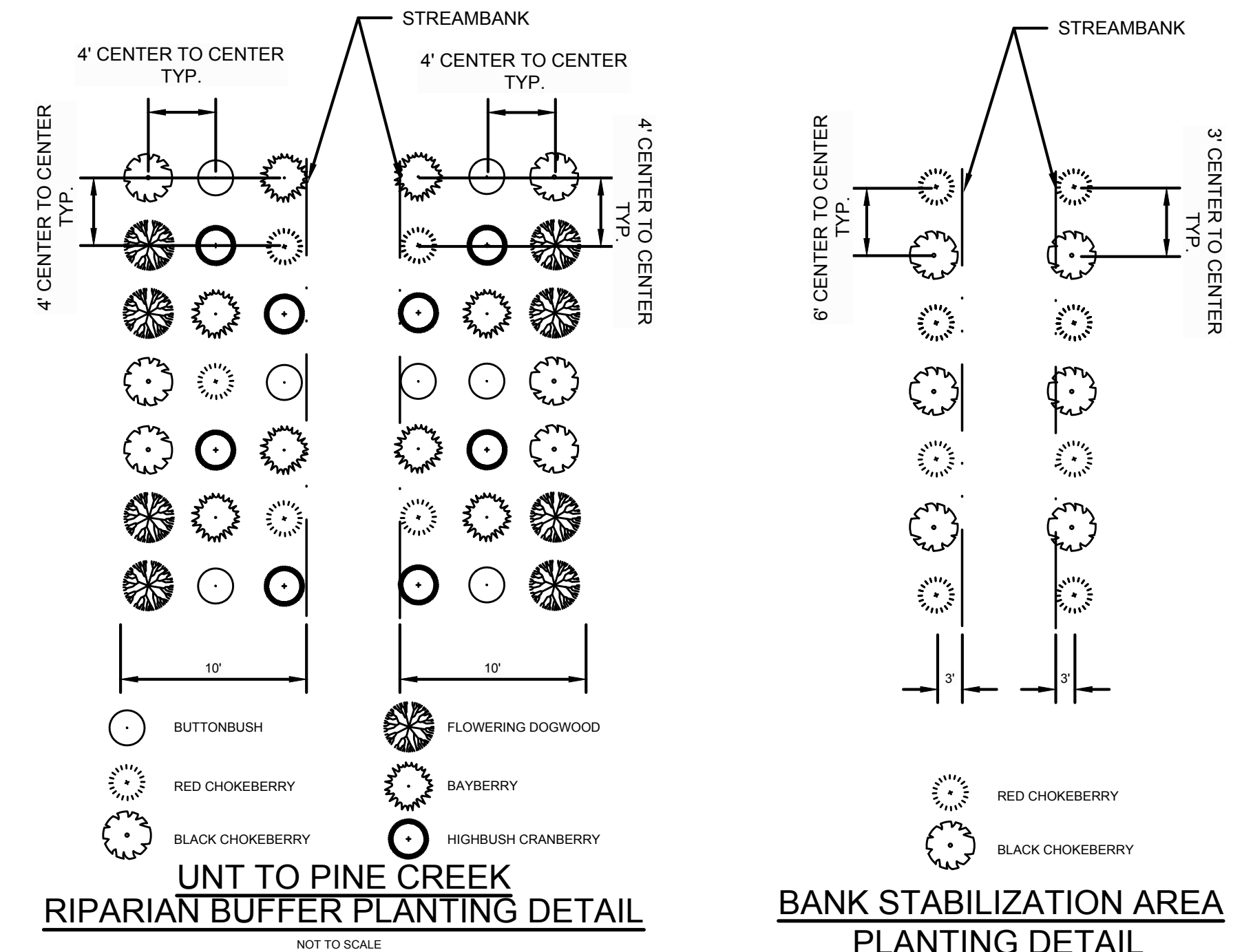
NOT TO SCALE
SOURCE: PA FISH AND BOAT COMMISSION

HALF LOG STRUCTURE



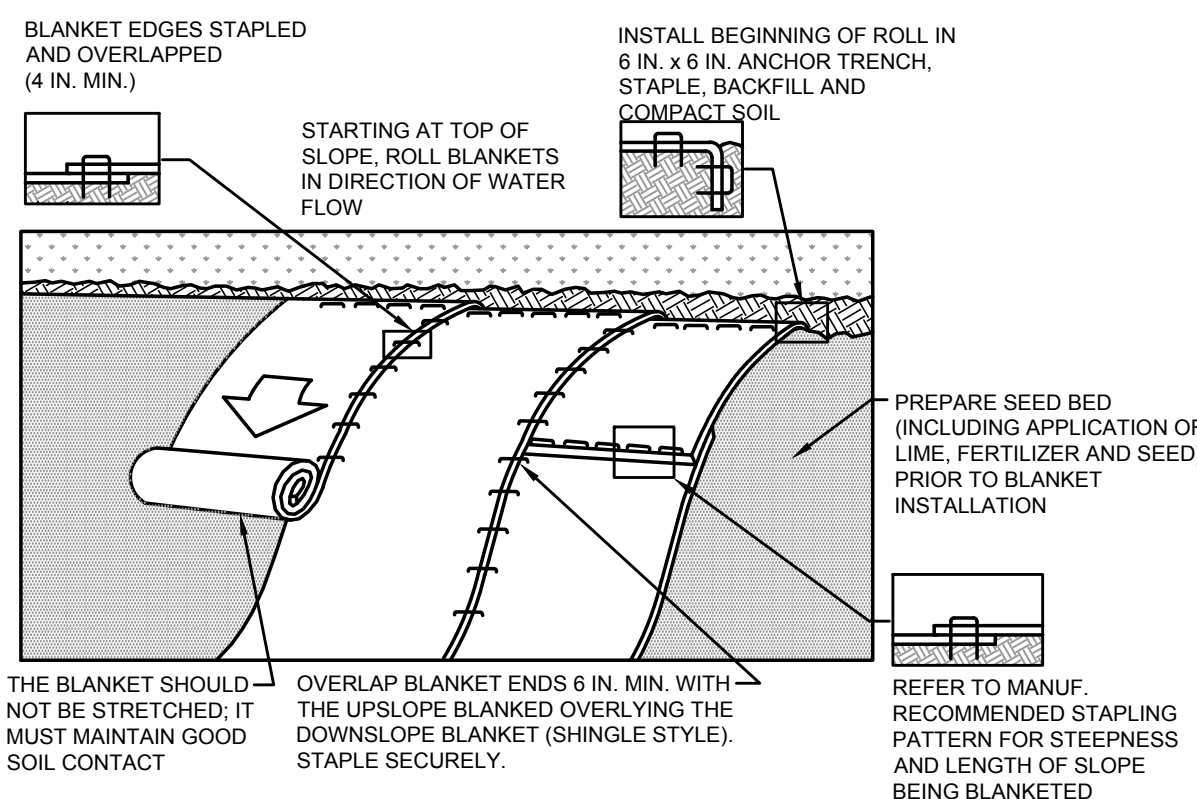
HALF LOG STRUCTURE DETAIL

NOT TO SCALE
SOURCE: PA FISH AND BOAT COMMISSION



**UNT TO PINE CREEK
RIPARIAN BUFFER PLANTING DETAIL**

**BANK STABILIZATION AREA
PLANTING DETAIL**



**STANDARD CONSTRUCTION DETAIL #11-1
EROSION CONTROL BLANKET INSTALLATION**

NOT TO SCALE

NOTES:

