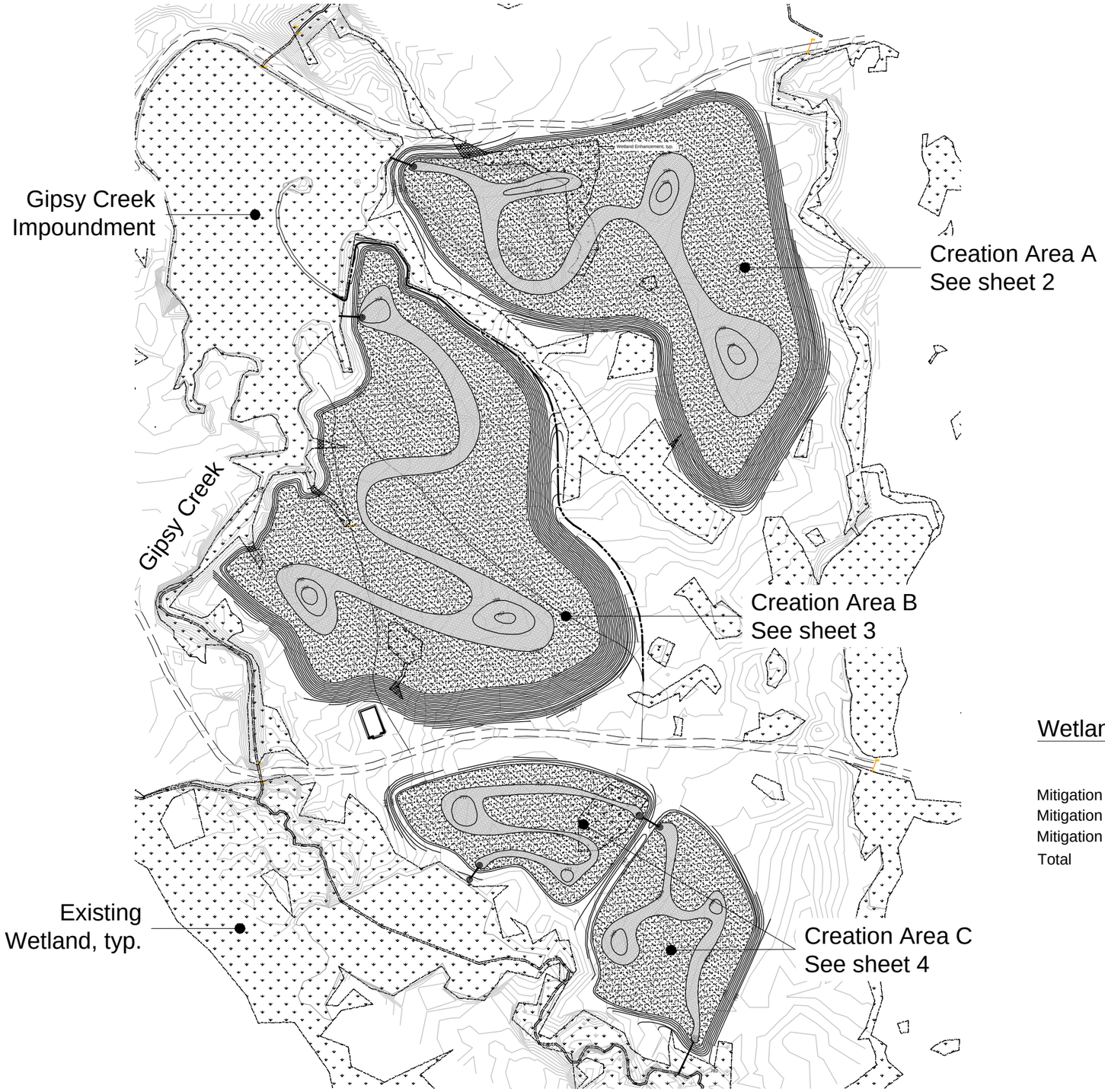

Overall Mitigation Plan

Wetland Creation Summary

	Total Area(ac.)	Wetland Mitigation Forested	Wetland Mitigation Emergent	Existing Wetland Enhancement	Existing Wetland Impact
Mitigation Area A	5.5	4.2	0.9	0.40	0.02
Mitigation Area B	6.5	5.2	1.2	0.10	0.02
Mitigation Area C	3.0	2.3	0.5	0.20	0.00
Total	15.0	11.7	2.6	0.70	0.04