SEED AND SOIL AMENDMENTS SHALL BE APPLIED ACCORDING TO THE RATES IN THE PLAN DRAWINGS PRIOR TO INSTALLING THE BLANKET.

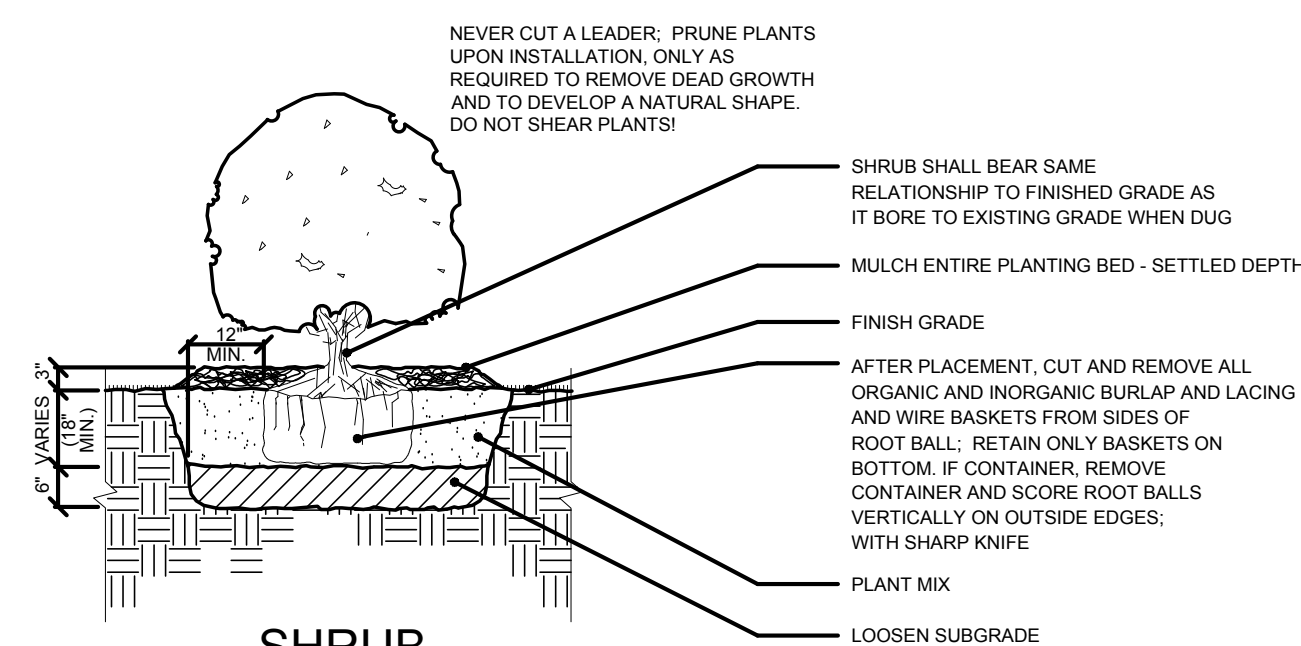
PROVIDE ANCHOR TRENCH AT TOE OF SLOPE IN SIMILAR FASHION AS AT TOP OF SLOPE.

SLOPE SURFACE SHALL BE FREE OF ROCKS, CLODS, STICKS, AND GRASS.

BLANKET SHALL HAVE GOOD CONTINUOUS CONTACT WITH UNDERLYING SOIL THROUGHOUT ENTIRE LENGTH. LAY BLANKET LOOSELY AND STAKE OR STAPLE TO MAINTAIN DIRECT CONTACT WITH SOIL. DO NOT STRETCH BLANKET.

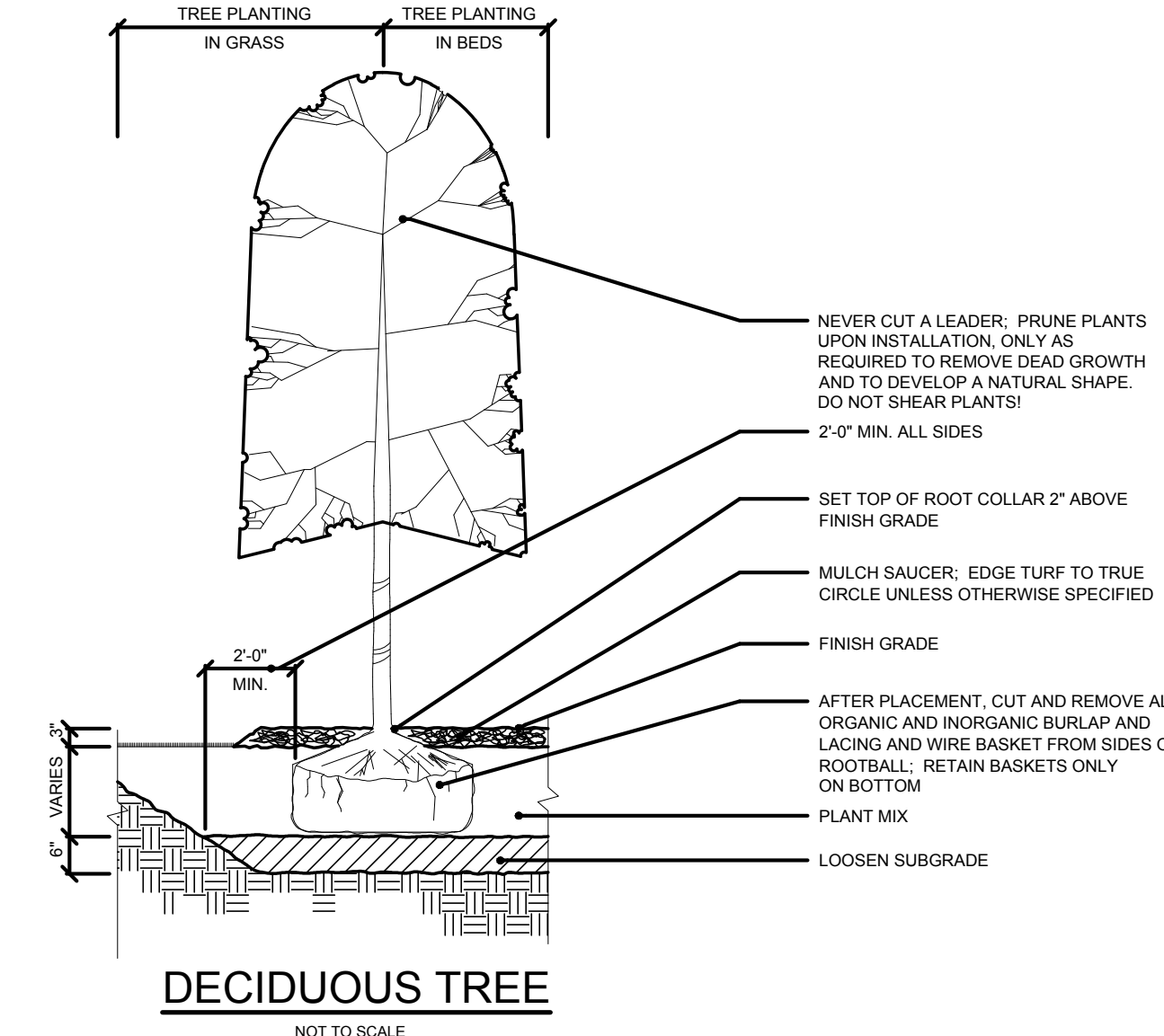
THE BLANKET SHALL BE STAPLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

BLANKETED AREAS SHALL BE INSPECTED WEEKLY AND AFTER EACH RUNOFF EVENT UNTIL PERENNIAL VEGETATION IS ESTABLISHED TO A MINIMUM UNIFORM 70% COVERAGE THROUGHOUT THE BLANKETED AREA. DAMAGED OR DISPLACED BLANKETS SHALL BE RESTORED OR REPLACED WITHIN 4 CALENDAR DAYS.



SHRUB

NOT TO SCALE



DECIDUOUS TREE

NOT TO SCALE

Drawing Scale:
N.T.S.

**NOT FOR
CONSTRUCTION**

ISSUED FOR TWP. SUBMISSION

Waterford Corporate Park III, Suite 101
2020 Georgetown Drive
Sewickley, PA 15143
P: 724-444-1100
F: 724-444-1104
www.pve-llc.com



Civil Engineering | Land Development | Structure Design
Land Planning | Landscape Architecture | Environmental

Prepared For:
Village At Marketplace, LLC
2000 Georgetown Drive, Suite 100
Sewickley, PA 15143

THIS PLAN HAS BEEN PREPARED SOLELY FOR THE BENEFIT OF THE PERSONS NAMED HEREIN AND FOR THE PROJECT NOTED ON THE DRAWING. THE USE OF THIS PLAN BY ANY THIRD PARTY, OR FOR ANY OTHER PURPOSE OTHER THAN SPECIFIED, IS PROHIBITED WITHOUT WRITTEN CONSENT FROM PVE ENGINEERING.



THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGENCY TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCURRED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

DATE ISSUED: **NOVEMBER 7, 2018**

PLAN REVISIONS	
DATE	DESCRIPTION
1-2-19	REV PER TWP & LSSE COMMENT LETTERS
2-3-19-19	REV PER LSSE COMMENT LETTER
3	
4	
5	
6	
7	
8	
9	
10	

Situate In:
Moon Township, Allegheny County, PA

Project Name:
**VILLAGE AT MARKETPLACE
RESIDENTIAL LAND DEVELOPMENT**

Drawing Name:
OFFSITE MITIGATION DETAILS

Project No: **161459**
Drawing No: **OMIT 2**



MITIGATION PLAN

VILLAGE AT MARKETPLACE

SITUATE IN:

MOON TOWNSHIP
ALLEGHENY COUNTY, PENNSYLVANIA

PREPARED FOR:

Village at Marketplace, LLC
2000 Georgetowne Drive, Suite 100
Sewickley, PA 15143

161459

August 30, 2019

Revised June 15, 2020

*Waterfront Corporate Park III – 2000 Georgetowne Drive – Suite 101 – Sewickley, PA 15143
Phone: 724-444-1100 - Fax: 724-444-1104*

MITIGATION PLAN

VILLAGE AT MARKETPLACE

MOON TOWNSHIP, ALLEGHENY COUNTY

TABLE OF CONTENTS

- 1.0 PROJECT LOCATION AND SITE DESCRIPTION
- 2.0 AQUATIC RESOURCE OVERVIEW
- 3.0 AQUATIC RESOURCE IMPACTS ASSESSMENT & MITIGATION REQUIREMENTS
- 4.0 WATERCOURSE MITIGATION OBJECTIVES
- 5.0 IDENTIFICATION OF POTENTIAL STEAM MITIGATION STRATEGIES/MITIGATION BASELINE INFORMATION
- 6.0 MITIGATION WORK PLAN
 - A. Low Bank Plantings
 - B. High Bank Plantings
 - C. Riparian Buffer
- 7.0 SITE CONSTRUCTION SEQUENCE
- 8.0 MAINTENANCE PLAN
- 9.0 MONITORING REQUIREMENTS/PERFORMANCE STANDARDS
 - 9.1 Completion/Inspection Report
 - 9.2 Monitoring Requirements
 - 9.3 Monitoring Plan
 - A. Low/High Bank Plantings
 - B. Riparian Buffer

- 10.0 ADAPTIVE MANAGEMENT PLAN
- 11.0 LONG TERM PROTECTION OF COMPENSATORY MITIGATION

APPENDIX

- A. MITIGATION PLANS
- B. RIVERINE CONDITIONS INDEX CALCULATIONS
- C. PLANTING INFORMATION
- D. MODEL DEED RESTRICTION

**MITIGATION PLAN
VILLAGE AT MARKETPLACE
MOON TOWNSHIP, ALLEGHENY COUNTY**

1.0 PROJECT LOCATION AND SITE DESCRIPTION

The project site is located approximately 1,500 feet northwest of Market Place Boulevard and Montour Run Road intersection, and between Interstate 376 and Hirshinger Road, in Moon Township, Allegheny County, Pennsylvania (see Figure 1). The existing site is mostly undeveloped and is largely wooded with a mixture of deciduous and evergreen vegetation with rolling topography and streams within the low points.