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N
NORTH

Wetland Mitigation Plan For:
Orvana Resources US Corp.
MDEQ File No. 12-27-0001-P
T-48N, R-44W, S-6 Gogebic County, Michigan

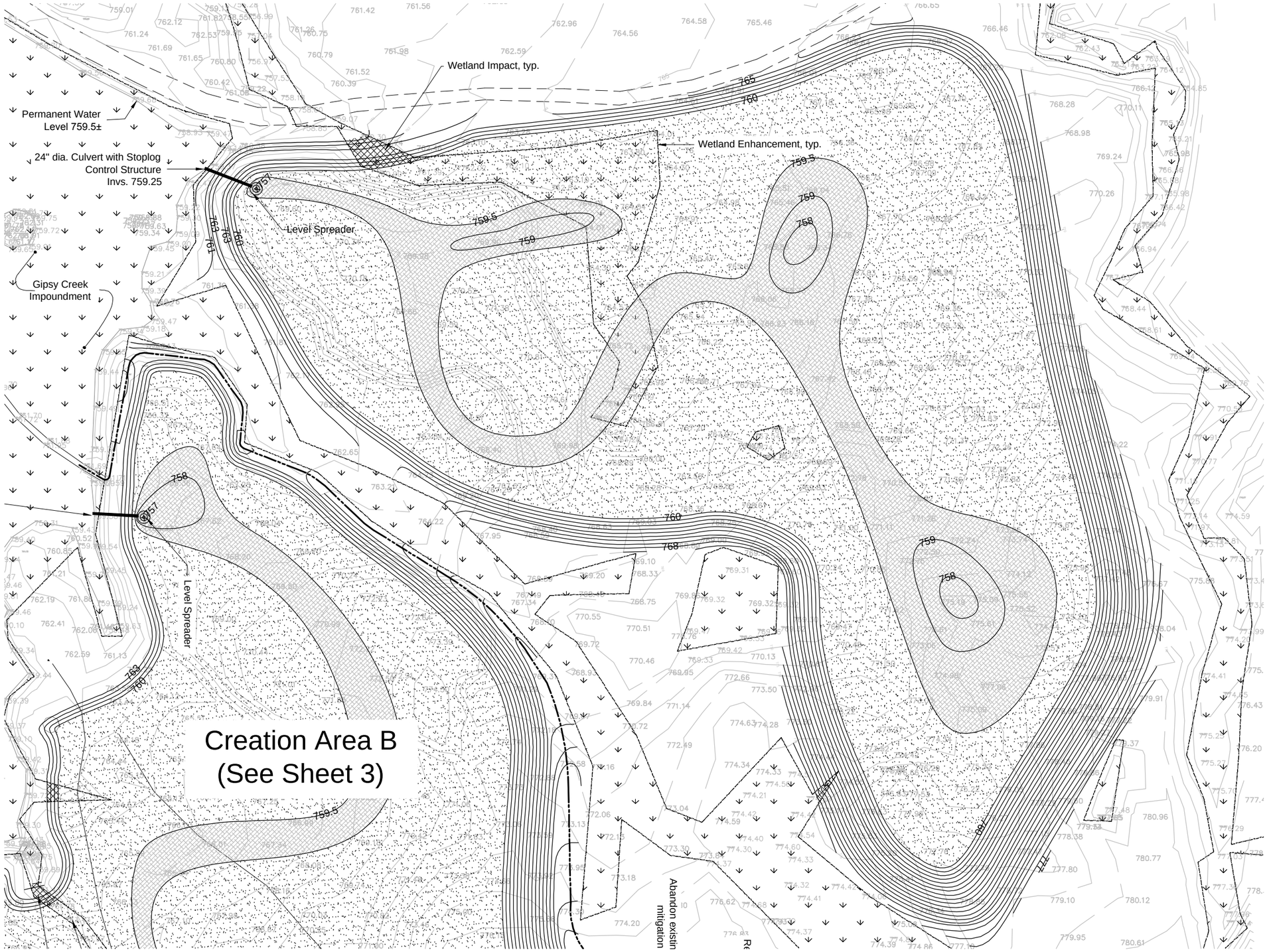
DATE:	ISSUED FOR:
10/12/12	Client Review
11/13/12	Agency Review

P.I.C.	JK
P.M.	JK
DESIGN	MSP
TECH.	MSP
CHECKED	WH

PROJECT NUMBER
12059

SHEET NAME
Overall Creation Areas

SHEET NUMBER
1



Grading and Planting Plan ~ Area A

0 40' 80'

Hatch Key

Forested Wetland Creation

Emergent Wetland Creation

See Sheet 5 for Seeding and Planting Lists

King & MacGregor Environmental Inc.
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N

NORTH

Wetland Mitigation Plan For:

Orvana Resources US Corp.