2.0 AQUATIC RESOURCE OVERVIEW

WETLANDS

There are no identified wetlands on the subject property.

STREAMS

Several watercourses were delineated on the project site. Watercourse R003 has a drainage area greater than 100 acres. The contributory drainage area to each of the remaining watercourses is less than 100 acres. Refer to the “Aquatic Resources Impacts and Assessments” Section below for the required stream impacts.

WC R001 is an ephemeral/intermittent, unnamed tributary that flows south to an existing culvert. WC R002 is an intermittent, unnamed tributary and flows west offsite. WC R003 is a perennial, unnamed tributary and borders the site to the southwest. WC R003A, R003C, R003C-1, R003C-2 and R003C-3 flow west into R003. R003B flows south into R003. R003D flows southwest into R003. WC R004 flows southwest offsite. WC R002, R003, R003A, R003B, R003D and R004 will not be disturbed. The HUC 8 for the impacted stream is HUC 8- 05030101.

3.0 AQUATIC RESOURCE IMPACTS ASSESSMENTS & MITIGATION REQUIREMENTS

The designer of the project has analyzed alternatives to avoid and/or minimize the proposed stream impacts (please refer to the Alternatives Analysis section of the Joint Permit Application).

A summary of all of the proposed, unavoidable impacts is below.

IMPACT AND MITIGATION SUMMARY TABLE

ENCROACHMENT AREA NO.	STREAM	CAUSE/TYPE	STREAM IMPACT (LF/ /CLASS
1	WC R001	Road/Perm	331/ Ephemeral
2	WC R003C	Road//Lots/Perm	1,164/ Intermittent

3	WC R003C-1	Road//Lots/Perm	650/ Intermittent
4	WC R003C-2	Road//Lots/Perm	121/ Ephemeral
5	WC R003C-3	Road//Lots/Perm	31/Ephemeral
6	WC R001	Road//Lots/Perm	926/ Intermittent
TOTAL			3,223

As utilized with previous permits approved by the Pittsburgh District Corps of Engineers, impacts to streams can be mitigated by enhancing a similar stream at a 3: 1 ratio (enhanced: impacted) for impacts to perennial watercourses, 2:1 for impacts to intermittent watercourses, and 1:1 for impacts to ephemeral watercourses. As detailed above, the project proposes to impact: 483 LF of an ephemeral watercourse and 2,740 LF of intermittent watercourses.

The following table presents the project's mitigation requirements.

MITIGATION AREA NO.	STREAM	REQUIRED STREAM MITIGATION	MITIGATION METHOD
1	R001	* **Enhance 331 LF	Floodplain Reconnection Bank Stabilization In-stream Structures Riparian Buffer Plantings
2	WC R003C	*Enhance 2,328 LF	Floodplain Reconnection Bank Stabilization In-stream Structures Riparian Buffer Plantings
3	WC R003C-1	*Enhance 1,300 LF	Floodplain Reconnection Bank Stabilization In-stream Structures Riparian Buffer Plantings
4	WC R003C-2	*Enhance 121 LF	Floodplain Reconnection Bank Stabilization In-stream Structures Riparian Buffer Plantings
5	WC R003C-3	*Enhance 31 LF	Floodplain Reconnection Bank Stabilization In-stream Structures Riparian Buffer Plantings
6	WC R001	*Enhance 1,852 LF	Floodplain Reconnection Bank Stabilization
		5,963 LF	

* Mitigation is provided on WC R003/WC R003B and offsite

4.0 WATERCOURSE MITIGATION OBJECTIVES

The objective of the watercourse mitigation plan is to provide compensatory mitigation for the proposed impacts to the watercourses of the site. Enhancement of the existing streams is anticipated to increase the Riverine Condition Index of the selected streams. Refer to the table below for a comparison of pre-mitigation and post mitigation conditions.

RIVERINE CONDITION INDEX (RCI) COMPARISON

MITIGATION STREAM	PRE MITIGATION RCI	POST MITIGATION RCI
WATERCOURSE R003 (ON-SITE)	0.73	0.78
WATERCOURSE R003B (ON-SITE)	0.51	0.59
WATERCOURSE UNT 1 (OFFSITE)	0.29	0.34
WATERCOURSE PINE CREEK (OFFSITE)	0.67	0.71

5.0 IDENTIFICATION OF POTENTIAL STREAM MITIGATION STRATEGIES / MITIGATION AREA BASELINE INFORMATION

The existing topography of the site and the design of the development do not allow for the creation of compensatory stream construction or for stream relocation. Therefore, various forms of stream enhancement and/or habitat improvement of the Site's streams and riparian zones were considered.

The topography and the habitat types of the Site were investigated to identify areas within and/or along the Site's streams where floodplain areas could be created and/or expanded and where the value and composition of the riparian zone could be improved. Mitigation opportunities are present along the existing streams R003 and R003B onsite.

The Town of McCandless was approached by the applicant searching for a stream corridor in need of rehabilitation. The Town showed interest as they are looking for large scale pollution prevention efforts to alleviate sediment loading and pollutant runoff to Pine Creek and its tributaries. The Town was informed that his interest was based on a Pennsylvania Department of Environmental Protection (DEP) and US Army Corps of Engineers mitigation requirement for disturbance proposed on another site in Allegheny County. Three sites in the Town of McCandless were investigated as possible sites for mitigation efforts.

Wall Park

The first area considered for offsite mitigation within the Town of McCandless is located adjacent to Wall Park along Sloop Road. Approximately 1,000 LF of stream abuts Sloop Road between the road and the park. Originally, this area was selected for possible riparian buffer plantings and stream bank stabilization. Portions of the shoulder of Sloop Road are shared with the stream bank. While some areas are in need of streambank stabilization and reconstruction, not enough linear footage of areas to be repaired exist at this location. Riparian buffer plantings at this area were not advisable, as the left descending bank is steep and in close proximity to the roadway. Planting in these areas could result in sight distance hazards and future hazards from falling limbs or trees. The right descending bank is well vegetated with native and non-invasive species and therefore should not be disturbed.