T-48N, R-44W, S-6 Gogebic County, Michigan

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TECH.	MSP
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PROJECT NUMBER
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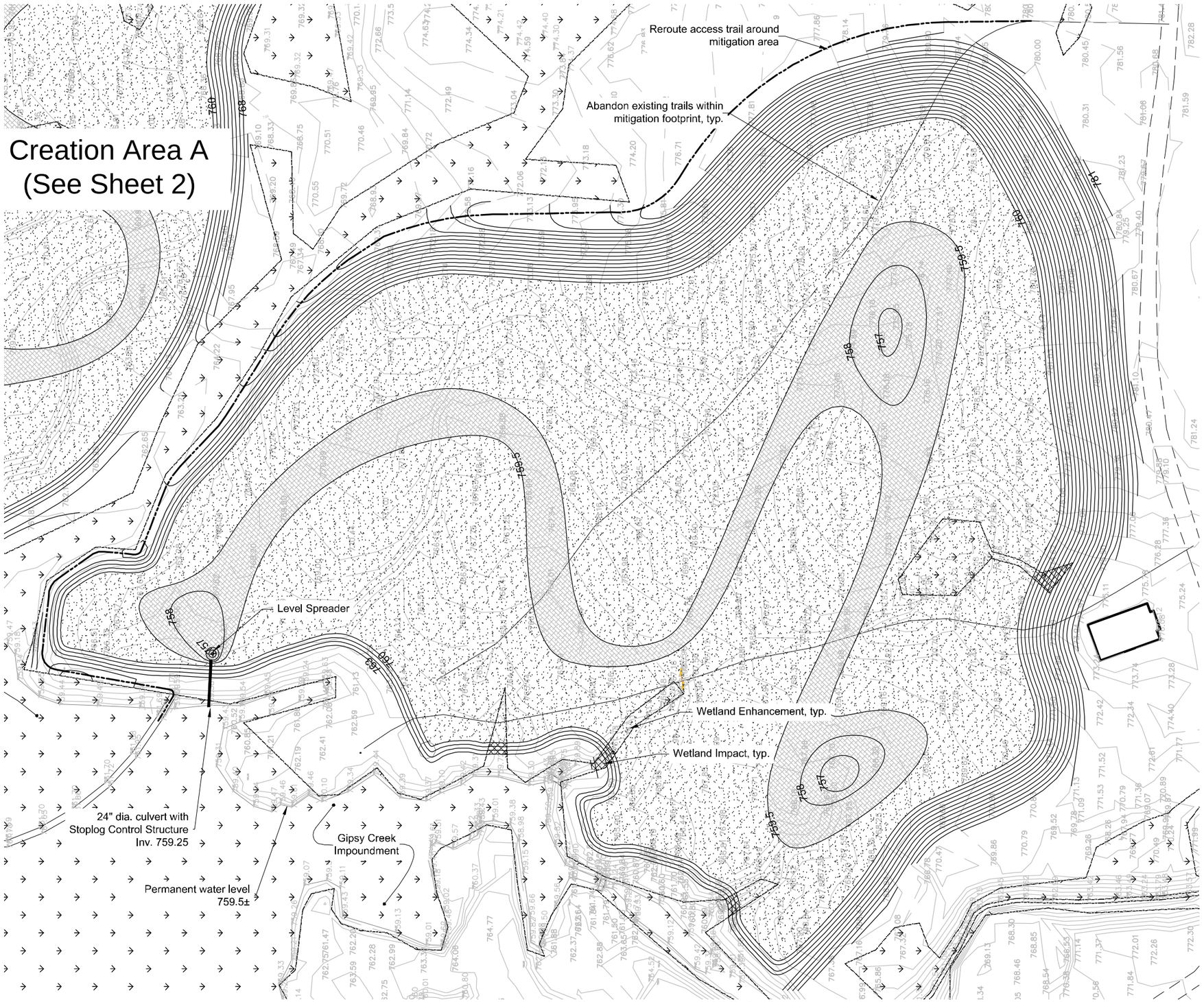
SHEET NAME
Creation Area A

SHEET NUMBER
2



Grading and Planting Plan ~ Area B

0 40' 80'

Hatch Key

Forested Wetland Creation

Emergent Wetland Creation

See Sheet 5 for Seeding and Planting Lists

King & MacGregor Environmental Inc.
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P.M.	JK
DESIGN	MSP
TECH.	MSP
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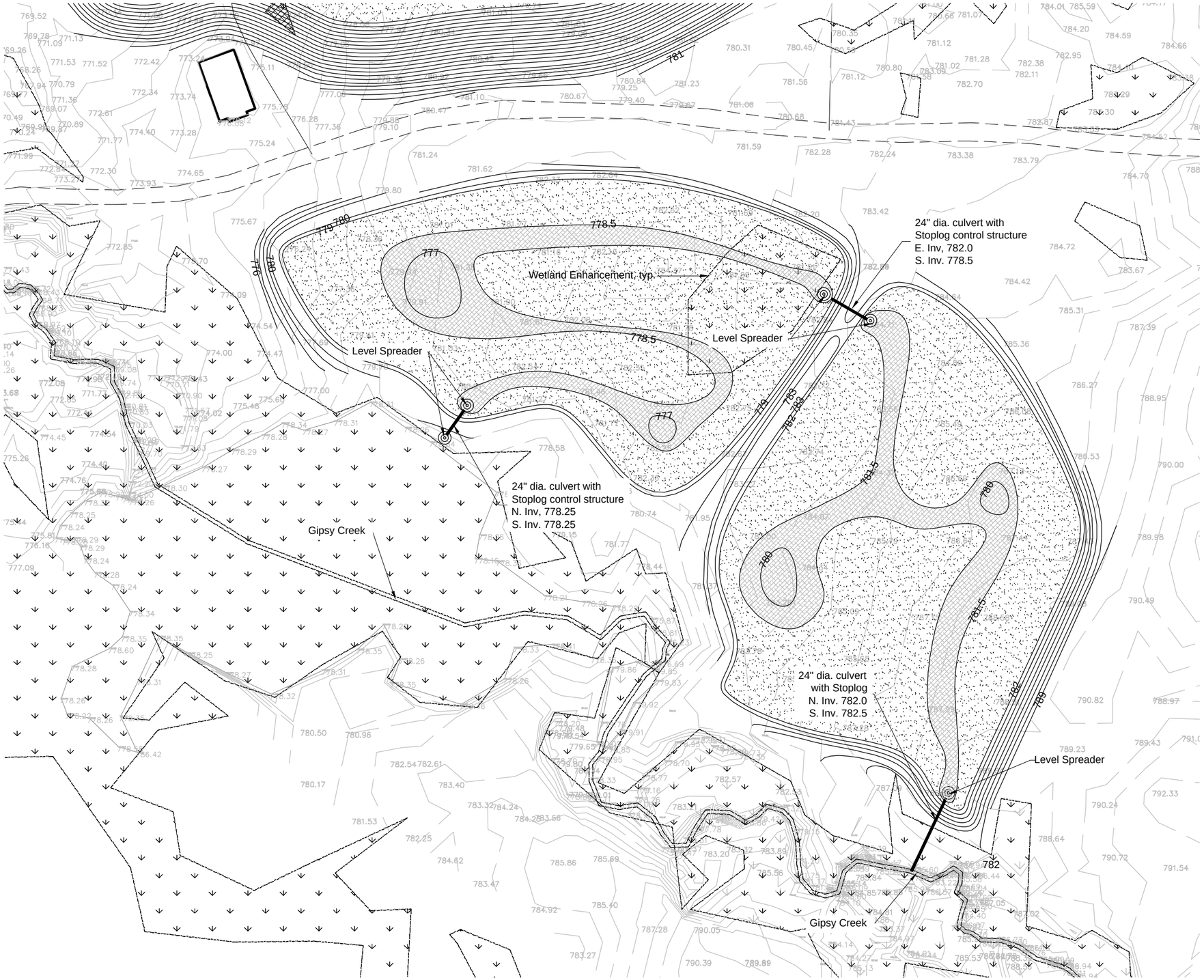
SHEET NAME
Creation Area B

SHEET NUMBER
3



Grading and Planting Plan ~ Area C

0 40' 80'

Hatch Key

Forested Wetland Creation

Emergent Wetland Creation

See Sheet 5 for Seeding and Planting Lists

King & MacGregor Environmental Inc.
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DESIGN	MSP
TECH.	MSP
CHECKED	WH

PROJECT NUMBER
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SHEET NAME
Creation Area C

SHEET NUMBER
4

TREES:

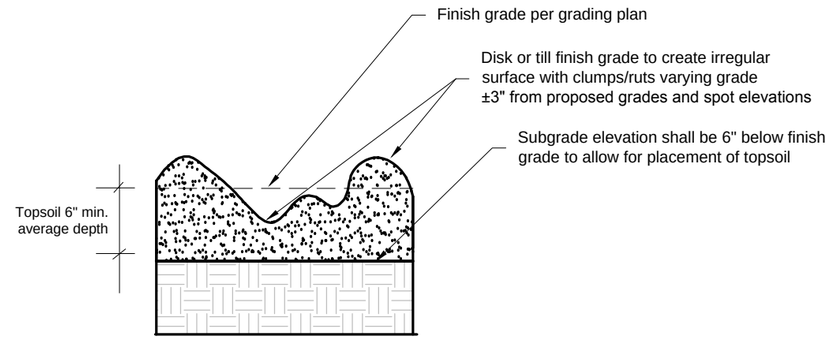
SPECIES	COMMON NAME	QUANTITY
Abies balsamea	Balsam Fir	
Acer rubrum	Red Maple	
Betula alleghaniensis	Yellow Birch	
Carpinus caroliniana	American Hornbeam	
Fraxinus pennsylvanica	Red Ash	
	TOTAL	450/ACRE TYP.

NOTES:
For trees: Trees to be bare root and minimum of 24" tall above root collar. Quantity of each species selected shall represent no less than 10% of the total number of trees installed. Species shall be evenly distributed throughout the forested wetland creation areas.

WETLAND SEED MIX:

SPECIES	COMMON NAME	RATE (LBS./AC.)
Alisma plantago	Common Water Plantain	4.6
Anemone canadensis	Canada Anemone	4.6
Asclepias incarnata	Swamp Milkweed	5.0
Bidens coronata	Northern Tickseed	4.6
Calamagrostis canadensis	Blue Joint Grass	6.0
Carex bebbii	Bebb's Sedge	2.0
Carex crinita	Fringe Sedge	2.0
Carex lacustris	Lake Sedge	3.0
Carex scoparia	Pointed Broom Sedge	3.5
Carex stipata	Awl-fruited Sedge	3.5
Carex tribuloides	Blunt Broom Sedge	4.0
Carex vulpinoidea	Fox Sedge	4.0
Cinna latifolia	Wood Reed Grass	2.0
Doellingeria umbellata	Flat-Topped Aster	4.6
Elymus canadensis	Canada Wild Rye	3.5
Elymus virginicus	Virginia Wild Rye	3.5
Eupatorium perfoliatum	Boneset	4.6
Eutrochium maculatum	Spotted Joe Pye Weed	5.0
Glyceria grandis	Manna Grass	2.0
Iris versicolor	Blue Flag	1.0
Juncus effusus	Soft Rush	3.5
Poa palustris	Fowl Meadow Grass	2.0
Pontederia cordata	Pickerel Weed	4.6
Scirpus atrovirens	Dark Green Rush	3.0
Schoenoplectus tabernaemontani	Soft Stem Bulrush	2.0
Scirpus cyperinus	Wool Grass	2.5
Scutellaria galericulata	Marsh Skullcap	4.6
Sparganium eurycarpum	Common Bur-Reed	4.6
Symphyotricum puniceum	Swamp Aster	4.5
	TOTAL	58.0

NOTES: Seed mix to be installed over all wetland creation areas.



Grading Detail

SCALE : NOT TO SCALE

Habitat Structures

Habitat structures to be placed at a rate of 6 per acre throughout the wetland creation areas representing a minimum of three of the following types:

TREE STUMPS:

Tree stumps to be installed horizontally within wetland areas. Stumps shall be a minimum of 10 feet in length (including root ball) and 24 inches in diameter at breast height (dbh). Stumps to be placed prior to the placement of topsoil.

WHOLE TREES:

Whole trees to be installed horizontally within wetland areas. Trees shall be a minimum of 20 feet long (including root ball) and 12 inches in diameter at breast height (dbh). Do not trim down fine structure of limbs. Trees to be placed prior to placement topsoil. At least 50% of entire structure shall extend 6 inches above projected high water level.

SNAGS:

Whole trees left standing that are dead, dying, live trees that will be flooded and die, or whole trees installed upright into the wetland. Trees shall be 20 feet high above ground surface and 12 inches in diameter at breast height (dbh). A variety of tree species shall be used. Snags to be in groups of tree and installed prior to placement of topsoil.