Stonebrook Residential Development-

Another site in need of stream restoration/ rehabilitation is the Stonebrook development along Village Drive, east of Rochester Road. Approximately 1,500 LF of stream exists onsite that is in need of repair or rehabilitation. Several areas are severely eroded resulting in vertical streambanks and in some cases, the erosion is beginning to threaten the foundations of nearby residences. Please refer to the Mitigation Area Selection Photos sections of this narrative. While in need of repair/rehabilitation, this site was not chosen as a mitigation option as safe access of trucks and machinery needed to complete the repair would be difficult in most places. Additionally, all work would have to be authorized and coordinated with not only PADEP , the Army Corps and the Town, but with the homeowners association and residents as well.

Public Works/Devlin Park-

The third site that was investigated was the areas of the Town of McCandless Public Work/ Devlin Park. The inquiry prompted immediate interest from the Town's Council and staff as there is a tributary that feeds Pine Creek adjacent the Town's Public Works Facility and Municipal Building that is in need of remediation as well as areas of Pine Creek that need remediation.

Pine Creek is subject to flooding conditions due, in part, to development activity over the years. Pine Creek has experienced significant streambank erosion which only exacerbates the flooding problems both on site at the Municipal Building and downstream including North Park Lake. Erosion of the streambanks reduces floodway and floodplain capacities, leads to higher sediment loading which can harm fish species, dislodge and displace invertebrates and macroinvertebrates and deposit them downstream. The Town is working to control stormwater generated from development activity. However, stream restoration efforts are also needed. In addition to the erosion and sedimentation and aquatic life issues, the Town has set out a plan to reduce pollution through its Multiple Separate Storm Sewer System (MS4) permit work.

Mitigation Area Baseline Information

On Site Mitigation Areas

- **Watercourse R003 – HUC 8-05030101** This watercourse is a low gradient, well formed, perennial stream that bisects the proposed development site. The surrounding riparian areas consists of well established hardwoods (Maple and Cherry) with little to no understory. The former floodplain has been cut off from regular surface water communication with the stream by deposits from numerous past flood events.

- **Watercourse R003B- HUC 8-05030101** Watercourse 3B is a high gradient, intermittent stream that flows north to south across the site. This stream has experienced significant stream bank erosion throughout and is incised with near vertical stream banks.

On Site Mitigation Areas

- **UNT 1 to Pine Creek- HUC 8- 05010009** Watercourse UNT 1 to Pine Creek is a medium gradient, intermittent stream bisecting the Town of McCandless Public Works facility. UNT 1 is adjacent to the Town salt storage facility and Town Hall. The majority of the salt storage area drains to existing PSCM facilities. The banks of the tributary are dominated by invasive species such as Autumn Olive and Bush Honeysuckle. The lower portion of the stream, as with other watercourses in the area, has significant stream bank erosion.
- **Pine Creek- HUC 8- 05010009** This watercourse is a low gradient, well formed, perennial stream that borders the proposed development site. The surrounding riparian areas consist of steep wooded slopes on the right descending bank. A soccer field is located upslope of these wooded areas. The left descending bank is adjacent to park facilities, athletic fields and maintained lawn areas. Areas of the LDB have experienced erosion and are near vertical and threatening the nearby baseball fields and park facilities. Additionally, this area is frequently used recreationally for fishing.

6.0 MITIGATION WORK PLAN

6.1 On Site Mitigation

Two forms of watercourse mitigation are being proposed along reaches of R003 (perennial) and R003B (intermittent):

1. Remove existing berm adjacent to stream to re-establish the floodplain and repurpose a sediment basin as a wetland area.
2. Streambank stabilization along the eroded banks of WC R003B.

A. Floodplain Reconnection

Areas of floodplain reconnection will be created along reaches of WC R003 where practicable considering the existing topography and the proposed design of the site.

The stream channel is incised below the existing bank grades and a berm has formed between the stream channel and the previous floodway area. The reconnection areas will be graded to create a relatively flat floodplain area that will be planted with trees matching the surrounding forested area consisting of Sugar Maple and Black Cherry. The stream areas on site lack a usable floodplain, so removing the existing berms and creating a floodplain area along the main channel will add needed stormwater storage areas and improve the general habitat characteristics of the adjacent and downgradient stream reaches. Allowing the natural flooding and receding of these newly created areas will improve habitat but allowing natural substrate to move into the area creating new habitat for macroinvertebrates and species. Additionally, enlarging the floodplain area will provide flood storage areas, helping to alleviate upstream and downstream flooding. Included in the floodplain reconnection is the repurposing of a proposed sediment basin as a wetland.

The floodplain reconnection area will consist of graded areas from the high water mark to the grades shown on the plans (MIT-1). Prunus serotina (Black Cherry) and Acer saccharum (Sugar Maple) whips will be planted in the newly graded area 20 foot on centers (Refer to Sheet MIT-2 for the planting detail). The floodplain will be planted with a floodplain seed mix (ENRMX-154) at a rate of 20 lbs per acre. Per manufacturers' recommendations, a cover crop of grain rye at 30 lbs. per acre will also be planted. Stream locations are as follows:

The sediment basin area will have collected sediment and erosion and sedimentation control appurtenances removed and disposed of after the site is stabilized. The berm will be removed and the basin floor will be compacted to 85% and 4 inches of topsoil added. The wetland area will be planted with a wetland seed mix (ENRMX-128) at a rate of 20 lbs per acre. Per manufacturers' recommendations, a cover crop of grain rye at 30 lbs. per acre will also be planted. Stream locations are as follows:

FLOODPLAIN RECONNECTION	
WC R003- ON SITE MITIGATION	
Left Descending Banks	Section 1: 1+59 to 10+14 (855 LF) Wetland: 10+14 to 12+28 (214 LF) Section 2: 12+68 to 27+87 (1,519 LF)

Approximately 2,588 LF of the WC R003 stream channel is adjacent to the proposed, created floodplain areas.

The constructed floodplain areas will indirectly benefit stream channel downstream (to the property boundary and beyond) by removing stormwater from the floodplain, reducing bank erosion and associated sediment transport, pollutant removal, increased habitat and bank stabilization from the new vegetative root systems. A wide, flat floodplain will also provide opportunity for absorption and infiltration of flood flows, resulting in groundwater recharge.

The proposed Floodplain Reconnection will directly and indirectly enhance and improve approximately 2,787 LF of the WC R003 stream channel.

B. Streambank Stabilization

While the area surrounding WC 003B is wooded, it lacks any woody understory along the stream banks and is experiencing erosion and incision into the existing ground.

In the majority of areas, bare roots are exposed within the banks of the streams. Pyramat erosion control blanketing will provide stabilization through protecting vegetated root systems, thereby decreasing downstream sediment load and increasing the value and function of the existing streams. Red and Black Chokeberry will be planted on the stream bank on 3' centers for added erosion protection.