LOG PILES:

Logs of a variety of lengths and diameters piled in groups of three. Logs shall be a minimum of 15 feet in length and 12 inches in diameter. At least 50% of log pile shall be above projected high water level.

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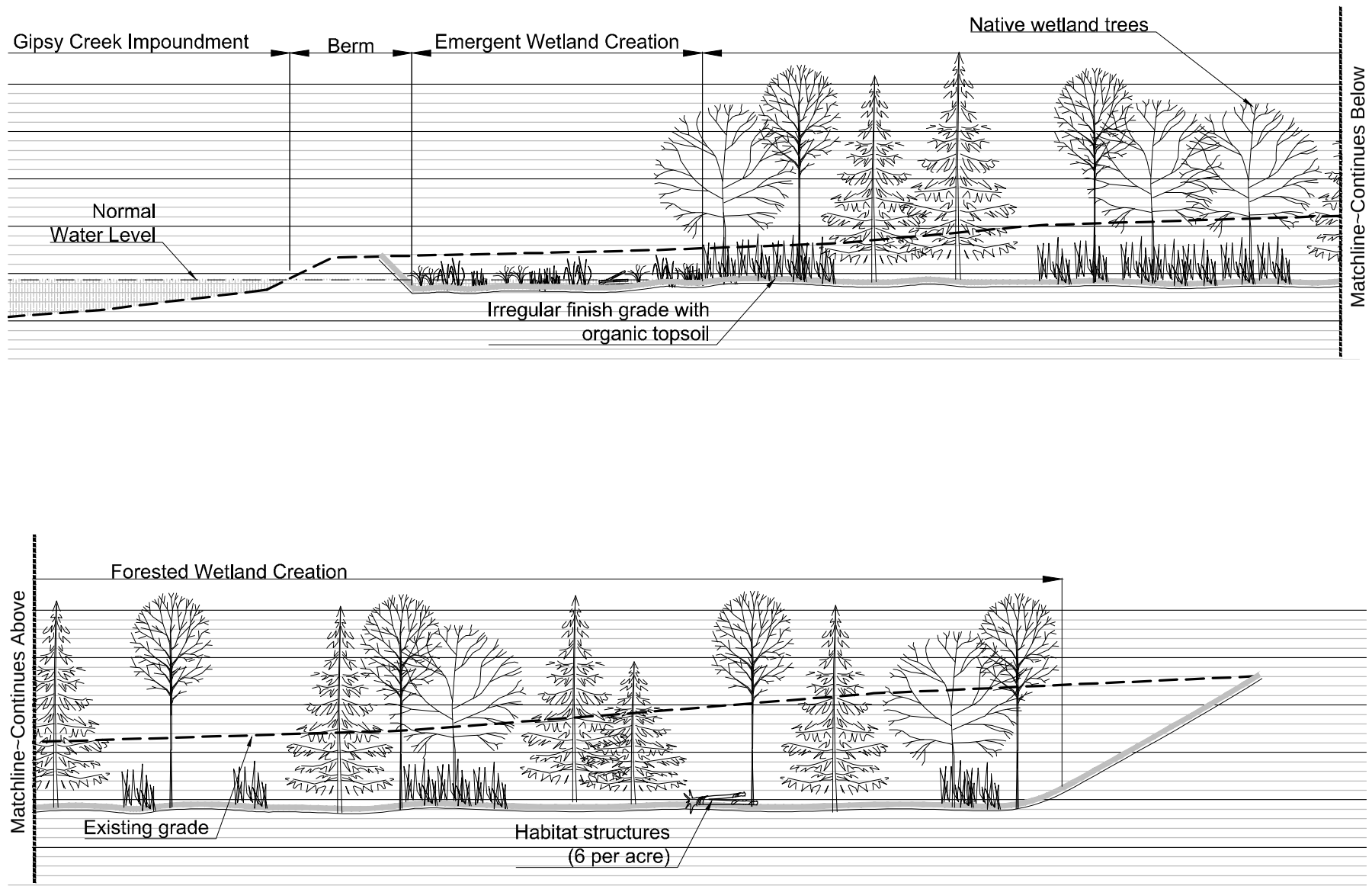
SHEET NAME
Details and Plant Lists

SHEET NUMBER
5



0 15' 30'

Horizontal

Typical Wetland Creation Section

0 7.5' 15'

Vertical

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SHEET NAME

Typical Wetland Creation Section

SHEET NUMBER

6