Stream locations are as follows:

STREAMBANK STABILIZATION	
WC R003B – ON SITE MITIGATION	
Left Descending Bank Right Descending Bank	WC R003B Section 1: 0+00 to 6+65 (665 LF)

Approximately 665 LF of the existing stream channels is adjacent to the proposed bank planting areas.

The stabilization areas will benefit 665 LF of stream channel downstream (to the confluence and beyond) reducing bank erosion and associated sediment transport, pollutant removal, increased habitat and bank stabilization from the new vegetative root systems

6.2 Off Site Mitigation

Two forms of watercourse mitigation are being proposed along reaches of Pine Creek (perennial) and an Unnamed Tributary to Pine Creek (intermittent):

1. Removal of existing invasive Bush Honeysuckle and Autumn Olive and installation of native riparian buffer plants.
2. Streambank stabilization along the eroded banks of Pine Creek and the UNT
3. Construction of in-stream structures including J-hooks, rock cross vanes, saw tooth deflectors and boulder placement.

A. Riparian Buffer Construction

Currently, the area for the proposed riparian buffer is populated by invasive species such as Autumn Olive and Bush Honeysuckle. The invasive species are to be removed when necessary and replaced with native riparian plantings. The existing Riparian Buffer is dominated by Autumn Olive, an invasive species in Pennsylvania and one capable of nitrogen fixation. Nitrogen fixation results in the leaching of nitrates from the root system and into the ground water and adjacent stream. High nitrogen levels can cause algal blooms and can be detrimental to a variety of fish species. This is important as this site is immediately upstream of North Park Lake, which is annually stocked with several fish species. Nitrates are one of the three target pollutants to be removed for water quality in Pennsylvania so removal of this invasive species will help to lower nitrate leaching into the UNT to Pine Creek and affecting the downstream habitat and recreational uses of the stream and North Park Lake. Bush Honeysuckle is listed by the PA DCNR as an invasive species as well. Removing this invasive from the area will provide space for a species more beneficial to the surrounding habitat and wildlife to be planted.

The proposed riparian buffer planting areas are adjacent to the Town Public Works parking and operations area and the salt storage facility and along an area of Pine creek that has had the vegetation removed in the past. The riparian buffers will consist of 18” Red Chokeberry, Black Chokeberry and Buttonbush, Bayberry, Highbush Cranberry, Flowering Dogwood and Pin Oak at the locations shown on the plans (OMIT-1). The methodology of the proposed plant selection is detailed below:

The majority of the salt storage area drains to two existing rain gardens where the runoff will be treated before being discharged to Pine Creek. The proposed riparian buffer planting area is partially tributary to the parking lots used as the salt storage facility. While the main area does not drain to the UNT to Pine Creek. It does experience runoff from the adjacent access road and parking lot. With this in mind, the proposed species were selected with salt tolerance as a consideration. In order to avoid creating a monoculture, seven species of plantings have been selected for the riparian buffer planting areas. Please see below for a list of characteristics for the proposed species.

- Buttonbush – *Cephalanthus occidentalis*

Buttonbush will be planted close to the stream edge, as it is listed as an obligate species (OBL) by the USDA and prefers a moist soil and can tolerate regular inundation.

- Salt Tolerant: Yes
- Inundation Tolerance: 0'-3'
- Average Height: 3'-10'
- Average Width: 3'-6'
- Soil Moisture Tolerant: Wet to Moist. Will tolerate dry soils
- Sun/Shade: Full Sun to Partial Shade
- Commercially Available: Yes
- Wildlife Value: High.
- Wildlife Uses: Seeds, Nectar and Nesting
- Attracts birds and butterflies

- Red Chokeberry – *Aronia arbutifolia*

Red Chokeberry will be planted in a front and middle zone, as it is listed as a Facultative Wet (FACW) by the USDA and prefers a moist soil and can tolerate seasonal inundation.

- Salt Tolerant: Yes
- Inundation Tolerance: Seasonal
- Average Height: 6'-8'
- Average Width: 3'-4'
- Soil Moisture Tolerant: Moist. Will tolerate Wet soils
- Sun/Shade: Full Sun to Partial Shade
- Commercially Available: Yes
- Wildlife Value: Moderate
- Wildlife Uses: Seeds and Nesting
- Attracts Songbirds

- Black Chokeberry – *Aronia melanocarpa*

Black Chokeberry will be planted in the highest zone, as it is listed as a Facultative (FAC) by the USDA and prefers a moist soil.

- Salt Tolerant: Yes

- Inundation Tolerance: Seasonal
- Average Height: 3'-6'
- Average Width: 3'-6'
- Soil Moisture Toleration: Moist. Will tolerate Wet soils
- Sun/Shade: Full Sun to Partial Shade
- Commercially Available: Yes
- Wildlife Value: Moderate
- Wildlife Uses: Seeds and Nesting
- Attracts Songbirds

- Flowering Dogwood – *Cornus Florida*

Flowering Dogwood will be planted in the highest zone, to provide shading and cover to the buffer area.

- Salt Tolerant: No
- Inundation Tolerance: None
- Average Height: 15'-30'
- Average Width: 15'-30'
- Soil Moisture Toleration: Medium Moisture
- Sun/Shade: Full Sun to Partial Shade
- Commercially Available: Yes
- Wildlife Value: Moderate
- Wildlife Uses: Seeds and Nesting
- Attracts Songbirds and Butterflies

- Bayberry – *Myrica pensylvanica*

Bayberry will be planted in a front and middle zone, as it is tolerant of wet soils

- Salt Tolerant: No
- Inundation Tolerance: Frequent
- Average Height: 5'-10'
- Average Width: 5'-10'
- Soil Moisture Toleration: Moist. Will tolerate wet soils
- Sun/Shade: Full Sun to Partial Shade
- Commercially Available: Yes
- Wildlife Value: Moderate
- Wildlife Uses: Seeds and Nesting
- Attracts Songbirds

- Highbush Cranberry – *Viburnum opulus*

Highbush Cranberry will be planted in a front and middle zone, as it is tolerant of wet soils

- Salt Tolerant: No
- Inundation Tolerance: Moderate

- Average Height: 8'-12'
- Average Width: 8'-12'
- Soil Moisture Toleration: Moderate
- Sun/Shade: Full Sun to Partial Shade
- Commercially Available: Yes
- Wildlife Value: Moderate
- Wildlife Uses: Seeds and Nesting
- Attracts Songbirds and Butterflies

The entire riparian buffer area will then be seeded with a riparian buffer seed mix (ERNMX-178) at a rate of at a rate of 20 lbs per acre. Per manufacturers' recommendations, a cover crop of grain rye at 30 lbs. per acre will also be planted. Stream locations are as follows:

RIPARIAN BUFFER UNT TO PINE CREEK- OFFSITE MITIGATION	
Right Descending Bank	3+26 to 5+77 (251 LF)

RIPARIAN BUFFER PINE CREEK- OFFSITE MITIGATION	
Left Descending Bank	5+48 to 9+79 (431 LF)

The planting areas will benefit 682 LF of stream channel downstream (to the property boundary and beyond) reducing bank erosion, the spread of invasive species downstream, reduction of associated sediment transport, pollutant removal from the impervious area runoff, increased habitat and bank stabilization from the new vegetative root systems.

B. Streambank Stabilization

Pine Creek and its Unnamed Tributary have limited bank vegetation and are also experiencing erosion. Continued erosion along Pine Creek could eventually threaten the stability of the adjacent baseball field. The near vertical streambanks will be regraded to a 2:1 slope. Historically, Pine Creek has experienced issues with streambank erosion and past watershed implementation plans have called for streambank stabilization as a measure to control Total Suspended Solids (TSS). Pine Creek will benefit from a lessened pollutant load as it already has a TMDL for sediment loading.

In the majority of areas, bare roots are exposed within the banks of the streams. Pyramat erosion control blanketing will provide stabilization through protecting vegetated root systems, thereby decreasing downstream sediment load and increasing the value and function of the existing streams. Red and Black Chokeberry will be planted on the stream bank on 3' centers for added erosion protection.

Stream locations are as follows:

STREAMBANK STABILIZATION	
PINE CREEK- OFF SITE MITIGATION	
Left Descending Bank	Section 1: 5+43 to 9+72 (429 LF) Section 2: 14+21 to 19+03 (482 LF)
UNT TO PINE CREEK- OFFSITE MITIGATION	
Left Descending Bank	Section 1: 3+32 to 5+87 (255 LF)

Approximately 1,166 LF of the existing stream channels is adjacent to the proposed bank planting areas.

The stabilization areas will benefit over 1,166 LF of stream channel downstream (to the property boundary and beyond) reducing bank erosion and associated sediment transport, pollutant removal, increased habitat and bank stabilization from the new vegetative root systems

C. In-Stream Enhancement Structures

The stream enhancement structures will consist of half log structures, j-hook structures, sawtooth deflectors, rock cross vanes and boulder placement within the stream channel. On site materials may be used to construct these mitigation structures. Pine Creek is a trout stocked stream and the proposed instream structures were chosen from PA Fish and Boat “Habitat Improvement for Trout Streams” guidance. Additionally, local trout fishing and conservation groups will be consulted during construction of the features. Stream locations are as shown below:

IN-STREAM STRUCTURES	
PINE CREEK- OFFSITE MITIGATION	
SAWTOOTH DEFLECTORS	
Left Descending Bank	Section 1: 5+47 to 9+69 (422 LF)
J-HOOKS	
Left Descending Bank	Section 1: 10+47 to 13+74 (327 LF)
ROCK CROSS VANES	
Left Descending Bank	Section 1: 14+88 to 15+25 (37 LF) Section 2: 19+00 to 19+47 (47 LF)
HALF LOG STRUCTURES	
Left Descending Bank	Section 1: 14+67 to 14+78 (11 LF) Section 2: 16+14 to 17+00 (86 LF) Section 3: 17+81 to 19+00 (119 LF) Section 4: 19+47 to 19+72 (25 LF)
BOULDER PLACEMENT	
Left Descending Bank	Section 1: 15+30 to 15+91 (61 LF) Section 2: 17+09 to 17+87 (78 LF)

Placement of in-stream structures will benefit 1,213 LF of stream channel downstream (to the property boundary and beyond) reducing bank erosion by deflecting flow away from the banks and will provide aquatic species habitat and shelter in areas of the stream lacking these areas.

MITIGATION SUMMARY

MITIGATION TOTALS		ACOE MITIGATION RATIO MITIGATION PROVIDED:IMPACTS (EPHEMERAL NOT INCLUDED)	PADEP MITIGATION RATIO MITIGATION PROVIDED:IMPACTS (EPHEMERAL INCLUDED)
Onsite Mitigation	3,253 LF	2.3:1	2.0:1
Offsite Mitigation	3,061 LF		
TOTAL	6,314 LF		

MITIGATION TOTALS		ACOE MITIGATION RATIO MITIGATION TYPE:IMPACTS (EPHEMERAL NOT INCLUDED)	PADEP MITIGATION RATIO MITIGATION TYPE: IMPACTS (EPHEMERAL INCLUDED)
Restoration Mitigation	4,419 LF	1.6:1 (70% of total mitigation)	1.4:1 (70% of total mitigation)
Enhancement Mitigation	1,895 LF	0.7:1 (30% of total mitigation)	0.6:1 (30% of total mitigation)
TOTAL	6,314 LF		

Restoration mitigation accounts for 70% of the total mitigation efforts.

7.0 SITE CONSTRUCTION SEQUENCE

The following construction sequence should be followed for construction of floodplain reconnection areas, riparian buffer areas and stream habitat enhancement structures:

On-Site Mitigation

1. Install Compost Filter Socks down slope of the work areas as shown on the Erosion and Sedimentation Control Plans and Details.
2. Remove existing vegetation from the areas of grading operations.
3. Grade areas of floodplain connection as shown on Sheet Nos MIT-1 and MIT-2.
4. Once grading in these areas is completed, seed the area as shown in the Mitigation Plans.
5. Stabilize any remaining disturbed areas with seed and straw mulch.

6. Once all disturbed areas have achieved a uniform 70% vegetative cover, cut open the remaining silt sock and spread the material evenly. Dispose of the outer silt sock wrapping in a PADEP approved manner. Seed and mulch any remaining disturbed area

Offsite Mitigation

1. Install Compost Filter Socks down slope of the work areas as shown on the Erosion and Sedimentation Control Plans and Details.
2. Install in stream structures from the bank or by hand where possible.
3. Remove existing vegetation from the areas of grading operations.
4. Grade areas of bank stabilization as shown on Sheet Nos OMIT-1 and OMIT-2.
5. Once grading in these areas is completed, seed the area as shown in the Mitigation Plans.
6. Install Riparian Buffer plantings as shown on the plans and details (OMIT-1 and OMIT 2) including any mulching, tethering or necessary protection.
7. Install construction fencing around the bank stabilization areas and riparian buffer areas. The construction fence should be of a natural color to match the existing features.
8. Stabilize any remaining disturbed areas with seed and straw mulch.
9. Once all disturbed areas have achieved a uniform 70% vegetative cover, cut open the remaining silt sock and spread the material evenly. Dispose of the outer silt sock wrapping in a PADEP approved manner. Seed and mulch any remaining disturbed area.

8.0 MAINTENANCE PLAN

Floodplain Reconnection Area/Riparian Buffer Areas

Maintenance of newly planted trees and vegetation is a critical process in the establishment of riparian buffers and floodplain construction. Deer browse damage, invasive plant species and competition by herbaceous plants and grasses are all concerns to the health of the newly constructed riparian buffers and floodplains. Watering, mulching, weed control and replacement of dead plant materials are all preventative measures to create successful mitigation areas.

Watering

Ideally, planting will occur in the spring or fall (preferably spring), so that the soil is already moist and to increase the likelihood of sufficient rainfall. As necessary, and where practical, deep regular watering will be performed throughout the first growing season.

Weeds and invasive plants limit buffer growth and survival of native plants; therefore, weeds and invasive plants should be controlled by either herbicide, mowing, or weed mats. These

techniques may need to be implemented after the first growing season and may need to continue further.

Mulching

During the initial planting season and as necessary during the establishment period, organic mulch will be used to help retain moisture in the underlying soil, reduce evaporation rates, control the temperature of the soil and provide a weed barrier around the plants. The areas around the plantings will be mulched with two to four inches with a coarse, shredded bark, compost, leaf mulch or wood chips mulch.

Deer and Other Animal Damage

The abundant deer population on this site may lead to damage from deer browsing. Plastic tube tree shelters will be utilized, and will be installed with a buried base to protect against voles, rabbits, etc. Where appropriate, plastic fencing will be used to discourage deer from entering the planted area.

Bank Stabilization

The bank stabilization areas will be monitored to ensure their success. If further erosion is evident during site inspections, the current permit holder shall be contacted and the areas repaired.

In-stream Structures

In-stream structures must be monitored in the spring and fall and after heavy flows to insure they have not become dislodged or damaged. If dislodged or damaged, the structure will be flagged and will be repaired as soon as possible.

9.0 MONITORING REQUIREMENTS / PERFORMANCE STANDARDS

9.1 Completion Inspection / Report

Upon completion of the construction of the mitigation features, a completion report will be required to use as a baseline for future monitoring. This completion report will include the following:

- As-built survey showing the constructed location of all mitigation features and plantings
- An assessment of vegetated cover (see Section 9.2 for monitoring requirements and procedures)
- Filing of the PASPGP-5 Self Compliance Certification form with the Army Corps of Engineers.

9.2 Monitoring Requirements

Monitoring of the Site's mitigation features will occur two times per year for the three years following construction of the mitigation features and annually for an additional 2 years (total of five years of monitoring).

9.2a Monitoring Plan -On Site Mitigation

A. Floodplain Reconnection Areas- ON SITE MITIGATION

The constructed floodplain reconnection areas will be monitored by examining the areas to ensure that all graded areas are stable with a minimum of 80% aerial coverage by herbaceous species and less than 10% aerial coverage by invasive / noxious species. Monitoring will be performed by walking a 1-meter wide transect through the created floodplain areas and recording observations on aerial coverage and composition of vegetation. Any invasive species shall be noted during inspection and removed per USDA approved practices. Geomorphology of the stream will be noted during site inspections. Berms or depositions in the floodplain that exceed 6 inches in height and block surface water communication with the floodplain shall be removed and regraded.

B. Riparian Buffer Areas- OFFSITE MITIGATION

All woody vegetation planted within the buffer areas must achieve a survival rate of 400 stems per acre. Survival rates can be calculated shown below:

400 stems per acre x acreage of planting area = number of living stems required.

Within each Forested Riparian Buffer area, two 10-meter diameter sampling plot areas will be established by driving a 60" long, 3/8" diameter section of rebar into the ground (leaving 36" exposed above the ground surface). A 4' long section of 1" diameter PVC pipe will then be fitted over the rebar and painted orange. One plot will be located in the upland section of each buffer, and one plot will be located in the floodplain section of each buffer. All planted woody vegetation within each sampling plot will be evaluated. Plant condition will be recorded and reported as alive, distressed or dead. Notes on the cause(s) of mortality will be taken. Salt tolerant species have been selected in the area. As the riparian buffer areas are located adjacent to the existing athletic fields and impervious areas, runoff to these areas will be inspected and noted to record any stressors that may be tributary from these areas.

A survival rate of 400 stems per acre for planted trees is an acceptable performance standard.

C. Bank Stabilization- ON SITE AND OFFSITE MITIGATION

The bank stabilization areas will be monitored to ensure their success. Bank slopes are to be repaired when they exceed a steepness of greater than 2:1. If erosion is evident during site inspections, the current permit holder shall be contacted and the areas repaired.

D. In-stream Structures -OFFSITE MITIGATION

In-stream structures must be monitored in the spring and fall and after heavy flows to insure they have not become dislodged or damaged. If dislodged or damaged, the structure will be flagged and will be repaired as soon as possible.

10.0 ADAPTIVE MANAGEMENT PLAN

Where monitoring identifies deficiencies in the established performance standards, an Adaptive Management Plan to address the deficiencies will be prepared and submitted to the agencies for review. Potential AMP strategies may include, but not be limited to the following

- A. Floodplain Reconnection Areas:** re-seeding /replanting of areas lacking aerial coverage by herbaceous species, and the physical and/or chemical removal of invasive and/or noxious plant species. Any flood damaged areas are to be returned to the original designed contours.
- B. Riparian Buffer Areas:** replanting of woody vegetation that failed to survive (transplant shock, drowning, etc.), and physical and or chemical removal of invasive and/or noxious woody plant species.
- C. Streambank Stabilization:** Replacement of any damaged pyramat areas; re-seeding of areas lacking aerial coverage by herbaceous species, and the physical and/or chemical removal of invasive and/or noxious plant species. Any flood damaged areas are to be returned to the original designed contours.
- D. In-Stream Structures:** Any flood damaged areas are to be returned to the original design.

11.0 LONG TERM PROTECTION OF COMPENSATORY MITIGATION

The riparian buffer areas and planting areas will be protected in perpetuity through the recording of a Deed Restriction. The sample Deed Restriction and language are attached in Appendix C.

12.0 FINANCIAL ASSURANCES

A letter of credit will be provided for the required financial assurances.